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COCKBURN COAST – AFFORDABLE HOUSING STRATEGY

Prepared for LandCorp
September 2012

HASSELL

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Executive Summary

The aim of this document is to identify strategies to guide the provision of affordable housing within the Cockburn Coast project in the City of Cockburn, through the Local Structure Planning process and other relevant mechanisms. The intention is to establish a project strategy that will assist to deliver a range of tenure types, where possible in perpetuity, and guide the location of potential sites for affordable housing.

A District Structure Plan (CCDSP Pt 1) for Cockburn Coast was endorsed by the Western Australian Planning Commission in September 2009. The CCDSP Pt 1 anticipated a residential population of approximately 10,000, and a dwelling yield of 4,850 across the whole Cockburn Coast project area, with a 'stretch' target of 20% (or approximately 970 units) being 'affordable'. This District Structure Plan was further refined by the District Structure Plan 2 (CCDSP Pt2) which sets new density targets resulting in an increased dwelling yield of 5193 dwellings but still seeks to achieve the stretch target of 20% affordable housing. As the planning for the area moves into greater levels of detail, it is necessary to ensure that the various objectives and targets of the CCDSP Pt 1 & 2 are carried through, where possible to implementation. This includes trying to achieve the 20% target for the provision of affordable housing and resulted in the preparation of this Affordable Housing Strategy.

In order to understand how to implement affordable 'product' across the Cockburn Coast project, it is important to first understand what constitutes 'Affordable Housing'. The definition of 'Affordable Housing' adopted by the Western Australian Planning Commission in the Cockburn Coast District Structure Plan 2009 and utilised by this strategy is:

"That which is accessible to low income households (the bottom 40% of income distribution) without spending more than 30% of the gross household income on housing costs."

As this definition is formulaic, it is necessary to determine the benchmark of a low income household. This is as set out in Table 1. It is noted that very low income households will be catered for through the social housing sector. Low to moderate income households will be the target market for affordable housing delivered by the private sector.

Table 1: Affordable Housing Benchmarks for Perth Statistical Division

	Very low- income householdw	Low-income household	Moderate-income household
Income Benchmark	<$655-$736 per week	<$984 per week	$984-$1,467 per week
Affordable Rental Benchmarks	<$197-$221 per week	<$296 per week	$296-$440 per week
Affordable Purchase Benchmarks	<$153,000 - $174,000	<$230,000 total	$230,000 - $345,000 total

Source: Judith Stubbs and Associates December 2010
Note: This table is to updated in conjunction with the release of new ABS data.

The basis, scope and methodology of this Affordable Housing Strategy has been developed following direct consultation with the City of Cockburn, the Department of Housing and the Department of Planning. The methodology includes in summary; a literature review, desktop research to identify relevant benchmarks, liaison with key government and private sector stakeholders, local market research, model development scenarios, and feasibility testing.

The research, literature review and scenario modelling undertaken identified a number of key elements which have guided and shaped the recommendations made as part of this strategy. These key outtakes include;

_The Judith Stubbs and Associates recommendation of a minimum 15% affordable rental and purchase accommodation in all new release and redevelopment areas is warranted, with 20% being considered as a reasonable 'stretch' target.

_State government policy does not support the mandatory provision of affordable housing.

Executive Summary

- Resultantly inclusionary zoning is not considered as an appropriate mechanism of implementation. In addition to Dwelling Density based initiatives are not considered relevant given the Residential Design Codes applied to the area.
- Plot Ratio Bonuses are considered to be most applicable and attractive as a mechanism for achieving affordable housing.
- The most successful methodology of achieving affordable housing will utilise a factor of mechanisms such as those listed by this report.
- Factors affecting the apartment market have directly impacted the viability of development sites and placed downward pressure on land values. The sustained withdrawal of credit availability for this sector and weak consumer demand has placed continued pressure on land values over the last 30 months. This in turn affects the attractiveness of affordable housing provision by the private sector.
- In considering the feasibility of plot ratio bonuses as a mechanism for achieving affordable product within the typologies proposed by the Cockburn Coast District Structure Plan Part 2, sites characterised by heights of 3 to 5 stories with a density coding of Residential R80 are considered the most feasible in today's market conditions.
- As a result of the study it is reasonable to make recommendations for mechanisms to achieve a 15% target for the provision of affordable housing (with 20% as a stretch target) utilising a number of the mechanisms outlined.

State Government can assist in the provision of affordable housing through public private partnerships, the provision of social housing, and utilising mechanisms such as plot ratio bonuses when developing state owned land. In considering that, it is likely government owned land may be sold prior to development occurring, there is an opportunity to ensure affordable product delivery by guaranteeing the provision of 15% affordable housing product by requiring its delivery as a condition of sale.

The private sector could assist in the provision of affordable product by utilising all mechanisms outlined. A combination of mechanisms is most likely to be successful and would require the commitment of the developer, local government and state government alike. It is likely that a sliding scale of plot ratio bonuses may provide the most attractive mechanisms in incentivising the private sector. Additionally, the strategy identifies fast tracked approvals, development conditions and development standard concessions as appropriate mechanisms for achieving affordable product.

The strategy also examines the role of statutory planning documents in providing the ability to implement the desired mechanisms for achieving affordable housing. As a result, local structure plans, detailed area plans and design guidelines will play a role in the provision of affordable product.

In summary, the targets as set by the CCDSP Pt 1 & 2for the delivery of 20% affordable housing product may be reasonable and indeed an achievable stretch target over the full life span of this project. Realistically, it could be expected that with the appropriate framework and guidance, 15% affordable housing product could be delivered through the Cockburn Coast project. It is perhaps obvious, but achieving this target will require the commitment of all stakeholders in the development industry, being the government and private sector alike. The delivery of affordable housing in the Cockburn Coast provides an opportunity to set a precedent in Western Australia, and for both the government and private sector to contribute to the creation of a diverse and vibrant coastal community.



Cockburn Coast WA_Imagery by HASSELL



Catherine Point Perspective, Cockburn Coast WA_Imagery by HASSELL

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Cockburn Coast Master Plan, WA_Imagery by HASSELL

1.0____Introduction

The strategy will assist in the delivery of a range of tenure types in perpetuity, and investigate the location of potential sites for affordable housing.

1.1 Aim

The aim of this document is to identify a strategy to guide provision of affordable housing within the Cockburn Coast project area within the City of Cockburn, through the Local Structure Planning process and other relevant mechanisms.

The intention is to establish a project strategy that will assist to deliver a range of tenure types, where possible in perpetuity and guide the location of potential sites for affordable housing.

1.2 Background

The former industrial area south of Fremantle now known as Cockburn Coast has been identified for urban renewal. Most of the former industrial activities have long since ceased, leaving approximately 330 hectares of underutilised land in close proximity to the infrastructure, amenities and services of the surrounding urban area. The creation of a high quality mixed use urban development within close proximity to Fremantle and a beautiful stretch of metropolitan coast would accommodate housing, employment and recreation opportunities for a significant number of people and contribute towards achieving population and employment targets identified in *Directions 2031 and Beyond*.

A District Structure Plan (DSP) for Cockburn Coast was endorsed by the Western Australian Planning Commission in September 2009. The DSP anticipated a residential population of approximately 10,000, and a dwelling yield of 4,850 across the whole Cockburn Coast project area, 20% (or approximately 970 units) of which should be 'affordable'.

As the biggest single landowner within the project area, LandCorp led the preparation of the Cockburn Coast master plan in consultation with landowners and key government agencies and stakeholders for the land south of Rollinson Road that resulted in some refinements to the detail of the 2009 DSP (refer to Figure 1). This master plan was subsequently advertised and its status as the prevailing guiding document for the land within the City of Cockburn was confirmed through adoption of Amendment 89 to City of Cockburn Town Planning Scheme No. 3. As a result, the master plan is now referred to as District Structure Plan Part 2. Because it identified the potential for a higher dwelling yield than anticipated by the DSP, with the possibility of 5,200 dwellings south of Rollinson Road, the resultant targets for affordable housing subsequently increased up to1,040 units within the City of Cockburn alone. No adjustment was made to population targets although clearly the potential exists for a larger total population if more dwellings can be achieved.

As planning moves into greater levels of detail, it is necessary to ensure that the various objectives and targets of the District Structure Plan are carried through to implementation. This includes targets for the provision of affordable housing. It is therefore important to understand the means by which the targets can most successfully be achieved within Cockburn Coast.

This strategy will assist LandCorp qand other agencies including Verve Energy, Western Power and the Western Australian Planning Commission to identify those aspects of affordable housing provision that it can directly influence, and those that will require interventions or other forms of control that are outside government agencyjurisdiction.

1.0____Introduction

1.3 Methodology

The basis, scope and methodology of this Affordable Housing Strategy has been developed following direct consltation with the City of Cockburn,the Department of Housing and the Department of Planning. As a result, it was developed that to identify suitable mechanisms and locations for delivering affordable housing targets within Cockburn Coast, the following methodology was followed:

_Literature review of key documents discussing housing affordability issues relevant to Cockburn Coast

_Desktop research to identify relevant benchmarks for possible applicability to Cockburn Coast through a review of relevant affordable housing case studies

_Liaison with key Government and private sector stakeholders to determine drivers and aspirations

_Local market research to determine local land valuations and construction costs

_Model development scenarios to determine likely development costs and developer margins for housing provision within Cockburn Coast

_Test development feasibility on a mixture of notional LandCorp owned and privately owned sites

_Based on this information, make recommendations as to appropriate strategies for application within the Cockburn Coast project area.

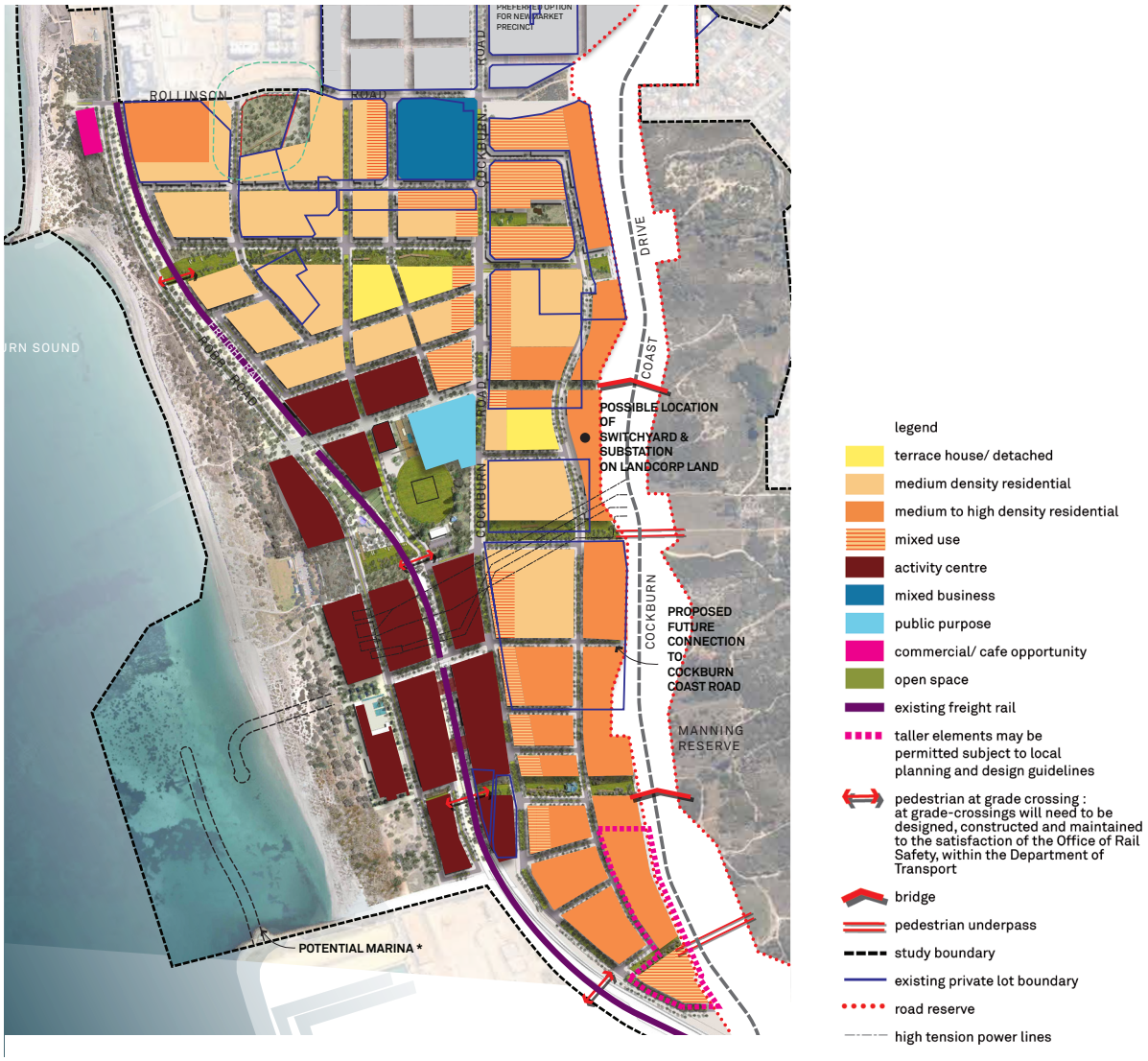


Figure 1_District Structure Plan Part 2

2.0____Affordable Housing

2.1 What is Affordable Housing?

There have been many attempts to define what is meant by the term 'affordable housing'. The definition adopted by LandCorp in its *Affordable Communities Policy* is:

> *"_ 75 percent of the median value for a property of that type in that area, or affordable by a household on a moderate income (80% to 120% of median income)."*

The definition that has been adopted by the Western Australian Government in its *Affordable Housing Strategy 2010 – 2020: Opening Doors to Affordable Housing* is:

> *"...dwellings which households on low-to-moderate incomes can afford, while meeting other essential living costs. It includes public housing, not-for-profit housing, other subsidised housing under the National Rental Affordability Scheme together with private rental and home ownership options for those immediately outside the subsidised social housing system."*

The definition adopted by the Western Australian Planning Commission in the *Cockburn Coast District Structure Plan 2009* is:

> *"that which is accessible to low income households (the bottom 40% of income distribution) without spending more than 30% of the gross household income on housing costs."*

It is important that a definition is agreed that can be formula-based so it can be measured. As affordable housing targets for Cockburn Coast arise from the Structure Plan, it is this last definition that has been adopted for the purposes of this strategy.

For the definition to be useful, it is necessary to benchmark both household income levels and the cost of both rental and purchase housing. This has been done for the Perth Statistical Division, within which Cockburn Coast is located, based on 2006 ABS Census data indexed to 2010 dollars, in the following table.

	Very low- income household	Low-income household	Moderate-income household
Income Benchmark	<$655-$736 per week	<$984 per week	$984-$1,467 per week
Affordable Rental Benchmarks	<$197-$221 per week	<$296 per week	$296-$440 per week
Affordable Purchase Benchmarks	<$153,000 - $174,000	<$230,000 total	$230,000 - $345,000 total

Source: Judith Stubbs and Associates December 2010
Note: This table is to updated in conjunction with the release of new ABS data.
Table 2: Affordable Housing Benchmarks for Perth Statistical Division

2.0____Affordable Housing

Project objectives relating to diverse social mix are unlikely to be delivered if no effort is taken to influence normal market forces.

Very low income households will be catered for through the social housing sector. Low to moderate income households will be the target market for affordable housing delivered by the private sector.

2.2 Types of Affordable Housing

Judith Stubbs and Associates (2010) identified and defined types of affordable housing most relevant to the Western Australian market in the following broad categories:

Affordable Rental Accommodation	Affordable Purchase Accommodation
Public Housing	Rent-to-Buy
Community Housing	Shared-Equity
Co-operative Housing	Property Covenants
Discount Market Rental Housing	Land Trusts
Time Limited Affordable Rental	Assisted Purchase

Low cost housing - housing that is available through the market but is cheaper due to cheaper construction materials or methods, or smaller size or amenity standards - might in some circumstances also be considered 'affordable' if it meets the income and price benchmarks identified in Table 1. However it is not the prime focus of this strategy.

2.3 Why Affordable Housing is Important

Households are generally considered to be in 'housing stress' when more than 30% of gross household income is spent on housing costs. If more than 50% is spent on housing, the household is considered to be in 'severe housing stress'. Without access to affordable housing that is suited to their needs, individuals and families are more likely to suffer increased levels of financial and personal stress and find it difficult to access other opportunities in life. Ultimately, society as a whole will feel the affect of this through increased levels of social dysfunction and economic under-achievement. (Stubbs, 2010)

In Western Australia, housing affordability has been steadily declining. The *Affordable Housing Strategy 2010 – 2020* notes that in May 2000 a Perth household on the median income of $40,700 pa could buy a home for 3.9 times their annual income, but by September 2010 a household on the median income of $73,300 pa needed 6.5 times their annual income to purchase a similar home. This ability to pay relates to the cost of finance; a further issue is the ability to save for the necessary deposit to qualify for a loan.

The evidence that housing – both rental and purchase - is less affordable than ever has been well documented elsewhere, and is not repeated in this report. For example, refer to the *Affordable Housing Strategy 2010 – 2020,* and the National Housing Supply Council's *State of Supply Report 2011.*

The implications of the lack of affordable housing are already being felt in some sectors of the economy, with some employers unable to attract or retain staff because there is no suitable and affordable accommodation within close proximity to the workplace. This is particularly the case for

2.0____Affordable Housing

so-called 'key workers', who are generally modestly paid but provide basic and essential services required for thriving communities (eg: police, teachers, nurses, fire fighters, ambulance officers, hospitality workers).

Based on the price of land and housing realised in other comparable redevelopment projects, new dwellings within Cockburn Coast, with its prime coastal location, are unlikely to be affordable to those in low to moderate income brackets. **Project objectives relating to achieving a diverse social mix are therefore unlikely to be delivered if no effort is taken to influence normal market forces.**

2.4 Affordable Living

Related to and expanding upon the concept of affordable housing is that of affordable living. Affordable living is a term used to describe the factors in addition to the cost of renting or purchasing housing, that affect household expenditure.

In addition to the direct cost of housing (rent or mortgage repayments), factors such as the cost of transport and access to employment, education, health, shopoping, recreation and other opportunities are closely linked to the location of housing. For this reason, cheap housing on the urban fringes will not necessarily help a household's financial position if, for example, it requires them to bear the expense of owning and running multiple private vehicles in order for its members to get to work and thus maintain their income. Thus the most socially disadvantaged households may be even worse off financially and socially if their housing is poorly located.

LandCorp has recognised this in their 'Affordable Communities' policy (undated). in relation to affordable living considers the wider issues of affordable housing particularly access to services, transport and employment, which includes amenity quality, economic opportunities and transport equity.

Where appropriate, LandCorp will make provision to develop affordable living by facilitating the development of affordable housing located close to, or within easy access to shopping centres, public open space, employment, transport and government and community services.



01_



02_

01_ Residential_3 stories
02_ Residential_2 stories

3.0____Literature Review

3.1 Overview

There is a growing body of literature relating to the subject of affordable housing. The intenion here is not to attempt a comprehensive review of the subject, but rather to acknowledge the key documents of relevance to the consideration of affordable housing in the Cockburn Coast project area.

The documents outlined in this section are:

_Cockburn Coast District Structure Plan, Parts 1 and 2
_City of Cockburn Town Planning Scheme No. 3
_Achieving Affordable and Diverse Housing in Regeneration Areas in Western Australia
_State Affordable Housing Strategy

3.2 Cockburn Coast District Structure Plan Parts 1 and 2

The *Cockburn Coast District Structure Plan* (CCDSP) consists of the plan adopted by the Western Australian Planning Commission in September 2009 for the whole project area, and a second report, known as the *Cockburn Coast District Structure Plan Part 2* (CCDSP Pt 2), which was commissioned by LandCorp for the part of the project area within the City of Cockburn, which was formerly zoned 'Industrial' in the Metropolitan Region Scheme and the City of Cockburn Town Planning Scheme No. 3.

CCDPS Pt 2 is a refinement of the earlier report, responding to a more detailed examination of various elements of the plan. It does not supersede the objectives or targets outlined in the earlier document. However, because of some adjustments to the design it does identify an opportunity to achieve a higher dwelling yield than anticipated by the September 2009 report.

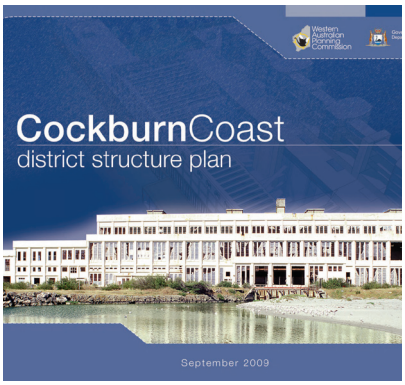
Housing Targets

The CCDSP seeks a community with a diversity of demographics, income and household types. This diversity will contribute to the sustainability of the community and the vibrancy, energy and activity of the place. To achieve this, the CCDSP aims to achieve:

_a range of sustainable housing types that match Perth's changing demographics and provide alternatives to the majority of existing single dwelling housing stock available in the broader area
_a diversity of built form, dwelling types and sizes, attracting a mix of demographics and lifestyles
_increased densities focussed on the bus rapid transit system, improving accessibility for a wide range of new residents
_an affordable housing target to enable representation of people in lower income brackets

On this basis, the CCDSP set the following targets relating to housing, based on yield estimates:

_Minimum 3% separate houses (single dwellings)
_Minimum 22% terrace or row houses
_Minimum 33% low-rise apartments (3 to 5 storeys)



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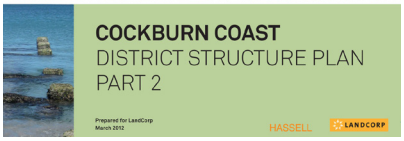

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01_ District Structure Plan September 2009
02_ District Structure Plan Part 2

3.0____Literature Review

_Minimum 31% medium to high-rise apartments (6 to 8 storeys and over 8 storeys respectively)
_Minimum 20% affordable housing
_Minimum 20% adaptable buildings (dwellings that are adaptable to changing demographics with the ability to transition over time)
_15% of homes need to be 'family homes' (suitable for accommodating families - assume 3 or more bedrooms)

Social housing is low income rental housing provided by Department of Housing or another community housing provider at a subsidy so that not more than 30% of household income is spent on rent. Social Housing is a sub-set of affordable housing, ie: part of the 20% affordable housing target. The actual proportion of housing that will be social housing is likely to be negotiated depending upon the partners involved (eg: Department of Housing, community housing provider, private developer) but could be in the order of a third of the affordable housing component, or up to 6% of all housing. This compares with approximately 10% of all housing that would typically be targetted in a standard (low density) residential subdivision.

'Adaptable Housing' is that which accommodates lifestyle changes without the need to demolish or substantially modify the existing structure and services. It is an extension of the concept of 'Universal Housing', being easily adapted to become 'universally accessible' when required.

With sufficient foresight at the design stage, multiple storey houses and apartments can all be suitable for adaptation.

This strategy is concerned with affordable housing, however in implementing the strategy, regard will have to be given not just to achieving affordable housing product, but to achieving it across a range of housing types in order to ensure that the product available suits a range of lifestyles and household types.

It should be noted, that the 20% affordable housing target as set by the District Structure Plan Part 2 was based on little rigor or justificatin amd was set as an ambitious target. It was anticiapted by DSP2, that as the project progressed a more detailed examanitation would be undertaken into the rationale for affordable housing for the Cockburn Coast, including such targets, culminating in the comissioning of the Judith Stubbs report on Affordable Housing (as exmamined in section 3.4 of this report) and this Affordable Housing Strategy.

Table 2 shows the target number of dwellings in each of the categories above if an exact mirror of the overall housing mix target were to be applied to the affordable housing product target using the CCDSP dwelling yield estimates. Note that totals in the table are greater than the estimated total number of dwellings, because the dwelling types are not mutually exclusive (for example, a dwelling might be a detached, adaptable family home, or an adaptable, affordable apartment in a low rise building).

3.0____Literature Review

Dwelling Type	CCDSP	
	No. Dwellings	No. Affordable Dwellings
All Dwellings	4,850	970
Detached single dwellings (3%)	146	29
Terrace or row house (22%)	1,067	213
Low-rise apartments (33%)	1,601	320
Medium to high-rise apartments (31%)	1,504	301
Adaptable housing (20%)	970	194
Family homes (15%)	728	146
Social Housing (6%)	291	291

Table 3: Indicative Dwelling Mix based on CCDSP

CCDSP Pt 2 subsequently revised the target dwelling mix, aiming to maximise yield, breaking housing down as follows:

_High rise 25%
_Medium rise 11.6%
_Low rise 31.6%
_Terraces 1.1%
_Mixed use 11.3%
_Activity centre 19.4%

Mixed Use and Activity Centre housing refers to housing that will be developed within these use areas, as defined in Figure 1. They will almost certainly take the form of apartments.

Detached single dwellings were removed as a housing typology, because there is a significant amount of this typology availabe in the immediate vicinity of Cockburn Coast, and it is very difficult to maximise yield using this form.

Because CCDSP Pt 2 is silent on adaptable and ‘family’ housing, the targets from the original CCDSP remain.

On the same basis as for Table 2, Table 3 estimates the number of dwellings that could be expected if affordable housing were to be equally apportioned across all housing types.

3.0____Literature Review

Dwelling Type	CCDSP Pt 2	
	No. Dwellings	No. Affordable Dwellings
All Dwellings	5,200	1,040
Terrace or row house (1.1%)	57	11
Low-rise apartments (31.6%)	1,643	329
Medium to high-rise apartments (11.6%)	603	121
Adaptable housing (20%)	1,040	208
Family homes (15%)	780	156
Social Housing (5%)	260	260

Table 4: Indicative Dwelling Mix based on CCDSP Pt 2

It is noted that there has been a context shift in the dwelling mix from CCDSP Pt 1 to CCDSP Pt 2. This is a reflection of the refinement of detailed planning in keeping with principles of Directions 2031 and Beyond (WAPC, 2010) and the updated assessment of the opportunity precented by the Cockburn Coast.

In reality, the demand for affordable housing in Cockburn Coast is likely to require a different mix from that indicated above; for example it is unlikely that there would be many, if any 'affordable' terrace or row houses, because these will be very high value product and relatively scarce in this location.

The demographic profile of population qualifying for 'affordable' housing product in this location is likely to vary according to economic conditions, so it would be desirable if this could be monitored by the State Government in order that affordable housing developments can appropriately respond to demand. In the meantime, the targets indicated above can be used as a guide.

3.3 City of Cockburn Town Planning Scheme No. 3

Zoning

Amendment No. 89 to City of Cockburn Town Planning Scheme No. 3 (TPS 3) rezoned the Cockburn Coast project area from 'Industry' and 'Light Industry' to 'Development', and included it within a new 'Development Area No. 33'.

The Development Area provisions set out the requirements for future Local Structure Plans and urban development in the area. The requirements seek to ensure the targets and objectives for the area are achieved. Provisions outline the considerable amount of detail that is expected to be resolved prior to subdivision and development being permitted, including matters such as building design, transport, sustainability, and affordable housing.

Subdivision and development within Cockburn Coast will be subject to the approval of Local Structure Plan/s, Design Guidelines and Detailed Area Plans. These are to be prepared having regard to District Structure Plan and District Structure Plan Part 2, noting that in the event of any discrepency between the two, the requirements of the District Structure Plan Part 2 will prevail.

3.0____Literature Review

10 This strategy is in response to the requirement of TPS 3 to describe how affordable housing can be addresssed in the Local Structure Plans.

Affordable Housing
With reference to Affordable Housing, the provisions of the Scheme relating to Development Area 33:

_include an objective "to encourage a diverse population that contributes to the interest and vitality of the Development Area by providing a genuine mix of dwelling types to cater for a range of living options"

_require subdivision and development applications to achieve at least 85% of the potential number of dwellings under the applicable R-Code as defined by an adopted Local Structure Plan, using the following per-dwelling site areas:

_R30 = 300sqm

_R40 = 220 sqm

_R50 = 180 sqm

_R60 = 180sqm

_R80 = 125 sqm

_R160 = 62.5 sqm

Note: These provisions were endorsed prior to the Multi Unit Housing Codes (Residential Design Codes Part 7 (Design elements for multiple dwellings in areas with a coding of R30 or greater and within mixed use development and activity centres)). As a result, the Local Structure Plan details that minimum and maximum yields should be calculated based on the Plot Ratios established by the relevant Local Structure Plan.

_require Local Structure Plans to address (inter alia) 'housing product and mix', how affordable housing targets set out in the CCDSP will be achieved, and how minimum dwelling targets will be met

This affordable housing strategy does not directly address the wider issue of overall housing mix and minimum dwelling targets. The District Structure Plan already provides high level targets for housing type mix, which will need to be translated into detailed planning of individual precincts. Affordable housing is inevitably a sub-set of all housing.

3.0___Literature Review

3.4 Achieving Affordable and Diverse Housing in Regeneration Areas in Western Australia

Overview

The Western Australian Planning Commission engaged Judith Stubbs and Associates (JSA) to examine what planning mechanisms and strategies may feasibly be used to achieve affordable and diverse housing within three case study areas, one of which was Cockburn Coast. The study, *Achieving Affordable and Diverse Housing in Regeneration Areas in Western Australia*, is an unpublished draft in two parts (December 2010 and April 2011), but provides important context and input to this strategy. This strategy does not attempt to replicate the investigations undertaken by JSA but rather uses them as a basis from which to evaluate the viability of options considered.

The JSA study was undertaken in three stages:

1. Profile of each redevelopment area, focussing on the question: *"If affordable housing were to be provided within, or associated with, the three redevelopment areas, for whom should it be provided and what are their housing needs in terms of price, tenure, type, size and any particular locational requirements?"*
2. Planning mechanisms and strategies for selected redevelopment areas, identifying "*feasible, legal, reasonable and equitable mechanisms for achieving affordable housing within or associated with each redevelopment area"*.
3. Overview and recommendations.

Cockburn Coast Affordable Housing Market

The JSA research indicated a range of groups likely to be excluded from affordable rental and purchase in Cockburn Coast if active steps are not taken to create such housing through appropriate mechanisms or strategies *either within the area or in association with it* (emphasis added).

Within the City of Cockburn (ie: that part of the Cockburn Coast project area that is the subject of this strategy), JSA notes that, based on data derived from the 2006 Census (the latest available):

_Low income households in purchasing stress are either families with children or single person households

_Moderate income households in purchasing stress are most likely to be couple households with children

_Low income households in rental stress are either families with children or single person households

_Moderate income households in rental stress are most likely to be working households with children and less likely to be single person households

3.0____Literature Review

The study states that the degree to which low and moderate income households will be excluded from Cockburn Coast will depend on:

1. whether the development has a similar amenity to South Fremantle
2. the type of stock provided

JSA consider that depending on the degree to which smaller medium density dwellings are provided in relatively low amenity areas in the eastern parts of the project area, Cockburn Coast is likely to provide access to a range of low and moderate income households, with the possible exception of families with children, noting that detached houses (most suitable and sought after by families with children) are available nearby in Hamilton Hill.

Except to the extent that social rental housing is provided, social housing tenants will be excluded from the development. The involvement of social housing providers in the project will therefore be important if this group is to be included.

Recommendations
JSA use the proportion of people currently experiencing housing stress in the Perth market as the basis for a recommendation that a minimum 15% affordable rental and purchase accommodation in all new release and redevelopment areas is warranted, and 20% as a stretch target.

Principally, three approaches are contemplated:

1. Raising of Funds via Development Scheme Contributions for Community Infrastructure
2. Market based mechanisms where developers are required to provide a proportion of dwellings as a prescribed type or tenure in the anticipation that, within that market, such low-cost dwellings would also be affordable. The proposal contemplates developers delivering up increased levels of profit due to rezoning or density bonuses or where profits are lower, compensation being paid to developers where mandatory mechanisms result in a loss of profits.
3. A mixture of 1 and 2 above through incentivisation of planning schemes enabling density bonuses supplemented by compensation, grants, tax abatements, partnering and joint ventures with both state and local governments and not-for-profit organisations.

To inform the development of this strategy, Colliers International prepared a synthesis of the ideas and measures in the JSA work and prepared a commentary on the principles concluded therein as they apply to medium and high density property development in the current market. Their report is included in Appendix A.

As will be discussed in section 8.2, some of the assumptions made by JSA, and hence the validity of some of the recommended mechanisms, are called into question when the reality of the Western Australian development industry is considered.

Notwithstanding these reservations, the work is a good overview of the issues and challenges of providing affordable housing.



01_

01_ Opening Doors report

3.0____Literature Review

3.5 Affordable Housing Strategy 2010-2020: Opening Doors to Affordable Housing

The State Government's affordable housing strategy (Opening Doors) was released in December 2010 via the Department of Housing. This is a landmark strategy that marks a repositioning of Government effort compared with past practice to:

_Work with markets and market mechanisms to help address the social and affordable housing needs of lower income households

_Share provision with the not-for-profit community sector

_Re-establish social housing as a *pathway rather than a destination* (emphasis added) by providing housing assistance to capable tenants for the duration of their need

_Create more support and options to help both tenants and applicants to move into mainstream housing

The stated goal is to increase the range of housing opportunities for those on low to moderate incomes, summarised as 'AAA':

_Available as and when needed

_Affordable for low to moderate income households

_Appropriate to the needs of individual circumstances

The strategy has an objective to achieve at least 20,000 additional affordable homes across the State by 2020.

Importantly, the strategy is a 'whole of government' one that seeks to engage more actively with the private and not-for-profit sectors to achieve greater access to appropriate housing for more people. It recognises that there is no single cause of and no single solution to 'the affordable housing crisis'.

Open Doors canvasses a range of strategies that combined would result in a significant shift in the way affordable housing is provided in WA.

In the context of providing a strategy for Cockburn Coast that can be applied through the planning process, the recommendations of Opening Doors relating to improving the supply of affordable dwellings outside the social housing system are particularly relevant. The first of these recommendations is the implementation of key planning system reforms. Significantly, the strategy notes that *"formal inclusionary zoning will not be supported"*. In other words, the strategy does not support the imposition of mandatory affordable housing provision on developers, instead preferring voluntary incentives.

The second set of strategies aimed at increasing affordable housing supply relate to leveraging the private sector, recognising that traditional solutions and an over-reliance on limited government funding will not be enough to deliver the diversity or the volume of affordable housing required.

Thirdly, the State Government willl leverage its own development activities to improve the supply and diverstiy of housing options. Government land and housing development agencies will dedicate a minimum of 15% of project yields to affordable price points. LandCorp's involvement in Cockburn Coast is a specific example of this. The Department of Housing will also pursue partnership opportunities with the private sector and local governments.

Finally, the strategy seeks to develop alternative tenures, such as 'land rent', community land trusts, leasehold strata, and perpetual shared equity schemes.



Cockburn Coast Perspective, WA_Imagery by HASSELL

4.0___Potential Mechanisms

Research did not find a single example of affordable housing delivery that did not rely on a Public Private Partnership.

4.1 Overview

The issue of affordable housing is topical thoughout the developed world, and jurisdictions everywhere are seeking ways to encourage its provision. Some mechanisms that have been adopted relate to the land use/planning regulatory system, and others have a broader basis. However it is by no means the case that mechanisms that have been adopted elsewhere are automatically transferrable into the Western Australian context.

Mechanisms can be broadly categorised as market based or off-market (JSA 2010). Market based mechanisms require a developer to provide dwellings of a prescribed type or tenure without requiring any further subsidy and on a cost-neutral basis for the developer. Off-market mechanisms include various types of inclusionary zoning, in which the developer is required to provide a proportion of the profit arising from the planning approvals process for affordable housing, with or without some form of off-set or compensation.

Research undertaken by Colliers (2012) failed to find a single example of private sector delievery of 'affordable' dwellings without some form of community or statutory support in the funding and delivery model. As prime coastal land it is unlikely that Cockburn Coast will be an exception.

This section provides a broad overview of the most widely applied mechanisms for encouraging affordable housing provision, and notes whether, on face value at least, they have possible application in Cockburn Coast, and under what circumstances.

4.2 Public Private Partnerships

The State Government's Affordable Housing Strategy identifies the private sector as having a key role in increasing the supply of affordable housing product. One way of doing this is through Public Private Partnerships (PPPs), which involve a contract between a public sector authority and a private party, in which the private party provides a project and assumes substantial financial, technical and operational risk in the project.

PPPs are increasingly being used to construct public facilities and infrastructure because they reduce the risk to Government and provide economic opportunities to the private sector. The private sector partner provides services such as design, construction and maintenance.

The effectiveness of PPPs for the provision of new affordable housing has not been extensively tested in Australia, although it has been used in the redevelopment or refurbishment of areas formerly dominated by public housing (eg: the Department of Housing 'New Living, programme).

It is noted that research undertaken by Austin 2008 (refer to Colliers 2012) did not find a single example of affordable housing delivery that did **not** rely on a PPP.

Key points to note:

_The effectiveness of PPPs for providing affordable housing in Western Australia has not been extensively tested

_Some form of PPP is likely to be required for any private sector involvement in affordable housing provision in Cockburn Coast

4.0 Potential Mechanisms

4.3 Shared equity schemes

Shared equity schemes allow consumers to obtain part equity in a home by sharing the overall cost with an equity partner - either a financial institution or a government backed provider (eg: Department of Housing through First Start).

The involvement of an equity partner helps to reduce the overall costs involved in a mortgage, and thus improves housing affordability. Two different models are:

- Individual equity model. This allows a household to enter into arrangements with an equity partner so as to reduce mortgage repayments and the size of the required deposit. At the time of resale, the partner recoups their equity loan plus a proportion of the capital gain. In some variants of this model household may have the opportunity to eventually gain full ownership by progressively buying out the equity partner.
- Community equity or subsidy retention model, which preserves ongoing affordability by limiting the resale value of properties through the use of a predetermined formula. This may require registration of a restrictive covenant on the property (refer to 4.4).

The Department of Housing operates shared equity schemes (First Start), where the government combines with a private lender and first-time home buyers to co-fund the home. This scheme has been very successful and has been used for both conventional detached housing and apartment housing.

The Department of Housing has indicated that it is likely to seek opportunities to be involved in Cockburn Coast, including possibly 10% (to be confirmed) shared equity schemes.

Key points to note:

- If there is no restriction applied, the first shared equity buyer has the capacity to eventually own 100% of the equity in the property and thereafer be able to sell it on the open market for market prices. This would effectively result in removing the property from the affordable 'pool' and potentially result in an increased profit margin.
- Shared equity schemes have so far been very popular when offered in Western Australia.

4.4 Planning System Controls

Planning controls are planning scheme provisions and policies that can be applied to proposed developments to require or encourage the provision of certain types of development.

Planning controls can only apply within the allowable jurisdiction of the planning authority, as defined by the Planning and Development Act (applicable in the case of Cockburn Coast). The responsible planning authority for Cockburn Coast is the City of Cockburn, along with the WAPC for certain classes of development and subdivision.

State Planning Policy 1 was prepared under the Planning and Development Act and through the *State Planning Framework (Variation 2)*, setting out the key principles to guide the way in which planning decisions are made. In effect it defines the scope of planning in Western Australia, identifying the various aims of planning, in pursuit of which planning controls can be formulated. The provision of affordable housing is not explicitly identified as one of the aims of planning, although it might be implied by extrapolating some of the other aims.

The absence of specific reference to the provision of affordable housing in SPP 1 has resulted in some ambiguity around the extent to which planning schemes and policies can incorporate controls relating to affordable housing. This has potentially guided the WAPC and State Affordable Housing Strategy away from the use of mandatory requirements for affordable housing. The matter of ambiguity is highlighted by Judith Stubbs and Associates (see 3.4) as being a likely impediment to the introduction of mandatory requirements for the provision of affordable housing into planning schemes in Western Australia.

Examples of planning controls that could be applied to affordable housing include:

- Inclusionary zoning
- Development standards
- Dwelling density
- Dwelling mix
- Plot ratio
- Design guidelines
- Developer contributions

These are discussed in the following paragraphs.

Key points to note:

- Overly onerous planning requirements can have the effect of limiting development by making it unviable or otherwise unattractive for a developer to proceed. Therefore, care must be exercised in formulating inflexible mandatory requirements in particular.

4.4.1 Inclusionary Zoning

Inclusionary zoning requires a certain percentage of dwellings in a development to be set aside as affordable product on either a compulsory or voluntary basis. For

4.0___Potential Mechanisms

voluntary provision, bonus density or floor area is offered as an incentive.

Affordable housing generated in this way may be required through a condition of approval to be permanently affordable, which can be achieved through a deed restriction such as a restrictive covenant (see 4.4).

As an alternative to the provision of on-site affordable units, the opportunity may be provided for a developer to build affordable units elsewhere in the community, or contribute to a fund used to build affordable housing (cash-in-lieu or developer contributions). Such alternatives would require a governance structure to guide administration.

An example of inclusionary policy is the Metropolitan Redevelopment Authority's (MRA's) Affordable and Diverse Housing Policy for the East Perth Redevelopment Area, which requires any development incorporating 10 or more dwellings to provide a minimum of 12% of dwellings as affordable housing for disposal as either social housing or affordable owner occupier housing. A 1:1 offset of floor space can be granted for every square metre of affordable floorspace provided within the development.

The affordable product is required to be sold to a nominated housing provider at cost upon completion of the development.

The MRA also administers a fund into which cash-in-lieu of the provision of affordable dwellings can be paid, for use by the Authority or a nominated housing provider for the purchase, provision or development of affordable housing elsewhere within the Redevelopment Area.

However it should be noted that the MRA operates under its own legislation, not the Planning and Development Act. Therefore it is not limited by perceived ambiguities or absence of reference to affordable housing in the Act and supporting policies such as SPP 1.

Key points to note:

_There is ambiguity about the ability to have mandatory inclusionary zoning provisions in planning schemes made under the Planning and Development Act, as it currently stands

_If mandatory, may affect development feasibility

_Developments under the nominated size threshold would not provide affordable units

_Incentives are typically only attractive to developers in 'up' market cycles

_Cash-in-lieu requires an equitable formula for calculating the amount owing

_Cash-in-lieu requires a special fund to be administered by the planning authority, and a governance structure around how and where the funds can be expended

_Cash-in-lieu schemes (traditionally most often used for car parking) require a strategy for how and where funds will be applied, in order to justify the requirement (ie: there is a nexus between the development and the demand created)

_Can only be applied within the area to which the planning instrument applies (ie: there would be limitations to where the funds could be expended)

_Ability to expend cash-in-lieu funds outside the Scheme Area would require some form of legislative amendment and accompanying governance structure

4.4.2 Development Standards

Development elements commonly dictated by the *Residential Design Codes* (State Planning Policy 3.1), planning schemes and/or design guidelines include building height, the amount of landscaping required, the amount of parking, site coverage, unit size, boundary setbacks, etc. Such standards are aimed to ensuring a minimum quality of development for the benefit of the whole community, however they can add to the cost of development and may adversely impact on the affordability of housing (and other land uses).

Concessions on development standards might be offered for affordable housing. The most common concession granted is the number parking bays required, on the assumed basis that affordable housing occupants have lower rates of car ownership, and/or that the development is located with excellent access to high frequency public transport. These assumptions should be scrutinised for accuracy rather than taken as truth, otherwise the concession may negatively impact on the surrounding area.

If a concession is given and the reason for the concession (affordable housing product) is not guaranteed, in future the development may revert to another use for which the concession no longer applies.

Key points to note:

_Development concessions can reduce the construction and/or maintenance cost of a development, making it more affordable

_If a development standard concession is granted for affordable housing product, consideration should be given to

4.0____Potential Mechanisms

ways of ensuring the product is actually provided

_Consideration should be given to the impact of granting a concession on development standards if the development later reverts from affordable housing

_Care must be exercised to ensure that reduced standards do not result in sub-standard housing; just because it is 'affordable' does not mean its occupants should be subjected to poor quality accommodation (eg: balconies that are too small to use, inadequate storage)

4.4.3 Dwelling Density

Related to the concept of inclusionary zoning (see 4.4.1), density bonuses may be used as an incentive to provide affordable housing and enable increased return to developers.

The Residential Design Codes already allow for a 50 percent density bonus for the provision of housing for people over 55, single bedroom apartments of minimum 60sqm gross area, and dependent persons' housing - all of which are likely to be represented in a mix of affordable housing product. The codes also require a diversity of dwelling types (eg: number of bedrooms) and sizes within a multiple unit development in areas coded R30 and above, or in mixed-use development or activity centres.

The extent of density bonus and/or the type of housing that can earn a density bonus could be extended beyond that which is currently available in the R-Codes. Acceptable design solutions to achieve additional density for affordable housing should be identified.

Key points to note:

_Dwelling density per se is not the prime determinant of dwelling yield in areas coded R30 and above - like Cockburn Coast. Plot ratio and dwelling size will dictate yield in such areas.

_Density bonuses will only be effective if the market conditions make it worthwhile (profitable)

_Cockburn Coast proposed densities are already much higher than those prevailing in surrounding suburbs, so density bonuses may not provide much incentive in early stages of the development

_Early yield estimates for Cockburn Coast used the now superseded R-Codes site-area-per-dwelling method rather than the plot ratio method that now applies for multi-unit housing in areas coded R30 and above.

4.4.4 Plot Ratio

Plot ratio or floor space bonuses are frequently used as an incentive to encourage provision of desired uses or facilities with a public benefit. This can be effective as an incentive for the provision of affordable housing in circumstances where other uses are a more attractive (profitable) than affordable housing product. In these cases, an additional amount of floor space is offered in exchange for provision of affordable dwelling units.

There are two ways in which this mechanism can be applied to encourage affordable housing. One is as a percentage bonus over and above the maximum usual permitted plot ratio on a site, for the provision of affordable housing.

It would be important to have a policy that guides the circumstance under which bonus plot ratio will be granted. Acceptable design solutions to achieve additional plot ratio for affordable housing should be identified.

The second way in which plot ratio can be used as an incentive for affordable housing provision is to allocate a base plot ratio and an upper level that can be achieved if a minimum amount of the additional plot ratio is used to provide affordable housing. For example, a base plot ratio of 2.0:1 for 'standard' development and up to 3.0:1 if a minimum of 0.5:1 of the total development is for affordable dwellings. This could be an 'as of right' provision embodied in the planning scheme.

The actual amount of bonus offered should be determined after examination of both market (to determine what would be attractive) and the likely built form outcomes (to ensure that application of bonuses will not result in unintended negative impacts).

The Cockburn Coast District Structure Plan (Part 2) is characterised by medium to high density residential development featuring relatively high plot ratio bonuses. This form of development would generally preclude the desire for a plot ratio bonus (refer to 5.2 for a discussion on the drivers for private development). However, given the flexible building height requirements and tendency towards medium density development there is potential for the encouragement of affordable housing using a plot ratio bonus.

There is potential to allow for the transfer of plot ratio bonuses to allow for flexibility in their application. It should be noted however, that this would only be considered appropraite where the provision of affordable product as a result of the bonus is provided within the Cockburn Coast project area.

The City of Perth have similarly implemented a transfer of plot ratio mechanism. This is done via a clause in their Town Planning Scheme and

4.0____Potential Mechanisms

then further dealt with by way of a policy aopted under the scheme provisions. The City of Cockburn would need to implement a similar policy to establish crtieria for both the donor site and the site being awarded the Plot ratio by trasnfer Additionally, a register of the trasnferred plot ratio need to be generally maintained.

The potential for plot ratio bonuses to act as an incentive for affordable housing delivery in Cockburn Coast was tested in feasibility analysis undertaken for this strategy (refer to 8.2 and Appendix A).

Key points to note:

_Plot ratio bonuses may not prove attractive for developers considering high density sites. The Cockburn Coast District Structure Plan Part2) features both high to medium dnsity developtment with a tendency for medium desnity.

_City of Cockburn needs to be comfortable that bonuses offered can be satisfactorily accommodated in acceptable built form

_Bonuses offered have to be sufficient to make the additional cost of providing the extra floor space commercially viable for the developer.

4.4.5 Design Guidelines

Design guidelines are a requirement of the City of Cockburn planning scheme, in association with local structure plans. For Cockburn Coast, the design guidelines will essentially replace development standards set out elsewhere in the planning scheme.

As well as addressing the usual built form and public realm interface elements of development, the City requires the design guidelines for Cockburn Coast to address affordable housing and diversity.

Design guidelines can be very detailed and include requirements for the design and layout of dwellings, including finishes and materials.

Whilst design guidelines can ensure a minimum standard of design they are sometimes criticised for stifling innovative design, techniques, technologies and materials, or alternative solutions. Design guidelines may also (inadvertently) preclude forms of development and thereby restrict diversity in the community. They can add to the cost of development, affecting affordability.

Alternatively, design guidelines can be used to ensure that a diversity of dwellings and facilities is provided.

It is important that design guidelines contain only elements that contribute towards the desired outcome, leaving room for choice and flexibility in other elements. Performance-based approaches are more likely promote affordable housing than overly prescriptive requirements.

In terms of affordable housing, the design guidelines could specify development standards such as the amount of car parking required, the size of private open space, and other relevant design considerations. In terms of housing diversity, they could specify the proportion of particular dwelling types required in a certain class of development.

Because they are required to be adopted by the City prior to or in conjunction with the relevant local structure plan (ie: prior to definition of final lot layout), the design guidelines can not be targeted at specific sites, which is the role of detailed area plans.

Detailed Area Plans

Detailed area plans as required by the City of Cockburn for Cockburn Coast, are essentially a further refinement of the design guidelines applied to a specific site or sites, once defined by subdivision.

Key points to note:

_If overly prescriptive, design guidelines can stifle the potential for innovative design solutions (eg: materials, construction techniques, responses to energy and water conservation) and add to development costs

4.4.6 Developer Contributions

Developers can be required to contribute towards the cost of infrastructure and community facilities if a clear need and nexus can be established between the proposed development and the infrastructure or community facilites.

State Planning Policy 3.6 *Development Contributions for Infrastructure* (SPP 3.6) sets out the manner in which developer contributions can be requested, and seeks to provide consistency and transparency in the manner and purposes for which contributions are sought and calculated. Development contributions will be calculated and applied as:

_standard conditions of subdivision

_conditions of development

_legal/voluntary agreements

As defined by SPP 3.6, standard development contribution requirements are:

_land for public open space, foreshore reserves, primary schools and roads

_Infrastructure works for public utilities (water, sewerage, drainage, etc) and roads

4.0 Potential Mechanisms

_monetray contributions for standard headworks charges, off-site major infrastructure works, and in-lieu of other contributions

A development contribution scheme is being developed for Cockburn Coast.

Developer contributions can also be requested for the capital cost of community infrastructure if it can be demonstrated that the development generates a need for that infrastructure.

It is necessary to prepare a community infrastructure plan for the area and supporting documentation, before developer contributions for community infrastructure can be requested.

JSA suggests that affordable housing could be interpreted as 'community infrastructure' and hence that developer contributions could be requested for the provision of affordable housing.

Contributions would be paid into a dedicated fund that could be used to directly build affordable housing, or provide funds for its purchase or construction by an affordable housing provider.

Key points to note:

_A case would have to be made to the Western Australian Planning Commission under SPP 3.6 to support affordable housing being included in the definition of community infrastructure, because it is by no means explicit in the current definition. The Department of Planning is unlikely to support this initiative.

_The development industry is likely to resist inclusion of affordable housing as another form of developer contribution, and already argues that contribution requirements are adding to the cost of delivering land and consequently adding to the cost of housing (see Colliers 2012).

4.5 Other Mechanisms and Incentives

4.5.1 Subsidies

Some form of subsidy will typically be required to ensure the provision of affordable housing product.

A typical subsidy will target one or more of the factors influencing the cost of providing housing, for example:

_Land costs

_Construction costs

_Fees - include planning, engineering and design costs

_Service connection costs

_Infrastructure charges including water and sewerage headworks and developer contributions

_Cost of approvals and compliance fees

_Local Government rates

_State Government taxes and charges such as stamp duty, Land Tax, water rates

_Federal Government taxes and charges - includes Goods and Services Tax

_Marketing costs

_Management costs (rental)

_Cost of finance, including holding costs

_Profit expectations of the owner/ seller

_Market conditions

Subsidies may include:

_Taxation relief, rent assistance and home purchase assistance

_Direct discount on the price charged for housing

_Discounted land price and/or construction costs for the developer, enabling a lower selling price without affecting development viability

_Grants for provision of affordable housing

_Grants for ongoing operation of affordable housing

_Concessions and development incentives

4.5.2 Discounts

Discounts on various planning authority imposed costs for new developments could be offered as an additional incentive to developers who comply with the affordable housing provisions. This could include development assessment fees and developer contributions. The City of Brisbane, for example, offers such financial incentives when 100% affordable housing is provided in a development. For proposals including a proportion of affordable and market housing, financial incentives are calculated on a pro-rata basis. Funding is not provided unless a covenant and management plan or other acceptable arrangement, has been established, and developments will be subject to a requirement that the affordable housing component remain affordable for the long term use (minimum 10 years).

4.5.3 Fast Tracked Approvals

Time taken to obtain planning and other development approvals can add a significant cost to developments (holding costs), and are often unpredictable, notwithstanding statutory time limits that may apply. Guaranteed speedy approvals for affordable housing developments could therefore be an incentive.

Notwithstanding that all applications should be processed in the most efficient manner possible, developments incorporating a minimum affordable housing component could be exempt from certain referral or assessment processes and/or have 'as of right' status that makes approval quicker.

4.0____Potential Mechanisms

4.5.4 Restrictive Covenants

Not an incentive for provision but a way of protecting affordability in perpetuity or for a specified minimum period is for a restrictive covenant to be registered on a property, setting the conditions for resale.

A restrictive covenant may last indefinitely or for a specified period of time. A covenant could require the owner-occupant to resell the property to someone from a specified pool of income eligible buyers for a specified, formula-determined price. The covenant could also contain an option that gives a not-for-profit developer, public agency, or some other party, the first right to repurchase the homeowner's property at the formula-determined price.

This could be particularly relevant in a shared equity scheme.

Restrictive covenants may be established by a developer or required as a condition of planning approval for subdivision or development. They should not however be contrary to the provisions of the local planning scheme or other statute.

The WAPC advises that restrictive covenants should be used sparingly, and only in situations where a more transparent mechanism, such as planning scheme provision, is not available.

Key points to note:

_Some form of governance would be needed to monitor compliance with a restrictive covenant, and to identify potential purchasers.

_The City of Cockburn is unlikely to be able to resource the policing and implementation of restrictive covenants.

4.5.5 Non-Planning Building Controls and Requirements

A review of building related controls and standards administered by State and local government could identify requirements that deter building owners and developers from providing affordable housing. For example, health and building requirements for such housing forms as lodging houses may be very prescriptive and costly to implement. Risk based or performance criteria would allow flexibility, particularly for the conversion of existing buildings.

4.5.6 Facilitation and Demonstration

Facilitation would involve bringing together parties with different resources (skills, land, capital, clients, etc) with the aim of delivering projects. LandCorp and/or the City of Cockburn could fill the facilitation role.

Demonstration would involve the public sector (LandCorp, the City of Cockburn, and/or the Department of Housing) carrying out a new form of development - for example using innovative construction materials or techniques to deliver cheaper and more affordable housing product. By being 'first' to 'risk' something unfamiliar to the development or construction industries or the consumer market, demonstration projects show what is possible and help stimulate different approaches in the market.

For example, when the East Perth Redevelopment first created small housing lots, no housing firms had small house products. The Redevelopment Authority commissioned the design and construction of houses, showing what was possible on small lots and helping both builders and consumers to envisage a type of housing product that did not previously exist in Perth. Now most home builders offer small lot product within their standard ranges.





Three to five storey housing development_Photo taken by HASSELL

4.0____Potential Mechanisms

4.6 Summary

Table 5 represents a summary of the mechanisms available to promote affordable housing that have the most potential for application to Cockburn Coast.

Mechanism	Applicability to Cockburn Coast	Comment
PPP	Yes	Government Agencies such as Landcorp and the Department of Housing could determine that parts of the development be subject to a PPP, with provision of affordable housing product a required outcome. Some form of PPP has been a factor in all examples of affordable housing provision by the private sector identified in preparing this strategy.
Shared Equity	Yes	Department of Housing could identify product in Cockburn Coast for which shared equity loans would be available.
Inclusionary zoning	No	There is legal ambiguity for local government if mandatory requirements to provide an affordable housing component in developments are applied. A clear statement at State Planning Policy level that such requirements can be imposed is highly desirable. Policies that have been adopted by Redevelopment Authorities have been adopted outside the Planning and Development Act.
Development standards	Yes	For Cockburn Coast, develoment standards will be contained within Design Guidelines, so any concessions for affordable housing will be outlined in those documents.
Dwelling density	No	Dwelling density is not an applicable control on land coded R30 and above - which applies to all of the Cockburn Coast project area.
Plot Ratio	Yes	Plot ratio bonuses can be offered for the provision of affordable housing. Bonuses will provide a greater of lesser incentive to developers to provide affordable product depending on the state of the market at the time the development is proposed. In the current market,
Design Guidelines	Yes	Development concessions should be granted on appropriate elements of affordable housing product if it is guaranteed to remain 'affordable' in perpetuity or an agreed period. Design guidelines can also nominate specific requirements for affordable product, such as size or number of bedrooms.
Developer Contributions	No	There is no established governance framework for the administration of a developer contribution scheme or cash-in-lieu payments for affordable housing.

4.0____Potential Mechanisms

Mechanism	Applicability to Cockburn Coast	Comment
Subsidies	Yes	Reserach has shown that some form of subsidy is involved in all successful affordable housing projects. It may be discounted land, purchase of affordable units by a housing provider, or some other direct or indirect subsidy or combination thereof.
Restrictive Covenants	Yes	In appropriate situations, a restrictive covenant or similar mechanism can be required as a condition of development approval to ensure affordable housing product remains 'affordable' for a specified period or in perpetuity. The period of time applied would need to be assessed in light of prevailing circumstances at the time of the development.
Discounts	Yes	The City of Cockburn could offer discounts on application fees and rates for bona fide affordable housing development.
Fast Tracked Approvals	Yes	The City of Cockburn could establish a procedure to guarantee fast tracking of affordable housing projects, to ensure that holding costs to the developer are minimised.
Facilitation and Demonstration	Yes	LandCorp and the Department of Housing have already expressed a willingness to participate in facilitation and demonstration affordable housing projects. The City of Cockburn has expressed a willingness to facilitate affordable housing development through the means available to it.

Table 5: Summary of Potential Mechanisms

5.0____Drivers of Housing Development

5.1 Public Sector

State and local government departments and agencies have differing motivations for being involved in affordable housing development.

At a high level, a healthy housing development sector is good for the economy.

Ensuring that the population is adequately housed is an important Government objective.

5.1.1 Department of Planning

The Department of Planning supports the Western Australian Planning Commission. It initiated the planning process that lead to the Cockburn Coast District Structure Plan and the identification of a target of 20% affordable housing for Cockburn Coast. The urban renewal of Cockburn Coast is an important component of metropolitan urban development to achieve the objectives of *Directions 2031 and Beyond*.

The Department therefore has an interest in ensuring that the objectives of the CCDP, including targets, are achieved.

The State Planning Strategy, currently being drafted, is expected to include direction on affordable housing. The State Planning Strategy will have flow-on consequences for the content of planning statutes and policies.

It is anticipated that if the statutory framework changes to become supportive, mandatory requirements can be introduced. Should the Department of Planning choose to introduce mandatory requirements for affordable housing this would need to be instituted as an indsutry wide requirement, rather than on a case by case basis as this could distort the property makret and create disencentives for development. Until such time that a planning policy is introduced, the Department of Planning does not support mandatory requirements for affordable housing.

5.1.2 City of Cockburn

The City of Cockburn is seeking to fulfil its responsibilities as the primary planning authority and the local government responsible for Cockburn Coast by introducing objectives and provisions into its town planning scheme that relate to population and housing diversity and affordable housing in the project area.

As the level of government closest to the local community, the City is aware of groups who could be in the market for affordable housing in the Cockburn Coast area, such as housing co-operatives, at-risk students and the homeless.

The City is interested in the mix of income ranges for affordable housing (very low income, low income, moderate income) and how housing appropriate to the needs and limitations of this mix can be delivered.

The City is concerned that affordable housing remain available in perpetuity, being aware of the risk that the first purchasers of affordable housing (whether shared equity or discounted sale price) could essentially receive a ‘free kick’ or windfall profit by later selling their dwelling at market price.

The City has expressed a preference for mandatory rather than incentive-based mechanisms for the provision of affordable housing, citing concerns that incentives are hard to pitch at the right level to motivate developers to take advantage of them.



Subi Centro, WA_Photo taken by HASSELL

5.0____Drivers of Housing Development

In consultation for this strategy, the City expressed doubt about whether the target densities envisaged in the District Structure Plan can be achieved for housing generally, and hence that offering bonus plot ratio and height could be an effective incentive. However it should be noted that TPS 3 includes a requirement that a minimum of 85% of nominated density be achieved.

Although preferring a mandatory approach, the City acknowledges that methods such as a developer contribution scheme requiring contribution to the purchase of land by the City for affordable housing would be difficult without supportive State level legislation and policy.

The City sees potential in a policy similar to the Affordable and Diverse Housing Policy that applies in the East Perth and Subiaco Redevelopment Areas, noting however this policy applies only to larger developments (10 dwellings and above), meaning that smaller developments would not contribute to the delivery of affordable housing. As noted in 4.4.1, however, these policies were introduced under different legislation from that which applies to Cockburn Coast. Additionally, these policies have experienced limited success due to their interventionist nature and developer aversion to this approach.

Finally, the City considers it has a role as a facilitator for affordable housing development.

5.1.3 Department of Housing

As the Government's deliverer of social and affordable housing Department of Housing (DOH) is able to bring together a range of housing options and programs that cumulatively facilitate a diversity of housing products. DOH is able to deliver social housing programs to low to moderate income earners, specific target groups such as people with disabilities etc, new affordable housing rental initiatives, shared equity home ownership products, low deposit full home ownership and normal market sales.

The Department's current focus is on supply.

DOH is increasingly endeavouring to work cooperatively with the private sector to deliver affordable housing outcomes rather than simply apply the traditional 100% government capital investment ownership model. This is seeing the Department apply a number of different development/ acquisition/investment models. These include:

- Joint Venture (JV) developments where DOH may contribute land or cash in partnership with the private sector. Ideally DOH makes a site available to the private sector partner to undertake the development as JV partner. This helps the private sector by removing the requirement for land and holding costs and also provides equity into the transaction and an asset that can be mortgaged. Projects of this nature are underway in Pier Street East Perth and Campbell Street West Perth.
- Equity Contribution – DOH may become an equity partner in a particular built form development. This enables DOH to deliver affordable housing outcomes by influencing the shape and form of the development and taking its return in dwellings, cash or a combination of both. This helps unblock the private sector challenges around project finance and derisks the development.
- Presales – DOH may be able to facilitate development by pre-purchasing units in specific developments thereby enabling developers to meet presales commitment and enabling capital funding to be obtained.
- Underwriting sales – through home ownership schemes such as SharedStart DOH may be able to provide developers with a commitment to deliver end user sales to particular target groups; this can facilitate presales and capital funding.
- Procurement – DOH's Expression of Interest process provides an opportunity for developers to put development proposals to the Department and for DOH to purchase in full all units in the development, purchase some units, or any other arrangement that would help the development proceed while enabling the Department to deliver affordable housing outcomes.
- Integrated Housing Developments – DOH has developed and continues to develop fully integrated housing developments that bring a range of housing tenures and client groups together to deliver financially viable and socially sustainable housing developments. Ideally, these would see social, affordable and full market rental, shared equity and full market ownership and possibly commercial units in the same complex. This brings together a range of different funding sources and funding/investment opportunities together to help projects stand up financially.
- Linkage with other affordable housing investors and providers – DOH is also able to facilitate linkages with other affordable housing providers such as Community Housing Organisations who undertake social and affordable housing developments in partnership with or independent of Government. Similarly, DOH involvement in facilitating and supporting other Government affordable housing initiatives such as the joint state/commonwealth

5.0____Drivers of Housing Development

initiative National Rental Affordability Scheme (NRAS) can provide further linkages with investment opportunities for affordable housing. (NRAS provides cash and tax benefits for investors who are prepared to rent their new investment properties at less than 80% of market rent).

_The traditional model of DOH acquiring, funding and developing a site itself also remains an option that can be pursued in the right circumstances.

When all of these activities are layered across the new delivery models DOHs brings a breadth of opportunity and market outcomes that make the delivery of affordable housing outcomes in all market settings a realistic option.

Public housing provision is more expensive than assisting someone to buy a house (KeyStart) which can actually be income positive Consider KeyStart to be filling a gap while banks aren't lending but will retract when banks start lending again

DOH hope to influence affordability through the use of different materials and construction techniques and will be open to opportunities to participate in developments that exhibit innovation in these ways.

DOH is aware of a current need to keep up activity in the housing construction industry to keep workers exmployed, or risk losing them to the resources industry.

DoH is willing to be involved in governance arrangements and may even take a leadership role if required.

The Department also recognises a need to educate the market as to difference between affordable housing and social housing, as there remain some negative perceptions about affordable housing and the people who occupy it, which are influenced by negative perceptions of social housing tenants.

5.2 Private Developers

It will be self evident that private developers need to be reasonably confident of achieving an adequate profit margin before they are likely to proceed with any development. This is especially so since the GFC has tightened developer margins, generally as a requirement for 'pre-sales' in order to secure financing for construction.

Analysis of a wide range of medium density property development sites (Colliers 2012, see Appendix A) shows that target profit margins after finance provisioning, typically range from 15% – 30% with a central tendency of 17.5% to 25%. The margins are dependent on location, product, capital at risk and market conditions and can be highly volatile given the lengthy duration of planning, sales and delivery.

This strongly suggests that the JSA assumption that 10% profit would be considered sufficient for a developer to proceed with a development, and that any profit about 10% could be considered to be 'super profit' from which affordable housing could be provided is not valid in the current Perth market.

Developer decisions vary from location to location and are often a function of market depth and demand for the particular product type. In recent times in metropolitan Perth, the majority of medium to high density development activity has centred on the Perth CBD and fringe. Suburban apartment market activity fundamentally remains in the low to mid rise format due to the limited price variance between competing dwelling types and existing market preferences.

The critical observation made in the reviewing of JSA 2011 report is the presumption that higher density equates to higher profitability and accordingly higher residual value to land. This paradigm generally no longer applies to medium to high density residential/mixed use development market in Metropolitan Perth.

The principal driver for this paradigm shift is construction cost, which for this class of development sits almost a third higher in WA than in east coast markets. In addition, more recently capital rationing of debt markets has further affected viability in this market sector.

As a result, in recent times the development market has focussed on lower yield, lower capital, medium density development, typically from two to five levels in height.

Developer Survey

A survey of residential developers was conducted by Colliers to establish an industry perspective regarding housing affordability, and views on the measures to enable private sector delivery of affordable dwellings advocated by JSA 2011.

Sixteen developers active in the medium to high density residential development market in Western Australia were invited to participate in a survey by questionnaire; eight agreed. A copy of the questionnaire and a summary of the responses to each question can be found in Colliers 2012, in Appendix A.

The intent of the questionnaire was to gauge the attitude of developers towards the proposed Cockburn Coast development, and to test the

5.0___Drivers of Housing Development

attitudes of private sector developers on:

- _private sector delivery of affordable dwellings
- _the observations and conclusions of JSA 2011 report with respect to:
  - _private sector financial capacity to absorb the mandating of affordable dwellings in medium to high density development
  - _observations as to super profits
  - _private sector financial capacity for to provide affordable dwellings in a medium to high density format through incentives on height and dwelling yield

Broadly the developer interviews established:

- _Support for the housing typology and densities proposed for Cockburn Coast
- _Indicated the proportion of 'low' density dwellings (terraces/town houses and cottage lot residential) as too low
- _Considered early infrastructure delivery to engage the market in the location and product typology to br critical and cited as important:
  - _Transport
  - _Retail and convenience amenity
  - _Community/civic services
  - _Schools
  - _Recreational amenity
  - _Employment
- _Acknowledged the need for the delivery of affordable dwellings but several questioned the appropriateness of product typology and location
- _All accepted but questioned the delivery of affordable dwellings at the price points of JSA 2010 in view of current price points for land, product typology, demand, current apartment price points and cost of construction
- _All interviewd considered that the supply of affordable dwellings should be a role of governments but accepted the need for private sector engagement
- _Delivery and/or funding of affordable dwellings through developer scheme contributions were often described as 'another tax' and clear resistance to this approach emerged. All acknowledged an acceptance of simplified developer scheme contributions linked to gross realisation and on completion market values (or similar) with deferred payment citing the need for clarity and minimising the impost on development feasibility and price setting for land
- _All indicated the inclusion of affordable dwellings either via developer scheme contributions or mandating of delivery will affect the attitudes of developers to the precinct when making development site selection decisions, and confirmed a general view it will have a negative impact on the residual value of land
- _All developers indicated a positive interest in partnering and joint venture opportunities with local and state government, and not-for-profit organisations in developing and delivering affordable dwellings
- _The developers acknowledged and accepted incentive schemes providing height and density bonuses but in view of the already high (relative to broader market) densities established in the CCSP2, questioned the inference (JSA 2010) that sufficient additional profit could be realised to offset the cost of affordable dwelling supply
- _A key concern raised by developers is the risk of stigma arising at market with the knowledge that affordable dwellings will be offered in a proposed development or precinct at such high proportions (20%); particularly if it was known (and it would require disclosure) that Department of Housing had acquired the stock. A clear risk mitigation strategy would be required by way of public education and branding (the difference between social housing and affordable housing) together with site selection and application. This is premised on the CCDSP aspirational target of 20% affordable dwellings
- _Finally, the issue of governance was raised. Developers want to know who will coordinate, administer and manage the affordable dwellings such that they are retained as 'affordable dwellings' in perpetuity?

5.0 Drivers of Housing Development

The Questions

The questions answered by developers who took part in the survey are summarised below:

1. What are your preliminary thoughts on the form of development contemplated for the Cockburn Coast?
2. What market based hurdles or opportunities can you envisage for the Cockburn Coast?
3. Are there specific infrastructure deliverables at state and local government level which may stimulate the contemplated form of development?
4. Are there initiatives at state and local government level which may be implemented to stimulate the contemplated form of development?
5. Have you any thoughts on initiatives that place a greater focus on increasing supply (such as NRAS) as opposed to subsidising demand?
6. What is your view of the contemplated accommodation mix in the context of the WA market?
7. In terms of the medium high density development contemplated for Cockburn Coast, what are your initial thoughts of enabling affordability measures such as those described in JSA 2010 *(these were summarised)*?
8. In the context of the contemplated built form, is a proposal to include affordable housing as 'special infrastructure' under State Planning Policy 3.6: Development Contributions for Infrastructure feasible? Are there alternative performance based measures that can be reasonably applied? Should such measures be incentivised? If yes, what forms of incentivisation will likely support built form supply as contemplated and meet the measures of affordability outlined above?
9. Do you see planning bonuses (examples cited) as a feasible mechanism in the context of:
   a) the density and heights already contemplated for Cockburn Coast
   b) a nil or low parking ratio for affordable housing supply
   c) proposed 'affordable' (Stubbs 2011) pricing regime?
10. What are the principal constraints to delivering 'affordable' dwelling product in a medium/high density format and meeting the implied diversity and pricing requirements?
11. What product typologies are more likely to achieve the implied diversity and pricing requirements? Are there low cost options such as pods and lightweight demountable structures that can be applied in part or in whole?
12. In the context of Cockburn Coast, what locational and infrastructure needs will better promote or support the supply of diversity in dwelling modes and pricing need?
13. What incentivisation based variation to planning provisions are likely to best generate sufficient funds/super profits to offset delivery of affordable housing?
14. How in your view, would the market likely respond to the mandatory provision of affordable housing in Cockburn Coast and what are the likely implications to market input?
15. Assuming an equitable and feasible solution, should there be a 'blanket' cap or ratio approach to the volume and type of affordable housing on:
   a) whole of Scheme area basis
   b) a project by project basis
   c) defined in designated precincts?
16. Initiatives already implemented in several redevelopment areas (SRA – EPRA) have met with some success (examples listed): What are your thoughts on applicability and feasibility of these schemes in Cockburn Coast? Are there alternative mechanisms that you could propose or are aware of that may prove feasible?
17. Is the provision of affordable dwellings a state responsibility? Is market intervention warranted through a mandatory planning regime or should it be focused on state/local government controlled land?
18. Would greater direction, clarity and simplicity be preferred, such as a blanket 'cash-in-lieu' mechanism applied on GFA and paid on completion of sales into a pooled fund to support delivery of affordable dwellings by the State? Could this be expanded to stimulate density and delivery by utilising mechanisms such as decreasing scales of 'cash-in-lieu' for greater diversity, set product modules and GFA?
19. Are there other alternatives worth considering such as profit sharing, that is, an agreed proportion of additional profits earned on the delivery of affordable density bonuses?
20. Do you consider there is joint venture or partnering opportunities between state and private developers that will facilitate the vision for Cockburn Coast as well as delivery of affordable dwellings? If so, can you provide some insight to JV or partnering structures and models that you would consider reasonable and functional?

6.0____Market Characteristics

Current residential market conditions will not necessary carry forward, however they are the necessary starting point for considering the likely situation for housing in Cockburn Coast once development commences. They also aid feasibility assessments (refer to 8.2).

The residential market is of course impacted by global economic conditions, as well as national and local political and economic fluctuations.

Colliers research (see Appendix A for more detail) indicates that the deterioration of global economic conditions over 2008 and into 2009 had a dampening effect on Western Australia's residential property market. Despite an improvement in the residential market in early 2010, demand for residential real estate has continued to weaken on the back of declining consumer confidence.

Real Estate Institute of Western Australia (REIWA) statics indicate the median house price increased by 0.4% during both the December 2011 and March 2012 quarters. The increase in the December 2011 median house price was the first since March 2010, potentially suggesting that the residential market may have bottomed out and is now showing early signs of improvement. Preliminary REIWA March 2012 quarter statistics signal a general softening from the previous year but stabilisation from the previous quarter.

Factors affecting the apartment market (refer to Appendix A) have directly impacted the viability of development sites and placed downward pressure on land values. The sustained withdrawal of credit availability for this sector and weak consumer demand has placed continued pressure on land values over the last 30 months.

The economic and market conditions of late 2007 and 2008 resulted in a retraction of development site activity and limited new development. As a result of the economic downturn, there was a general lack of prominent apartment/mixed-use development site sales over late 2008 and 2009, however this began to turn in 2010 with mid-tier developers returning to market taking advantage of discounted land pricing.

It is anticipated market (consumer) sentiment in this sector may improve into 2012, and with the limited production/initiation of new apartment stock since 2009, a scarcity of stock may emerge in 2013, enabling achievement of presale/pre-lease requirements to obtain development funding, suggesting a recovery in demand for sites and values may occur from 2013.

The withdrawal from the market by developers was a direct function of the uncertain times experienced over the period 2008 - 2010. Although demand for large built form development sites with high capital requirements remains relatively subdued and has resulted in a softening of those values, the general consensus is that enquiry has increased. Of the limited transactions that have occurred, values appear to have stabilised and typically reflect discounts in the vicinity of 20% to 50% off the top of the market.



Cockburn Coast Perspective, WA_Imagery by HASSELL

7.0____Case Studies

The research failed to identify examples of where the private sector delivered 'affordable' dwellings without some form of community or statutory support in the funding and delivery model.

In addition to reviewing the work by Judith Stubbs and Associates, Colliers undertook further investigations to establish whether there are examples of private sector delivery of affordable dwellings in Australia and internationally.

The full text of the Colliers report can be found in Appendix A.

The research failed to identify examples of where the private sector delivered 'affordable' dwellings without some form of community or statutory support in the funding and delivery model.

7.1 International

In summarising her international research for Waitakere City Council, Patricia M Austin (2008) identified the following essential factors or key components for affordable housing partnerships to achieve desirable affordability outcomes:

_Access to land or property at reduced cost – including discount market price, leasehold, deferred payments and the effect of planning policy

_Access to finance such as grants, deferred loans or loans at below market interest rates

_The incorporation of debt finance based on a net income stream

_Management expertise, particularly the capacity to manage development risk and ongoing management risk

_Non-profit, charitable or community trust status of housing organisations, enabling profits to be foregone; accessing finance in more favourable terms; and maximising tax exempt status

_A broader range of household incomes for the household group being targeted including moderate income households

_Opportunities for cross subsidisation within and between development(s)

_Good quality design that is highly energy and water efficient to minimise residents' outgoings

_Local Government support through the planning process and through contributions for the partnership of resources and/or implicit subsidies

_The support of the local community

_Mechanisms that retain the housing as affordable into the future.

She also noted that all of the case study partnerships researched make use of one or more of three key components:

_Either land (or property) being available at below market rates, or deferred payments or leasehold

_Finance being available in the form of grants, loans at below market rates or deferred interest on loans

_Incorporation of debt finance based on net income stream.

Where only one of these three key components is used, the schemes rely upon some form of cross-subsidisation from market rate Development or provide affordable housing or shared ownership for moderate-income households.

In every case study considered by Austin 2008 the affordable housing delivery mechanism relied on a public private partnership, which in nearly all cases constituted either the local authority, not for profit organisations, state and federal governments.

There is not one example where the private sector has outwardly established a role in delivering affordable dwellings where all inputs to the model are kept at the market level. Each case study involved the

7.0____Case Studies

contribution of land at discounted market rates.

7.2 Australia

7.2.1 Inkerman Oasis, Port Phillip, Victoria

This case study is sourced from http://www.housing.nsw.gov.au/Centre+For+Affordable+Housing/Developing+Affordable+Housing/Case+Studies/Inkerman+Oasis+Port+Phillip+Victoria.htm

Inkerman Oasis is a 242-unit project in the City of Port Phillip, Victoria. It is a joint venture between the City of Port Phillip Council and Inkerman Developments Pty Ltd. The Council contributed land and added value through masterplanning, which included paying for the remediation of the site. Inkerman developed the site, and repaid council for the remediation on settlement.

In exchange for the land, the developer provided 28 units of affordable housing. The State Housing Authority and another housing agency have purchased an additional four units.

The council benefits by having affordable housing developed with no additional resource commitments.

The developer benefits by having land provided for its development yielding 210 units for private housing.

The community benefits by having access to affordable housing which was developed only after community input and support were sought

Port Phillip Housing Association, an organisation with considerable experience, is managing the affordable housing units. The Association is responsible for all operating, property and tenancy management costs, and maintains detailed financial records for each managed property. It must comply with accountability requirements, which include six monthly auditing inspections and production of an annual report for public release.

7.2.2 City Edge, ACT

This case study is sourced from http://www.housing.nsw.gov.au/Centre+For+Affordable+Housing/Developing+Affordable+Housing/Case+Studies/City+Edge+ACT.htm

City Edge is a housing development of 40 townhouses and 86 apartments in O'Connor ACT. ACT Housing entered into a joint venture with a private developer to create a mixed affordable and private housing site.

City Edge, which opened in December 2001, represents $6.5 million worth of housing available to people on low-to-moderate incomes through Community Housing Canberra and ACT Housing.

Each agency owns 15 apartments. In addition, the private developer retained 40 townhouses and 56 apartments for private sale.

7.2.3 Forest Glade, Parklea, NSW

This case study is sourced from http://www.housing.nsw.gov.au/Centre+For+Affordable+Housing/Affordable+Home+Purchase/Forest+Glade+Parklea.htm

The Forest Glade Smart Housing project at Parklea, Sydney, was developed collaboratively by Landcom and developers, Cosmopolitan Developments, and targeted 20% of its properties for sale to those on moderate-incomes.

The project comprised 64 detached homes with a mix of two, three and four bedroom houses. Thirteen were targeted to moderate-income households, through a balloting process to eligible purchasers. (Landcom defines moderate household incomes as being between $48,000 and $69,000).

Pricing for the 13 designated homes ranged from $156,000 to $220,000 (2002 prices), while the asking prices of those aimed at the broader market were between $270,000 and $415,000. Apart from income, assets and property eligibility (purchasers had to be first time buyers), there were also re-sale restrictions placed on the moderate-income homes. These homes were distributed throughout the site and are indistinguishable from the other 50 in the project. The project went on sale in June 2002 and the moderate-income homes were oversubscribed by eligible purchasers by a ratio of 25 to one.

The provision of affordable housing at this site was a condition stipulated by the local council in return for a more flexible approach to planning, design and construction.

Smart design, regulatory provisions and the use of efficient construction and materials planning delivered increased project value, which was then transferred to make the moderate-income homes affordable. While providing moderate-income housing, the developers were nonetheless required by council to guarantee high standards of amenity and design.

7.2.4 Waverley Council, NSW

This case study is sourced from http://www.housing.nsw.gov.au/Centre+For+Affordable+Housing/Developing+Affordable+Housing/Case+Studies/Waverley+Council+NSW.htm

Waverley Council's Affordable Housing Program offers a density bonus to developers who provide affordable housing as part of their residential development. A bonus is

7.0____Case Studies

offered only to projects where the increased density can be accommodated within a building in a manner that will not compromise the environmental amenity of the surrounding area.

The affordable housing units can be provided in perpetuity (that is permanently) or for a specified time, with rent capped at well below market rent. The council owns units that are provided in perpetuity. Rent-capped units are owned by the private developer, or private owner, and leased to council for a capped rent lower than market rent for a specified time.

Waverley Council provided a density bonus to the Orion Group, a private developer operating in the eastern suburbs of Sydney, in exchange for providing some of their developments as affordable housing.

A registered social housing provider manages the affordable housing properties under a headlease agreement between the provider and the council.

A standard Residential Tenancy Agreement is then executed between the provider and the affordable housing tenants.

The density bonus increased the commercial attractions of the development while still providing environmental amenity and affordable housing at no cost to council.

It was therefore mutually beneficial for the council, the developer and the community.

7.3 Western Australia

7.3.1 Department of Housing

The Department of Housing (DoH) is increasingly endeavouring to work cooperatively with the private sector to deliver affordable housing outcomes rather than simply apply the traditional 100% government capital investment ownership model. This is seeing the DoH apply a number of different development, acquisition, investment models. These include joint venture developments, equity contribution, presales, underwriting sales, procurement, integrated housing developments, and linkage with other affordable housing sector investors and providers.

The traditional model of the DoH acquiring, funding and developing sites itself also remains an option that could be pursued in the right circumstances. DoH accesses and enables a breadth of opportunity and market outcomes that make the delivery of affordable housing outcomes in all market settings a realistic option.

7.3.2 Department of Housing Developer Engagement

Enquiries to a range of Western Australian and national developers identified several instances where developers had engaged with the Department of Housing in the delivery of affordable dwellings in a medium to high density product form. In each instance, the Department of Housing effectively secured a proportion of available product at full market price and then allocated the product to a mix of

_Social housing

_Shared Equity purchase

_Affordable rental

The most recent example is OneAberdeen, located at the juncture of Pier Street and Aberdeen Street, Perth. This project is a partnership between Diploma Properties Pty Ltd and Department of Housing (DoH). The Department of Housing owns the land and Diploma is engaged in a joint venture. In effect DoH applies the land and warrants the acquisition of some 30% of the apartment stock. It is understood, DoH insisted on maximising the yield outcome in order to optimise the volume of affordable housing stock it could secure whilst enabling the developer as joint venture partner sufficient scope to earn a reasonable profit. To this end, the trade off in market value of land was close to a discount of 40%. DoH has applied similar methods to secure affordable dwellings across several notable medium to high density projects including;

_Fort Knox, Fremantle – Match Projects

_Stella Apartments, Cockburn Central - Goodland Properties.

7.3.3 Foundation Housing

Foundation Housings' is a 'not for profit' affordable housing provider whose core objective is founded on its aim to increase the supply of secure, affordable good quality rental housing and to undertake effective tenancy and property management that achieves sustainable housing outcomes. Foundation Housing is one of the largest affordable housing providers in Western Australia with over 1,300 households currently in management and development, and some 1,700 tenants across Perth and regional Western Australia.

Foundation Housing provides a range of housing services with expertise in

_Property management

_Public and private sector partnership

_A commitment to providing sustainable and affordable housing

_A sound financial base

Simplistically, the financial model enabling growth and further delivery of affordable accommodation is one that leverages off the capital base and net cash flow from operation of

its property portfolio. Foundation Housing makes a long term investment in its growing portfolio. This enables capital leverage to develop new accommodation independently or in a range of joint venture, alliance and partnership models with both private and public sector participants, hat is further supplemented through;

Foundation Housing makes a long term investment in its growing portfolio. This enables capital leverage to develop new accommodation independently or in a range of joint venture, alliance and partnership models with both private and public sector participants, that is further supplemented by

- _wider access to the National Rental Affordability Scheme
- _strategic asset management
- _innovative management services
- _discounts and concessions on
  - _the Goods and Services Tax
  - _stamp duty
  - _ water and council rates to name a few

Department of Housing additionally offer via Tender the transfer of social housing rental stock (to a range of affordable housing providers.

7.3.4 Access Housing

Access Housing is similar in nature to Foundation Housing and was established in 2006, providing accommodation solutions across the spectrum of social housing to affordable home ownership founded on a property model of;

- _Property and Tenancy Management Services (1,400 social and affordable rental properties), and
- _Affordable Housing Property Development.

Similar to Foundation Housing, the capital base and rental stock was initially 'gifted' via the State to facilitate a capital and net cash flow base from which to leverage and grow the portfolio. This is additionally supplemented through property and tenancy management services whilst taking a more commercial approach in the property development arena to generate greater margins for reinvestment and growth of the portfolio. This latter approach is the principal difference to Foundation Housing and to this end Access Housing has developed a wider range of financial models for funding and development with institutional partners and developers. As an example, Access Housing has entered into Alliance Agreements with private companies in the building, development and finance industries in order to share expertise and de-risk the delivery of affordable housing options.

Access Housing additionally partners with the Department of Housing to provide affordable and sustainable housing solutions in the community and as for Foundation Housing, competes for State Government programs and capital grants for the supply of affordable housing.

8.0___Development Feasibility

8.1 Development Scenarios

To aid understanding of the likely viability of different forms of housing development in Cockburn Coast, development concepts were modelled on sites likely to be suitable locations for affordable housing. The selection criteria for the sites, which are identified in Figure 2, were:

_Represent a range of building typologies, but not terrace housing as this is considered to be premium product
_Represent a range of building heights
_Mixture of 100% residential and mixed use buildings
_Mixture of LandCorp and privately owned sites
_All precincts represented
_Sites close to, but not immediately adjacent to or facing high amenity locations such as, ocean views, and 'main street'
_Easy walking distance to the proposed bus rapid transit route

At this stage, the structure plan only identifies indicative street blocks. Individual lots will only be designed at subdivision stage, based on any criteria specified in the Local Structure Plan and/or design guidelines.

For this exercise, it was necessary to nominate conceptual lot boundaries within each street block. The lots created are of a size and dimension that would be suitable for the building typology used in each case.

The four conceptual development scenarios were based on a typical product mix based on market activity, and established a number of apartments (yield) and parking provision for each development based on assumptions documented in Appendix A.

For each site a 'complying' development was derived (Base Case), and one each assuming a 30% plot ratio bonus and a 40% plot ratio bonus (Scenarios 1 and 2, respectively).

The Base Case developments are briefly described below, and the Base Case and Scenario 1 and Scenario 2 conceptually illustrated in Figure 3, Figure 4, Figure 5, and Figure 6.

Site Option 1A
_Site area 3,500 sqm
_R100 Activity Centre
_Plot Ratio 1.25:1
_3 - 5 levels
_Retail commercial 1,375sqm
_13 apartments per level
_Ownership:

Site Option 1B
_Site area 4,050 sqm
_R160
_Plot Ratio 2.5:1
_6 - 9 levels
_17 apartments per level
_Ownership:

Site Option 2
_Site area 4,435 sqm
_R160
_Plot Ratio 1.25:1
_6 - 9 levels
_Retail commercial 1,800 sqm, 4 apartments
_18 apartments per level
Ownership:

Site Option 3A
_Site area 4,330 sqm
_R100 Activity Centre
_Plot Ratio 1.25:1
_3 - 5 levels
_20 apartments per level
_Ownership:

Site Option 3B
_Site area 3,603 sqm
_R100 Mixed Use
_Plot Ratio 1.5:1
_3 - 5 levels
_Retail commercial 1,455 sqm
_13 apartments per upper level
_Ownership:

Site Option 4A
_Site area 2,760 sqm
_R100
_Plot Ratio 1.25:1
_3 - 5 levels
_12 apartments per level (10 for lifted)
_Ownership:



01_



02_

01_ Medium Denisty Residential Housing
02_ Medium Denisty Residential Housin

8.0____Development Feasibility

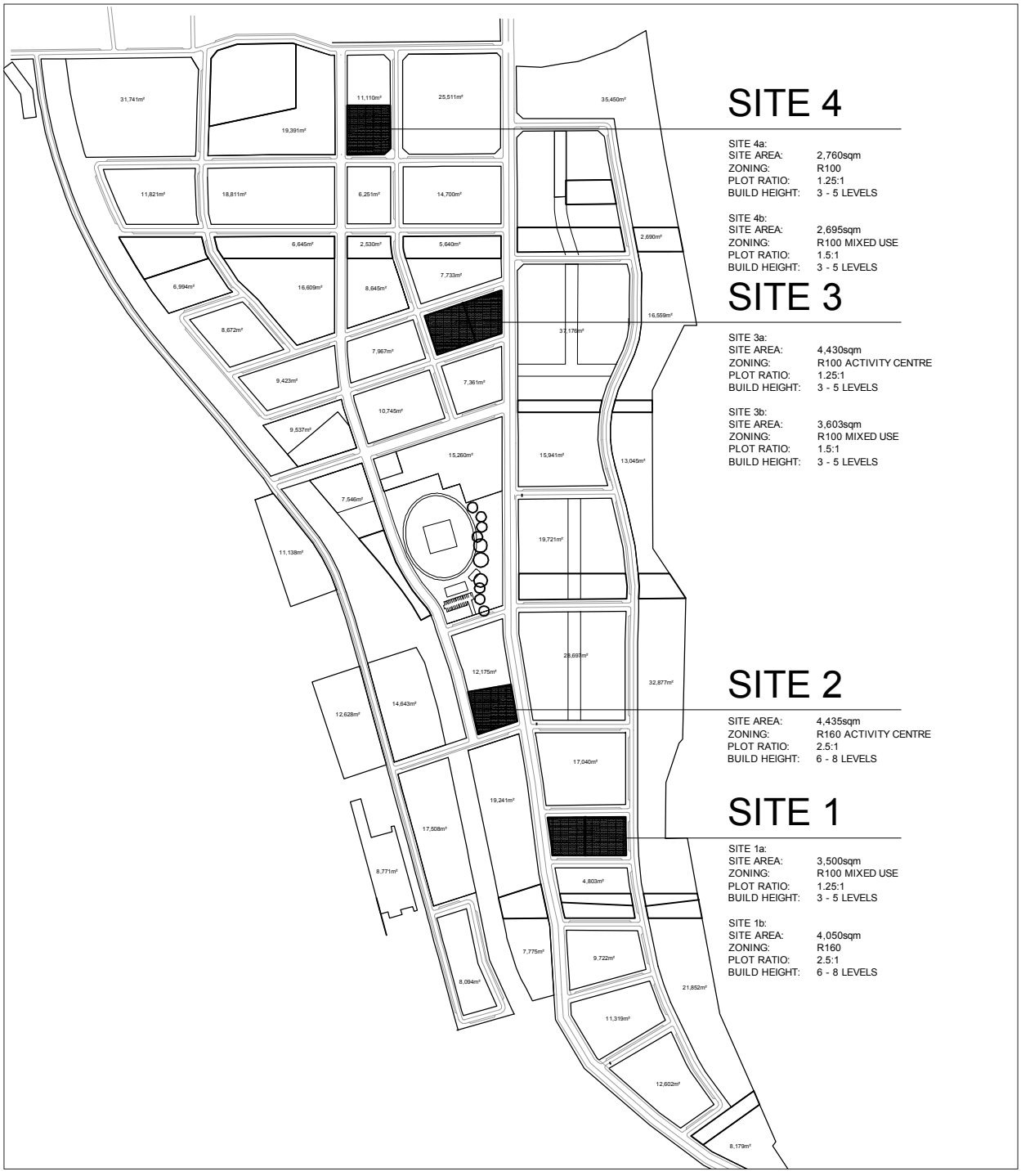
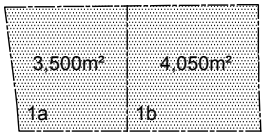


Figure 2_Development Scenario Sites

SITE 1

SITE 1a:
SITE AREA: 3,500sqm
ZONING: R100
PLOT RATIO: 1.25:1
BUILD HEIGHT: 3 - 5 LEVELS

SITE 1b:
SITE AREA: 4,050sqm
ZONING: R160
PLOT RATIO: 2.5:1
BUILD HEIGHT: 6 - 9 LEVELS



COMBINED AREA:
7,550m²

COCKBURN COAST -AFFORDABLE HOUSING DEVELOPMENT STUDY

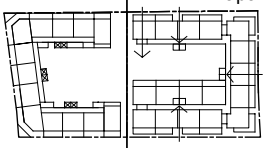
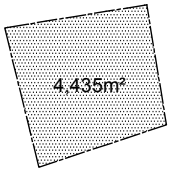
Site 1a 3,500sqm	Site 1b 4,050sqm
R100 PR=1.25:1 4,375sqm	R160 2.5:1 10,125sqm
Complying Development: 32 Aparts@95sqm + 1,375sqm Retail/Comm	Complying Development: 107 Aparts@95sqm
+ 30 % = 5,687sqm 45 aparts + 1,375sqm Retail/Comm	+ 30 % = 13,162sqm 138 aparts
+ 40 % = 6,125sqm 50 aparts + 1,375sqm Retail/Comm	+ 40 % = 14,175sqm 149 aparts
13 aparts/level  4 levels = 52 aparts 5 levels = 65 aparts 3 levels = 39 aparts	17 aparts/level 6 levels = 102 aparts 7 levels = 119 aparts 8 levels = 136 aparts

Figure 3_Site Options 1A and 1B

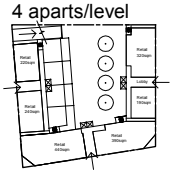
SITE 2

SITE AREA: 4,435sqm
ZONING: R160 ACTIVITY CENTRE
PLOT RATIO: 2.5:1
BUILD HEIGHT: 6 - 9 LEVELS



SITE AREA:
4,435m²

4 aparts/level



2 Lifted Option

COCKBURN COAST -AFFORDABLE HOUSING DEVELOPMENT STUDY

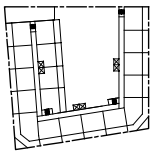
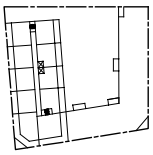
Site 2 4,435sqm	
R160 PR=2.5:1 11,087sqm	
Complying Development: 98 Aparts@95sqm + 1,800sqm Retail/Comm	
+ 30 % = 14,413sqm 133 aparts@95sqm + 1,800sqm Retail/Comm	
+ 40 % = 15,522sqm 144 aparts@95sqm + 1,800sqm Retail/Comm	
18 aparts/level  8 levels = 98 aparts 8 full levels = 130 aparts 9 full levels = 148 aparts	10 aparts/level  Complying 8 Level Option Upper Level Plan

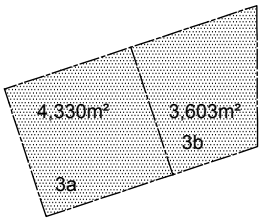
Figure 4_Site Option 2

8.0____Development Feasibility

SITE 3

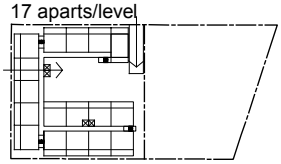
SITE 3a:
SITE AREA: 4,430sqm
ZONING: R100 ACTIVITY CENTRE
PLOT RATIO: 1.25:1
BUILD HEIGHT: 3 - 5 LEVELS

SITE 3b:
SITE AREA: 3,603sqm
ZONING: R100 MIXED USE
PLOT RATIO: 1.5:1
BUILD HEIGHT: 3 - 5 LEVELS



Combined Site Area:
7,933m²

17 aparts/level



3a Lifted Option

COCKBURN COAST -AFFORDABLE HOUSING DEVELOPMENT STUDY

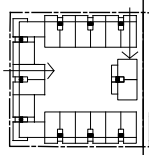
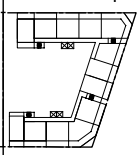
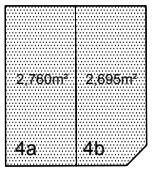
Site 3a 4,330sqm	Site 3b 3,603sqm
R100 PR=1.25:1 5,412sqm	R100 1.5:1 5,405sqm
Complying Development: 57 Aparts@95sqm (3 levels walkup)	Complying Development: 42 Aparts@95sqm + 1,455sqm Retail/Comm
+ 30 % = 7,036sqm 74 aparts (4.5 levels lifted)	+ 30 % = 7,026sqm 59 aparts@95sqm + 1,455sqm Retail/Comm
+ 40 % = 7,577sqm 80 aparts@95sqm (5 levels lifted)	+ 40 % = 7,567sqm 64 aparts@95sqm + 1,455sqm Retail/Comm
20 aparts/level  3 levels = 57 aparts (walkup) 4.5 levels = 74 aparts (lifted) 5 levels = 80 aparts (lifted)	13 aparts/level  4.5 levels = 42 aparts 5.5 levels = 59 aparts 6 levels = 64 aparts

Figure 5_Site Options 3A and 3B

SITE 4

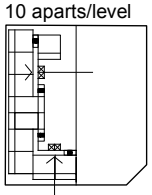
SITE 4a:
SITE AREA: 2,760sqm
ZONING: R100
PLOT RATIO: 1.25:1
BUILD HEIGHT: 3 - 5 LEVELS

SITE 4b:
SITE AREA: 2,695sqm
ZONING: R100 MIXED USE
PLOT RATIO: 1.5:1
BUILD HEIGHT: 3 - 5 LEVELS



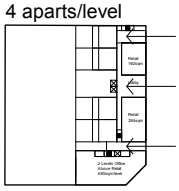
COMBINED AREA:
5,455m²

10 aparts/level



4a Lifted Option

4 aparts/level



4b Ground Floor

COCKBURN COAST -AFFORDABLE HOUSING DEVELOPMENT STUDY

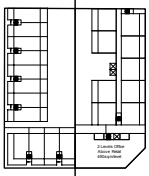
Site 4a 2,760sqm	Site 4b 2,695sqm
R100 PR=1.25:1 3,450sqm	R100 1.5:1 4,042sqm
Complying Development: 36 Aparts@95sqm (3 - 4 levels walkup/lifted)	Complying Development: 22 Aparts@95sqm + 1926sqm Retail/Comm
+ 30 % = 4,485sqm 47 aparts (5 levels lifted)	+ 30 % = 13,162sqm 35 aparts (4.5 levels) + 1926sqm Retail/Comm
+ 40 % = 4,830sqm 51 aparts (5.5 levels lifted)	+ 40 % = 14,175sqm 39 aparts (5 levels) + 1926sqm Retail/Comm
12 aparts/level (10 aparts/level lifted development)  3 levels = 36 aparts	9 aparts/level 3 levels = 22 aparts 4 levels = 31 aparts 5 levels = 40 aparts

Figure 6_Site Options 4A and 4B

8.0____Development Feasibility

Site Option 4B
_Site area 2,695sqm
_R100 Mixed Use
_Plot Ratio 1.5:1
_3 - 5 levels
_Retail commercial 1,926 sqm
_9 apartments per level
_Ownership:

In effect the four conceptual developments resulted in seven individual sites. It should be noted that the configuration of the lots affects the ability to design an efficient building. For example, Site 4, which CCDSP Pt 2 shows as being partly Mixed Use and partly Residential resulted in two long, narrow development sites corresponding with each land use type, which are difficult to efficiently develop.

8.2 Scenario Feasibility Assessment

The development scenarios described in 8.1 were then used to test development feasibility.

The intent of the feasibility assessment was to establish whether there is an incentive structure related to density and height bonuses that will enable private sector delivery of affordable dwellings as defined by the thesis of JSA 2011.

The two principal factors that measure feasibility for the private sector will be the level of profitability and residual value to land.

'Base Case' development feasibilities were established for each 'complying' site concept option outlined in 8.1, and the residual value of land and developer profit margin measured.

The viability of increasing plot ratio/ height (bonus) and delivering a quantum of affordable dwellings could then be measured by change in residual value of land or change in profitability. In view of the attitudes expressed in the developer survey (refer to 5.2), the developer margin or profitability ratio was 'fixed' as this would be a very sensitive factor at market, impacting the desire of developers to participate.

Ultimately, nine sets of feasibility calculations were prepared for each development site.

For each plot ratio scenario, a residual value analysis was done based on 20% provision of affordable housing, and 10% provision. For each of these, two Sub Sets with differing sales prices for the affordable product were analysed.

Sub Set A assumed that the sale price of affordable stock is set at the 'actual delivery cost'. Sub Set 1B assumed the sale price is set at the price range established by JSA 2011.

In each case, the balance increase in dwelling yield is provided to the developer as an offset and incentive, for sale.

Interpreting the Results
The results of the analysis are shown in Table 5.

If the percentage change from the Base Case is negative, it implies that the addition of plot ratio/height and requiring delivery of affordable dwellings is not feasible.

A 'no change' (0%) outcome in the residual land value means the 'bonus' yield has traded off the delivery of 'affordable' stock and not disadvantaged the developer profit margin or the notional market value of land.

An increase in the residual land value outcome demonstrates the 'bonus' yield has provided a benefit to the developer in the delivery of 'affordable' stock, in that the increase in land value will in reality translate to improved profit, however over time economic principles of demand and supply will see this benefit transfer to improved site values.

8.0 Development Feasibility

Table 6: Residual Value Output Analysis

Site	Base Case	Scenario 1 Subset 1A		Scenario 2 Subset 1A		Scenario 1 Subset 1B		Scenario 2 Subset 1B		Scenario 1 Subset 2A		Scenario 2 Subset 2A		Scenario 1 Subset 2B		Scenario 2 Subset 2B	
		Affordable dwelling yield = Base Case + 20%								Affordable dwelling yield = Base Case + 10%							
		Balance of Yield Increase to Developer for sale															
		Sale Price of Affordable dw = cost to developer		Sale Price of Affordable dw = cost to developer		Sale Price of Affordable dw = JSA 2011		Sale Price of Affordable dw = JSA 2011		Sale Price of Affordable dw = cost to developer		Sale Price of Affordable dw = cost to developer		Sale Price of Affordable dw = JSA 2011		Sale Price of Affordable dw = JSA 2011	
		Residual value to land	Change from BC	Residual value to land	Change from BC	Residual value to land	Change from BC	Residual value to land	Change from BC	Residual value to land	Change from BC	Residual value to land	Change from BC	Residual value to land	Change from BC	Residual value to land	Change from BC
1A	$1,074	$246	(77%)	$200	(81%)	$46	(96%)	$0	(100%)	$280	(74%)	$234	(78%)	$183	(83%)	$137	(87%)
1B	$1,094	$857	(21.7%)	$877	(19.9%)	$220	(79.9%)	$240	(78.1%)	$965	(11.7%)	$985	(9.9%)	$642	(41%)	$662	(40%)
2	$1,026	$1,057	3%	$1,103	7%	$462	(55%)	$510	(50%)	$1,026	0%	$1,204	17%	$722	(30%)	$909	(11%)
3A	$1,169	$217	(81%)	$217	(81%)	NA	Not Feasible	NA	Not Feasible	$275	(76%)	$275	(76%)	$152	(87%)	$152	(87%)
3B	$1,010	$1,243	23%	$1,299	29%	$944	(7%)	$1,002	(1%)	$1,288	27%	$1,346	33%	$1,124	11%	$1,182	17%
4A	$1,130	$109	(90%)	$109	(90%)	NA	Not Feasible	NA	Not Feasible	$167	(85%)	$156	(86%)	$72	(94%)	$22	(98%)
4B	$1,577	$942	(40%)	$1,058	(33%)	$764	(52%)	$876	(44%)	$1,032	(35%)	$1,076	(32%)	$942	(40%)	$987	(37%)

Source: Colliers 2012

Conclusions on Feasibility

Site 3B proved to be the most workable configuration. The feasibility analysis concluded that one form of proposed development can reasonably be expected to yield affordable housing by the private sector through application of the incentive of a 40% plot ratio bonus: 3 - 5 storey development in the R80 coded areas shown on Figure 1.

If all private land were to be developed to take advantage of a 40% plot ratio bonus and related height concessions where required, 5% affordable housing would result.

In higher density, higher-rise locations, the 40% plot ratio bonus for the provision of affordable product would not be feasible in the current development climate.

9.0____Recommended Strategies

9.1 Overview

Recommended strategies to promote the provision of affordable housing in the Cockburn Coast project area are summarised by sector below, and in Table 5.

Statutory planning provisions are primarily the responsibility of the City of Cockburn to introduce and enforce, and will influence the potential yields and financial viability of development provided by all sectors. Through the Department of Planning, the State Government can also influence planning policy throughout Western Australia.

Non-statutory strategies to encourage affordable housing provision are possible from all sectors.

The strategies recommended below should be utilised to acheive a diversity of affordable housing product (i.e mix of single, double, three bedroom dwellings). Both private and state government developers alike should ensure that the strategies adopted by their development should ensure this diversity is acheived.

9.2 State Government

9.2.1 Provision of Affordable Housing on State Land

All State Government land and housing development agencies are required to contribute a minimum of 15% of project yields to affordable price points. In order to ensure the provision of the 15% requirement, all state agencies will develop their own strategy for the delivery of affordable housing within the Cockburn Coast.

Within the Cockburn Coast project area, approximately 34.5 hectares of development land is owned by State Government agencies. Based on the land use and density proposals in CCDSP Pt 2, this would equate to approximately 504 affordable dwellings.

State Government agencies should approach the delivery of affordable housing at a rate of 15% by drawing upon all options available. This would include plot ratio bonuses, Public Private Partnerships and other strategies outlined in this strategy. In reference to State owned land, it is likely that some of this land will ultimately be offered for sale to the private sector. There is an opportunity here to make it a condition of sale that a minimum of 15% of the resultant development dwelling yield must be 'affordable' product. It must be noted that such a requirement will affect the value of the land, which will be a factor in the relevant business case.

In addition, all residential development would be eligible for a plot ratio bonus for the provision of affordable product, meaning that further affordable product on top of the required 15% could potentially be achieved on State Government land.

9.2.2 Social Housing

The Department of Housing has a mandate to provide social housing. It is envisaged that up 5% of housing stock will be provided as Social Rental Housing. This would equate to around 260 dwellings based on an estimated 5,200 dwellings overall.

9.0____Recommended Strategies

9.2.3 Public Private Partnerships

The various options for public private partnerships should be pursued to achieve affordable housing outcomes in Cockburn Coast, including:

_Discounted land
_Purchase of dwellings
_Equity contribution
_Underwriting sales

9.2.4 Perpetuity

All development providing affordable housing should aim to provide a minimum of 50% of affordable product in perpetuity.

9.3 Private Sector

The feasibility analysis demonstrates that if a plot ratio bonus of 40% is offered for the provision of 20% above the base development dwelling yield as affordable housing, there is every possibility that private sector developers of land within the R80/3 - 5 storey land use areas depicted in Figure 1 will deliver affordable housing product, even under current conditions.

A bonus should be offered across all parts of the project area, as in the future conditions may well change such that the availability of this incentive will also be viable in higher density/higher rise configurations.

It is recommended that a sliding scale of plot ratio bonus be made available for the provision of affordable housing, as follows:

_10% Affordable yield: 30% plot ratio bonus
_20% Affordable yield: 40% plot ratio bonus
_25% Affordable yield: 50% plot ratio bonus

Other forms of incentive can and should be available to the private sector for the provision of affordable product, however on their own, these are unlikely to have much impact on yields but may influence developer decisions and feasibilities.

It is likely that to ensure the success of this stratgy a committee will be formulated to guide and assist private land developers in the delivery of affordable housing to be covened on an ‘as-needs’ basis. This should assist in the fostering of relationships between private land owners and the key stakeholders in the provision of affordable housing.

All development providing affordable housing should aim to provide a minimum of 50% of affordable product in perpetuity.

9.0____Recommended Strategies

Table 7: Affordable Housing Mechanisms for Cockburn Coast

Mechanism	Responsibility
Plot ratio bonus	City of Cockburn
Development standards concessions	City of Cockburn
Development conditions	City of Cockburn, WAPC as appropriate
Fast tracked approvals	City of Cockburn, WAPC as appropriate

9.4 Statutory Planning Provisions

9.4.1 Overview

The District Structure Plans (Parts 1 and 2) have no statutory weight in their own right, as they have not been adopted under City of Cockburn Town Planning Scheme No. 3. Accordingly, a local structure plan must be prepared for each local structure plan area defined in the District Structure Plan Part 2, for adoption under the scheme.

It is important to reiterate the statement in the 2009 District Structure Plan that, "Precise lot and dwelling yields will only be known as detailed subdivision design progresses. The design phase of works will occur as part of the implementation of the structure plan, thus ensuring that each stage is carefully planned for site responsiveness." In other words, preliminary estimates of yield are just that - estimates, not guarantees.

It would not be reasonable to expect final yields to match early estimates exactly. What would be reasonable is for detailed design to be undertaken with the aim of getting as close to the original estimates as possible.

The Local Structure Plans will be the primary source of development guidance for subdivision and development, along with associated design guidelines and detailed area plans, where applicable.

This section identifies elements for inclusion in the structure plans and supporting statutory instruments that will be relevant to ensuring that the aspirations for provision of affordable housing are carried through to implementation. The scope of content for these documents can only encompass matters that can be directly implemented through the planning system. Other mechanisms for encouraging affordable housing provision (eg: tax incentives) will be at least as important as planning mechanisms, but are necessarily beyond the capacity of the planning system to enforce.

9.4.2 Local Structure Plans

The City of Cockburn requires the Local Structure Plans for Cockburn Coast to include discussion of how affordable housing provison targets from the District Structure Plans will be achieved. In particular, they are required to identify specific measures to achieve the targets, to the satisfaction of the City of Cockburn and the WAPC.

Residential Density

TPS 3 requires achievement of at least 85% of dwelling yield possible under the R-Codes allocated within each Local Structure Plan. The challenge with

9.0____Recommended Strategies

this measure is the in areas coded higher than R30, site area can not be used as a simple measure of a site's potential yield. Instead, plot ratio dictates the amount of development in terms of floor area. However initial yield estimates for Cockburn Coast were based on site area and R-Codes, the method that was current at the time.

Feasibility analysis undertaken for this strategy indicates that in current circumstances, the areas identified as R80 with a height between 3 and 5 storeys is likely to be the most attractive to developers wishing to take advantage of a bonus plot ratio in return for providing affordable housing. However the bonus opportunity should be available throughout the project area, as market conditions will change and with them, the feasibility of different development types.

Final allocation of R-Codes within the Local Structure Plans must be carefully considered in relation to the potential for subdivision to accommodate the desired building types. Subsequently, subdivision of land must ensure that the lots created are capable of accommodating at least 85% of the dwelling yield in the buildings that can be constructed upon them.

Table 7 summarises the recommended ways in which the Local Structure Plans should respond to affordable housing targets.

Table 8: Recommended Content for Local Structure Plans

Element	Pre-Requisite	Comment
Specify that site yield is calculated based on site area, for the purposes of assessing minimum 85% yield	NA	This is necessary to avoid confusion between the provisions of the Planning Scheme and the way in which the R-Codes apply to land coded above R30.
Plot Ratio bonus for the provision of affordable housing, as follows: Affordable yield 10% = 30% bonus Affordable yield 20% = 40% bonus Affordable yield 25% = 50% bonus		Feasibility analysis for this strategy has indicated that a plot ratio bonus could provide an incentive for provision of affordable housing, particularly in 'low rise' R80 areas.
Guidance for future subdivision on optimal lot dimensions to accommodate the different building typologies intended for the each precinct.	Clear understanding of the optimal lot dimensions for different building typologies.	Inadequate lot dimensions can limit the design and hence yield options. Not directly related to provision of affordable housing but relevant to maximising overall dwelling yield.
Target affordable housing yield for each precinct,	Identification of the likely nature of affordable housing demand in Cockburn Coast (eg: singles, families, aged, etc).	Simply aiming to provide 20% of each housing typology may not meet the true affordable needs profile of Cockburn Coast.
Preferred locations and indicative site areas for affordable housing product according to intended development typology.	Locational criteria for affordable housing appiled to each precinct but should be flexible in its implementation.	Necessary if there specific sites are going to be required to provide affordable housing as a condition of sale.
Define what is meant by the different target dwelling types (ie: ie: detached single dwellings, terrace or row houses, low-rise apartments, medium to high-rise apartments, adaptable buildings, family homes, affordable housing, social housing).	Agreement with stakeholders on what these should be.	The definition should be consistent between precincts. Not necessarily affordable but needs to be understood for all housing or achievement of targets can not be measured.

9.0____Recommended Strategies

9.4.3 Design Guidelines

The City of Cockburn requires the preparation of design guidelines for each local structure plan area, to address amongst other things affordable housing and housing diversity. Affordable housing is a sub-set of all housing and hence housing diversity general will reflect in affordable housing provision.

Table 9: Recommended Content for Design Guidelines

Element	Pre-Requisite	Comment
Minimum and maximum dwelling size for 'affordable' product according to dwelling type (eg: studio apartment, 1 and 2 bedroom apartments, 3 or more bedroom apartments)	Agreement with stakeholders on what these should be.	Should be consistent between precincts. May be decided that there should be no size difference.
Required design elements for each housing type (eg: required storage area size and location for family housing compared with other dwelling types)	Agreement as to whether and what these design elements would be.	Needs to be based on reasonable expectation of user needs.
Design elements to distinguish between the different dwelling types (family housing, adaptable housing, etc)	Agreement as to whether and what these design elements would be.	Not specific to affordable housing so not defined in this strategy but will affect all housing.
Any specific variation to development or design standards applicable to affordable housing product - eg: car parking provision, balcony size	Determine whether variations are necessary or desirable as incentives	These are likely to be both precinct specific where appropriate and applied across all precincts where appropriate.
Required dwelling mix within each development. eg: proportion of adaptable dwellings, family dwellings, 1 and 2 bedrooms, etc.	Agreement with stakeholders on what these should be.	Not necessarily specific to affordable housing. Current R-Codes requirements may be adequate to cover some types.

9.0____Recommended Strategies

9.4.4 Detailed Area Plans

Sites requiring detailed area plans will be identified in the Local Structure Plans. The City of Cockburn requires detailed area plans for activity centres, which means that both the Robb Jetty Precinct and the Power Station Precinct Local Structure Plans will include reference to detailed area plans.

With regard to affordable housing, detailed area plans should identify:

_Any sites that will be required to accommodate affordable housing product

_The target and minimum affordable housing yield for each development site required to accommodate affordable housing product

_The target and minimum dwelling type mix for each development site

9.4.5 Development Control and Conditions of Approval

To the extent necessary, conditions will be put on development and subdivision approvals by the relevant planning authority (City of Cockburn, Western Australian Planning Commission, Development Assessment Panel) to ensure that affordable housing is actually delivered and managed as expected. This will be particularly important where bonuses or incentives have been taken. Conditions may cover such things as:

_Evidence that the affordable product will be managed as such by a recognised affordable housing provider

_Minimum period of time for which product will remain 'affordable'

_Requirement for restrictive covenants to prevent sale or occupation of dwelling approved as affordable to non-eligible buyers or occupants to ensure 'affordability in perpetuity' (however note that monitoring of restrictive covenant compliance would have administrative implications)

i **Appendix A**
Colliers Housing
Affordability Modelling
Assessment



Cockburn Coast District Structure Plan
Property Consultancy Services,
Affordable Housing Strategy
Property Research and Market Testing

January 2012 – May 2012

PREPARED BY:
Colliers International Valuation & Advisory Services

480 offices in 61 countries worldwide
This business is independently owned and operated by Colliers International (WA) Pty Ltd
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Ref: V513065

Cockburn Coast District Structure Plan
Affordable Housing Strategy
Property Research,
Executive Summary

Report Details

Instructing Party	**Reliant Party**	Hassell and LandCorp
Ms Denise Morgan Senior Associate Podium Level, Central Park 152 – 158 St Georges Terrace Perth WA 6000	**Purpose of Report**	Assist in the Preparation of an Affordability Strategy for Cockburn Coast
	Date of Initial Backgrounding and Research	January 2012 - May 2012

Preamble

The Cockburn Coast District Structure Plan (DSP) has been prepared to guide future land use and transport initiatives within the area stretching between South Beach in South Fremantle and the Port Coogee marina.

The plan has been developed over several years in conjunction with local government and state government agencies, with a focus on community and landowner consultation.

The form of development contemplated for the corridor is predominantly medium/high density mixed use apartments (multiple dwellings), and less than 10% single attached/detached dwellings.

The Cockburn Coast District Structure Plan (DSP), which was endorsed by the WA Planning Commission in 2009, envisages a population of 10,800 residents throughout Cockburn Coast with an employment base of approximately 3,600 jobs.

Key considerations in the development of the plan included:

1. State Government policy, particularly support for infill development as the metropolitan population increases;
2. Appropriate interface with the surrounding areas of South Beach and Port Coogee;
3. Regional public transport and road network connections, with significant consideration given to connections with Fremantle;
4. Regional infrastructure requirements;
5. Likely demographic projections and requirements;
6. Improving access to the beach and Beeliar Regional Park;
7. Existing industrial operations and transitioning arrangements for these uses over time; and
8. Providing an appropriate framework to encourage the regeneration of the South Fremantle Power Station.

LandCorp require an Affordable Housing Strategy to deliver on the DSP targets set for the Cockburn Coast. Hassell, with sub-consultants Colliers, have provided a scope of works, process and fee to develop a strategy that will assist to facilitate the provision of affordable housing through the Local Structure Plan (LSP) process (and enforced further through Design Guidelines). LandCorp as a major landowner in the project area has an imperative and the mandate to provide affordable housing. Yet to be determined are the housing typologies, tenure arrangements, location and mechanisms to deliver affordable product to market. With regard to the private land holdings there are currently no tested statutory powers at State or Local level to enforce the provision of affordable housing.

The challenge is to devise an incentive based strategy to encourage private developers to meet the targets set in the DSP.

Property Scope

1. Synthesise the ideas and measures tabled within;
    a. Judith Stubbs and Associates, December 2010, Achieving Affordable and Diverse Housing in Regeneration Areas in Western Australia; Report 2 Planning Mechanisms and Strategies (Final Draft not for circulation).
    b. Judith Stubbs and Associates, April 2011, Achieving Affordable and Diverse Housing in Regeneration Areas in Western Australia, Report 1 Profile of Selected Redevelopment Areas.
2. Prepare commentary on the principles concluded by Stubbs as they apply to medium/high density property development in the current market.
3. Research secondary data for examples of private sector delivery of affordable housing in medium/high density built form.
4. Prepare a questionnaire for primary data research. Present the questionnaire by direct interview to a sample of eight to twelve Western Australian and national built form developers active in the medium/high density residential market. The aim of the questionnaire is to gauge/confirm developer principles in feasibility analysis plus attitudes on affordability and delivery thereof, plus extract alternate ideas/options in delivery.
5. Collate/synthesise the findings/observations of items 1 to 4 above and conclude a series of incentive structures and localised strategies that provide practical and realistic prospects for delivery.
6. Test the feasibility of the concluded incentive structures on notional development sites in the Cockburn Coast Area.
7. Where incentive structures prove workable, refer the strategies to the developer group for comment feedback/critique and improvement.
8. Provide summation of above to Hassell for incorporation into an Affordable Housing Strategy for Cockburn Coast.

Observations

Literature Review

Stubbs 2010[1] and Stubbs 2011[2] establishes a need for affordable housing and sets a dwelling and rental pricing framework that meets the needs of very low, low and moderate household incomes.

Stubbs 2010 establishes three core approaches to enabling (mandating) the delivery of affordable dwellings;

1. Statutory and Policy approach via legislation or Town Planning Schemes - Developer Scheme contributions;
2. Private sector partnering with not for profit and local and state governments; and
3. A mixture of 1 and 2 above through incentivisation of planning schemes enabling density bonuses supplemented by compensation or other support schemes with local and state governments and not for profit organisations.

The Stubbs 2010 core approaches are confirmed by research of Austin 2008[3] and Gurran et al 2008[4] who also illustrate by case study the prevalence of government intervention in the delivery of affordable dwellings nationally and internationally. No examples of 'pure' private sector delivery of affordable dwellings is cited and for the most part, case studies illustrate government incentives in density bonuses supplemented by various mechanisms including provision of funding grants, taxation offsets, discounted land value and other assistance measures. This activity in supply of affordable dwellings is in most cases supplemented by not-for-profit organisations providing various forms of community and housing aid.

Local market activity in the supply of affordable dwellings in a medium to high density residential format is essentially limited to Department of Housing and organisations such as Foundation Housing. Department of Housing for the most part, engage in the market by acquiring a proportion of the product at full market value and then allocating this to social housing, affordable rental and shared equity schemes that target essential workers and first home buyers. Foundation Housing is a not-for-profit that utilises 'gifted' land and/or government grants to fund and deliver affordable dwellings, of which the greater volume remains group or detached housing.

[1] Judith Stubbs and Associates, December 2010, Achieving Affordable and Diverse Housing in Regeneration Areas in Western Australia; Report 2 Planning Mechanisms and Strategies (Final Draft not for circulation).
[2] Judith Stubbs and Associates, April 2011, Achieving Affordable and Diverse Housing in Regeneration Areas in Western Australia, Report 1 Profile of Selected Redevelopment Areas
[3] Austin Patricia M., April 2008, Public Private Partnerships For Funding Affordable Housing Developments In New Zealand, Waitakere City Council
[4] Gurran Nicole, Milligan Vivienne, Baker Douglas, Bugg Laura Beth, and Christensen Sharon, June 2008, New Directions in planning for affordable housing: Australian And international evidence and Implications, Australian Housing And Urban Research Institute. Sydney Research Centre.

Observations Cont'd

Developer Perspective

Broadly the developer interviews established;

- Support for the housing typology and densities of the Cockburn Coast Master Plan,
- Indicated the proportion of 'low' density dwellings (terraces/town houses and cottage lot residential) as too low,
- Considered critical the need for early infrastructure delivery to engage the market in the location and product typology, and cited as important;
    - Transport,
    - Retail and convenience amenity,
    - Community/civic services,
    - Schools,
    - Recreational amenity, and
    - Employment.
- Acknowledged the need for the delivery of affordable dwellings but several questioned the appropriateness of product typology and location.
- All accepted but questioned the delivery of affordable dwellings at the price points of Stubbs 2010 in view of current price points for land, product typology, demand, current apartment price points and cost of construction.
- All confirmed a view the supply of affordable dwellings should be a role of governments but accepted the need for private sector engagement.
- Delivery and/or funding of affordable dwellings through developer scheme contributions were oft described as 'another tax' and clear resistance to this approach emerged. All acknowledged an acceptance of simplified developer scheme contributions linked to gross realisation and on completion market values (or similar) with deferred payment citing the need for clarity and minimising the impost on development feasibility and price setting for land.
- All indicated the inclusion of affordable dwellings either via developer scheme contributions or mandating of delivery will affect the attitudes of developers to the precinct when making development site selection decisions, and confirmed a general view it will have a negative impact on the residual value of land.
- All developers indicated a positive interest in partnering and joint venture opportunities with local and state government, and not-for-profit organisations in developing and delivering affordable dwellings.
- The developers acknowledged and accepted incentive schemes providing height and density bonuses but in view of the already high (relative to broader market) densities established in the Cockburn Coast Master Plan, questioned the inference (Stubbs 2010) that sufficient additional profit could be realised to offset the cost of affordable dwelling supply.
- A key concern raised by developers is the risk of stigma arising at market with the knowledge that affordable dwellings will be offered in a proposed development or precinct at such high proportions (20%); particularly if it was known (and it would require disclosure) that Department of Housing had acquired the stock. A clear risk mitigation strategy would be required by way of public education and branding (the difference between social housing and affordable housing) together with site selection and application. This is premised on the DSP aspirational target of 20% affordable dwellings.
- In closing, the issue of governance was raised. Who will coordinate, administer and manage the affordable dwellings such that they are retained as 'affordable dwellings' in perpetuity?

Observations Cont'd

Incentive Based Delivery and Feasibility

The aim of this paper is to test whether incentive based schemes for the delivery of affordable dwellings is feasible in the context of the Cockburn Coast Master Plan. To this end Hassell and Colliers selected four sites of which several could be split into two components; the net effect is seven test sites that illustrate the range of heights and density across the Cockburn Coast Master Plan, and also meet fundamental needs of transportation access and walkable amenity.

Development yields were established under notional concepts conforming to the broad statutory provisions of the Cockburn Coast District Structure Plan and Cockburn Coast Master Plan; the Base Case. Two additional yield scenarios were prepared for each site premised on an increase in plot ratio (and height as required) of 30% (Scenario 1) and 40% (Scenario 2).

The yield increase in Scenario 1 and Scenario 2 was allocated to reflect affordable dwellings at 10% of Base Case Yield and 20% of Base Case Yield with the balance provided to the developer for sale to offset the financial impact of providing the affordable dwellings.

On the premise developers would not compromise profitability, residual value feasibilities were developed to establish whether the increase in yield could sufficiently offset the financial impact of providing the affordable dwellings at two designated ('affordable') price points. The price points elected are the actual cost of the affordable dwellings to the project and then at the price point range cited in Stubbs 2010.

The feasibility testing indicated that across the various sites and whilst cognisant of character of location, scale and contemplated built form, that in certain circumstances affordable dwellings at 'cost' to the developer and/or at the Stubbs 2010 benchmarks may be feasibly delivered by the private sector whilst maintaining profitability to developers and residual land values.

The results clearly indicate the outcome is particular to a specific scale of site and built form and suggests it is not achievable on all sites through out the DSP.

The most workable configuration is that of Site 3B;

Site 3B	Base Case	Scenario 1	Scenario 2
Site Area m²	3,603	3,603	3,603
Plot Ratio	1.50	1.95	2.10
Plot Ratio - NLA m²	5,405	7,026	7,566
Increase in Plot Ratio		30%	40%
Height (levels)	3.0	4.5	5.0

Figure 1

The Cockburn Coast Master Plan Figure 31 Land Use Plan identifies Site 3B as being contained within the 'Low Density Residential' zone which is broadly described as having a Residential Density Code of R80 and general heights ranging from three to five storeys.

The below extract from the Cockburn Coast Master Plan identifies this land use component as delivering 31.6% of the dwellings or 1,641 dwellings.

Building Typology	Indicative Density	Dwelling Yield	% Component
High Rise	R160	1,300	25.0%
Medium Rise	R120	602	11.6%
Low Rise	R80	1,641	31.6%
Terrace	R40	57	1.1%
Mixed Use	R100	585	11.3%
Activity Centre	R160	1,008	19.4%
TOTAL	-	**5,193**	**100%**

Table 3_Dwelling Yield by Building Typology

Figure 2

Conditioned on the assumption affordable dwellings are delivered by the private sector at the maximum plot ratio/height incentive available (Scenario 2) in this land use zone only; the dwelling yield will increase approximately 50% from 1,641 dwellings to 2,508 dwellings, of which some 341 dwellings are 'affordable dwellings'. This will result in a total yield adjustment from 5,193 to 6,060 and enable an affordable dwelling ratio of 5.6% of the entire Cockburn Coast Master Plan.

Conclusion

The research into delivery of affordable dwellings did not identify a generally applicable model or mechanism that was wholly reliant on private sector delivery.

In the main, case studies clearly establish intervention by governments and not-for-profit organisations through statutory planning and policy in addition to the density incentivisation whilst supplemented with the provision of grants, financial incentives, low cost land or tax abatement whether it be local, state or federal.

In Western Australia, the delivery of affordable dwellings in medium high density formats has been limited to date by the activities of the Department of Housing. The model is premised on the state funding delivery of affordable dwellings through the acquisition of stock at market price and the enabling of stock (also at market price) through partnerships and joint ventures.

There are no known examples of incentivised private sector delivery of affordable dwellings that do not involve some form of government and not-for-profit intervention or support.

The modelling of incentive based schemes enabling plot ratio (and height as required) bonuses to private sector developers to offset the cost of delivery at 'affordable' price points identified a general market failure across the product lines tested with the exception of a regular shaped 'low density' allotment of three to five level; Concept 3B.

The Cockburn Coast Master Plan presently sets aside some 31.6% of the precinct under this land use zone.

The application of 40% plot ratio incentives in this land use zone may enable the delivery of approximately 341 affordable dwellings amounting to 5.6% of total contemplated residential stock.

This is well short of the District Structure Plan aspirational target of 20%.

It is understood, 5% of total stock is to be social housing and will be delivered by the State through Department of Housing.

Additionally, it is understood State policy mandates that development of government held land in brownfield or similar projects now deliver 15% of product as affordable housing. The State through various agencies controls some 40 hectares of land within the Cockburn Coast Master Plan area. Premised on an average yield of R80 and land use efficiency of 65%, a further 312 affordable dwellings maybe delivered equating to 5.1% of total stock. This is premised on there being no overlap between the government land holdings and the abovementioned 'low density' zone. This is a critical assumption and one requiring further analysis and confirmation across the master plan area.

In total, this suggests a delivery of some 15% of total dwelling stock as affordable dwellings is possible inclusive of social housing.

This number maybe further supplemented via partnerships and joint ventures that engage state government and not-for-profits through mechanisms such as application of land at discounted or nil value, the provision of grants or other funding support as well as abatement of local and state taxes for the delivery of higher proportions of affordable to market based product.

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Document Control

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Appendices

A. Developer Survey

B. Hassell Notional Development Concepts and Yields

C. Residual Value Calculations

1 INTRODUCTION

1.1 PREAMBLE

Hassell has been engaged by LandCorp to prepare an Affordable Housing Strategy for the Cockburn Coast.

Colliers has been appointed as sub consultant to provide property research and a 'property perspective' on potential private sector developer delivery modes and mechanisms.

The form of development contemplated for the corridor is predominantly medium/high density mixed use apartments (multiple dwellings low/high rise – 64%), group dwellings/terraces (22%), and 3% single detached dwellings.



Figure 3

Society	Population	Approximately 10 000 people
	Housing stock	1) Approximately 4850 dwellings [1] Minimum 3 per cent separate houses Minimum 22 per cent terrace 2) Minimum 33 per cent low-rise apartments [2] 3) Minimum 31 per cent medium to high-rise apartments [3][4] Minimum 20 per cent affordable housing Minimum 20 per cent adaptable buildings 15 per cent of homes need to be 'family homes'

1 Potential dwelling yield assumes residential build out of the South Fremantle landfill site and the South Fremantle chalet village
2 Low rise apartments - 3 to 5 storeys
3 Medium rise apartments - 6 to 8 storeys
4 High rise apartments - over 8 storeys
5. Adaptable housing refers to dwellings that are adaptable to changing demographics with the ability to transition over time

Figure 4

The Cockburn Coast District Structure Plan (DSP), which was endorsed by the Western Australian Planning Commission (WAPC) in August 2009 (now referred to as Part 1), envisages a population of 10,800 residents throughout Cockburn Coast with an employment base of approximately 3,600 jobs.

The DSP has been prepared to guide future land use and transport initiatives within the area stretching between South Beach and the Port Coogee marina, and sets a framework for future redevelopment of the Cockburn Coast area as an intensive, mixed use urban environment.

Since then the planning for the area has been progressing, and in September 2011 the Cockburn Coast area was rezoned by the WAPC from 'Industry' to 'Urban' under the Metropolitan Region Scheme.

The Draft Cockburn Coast District Structure Plan (Part 2) applies to the Cockburn Coast project area south of Rollinson Road (formerly referred to as the 'Master Plan').

Part 2 has been prepared to build upon the endorsed Cockburn Coast District Structure Plan (2009) Part 1, and to provide the next layer of planning to guide future Local Structure Plans.

It is intended that both the Cockburn Coast District Structure Plan Parts 1 and 2 will be used as guiding documents to inform the preparation of Local Structure Plans which will be a requirement under the Scheme.

Land Use

The following extract from the Draft Cockburn Coast District Structure Plan (Part 2) outlines contemplated land uses.

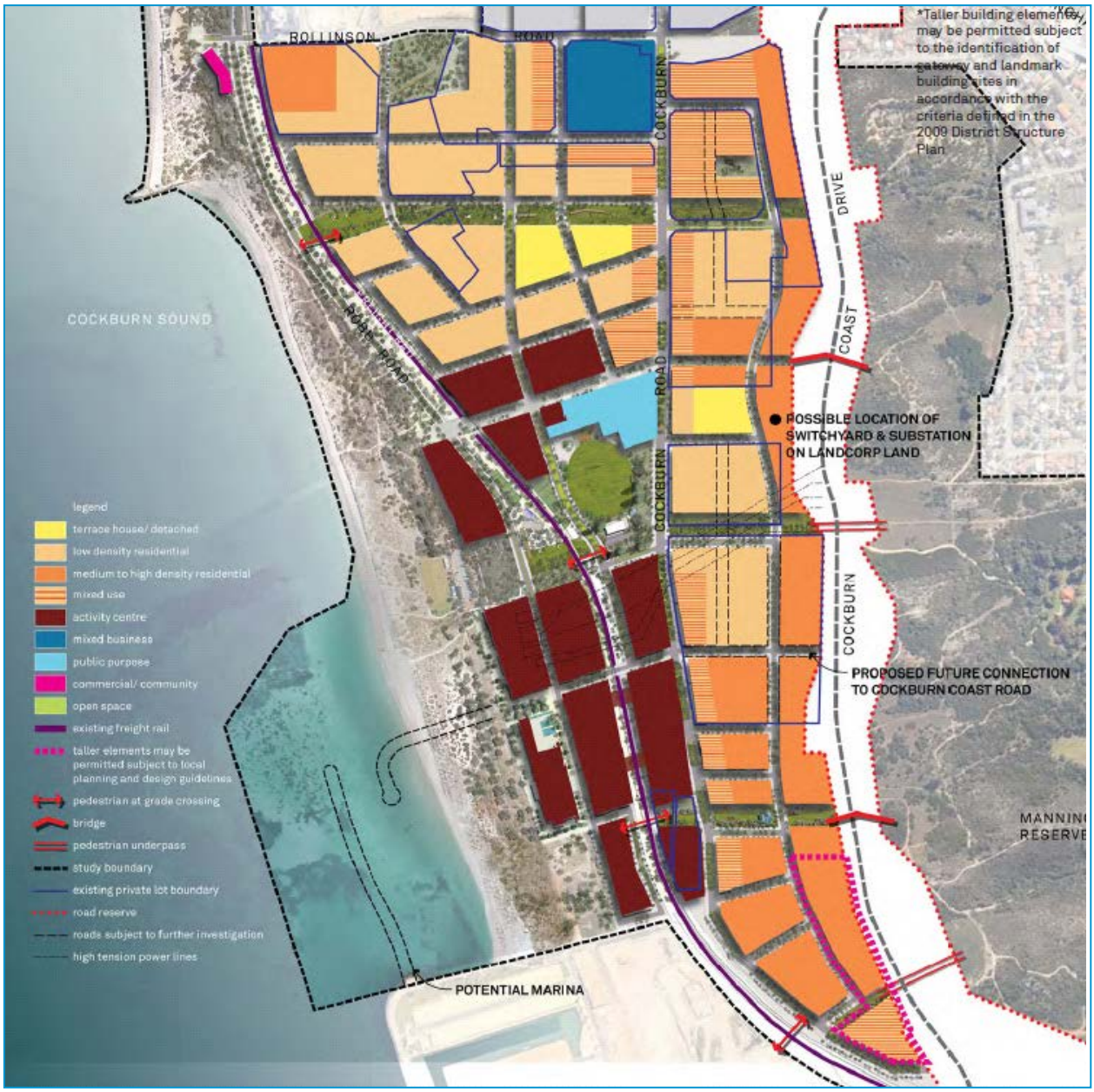

Figure 5

The predominant use is residential and the legend illustrates increasing density from 'yellow' (terrace house/detached) to 'activity centre' (commercial/retail/ and medium to high density residential).

The residential components are further described as 'Single detached', 'Terraced housing', 'Low Rise Apartments (3 - 5 storeys)', 'Medium Rise Apartments (6 – 8 storeys)' and 'High Rise Apartments (above 8 storeys)'.

Conceptually the development form and subsequent yield analysis are illustrated below.

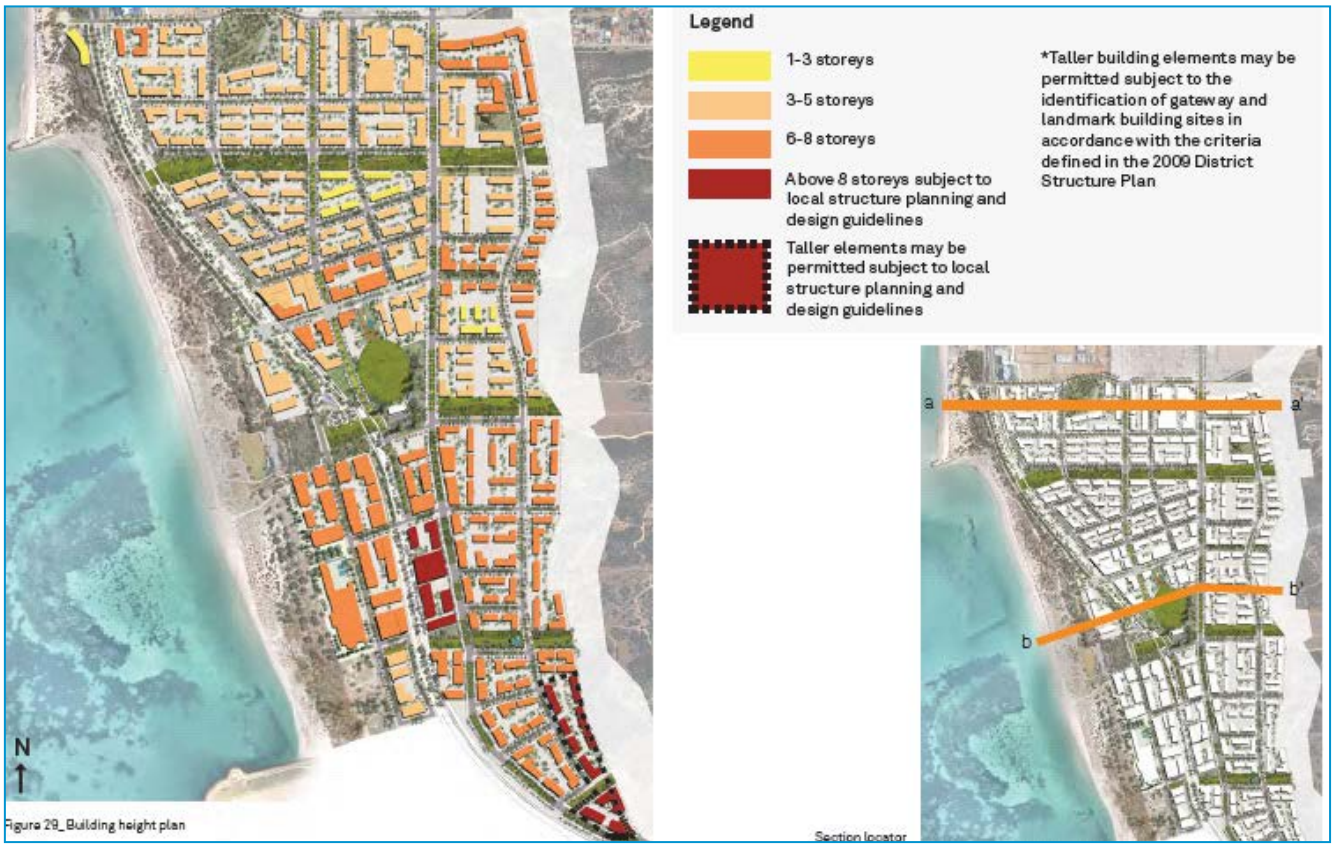

Figure 6

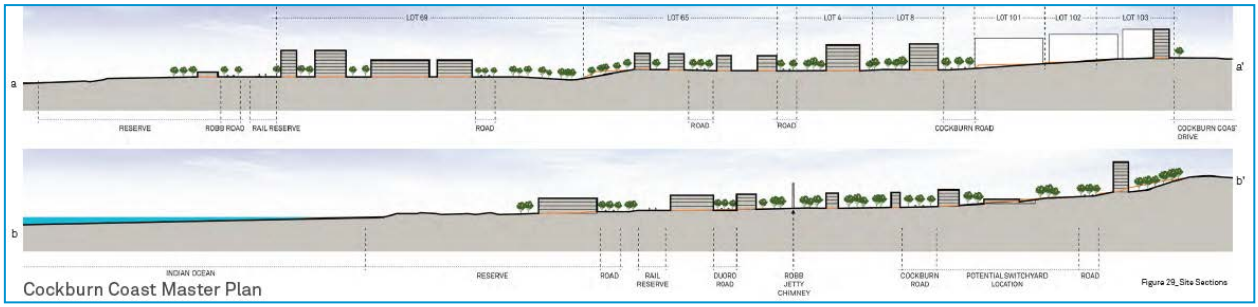

Figure 7

Building Typology	Indicative Density	Dwelling Yield	% Component
High Rise	R160	1,300	25.0%
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Low Rise	R80	1,641	31.6%
Terrace	R40	57	1.1%
Mixed Use	R100	585	11.3%
Activity Centre	R160	1,008	19.4%
TOTAL	-	**5,193**	**100%**

Figure 8



Figure 9



Figure 10

1.2 REPORT SCOPE

The property research and analysis is to inform the development of an affordability strategy for the Cockburn Coast and includes;

1. Synthesise the ideas and measures tabled within;
    a. Judith Stubbs and Associates, December 2010, Achieving Affordable and Diverse Housing in Regeneration Areas in Western Australia; Report 2 Planning Mechanisms and Strategies (Final Draft not for circulation);
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5. Collate/synthesise the findings/observations of items 1 to 4 above and conclude a series of incentive structures and localised strategies that provide practical and realistic prospects for delivery.
6. Test the feasibility of the concluded incentive structures on notional development sites in the Cockburn Coast Area.
7. Where incentive structures prove workable, refer the strategies to the developer group for comment feedback/critique and improvement.
8. Provide summation of above to Hassell for incorporation into an Affordable Housing Strategy for Cockburn Coast.

2 LITERATURE REVIEW

2.1 STUBBS SYNOPSIS

Report 1

The below extracts sourced from Report 1 succinctly define the parameters for affordable dwellings.

'Affordable housing' includes the full range of housing for various types of groups, and special needs accommodation such as group homes, lodging houses, and social (community and public) rental housing for those more disadvantaged in the housing market, to the 'key worker' rental housing, and assisted or subsidised purchase for working households who still require some assistance or support into the home ownership market (Stubbs 2011: pp 6).

Social housing and special use accommodation generally requires 'deep subsidies' to be affordable, and rent is tied to a proportion of the income (generally no more than 25% for a very low – or low – income social housing tenant, for example). Affordable housing for moderate income households including groups like key workers is generally offered at a discounted rate on the rent that would normally apply (typically around 70 – 80% of market rent), or subsidised purchase, shared equity and the like for moderate income purchasers (Stubbs: pp 6).

Affordable housing is different to low cost housing (Stubbs 2011: pp6). 'Affordable housing' is benchmarked against the relevant household income to ensure that a low – to moderate – income household does not fall into housing stress (Stubbs 2011: pp 6).

Low cost housing generally denotes a dwelling that can be purchased or rented for less than other dwellings within an area due to savings related to construction materials or methods, amenity, size or development standards (Stubbs 2011: pp 6).

Using the benchmark of 30% of gross household income as a measure of housing stress, the upper limits of **affordable rents** in Perth SD were calculated as $295 per week for low income households and $440 per week for moderate income households for 2010. For purchasing households, using current interest rates and assuming a 20% deposit, the maximum cost of the dwelling would need to be $230,000 for a low income household and $345,000 for a moderate income household (in 2010 dollars) (Stubbs 2011: pp 6).

Affordable housing is important for social or economic sustainability, and may be regarded as important community infrastructure that supports social and economic diversity and wellbeing (Stubbs 2011: pp 7).

Other relevant factors including relative cost of transport, access to services, and the appropriateness of housing regarding location, type or condition to meet the needs of particular households (Stubbs 2011: pp 5).

It is likely that land values in the development will be high due to the coastal location, and more reflective of South Fremantle and Port Coogee rather than the areas to the east. In addition, some land may carry high remediation costs. Diversity of Zoning has led to varying lot sizes but has not particularly resulted in the diversity of housing. Land values and/or building costs are such that there is not a lot of pressure to take up the density, although there is a demand for density in higher amenity areas just near the marina. Higher density is likely to require a government intervention (Stubbs 2011: pp 36).

Report 2

The lack of affordable housing to rent or buy not only affects the quality of the life of individual families, who may be sacrificing basic necessities to pay for their housing, it also has a serious impact on employment growth and economic development. The loss of young families and workers in lower paid essential service jobs can adversely affect local economies, and is contributing to shortages in some areas of Western Australia. This can contribute to a lack of labour supply among 'key workers' that are essential to various services including childcare, aged services, health care, tourism and hospitality, whose wages do not allow them to access rental or purchase housing close to where they work (Stubbs 2010: pp 5).

The provision of adequate stocks of affordable housing is thus both an efficiency and equity measure in a public policy sense, and can be regarded as necessary 'community infrastructure' to support the objectives of government including the social, economic and environmental sustainability of communities and the Perth Metropolitan Area more generally, social mix and economic growth (Stubbs 2010: pp 5).

Some 'affordable housing' can be provided through the market without the need for subsidy or government intervention, for example, dwellings in smaller and/or in low amenity areas under certain market conditions. However, such dwellings may need to be mandated where the market is reluctant to provide such accommodation, for example, due to considerations of reduced profitability or risk (Stubbs 2010: pp 7).

State Planning Policy 3.6: Development Contributions for Infrastructure potentially provides a powerful tool for requiring mandatory development contributions toward 'affordable housing' as a form of *'community infrastructure'* in areas designated as Development Contribution Areas capitalised under relevant local planning scheme schedules, and where need, nexus, transparency, equity, consistency and accountability are demonstrated (Stubbs 2010: pp 35).

Currently, 'affordable housing' is not provided for under the Policy as either a 'standard requirement' under *Appendix 1*, or *'community infrastructure'* in *clause 5.1 Scope*. However, the definition of 'community infrastructure' as *'the structures and facilities which help communities and neighbourhoods to function effectively including....other services and facilities for which development contributions may reasonably be requested, having regard to the objectives...of this policy'* appear to provide for adequate scope for consideration of 'affordable housing' under this policy (Stubbs 2010: pp 35).

This, particularly given Objectives under clause 4, include meeting of the *'demands arising from new growth and development'* and *'to ensure the social well-being of communities arising from, or affected by, development'* (Stubbs 2010: pp 35).

'...the provision of affordable housing can also be seen as supporting both the wellbeing of the local community in the face of exclusion and displacement as a result of incremental, or more rapid gentrification resulting from redevelopment (Stubbs 2010: pp 35 - 36). The policy provides positive support for the levying of development contributions for 'community infrastructure' in accordance with a Development Contribution Plan under a local planning scheme schedule...' (Stubbs 2010: pp 36).

Market-based mechanisms include those where a developer is required to provide a proportion of dwellings as a prescribed type or tenure in the anticipation that, within that market, such 'low-cost' dwellings would also be 'affordable'. No other subsidy is required and the outcome is generally cost neutral to the developer (Stubbs 2010: pp 68).

Off-market or more interventionist mechanisms include various types of inclusionary zoning, where the developer is required to provide a proportion of the private benefit or profit arising from the planning approvals process for affordable housing, with or without some form of offset or compensation (eg. bonus plot ratio). These types of mechanisms may be cost neutral (where an offset is provided), or may result in some impost on the development. The type of mandatory mechanism used will be highly dependent upon the reasonableness and economic feasibility or equity of the development context. For example, where a major uplift in land or unit value is anticipated due to rezoning and/or significant increase in density or plot ratio to that which would have formally applied, and where nexus considerations are met, mandatory development contributions may be justifiable. Where anticipated profits are lower but there is still clear need and nexus, mandatory mechanisms with compensation (eg. combined with relaxation of controls or bonuses) may be more appropriate (Stubbs 2010: pp 68).

There are effectively four broad ways in which government can use mandatory or inclusionary provisions through market and off-market approaches to achieve affordable housing goals (Stubbs 2010: pp 68).

- Mandatory Provision of Low Cost Dwelling Types/Tenure via the Market.

  The first involves requiring a component of low cost dwelling types or tenures in private market developments. Government does not require a 'contribution' toward affordable housing as such, but assumes that the low cost nature of the stock will provide 'affordability' within the given market.

  As noted....EPRA is currently implementing a range of mandatory mechanisms to achieve a complement of affordable housing in its project precincts, including mandating a proportion of smaller dwellings or of rental housing under certain development scenarios in the expectation that 'low cost' stock would also be 'affordable' or will increase supply of such stock and therefore have a flow on effect to demand/price.

  City of Perth has likewise recently adopted recommendations from a report to incorporate such dwellings within multi-unit developments for amendments to City Planning Scheme No. 2 (Stubbs 2010: pp 69).

- Mandatory Sale of Percentage Land or Dwellings at Cost in Perpetuity

  Other inclusionary approaches include a requirement that a minimum proportion of stock be sold as affordable housing to a nominated not-for-profit housing provider at cost, with or without development concessions to offset lost profit. For example, EPRA requires that 12% of the development of 10 or more dwellings be sold or made available as either social housing or affordable owner/occupier housing for the cost of construction. EPRA prefers that affordable housing be provided on site, scattered throughout the development and indistinguishable from conventional dwellings through comparable design standards, and contain a mix of sizes. The Policy also provides for variations to plot ratio where such housing is provided on site to compensate the developer for foregone profit, though provision of this bonus is at the discretion of EPRA and the affordable housing requirement applies whether or not the bonus is granted. Other positive aspects of the Scheme include a maximum parking requirement and the ability to relax or vary any requirement of the Scheme or any relevant Design Guideline or Development Policy to encourage the incorporation of a 'Preferred Use' into a development.

  Cash in lieu options are also provided for, with the amount payable where dwellings are not provided on site calculated as the difference between the 'open market value' and the 'construction cost' of the dwellings. Appropriate administrative provision to apply, and EPRA or a housing provider nominated by EPRA will use the moneys collected for development of affordable housing within an EPRA area.

  EPRA achieves this in a number of ways, including a covenant of the title on the land sold to developers that can be lifted when the conditions of sale or development approval have been met and, more generally through conditions of consent on the development approval.

  However, there are some limitations to the main mechanisms used by EPRA. The target of 12% appears low compared with assessed need in the Metropolitan Area and case study redevelopment areas. Further, it is quite likely that the yield will not be achieved by relying on the main mechanisms within the current funding policy environment, as social housing providers are likely to lack in the ability to purchase the number of dwellings on offer, especially if the geographic area is not a priority for them. Also, many low – and moderate – income earners are likely to 'fall through the gaps' of DOH's eligibility criteria. Finally, the mandating smaller dwellings will not always guarantee 'affordable housing' in high amenity and gentrifying areas (Stubbs 2010: pp 70).

- Mandatory Percentage of Dwellings at Discount Market Rent or Social Housing Costs for Time Limited Period.

  A variation on the latter form of mandatory mechanism involves requiring that a proportion of dwellings be provided for rental at discount market rent for a time-limited period (generally 10 years) through a registered community housing provider. This represents deferred profit for the developer, who would then be able to sell these dwellings (or rent them at the appropriate market rent) after the defined period, generally realising a capital gain, particularly in a well located area or a buoyant market.

Again, lost profit may be offset through the use of a bonus or similar incentive used in tandem with the requirement to provide time-limited discount market rental units. Alternatively, the requirement to provide time-limited discount market rental may be used as a standalone mechanism where there is likely to be a significant uplift in land values, density and above normal development profit. It is noted that, if used in conjunction with NRAS funding, the refundable tax credits can fully or partly offset the discount market rent in some markets (Stubbs 2010: pp 70).

There is likely to be a major increase in the yields of affordable housing if the affordable housing is provided on land within Hamilton Hill rather than Cockburn Coast itself (eg. on other land owned by Council, a developer, or another public authority or community housing provider). It is likely that yield will double though this may be at odd with aims to provide a social mix on the site (Stubbs 2010: pp 117).

- Mandatory Development Contributions.

Other forms of mandatory mechanisms used in overseas jurisdictions and states such as South Australia and New South Wales under an explicit regulatory regime include mandatory development contributions for affordable housing as a form of 'community infrastructure' or 'public purpose'. Generally, though not always, it is necessary to demonstrate need, nexus and reasonableness. In these cases, a specified proportion of the value of development or anticipated profit above 'normal profit'[5] are provided in cash or in kind (land or units) in perpetuity as affordable rental housing, with appropriate and transparent methods of cost calculation, apportionment administration and accountability.

The development can be levied on the basis of net land area (per SPP 3.6 – Development Contributions), or per dwelling, bedroom or lot created in residential development, and/or for each square metre of floor space created in commercial and retail developments. The latter is relevant in the redevelopment areas, given the likely nexus between the creation of certain types of employment arising from significant commercial and retail floor space and the need for affordable key worker housing in close proximity to work and local services.

Such mandatory contributions have been used to good effect in various international and interstate jurisdictions where research indicates that likely 'windfall' profit is sufficient to make such a requirement reasonable and economically feasible, where there is a reasonable nexus between the development and the need for affordable housing (for example, where redevelopment is contributed to a gentrifying market and/or displacement of traditional lower-income residents) and where the development contribution will not impact upon those in need of affordable housing (for example, where the development is likely to accommodate higher-income earners including those migrating in from other areas in displacing lower-income residents, and will not provide an additional impost upon first home buyers or low-income renters) (Stubbs 2010: pp71).

[5] Stubbs cites in the footnote that normal profit is generally taken as 10%.

2.2 STUBBS SYNOPSIS

Stubbs 2011 presents research on the community needs for affordable housing. This report has determined the price levels that very-low, low-and moderate-income households can afford to pay for rental and owner occupier housing as shown below:

Affordable Housing Benchmarks in Perth SD

	Very low-income household	Low-income household	Moderate-income household
Income Benchmark	<$655-$736 per week	<$984 per week	$984-$1,467 per week
Affordable Rental	<$197-$221 per week	<$296 per week	$296-$440 per week
Benchmarks			
Affordable Purchase	<$153,000 - $174,000	<$230,000 total	$230,000 - $345,000 total
Benchmarks	purchase cost	purchase cost	purchase cost

Table 1

The report documents the proportion of people that are currently experiencing housing stress in the Perth market. Stubbs uses this as the basis for the recommendation that a *minimum 15% affordable rental and purchase accommodation in all new release and redevelopment areas is warranted, and 20% justified.*

Principally, three approaches are contemplated;

1. Raising of Funds via Development Scheme Contributions for Community Infrastructure, or

2. Market based mechanisms where developers are required to provide a proportion of dwellings as a prescribed type or tenure in the anticipation that, within that market, such low-cost dwellings would also be affordable. The proposal contemplates developers delivering up increased levels of profit due to rezoning or density bonuses or where profits are lower, compensation being paid to developers where mandatory mechanisms result in a loss of profits.

3. A mixture of 1 and 2 above through incentivisation of planning schemes enabling density bonuses supplemented by compensation, grants, tax abatements, partnering and joint ventures with both state and local governments and not-for-profit organisations.

2.3 INVESTIGATIONS TO PRIVATE SECTOR DELIVERY OF AFFORDABLE DWELLINGS

In addition to reviewing Stubbs 2011, further investigations were made to establish whether there are examples of private sector delivery of affordable dwellings in Australia and internationally. The research failed to identify examples of where the private sector delivered “affordable dwellings” without some form of community or statutory support in the funding and delivery model.

Austin Patricia M., April 2008, Public Private Partnerships for Funding Affordable Housing Developments in New Zealand, Waitakere City Council: summarises in her research the following essential factors or key components for affordable housing partnerships to achieve desirable affordability outcomes;

- *Access to land or property at reduced cost – including discount market price, leasehold, deferred payments and the effect of planning policy;*
- *Access to finance such as grants, deferred loans or loans at below market interest rates;*
- *The incorporation of debt finance based on a net income stream;*
- *Management expertise; particularly the capacity to manage development risk and ongoing management risk;*
- *Non-profit, charitable or community trust status of housing organisations: enabling profits to be foregone; accessing finance in more favourable terms; and maximising tax exempt status;*
- *A broader range of household incomes for the household group being targeted including moderate income households;*
- *Opportunities for cross subsidisation within and between development(s);*
- *Good quality design that is highly energy and water efficient to minimise residents outgoings;*
- *Local council support through the planning process and through contributions for the partnership of resources and/or implicit subsidies;*
- *The support of the local community;*
- *Mechanisms that retain the housing as affordable into the future.*

Moreover, Austin 2008 further notes that ... *all of the case study partnerships make use of one or more of three key components:*

- *Either land (or property) being available at below market rates, or deferred payments or leasehold;*
- *And/or finance being available in the form of grants, loans at below market rates or deferred interest on loans;*
- *And/or the incorporation of debt finance based on net income stream.*

Where only one of these three key components is used, the schemes rely upon some form of cross-subsidisation from market rate-development or provide affordable housing or shared ownership for moderate-income households. Whilst a number of the partner housing associations have adopted not-for-profit status resulting in reduced development costs, the adopting of non-profit charitable status may be a critical component for some partnerships, especially if targeting low income households, in order to access finance on favourable terms and tax exemptions (Austin 2008: pp3).

Retention as affordable is an important component of almost all of the case studies. This recognises that many of the partners are supportive of the wider community interest (that is the provision of affordable housing for social investment, community and economic development reasons) and not necessarily for individual households to achieve a capital gain (Austin 2008: pp3).

It is important to note that in every case study considered by Austin 2008 the affordable housing delivery mechanism relied on a public private partnership, which in nearly all cases constituted either the local authority, not for profit organisations, state and federal governments. There is not one example where the private sector has outwardly established a role in delivering affordable dwellings where all inputs to the model are kept at the market level. Each case study involved the contribution of land at discounted market rates.

The most relevant Australian case study within Austin 2008 is Inkerman Oasis, Port Phillip, Victoria, Australia.

Inkerman Oasis is a partnership between the City of Port Phillip Council and Inkerman Developments Pty Ltd. In this instance, the council contributed the land and master planning of a 1.223 hectare site for high density mixed use development in part of St Kilda. The land was the former City of St Kilda Municipal Depot Site which became redundant for the Council. The Council contributed the land and undertook the master planning design and underwrote the associated costs including site remediation. The total value was estimated at $7.5 million and was based on the book value of the land plus the actual costs of master planning and associated costs inclusive of site remediation. The development resulted in 210 dwellings and three retail tenancies of which 28 units of affordable housing were returned to the Council in exchange for the land and a further four were sold to the State Housing Authority.

Further case studies are cited below at Section 2.4 Australian Case Studies for your consideration, but in each instance local and state government intervention has occurred to offset the typical market inputs in development feasibility in order to engage the private sector.

Gurran et al 2008[6] has researched how planning mechanisms intersect with the broader policy, legislative and financial frameworks supporting affordable housing supply and considered which government, spatial and housing market contexts are most effective. To this end, the following observation is noted in the executive summary at page 4;

In the United States, where inclusionary zoning is used widely, targets of 10 to 15 per cent affordable housing inclusion are not directly linked to capital funding for affordable housing developments. However, such targets are usually supported by the availability of planning bonuses (such as density increases) or concessions (like reduced fees). Many state and local jurisdictions with affordable housing strategies in place also dedicate their own resources or public land to support low income housing programs. Mandatory inclusionary requirements in the United States are also made more feasible by the existence of Federal and State tax incentives designed to stimulate development of housing for lower income households (such as the Low Income Housing Tax Credit program).

By combining planning requirements for affordable housing with funding, subsidies or incentives, strong not for profit housing developers have emerged in the United States, United Kingdom and the Netherlands, to provide a viable "delivery infrastructure" for affordable housing that can be created or secured through the planning and development process.

[6] Gurran Nicole, Milligan Vivienne, Baker Douglas, Bugg Laura Beth, and Christensen Sharon, June 2008, New Directions in planning for affordable housing: Australian and international evidence and implications, Australian Housing and Urban Research Institute. Sydney Research Centre.

The above observation clearly supports the need for local, state and federal government intervention not only for mandatory inclusionary policy with respect to affordable dwellings but also in the provision of grants or other funding mechanisms, taxation or other incentives such as the provision of low cost land to enable delivery of affordable dwellings. Moreover, it signals the need for a whole of government approach.

Further to this Gurran et al 2008 goes on to note that *"Incentive or concession schemes will be effective in contexts where land costs or building costs are high enough to generate a valuable bonus when prevailing controls are varied. Incentive approaches appear to work best when they are situated within a framework of national or central government policy for affordable housing, and when they are clearly supported by legislation (Gurran et al 2008: pp 5).*

Mandatory inclusionary housing schemes will have an impact within a high value market characterised by significant development activity and limited development opportunity. In such schemes, a proportion of the development is dedicated to affordable housing, either as onsite contribution or a payment. By contrast, lower value markets – characterised by development activity and demand for housing, but more potential opportunities for growth – are likely to support affordable housing and inclusionary targets that deliver dwellings that can be purchased at lower cost for social housing providers or low and moderate income households (Gurran et al: pp 5).

Further, Gurran et al 2008 notes that

In an Australian context, incentives will create the most value within inner city or very high value coastal areas. Similarly, mandatory requirements for affordable housing contributions (either negotiated or as a fixed amount) will usually have the greatest yield in inner city locations and in outer fringe release areas where there is significant value uplift associated with a rezoning. In middle ring areas or Greenfield areas where the gap between affordable home purchase costs and actual market values are relatively small, there is an opportunity to require a significant proportion of new housing to be made available for low and moderate income home purchases, or for allocation by social housing providers.

Two major elements separate Australia from the majority of international jurisdictions reviewed in this study. The first is the lack of national policy for housing and affordability in general, and new affordable housing creation in particular. The second element that is distinctively absent from Australian practice is a policy and practice linkage between planning objectives and requirements and the existing funding or incentives for affordable housing development. Irrespective of the total amount of capital funding for housing assistance in Australia there is a potential to maximise the leverage of this investment by a stronger use of the planning system to secure land for affordable housing development (Gurran et al 2008: pp 7).

2.4 AUSTRALIAN CASE STUDIES

Inkerman Oasis – Port Philip - Victoria
http://www.housing.nsw.gov.au/Centre+For+Affordable+Housing/Developing+Affordable+Housing/Case+Studies/Inkerman+Oasis+Port+Phillip+Victoria.htm

City Edge – ACT
http://www.housing.nsw.gov.au/Centre+For+Affordable+Housing/Developing+Affordable+Housing/Case+Studies/City+Edge+ACT.htm

Forrest Glade – Parklea NSW
http://www.housing.nsw.gov.au/Centre+For+Affordable+Housing/Affordable+Home+Purchase/Forest+Glade+Parklea.htm

Waverley Council, NSW
http://www.housing.nsw.gov.au/Centre+For+Affordable+Housing/Developing+Affordable+Housing/Case+Studies/Waverley+Council+NSW.htm

2.5 WESTERN AUSTRALIAN ACTIVITY

Department of Housing

The Department of Housing (DoH) is increasingly endeavouring to work cooperatively with the private sector to deliver affordable housing outcomes rather than simply apply the traditional 100% government capital investment ownership model. This is seeing the DoH apply a number of different development, acquisition, investment models. These include:-

Joint Venture (JV) developments – where the DoH may contribute land or cash in partnership with the private sector. Ideally this works where the DoH makes a site available to the private sector partner to undertake the development as a JV partner. This helps the private sector by removing the requirement for land and holding costs and also provides equity into the transaction and an asset that can be mortgaged. Projects of this nature are underway in Pier Street, East Perth and Campbell Street, West Perth.

Equity Contribution – the DoH may become an equity partner in a particular built form development. This enables the DoH to deliver an increase in affordable housing outcomes by influencing the shape and form of the development and taking its return in units, cash or a combination of both. This helps unblock the private sector challenges around project finance and also de-risks the development.

Presales – The DoH may be able to facilitate development by pre purchasing units in specific developments thereby enabling developers to meet presales commitment and enabling capital funding to be obtained.

Underwriting sales – the DoH through its innovative home ownership schemes such as SharedStart may be able to provide developers with a commitment to deliver end user sales to particular target groups – again this can facilitate presales and capital funding.

Procurement – the DoH's Expression of Interest process provides an opportunity for the developers to put development proposals to the DoH and for the DoH to purchase in full all units in the development, to purchase some units or any other arrangement that would help the development proceed while enabling the DoH to deliver affordable housing outcomes.

Integrated Housing Developments – the DoH has developed and is continuing to develop fully integrated housing developments that bring a range of housing tenures and client groups together to deliver financially viable and socially sustainable housing developments. Ideally, these would see social, affordable and full market rental, shared equity and full market ownership and possibly commercial units in the same complex. This obviously brings together a range of different funding sources and funding/investment opportunities together to help projects stand up financially.

Linkage with other affordable housing investors and providers – the DoH is also able to facilitate linkages with other affordable housing providers such as Community Housing Organisations who undertake social and affordable housing developments in partnership with or independent of Government. Similarly, DOH facilitates and supports other Government affordable housing initiatives such as the National Rental Affordability Scheme (joint state/commonwealth initiative), which can provide further linkages with investment opportunities for affordable housing. (NRAS provides cash and tax benefits for investors who are prepared to rent their new investment properties at less than 80% of market rent).

The traditional model of the DoH acquiring, funding and developing sites itself also remains an option that could be pursued in the right circumstances.

In addition to these, it must be recognised that the DoH as the Government's deliverer of social and affordable housing is able to bring together a range of housing options and programs that when accumulated facilitate a diversity of housing products throughout a vibrant and diverse population. This includes social housing programs to low to moderate income earners, specific target groups such as people with disabilities, new affordable housing rental initiatives, shared equity home ownership products, low deposit full home ownership and normal market sales.

When all of these activities are layered across the above delivery models DoH accesses and enables a breadth of opportunity and market outcomes that make the delivery of affordable housing outcomes in all market settings a realistic option.

DoH Developer Engagement

Enquiries to a range of Western Australian and national developers identified several instances where developers had engaged with the Department of Housing in the delivery of affordable dwellings in a medium to high density product form.

In each instance, the Department of Housing effectively secured a proportion of available product at full market price and then allocated the product to a mix of;

- Social housing,
- Shared Equity purchase, and
- Affordable rental.

The most recent example is OneAberdeen, located at the juncture of Pier Street and Aberdeen Street, Perth. This project is a partnership between Diploma Properties Pty Ltd and Department of Housing (DoH). The Department of Housing owns the land and Diploma is engaged in a joint venture. The product allocation is tabled below. In effect DoH applies the land and warrants the acquisition of some 30% of the apartment stock, and verbal advice indicates this may move to up to 70 apartments in total.

Apartment buyer type	Number	Allocation
Market	117	69.6%
NRAS	7	4.2%
Shared Equity	16	9.5%
Essential Worker	11	6.5%
DoH	17	10.1%
	168	

Figure 11

A description of the proposed development is tabled below.



Concept plans illustrate the site will be developed to incorporate a fourteen level mixed use development, with the thirteenth floor partly incorporating a mezzanine level. The proposed development will comprise inter alia the following:

- Seven (7) commercial strata suites situated on the ground level and fronting onto both Aberdeen Street and Pier Street. The Draft Strata Plan indicates ground floor commercial suites ranging in area from 38m² to 69m² of strata building area, totalling 413m².
- 64 single covered and secured car parking bays situated within the ground floor car parking area, and being allocated to both the residential and commercial units, as well as four (4) m² storage areas forming part of the thirteenth floor apartment strata areas, plus 18 bike racks.

- 62 single covered and secured car parking bays situated within the first floor car parking area, and being allocated to the residential apartments, as well as thirty six (36) 4m² storage areas forming part of the residential strata units, plus 4 bike racks.
- 42 single covered and secured car parking bays situated within the second floor car parking area, and being attributed to the residential apartments, as well as nine (9) 4m² storage areas forming part of the residential strata units and being located within the car parking area, plus 14 bike racks.
- 161 strata titled residential apartments located over levels one to thirteen, including the mezzanine level at level thirteen.
- The communal facilities area located on the first floor.
- Residential apartment accommodation typically comprises one (1) and two (2) bedroom apartments with internal strata areas ranging from 46m² to 76m².
- One (1) car bay and a storeroom ranging in area from 4m² to 6m² for each apartment.
- One (1) car bay to each commercial strata suite.

An analysis of the proposal from a feasibility perspective to arrive at the residual value of land identified a significant discounting effect to market value arising from the development proposal. The recent sale of land opposite well established the market value for the site 'as is'.

A number of low rise market developments nearby 'for sale' off the plan and under construction confirmed the market value rate for land in the locale via residual value analysis.

The inference is that the highest and best use at market for the land is low rise residential in three to six storey formats delivering modules of 30 to 50 dwellings.

It is understood, DoH insisted on maximising the yield outcome in order to optimise the volume of affordable housing stock it could secure whilst enabling the developer as joint venture partner sufficient scope to earn a reasonable profit. To this end, the trade off in market value of land was close to a discount of 40%.

DoH has applied similar methods to secure affordable dwellings across several notable medium to high density projects including;

- Fort Knox, Fremantle – Match Projects
- Stella Apartments, Cockburn Central - Goodland Properties.

Foundation Housing

Foundation Housings' is a 'not for profit' affordable housing provider whose core objective is founded on its aim to increase the supply of secure, affordable good quality rental housing and to undertake effective tenancy and property management that achieves sustainable housing outcomes.

Foundation Housing was established in 2005 after the merger of three separate successful housing organisations. Foundation Housing is now one of the largest affordable housing providers in Western Australia with over 1,300 households currently in management and development, and some 1,700 tenants across Perth and regional Western Australia.

Foundation Housing provides a range of housing services with expertise in;

- Property management,
- Public and private sector partnership,
- A commitment to providing sustainable and affordable housing,
- A sound financial base.

Foundation Housings' capital and cash flow base was established with the transfer of title of 340 rental houses in 2005.

Simplistically, the financial model enabling growth and further delivery of affordable accommodation is one that leverages off the capital base and net cash flow from operation of its property portfolio. Foundation Housing makes a long term investment in its growing portfolio.

This enables capital leverage to develop new accommodation independently or in a range of joint venture, alliance and partnership models with both private and public sector participants, that is further supplemented through;

- wider access to the National Rental Affordability Scheme,
- strategic asset management,
- innovative management services,
- discounts and concessions on;
    - the Goods and Services Tax,
    - stamp duty, and
    - water and council rates to name a few.

Department of Housing additionally offer via Tender the transfer of social housing rental stock ("Transfer of Freehold Title of Social Housing Initiatives Dwellings to Community Housing Organisations") to a range of affordable housing providers enabling further expansion of the capital base and growth in net cash flow from strategic asset management and property management. To this end Foundation Housing was successful in adding a further 300 dwellings to its portfolio in 2011.

Access Housing

Access Housing is similar in nature to Foundation Housing and was established in 2006, providing accommodation solutions across the spectrum of social housing to affordable home ownership founded on a property model of;

- Property and Tenancy Management Services (1,400 social and affordable rental properties), and
- Affordable Housing Property Development.

Similar to Foundation Housing, the capital base and rental stock was initially 'gifted' via the State to facilitate a capital and net cash flow base from which to leverage and grow the portfolio.

This is additionally supplemented through property and tenancy management services whilst taking a more commercial approach in the property development arena to generate greater margins for reinvestment and growth of the portfolio.

This latter approach is the principal difference to Foundation Housing and to this end Access Housing has developed a wider range of financial models for funding and development with institutional partners and developers.

As an example, Access Housing has entered into Alliance Agreements with private companies in the building, development and finance industries in order to share expertise and de-risk the delivery of affordable housing options including:

- BGC,
- ABN Group/ Dale Alcock Homes,
- Niche Living,
- Coastline Homes,
- Questus Ltd,
- Commonwealth Bank of Australia (CBA).

Access Housing additionally partners with the Department of Housing to provide affordable and sustainable housing solutions in the community and as for Foundation Housing, competes for State Government programs and capital grants for the supply of affordable housing.

3 DEVELOPER SURVEY

3.1 PURPOSE

The purpose of the developer survey is to establish an industry perspective against the definitional criteria of affordability together with the proposed measures to enable private sector delivery of affordable dwellings advocated by Stubbs 2011.

Stubbs 2011 presents research on the community need for affordable housing. This report has determined the price levels that very-low, low-and moderate-income households can afford to pay for rental and owner occupier housing as shown below:

Affordable Housing Benchmarks in Perth SD

	Very low-income household	Low-income household	Moderate-income household
Income Benchmark	<$655-$736 per week	<$984 per week	$984-$1,467 per week
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Benchmarks			
Affordable Purchase	<$153,000 - $174,000	<$230,000 total	$230,000 - $345,000 total
Benchmarks	purchase cost	purchase cost	purchase cost

Table 2

Stubbs 2011 documents the proportion of people that are currently experiencing housing stress in the Perth market. It uses this as the basis for the recommendation that a *minimum 15% affordable rental and purchase accommodation in all new release and redevelopment areas is warranted, and 20% justified.*

The critical observation made in the reviewing of Stubbs 2011 is the general presumption that higher density equates to higher profitability and accordingly higher residual value to land. This paradigm generally no longer applies to medium to high density residential/mixed use development market in Metropolitan Perth.

The principal driver for this paradigm shift is construction cost, which for this class of development sits near one third higher than the east coast markets and, more recently, capital rationing of debt markets has further impacted appetite and viability in this market sector.

Consequently, the development market has in recent times focussed on lower yield, lower capital, medium density development typically from two to five levels in height.

Further to this, Stubbs 2011 infers there is sufficient 'super profits' in the development of medium to high density product that the industry can be mandated to 'sacrifice' a component of this super profit to deliver affordable dwelling stock or incentivised to offset a component of the yield in increased height and density. This is premised on an inference a 'normal' developer profit is 10%.

The decision analysis of developers varies from location to location and is often a function of market depth and demand for the product typology in question, with the majority of medium to high density development activity in recent times centred on the Perth CBD and fringe. The suburban apartment market activity fundamentally remains in the low to mid rise format due to the limited price variance between competing dwelling stock typologies and existing market preferences.

Additionally, competition in this market has emerged with greenfields and brownfields development via house and land packages tailored to 165m² to 250m² green title allotments. This single and double storey product is proving price point competitive and can be delivered at a far lower built form cost.

A final misconception drawn from Stubbs 2011 is the inference that 10% is a 'normal profit' profit for property development and that profits beyond this are 'super profits', which can be tapped by various methods including scheme contributions for the delivery of affordable dwellings (Stubbs 2011: pp70).

A number of the incentive based density approaches aim to secure an allocation of the perceived super profit above a normal profit as an allocation to affordable dwellings in kind or as cash in lieu. In the first instance a 'normal profit' would need to be agreed or defined between the parties and then a superior profitability demonstrated.

It is our market experience based on the analysis of a wide range of medium density property development sites that target profit margins after finance provisioning, typically range from 15% – 30% with a central tendency of 17.5% to 25%. The margins are dependent on location, product, capital at risk and market conditions and can be highly volatile given the lengthy duration of planning, sales and delivery.

The effect and fall out of the GFC has tightened developer margins in recent times, generally due to 'pre sale' needs to enable debt funding of construction.

Therefore, with any incentive based affordable delivery model, the developer would be seeking a degree of certainty and comfort in the profit position before allocating unearned 'super profit' to affordable dwellings in kind or as cash in lieu.

Current market conditions are such that it is unlikely that affordability schemes will be able to tap into perceived super profits from medium density built form development in the short to medium term. Market conditions may change longer term and this potential should be captured with the affordable dwelling strategy.

3.2 QUESTIONNAIRE

The survey questionnaire has been designed to interrogate a sample of developers active in the medium to high density residential development market. The intent of the questionnaire is principally two fold, firstly to gauge the attitude of developers towards the proposed development within Cockburn Coast and then secondly, to test the attitudes of private sector developers on matters of;

- Private sector delivery of affordable dwellings,
- The observations and conclusions of Stubbs 2011 with respect to;
    - Private sector financial capacity to absorb the mandating of affordable dwellings in medium to high density development,
    - Observations as to super profits and financial capacity for private sector developers to provide affordable dwellings in a medium to high density format through incentivisation that enables increasing profit levels through the addition of height and density at an equal or higher level than the affordable stock contributed within the proposed development.

A copy of the questionnaire is tabled at **Appendix A.**

3.3 SAMPLE GROUP

Participation was sought from the he following list of 16 developers.

- Pindan
- Giorgiou
- Australand
- TRG Property Group
- Psaros Property Group
- Match
- DevWest
- Mirvac
- Stockland
- Diploma
- Finbar
- ABN Group
- Doric
- Goodland
- LendLease
- Nicheliving

Of the developers approached, eight elected to participate.

3.4 SUMMARY OBSERVATIONS

The questions tabled for developers are listed below with summary of responses.

The questionnaire leads with a preamble describing the aspiration and form for development for Cockburn Coast inclusive of plans depicting layout, height, density and contemplated product typology.

Question 1

What are your preliminary thoughts on the form of development contemplated for the Cockburn Coast?

Six of eight developers considered the product typology as ambitious in scale and density premised on market preferences, built form cost and the historic practice of State to not deliver the necessary infrastructure in a timely manner.

Two of eight developers were highly supportive of the density plan; one suggesting higher densities were required with the second suggesting a rebalance between 'low rise' (3 – 5 storeys) and 'medium rise' (6- 8 storeys) was required' with more medium rise.

All respondents described the clear need for early amenity and infrastructure, chiefly transport as key to facilitating the density and massing depicted.

One respondent indicated a higher proportion of product in the 1 – 3 storey 'terrace' category is required (current DSP only 1.1%).

A similar comment was made with respect to application of some detached dwellings.

Out of character with the location and demographic.

Management of transition and interface with current uses and planned uses.

Question 2

What market based hurdles or opportunities can you envisage for the CC?
Prompts

- Accommodation preferences
- Demographic Profile
- Household Income
- Amenity
- Transport
- Employment
- Built Form Cost
- Land Acquisition and Development Financing
- Service Infrastructure

The majority of respondents indicated a concern that current accommodation preferences for a majority of home owners in the current market may not be met by this concept. This is additionally inhibited by the demographic profile as measured by factors of household income and employment profiles for the south west coastal corridor.

All respondents identified critical barriers to the form of development as being construction costs and depth of market which is intrinsically linked to the above point.

In the present market, land acquisition and development financing subject to pre-sales is creating a barrier to development. This is, in part, a function of a weak residential market and therefore a weak pre-sales environment, however respondents identified this issue as more sensitive with medium to high density dwelling accommodation due to present accommodation preferences and relative pricing as compared to alternatives of low rise group/multiple dwellings and single detached dwellings. There was a general concern this would be further emphasised in this location due to the demographic of surrounding suburbs as well as local employment and connectivity.

All the respondents identified the opportunity to address a number of these barriers through the creation of 'place', that is providing people a reason to want to live here, and key to this opportunity was the provision of early amenity and strong public transport linkages.

Question 3

Are there specific infrastructure deliverables at state and local government level which may stimulate the contemplated form of development?

- Creation of place – destination
- Transportation, emphasis light rail and broader metropolitan linkages
- Convenience retail
- Employment
- Refurbishment of derelict power station and establishment of local activity node
- Servicing infrastructure
- Community infrastructure
- Government offices

Question 4

Are there initiatives at state and local government level which may be implemented to stimulate the contemplated form of development?

- Instil market confidence through delivery of early infrastructure – emphasis transportation. Incentivisation of amenity inclusive of retail and community based services such as childcare.
- Fast track approval processes.
- No developer scheme contributions.
- Partnering opportunities on State land.
- Deferred settlement on land transactions (State).
- State commitment for Government Office of Education at the District Centre.

Question 5

Various studies (National Housing Supply Council) indicate an imbalance between demand (high) and supply (low) and forecast a worsening of the situation in the longer term.

In the past Governments have subsidised demand (First Home Owners Grant) to stimulate supply (Post GST and Post GFC). In each instance a pull forward of demand resulted together with short term demand led house price inflation followed by a lull in market activity as the anticipated flow through to second and third home buyers did not eventuate.

Have you any thoughts on initiatives that place a greater focus on increasing supply (such as NRAS) as opposed to subsidising demand?

- No stamp duty on the first sale of newly built product.
- Limit first home buyer grant to newly built product only.
- Index NRAS to meet predetermined tiers of residential product pricing in order to encourage a greater diversity in product investment and thereto supply to a wider market.

Question 6

It is argued the creation of 'sustainable communities' mandates the planning and production of diverse dwelling/accommodation types. The anticipated implementation, delivery and build out of CC is 15 – 20 years.

What is your view of the contemplated accommodation mix in the context of the WA market?

Generally all respondents indicated the requirement for significant place making and as previously noted the delivery of early upfront infrastructure and amenity.

Concerns were generally raised that private sector developers would not be keen to initiate development prior to significant infrastructure investment by the State to establishing confidence in location and delivery.

Premised on the aspirational built form contemplated, all respondents anticipated slow product absorption and as previously noted anticipate improved market acceptance with early investment and infrastructure and also the transition in management of the interface with existing industrial uses and an emerging residential coastal node.

All respondents indicated reasonable confidence of delivering built out over the next 15 to 20 years.

Critical to stimulate demand and interest and if successful, delivery may be sooner.

Affordability

In accordance with the DSP, a minimum target of 20% affordable housing is to be achieved throughout Cockburn Coast. Rising housing prices in Australia have led to significant problems of housing affordability, particularly for those on low or moderate incomes.

What is affordable housing?

Housing that costs more than 30% of a household's income is generally considered to be 'unaffordable', but because housing costs vary between different geographic areas (and from site to site), what constitutes 'affordable' will vary both by income and location. Housing in some high value areas may be unaffordable to households with relatively high incomes.

'Affordable housing' is required that covers all dwelling types to suit the needs of the population, that is – single bedroom dwellings, family housing and aged and dependent persons accommodation.

Affordable housing is housing that is reasonably adequate in standard and location for households in lower or middle parts of the income scale and which does not cost so much that such a household is unlikely to be able to meet other basic living costs on a sustainable basis. It includes owner-occupied housing as well as rental housing owned by governments, non profit organisations, corporations or individuals. As a rule of thumb, housing is considered to be affordable if the cost of purchase or rental does not exceed 30% of the gross household income.

Social housing is publicly funded housing and is proposed to make up 5% of the housing stock at Cockburn Coast. Social housing is a sub-set of affordable housing. The Department of Housing is currently the main provider of social housing. Further work is desirable to clarify whether 20% is an appropriate or achievable target for Cockburn Coast. Given the location of the project on prime section of the coast, high land values will be a significant factor influencing the ability to deliver affordable housing product.

In 2010 The Western Australian Planning Commission (WAPC) commissioned a study into 'Achieving Affordable and Diverse Housing in Regeneration Areas in Western Australia'.

The report was prepared by Judith Stubbs and Associates and delivered in two parts;

- Judith Stubbs and Associates, April 2011, Report 1: Profile of Selected Redevelopment Areas.
- Judith Stubbs and Associates, December 2010, Report 2: Planning Mechanisms and Strategies.

The above reports have been circulated to various state agencies for consideration and in part, application.

Developer Survey

An assessment is required to quantify the market for and type of affordable housing that would be appropriate without creating an undesirable imbalance in the future community profile, and without adversely affecting development viability for this and other types of desirable development (residential and non residential).

The intent of this interview process is to gauge development industry views on affordability, modes and methods of delivery including incentivisation options such as density and plot ratio bonuses; and for that matter any innovative thought towards a realistic delivery model for affordability in a medium to high density format.

Question 7

Affordable housing consultant Judith Stubbs (Stubbs 2010) has analysed the community needs for affordable housing for the WAPC.

The report documents the proportion of people that are currently experiencing housing stress in the Perth market. It uses this as the basis for the recommendation that a *minimum 15% affordable rental and purchase accommodation in all new release and redevelopment areas is warranted, and 20% justified.*

To this end, the Cockburn Coast District Structure Plan has set a minimum target of 20% affordable housing to be achieved throughout Cockburn Coast.

Stubbs 2010 defines housing affordability;

"Housing is 'affordable' when a very low-, low- or moderate income household pays no more than 30% of gross household income on rental or mortgage payments..."

Stubbs 2010 goes on to state;

"...such households are considered to be in 'housing stress' when they pay more than 30% of gross income on housing costs, and in 'severe housing stress' when paying more than 50% of gross income on housing costs."

Stubbs 2010 has determined the price levels (2010) that very low, low and moderate income households can afford to pay for rental and owner occupier housing are:

Affordable Housing Benchmarks in Perth SD

	Very low-income household	Low-income household	Moderate-income household
Income Benchmark	<$655-$736 per week	<$984 per week	$984-$1,467 per week
Affordable Rental Benchmarks	<$197-$221 per week	<$296 per week	$296-$440 per week
Affordable Purchase Benchmarks	<$153,000 - $174,000 total purchase cost	<$230,000 total purchase cost	$230,000 - $345,000 total purchase cost

Figure 12

In terms of the medium high density development contemplated for CC, what are your initial thoughts of enabling such affordability measures?

All respondents indicated it would be highly unlikely the private sector could deliver affordable dwellings at the price points stipulated for very low-income and low-income households in a medium to high density residential format. The critical barrier to this delivery is construction cost where for the most part typical apartment product cannot be delivered at the price benchmark for very low-income households and marginally at the price benchmark for the low income household.

All respondents identified the benchmark pricing for the low-income to moderate-income household could feasibly be achieved in a single storey detached dwelling format although this prospect is likely to be marginal in a medium density format.

Three of eight developers question whether the location was appropriate for the mandating of affordable product. Similarly, the question of appropriateness of product was raised with suggestions the Cockburn Coast District Structure Plan concept provided insufficient scope for diversity of product. The concept plans suggesting apartment living across 90% or more of the product.

Question 8

Stubbs Report 1 proposes an amendment to *State Planning Policy 3.6: Development Contributions for Infrastructure* to include 'affordable housing' as 'special infrastructure'. Further to this, the proposal suggests a more equitable developer contribution based on dwelling yield, bedroom count and even accounting for retail/commercial GFA as opposed to a land based measure.

In the context of the contemplated built form, is such a proposal feasible?

Are there alternative performance based measures that can be reasonably applied?

Should such measures be incentivised? If yes, what forms of incentivisation will likely support built form supply as contemplated and meet the measures of affordability outlined above?

Four of eight respondents accepted the proposal as reasonable, although this was qualified to the extent it may affect feasibility and thereto the residual value to the land and the capacity of developers to consider the scale of development proposed and additional delivery of affordability. More detail required.

All respondents noted a dislike of developer scheme contributions and the principal issue identified was certainty in assessment methodology and thereto cost.

Four of eight respondents identified developer scheme contributions as a "disincentive".

Concerns were raised by four respondents as to the control and application of developer scheme contributions to affordable housing and the risk it may lead to concentrations of such development that may create stigmatised pockets. Only one of eight respondents provided an idea as to an alternative performance based measure this being the government prefund all affordable housing through dedicated acquisition of stock from developers. Conversely, a concern as to governance is raised, that is who will administer, monitor and maintain affordable dwellings in perpetuity.

Six of eight respondents indicated incentivisation of affordable dwellings will unlikely meet with measures of affordability outlined above. One respondent identified the option of providing "cheaper" land together with a guaranteed government purchase. One respondent reinforced the proposal for no stamp duty on new construction and limitation of first home buyer grant to new construction only thereto stimulating supply.

Four of eight respondents indicated a high likelihood that incentivisation via density and height may have a reverse effect further diminishing profits and placing greater pressure on residual land value.

Two respondents suggested a greater level of state participation to land and construction either in partnering or in joint venture format to offset acquisition and financing costs.

Question 9

JSA Report 2 page 42 cites;

One approach to affordable housing is to offer bonuses to developers to offset loss of profit associated with provision of affordable housing, or in order to generate funds for the construction of affordable housing through sharing additional profit generated through the developer taking up the planning incentive... . Bonuses that may result in increased saleable floor area include plot ratio and height (where other constraints affect the use of allowable plot ratio) and bonuses around parking may reduce costs in high density development.

Do you see this as a feasible mechanism in the context of;

a. the density and heights already contemplated for CC;

b. a nil or low parking ratio for affordable housing supply; and

c. proposed 'affordable' (Stubbs 2011) pricing regime?

	Very low-income household	Low-income household	Moderate-income household
Affordable Rental Benchmarks	<$197-$221 per week	<$296 per week	$296-$440 per week
Affordable Purchase Benchmarks	<$153,000 - $174,000 total purchase cost	<$230,000 total purchase cost	$230,000 - $345,000 total purchase cost

All respondents queried the super profit theory. Intuitively all respondents indicated it would be highly unlikely that sufficient super profits could be generated to offset the cost of implementing affordable dwellings within a project at the levels contemplated.

Several respondents raised questions of administration and management, that is who would take responsibility for the governance of the affordable dwellings and how will the affordable dwellings be managed in a pool such that they remain affordable? Three of eight developers reinforced the fact that increasing density and height bonuses may be self defeating in that this typically incurs additional costs as height increases and in parallel with this, the need for additional parking may impose further basements or a loss in GFA to parking.

Question 10

What are the principal constraints to delivering 'affordable' dwelling product in a medium/high density format and meeting the implied diversity and pricing requirements?

All respondents identified;

- Construction costs, construction methods, parking ratios, social stigma,
- "End buyer",
- Administration and management.

Question 11

What product typologies are more likely to achieve the implied diversity and pricing requirements? Are there low cost options such as pods and lightweight demountable structures that can be applied in part or in whole?

Six of eight respondents identified the most practical delivery model is that of single storey detached/attached dwellings. Two respondents identified recent product typologies on small lots with five metre frontages presently being delivered across a broad range of suburban Greenfields residential estates.

Four of eight respondents identified the possibility of meeting the affordability benchmarks in some of the lower rise, one to three storey product, with one bed and possibly small two bed walk up format.

All respondents recognise that alternative construction methods did exist although in their experience failed to achieve sufficient cost efficiency to shift the mindset of current builders.

One respondent suggested the "mentality" of WA buyers for masonry/concrete construction as opposed to lighter weight steel framed/timber frame construction was a key barrier to alternate delivery mechanisms.

Question 12

In the context of CC, what locational and infrastructure needs will better promote or support the supply of diversity in dwelling modes and pricing need?

All respondents identified four principal requirements;

- Integrated transport, both local and to the broader metropolitan area;
- The provision of early amenity and convenience retail;
- The provision of social and civic infrastructure primarily in the form of place making and destination;
- Provision of employment opportunities.

Question 13

What incentivisation based variation to planning provisions (if any) such as height, plot ratio, parking to name a few are likely to best generate sufficient funds/super profits to offset delivery of affordable housing?

All respondents provided a null response to this question.

Question 14

How in your view, would the market likely respond to the mandatory provision of affordable housing in CC and what are the likely implications to market input such as;

a. implementation,

b. take up, and

c. residual land values to name a few?

All respondents identified the mandating of affordable housing at Cockburn Coast will likely have the largest effect on residual land values.

Four of eight respondents identified the risk of an emerging stigma with the public confusing social housing with affordable housing.

To this end, the same group of respondents identified a strong need to properly make the market fully aware of the distinction between social and affordable housing with the need to salt and pepper the distribution throughout Cockburn Coast.

Two respondents identified the mandatory provision of affordable housing as restricting implementation seeing undeveloped land and left idle for lengthy periods of time.

The mandating of affordable housing is likely to be a disincentive to developers and a major downside to residual value.

Question 15

Following on from Q12 and 13 above, assuming an equitable and feasible solution, should there be a 'blanket' cap or ratio approach to the volume and type of affordable housing on;

a. whole of Scheme area basis, or

b. a project by project basis, or

c. should it be defined in designated precincts?

Can you provide a broader explanation of the reasoning behind your views outlining the key drivers, motivations and foreseeable advantages to community and supply of affordable dwellings?

Six of eight respondents preferred a salt and pepper approach. Two of eight respondents preferred a project by project approach. The respondents preferring the salt and pepper approach generally indicated this preference to avoid the construction of "ghettos" as well as identifying it as the likely most cost effective approach if delivered by private enterprise.

The two respondents who cited the project by project basis were both keen to see the affordable dwelling product retained to State land and delivered by the State.

Question 16

Initiatives already implemented in several redevelopment areas (SRA – EPRA) that have met with some success include;

a. the sale of serviced land at cost or a discount to market value to Department of Housing or a Community Housing provider,

b. mandating 10% of dwellings constructed be offered to Department of Housing or a Community Housing provider for use as affordable housing with transfer at construction cost and incoming buyer utilising a shared equity scheme,

c. provision of density bonuses and responsible agency secures 50% of the additional profit arising from the application of bonus GFA to both affordable and non-affordable housing. This maybe 'cash in kind' or a number of the additional units constructed within the development or elsewhere in the locality.

What are your thoughts on applicability and feasibility of these schemes in CC? Moreover, are there alternative mechanisms that you could propose or are aware of that may prove feasible?

Four of eight respondents noted Option A as the most preferable with affordable dwellings being delivered by the Department of Housing or some similar community housing provider. Six of eight respondents considered Option B as feasible although questions were raised as to management and governance.

As previously noted all respondents failed to see the application of Option C in a feasible and workable manner.

Question 17

Is the provision of affordable dwellings in your view a state responsibility?

In view of your response, is market intervention warranted through a mandatory planning regime or should it be focused on state/local government controlled land; for example LandCorp control 40 hectares of land with the City of Fremantle in control of 20 hectares under the former South Fremantle Landfill Site?

- Generally all respondents cited the preference that the provision of affordable dwellings should be a State responsibility.
- Many were borderline quoting potential for private enterprise to engage in the delivery of affordable dwellings.
- In this regard, the principal concern raised generally related to the "end buyer", management, and administration; that is governance of the affordable dwelling pool. Several cited a fear the failure of such governance may lead to social stigma that impacts the various projects within which affordable dwellings are delivered, particularly at the percentages presently targeted.

Two respondents cited the government should play the major role but encourage private public partnerships.

Six of eight respondents maintained a preference for the salt and pepper approach as opposed to focusing all the affordable product to State controlled land.

Question 18

Following on from Q15-16 above, from an industry perspective, would greater direction, clarity and simplicity be preferred, and as such, a blanket 'cash in lieu' mechanism be applied on GFA of private and public built form development, which is paid on completion of sales into a pooled fund to support delivery of affordable dwellings by the state, on either publicly or privately owned land?

Could this be expanded to stimulate density and delivery by utilising mechanisms such as decreasing scales of 'cash in lieu' for greater diversity, set product modules and GFA?

Fifty per cent of respondents accepted the cash only mechanism although this was qualified to the extent the mechanism and method of calculation was simple and clear such that developers could easily work into project feasibilities with certainty. The other four respondents indicated a low response and as for question 8, noted this approach as being quite similar to a developer scheme contribution citing both as 'just another form of taxation'.

Question 19

Are there other alternatives worth considering such as profit sharing, that is, an agreed proportion of additional profits earned on the delivery of affordable density bonuses?

All respondents provided a null response to this question.

Question 20

Do you consider there is joint venture or partnering opportunities between state and private developers that will facilitate the vision for CC as well as delivery of affordable dwellings? If so, can you provide some insight to JV or Partnering structures and models that you would consider reasonable and functional?

Prompts;

a. land at $nil; development bonuses, profit share and delivery of affordable dwellings,
b. land at cost; development bonuses, profit share and delivery of affordable dwellings,
c. either a or b, development bonuses, where profit share paid into pooled fund for delivery of affordable dwellings on specific sites; contract award on construction of affordable dwellings,
d. either a or b, development bonuses, with state capital funding of affordable dwellings.

All respondents quoted an acceptance for joint venturing and partnering models to enable the delivery of product and affordable dwellings in concert with the vision for the Cockburn Coast.

Four of eight developers showed a preference for Prompt A where land is submitted at $0 and the State through a dedicated agency engages in profit share and delivery of affordable dwellings at the contemplated ratios.

4 MARKET COMMENTARY

4.1 WESTERN AUSTRALIAN ECONOMIC OVERVIEW

The Western Australian economy continues to prop the national GDP through significant increases in Gross State Product and investment into infrastructure and resource sector based projects.

Despite this, the effect felt on the ground in the WA economy is tiered with not all in the community benefiting from the investment into the State. Deloitte's Access Economics is predicting a continuation of superior growth of the WA economy in the short term, however this falls away and plateaus from 2014 onwards.

Generally, at the consumer level, consumption is in decline and savings rates are increasing and this is being mostly felt in the retail, small business and residential housing sector.

Consumer confidence remains low although improving and small business expectations for WA continue to remain cautious. This survey data reflects the nature of the predominant small business sector providing goods and services into the WA community. The corporate sector and corporate services, particularly through mining and engineering as well as property, financial and administration have conversely performed better.

The lack of confidence at the consumer and small business end of the WA economy has fundamentally been driven by the external woes affecting international economies and markets to which WA and Australia are intrinsically linked as well as political uncertainty and concern to effect of policy such as the Mineral Resources Rent Tax and Carbon Tax.

In Summary;

- WA's economy recovered from the 2008 GFC on the back of short term commodities demand and resource based investment and maintains a positive short to medium term outlook.
- The peak of the commodity demand cycle appears to have been reached post GFC and more recently on weaker European and US markets; however committed investment into WA is anticipated to continue and peak circa 2014 - 2015. Refer overleaf.

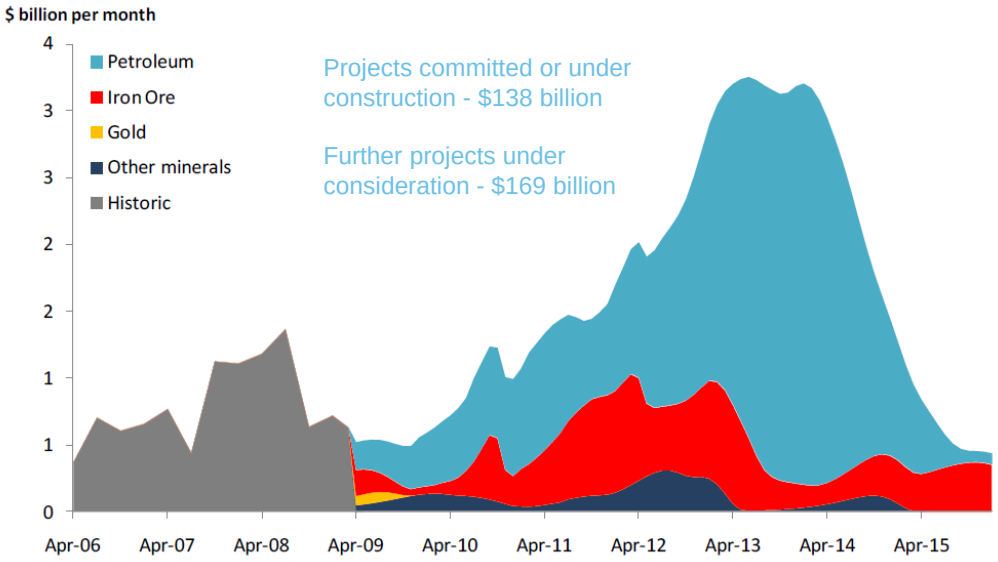


Figure 13: Source ACIL Tasman

- Consumer and business sentiment has improved on the news of better short term economic fundamentals however remains fragile. Business sentiment in WA is rising whilst consumer sentiment has plateaued principally on the concerns/effects of a dual economy in WA, compounded by remaining uncertainty of effects of external markets into WA, political policy making that has the potential to increase household costs and an unclear direction with interest rates.
- Retail turnover performance is two tier with a strong good/convenience sector whilst general retail and particularly fashion and plus accessories has been weak and often in decline on the back of weak consumer sentiment and a sustained shift from consumption to savings; although 2012 ABS data suggests a change may be in the wind.
- Deloittes Access Dec 2011 long term forecasts indicate a healthy average annual retail turnover growth of 3.9% per annum for WA.
- Business investment is increasing however not all business sectors managed the GFC well and some remain fiscally weak, particularly those not benefiting from the resource sector investment.
- Unemployment levels appear to have stabilised and have now improved. Despite this, long term forecasts remain modest with average employment growth of 1.7% per annum (Deloittes Access Dec 2011).
- Long term population growth forecasts of 1.7% to 2.5% per annum (Deloittes Access Dec 2011) over the next decade suggest sustained dwelling demand will emerge once current sentiment improves and stock on the market returns to 'normal' levels. Additionally, the State of WA is signalling a more robust population growth in its recent WA Tomorrow (2012) publication.
- Long term economic growth for WA (GSP) is forecast to sustain a band of 2.9% to 3.7% (Deloittes Access Dec 2011) per annum over the next decade.
- Industrial production for WA is forecast to average 4.0% per annum (Deloittes Access Dec 2011) over the next decade.

Demand for resources from China and other emerging economies remained strong in 2011, resulting in continued strong exports and capital expenditure in Western Australia's resources sector. These emerging economies have been the driving force of economic growth in Western Australia, however, the contagion from the issues affecting advanced economies has started to affect growth in emerging markets. Despite this, the IMF anticipates China's economy will remain reasonably robust in 2012, although does caution a softening trend.

Further to this, European sovereign debt issues, concerns emerging of China's shadow financial system and local government debt serviceability is sapping business and consumer sentiment. Consequently, a cautionary approach continues to be observed with respect to capital investment in property for WA, however there was a strong increase in commercial property transactions in 2011, as a result of continuing institutional business and portfolio reweighting. The main concerns regarding the market is the further tightening of credit availability placing pressure on business and investment projects together with a possible slowing in mineral resource demand from emerging markets.

4.2 RESIDENTIAL MARKET OVERVIEW

The deterioration of global economic conditions over 2008 and into 2009 had a dampening effect on Western Australia's residential property market. What began as a stagnation of residential prices and transactions in late 2007 to early 2008 predominantly as a result of affordability and rising interest rates, quickly transformed into a downturn of values and demand during the latter half of 2008 into early 2009. The period was characterised by a substantial increase in stock on the market, a significant reduction in demand and a fall in values across most residential property subsectors.

Mid 2009 saw a noticeable increase in activity in the residential property market. This was primarily for the affordable house and land product and lower range apartments (under $500,000) due to the First Home Buyers Grant (FHOG) increase. However, the increase in activity was also attributed to second and third home owner trade up buyers and was the result of a low interest environment, governmental stimulus and the perception that the residential property market had bottomed out. As anticipated by the market, upon expiry of the increased FHOG incentive on 30 June 2009, the first home buyer market activity softened.

Despite an improvement in the residential market in early 2010; the past 18 months has seen demand for residential real estate continue to weaken on the back of a declining consumer confidence due to a number of factors including, but not limited to, the flow on effects from the withdrawal of government incentives; and ongoing political, interest rate and economic uncertainty. These factors have had a dampening effect on the market and contributed to price falls across the house and unit sectors, with the premium / luxury market affected most severely. Whilst selling agents are presently reporting an increased level of enquiry for the majority of residential property classes, the conversion of this interest to an increase in volume of transactions and values is yet to occur although early 2012 data suggests a change.

The most recent Real Estate Institute of Western Australia statics available indicate the median house price increased by 0.4% during both the December 2011 and March 2012 quarters. The increase in the December 2011 median house price was the first since March 2010, potentially suggesting that the residential market may have bottomed out and is now showing early signs of improvement. This trend is considered premature to confirm although the benefit recent interest rate reductions by the Reserve Bank of Australia is yet to flow through. Further to this, REIWA reported the Perth Metropolitan vacancy rate has fallen -4.0% and -1.4% from the previous quarter and year respectively.

This change is influencing all residential submarkets and in turn is signalling an imminent change in dwelling demand spurred by a lack of rental accommodation and renewed investor interest as yields improve.

Anecdotally, the supply of stock on the market appears to be slowly unwinding and returning to longer term trend volumes, however the REIWA data for the March 2012 quarter also showed average selling days extending two days from 77 to 79. The changing dynamics are characterised by David Airy, REIWA, following the release of the December 2011 quarter statistics:

"First-home buyers have been skewing the median downwards by generating large sales volumes of more affordable homes, but now this has been balanced with more upgrade buyers in the market, who tend to purchase the more expensive properties."

"REIWA data show that while first-home buyers continue to be increasingly active in the market, we saw an increase in trade-up buyers during the December quarter and an increase in house sales of around 6% to 7%, which may have put a floor under prices."

"It's a similar situation in the multi-residential sector with units, apartments, villas and townhouses also experiencing an increase in turnover and a 1% increase in median price." "The number of houses for sale has fallen to its lowest level since March 2010, while land remains over represented with 2,800 lots on the market."

"The housing market seems to be stabilising, with an increasing number of sellers adopting more realistic asking prices, with both the number of sellers discounting and the average discount both coming down in the quarter."

"Our preliminary data show the vacancy rate dropping to 2.3% in the quarter and well down on the 3.4% from the same period last year. While the median rent for units and apartments remains steady at $380 per week, it has increased by $20 for houses to $420 per week. The overall median rent for Perth has reached $400 per week, representing an increase of 8.1% over the last year."

"It's evident there is greater confidence retuning to the property market reflected in the increase in sales activity in the December quarter and the fall in listings we saw across 2011.

"This bodes well for a positive start to 2012, but we still maintain some level of cautiousness given the global economic situation despite WA having a more robust economy."

Source: *Property Observer*

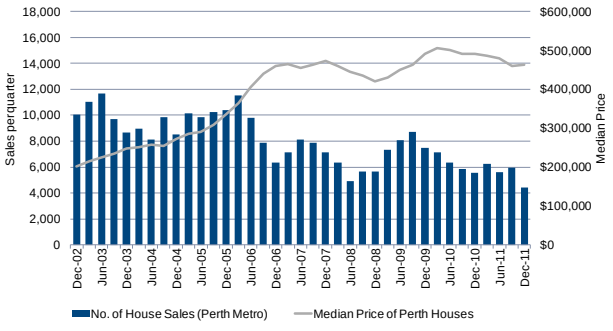
The preliminary REIWA March 2012 quarter statistics are summarised below, which signal a general softening from the previous year but stabilisation from the previous quarter.

Median Sale Price	Mar Qtr 2012	% Change Previous Qtr	% Change Previous Yr
Houses, Perth	$469,000	0.4%	-3.3%
Units/Apartments, Perth	$399,000	2.30%	-1.5%
Land, Perth	$265,000	13.2%	10.0%

Figure 14:Source REIWA

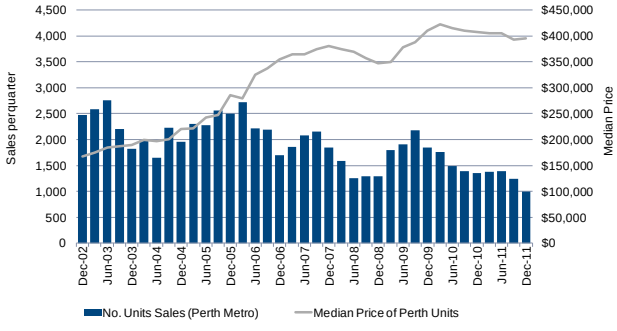
Further to this transactional data and approvals continue to trend down. Refer charts below.

Established House Sales (Perth Metro)



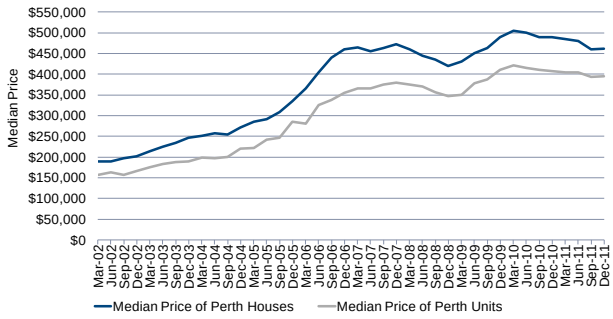
Source: REIWA (*Latest figures are preliminary figures*), Colliers International Research

Perth Established Units Sales (Perth Metro)



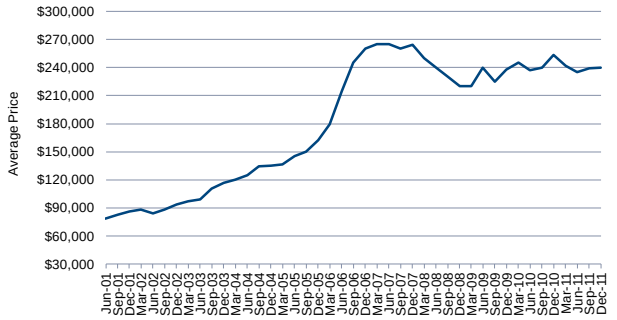
Source: REIWA (*Latest figures are preliminary figures*), Colliers International Research

Perth Quarterly Median House & Unit Price



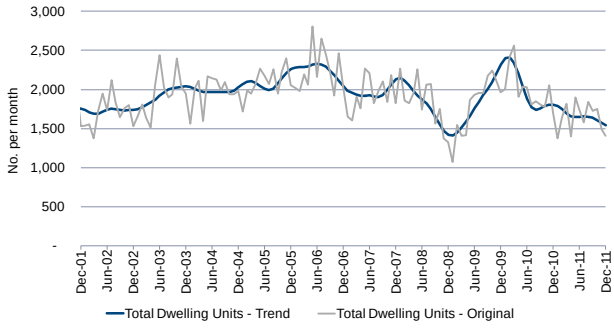
Source: REIWA (*Latest figures are preliminary figures*), Colliers International Research

Perth Median Residential Lot Price



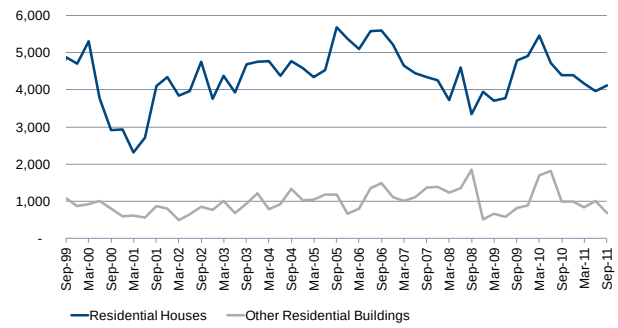
Source: REIWA (*Latest figures are preliminary figures*), Colliers International Research

WA Dwelling Units Approvals



Source: ABS- WA Dwelling Units Approved, Colliers International Research

W.A. Dwelling Unit Commencements



Source: ABS Dwelling Commencements (Table 8750-05), Colliers International Research

Figure 15

4.3 RESIDENTIAL APARTMENT MARKET OVERVIEW

With regard to the market for units and apartments, the following comments can be made:

- Federal Government initiatives, more specifically the First Home Owner's Grant (FHOG) Boost, resource sector optimism, relatively low interest rates, price discounting and a projected shortage of housing were the drivers for the apartment/unit market during 2009. However, 2010 witnessed a retraction in demand due to higher interest rates and economic uncertainty.
- 2010 witnessed first homebuyers diminishing in numbers after the withdrawal of the FHOG Boost at the end of December 2009. This carried through to 2011 with relatively low levels of first homebuyer transactions.
- Second half of 2011 and into 2012 has seen increased first home buyer activity.
- Apartment market pricing stabilised in the second half of 2010 after strong discounting in 2009 however transactional activity remains sluggish with all buyer groups price sensitive.
- This is further impacted by detached dwelling substitutes in suburban locations now priced sub $350,000 which in many cases is 15% to 25% less than typical entry level apartment stock.
- A similar relativity has emerged in the premium residential sub markets creating wider choice.
- This is compounded by the negative perception that emerged from the last cycle on the back of speculative buying, long development lead times and then with the change in market, the public laundering of settlement defaults and number of developer failures on incomplete projects further extending delivery times for legitimate buyers.
- Stock on the market is slowly returning to longer term trend.
- Due to the tightening rental market in 2012, improving yields are seeing a return of investors to the apartment market.
- Selling agents have reported increased levels of enquiry in 2012, particularly for city-fringe (apartment/unit) projects priced between $350,000 and $600,000.
- The Real Estate Institute of Western Australia (REIWA) reported quarterly and annual increases to the March 2012 median weekly rent for the Perth Metropolitan Area of 5% and 10% respectively; and quarterly and annual decreases to the vacancy rate of -4.0% and -1.4% respectively.
- Demand for luxury apartments in all locations of the metropolitan area remained subdued through 2011 and into 2012, however 'western suburbs' selling agents generally report improving activity although this generally pertains to detached dwellings sub $1.8m.
- Recent uncertainty in the global economic conditions and concerns of a property bubble in Australia are likely to keep a lid on a significant recovery in activity for premium priced stock due to the market 'memory' of fallout experienced from 2008 to 2010.
- Long term investors remain cautious, although activity is improving.

- General residential lending criteria of banks has tightened making difficult the achievement of a home loan without a savings and employment track record together with capacity to meet 10% to 20% deposit requirements. This is more so with apartments with many of the banks taking a cautious stance after the fallout of the last cycle peak.

- A number of developers are introducing selling incentives.

- Consequently, new apartment project commencements have softened due to GFC impact and credit constraints placed on buyers and developers.

- High construction costs continue to inhibit feasible medium to high rise apartment development.

- Developers are seeking alternative methods of finance raising to activate projects i.e. fund syndication, joint ventures.

- Builder/developers are most active in the market place due to the internal cost advantage. This is well demonstrated by the continued activities of Finbar, Diploma, Qube Property Group, Pindan and Match through 2010 and into 2011.

- The effect of weak product line demand (at comparative price point) and higher cost base has seen a general shift to low to mid rise (3 to 8 storey) development and increasing levels of group house, town house and terrace styled multi unit development. Consequently the suburban apartment/unit markets are characterised by single and 2 to 4 storey multi unit housing with 'city' fringe areas at 3 – 6 storeys.

- The primary observation in this submarket is that developers are finding it difficult to make feasible medium density development due to the existing balance between product line comparative pricing, cost and funding. The first factor of production to suffer is land value with decreases from the highs of 2007 observed in a range from 20% to 50%.

- This withdrawal from market of medium density development has and is resulting in limited short term supply of this product line. On the premise of continued population growth, there should be over time, a natural correction to demand the timing of which is presently being tempered by consumer caution and affordability. It is anticipated that medium term (defined as 3 – 5 years) the supply shortage and higher demand may drive pricing forward, that together with softer land pricing may enable a return to feasibility of such projects at comparative price cost ratios.

- New apartment project commencements have softened considerably due to GFC impact and credit constraints, with a number of development sites that were proposed to accommodate new developments now in receivership. The 'pre-sale' market emerging is likely to create a 'gap' in supply from 2013 potentially setting up the market for demand led price movement upwards. The effect will be balanced by pricing of detached dwellings and available supply thereof. 'WA Tomorrow 2012' population growth forecasts for 2012 – 2014 suggests the present lack of new supply and market tardiness in delivery (meeting demand) should avail improving demand led conditions from 2013.

4.4 DEVELOPMENT SITE MARKET

The above factors have directly impacted the viability of development sites and placed downward pressure on land values. The sustained withdrawal of credit availability for this sector and weak consumer demand has placed continued pressure on land values over the last 30 months.

The economic and market conditions of late 2007 and 2008 resulted in a retraction of development site activity and limited new development. As a result of the economic downturn, there was a general lack of prominent apartment/mixed-use development site sales over late 2008 and 2009, however this began to turn in 2010 with mid tier developers returning to market taking advantage of discounted land pricing.

It is anticipated market (consumer) sentiment in this sector may improve into 2012, and with the limited production/initiation of new apartment stock since 2009, a scarcity of stock may emerge in 2013, enabling achievement of presale/pre-lease requirements to obtain development funding, suggesting a recovery in demand for sites and values may occur 2013.

The withdrawal from the market by developers was a direct function of the uncertain times experienced over the period 2008 - 2010. Although demand for large built form development sites with high capital requirements remains relatively subdued and has resulted in a softening of those values, the general consensus is that enquiry has increased. Of the limited transactions that have occurred, values appear to have stabilised and typically reflect discounts in the vicinity of 20% to 50% off the top of the market.

The shift in development site price points from 2007 to 2010 is demonstrated in the table below:

Development Site	Sale 1 Date	Sale 1 Price	Sale 2 Date	Sale 2 Price	Discount
Various Lots Welshpool Road & Swansea Street, East Victoria Park	Nov-07	$12,209,091	Jan-10	$9,300,000	24%
Lot 140 Stirling Highway, North Fremantle	Mar-07	$61,000,000	Apr-10	$30,000,000	51%
Cnr Wellington Street & George Street, West Perth	Sep-07	$13,350,000	Jun-10	$7,550,000	43%
Lot 110 Bennet Avenue, North Coogee	Apr-07	$13,909,091	May-10	$9,000,000	35%

Figure 16

4.5 PREVAILING MARKET CONDITIONS - CHANGING TIMES

The events of early 2008 including the initial sub-prime fallout in the United States and subsequent Global Financial Crisis (GFC) created uncertain times for both the equities and property markets in Australia which softened considerably during this period. This change in markets impacted to varying degrees upon a variety of participants.

Whilst a degree of uncertainty still remains within these markets, the magnitude would appear to be less than that evident throughout 2008 and the majority of 2009. Improving levels of investor confidence and general market activity within Australian property markets were evidenced throughout 2010 and until early to mid-2011. Since this time the concerns regarding European sovereign debt crises appear to have re-introduced a layer of general market conservatism into domestic markets, somewhat setting back the momentum that appeared to be gaining throughout late 2010 and early 2011.

We draw your attention to the fact that the market value adopted herein is subject to the issues outlined above, and should be closely monitored in light of future events. Furthermore, it is our strong recommendation that regular valuation updates be initiated and instructed by the party wishing to rely upon this valuation.

5 MARKET SALES EVIDENCE

The identification of the market value of typical medium density sites in this locale is required for benchmarking against the residual value analyses at Section 6: Feasibility of Incentivised Delivery. In this regard a sample of market activity pertaining to residential development sites throughout North Coogee is investigated and tabled below.

Similarly, the market activity pertaining to residential apartments within the locality is investigated to assist with the assessment of the 'as if complete' gross realisation estimate for the residual value analyses at Section 6: Feasibility of Incentivised Delivery.

5.1 RESIDENTIAL DEVELOPMENT SITES

13 O'Connor Close, North Coogee	
Contract Date	November 2011
Contract Amount	$2,100,000 (exclusive of GST)
Site Area	2,252 m² (1,689 m² estimated 'effective' site area)
Site Rate	$933/m² $1,243/m² (effective)
Potential Yield (estimated)	9 dwellings (townhouse concept) 19 dwellings (assuming average apartment area of 85 m²)
Yield Analysis	$233,333/dwelling (townhouse concept) $110,526/dwelling (apartment concept)
Town Planning	The site is predominantly zoned "Mixed Business / Residential (R60 / R80) with the western margin of the site zoned "Public Open Space" (approximately 25% of site).
Comment	Situated on the western side of O'Connor Close approximately 85 metres north of Rollinson Road, the property features a rectangular shaped allotment improved with a functional concrete tilt panel office-warehouse facility constructed in the late 1990's. The site is separated from the Indian Ocean by a freight railway line and beachfront vegetation area, however future multi-level development on the site will benefit from having unrestricted ocean views as demonstrated by a multi-level apartment development which adjoins the site to the immediate south. Whilst the existing improvements offer a utility value, they are not considered to enhance the underlying land value under highest and best use principles.

Lot 460 Barrow Crescent, North Coogee	
Sale Date	December 2011
Sale Amount	$2,927,100 (exclusive of GST)
Site Area	2,342 m²
Site Rate	$1,250/m² $1,132/m² (present value analysis of deferred payment structure)
Potential Yield (estimated)	13 dwellings (townhouse concept) 34 dwellings (apartment concept – assuming average apartment area of 85 m²)
Yield Analysis	$225,162/dwelling (townhouse concept) $86,091/dwelling (apartment concept)
Town Planning	"Group / Multiple Dwelling Site R60 – R100"
Comment	Forming part of the South Beach estate and situated on the northern corner of Barrow Crescent and Herrison Way, the property comprises an irregular shaped residential development site. Acquired by a subsidiary organisation of local residential developer Match, the site benefits from fronting a public open space area and being within short walking distance of South Beach. The site is presently improved with Stockland's estate sales office. We understand that the property sold subject to a staged payment structure, with $500,000 payable initially; and the balance $2,427,100 to be paid in 18 months. Moreover, we understand Stockland will continue operating the sales office on-site during this 18 month period rent free. Our present value analysis of the transaction cognisant of the deferred payment structure reveals a slightly lower site rate of $1,132/m².

Lot 462 Shoalwater Street, North Coogee (Under Contract)	
Sale Date	June 2011
Sale Amount	$3,835,000 (exclusive of GST)
Site Area	2,950 m²
Site Rate	$1,300/m² $1,170/m² (present value analysis of deferred payment structure - rounded)
Potential Yield (estimated)	16 dwellings (townhouse concept) 43 dwellings (apartment concept – assuming average apartment area of 85 m²)
Yield Analysis	$239,690/dwelling (townhouse concept) $89,190/dwelling (apartment concept)
Town Planning	"Group / Multiple Dwelling Site R60 – R100"
Comment	Forming part of the South Beach estate and situated to the southwest 'elbow' of Shoalwater Street, the property comprises an irregular shaped residential development site. Acquired by a subsidiary organisation of local residential developer Match, the site benefits from fronting a public open space area and being within short walking distance of South Beach. We understand that the property sold subject to a staged payment structure, with $400,000 payable initially; and the balance $3,430,000 to be paid in 18 months. Our present value analysis of the transaction cognisant of the deferred payment structure reveals a slightly lower site rate of $1,170/m² rounded.

Lot 786 Orsino Boulevard, North Coogee	
Sale Date	September 2010
Sale Amount	$7,565,000 (exclusive of GST)
Site Area	4,625 m²
Site Rate	$1,636/m²
Approved Yield	100 residential apartments
Yield Analysis	$75,650/dwelling (premised on proposed development)
Town Planning	"Residential R80": Proposed "Marina Village (Local Centre)"
Comment	Forming part of the developing Port Coogee residential estate, the subject site features a generally regular shaped oceanfront development site. The site benefits from being located close to the future marina and is located directly opposite an existing public open space area. Additionally, the site is located close to a proposed shopping centre that will be anchored by a national supermarket. Development approval was recently granted for a multi-level project proposed for the site incorporating 100 residential apartments.

Lots 119 and 120 O'Connor Close, North Coogee	
Sale Date	June 2010
Sale Amount	$4,500,000
Site Area	4,503 m²
Site Rate	$999/m², refer to "comment" $1,301/m², based on net area
Potential Yield	19 dwellings (townhouse concept) 50 dwellings (apartment concept – assuming average apartment area of 85 m²)
Yield Analysis	$236,842/dwelling (townhouse concept) $90,000/dwelling (apartment concept)
Town Planning	"Residential R60/R100"
Comment	The site is located on the western side of O'Connor Close, within the new developing South Beach precinct. The site is situated towards the northern end of O'Connor Close and the western boundary is adjacent to a railway line. As a portion of the land on the western side of the railway line will be suitable for multi level development, it appears likely that most ocean views from Lots 119 and 120 will be obscured. The beach front is located about 200 metres from the rear boundary, with a majority of the land on the opposite or western side of the railway line being reserved for parks and recreation. Development of the site requires a 15 metre wide strip along the western boundary to be ceded free of cost to the Crown for POS. However, the development potential or density is calculated on the whole site area of 4,503 m². Based on the adjusted land area of 3,459 m² (after allowing for the POS), this sale reflects a rate of $1,301/m². The development of 45 apartments on the net site area of 3,459 m² reflects a density of around R130.

Lot 749 Corner Orsino Boulevard & Cockburn Road, Port Coogee

Sale Date	February 2010
Sale Amount	$10,000,000 inclusive of GST (Margin Scheme)
Site Area	1.5442 ha (15,442 m²)
Site Rate	$648/m²
Potential Residential Yield	107 dwellings (R80)
Proposed Residential Yield	58 dwellings
Yield Analysis	$93,458/dwelling (potential) $172,414/dwelling (proposed)
Town Planning	"Neighbourhood Centre (R80)" (Proposed Local Structure Plan)
Comment	Located within Australand's developing Port Coogee development, the property features a beachfront mixed-use development site. The property is generally triangular shaped and benefits from having three frontages to Cockburn Road, Orsino Boulevard and Prenlite View. Future built form development on the site will benefit from having extensive ocean views.

Lot 110 Bennett Avenue, North Coogee

Sale Date	$9,000,000 (exclusive of GST)
Sale Amount	May 2010
Site Area	10,024 m²
Site Rate	$898/m²
Town Planning	"Industry – Restricted Use 9"
Comment	Situated approximately 16 kilometres southwest of the Perth Central Business District within the coastal locality of North Coogee, the property features a rectangular shaped development site of 1.0024 hectares. More particularly, the site is orientated on the western side of Bennett Avenue approximately 90 metres southeast of Abattoir Loop. Fronting a railway line, the site has a single frontage to Bennett Avenue of 94 metres and future multi-level development on the site will benefit from having unrestricted ocean views. The site is currently improved with older style improvements of an industrial nature; however we do not consider they add value under highest and best use principals. The site forms part of an underutilised industrial area located between the South Beach and Port Coogee residential developments. Incorporating approximately 330 hectares, the precinct has been earmarked by the State Government as a mixed-use rejuvenation opportunity and the Department of Planning endorsed the "Cockburn District Structure Plan" in August 2009. However, the majority of the precinct remains zoned "Industrial" under the Metropolitan Region Scheme and at the date of sale a five-year time frame was estimated until the site will be zoned "Urban/ Residential" under the appropriate Town Planning Schemes to facilitate redevelopment. The site was strategically acquired by LandCorp who are a key stake holder within the locality and therefore we believe this transaction reflects a degree of 'special value'.

Development Site Market Evidence Summary

The market evidence investigated is summarised within the schedule below:

Property	Sale Date	Sale Price	Site Area	Site Rate	Potential Yield (Ths.)	Yield Analysis ($/dwel.)	Pot Yield (apts.)	Yield Analysis ($/dwel.)
13 O'Connor Close, North Coogee	Nov-11	$2,100,000	*1,689 m²	*$1,243/m²	9	$233,333	19	$110,526
Lot 460 Barrow Crescent, North Coogee	Dec-11	$2,927,100	2,342 m²	*$1,132/m²	13	$225,162	34	$86,091
Lot 462 Shoalwater Street, North Coogee	Jun-11	$3,835,000	2,950 m²	*$1,170/m²	16	$239,690	43	$89,190
Lot 786 Orsino Boulevard, North Coogee	Sep-10	$7,565,000	4,652 m²	$1,636/m²	-	-	100	$75,650
Lots 119 & 120 O'Connor Close, North Coogee	Jun-10	$4,500,00	*3,459 m²	$1,301/m²	19	$236,842	50	$90,000
Lot 749 Corner Orsino Boulevard & Cockburn Rd, Port Coogee	Feb-10	$10,000,000	15,442 m^2	$648/$m^2$	107	$93,458	58	$178,414
Lot 110 Bennett Avenue, North Coogee	May 10	$9,000,000	10,024 m^2	$898/$m^2$	-	-	-	-

*Effective

Figure 17

5.2 RESIDENTIAL APARTMENT PRICING

The following provide a snapshot of coastal residential apartment pricing in this locale from premium to standard stock.

"Islands Apartments" – Stage 1
21 – 23 Ocean Drive, North Coogee

Sale Details:

Unit	Sale Date	Sale / Asking Price	Year Built	Type	Net Area	Strata Rate
41 (Apt)	Oct-11	$2,300,000	2010	3 x 3	143 m²	$16,084/m²
47 (Apt)	Sep-11	$2,150,000	2010	3 x 3	136 m²	$15,809/m²
20 (Apt)	Mar-11	$2,080,000	2010	3 x 3	135 m²	$15,407/m²
46 (Apt)	Mar-11	$2,200,000	2010	3 x 3	136 m²	$16,176/m²
19 (Apt)	Dec-10	$2,300,000	2010	3 x 3	135 m²	$17,037/m²
APT3A	For Sale	$1,860,000	2010	2 x 2	111 m²	$16,757/m²
APT7A	For Sale	$2,030,000	2010	2 x 2	110 m²	$18,455/m²
APT4B	For Sale	$1,720,000	2010	2 x 2	110 m²	$15,636/m²
BH3A	For Sale	$1,050,000	2010	2 x 2	111 m²	$9,459/m²
BH4A	For Sale	$5,190,000	2010	4 x 3	231 m²	$22,468/m²
BH1B	For Sale	$4,450,000	2010	3 x 3	177 m²	$25,141/m²
BH3B	For Sale	$1,515,000	2010	2 x 3	151 m²	$10,033/m²
BH5B	For Sale	$1,415,000	2010	2 x 2	118 m²	$11,992/m²

Comment

The properties form part of the initial stage of the "Islands Apartments".

"Beachside Leighton North"

1 Freeman Loop, North Fremantle

Sale Details:

Unit	Sale Date	Asking Price	Year	Type	Net Area	Strata Rate
54	Apr-11	$1,650,000	2010	2 x 3	122 m²	$13,525/m²
22	Feb-11	$2,100,000	2010	2 x 3	156 m²	$13,462/m²

Comment

The properties form part of a recently constructed apartment complex overlooking Leighton Beach. Forming part of the first floor, apartment 22 has a southern aspect; whilst apartment 54 is orientated on the second floor and has northern aspect.

"Vueze"

20 Enderby Close, North Coogee

Sale Details:

Unit	Sale Date	Sale Price	Year	Type	Net Area	Strata Rate
11	Dec-10	$1,115,000	2009	3 x 2	144 m²	$7,743/m²

Comment

Located opposite Stage 1 of the "Islands Apartments" and overlooking a public water feature with viewing platform, the apartment forms part of a six-level complex.

"The Promenade"

2 South Beach Promenade, North Coogee

(For Sale)

Price List

Lot	Level	Type	Net	Balc.	Store	Park.	Total	Contract Date	Contract/ Asking Price	Strata Rate
1	1	1 x 1	60 m²	13 m²	6 m²	13 m²	92 m²	Mar-12	$475,000	$7,917/m²
2	1	1 x 1	60 m²	18 m²	6 m²	13 m²	97 m²	Dec-11	$475,000	$7,917/m²
3	1	1 x 1	55 m²	23 m²	5 m²	13 m²	96 m²	Feb-12	$475,000	$8,636/m²
4	1	2 x 2	88 m²	22 m²	7 m²	26 m²	143 m²	Apr-12	$695,000	$7,898/m²
5	1	1 x 1	54 m²	12 m²	6 m²	13 m²	85 m²	For Sale	$475,000	$8,796/m²
6	2	2 x 2	89 m²	27 m²	6 m²	26 m²	148 m²	For Sale	$735,000	$8,258/m²
7	2	2 x 2	88 m²	23 m²	9 m²	26 m²	146 m²	Mar-12	$735,000	$8,352/m²
8	2	2 x 2	88 m²	22 m²	8 m²	26 m²	144 m²	Apr-12	$720,000	$8,182/m²
9	2	1 x 1	54 m²	12 m²	7 m²	13 m²	86 m²	Apr-12	$465,000	$8,611/m²

Comment

Titled "The Promenade" and contained over three levels; the proposed development features a modern residential complex incorporating 9 apartments ranging between 54 and 89 square metres. The total net living area of the complex equates to 636 square metres; and the product mix of the yield comprises five one-bedroom apartments and four two-bedroom apartments.

"30 South Beach Promenade"

30 South Beach Promenade, North Coogee

Sale Details:

Unit	Sale Date	Sale / Asking Price	Year Built	Type	Net Area	Strata Rate
1	For Sale	$795,000	U.C.	2 x 2	99 m²	$8,030/m²
2	For Sale	$1,235,000	U.C.	3 x 2	151 m²	$8,179/m²
3	For Sale	$795,000	U.C.	2 x 2	97 m²	$8,196/m²
4	For Sale	$780,000	U.C.	2 x 2	97 m²	$8,041/m²
5	For Sale	$1,175,000	U.C.	3 x 2	142 m²	$8,275/m²
6	For Sale	$838,000	U.C.	2 x 2	99 m²	$8,465/m²
7	For Sale	$1,150,000	U.C.	3 x 2	136 m²	$8,456/m²
8	For Sale	$1,345,000	U.C.	3 x 2	158 m²	$8,513/m²
9	For Sale	$815,000	U.C.	2 x 2	97 m²	$8,402/m²
10	For Sale	$815,000	U.C.	2 x 2	98 m²	$8,316/m²
11	For Sale	$1,245,000	U.C.	3 x 2	142 m²	$8,768/m²
12	For Sale	$1,190,000	U.C.	3 x 2	136 m²	$8,750/m²
13	For Sale	$1,425,000	U.C.	3 x 2	158 m²	$9,019/m²
14	For Sale	$1,290,000	U.C.	3 x 2	141 m²	$9,149/m²
15	For Sale	$1,300,000	U.C.	3 x 2	136 m²	$9,559/m²
16	For Sale	$1,525,000	U.C.	3 x 2	158 m²	$9,652/m²
17	For Sale	$1,350,000	U.C.	3 x 2	142 m²	$9,507/m²

Comment

Currently under construction, the four level development is orientated on the eastern corner of South Beach Promenade and Keeling Way.

"Ocean View Apartments North Coogee"

52 Rollinson Road, North Coogee

Sale Details:

Unit	Sale Date	Asking Price	Year	Type	Net Area	Strata Rate
16	For Sale	$1,290,000	2007	3 x 2	131 m²	$9,847/m²
4	For Sale	$700,000's	2007	3 x 2	131 m²	$5,344/m²

Comment

Situated on the northwest corner of Rollinson Road and O'Connor Close, the apartments form part of a multi-level apartment development constructed in 2007. Titled "Ocean View Apartments North Coogee", apartment 16 is located on the fourth floor and benefits from having extensive ocean views; whilst apartment 4 is located on the first floor and we understand has limited ocean views.

"Palazzo Apartments"
9 O'Connor Close, North Coogee

Sale Details:

Unit	Sale Date	Asking Price	Year	Type	Net Area	Strata Rate
8	Mar-11	$1,450,000	2008	3 x 2	176 m²	$8,239/m²

Comment

Adjoining the "Ocean View Apartments North Coogee" to the north, the property forms part of a multi-level apartment complex constructed in 2008.

5.3 CATCHMENT AREA PRICING

The pricing of unit product within the market catchment of the Cockburn Coast has been broadly analysed to confirm depth, product and price points. The summary data is tabled below.

Price Points

Suburb - Bed Count	Min of Sale Price	Average of Sale Price	Max of Sale Price
Beaconsfield	**$325,000**	**$688,021**	**$1,315,000**
2	$325,000	$595,050	$866,000
3	$525,000	$700,026	$1,300,000
4	$500,000	$795,962	$1,315,000
Cockburn Central	**$455,000**	**$481,667**	**$500,000**
4	$455,000	$481,667	$500,000
Coogee	**$539,000**	**$815,598**	**$1,500,000**
2	$575,000	$575,000	$575,000
3	$600,000	$831,786	$1,150,000
4	$539,000	$793,614	$1,500,000
5	$632,000	$935,400	$1,200,000
6	$1,000,000	$1,000,000	$1,000,000
Fremantle	**$325,000**	**$939,303**	**$2,600,000**
2	$325,000	$819,136	$2,600,000
3	$555,000	$917,694	$1,850,000
4	$745,000	$1,202,250	$1,995,000
5	$1,055,000	$1,367,500	$1,680,000
6	$875,000	$875,000	$875,000
Hamilton Hill	**$225,000**	**$492,533**	**$775,000**
1	$480,000	$480,000	$480,000
2	$225,000	$463,058	$755,000
3	$295,000	$493,789	$775,000
4	$237,500	$535,120	$737,000
5	$495,000	$610,000	$720,000
North Coogee	**$801,500**	**$1,253,325**	**$1,850,000**
2	$801,500	$801,500	$801,500
3	$895,000	$1,160,556	$1,500,000
4	$1,150,000	$1,382,000	$1,850,000

Suburb - Bed Count	Min of Sale Price	Average of Sale Price	Max of Sale Price
South Fremantle	**$425,000**	**$1,027,873**	**$2,210,000**
2	$625,000	$858,107	$1,400,000
3	$555,000	$1,056,278	$1,900,000
4	$425,000	$1,060,769	$1,550,000
6	$2,210,000	$2,210,000	$2,210,000
Spearwood	**$268,275**	**$496,518**	**$800,000**
1	$625,000	$625,000	$625,000
2	$385,000	$461,717	$550,000
3	$268,275	$472,214	$670,000
4	$300,000	$529,198	$800,000
5	$515,000	$515,000	$515,000
Success	**$230,000**	**$513,133**	**$830,000**
3	$380,000	$465,581	$610,000
4	$230,000	$521,183	$830,000
5	$456,000	$570,400	$740,000
White Gum Valley	**$380,000**	**$694,198**	**$945,000**
1	$380,000	$380,000	$380,000
2	$499,000	$700,283	$865,000
3	$490,000	$687,267	$945,000
4	$580,000	$725,111	$885,000

Analysis $/m²

Suburb - Bed Count	Min of $/m²	Average of $/m²	Max of $/m²
Beaconsfield	**$3,103**	**$4,428**	**$5,800**
3	$3,103	$4,602	$5,800
4	$3,635	$3,993	$4,448
Cockburn Central	**$2,717**	**$2,747**	**$2,784**
4	$2,717	$2,747	$2,784
Coogee	**$2,821**	**$3,694**	**$6,190**
3	$2,895	$4,477	$6,190
4	$2,857	$3,510	$4,109
5	$2,821	$3,600	$4,940
Fremantle	**$3,007**	**$4,921**	**$8,150**
3	$4,126	$5,349	$8,150
4	$4,032	$4,207	$4,382
5	$3,552	$3,552	$3,552
6	$3,007	$3,007	$3,007
Hamilton Hill	**$2,295**	**$3,651**	**$4,712**
3	$2,878	$4,006	$4,712
4	$2,295	$3,092	$3,892

Suburb - Bed Count	Min of $/m²	Average of $/m²	Max of $/m²
North Coogee	**$3,013**	**$4,428**	**$6,584**
2	$3,013	$3,013	$3,013
3	$3,689	$4,443	$5,157
4	$4,000	$4,557	$6,584
South Fremantle	**$2,237**	**$5,013**	**$7,280**
2	$5,533	$5,567	$5,601
3	$4,068	$5,294	$7,280
4	$2,237	$4,669	$5,939
6	$4,055	$4,055	$4,055
Spearwood	**$2,266**	**$2,913**	**$3,473**
4	$2,266	$2,913	$3,473
Success	**$1,608**	**$2,690**	**$4,231**
3	$2,212	$2,960	$4,231
4	$1,608	$2,651	$3,972
5	$1,727	$2,332	$2,681
White Gum Valley	**$3,333**	**$4,782**	**$6,786**
1	$6,786	$6,786	$6,786
2	$4,397	$4,495	$4,594
3	$3,798	$4,984	$5,927
4	$3,333	$4,105	$5,566

6 FEASIBILITY OF INCENTIVISED DELIVERY

6.1 MEASUREMENT METHODOLOGY

The intent of this process is to establish whether there is an incentive structure related to density and height bonuses that will enable private sector delivery of affordable dwellings as defined by the thesis of Stubbs: 2011.

The methodology applied considers a typical developer feasibility with consideration of proposed development, developer margins, development cost and the residual land value result.

It in effect contemplates the notion of 'super profits' in the development sector and the ability of increased density and height to offset delivery of affordable stock.

To this end consideration is given to the product typology contemplated for the DSP and market activity of similar product from which probable market price points are established. These price points are applied to a 'base case' acknowledging traditional delivery methods to establish a notional residual value for land at market.

The resultant residual value of land should in general align with the analysis of market activity of comparable development sites (developer acquisitions) and this is demonstrated with sales evidence.

To this end, Colliers and Hassell have identified four sites within the DSP that demonstrate the variance in density and height options presently available under the DSP.

'Base Case' development feasibilities are established for each site and the residual value of land and developer profit margin is measured. This is contrast and confirmed against Market Evidence tabled at Section 5.1 above.

Height and density bonuses are applied as a percentage of Plot Ratio to deliver a ratio of 20% of the 'conforming' or Base Case yield as affordable dwellings, and a minimum 'one for one' additional yield is granted to the developer. The developer margins are locked at constant levels and not applied to the 'affordable' stock.

A 'no change' outcome in the residual land value demonstrates the 'bonus' yield has traded off the delivery of 'affordable' stock and not disadvantaged the developer profit margin or the notional market value of land.

An increase in the residual land value outcome demonstrates the 'bonus' yield has provided a benefit to the developer in the delivery of 'affordable' stock, in that the increase in land value will in reality translate to improved profit, however over time economic principles of demand and supply will see this benefit transfer to improved site values.

A decrease in the residual land value outcome demonstrates the 'bonus' yield has disadvantaged the developer in the delivery of 'affordable' stock. Reality will likely see a smaller change in site values whilst owners of land maintain value expectations and as such developer margins will be reduced or placed at risk unless compensation under the Scheme is applied to affected landowners.

6.2 TEST CASE: DENSITY AND HEIGHT BUILT DESIGN OPTIONS

Site Location

The four sites and baseline density height outcomes under the current CCDSP are tabled below.

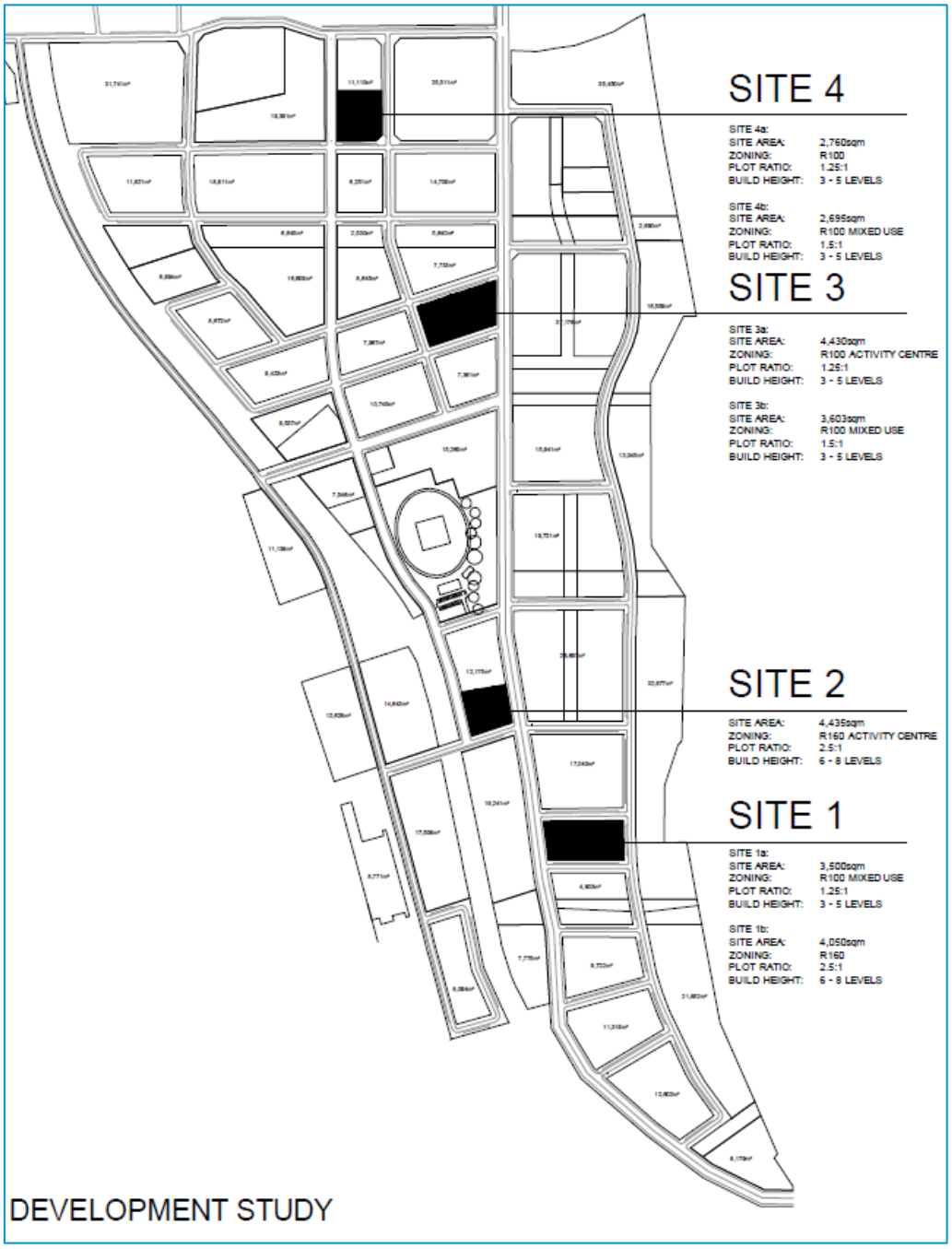


Figure 18

A full copy of the Hassell Concepts is tabled at **Appendix B**.

Height and Density Analysis

The height density analysis for each option in the Base Case and bonus Scenarios is tabled below.

Site 1A	Base Case	Scenario 1	Scenario 2
Site Area m²	3,500	3,500	3,500
Plot Ratio	1.25	1.63	1.75
Plot Ratio - NLA m²	4,375	5,688	6,125
Increase in Plot Ratio		30%	40%
Height (levels)	3.0	4.0	5.0

Site 1B	Base Case	Scenario 1	Scenario 2
Site Area m²	4,050	4,050	4,050
Plot Ratio	2.50	3.25	3.50
Plot Ratio - NLA m²	10,125	13,163	14,175
Increase in Plot Ratio		30%	40%
Height (levels)	7.0	8.0	9.0

Site 2	Base Case	Scenario 1	Scenario 2
Site Area m²	4,435	4,435	4,435
Plot Ratio	2.50	3.25	3.50
Plot Ratio - NLA m²	11,088	14,414	15,522
Increase in Plot Ratio		30%	40%
Height (levels)	8.0	8.0	9.0

Site 3A	Base Case	Scenario 1	Scenario 2
Site Area m²	4,330	4,330	4,330
Plot Ratio	1.25	1.62	1.75
Plot Ratio - NLA m²	5,413	7,036	7,577
Increase in Plot Ratio		30%	40%
Height (levels)	3.0	4.5	5.0

Site 3B	Base Case	Scenario 1	Scenario 2
Site Area m²	3,603	3,603	3,603
Plot Ratio	1.50	1.95	2.10
Plot Ratio - NLA m²	5,405	7,026	7,566
Increase in Plot Ratio		30%	40%
Height (levels)	3.0	4.5	5.0

Site 4A	Base Case	Scenario 1	Scenario 2
Site Area m²	2,760	2,760	2,760
Plot Ratio	1.25	1.63	1.75
Plot Ratio - NLA m²	3,450	4,485	4,830
Increase in Plot Ratio		30%	40%
Height (levels)	3.0	5.0	5.5

Site 4B	Base Case	Scenario 1	Scenario 2
Site Area m²	2,695	2,695	2,695
Plot Ratio	1.50	1.95	2.10
Plot Ratio - NLA m²	4,043	5,255	5,660
Increase in Plot Ratio		30%	40%
Height (levels)	3.0	5.0	6.0

Figure 19

For each of the sites and height/plot ratio combinations above, we have had regard to market activity and compiled a ‘typical’ product mix for the contemplated apartment projects emerging from the DSP. The concluded apartment typology is tabled below in overview: Figure 20.

This typology is then broadly applied to each of the concepts to establish a product yield (number of apartments) and parking requirement. A provision for residential visitor parking at 10% of total occupier parking is applied.

The commercial and retail Net Lettable Area (NLA) is kept constant and converted to strata unit equivalents based on the averages at Figure 20. Parking ratios for tenant users are applied at 1 bay per 75m². No parking provision is made for commercial/retail customers as it is assumed this will be delivered on street or in dedicated parking stations.

The results of this approach to yield analysis for each of the selected sites, is tabled at Figure 21 overleaf.

# Apt	Bed Count	Net Area m²	Total Net Area m²	Parking Ratio	Parking Bays	%age Apt by Count			%age Apt by NLA		
10	1	55	50	1.00	10	10.0%			6.9%		
20	1	65	1,300	1.00	20	20.0%	30%	total 1 bed	16.2%	23%	total 1 bed
35	2	75	2,625	1.00	35	35.0%			32.7%		
20	2	90	1,800	1.00	20	20.0%	55%	total 2 bed	22.4%	55%	total 2 bed
10	3	110	1,100	1.00	10	10.0%			13.7%		
5	3	130	650	2.00	10	5.0%	15%	total 3 bed	8.1%	22%	total 3 bed
100			8,025		105						

Average Apartment floor area	80.25	m²
Residential Parking Ratio	1.05	
Average Balcony Area	15	m²
Visitor Parking - Ratio of Total Res Parking	10%	
Commercial/Retail Parking at 1 bay per	75	m²
Average Retail Strata Shop	75	m²
Average Commercial Strata Unit	150	m²

Figure 20

Site	Site Area m²	Height	NLA Res m²	NLA Com/Ret m²	Residential Parking (includes visitor)	Comm/Retail Tenant Parking	Total Parking	Residential Dwellings	Commercial Units	Retail Units	Total Number of Units
1A	3,500	3.5	3,040	1,335	46	18	64	39	5	7	51
1B	4,050	6.5	10,125	0	149	0	149	130	0	0	130
2	4,435	8.0	9,285	1,800	137	24	161	119	0	24	143
3A	4,430	3.5	5,415	0	81	0	81	69	0	0	69
3B	3,603	4.5	3,950	1,455	59	19	78	53	6	7	66
4A	2,760	3.5	3,450	0	52	0	52	45	0	0	51
4B	2,695	3.5	2,110	1,926	30	26	56	27	7	13	47

Figure 21

A similar yield analysis is then applied to the plot ratio and height increases illustrated under Scenario 1 (+ 30%) and Scenario 2 (+ 40%). Refer Figure 19.

The intent of the increase in plot ratio and height is to enable the provision of additional dwellings as affordable product and also to provide additional units for sale to the developer to offset the 'cost' of providing the affordable dwellings. In other words, the additional dwellings provided to the developer should at a minimum maintain profit levels and not affect the residual value of land and ideally; to incentivise delivery of affordable stock, improve profitability and thereto in time improve the residual value of land as markets adjust to the 'super' profit.

The yield analysis with the increased plot ratio/height under Scenario 1 (+ 30%) firstly applies the increase in dwellings to affordable stock equating to 20% of the 'Base Case' yield and then 1:1 to the developer. Under Scenario 2 (+ 40%), the increase in dwelling yield applies 20% of the 'Base Case' yield to affordable stock and the balance to the developer, that is, the developer stock for sale is improved by more than 20% in the aim to further improve the chances of meeting the 'cost' of delivering affordable dwellings and then improving the profitability. The application of yield is tabled at Figure 22 overleaf.

Site	Base Case		Base Case + 30%				Base Case + 40%			
	Apartments	Total Parking	Increase in Apartments	Applied to Affordable	Applied to Developer	Total Parking	Increase in Apartments	Applied to Affordable	Applied to Developer	Total Parking
1A	39	64	18	8	10	83	24	8	16	90
1B	130	149	52	26	26	206	62	26	36	207
2	119	161	48	24	24	214	38	24	14	227
3A	69	81	28	14	14	112	28	14	14	112
3B	53	78	22	11	11	102	28	11	17	109
4A	45	52	18	9	9	72	18	9	9	72
4B	27	56	12	6	6	69	21	6	15	79

Figure 22

The above illustrates a market derived yield under the current DSP (Base Case). It also illustrates that within the performance bounds of the DSP an increase in yield of 40% (Scenario 2) is possible of which half representing a 20% increase on the Base Case is applied to affordable dwellings.

This identifies a risk to the DSP in that if proven successful, the contemplated yield for the DSP may increase by 40% (Scenario 1) to 50% (Scenario 2) but in doing so will see the private sector deliver affordable dwelling numbers that are on average approximately 14% of stock.

Whether the proposed incentivisation of affordable dwellings through height and density bonuses proves feasible is demonstrated in the pages following and the second consideration is whether it is widely accepted at market. If a 50% take up is adopted then one could imagine under Scenario 2 a DSP yield increase of some 25% with delivery of a DSP affordable dwelling ratio of approximately 7%.

6.3 INCENTIVISATION - FEASIBILITY TESTING

Modelling Technique

If in fact there is scope for the private sector to deliver affordable dwellings the two principal factors that measure the feasibility is the level of profitability and residual value to land. The hypothetical development approach is applied to the concept options outlined above to establish a Base Case residual land value which is contrast to the local market activity as a test of reasonableness.

This approach best replicates the development scenarios whilst recognising the attributes and disadvantages of site specific land use and built form limitations, benefit of location, amenity and planning and infrastructure framework.

The hypothetical development method of valuation typically consists of firstly, calculating the gross realisation for the product of the proposed development on an 'as if complete' basis and then deducting from this figure an allowance for Goods and Services Tax, selling commission, development management, legal expenses, advertising, profit and risk, loss of interest over the development and selling period, development costs, rates and taxes and the initial purchase expense for the notional site.

This figure is then adopted as being a realistic guide to the market value of the land, in that it measures what a prudent purchaser would be able to pay for the land for development purposes and earn a return/profit from the venture, while at the same time being sufficiently rewarded for the risk undertaken.

The principal inputs of this method are outlined in the table below.

Component	Comment
Acquisition Costs	Includes Stamp Duty on acquisition and costs associated with the assumed purchaser due diligence.
Professional Fees	Costs predominantly associated with the initial planning and pre-construction works, together with a development management fee.
Construction Costs	The adopted costs are based on Cordell Commercial, Industrial and Housing Building Cost Guide, WA, February 2012. The adopted construction costs reflect an 'average' to 'quality' standard development and the 'as if complete' pricing has acknowledged this fact. Independent expert advice on this input element specific to the concepts has not been obtained. This is not considered a major factor due to the preliminary nature of the concepts applied and also the premise upon which the calculations are being made, which is fundamentally a benchmarking exercise.
Statutory Fees and Contributions	Fees payable to Councils and other statutory authorities such as Development Approvals, Building Licence and Headworks charges and fees. A Scheme Contribution for local infrastructure is applied at $\$100/m^2$ of land area.
Land Holding Costs	Land Tax, Water rates and Council rates. These costs are incorporated into the model on a proportional basis.
Selling Costs	Costs associated with the sale of the completed apartments, including selling agents fees, project marketing fees, title registration costs and conveyance expenses.
Interest Charges	Based on 100% debt funding with the interest rate adopted on a nominal basis assuming a senior debt facility only. The adopted rate is 8.0% per annum nominal plus loan charges.

Component	Comment
Hurdle Rates	A Profit and Risk Factor is utilised in the static approach and represents the target developers margin representing a percentage of total development costs (net of selling costs). The Developer Margins utilised reflect the analysis of developer inputs sourced from recent valuation and feasibility submissions received from or made available from; • LandCorp; • Pindan; • Match; • Psaros Property Group; • Australand; • Mirvac; • Lendlease; • BGC; • Finbar. The adopted profit and risk is varied from concept to concept to reflect factors of; • Location; • capital outlay; capital risk; • quantum and type of product; marketability risk; and • duration. Typically analysed developer margins on medium to high density built form range from 15.0% to 22.5% in the current market.
Escalation Rates	No escalation is incorporated into the model for neither development costs nor sales revenues. The adopted costs and revenues are reflective of market levels as at the date of analysis.
Goods and Services Tax (GST)	The General Tax Rule has been applied to the notional land acquisition and subsequent development. Construction costs, professional fees, due diligence costs and selling costs have been incorporated into the model on a GST net basis, on the presumption an Input Tax Credit would ordinarily be reclaimed the month following where the cost was incurred.
Gross Realisation	Represents the GST inclusive sales revenue for the completed apartments and retail/commercial suites. There are a large number of key variables involved in achieving sale prices into the future and draw your attention to this fact. As such, it is stressed that the estimate of Gross Realisation "As If Complete" represents current values as at the date of analysis.

It is critical to recognise that in these analyses the projected income stream reflects the anticipated growth, or otherwise, inherent in a property investment based upon the physical and market characteristics related to that property. The future values quoted for property prices and costs are projections only, formed on the basis of information currently available and are not representations of what the value of the property will be as at a future date. This information includes the current expectations as to property values and income that may not prove to be accurate.

The premise of these calculations is benchmarking and enabling comparative measures.

Rationale

The Base Case Scenario should demonstrate a residual value for land commensurate with market activity. Once this is demonstrated, on the premise cost rates and other development inputs remain constant and relative to scale of built form, the measure of profitability can be ascertained (developer margin).

The viability of increasing plot ratio/height and delivering a quantum of affordable dwellings can then be measured by change in residual value of land or change in profitability. In view of the attitudes expressed in the developer survey, the developer margin or profitability ratio has been 'fixed' as this would be a very sensitive factor at market impacting the desire of developers to participate.

To this end, a residual value analysis is applied to both Scenario 1 and Scenario 2.

This has been applied to two sub sets of both Scenario 1 and 2;

Sub Set 1A

- The affordable stock attributed to the increase in plot ratio and height is 20% of the Base Case.
- The balance increase in dwelling yield is provided to the developer as an offset and incentive; for sale.
- The sale price of affordable stock is set at the 'actual delivery cost'.

Sub Set 1B

- The affordable stock attributed to the increase in plot ratio and height is 20% of the Base Case.
- The balance increase in dwelling yield is provided to the developer as an offset and incentive; for sale.
- The sale price of affordable stock is set at the 'Price Range established by Stubbs 2011'.

Sub Set 2A

- The affordable stock attributed to the increase in plot ratio and height is 10% of the Base Case.
- The balance increase in dwelling yield is provided to the developer as an offset and incentive; for sale.
- The sale price of affordable stock is set at the 'actual delivery cost'.

Sub Set 2B

- The affordable stock attributed to the increase in plot ratio and height is 10% of the Base Case.
- The balance increase in dwelling yield is provided to the developer as an offset and incentive; for sale.
- The sale price of affordable stock is set at the 'Price Range established by Stubbs 2011'.

6.4 VALUE DEFINITIONS - LIMITATIONS

In order to apply a hypothetical development approach to the residual value of land, the Valuer must determine the gross realisation of the proposed development which includes establishing the 'as if complete' value for the individual products of development whether they be residential dwellings, commercial office suites or retail shops.

To this end the following definitions as endorsed by the International Valuation Standards Committee (IVSC) and the Australian Property Institute (API) are applied:-

Market Value	Market Value is the estimated amount for which an asset should exchange on the date of valuation between a willing buyer and a willing seller in an arms length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without compulsion.
Gross Realisation	Gross Realisation at the date of valuation is the sum of the Market Values of the individual units which a property can achieve over a specified selling period, assuming an orderly sale, between willing buyers and willing sellers, in arms length transactions, after proper marketing, wherein the parties acted knowledgeably, prudently and without compulsion.
"As Is" Value	The "As Is" valuation means a valuation that provides the current market value of the property as it currently exists rather than a value of the proposed development.
"As If Complete" Value	The Value "As If Complete" assessed herein is the Market Value of the proposed improvements as detailed in the report on the assumption that all construction had been satisfactorily completed in all respects at the date of this report. The valuation reflects the valuer's view of the market conditions existing at the date of the report and does not purport to predict the market conditions and the value at the actual completion of the improvements because of the time lag. Accordingly, the "As If Complete" valuation must be confirmed by a further inspection by the valuer, initiated and instructed by the reliant party on completion of improvements. The right is reserved to review, and if necessary, vary the valuation in this report if there are any changes in relation to the project itself or in the property market conditions and prices.

6.5 FEASIBILITY OUTPUTS

The residual value outputs for the 63 (7 sites x 9 calculation sets) feasibility analyses prepared are tabled below at Figure 23.

Where the residual value output has improved or the reduction is less than 10%, the outcome is highlighted in pink/red.

Site	Base Case	Scenario 1 Subset 1A		Scenario 2 Subset 1A		Scenario 1 Subset 1B		Scenario 2 Subset 1B		Scenario 1 Subset 2A		Scenario 2 Subset 2A		Scenario 1 Subset 2B		Scenario 2 Subset 2B	
		Affordable dw yield = Base Case + 20% Balance of Yield Increase to Developer for sale Sale Price of Affordable dw = cost to developer		Affordable dw yield = Base Case + 20% Balance of Yield Increase to Developer for sale Sale Price of Affordable dw = cost to developer		Affordable dw yield = Base Case + 20% Balance of Yield Increase to Developer for sale Sale Price of Affordable dw = Stubbs 2011		Affordable dw yield = Base Case + 20% Balance of Yield Increase to Developer for sale Sale Price of Affordable dw = Stubbs 2011		Affordable dw yield = Base Case + 10% Balance of Yield Increase to Developer for sale Sale Price of Affordable dw = cost to developer		Affordable dw yield = Base Case + 10% Balance of Yield Increase to Developer for sale Sale Price of Affordable dw = cost to developer		Affordable dw yield = Base Case + 10% Balance of Yield Increase to Developer for sale Sale Price of Affordable dw = Stubbs 2011		Affordable dw yield = Base Case + 10% Balance of Yield Increase to Developer for sale Sale Price of Affordable dw = Stubbs 2011	
		Residual value to land	Change from BC	Residual value to land	Change from BC	Residual value to land	Change from BC	Residual value to land	Change from BC	Residual value to land	Change from BC	Residual value to land	Change from BC	Residual value to land	Change from BC	Residual value to land	Change from BC
1A	$1,074	$246	(77%)	$200	(81%)	$46	(96%)	$0	(100%)	$280	(74%)	$234	(78%)	$183	(83%)	$137	(87%)
1B	$1,094	$857	(21.7%)	$877	(19.9%)	$220	(79.9%)	$240	(78.1%)	$965	(11.7%)	$985	(9.9%)	$642	(41%)	$662	(40%)
2	$1,026	$1,057	3%	$1,103	7%	$462	(55%)	$510	(50%)	$1,026	0%	$1,204	17%	$722	(30%)	$909	(11%)
3A	$1,169	$217	(81%)	$217	(81%)	NA	Not Feasible	NA	Not Feasible	$275	(76%)	$275	(76%)	$152	(87%)	$152	(87%)
3B	$1,010	$1,243	23%	$1,299	29%	$944	(7%)	$1,002	(1%)	$1,288	27%	$1,346	33%	$1,124	11%	$1,182	17%
4A	$1,130	$109	(90%)	$109	(90%)	NA	Not Feasible	NA	Not Feasible	$167	(85%)	$156	(86%)	$72	(94%)	$22	(98%)
4B	$1,577	$942	(40%)	$1,058	(33%)	$764	(52%)	$876	(44%)	$1,032	(35%)	$1,076	(32%)	$942	(40%)	$987	(37%)

Figure 23: Residual Value Output Analyses

6.6 RESIDUAL VALUE OUTPUT OBSERVATIONS

Measures

A comparison of residual values resulting from the Base Case analysis confirms relativity to current market evidence. Refer Section 5.1. This confirms the Base Case results as a relevant baseline to which results for Scenario 1 and Scenario 2 can be measured.

If the percentage change noted at Figure 23: Residual Value Output Analyses is negative, it implies the addition of plot ratio/height and compelling delivery of affordable dwellings either at a ratio of 10% or 20% and at price points equating to 'cost' or at price points tabled by Stubbs 2011, is infeasible.

A 0% change would imply the cost of delivery of affordable dwellings at the tested ratio and price points is offset by the addition of plot ratio/height and residual land values and profitability are maintained.

A positive increase in residual values implies the cost of delivery of affordable dwellings at the tested ratio and price points is more than offset by the addition of plot ratio/height and super profits may in fact exist, in which case normal market forces will improve the residual value of land over time and return profits to an equilibrium.

Observations

- Of the 56 comparative feasibility outputs; 23% (13) indicated a change in residual value of less than negative 10% or an improvement.
- Of the above affirmative indicators (13);
    - one (1) related to Site 1B although a negative shift in residual value of (9.9%) is recorded,
    - four (4) related to Site 2 with range in residual value shift of 0% to 17%, and
    - eight (8) related to Site 3B with range in residual value shift of (7%) to 33%.
- Site 3B showed a balanced or positive change for seven (7) of eight (8) iterations demonstrating private sector delivery of affordable dwellings incentivised by plot ratio/height bonuses is workable at this scale site cognisant of site/locational characteristics and contemplated built form.
- Of the 56 iterations benchmarked against the base case; 11% of outcomes (6) achieved a balance or positive improvement to residual land value whilst maintaining developer profitability at current market levels.

Conclusions

- The feasibility testing indicates that across the various sites and whilst cognisant of character of location, scale and contemplated built form, that in certain circumstances affordable dwellings at 'cost' to the developer and/or at the Stubbs 2011 benchmarks may be feasibly delivered by the private sector whilst maintaining profitability to developers and residual land values.
- Having said that, the results clearly indicate the outcome is particular to a specific scale of site and built form and suggests it is not achievable on all sites through out the DSP.
- The most workable configuration is that of Site 3B;

Site 3B	Base Case	Scenario 1	Scenario 2
Site Area m²	3,603	3,603	3,603
Plot Ratio	1.50	1.95	2.10
Plot Ratio - NLA m²	5,405	7,026	7,566
Increase in Plot Ratio		30%	40%
Height (levels)	3.0	4.5	5.0

- The Cockburn Coast Master Plan Figure 31 Land Use Plan identifies Site 3B as being contained within the 'Low Density Residential' zone which is broadly described as having a Residential Density Code of R80 and general heights ranging from three to five storeys.
- The below extract from the Cockburn Coast Master Plan identifies this land use component as delivering 31.6% of the dwellings or 1,641 dwellings.

Building Typology	Indicative Density	Dwelling Yield	% Component
High Rise	R160	1,300	25.0%
Medium Rise	R120	602	11.6%
Low Rise	R80	1,641	31.6%
Terrace	R40	57	1.1%
Mixed Use	R100	585	11.3%
Activity Centre	R160	1,008	19.4%
TOTAL	-	**5,193**	**100%**

Table 3_Dwelling Yield by Building Typology

- Conditioned on the assumption affordable dwellings are delivered by the private sector at the maximum plot ratio/height incentive available (Scenario 2) in this land use zone only; the dwelling yield will increase 50% from 1,641 dwellings to 2,508 dwellings, of which some 341 dwellings are 'affordable dwellings'. This will result in a total yield adjustment from 5,193 to 6,060 and enable an affordable dwelling ratio of 5.6% of the entire Cockburn Coast Master Plan.

7 CONCLUSIONS

The research into delivery of affordable dwellings did not identify a generally applicable model or mechanism that was wholly reliant on private sector delivery.

In the main, case studies clearly establish intervention by governments and not-for-profit organisations through statutory planning and policy in addition to the density incentives whilst supplemented with the provision of grants, financial incentivisation, low cost land or tax abatement whether it be local, state or federal.

In Western Australia, the delivery of affordable dwellings in medium high density formats has been limited to date by the activities of the Department of Housing. The model is premised on the state funding delivery of affordable dwellings through the acquisition of stock at market price and the enabling of stock (also at market price) through partnerships and joint ventures.

There are no known examples of incentivised private sector delivery of affordable dwellings that do not involve some form of government and not-for-profit intervention or support.

The modelling of incentive based schemes enabling plot ratio (and height as required) bonuses to private sector developers to offset the cost of delivery at 'affordable' price points identified a general market failure across the product lines tested with the exception of a regular shaped 'low density' allotment of three to five level is; Concept 3B.

The Cockburn Coast Master Plan presently sets aside some 31.6% of the precinct under this land use zone.

The application of 40% plot ratio incentives in this land use zone may enable the delivery of approximately 341 affordable dwellings amounting to 5.6% of total contemplated residential stock.

This is well short of the District Structure Plan aspirational target of 20%.

It is understood, 5% of total stock is to be social housing and will be delivered by the State through Department of Housing.

Additionally, it is understood State policy mandates that development of government held land in brownfield or similar projects now deliver 15% of product as affordable housing. The State through various agencies controls some 40 hectares of land within the Cockburn Coast Master Plan area. Premised on an average yield of R80 and land use efficiency of 65%, a further 312 affordable dwellings maybe delivered equating to 5.1% of total stock. This is premised on there being no overlap between the government land holdings and the abovementioned 'low density' zone. This is a critical assumption and one requiring further analysis and confirmation across the master plan area.

In total, this suggests a delivery of some 15% of total dwelling stock as affordable dwellings is possible inclusive of social housing.

This number maybe further supplemented via partnerships and joint ventures that engage state government and not-for-profits through mechanisms such as application of land at discounted or nil value, the provision of grants or other funding support as well as abatement of local and state taxes for the delivery of higher proportions of affordable to market based product.

APPENDIX A

Developer Survey Questionnaire

Cockburn Coast Affordability Strategy – Developer Survey

Interview Details

Company:

Interviewed:

Position:

Role:

Contact: Email:
Tele:
Mob:

Date:

Introduction

Hassell has been engaged by LandCorp to prepare an Affordable Housing Strategy for the Cockburn Coast.

Colliers has been appointed as sub consultant to provide property research and a 'property perspective' on delivery modes and mechanisms.

The form of development contemplated for the corridor is predominantly medium/high density mixed use apartments (multiple dwellings low/high rise – 64%), group dwellings/terraces (22%) and 3% single detached dwellings.



Figure 1

Society	Population	Approximately 10 000 people
	Housing stock	1) Approximately 4850 dwellings [1] Minimum 3 per cent separate houses Minimum 22 per cent terrace 2) Minimum 33 per cent low-rise apartments [2] 3) Minimum 31 per cent medium to high-rise apartments [3/4] Minimum 20 per cent affordable housing Minimum 20 per cent adaptable buildings 15 per cent of homes need to be 'family homes'

1 Potential dwelling yield assumes residential build out of the South Fremantle landfill site and the South Fremantle chalet village
2 Low rise apartments - 3 to 5 storeys
3 Medium rise apartments - 6 to 8 storeys
4 High rise apartments - over 8 storeys
5. Adaptable housing refers to dwellings that are adaptable to changing demographics with the ability to transition over time

Figure 2

The Cockburn Coast District Structure Plan (DSP), which was endorsed by the WA Planning Commission in August 2009 (now referred to as Part 1), envisages a population of 10,000 residents throughout Cockburn Coast with an employment base of approximately 3,600 jobs.

It was prepared to guide future land use and transport initiatives within the area stretching between South Beach and the Port Coogee marina. It sets a framework for future redevelopment of the Cockburn Coast area as an intensive, mixed use urban environment.

Since then the planning for the area has been progressing, and in September 2011 the Cockburn Coast area was rezoned by the WAPC from Industry to Urban under the Metropolitan Region Scheme ("MRS").

The Draft Cockburn Coast District Structure Plan (Part 2) applies to the Cockburn Coast project area south of Rollinson Road (formerly referred to as the 'Master Plan').

It has been prepared to build upon the endorsed Cockburn Coast District Structure Plan (2009) Part 1, and to provide the next layer of planning to guide future Local Structure Plans.

It is intended that both the Cockburn Coast District Structure Plan Parts 1 and 2 will be used as guiding documents to inform the preparation of Local Structure Plans which will be a requirement under the Scheme.

Land Use

The following extract from the Draft Cockburn Coast District Structure Plan (Part 2) outlines contemplated land uses.

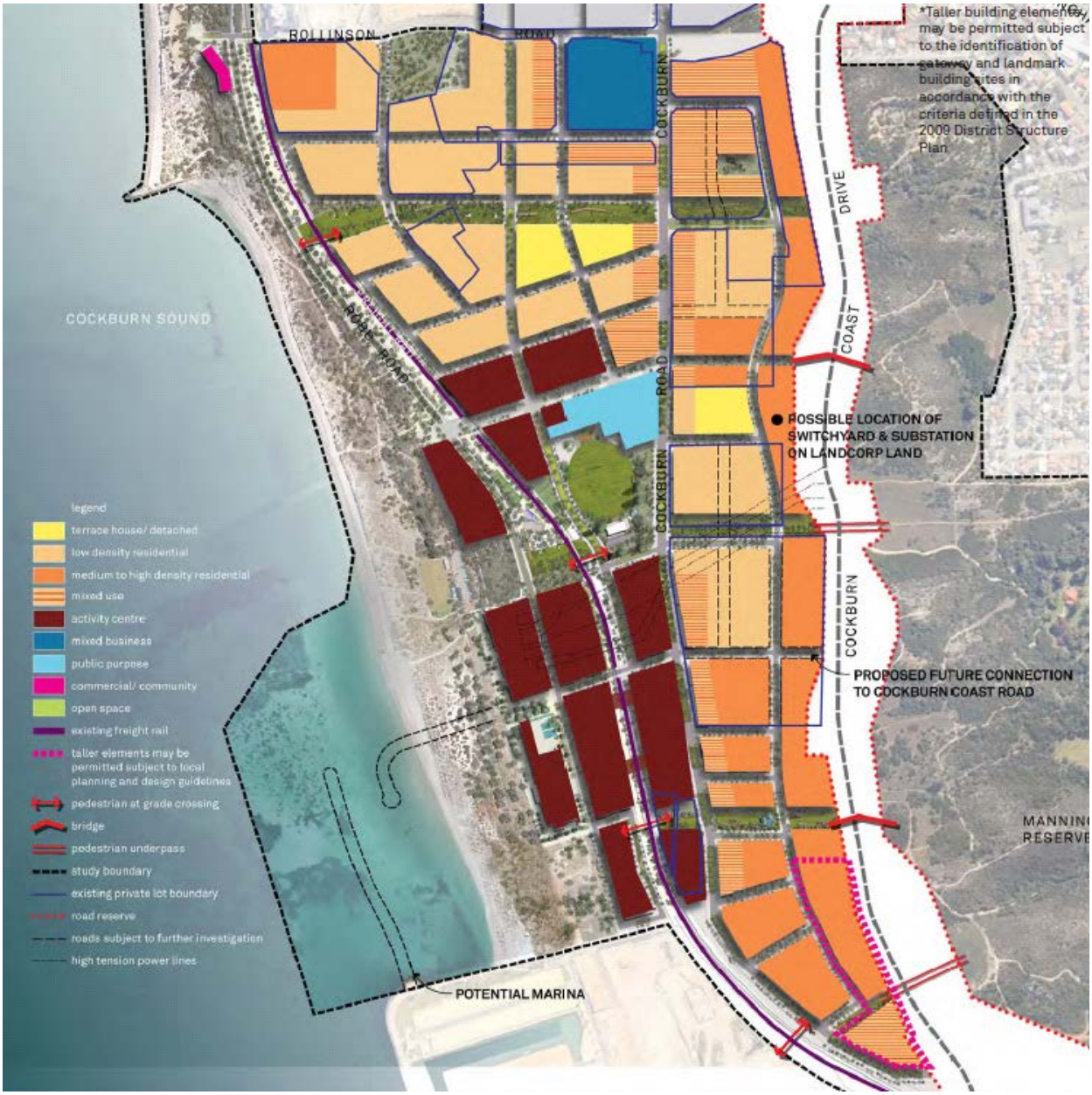


Figure 3

The predominant use is residential and the legend illustrates increasing density from 'yellow' (terrace house/detached) to 'activity centre' (commercial/retail/ and medium to high density residential).

The residential components are further described as 'Single detached', 'Terraced housing', 'Low Rise Apartments (3-5 storeys)', 'Medium Rise Apartments (6 – 8 storeys)' and 'High Rise Apartments (above 8 storeys)'.

Conceptually the development form and subsequent yield analysis are illustrated below.

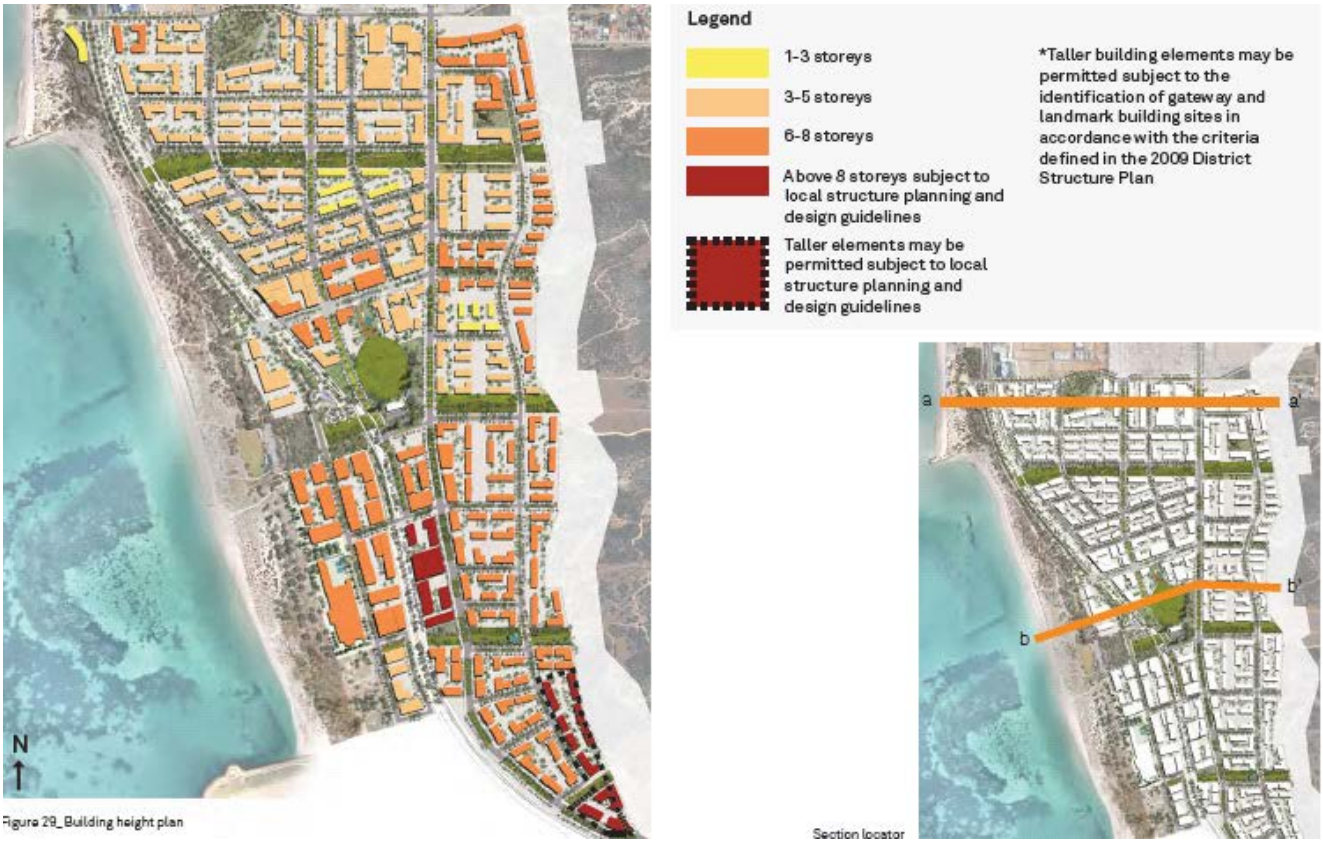


Figure 4

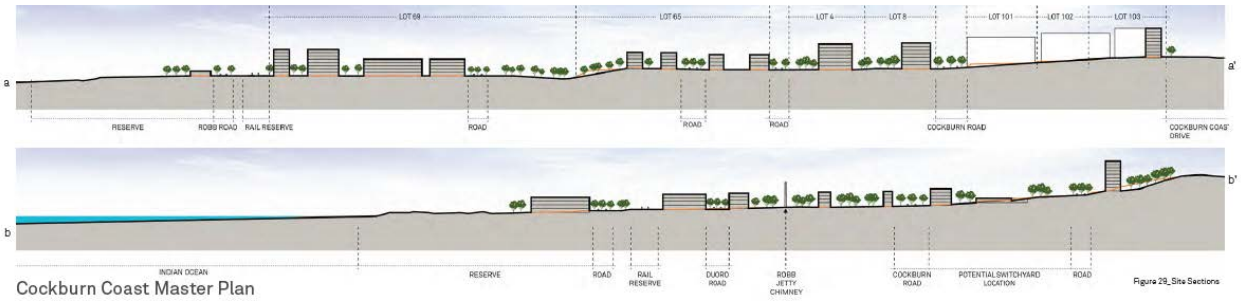


Figure 5

Building Typology	Indicative Density	Dwelling Yield	% Component
High Rise	R160	1,300	25.0%
Medium Rise	R120	602	11.6%
Low Rise	R80	1,641	31.6%
Terrace	R40	57	1.1%
Mixed Use	R100	585	11.3%
Activity Centre	R160	1,008	19.4%
TOTAL	-	**5,193**	**100%**

Figure 6





Residential buildings will actively engage with the public realm



Figure 7



Figure 8

Question 1

What are your preliminary thoughts on the form of development contemplated for the Cockburn Coast?

Question 2

What market based hurdles or opportunities can you envisage for the CC?
Prompts

- Accommodation preferences
- Demographic Profile
- Household Income
- Amenity
- Transport
- Employment
- Built Form Cost
- Land Acquisition and Development Financing
- Service Infrastructure

Question 3

Are there specific infrastructure deliverables at state and local government level which may stimulate the contemplated form of development?

Question 4

Are there initiatives at state and local government level which may be implemented to stimulate the contemplated form of development?

Question 5

Various studies (National Housing Supply Council) indicate an imbalance between demand (high) and supply (low) and forecast a worsening of the situation in the longer term.

In the past Governments have subsidised demand (First Home Owners Grant) to stimulate supply (Post GST and Post GFC). In each instance a pull forward of demand resulted together with short term demand led house price inflation followed by a lull in market activity as the anticipated flow through to second and third home buyers did not eventuate.

Have you any thoughts on initiatives that place a greater focus on increasing supply (such as NRAS) as opposed to subsidising demand?

Question 6

It is argued the creation of 'sustainable communities' mandates the planning and production of diverse dwelling/accommodation types. The anticipated implementation, delivery and build out of CC is 15 – 20 years.

What is your view of the contemplated accommodation mix in the context of the WA market?

Affordability

In accordance with the DSP, a minimum target of 20% affordable housing is to be achieved throughout Cockburn Coast. Rising housing prices in Australia have led to significant problems of housing affordability, particularly for those on low or moderate incomes.

What is affordable housing?

Housing that costs more than 30% of a household's income is generally considered to be 'unaffordable', but because housing costs vary between different geographic areas (and from site to site), what constitutes 'affordable' will vary both by income and location. Housing in some high value areas may be unaffordable to households with relatively high incomes.

'Affordable housing' is required that covers all dwelling types to suit the needs of the population, that is – single bedroom dwellings, family housing and aged and dependent persons accommodation.

Affordable housing is housing that is reasonably adequate in standard and location for households in lower or middle parts of the income scale and which does not cost so much that such a household is unlikely to be able to meet other basic living costs on a sustainable basis. It includes owner-occupied housing as well as rental housing owned by governments, non profit organisations, corporations or individuals. As a rule of thumb, housing is considered to be affordable if the cost of purchase or rental does not exceed 30% of the gross household income.

Social housing is publicly funded housing and is proposed to make up 5% of the housing stock at Cockburn Coast. Social housing is a sub-set of affordable housing. The Department of Housing is currently the main provider of social housing. Further work is desirable to clarify whether 20% is an appropriate or achievable target for Cockburn Coast. Given the location of the project on prime section of the coast, high land values will be a significant factor influencing the ability to deliver affordable housing product.

In 2010 The Western Australian Planning Commission (WAPC) commissioned a study into 'Achieving Affordable and Diverse Housing in Regeneration Areas in Western Australia'.

The report was prepared by Judith Stubbs and Associates and delivered in two parts;

- Judith Stubbs and Associates, April 2011, Report 1: Profile of Selected Redevelopment Areas.
- Judith Stubbs and Associates, December 2010, Report 2: Planning Mechanisms and Strategies.

The above reports have been circulated to various state agencies for consideration and in part, application.

Developer Survey

An assessment is required to quantify the market for and type of affordable housing that would be appropriate without creating an undesirable imbalance in the future community profile, and without adversely affecting development viability for this and other types of desirable development (residential and non residential).

The intent of this interview process is to gauge development industry views on affordability, modes and methods of delivery including incentivisation options such as density and plot ratio bonuses; and for that matter any innovative thought towards a realistic delivery model for affordability in a medium to high density format.

Question 7

Affordable housing consultant Judith Stubbs (JSA 2010) has analysed the community needs for affordable housing for the WAPC.

The report documents the proportion of people that are currently experiencing housing stress in the Perth market. It uses this as the basis for the recommendation that a *minimum 15% affordable rental and purchase accommodation in all new release and redevelopment areas is warranted, and 20% justified.*

To this end, the Cockburn Coast District Structure Plan has set a minimum target of 20% affordable housing to be achieved throughout Cockburn Coast.

JSA 2010 defines housing affordability;

"Housing is 'affordable' when a very low-, low- or moderate income household pays no more than 30% of gross household income on rental or mortgage payments..."

JSA 2010 goes on to state;

"...such households are considered to be in 'housing stress' when they pay more than 30% of gross income on housing costs, and in 'severe housing stress' when paying more than 50% of gross income on housing costs."

JSA 2010 has determined the price levels (2010) that very low, low and moderate income households can afford to pay for rental and owner occupier housing are:

Affordable Housing Benchmarks in Perth SD

	Very low-income household	Low-income household	Moderate-income household
Income Benchmark	<$655-$736 per week	<$984 per week	$984-$1,467 per week
Affordable Rental Benchmarks	<$197-$221 per week	<$296 per week	$296-$440 per week
Affordable Purchase Benchmarks	<$153,000 - $174,000 total purchase cost	<$230,000 total purchase cost	$230,000 - $345,000 total purchase cost

Figure 9

In terms of the medium high density development contemplated for CC, what are your initial thoughts of enabling such affordability measures?

Question 8

JSA Report 1 proposes an amendment to *State Planning Policy 3.6: Development Contributions for Infrastructure* to include 'affordable housing' as 'special infrastructure'. Further to this, the proposal suggests a more equitable developer contribution based on dwelling yield, bedroom count and even accounting for retail/commercial GFA as opposed to a land based measure.

In the context of the contemplated built form, is such a proposal feasible?

Are there alternative performance based measures that can be reasonably applied?

Should such measures be incentivised? If yes, what forms of incentivisation will likely support built form supply as contemplated and meet the measures of affordability outlined above?

Question 9

JSA Report 2 page 42 cites;

One approach to affordable housing is to offer bonuses to developers to offset loss of profit associated with provision of affordable housing, or in order to generate funds for the construction of affordable housing through sharing additional profit generated through the developer taking up the planning incentive... . Bonuses that that may result in increased saleable floor area include plot ratio and height (where other constraints affect the use of allowable plot ratio) and bonuses around parking may reduce costs in high density development.

Do you see this as a feasible mechanism in the context of;

a. the density and heights already contemplated for CC;

b. a nil or low parking ratio for affordable housing supply; and

c. proposed 'affordable' (JSA) pricing regime?

	Very low-income household	Low-income household	Moderate-income household
Affordable Rental Benchmarks	<$197-$221 per week	<$296 per week	$296-$440 per week
Affordable Purchase Benchmarks	<$153,000 - $174,000 total purchase cost	<$230,000 total purchase cost	$230,000 - $345,000 total purchase cost

Question 10

What are the principal constraints to delivering 'affordable' dwelling product in a medium/high density format and meeting the implied diversity and pricing requirements?

Question 11

What product typologies are more likely to achieve the implied diversity and pricing requirements? Are there low cost options such as pods and lightweight demountable structures that can be applied in part or in whole?

Question 12

In the context of CC, what locational and infrastructure needs will better promote or support the supply of diversity in dwelling modes and pricing need?

Question 13

What incentivisation based variation to planning provisions (if any) such as height, plot ratio, parking to name a few are likely to best generate sufficient funds/super profits to offset delivery of affordable housing?

Question 14

How in your view, would the market likely respond to the mandatory provision of affordable housing in CC and what are the likely implications to market input such as;

a. implementation,

b. take up, and

c. residual land values to name a few?

Question 15

Following on from Q12 and 13 above, assuming an equitable and feasible solution, should there be a 'blanket' cap or ratio approach to the volume and type of affordable housing on;

a. whole of Scheme area basis, or

b. a project by project basis, or

c. should it be defined in designated precincts?

Can you provide a broader explanation of the reasoning behind your views outlining the key drivers, motivations and foreseeable advantages to community and supply of affordable dwellings?

Question 16

Initiatives already implemented in several redevelopment areas (SRA – EPRA) that have met with some success include;

a. the sale of serviced land at cost or a discount to market value to Department of Housing or a Community Housing provider,

b. mandating 10% of dwellings constructed be offered to Department of Housing or a Community Housing provider for use as affordable housing with transfer at construction cost and incoming buyer utilising a shared equity scheme,

c. provision of density bonuses and responsible agency secures 50% of the additional profit arising from the application of bonus GFA to both affordable and non-affordable housing. This maybe 'cash in kind' or a number of the additional units constructed within the development or elsewhere in the locality.

What are your thoughts on applicability and feasibility of these schemes in CC? Moreover, are there alternative mechanisms that you could propose or are aware of that may prove feasible?

Question 17

Is the provision of affordable dwellings in your view a state responsibility?

In view of your response, is market intervention warranted through a mandatory planning regime or should it be focused on state/local government controlled land; for example LandCorp control 40 hectares of land with the City of Fremantle in control of 20 hectares under the former South Fremantle Landfill Site?

Question 18

Following on from Q15-16 above, from an industry perspective, would greater direction, clarity and simplicity be preferred, and as such, a blanket 'cash in lieu' mechanism be applied on GFA of private and public built form development, which is paid on completion of sales into a pooled fund to support delivery of affordable dwellings by the state, on either publicly or privately owned land?

Could this be expanded to stimulate density and delivery by utilising mechanisms such as decreasing scales of 'cash in lieu' for greater diversity, set product modules and GFA?

Question 19

Are there other alternatives worth considering such as profit sharing, that is, an agreed proportion of additional profits earned on the delivery of affordable density bonuses?

Question 20

Do you consider there is joint venture or partnering opportunities between state and private developers that will facilitate the vision for CC as well as delivery of affordable dwellings? If so, can you provide some insight to JV or Partnering structures and models that you would consider reasonable and functional?

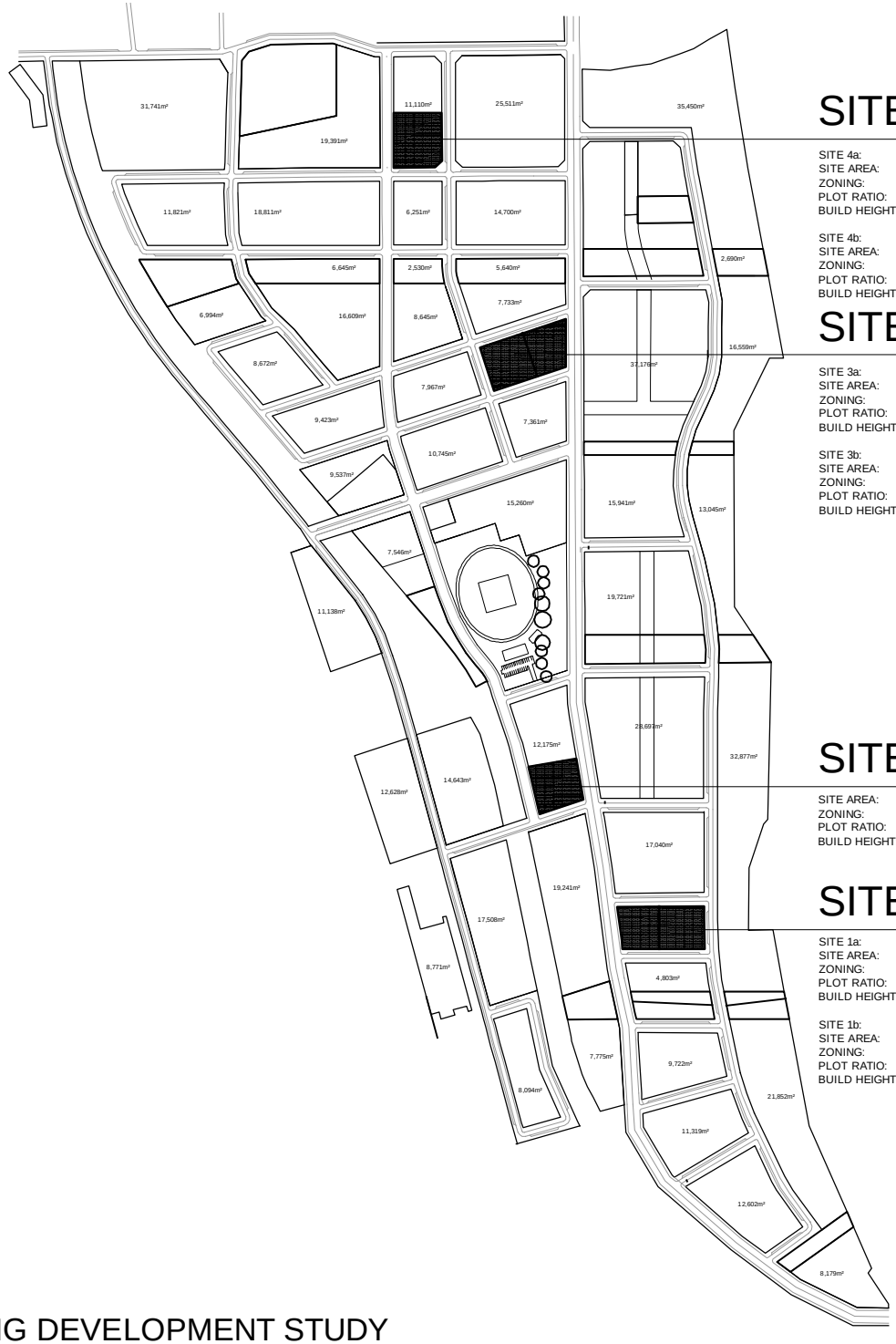
Prompts;

a. land at $nil; development bonuses, profit share and delivery of affordable dwellings,
b. land at cost; development bonuses, profit share and delivery of affordable dwellings,
c. either a or b, development bonuses, where profit share paid into pooled fund for delivery of affordable dwellings on specific sites; contract award on construction of affordable dwellings,
d. either a or b, development bonuses, with state capital funding of affordable dwellings.

Final Comments/Summary

APPENDIX B

Hassell Notional Development Concepts and Yields



SITE 4

SITE 4a:
SITE AREA: 2,760sqm
ZONING: R100
PLOT RATIO: 1.25:1
BUILD HEIGHT: 3 - 5 LEVELS

SITE 4b:
SITE AREA: 2,695sqm
ZONING: R100 MIXED USE
PLOT RATIO: 1.5:1
BUILD HEIGHT: 3 - 5 LEVELS

SITE 3

SITE 3a:
SITE AREA: 4,430sqm
ZONING: R100 ACTIVITY CENTRE
PLOT RATIO: 1.25:1
BUILD HEIGHT: 3 - 5 LEVELS

SITE 3b:
SITE AREA: 3,603sqm
ZONING: R100 MIXED USE
PLOT RATIO: 1.5:1
BUILD HEIGHT: 3 - 5 LEVELS

SITE 2

SITE AREA: 4,435sqm
ZONING: R160 ACTIVITY CENTRE
PLOT RATIO: 2.5:1
BUILD HEIGHT: 6 - 8 LEVELS

SITE 1

SITE 1a:
SITE AREA: 3,500sqm
ZONING: R100 MIXED USE
PLOT RATIO: 1.25:1
BUILD HEIGHT: 3 - 5 LEVELS

SITE 1b:
SITE AREA: 4,050sqm
ZONING: R160
PLOT RATIO: 2.5:1
BUILD HEIGHT: 6 - 8 LEVELS

SITE LOCATION KEY PLAN

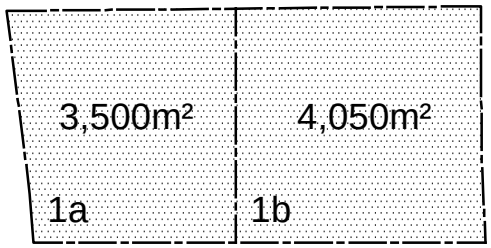
COCKBURN COAST -AFFORDABLE HOUSING DEVELOPMENT STUDY

HASSELL

SITE 1

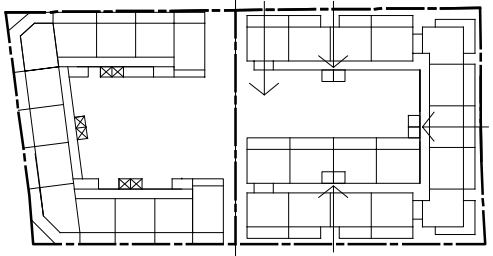
SITE 1a:
SITE AREA: 3,500sqm
ZONING: R100
PLOT RATIO: 1.25:1
BUILD HEIGHT: 3 - 5 LEVELS

SITE 1b:
SITE AREA: 4,050sqm
ZONING: R160
PLOT RATIO: 2.5:1
BUILD HEIGHT: 6 - 9 LEVELS



COMBINED AREA:
7,550m²

COCKBURN COAST -AFFORDABLE HOUSING DEVELOPMENT STUDY

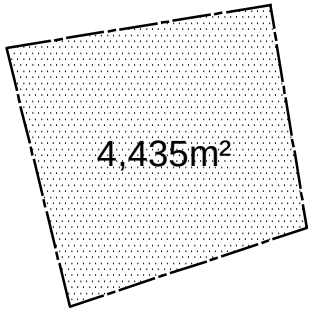
Site 1a 3,500sqm	Site 1b 4,050sqm
R100 PR=1.25:1 4,375sqm	R160 2.5:1 10,125sqm
Complying Development: 32 Aparts@95sqm + 1,375sqm Retail/Comm	Complying Development: 107 Aparts@95sqm
+ 30 % = 5,687sqm 45 aparts + 1,375sqm Retail/Comm	+ 30 % = 13,162sqm 138 aparts
+ 40 % = 6,125sqm 50 aparts + 1,375sqm Retail/Comm	+ 40 % = 14,175sqm 149 aparts
13 aparts/level  4 levels = 52 aparts 5 levels = 65 aparts 3 levels = 39 aparts	17 aparts/level 6 levels = 102 aparts 7 levels = 119 aparts 8 levels = 136 aparts

HASSELL

SITE 2

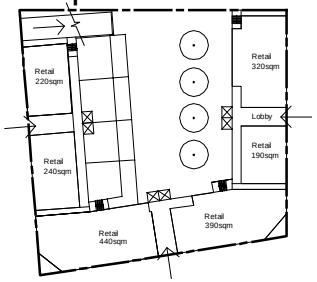
COCKBURN COAST -AFFORDABLE HOUSING DEVELOPMENT STUDY

SITE AREA: 4,435sqm
ZONING: R160 ACTIVITY CENTRE
PLOT RATIO: 2.5:1
BUILD HEIGHT: 6 - 9 LEVELS

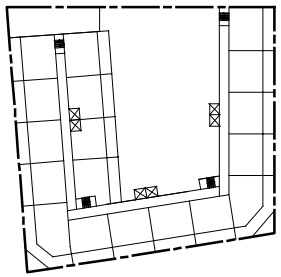
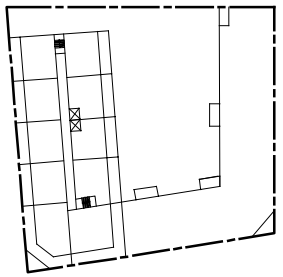


SITE AREA:
4,435m²

4 aparts/level



2 Lifted Option

Site 2 4,435sqm	
R160 PR=2.5:1 11,087sqm	
Complying Development: 98 Aparts@95sqm + 1,800sqm Retail/Comm	
+ 30 % = 14,413sqm 133 aparts@95sqm + 1,800sqm Retail/Comm	
+ 40 % = 15,522sqm 144 aparts@95sqm + 1,800sqm Retail/Comm	
18 aparts/level  8 levels = 98 aparts 8 full levels = 130 aparts 9 full levels = 148 aparts	10 aparts/level  Complying 8 Level Option Upper Level Plan

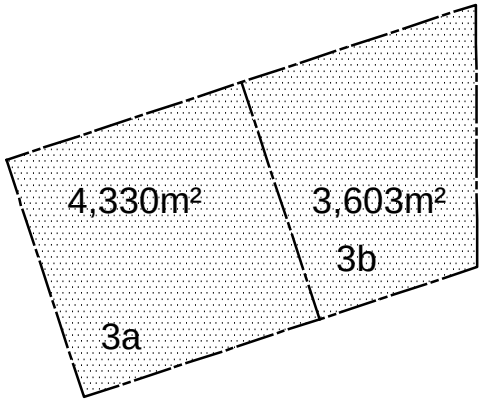
HASSELL

SITE 3

COCKBURN COAST -AFFORDABLE HOUSING DEVELOPMENT STUDY

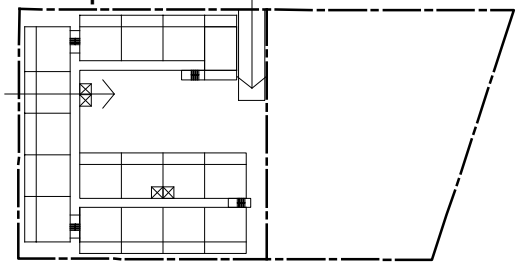
SITE 3a:
SITE AREA: 4,430sqm
ZONING: R100 ACTIVITY CENTRE
PLOT RATIO: 1.25:1
BUILD HEIGHT: 3 - 5 LEVELS

SITE 3b:
SITE AREA: 3,603sqm
ZONING: R100 MIXED USE
PLOT RATIO: 1.5:1
BUILD HEIGHT: 3 - 5 LEVELS

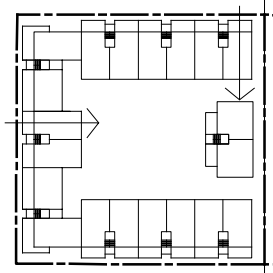
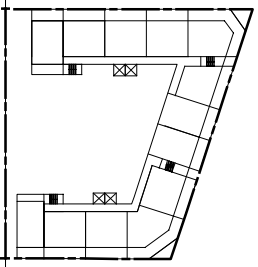


Combined Site Area:
7,933m²

17 aparts/level



3a Lifted Option

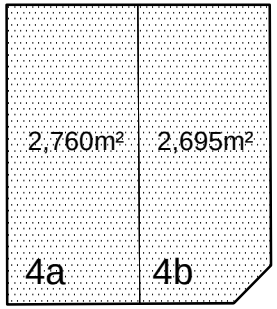
Site 3a 4,330sqm	Site 3b 3,603sqm
R100 PR=1.25:1 5,412sqm	R100 1.5:1 5,405sqm
Complying Development: 57 Aparts@95sqm (3 levels walkup)	Complying Development: 42 Aparts@95sqm + 1,455sqm Retail/Comm
+ 30 % = 7,036sqm 74 aparts (4.5 levels lifted)	+ 30 % = 7,026sqm 59 aparts@95sqm + 1,455sqm Retail/Comm
+ 40 % = 7,577sqm 80 aparts@95sqm (5 levels lifted)	+ 40 % = 7,567sqm 64 aparts@95sqm + 1,455sqm Retail/Comm
20 aparts/level  3 levels = 57 aparts (walkup) 4.5 levels = 74 aparts (lifted) 5 levels = 80 aparts (lifted)	13 aparts/level  4.5 levels = 42 aparts 5.5 levels = 59 aparts 6 levels = 64 aparts

HASSELL

SITE 4

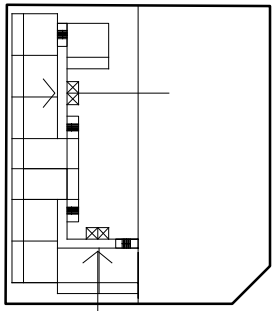
SITE 4a:
SITE AREA: 2,760sqm
ZONING: R100
PLOT RATIO: 1.25:1
BUILD HEIGHT: 3 - 5 LEVELS

SITE 4b:
SITE AREA: 2,695sqm
ZONING: R100 MIXED USE
PLOT RATIO: 1.5:1
BUILD HEIGHT: 3 - 5 LEVELS



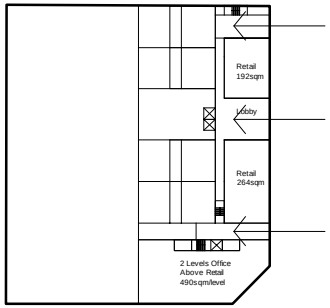
COMBINED AREA:
5,455m²

10 aparts/level



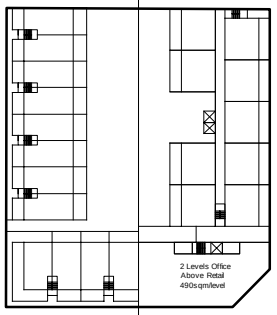
4a Lifted Option

4 aparts/level



4b Ground Floor

COCKBURN COAST -AFFORDABLE HOUSING DEVELOPMENT STUDY

Site 4a 2,760sqm	Site 4b 2,695sqm
R100 PR=1.25:1 3,450sqm	R100 1.5:1 4,042sqm
Complying Development: 36 Aparts@95sqm (3 - 4 levels walkup/lifted)	Complying Development: 22 Aparts@95sqm + 1926sqm Retail/Comm
+ 30 % = 4,485sqm 47 aparts (5 levels lifted)	+ 30 % = 13,162sqm 35 aparts (4.5 levels) + 1926sqm Retail/Comm
+ 40 % = 4,830sqm 51 aparts (5.5 levels lifted)	+ 40 % = 14,175sqm 39 aparts (5 levels) + 1926sqm Retail/Comm
12 aparts/level (10 aparts/level lifted development)  3 levels = 36 aparts	9 aparts/level 3 levels = 22 aparts 4 levels = 31 aparts 5 levels = 40 aparts

HASSELL

APPENDIX C

Residual Value Calculations

APPENDIX C

Base Case

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	3,500	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	1.25		32	apts	45	50
		Plot Ratio Area	4,375	sqm	95	m²	97	96
		Levels	3.50	storeys	3,040	m²	4,352	4,790
		RCode Eqivalent	100		1,335	m²	1,335	1,335
Site Cover	80%		44		4,375	m²	5,687	6,125
Podium	85%	Basement	95%	Efficiency		PRatio	1.62	1.75
	-		0.67	Levels				
	-		2,228					
	-		64					

Residential							$5,000	Rounding Factor		
# Apt	**Bed**	**Net Area**	**Total area**	**Carbays/apt**	**Total Carbays**	**$/sqm net**	**Average price**	**Gross Realisation**	**Affordable Component**	
Affordable Stock Added										
0	1	0	-	-	0	$0	$0	$0	0%	
0	1	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	0%
Additional Stock to Developer								**$0**		
0	1	0	-	-	0	$0	$0	$0	0%	
0	1	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	0%
Complying Yield								**$0**		
6	1	55	330	1.00	6	$7,000	$385,000	$2,310,000	15%	
10	1	65	650	1.00	10	$7,000	$455,000	$4,550,000	26%	41% total 1 bed
10	2	75	750	1.00	10	$7,100	$535,000	$5,350,000	26%	
8	2	90	720	1.00	8	$7,050	$635,000	$5,080,000	21%	46% total 2 bed
3	3	110	330	1.00	3	$6,725	$740,000	$2,220,000	8%	
2	3	130	260	2.00	4	$6,600	$860,000	$1,720,000	5%	13% total 3 bed
39			3,040		41			**$21,230,000**	100%	100%
					1.05			$21,230,000		
		Average floor area	77.95				Average price	$545,000		
		Balcony Average	15					$6,984		
		Carbay provision	35							
		Amenities - sqm per apartment	-	-						
		Total Apartments	39							
		Visitor Parking	10.0%	5.0						

Commercial	Average Unit	150		75	m²/car bay				
	No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**		
	5	800	11	$6,600	$1,056,000	$5,280,000	$6,000	$450	7.50%

Retail	Average Unit	75		75	m²/car bay				
	No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**		
	7	535	7	$7,150	$546,464	$3,825,250	$6,500	$400	6.15%

	Total Net Floor Area	4,375	1.25				
	Surplus/Deficit Plot Ratio	**0**					
	Total Units	51			**Total Realisation**	**$30,335,250**	
	Total Parking	64	64				

					Sale Rate				
Timings					8	4.0			
	Statutory Planning Planning		6	months	Pre Sales	33.0			
	Pre - sales commitment		4	months	60%	$16,546,500			
	Construction Design and Tender/mobilisation		4	months		$15,758,055			
	Development		18	months					
	Selling		3	months					
	Total Duration		**35**	months					
	PR Guide		2.9	6.0%	17.5%				

Development Calculations								$/unit	
Gross Realisation							$30,335,250	$594,809	
LESS	GST	Land					$2,757,750		$2,757,750
		Res GR	$21,230,000	Com GR	$9,105,250		$27,577,500		
		GST	$1,930,000		$827,750				
LESS									
	Agency Selling Fee			2.00%		$606,705		$11,896	
	Development Management Fee			1.00%		$303,353		$5,948	
	Settlement Fee Vendor			0.15%		$45,503		$892	
	Marketing			0.75%		$227,514		$4,461	
	Ancillary Costs			0.00%		$0		$0	
						$1,183,075			
							$26,394,425		
LESS	Profit and Risk			20.00%		$4,399,071		$86,256	$1,006
							$21,995,354		

LESS	**Development Costs**	**Net Area**	**Efficiency**	**Gross Area**					
	Basement Car Park	2,228	95.0%	2,345	$945	$2,216,025		$43,451	
	Podium Car Park	-	85.0%	-	$770	$0		$0	
	Commercial	800	85.0%	941	$1,925	$1,811,765		$35,525	
	Retail	535	85.0%	629	$1,400	$881,176		$17,278	
	Residential	3,040	90.0%	3,378	$1,965	$6,637,333		$130,144	
	Balcony	585			$885	$517,725		$10,151	
	External Works	0.0%		4,375		$400,000		$7,843	
	External Services	0.0%				$0		$0	
	Scheme Costs				$100	$350,000		$6,863	
	Sustainability Initiatives	0.0%				$0		$0	
	Public Art	1.0%				$124,640		$2,444	
	Headworks/Statutory Fees	51			$4,000	$204,000		$4,000	
	Professional Fees	9.0%				$1,182,840		$23,193	
	Contingency	10.0%				$1,432,550		$28,089	
						$15,758,055		$308,981	$3,602

LESS	Rates and Taxes						
	$1,500	Completed Product pa per unit for half selling period			$9,563		
					$15,767,618		$3,604
						$6,227,737	
LESS	Interest on Development Costs		**8.00%**				
	Interest on half the development and selling period				$1,103,733		$252
						$5,124,004	
LESS	Interest on Land Purchase						
	For Planning, Development and half selling Period			34	months		
	8.00%	p.a.		22.33%	$935,445		$214
						$4,188,559	
LESS	Rates and Taxes						
	Land	**5.00%**	for land during planning and development		$199,455		$46
						$3,989,104	
LESS	Purchase Costs		**6.00%**		$225,798		$52
						$3,763,305	$5,027 Cost Base
					Adopt	**$3,760,000**	$859

$/unit All	**$73,725**
$/unit Res Only	**$96,410**
$/sqm land	**$1,074**

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	4,050	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	2.50		107	apts	138	149
		Plot Ratio Area	10,125	sqm	95	m²	96	96
		Levels	6.50	storeys	10,165	m²	13,214	14,231
		RCode Eqivalent	160		-	m²	-	-
Site Cover	80%		63		10,165	m²	13,214	14,231
Podium	85%	Efficiency	95%	Efficiency		PRatio	3.26	3.51
	-	Levels	1.35	Levels				
	-		5,194					
	-		148					

Residential

# Apt	Bed	Net Area	Total area	Carbays/apt	Total Carbays	$/sqm net	$5,000 Average price	Rounding Factor Gross Realisation	Affordable Component		
Affordable Stock Added											
0	1	0	-	-	0	$0	$0	$0	0%		
0	1	0	-	-	0	$0	$0	$0	0%		
0	2	0	-	-	0	$0	$0	$0	0%		
0	2	0	-	-	0	$0	$0	$0	0%		
0	3	0	-	-	0	$0	$0	$0	0%		
0	3	0	-	-	0	$0	$0	$0	0%	0%	
Additional Stock to Developer								**$0**			
0	1	0	-	-	0	$0	$0	$0	0%		
0	1	0	-	-	0	$0	$0	$0	0%		
0	2	0	-	-	0	$0	$0	$0	0%		
0	2	0	-	-	0	$0	$0	$0	0%		
0	3	0	-	-	0	$0	$0	$0	0%		
0	3	0	-	-	0	$0	$0	$0	0%	0%	
Complying Yield								**$0**			
20	1	55	1,100	1.00	20	$7,350	$405,000	$8,100,000	15%		
30	1	65	1,950	1.00	30	$7,350	$480,000	$14,400,000	23%	38%	total 1 bed
35	2	75	2,625	1.00	35	$7,450	$560,000	$19,600,000	27%		
30	2	90	2,700	1.00	30	$7,400	$665,000	$19,950,000	23%	50%	total 2 bed
10	3	110	1,100	1.00	10	$7,050	$775,000	$7,750,000	8%		
5	3	130	650	2.00	10	$6,925	$900,000	$4,500,000	4%	12%	total 3 bed
130			10,125		135			**$74,300,000**	100%	100%	
					1.04			$74,300,000			
		Average floor area	77.88				Average price	$570,000			
		Balcony Average	15					$7,338			
		Carbay provision	35								
		Amenities - sqm per apartment	-	-							
		Total Apartments	130								
		Visitor Parking	10.0%	14.0							

Commercial	Average Unit	150		75	m²/car bay				
		No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**	
		-	-	-	$6,600	$0	$0	$6,000	$450 7.50%

Retail	Average Unit	75		75	m²/car bay				
		No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**	
		-	-	-	$7,150	$0	$0	$6,500	$400 6.15%

Total Net Floor Area	10,125	2.50	
Surplus/Deficit Plot Ratio	**0**		
Total Units	130		**Total Realisation** **$74,300,000**
Total Parking	149	148	

					Sale Rate			
Timings					8	12.0		
	Statutory Planning Planning	6	months		Pre Sales	96.0		
	Pre - sales commitment	12	months		74%	$49,645,909		
	Construction Design and Tender/mobilisation	4	months			$43,450,570		
	Development	24	months					
	Selling	3	months					
	Total Duration	**49**	months					
	PR Guide	4.1		5.0%	20.4%			

							$/unit	
Development Calculations								
Gross Realisation						$74,300,000	$571,538	
LESS	GST	Land				$6,754,545		$6,754,545
		Res GR	$74,300,000	Com GR	$0	$67,545,455		
		GST	$6,754,545		$0			
LESS								
	Agency Selling Fee			2.00%		$1,486,000	$11,431	
	Development Management Fee			1.00%		$743,000	$5,715	
	Settlement Fee Vendor			0.15%		$111,450	$857	
	Marketing			0.75%		$557,250	$4,287	
	Ancillary Costs			0.00%		$0	$0	
						$2,897,700		
						$64,647,755		
LESS	Profit and Risk			20.00%		$10,774,626	$82,882	$1,064
						$53,873,129		
LESS	**Development Costs**		**Net Area**	**Efficiency**	**Gross Area**			
	Basement Car Park		5,194	95.0%	5,468	$945	$5,166,788	$39,745	
	Podium Car Park		-	85.0%	-	$770	$0	$0	
	Commercial		-	85.0%	-	$1,925	$0	$0	
	Retail		-	85.0%	-	$1,400	$0	$0	
	Residential		10,125	90.0%	11,250	$2,525	$28,406,250	$218,510	
	Balcony		1,950			$885	$1,725,750	$13,275	
	External Works		0.0%		10,125		$500,000	$3,846	
	External Services		0.0%				$0	$0	
	Scheme Costs					$100	$405,000	$3,115	
	Sustainability Initiatives		0.0%				$0	$0	
	Public Art		1.0%				$357,988	$2,754	
	Headworks/Statutory Fees		130			$4,000	$520,000	$4,000	
	Professional Fees		9.0%				$3,337,360	$25,672	
	Contingency		7.5%				$3,031,435	$23,319	
							$43,450,570	$334,235	$4,291
LESS	Rates and Taxes	Completed Product					$24,375		
		$1,500	pa per unit for half selling period				$43,474,945		$4,294
							$10,398,183		
LESS	Interest on Development Costs			**8.00%**					
	Interest on half the development and selling period						$3,912,745		$386
							$6,485,438		
LESS	Interest on Land Purchase								
	For Planning, Development and half selling Period				48	months			
		8.00%	p.a.		31.67%		$1,559,789		$154
							$4,925,649		
LESS	Rates and Taxes								
	Land	**5.00%**	for land during planning and development				$234,555		$23
							$4,691,095		
LESS	Purchase Costs			**6.00%**			$265,534		$26
							$4,425,561		$5,321 Cost Base
						Adopt	**$4,430,000**		$438
						$/unit All	**$34,077**		
						$/unit Res Only	**$34,077**		
						$/sqm land	**$1,094**		

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	4,435	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	2.50		98	apts	133	144
		Plot Ratio Area	11,088	sqm	95	m²	95	96
		Levels	8.00	storeys	9,310	m²	12,643	13,754
		RCode Eqivalent	160		1,800	m²	1,800	1,800
Site Cover	80%		69		11,110	m²	14,443	15,554
Podium	85%	Basement	95%	Efficiency		PRatio	3.26	3.51
	-		1.34	Levels				
	-		5,646					
	-		161					

Residential — $5,000 Rounding Factor

# Apt	Bed	Net Area	Total area	Carbays/apt	Total Carbays	$/sqm net	Average price	Gross Realisation	Affordable Component	
Affordable Stock Added										
0	1	0	-	-	0	$0	$0	$0	0%	
0	1	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	0%
Additional Stock to Developer								**$0**		
0	1	0	-	-	0	$0	$0	$0	0%	
0	1	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	0%
Complying Yield								**$0**		
20	1	55	1,100	1.00	20	$7,700	$425,000	$8,500,000	17%	
24	1	65	1,560	1.00	24	$7,700	$500,000	$12,000,000	20%	37% total 1 bed
35	2	75	2,625	1.00	35	$7,800	$585,000	$20,475,000	29%	
25	2	90	2,250	1.00	25	$7,750	$700,000	$17,500,000	21%	50% total 2 bed
10	3	110	1,100	1.00	10	$7,400	$815,000	$8,150,000	8%	
5	3	130	650	2.00	10	$7,250	$945,000	$4,725,000	4%	13% total 3 bed
119			9,285		124			**$71,350,000**	100%	100%
					1.04			$71,350,000		
		Average floor area	78.03				Average price	$600,000		
		Balcony Average	15					$7,684		
		Carbay provision	35							
		Amenities - sqm per apartment	-	-						
		Total Apartments	119							
		Visitor Parking	10.0%	13.0						

Commercial Average Unit 150 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
-	-	-	$6,600	$0	$0	$6,000	$450	7.50%

Retail Average Unit 75 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
24	1,800	24	$7,150	$536,250	$12,870,000	$6,500	$400	6.15%

Total Net Floor Area	11,085	2.50	
Surplus/Deficit Plot Ratio	3		
Total Units	143		**Total Realisation** **$84,220,000**
Total Parking	161	161	

Timings			Sale Rate	
			10	10.0
Statutory Planning Planning	6	months	Pre Sales	100.0
Pre - sales commitment	10	months	71%	$54,360,182
Construction Design and Tender/mobilisation	4	months		$49,946,175
Development	24	months		
Selling	3	months		
Total Duration	**47**	months		
PR Guide	3.9		6.0%	23.5%

Development Calculations						$/unit	
Gross Realisation					$84,220,000	$588,951	
LESS GST	Land				$7,656,364		$7,656,364
	Res GR	$71,350,000	Com GR	$12,870,000	$76,563,636		
	GST	$6,486,364		$1,170,000			
LESS							
Agency Selling Fee			2.00%	$1,684,400		$11,779	
Development Management Fee			1.00%	$842,200		$5,890	
Settlement Fee Vendor			0.15%	$126,330		$883	
Marketing			0.75%	$631,650		$4,417	
Ancillary Costs			0.00%	$0		$0	
				$3,284,580			
					$73,279,056		
LESS Profit and Risk			20.00%	$12,213,176		$85,407	$1,102
					$61,065,880		

LESS **Development Costs**	**Net Area**	**Efficiency**	**Gross Area**				
Basement Car Park	5,646	95.0%	5,943	$945	$5,616,041	$39,273	
Podium Car Park	-	85.0%	-	$770	$0	$0	
Commercial	-	85.0%	-	$1,925	$0	$0	
Retail	1,800	85.0%	2,118	$1,400	$2,964,706	$20,732	
Residential	9,285	90.0%	10,317	$2,960	$30,537,333	$213,548	
Balcony	1,785			$885	$1,579,725	$11,047	
External Works	0.0%		11,085		$500,000	$3,497	
External Services	0.0%				$0	$0	
Scheme Costs				$100	$443,500	$3,101	
Sustainability Initiatives	0.0%				$0	$0	
Public Art	1.0%				$411,978	$2,881	
Headworks/Statutory Fees	143			$4,000	$572,000	$4,000	
Professional Fees	9.0%				$3,836,275	$26,827	
Contingency	7.5%				$3,484,617	$24,368	
					$49,946,175	$349,274	$4,506

LESS Rates and Taxes	Completed Product				
$1,500	pa per unit for half selling period		$26,813		
			$49,972,988		$4,508
				$11,092,893	
LESS Interest on Development Costs		8.00%			
Interest on half the development and selling period			$4,497,569		$406
				$6,595,324	
LESS Interest on Land Purchase					
For Planning, Development and half selling Period		46	months		
8.00%	p.a.	30.33%	$1,534,973		$138
				$5,060,351	
LESS Rates and Taxes					
Land 5.00%	for land during planning and development		$240,969		$22
				$4,819,382	
LESS Purchase Costs		6.00%	$272,795		$25
				$4,546,587	$5,509 Cost Base
			Adopt	**$4,550,000**	$410
			$/unit All	**$31,818**	
			$/unit Res Only	**$38,235**	

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	4,330	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	1.25		57	apts	74	80
		Plot Ratio Area	5,413	sqm	95	m²	95	95
		Levels	3.50	storeys	5,415	m²	7,039	7,581
		RCode Eqivalent	100		-	m²	-	-
Site Cover	80%		54		5,415	m²	7,039	7,581
Podium	85%	Basement	95%	Efficiency		PRatio	1.63	1.75
	-		0.70	Levels				
	-		2,879					
	-		82					

Residential — $5,000 Rounding Factor

# Apt	Bed	Net Area	Total area	Carbays/apt	Total Carbays	$/sqm net	Average price	Gross Realisation	Affordable Component	
Affordable Stock Added										
0	1	0	-	-	0	$0	$0	$0	0%	
0	1	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	0%
Additional Stock to Developer								**$0**		
0	1	0	-	-	0	$0	$0	$0	0%	
0	1	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	0%
Complying Yield								**$0**		
10	1	55	550	1.00	10	$6,300	$345,000	$3,450,000	14%	
17	1	65	1,105	1.00	17	$6,300	$410,000	$6,970,000	25%	39% total 1 bed
20	2	75	1,500	1.00	20	$6,400	$480,000	$9,600,000	29%	
12	2	90	1,080	1.00	12	$6,350	$570,000	$6,840,000	17%	46% total 2 bed
6	3	110	660	1.00	6	$6,050	$665,000	$3,990,000	9%	
4	3	130	520	2.00	8	$5,950	$775,000	$3,100,000	6%	14% total 3 bed
69			5,415		73			**$33,950,000**	100%	100%
					1.06			$33,950,000		
		Average floor area	78.48				Average price	$490,000		
		Balcony Average	15					$6,270		
		Carbay provision	35							
		Amenities - sqm per apartment	-	-						
		Total Apartments	69							
		Visitor Parking	10.0%	8.0						

Commercial Average Unit 150 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
-	-	-	$6,600	$0	$0	$6,000	$450	7.50%

Retail Average Unit 75 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
-	-	-	$7,150	$0	$0	$6,500	$400	6.15%

Total Net Floor Area	5,415	1.25	
Surplus/Deficit Plot Ratio	**(3)**		
Total Units	69		**Total Realisation** **$33,950,000**
Total Parking	81	82	

Timings			Sale Rate	
			10	4.0
Statutory Planning Planning	6	months	Pre Sales	38.0
Pre - sales commitment	4	months	55%	$16,975,000
Construction Design and Tender/mobilisation	4	months		$16,550,096
Development	18	months		
Selling	3	months		
Total Duration	**35**	months		
PR Guide	2.9		6.0%	17.5%

Development Calculations						$/unit	
Gross Realisation					$33,950,000	$492,029	
LESS GST	Land				$3,086,364		$3,086,364
	Res GR	$33,950,000	Com GR	$0	$30,863,636		
	GST	$3,086,364		$0			
LESS							
Agency Selling Fee			2.00%	$679,000		$9,841	
Development Management Fee			1.00%	$339,500		$4,920	
Settlement Fee Vendor			0.15%	$50,925		$738	
Marketing			0.75%	$254,625		$3,690	
Ancillary Costs			0.00%	$0		$0	
				$1,324,050			
					$29,539,586		
LESS Profit and Risk			20.00%	$4,923,264		$71,352	$909
					$24,616,322		

LESS **Development Costs**	**Net Area**	**Efficiency**	**Gross Area**				
Basement Car Park	2,879	95.0%	3,031	$945	$2,864,295	$41,512	
Podium Car Park	-	85.0%	-	$770	$0	$0	
Commercial	-	85.0%	-	$1,925	$0	$0	
Retail	-	85.0%	-	$1,400	$0	$0	
Residential	5,415	90.0%	6,017	$1,460	$8,784,333	$127,309	
Balcony	1,035			$885	$915,975	$13,275	
External Works	0.0%		5,415		$400,000	$5,797	
External Services	0.0%				$0	$0	
Scheme Costs				$100	$433,000	$6,275	
Sustainability Initiatives	0.0%				$0	$0	
Public Art	1.0%				$129,646	$1,879	
Headworks/Statutory Fees	69			$4,000	$276,000	$4,000	
Professional Fees	9.0%				$1,242,292	$18,004	
Contingency	10.0%				$1,504,554	$21,805	
					$16,550,096	$239,856	$3,056

LESS Rates and Taxes	Completed Product				
$1,500	pa per unit for half selling period		$12,938		
			$16,563,033		$3,059
				$8,053,288	
LESS Interest on Development Costs		**8.00%**			
Interest on half the development and selling period			$1,159,412		$214
				$6,893,876	
LESS Interest on Land Purchase					
For Planning, Development and half selling Period		34 months			
8.00% p.a.		22.33%	$1,258,555		$232
				$5,635,321	
LESS Rates and Taxes					
Land **5.00%**	for land during planning and development		$268,349		$50
				$5,366,972	
LESS Purchase Costs		**6.00%**	$303,791		$56
				$5,063,182	$4,545 Cost Base
			Adopt	**$5,060,000**	$934
			$/unit All	**$73,333**	
			$/unit Res Only	**$73,333**	

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	3,603	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	1.50		42	apts	59	64
		Plot Ratio Area	5,405	sqm	94	m²	94	95
		Levels	4.50	storeys	3,950	m²	5,570	6,111
		RCode Eqivalent	100		1,455	m²	1,455	1,455
Site Cover	80%		54		5,405	m²	7,025	7,566
Podium	85%	Basement	95%	Efficiency		PRatio	1.95	2.10
	-		0.80	Levels				
	-		2,738					
	-		78					

Residential

# Apt	Bed	Net Area	Total area	Carbays/apt	Total Carbays	$/sqm net	$5,000 Average price	Rounding Factor Gross Realisation	Affordable Component	
Affordable Stock Added										
0	1	0	-	-	0	$0	$0	$0	0%	
0	1	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	0%
Additional Stock to Developer								**$0**		
0	1	0	-	-	0	$0	$0	$0	0%	
0	1	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	0%
Complying Yield								**$0**		
8	1	55	440	1.00	8	$7,000	$385,000	$3,080,000	15%	
14	1	65	910	1.00	14	$7,000	$455,000	$6,370,000	26%	42% total 1 bed
18	2	75	1,350	1.00	18	$7,100	$535,000	$9,630,000	34%	
9	2	90	810	1.00	9	$7,050	$635,000	$5,715,000	17%	51% total 2 bed
4	3	110	440	1.00	4	$6,725	$740,000	$2,960,000	8%	
0	3	130	-	2.00	0	$6,600	$860,000	$0	0%	8% total 3 bed
53			3,950		53			**$27,755,000**	100%	100%
					1.00			$27,755,000		
		Average floor area	74.53				Average price	$525,000		
		Balcony Average	15					$7,027		
		Carbay provision	35							
		Amenities - sqm per apartment	-	-						
		Total Apartments	53							
		Visitor Parking	10.0%	6.0						

Commercial Average Unit 150 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
6	910	12	$6,600	$1,001,000	$6,006,000	$6,000	$450	7.50%

Retail Average Unit 75 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
7	545	7	$7,150	$556,679	$3,896,750	$6,500	$400	6.15%

Total Net Floor Area	5,405	1.50		
Surplus/Deficit Plot Ratio	(1)			
Total Units	66		**Total Realisation**	**$37,657,750**
Total Parking	78	78		

Timings			Sale Rate	
			8	5.0
Statutory Planning Planning	6	months	Pre Sales	42.0
Pre - sales commitment	5	months	59%	$20,198,248
Construction Design and Tender/mobilisation	4	months		$20,845,083
Development	18	months		
Selling	3	months		
Total Duration	**36**	months		
PR Guide	3.0		6.0%	18.0%

Development Calculations								$/unit	
Gross Realisation							$37,657,750	$570,572	
LESS	GST	Land					$3,423,432		$3,423,432
		Res GR	$27,755,000	Com GR	$9,902,750		$34,234,318		
		GST	$2,523,182		$900,250				
LESS									
	Agency Selling Fee			2.00%		$753,155		$11,411	
	Development Management Fee			1.00%		$376,578		$5,706	
	Settlement Fee Vendor			0.15%		$56,487		$856	
	Marketing			0.75%		$282,433		$4,279	
	Ancillary Costs			0.00%		$0		$0	
						$1,468,652			
							$32,765,666		
LESS	Profit and Risk			20.00%		$5,460,944		$82,742	$1,010
							$27,304,722		

LESS	**Development Costs**	**Net Area**	**Efficiency**	**Gross Area**				
	Basement Car Park	2,738	95.0%	2,882	$945	$2,723,868		$41,271	
	Podium Car Park	-	85.0%	-	$770	$0		$0	
	Commercial	910	85.0%	1,071	$1,925	$2,060,882		$31,225	
	Retail	545	85.0%	641	$1,400	$897,647		$13,601	
	Residential	3,950	90.0%	4,389	$2,235	$9,809,167		$148,624	
	Balcony	795			$885	$703,575		$10,660	
	External Works	0.0%		5,405		$400,000		$6,061	
	External Services	0.0%				$0		$0	
	Scheme Costs				$100	$360,300		$5,459	
	Sustainability Initiatives	0.0%				$0		$0	
	Public Art	1.0%				$165,951		$2,514	
	Headworks/Statutory Fees	66			$4,000	$264,000		$4,000	
	Professional Fees	9.0%				$1,564,685		$23,707	
	Contingency	10.0%				$1,895,008		$28,712	
						$20,845,083		$315,835	$3,857

LESS	Rates and Taxes	Completed Product				
	$1,500	pa per unit for half selling period		$12,375		
				$20,857,458		$3,859
					$6,447,263	
LESS	Interest on Development Costs		8.00%			
	Interest on half the development and selling period			$1,460,022		$270
					$4,987,241	
LESS	Interest on Land Purchase					
	For Planning, Development and half selling Period		35	months		
	8.00%	p.a.	23.00%	$932,574		$173
					$4,054,668	
LESS	Rates and Taxes					
	Land	5.00% for land during planning and development		$193,079		$36
					$3,861,588	
LESS	Purchase Costs		6.00%	$218,580		$40
					$3,643,008	$5,051 Cost Base
				Adopt	**$3,640,000**	$673
				$/unit All	**$55,152**	
				$/unit Res Only	**$68,679**	
				$/sqm land	**$1,010**	

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	2,760	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	1.25		36	apts	47	51
		Plot Ratio Area	3,450	sqm	96	m²	95	95
		Levels	3.50	storeys	3,450	m²	4,485	4,830
		RCode Eqivalent	100		-	m²	-	-
Site Cover	80%		35		3,450	m²	4,485	4,830
Podium	85%	Basement	95%	Efficiency		PRatio	1.63	1.75
	-		0.70	Levels				
	-		1,835					
	-		52					

Residential

# Apt	Bed	Net Area	Total area	Carbays/apt	Total Carbays	$/sqm net	$5,000 Average price	Rounding Factor Gross Realisation	Affordable Component		
Affordable Stock Added											
0	1	0	-	-	0	$0	$0	$0	0%		
0	1	0	-	-	0	$0	$0	$0	0%		
0	2	0	-	-	0	$0	$0	$0	0%		
0	2	0	-	-	0	$0	$0	$0	0%		
0	3	0	-	-	0	$0	$0	$0	0%		
0	3	0	-	-	0	$0	$0	$0	0%	0%	
Additional Stock to Developer								**$0**			
0	1	0	-	-	0	$0	$0	$0	0%		
0	1	0	-	-	0	$0	$0	$0	0%		
0	2	0	-	-	0	$0	$0	$0	0%		
0	2	0	-	-	0	$0	$0	$0	0%		
0	3	0	-	-	0	$0	$0	$0	0%		
0	3	0	-	-	0	$0	$0	$0	0%	0%	
Complying Yield								**$0**			
8	1	55	440	1.00	8	$6,300	$345,000	$2,760,000	18%		
10	1	65	650	1.00	10	$6,300	$410,000	$4,100,000	22%	40%	total 1 bed
14	2	75	1,050	1.00	14	$6,400	$480,000	$6,720,000	31%		
8	2	90	720	1.00	8	$6,350	$570,000	$4,560,000	18%	49%	total 2 bed
3	3	110	330	1.00	3	$6,050	$665,000	$1,995,000	7%		
2	3	130	260	2.00	4	$5,950	$775,000	$1,550,000	4%	11%	total 3 bed
45			3,450		47			**$21,685,000**	100%	100%	
					1.04			$21,685,000			
		Average floor area	76.67				Average price	$480,000			
		Balcony Average	15					$6,286			
		Carbay provision	35								
		Amenities - sqm per apartment	-	-							
		Total Apartments	45								
		Visitor Parking	10.0%	5.0							

Commercial	Average Unit	150		75	m²/car bay			
	No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**	
	-	-	-	$6,600	$0	$0	$6,000	$450 7.50%

Retail	Average Unit	75		75	m²/car bay			
	No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**	
	-	-	-	$7,150	$0	$0	$6,500	$400 6.15%

	Total Net Floor Area	3,450	1.25		
	Surplus/Deficit Plot Ratio	**0**			
	Total Units	45		**Total Realisation**	**$21,685,000**
	Total Parking	52	52		

				Sale Rate		
Timings				10	3.0	
	Statutory Planning Planning	6	months	Pre Sales	25.0	
	Pre - sales commitment	3	months	56%	$11,039,636	
	Construction Design and Tender/mobilisation	4	months		$10,743,015	
	Development	18	months			
	Selling	3	months			
	Total Duration	**34**	months			
	PR Guide	2.8	6.0%	17.0%		

Development Calculations							$/unit
Gross Realisation						$21,685,000	$481,889
LESS	GST	Land				$1,971,364	$1,971,364
		Res GR	$21,685,000	Com GR	$0	$19,713,636	
		GST	$1,971,364		$0		
LESS							
	Agency Selling Fee		2.00%		$433,700		$9,638
	Development Management Fee		1.00%		$216,850		$4,819
	Settlement Fee Vendor		0.15%		$32,528		$723
	Marketing		0.75%		$162,638		$3,614
	Ancillary Costs		0.00%		$0		$0
					$845,715		
						$18,867,921	
LESS	Profit and Risk		20.00%		$3,144,654		$69,881 $911
						$15,723,268	

LESS	**Development Costs**	**Net Area**	**Efficiency**	**Gross Area**				
	Basement Car Park	1,835	95.0%	1,932	$945	$1,825,740		$40,572
	Podium Car Park	-	85.0%	-	$770	$0		$0
	Commercial	-	85.0%	-	$1,925	$0		$0
	Retail	-	85.0%	-	$1,400	$0		$0
	Residential	3,450	90.0%	3,833	$1,460	$5,596,667		$124,370
	Balcony	675			$885	$597,375		$13,275
	External Works	0.0%		3,450		$400,000		$8,889
	External Services	0.0%				$0		$0
	Scheme Costs				$100	$276,000		$6,133
	Sustainability Initiatives	0.0%				$0		$0
	Public Art	1.0%				$84,198		$1,871
	Headworks/Statutory Fees	45			$4,000	$180,000		$4,000
	Professional Fees	9.0%				$806,398		$17,920
	Contingency	10.0%				$976,638		$21,703
						$10,743,015		$238,734 $3,114
LESS	Rates and Taxes	Completed Product				$8,438		
		$1,500 pa per unit for half selling period				$10,751,453		$3,116
							$4,971,815	
LESS	Interest on Development Costs		**8.00%**					
	Interest on half the development and selling period					$752,602		$218
							$4,219,213	
LESS	Interest on Land Purchase							
	For Planning, Development and half selling Period			33	months			
		8.00% p.a.		21.67%		$751,367		$218
							$3,467,846	
LESS	Rates and Taxes							
	Land	**5.00%** for land during planning and development				$165,136		$48
							$3,302,711	
LESS	Purchase Costs		**6.00%**			$186,946		$54
							$3,115,765	$4,559 Cost Base
						Adopt	**$3,120,000**	$904
						$/unit All	**$69,333**	
						$/unit Res Only	**$69,333**	
						$/sqm land	**$1,130**	

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	2,695	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	1.50		22	apts	35	39
		Plot Ratio Area	4,043	sqm	96	m²	95	96
		Levels	3.50	storeys	2,117	m²	3,329	3,733
		RCode Eqivalent	100		1,926	m²	1,926	1,926
Site Cover	80%		40		4,043	m²	5,255	5,659
Podium	85%	Basement	95%	Efficiency		PRatio	1.95	2.10
	-		0.76	Levels				
	-		1,946					
	-		56					

Residential							$5,000	Rounding Factor		
# Apt	**Bed**	**Net Area**	**Total area**	**Carbays/apt**	**Total Carbays**	**$/sqm net**	**Average price**	**Gross Realisation**	**Affordable Component**	
Affordable Stock Added										
0	1	0	-	-	0	$0	$0	$0	0%	
0	1	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	0%
Additional Stock to Developer								**$0**		
0	1	0	-	-	0	$0	$0	$0	0%	
0	1	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	2	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	
0	3	0	-	-	0	$0	$0	$0	0%	0%
Complying Yield								**$0**		
3	1	55	165	1.00	3	$6,300	$345,000	$1,035,000	11%	
7	1	65	455	1.00	7	$6,300	$410,000	$2,870,000	26%	37% total 1 bed
8	2	75	600	1.00	8	$6,400	$480,000	$3,840,000	30%	
5	2	90	450	1.00	5	$6,350	$570,000	$2,850,000	19%	48% total 2 bed
4	3	110	440	1.00	4	$6,050	$665,000	$2,660,000	15%	
0	3	130	-	2.00	0	$5,950	$775,000	$0	0%	15% total 3 bed
27			2,110		27			**$13,255,000**	100%	100%
					1.00			$13,255,000		
		Average floor area	78.15				Average price	$490,000		
		Balcony Average	15					$6,282		
		Carbay provision	35							
		Amenities - sqm per apartment	-	-						
		Total Apartments	27							
		Visitor Parking	10.0%	3.0						

Commercial	Average Unit	150		75	m²/car bay				
	No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**		
	7	980	13	$6,600	$924,000	$6,468,000	$6,000	$450	7.50%

Retail	Average Unit	75		75	m²/car bay				
	No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**		
	13	946	13	$7,150	$520,300	$6,763,900	$6,500	$400	6.15%

	Total Net Floor Area	4,036	1.50			
	Surplus/Deficit Plot Ratio	7				
	Total Units	47			**Total Realisation**	**$26,486,900**
	Total Parking	56	56			

					Sale Rate			
Timings					8	4.0		
	Statutory Planning Planning		6	months	Pre Sales	30.0		
	Pre - sales commitment		4	months	56%	$13,484,240		
	Construction Design and Tender/mobilisation		4	months		$12,530,553		
	Development		18	months				
	Selling		3	months				
	Total Duration		**35**	months				
	PR Guide		2.9	6.0%	17.5%			

Development Calculations								$/unit	
Gross Realisation							$26,486,900	$563,551	
LESS	GST	Land					$2,407,900		$2,407,900
		Res GR	$13,255,000	Com GR	$13,231,900		$24,079,000		
		GST	$1,205,000		$1,202,900				
LESS									
	Agency Selling Fee			2.00%		$529,738		$11,271	
	Development Management Fee			1.00%		$264,869		$5,636	
	Settlement Fee Vendor			0.15%		$39,730		$845	
	Marketing			0.75%		$198,652		$4,227	
	Ancillary Costs			0.00%		$0		$0	
						$1,032,989			
							$23,046,011		
LESS	Profit and Risk			20.00%		$3,841,002		$81,723	$952
							$19,205,009		

LESS	**Development Costs**	**Net Area**	**Efficiency**	**Gross Area**				
	Basement Car Park	1,946	95.0%	2,048	$945	$1,935,549		$41,182	
	Podium Car Park	-	85.0%	-	$770	$0		$0	
	Commercial	980	85.0%	1,153	$1,925	$2,219,412		$47,222	
	Retail	946	85.0%	1,113	$1,400	$1,558,118		$33,151	
	Residential	2,110	90.0%	2,344	$1,460	$3,422,889		$72,827	
	Balcony	405			$885	$358,425		$7,626	
	External Works	0.0%		4,036		$400,000		$8,511	
	External Services	0.0%				$0		$0	
	Scheme Costs				$100	$269,500		$5,734	
	Sustainability Initiatives	0.0%				$0		$0	
	Public Art	1.0%				$98,944		$2,105	
	Headworks/Statutory Fees	47			$4,000	$188,000		$4,000	
	Professional Fees	9.0%				$940,575		$20,012	
	Contingency	10.0%				$1,139,141		$24,237	
						$12,530,553		$266,608	$3,105

LESS	Rates and Taxes	Completed Product				
	$1,500	pa per unit for half selling period			$8,813	
					$12,539,365	$3,107
					$6,665,644	
LESS	Interest on Development Costs		**8.00%**			
	Interest on half the development and selling period				$877,756	$217
					$5,787,888	
LESS	Interest on Land Purchase					
	For Planning, Development and half selling Period			34 months		
	8.00% p.a.			22.33%	$1,056,644	$262
					$4,731,244	
LESS	Rates and Taxes					
	Land	**5.00%** for land during planning and development			$225,297	$56
					$4,505,947	
LESS	Purchase Costs		**6.00%**		$255,054	$63
					$4,250,893	$4,758 Cost Base
					Adopt	**$4,250,000** $1,053

$/unit All	**$90,426**
$/unit Res Only	**$157,407**
$/sqm land	**$1,577**

APPENDIX C

Scenario 1 + 40%

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	3,500	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	1.25		32	apts	45	50
		Plot Ratio Area	4,375	sqm	95	m²	97	96
		Levels	4.00	storeys	3,040	m²	4,352	4,790
		RCode Eqivalent	100		1,335	m²	1,335	1,335
Site Cover	80%		44		4,375	m²	5,687	6,125
Podium	85%	Basement	95%	Efficiency		PRatio	1.62	1.75
	-		0.87	Levels				
	-		2,893					
	-		83					

Residential

# Apt	Bed	Net Area	Total area	Carbays/apt	Total Carbays	$/sqm net	$5,000 Average price	Rounding Factor Gross Realisation	Affordable Component		
Affordable Stock Added											
2	1	55	110	1.00	2	$3,182	$175,000	$350,000	4%		
2	1	65	130	1.00	2	$3,154	$205,000	$410,000	4%		
2	2	75	150	1.00	2	$3,133	$235,000	$470,000	4%		
2	2	90	180	1.00	2	$3,056	$275,000	$550,000	4%		
0	3	110	-	1.00	0	$3,045	$335,000	$0	0%		
0	3	130	-	2.00	0	$2,962	$385,000	$0	0%	14%	21%
Additional Stock to Developer							$222,500	**$1,780,000**			
2	1	55	110	1.00	2	$7,000	$385,000	$770,000	4%		
2	1	65	130	1.00	2	$7,000	$455,000	$910,000	4%		
2	2	75	150	1.00	2	$7,100	$535,000	$1,070,000	4%		
4	2	90	360	1.00	4	$7,050	$635,000	$2,540,000	7%		
0	3	110	-	1.00	0	$6,725	$740,000	$0	0%		
0	3	130	-	2.00	0	$6,600	$860,000	$0	0%	18%	26%
Complying Yield								**$5,290,000**			
6	1	55	330	1.00	6	$7,000	$385,000	$2,310,000	11%		
10	1	65	650	1.00	10	$7,000	$455,000	$4,550,000	18%	28%	total 1 bed
10	2	75	750	1.00	10	$7,100	$535,000	$5,350,000	18%		
8	2	90	720	1.00	8	$7,050	$635,000	$5,080,000	14%	32%	total 2 bed
3	3	110	330	1.00	3	$6,725	$740,000	$2,220,000	5%		
2	3	130	260	2.00	4	$6,600	$860,000	$1,720,000	4%	9%	total 3 bed
57			4,360		59			**$21,230,000**	68%	68%	
					1.04			$28,300,000	100%		
		Average floor area	76.49				Average price	$495,000			
		Balcony Average	15					$4,869			
		Carbay provision	35								
		Amenities - sqm per apartment	-	-							
		Total Apartments	57								
		Visitor Parking	10.0%	6.0							

Commercial Average Unit 150 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
5	800	11	$6,600	$1,056,000	$5,280,000	$6,000	$450	7.50%

Retail Average Unit 75 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
7	535	7	$7,150	$546,464	$3,825,250	$6,500	$400	6.15%

Total Net Floor Area	5,695	1.63		
Surplus/Deficit Plot Ratio	(8)			
Total Units	69		**Total Realisation**	**$37,405,250**
Total Parking	83	83		

Timings			Sale Rate	
			8	6.0
Statutory Planning Planning	6	months	Pre Sales	45.0
Pre - sales commitment	8	months	60%	$20,402,864
Construction Design and Tender/mobilisation	4	months		$25,411,480
Development	18	months		
Selling	3	months		
Total Duration	**39**	months		
PR Guide	3.3		6.0%	19.5%

Development Calculations								$/unit	
Gross Realisation							$37,405,250	$542,105	
LESS	GST	Land					$3,400,477		$3,400,477
		Res GR	$28,300,000	Com GR	$9,105,250	$37,405,250	$34,004,773		
		GST	$2,572,727		$827,750				
LESS									
	Agency Selling Fee			2.00%		$712,505		$10,326	
	Development Management Fee			1.00%		$374,053		$5,421	
	Settlement Fee Vendor			0.15%		$56,108		$813	
	Marketing			0.75%		$267,189		$3,872	
	Ancillary Costs			0.00%		$0		$0	
						$1,409,855			$248
							$32,594,918		
LESS	Profit and Risk			20.00%		$5,162,789		$84,636	$1,007
							$27,432,129		

LESS	**Development Costs**	**Net Area**	**Efficiency**	**Gross Area**				
	Basement Car Park	2,893	95.0%	3,045	$945	$2,877,525	$41,703	
	Podium Car Park	-	85.0%	-	$770	$0	$0	
	Commercial	800	85.0%	941	$1,925	$1,811,765	$26,257	
	Retail	535	85.0%	629	$1,400	$881,176	$12,771	
	Residential	4,360	90.0%	4,844	$2,815	$13,637,111	$197,639	
	Balcony	855			$885	$756,675	$10,966	
	External Works	0.0%		5,695		$400,000	$5,797	
	External Services	0.0%				$0	$0	
	Scheme Costs				$100	$350,000	$5,072	
	Sustainability Initiatives	0.0%				$0	$0	
	Public Art	1.0%				$203,643	$2,951	
	Headworks/Statutory Fees	69			$4,000	$276,000	$4,000	
	Professional Fees	9.0%				$1,907,451	$27,644	
	Contingency	10.0%				$2,310,135	$33,480	
						$25,411,480	$368,282	$4,462

LESS	Rates and Taxes	Completed Product			
	$1,500	pa per unit for half selling period	$12,938		
			$25,424,417		$4,464
			$2,007,711		
LESS	Interest on Development Costs	8.00%			
	Interest on half the development and selling period		$1,779,709		$313
			$228,002		
LESS	Interest on Land Purchase				
	For Planning, Development and half selling Period	38 months			
	8.00% p.a.	25.00%	$45,600		$8
			$182,402		
LESS	Rates and Taxes				
	Land 5.00% for land during planning and development		$8,686		$2
			$173,716		
LESS	Purchase Costs	6.00%	$9,833		$2
			$163,883		$4,816 Cost Base
					$4,987
			Adopt	**$160,000**	$28

$/unit All	**$2,319**
$/unit Res Only	**$2,807**
$/sqm land	**$46**

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	4,050	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	2.50		107	apts	138	149
		Plot Ratio Area	10,125	sqm	95	m²	95	95
		Levels	8.00	storeys	10,125	m²	13,162	14,175
		RCode Eqivalent	160		-	m²	-	-
Site Cover	80%		63		10,125	m²	13,162	14,175
Podium	85%	Efficiency	95%	Efficiency		PRatio	3.25	3.50
	-	Levels	1.90	Levels				
	-		7,310					
	-		209					

Residential

# Apt	Bed	Net Area	Total area	Carbays/apt	Total Carbays	$/sqm net	$5,000 Average price	Rounding Factor Gross Realisation	Affordable Component		
Affordable Stock Added											
4	1	55	220	1.00	4	$3,182	$175,000	$700,000	2%		
6	1	65	390	1.00	6	$3,154	$205,000	$1,230,000	3%		
8	2	75	600	1.00	8	$3,133	$235,000	$1,880,000	4%		
6	2	90	540	1.00	6	$3,056	$275,000	$1,650,000	3%		
2	3	110	220	1.00	2	$3,045	$335,000	$670,000	1%		
0	3	130	-	2.00	0	$2,962	$385,000	$0	0%	14%	20%
Additional Stock to Developer							$235,769	**$6,130,000**			
4	1	55	220	1.00	4	$7,350	$405,000	$1,620,000	2%		
6	1	65	390	1.00	6	$7,350	$480,000	$2,880,000	3%		
8	2	75	600	1.00	8	$7,450	$560,000	$4,480,000	4%		
6	2	90	540	1.00	6	$7,400	$665,000	$3,990,000	3%		
2	3	110	220	1.00	2	$7,050	$775,000	$1,550,000	1%		
0	3	130	-	2.00	0	$6,925	$900,000	$0	0%	14%	
Complying Yield								**$14,520,000**			
20	1	55	1,100	1.00	20	$7,350	$405,000	$8,100,000	11%		
30	1	65	1,950	1.00	30	$7,350	$480,000	$14,400,000	16%	27%	total 1 bed
35	2	75	2,625	1.00	35	$7,450	$560,000	$19,600,000	19%		
30	2	90	2,700	1.00	30	$7,400	$665,000	$19,950,000	16%	36%	total 2 bed
10	3	110	1,100	1.00	10	$7,050	$775,000	$7,750,000	5%		
5	3	130	650	2.00	10	$6,925	$900,000	$4,500,000	3%	8%	total 3 bed
182			14,065		187			**$74,300,000**	71%	71%	
					1.03			$94,950,000			
		Average floor area	77.28				Average price	$520,000			
		Balcony Average	15					$5,283			
		Carbay provision	35								
		Amenities - sqm per apartment	-	-							
		Total Apartments	182								
		Visitor Parking	10.0%	19.0							

Commercial Average Unit 150 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
-	-	-	$6,600	$0	$0	$6,000	$450	7.50%

Retail Average Unit 75 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
-	-	-	$7,150	$0	$0	$6,500	$400	6.15%

Total Net Floor Area	14,065	3.47		
Surplus/Deficit Plot Ratio	**(903)**			
Total Units	182		**Total Realisation**	**$94,950,000**
Total Parking	206	209		

Timings			Sale Rate	
			8	17.0
Statutory Planning Planning	6	months	Pre Sales	134.0
Pre - sales commitment	12	months	74%	$63,443,864
Construction Design and Tender/mobilisation	4	months		$62,914,074
Development	24	months		
Selling	3	months		
Total Duration	**49**	months		
PR Guide	4.1		5.0%	20.4%

Development Calculations								$/unit	
Gross Realisation							$94,950,000	$521,703	
LESS	GST	Land					$8,631,818		$8,631,818
		Res GR	$94,950,000	Com GR	$0	$94,950,000	$86,318,182		
		GST	$8,631,818		$0				
LESS									
	Agency Selling Fee			2.00%		$1,776,400		$9,760	
	Development Management Fee			1.00%		$949,500		$5,217	
	Settlement Fee Vendor			0.15%		$142,425		$783	
	Marketing			0.75%		$666,150		$3,660	
	Ancillary Costs			0.00%		$0		$0	
						$3,534,475			$251
							$82,783,707		
LESS	Profit and Risk			20.00%		$12,868,497		$82,490	$1,064
							$69,915,210		

LESS	**Development Costs**	**Net Area**	**Efficiency**	**Gross Area**					
	Basement Car Park	7,310	95.0%	7,695	$945	$7,271,775		$39,955	
	Podium Car Park	-	85.0%	-	$770	$0		$0	
	Commercial	-	85.0%	-	$1,925	$0		$0	
	Retail	-	85.0%	-	$1,400	$0		$0	
	Residential	14,065	90.0%	15,628	$2,678	$41,851,189		$229,952	
	Balcony	2,730			$885	$2,416,050		$13,275	
	External Works	0.0%		14,065		$500,000		$2,747	
	External Services	0.0%				$0		$0	
	Scheme Costs				$100	$405,000		$2,225	
	Sustainability Initiatives	0.0%				$0		$0	
	Public Art	1.0%				$520,390		$2,859	
	Headworks/Statutory Fees	182			$4,000	$728,000		$4,000	
	Professional Fees	9.0%				$4,832,316		$26,551	
	Contingency	7.5%				$4,389,354		$24,117	
						$62,914,074		$345,682	$4,473

LESS	Rates and Taxes	Completed Product			
	$1,500	pa per unit for half selling period		$34,125	
				$62,948,199	$4,476
				$6,967,011	
LESS	Interest on Development Costs		**8.00%**		
	Interest on half the development and selling period			$5,665,338	$403
				$1,301,673	
LESS	Interest on Land Purchase				
	For Planning, Development and half selling Period		48 months		
	8.00% p.a.		31.67%	$313,061	$22
				$988,612	
LESS	Rates and Taxes				
	Land	**5.00%** for land during planning and development		$47,077	$3
				$941,536	
LESS	Purchase Costs		**6.00%**	$53,294	$4
				$888,241	$4,971 Cost Base
					$5,240
			Adopt	**$890,000**	$63
			$/unit All	**$4,890**	
			$/unit Res Only	**$4,890**	
			$/sqm land	**$220**	

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	4,435	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	2.50		98	apts	133	144
		Plot Ratio Area	11,088	sqm	95	m²	95	96
		Levels	10.00	storeys	9,310	m²	12,643	13,754
		RCode Eqivalent	160		1,800	m²	1,800	1,800
Site Cover	80%		69		11,110	m²	14,443	15,554
Podium	85%	Basement	95%	Efficiency		PRatio	3.26	3.51
	-		1.78	Levels				
	-		7,500					
	-		214					

Residential

# Apt	Bed	Net Area	Total area	Carbays/apt	Total Carbays	$/sqm net	$5,000 Average price	Rounding Factor Gross Realisation	Affordable Component		
Affordable Stock Added											
4	1	55	220	1.00	4	$3,182	$175,000	$700,000	2%		
5	1	65	325	1.00	5	$3,154	$205,000	$1,025,000	3%		
8	2	75	600	1.00	8	$3,133	$235,000	$1,880,000	5%		
5	2	90	450	1.00	5	$3,056	$275,000	$1,375,000	3%		
2	3	110	220	1.00	2	$3,045	$335,000	$670,000	1%		
0	3	130	-	2.00	0	$2,962	$385,000	$0	0%	14%	20%
Additional Stock to Developer							$235,417	**$5,650,000**			
4	1	55	220	1.00	4	$7,700	$425,000	$1,700,000	2%		
5	1	65	325	1.00	5	$7,700	$500,000	$2,500,000	3%		
8	2	75	600	1.00	8	$7,800	$585,000	$4,680,000	5%		
5	2	90	450	1.00	5	$7,750	$700,000	$3,500,000	3%		
2	3	110	220	1.00	2	$7,400	$815,000	$1,630,000	1%		
0	3	130	-	2.00	0	$7,250	$945,000	$0	0%	14%	
Complying Yield								**$14,010,000**			
20	1	55	1,100	1.00	20	$7,700	$425,000	$8,500,000	12%		
24	1	65	1,560	1.00	24	$7,700	$500,000	$12,000,000	14%	26%	total 1 bed
35	2	75	2,625	1.00	35	$7,800	$585,000	$20,475,000	21%		
25	2	90	2,250	1.00	25	$7,750	$700,000	$17,500,000	15%	36%	total 2 bed
10	3	110	1,100	1.00	10	$7,400	$815,000	$8,150,000	6%		
5	3	130	650	2.00	10	$7,250	$945,000	$4,725,000	3%	9%	total 3 bed
167			12,915		172			**$71,350,000**	71%	71%	
					1.03			$91,010,000			
		Average floor area	77.34				Average price	$545,000			
		Balcony Average	15					$5,525			
		Carbay provision	35								
		Amenities - sqm per apartment	-	-							
		Total Apartments	167								
		Visitor Parking	10.0%	18.0							

Commercial Average Unit 150 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
-	-	-	$6,600	$0	$0	$6,000	$450	7.50%

Retail Average Unit 75 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
24	1,800	24	$7,150	$536,250	$12,870,000	$6,500	$400	6.15%

Total Net Floor Area	14,715	3.32	
Surplus/Deficit Plot Ratio	**(272)**		
Total Units	191		**Total Realisation** **$103,880,000**
Total Parking	214	214	

Timings			Sale Rate		
			10	14.0	
Statutory Planning Planning	6	months	Pre Sales	135.0	
Pre - sales commitment	10	months	71%	$67,049,818	
Construction Design and Tender/mobilisation	4	months		$67,236,681	
Development	24	months			
Selling	3	months			
Total Duration	**47**	months			
PR Guide	3.9		6.0%	23.5%	

Development Calculations							$/unit	
Gross Realisation						$103,880,000	$543,874	
LESS GST	Land					$9,443,636		$9,443,636
	Res GR	$91,010,000	Com GR	$12,870,000	$103,880,000	$94,436,364		
	GST	$8,273,636		$1,170,000				
LESS								
Agency Selling Fee			2.00%		$1,964,600		$10,286	
Development Management Fee			1.00%		$1,038,800		$5,439	
Settlement Fee Vendor			0.15%		$155,820		$816	
Marketing			0.75%		$736,725		$3,857	
Ancillary Costs			0.00%		$0		$0	
					$3,895,945			$265
						$90,540,419		
LESS Profit and Risk			20.00%		$14,234,009		$85,234	$1,103
						$76,306,409		

LESS **Development Costs**	**Net Area**	**Efficiency**	**Gross Area**				
Basement Car Park	7,500	95.0%	7,894	$945	$7,460,114	$39,058	
Podium Car Park	-	85.0%	-	$770	$0	$0	
Commercial	-	85.0%	-	$1,925	$0	$0	
Retail	1,800	85.0%	2,118	$1,400	$2,964,706	$15,522	
Residential	12,915	90.0%	14,350	$2,960	$42,476,000	$222,387	
Balcony	2,505			$885	$2,216,925	$11,607	
External Works	0.0%		14,715		$500,000	$2,618	
External Services	0.0%				$0	$0	
Scheme Costs				$100	$443,500	$2,322	
Sustainability Initiatives	0.0%				$0	$0	
Public Art	1.0%				$556,177	$2,912	
Headworks/Statutory Fees	191			$4,000	$764,000	$4,000	
Professional Fees	9.0%				$5,164,328	$27,038	
Contingency	7.5%				$4,690,931	$24,560	
					$67,236,681	$352,025	$4,569

LESS Rates and Taxes	Completed Product				
$1,500	pa per unit for half selling period		$35,813		
			$67,272,494		$4,572
				$9,033,916	
LESS Interest on Development Costs		8.00%			
Interest on half the development and selling period			$6,054,524		$411
				$2,979,392	
LESS Interest on Land Purchase					
For Planning, Development and half selling Period		46	months		
8.00%	p.a.	30.33%	$693,413		$47
				$2,285,978	
LESS Rates and Taxes					
Land 5.00%	for land during planning and development		$108,856		$7
				$2,177,122	
LESS Purchase Costs		6.00%	$123,233		$8
				$2,053,889	$5,185 Cost Base
					$5,446
			Adopt	**$2,050,000**	$139
			$/unit All	**$10,733**	
			$/unit Res Only	**$12,275**	

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	4,330	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	1.25		57	apts	74	80
		Plot Ratio Area	5,413	sqm	95	m²	95	95
		Levels	4.50	storeys	5,415	m²	7,039	7,581
		RCode Eqivalent	100		-	m²	-	-
Site Cover	80%		54		5,415	m²	7,039	7,581
Podium	85%	Basement	95%	Efficiency		PRatio	1.63	1.75
	-		0.95	Levels				
	-		3,908					
	-		112					

Residential — $5,000 Rounding Factor

# Apt	Bed	Net Area	Total area	Carbays/apt	Total Carbays	$/sqm net	Average price	Gross Realisation	Affordable Component		
Affordable Stock Added											
2	1	55	110	1.00	2	$3,182	$175,000	$350,000	2%		
2	1	65	130	1.00	2	$3,154	$205,000	$410,000	2%		
4	2	75	300	1.00	4	$3,133	$235,000	$940,000	4%		
4	2	90	360	1.00	4	$3,056	$275,000	$1,100,000	4%		
2	3	110	220	1.00	2	$3,045	$335,000	$670,000	2%		
0	3	130	-	2.00	0	$2,962	$385,000	$0	0%	14%	20%
Additional Stock to Developer							$247,857	**$3,470,000**			
2	1	55	110	1.00	2	$6,300	$345,000	$690,000	2%		
2	1	65	130	1.00	2	$6,300	$410,000	$820,000	2%		
4	2	75	300	1.00	4	$6,400	$480,000	$1,920,000	4%		
4	2	90	360	1.00	4	$6,350	$570,000	$2,280,000	4%		
2	3	110	220	1.00	2	$6,050	$665,000	$1,330,000	2%		
0	3	130	-	2.00	0	$5,950	$775,000	$0	0%	14%	
Complying Yield								**$7,040,000**			
10	1	55	550	1.00	10	$6,300	$345,000	$3,450,000	10%		
17	1	65	1,105	1.00	17	$6,300	$410,000	$6,970,000	18%	28%	total 1 bed
20	2	75	1,500	1.00	20	$6,400	$480,000	$9,600,000	21%		
12	2	90	1,080	1.00	12	$6,350	$570,000	$6,840,000	12%	33%	total 2 bed
6	3	110	660	1.00	6	$6,050	$665,000	$3,990,000	6%		
4	3	130	520	2.00	8	$5,950	$775,000	$3,100,000	4%	10%	total 3 bed
97			7,655		101			**$33,950,000**	71%	71%	
					1.04			$44,460,000			
		Average floor area	78.92				Average price	$460,000			
		Balcony Average	15					$4,435			
		Carbay provision	35								
		Amenities - sqm per apartment	-	-							
		Total Apartments	97								
		Visitor Parking	10.0%	11.0							

Commercial Average Unit 150 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
-	-	-	$6,600	$0	$0	$6,000	$450	7.50%

Retail Average Unit 75 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
-	-	-	$7,150	$0	$0	$6,500	$400	6.15%

Total Net Floor Area	7,655	1.77
Surplus/Deficit Plot Ratio	**(616)**	
Total Units	97	
Total Parking	112	112

Total Realisation **$44,460,000**

Timings			Sale Rate		
			10	5.0	
Statutory Planning Planning	6	months	Pre Sales	53.0	
Pre - sales commitment	4	months	55%	$22,230,000	
Construction Design and Tender/mobilisation	4	months		$30,756,385	
Development	18	months			
Selling	3	months			
Total Duration	**35**	months			
PR Guide	2.9		6.0%	17.5%	

Development Calculations							$/unit	
Gross Realisation						$44,460,000	$458,351	
LESS GST	Land					$4,041,818		$4,041,818
	Res GR	$44,460,000	Com GR	$0	$44,460,000	$40,418,182		
	GST	$4,041,818		$0				
LESS								
Agency Selling Fee			2.00%		$819,800		$8,452	
Development Management Fee			1.00%		$444,600		$4,584	
Settlement Fee Vendor			0.15%		$66,690		$688	
Marketing			0.75%		$307,425		$3,169	
Ancillary Costs			0.00%		$0		$0	
					$1,638,515			$214
						$38,779,667		
LESS Profit and Risk			20.00%		$5,937,520		$71,536	$909
						$32,842,147		

LESS	**Development Costs**	**Net Area**	**Efficiency**	**Gross Area**				
	Basement Car Park	3,908	95.0%	4,114	$945	$3,887,258	$40,075	
	Podium Car Park	-	85.0%	-	$770	$0	$0	
	Commercial	-	85.0%	-	$1,925	$0	$0	
	Retail	-	85.0%	-	$1,400	$0	$0	
	Residential	7,655	90.0%	8,506	$2,235	$19,009,917	$195,979	
	Balcony	1,455			$885	$1,287,675	$13,275	
	External Works	0.0%		7,655		$400,000	$4,124	
	External Services	0.0%				$0	$0	
	Scheme Costs				$100	$433,000	$4,464	
	Sustainability Initiatives	0.0%				$0	$0	
	Public Art	1.0%				$245,848	$2,535	
	Headworks/Statutory Fees	97			$4,000	$388,000	$4,000	
	Professional Fees	9.0%				$2,308,653	$23,801	
	Contingency	10.0%				$2,796,035	$28,825	
						$30,756,385	$317,076	$4,018

LESS Rates and Taxes	Completed Product				
$1,500	pa per unit for half selling period		$18,188		
			$30,774,573		$4,020
				$2,067,574	
LESS Interest on Development Costs		**8.00%**			
Interest on half the development and selling period			$2,154,220		$281
				($86,647)	
LESS Interest on Land Purchase					
For Planning, Development and half selling Period		34 months			
8.00% p.a.		22.33%	($15,818)		($2)
				($102,465)	
LESS Rates and Taxes					
Land **5.00%**	for land during planning and development		($4,879)		($1)
				($107,344)	
LESS Purchase Costs		**6.00%**	($6,076)		($1)
				($113,420)	#VALUE! Cost Base
					$4,469
			Adopt	**Not Feasible**	#VALUE!
			$/unit All	**NA**	
			$/unit Res Only	**NA**	

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	3,603	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	1.50		42	apts	59	64
		Plot Ratio Area	5,405	sqm	94	m²	94	95
		Levels	5.50	storeys	3,950	m²	5,570	6,111
		RCode Eqivalent	100		1,455	m²	1,455	1,455
Site Cover	80%		54		5,405	m²	7,025	7,566
Podium	85%	Basement	95%	Efficiency		PRatio	1.95	2.10
	-		1.04	Levels				
	-		3,560					
	-		102					

Residential							$5,000	Rounding Factor			
# Apt	**Bed**	**Net Area**	**Total area**	**Carbays/apt**	**Total Carbays**	**$/sqm net**	**Average price**	**Gross Realisation**	**Affordable Component**		
Affordable Stock Added											
2	1	55	110	1.00	2	$3,182	$175,000	$350,000	3%		
2	1	65	130	1.00	2	$3,154	$205,000	$410,000	3%		
3	2	75	225	1.00	3	$3,133	$235,000	$705,000	4%		
2	2	90	180	1.00	2	$3,056	$275,000	$550,000	3%		
2	3	110	220	1.00	2	$3,045	$335,000	$670,000	3%		
0	3	130	-	2.00	0	$2,962	$385,000	$0	0%	15%	21%
Additional Stock to Developer							$244,091	**$2,685,000**			
2	1	55	110	1.00	2	$7,000	$385,000	$770,000	3%		
2	1	65	130	1.00	2	$7,000	$455,000	$910,000	3%		
3	2	75	225	1.00	3	$7,100	$535,000	$1,605,000	4%		
2	2	90	180	1.00	2	$7,050	$635,000	$1,270,000	3%		
2	3	110	220	1.00	2	$6,725	$740,000	$1,480,000	3%		
0	3	130	-	2.00	0	$6,600	$860,000	$0	0%	15%	
Complying Yield								**$6,035,000**			
8	1	55	440	1.00	8	$7,000	$385,000	$3,080,000	11%		
14	1	65	910	1.00	14	$7,000	$455,000	$6,370,000	19%	29%	total 1 bed
18	2	75	1,350	1.00	18	$7,100	$535,000	$9,630,000	24%		
9	2	90	810	1.00	9	$7,050	$635,000	$5,715,000	12%	36%	total 2 bed
4	3	110	440	1.00	4	$6,725	$740,000	$2,960,000	5%		
0	3	130	-	2.00	0	$6,600	$860,000	$0	0%	5%	total 3 bed
75			5,680		75			**$27,755,000**	71%	71%	
					1.00			$36,475,000			
		Average floor area	75.73				Average price	$485,000			
		Balcony Average	15					$4,886			
		Carbay provision	35								
		Amenities - sqm per apartment	-	-							
		Total Apartments	75								
		Visitor Parking	10.0%	8.0							

Commercial	Average Unit	150		75	m²/car bay					
		No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**		
		6	910	12	$6,600	$1,001,000	$6,006,000	$6,000	$450	7.50%

Retail	Average Unit	75		75	m²/car bay					
		No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**		
		7	545	7	$7,150	$556,679	$3,896,750	$6,500	$400	6.15%

	Total Net Floor Area	7,135	1.98					
	Surplus/Deficit Plot Ratio	(110)						
	Total Units	88				**Total Realisation**	**$46,377,750**	
	Total Parking	102	102					

					Sale Rate				
Timings					8	7.0			
	Statutory Planning Planning	6	months		Pre Sales	56.0			
	Pre - sales commitment	5	months		59%	$24,875,339			
	Construction Design and Tender/mobilisation	4	months			$27,496,453			
	Development	18	months						
	Selling	3	months						
	Total Duration	**36**	months						
	PR Guide	3.0		6.0%	18.0%				

Development Calculations										
Gross Realisation								$46,377,750	$/unit $527,020	
LESS	GST	Land						$4,216,159		$4,216,159
		Res GR	$36,475,000	Com GR	$9,902,750		$46,377,750	$42,161,591		
		GST	$3,315,909		$900,250					
LESS										
	Agency Selling Fee			2.00%			$873,855		$9,930	
	Development Management Fee			1.00%			$463,778		$5,270	
	Settlement Fee Vendor			0.15%			$69,567		$791	
	Marketing			0.75%			$327,696		$3,724	
	Ancillary Costs			0.00%			$0		$0	
							$1,734,895			$243
								$40,426,696		
LESS	Profit and Risk			20.00%			$6,330,965		$82,220	$1,010
								$34,095,732		

LESS	**Development Costs**	**Net Area**	**Efficiency**	**Gross Area**				
	Basement Car Park	3,560	95.0%	3,747	$945	$3,541,028		$40,239	
	Podium Car Park	-	85.0%	-	$770	$0		$0	
	Commercial	910	85.0%	1,071	$1,925	$2,060,882		$23,419	
	Retail	545	85.0%	641	$1,400	$897,647		$10,201	
	Residential	5,680	90.0%	6,311	$2,235	$14,105,333		$160,288	
	Balcony	1,125			$885	$995,625		$11,314	
	External Works	0.0%		7,135		$400,000		$4,545	
	External Services	0.0%				$0		$0	
	Scheme Costs				$100	$360,300		$4,094	
	Sustainability Initiatives	0.0%				$0		$0	
	Public Art	1.0%				$220,005		$2,500	
	Headworks/Statutory Fees	88			$4,000	$352,000		$4,000	
	Professional Fees	9.0%				$2,063,954		$23,454	
	Contingency	10.0%				$2,499,678		$28,405	
						$27,496,453		$312,460	$3,854

LESS	Rates and Taxes						
		$1,500	Completed Product pa per unit for half selling period			$16,500	
						$27,512,953	$3,856
						$6,582,779	
LESS	Interest on Development Costs		**8.00%**				
	Interest on half the development and selling period					$1,925,907	$270
						$4,656,872	
LESS	Interest on Land Purchase						
	For Planning, Development and half selling Period			35	months		
		8.00% p.a.		23.00%		$870,797	$122
						$3,786,075	
LESS	Rates and Taxes						
	Land	**5.00%**	for land during planning and development			$180,289	$25
						$3,605,786	
LESS	Purchase Costs		**6.00%**			$204,101	$29
						$3,401,685	$4,778 Cost Base
							$4,986
						Adopt **$3,400,000**	$477

$/unit All	**$38,636**
$/unit Res Only	**$45,333**
$/sqm land	**$944**

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	2,760	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	1.25		36	apts	47	51
		Plot Ratio Area	3,450	sqm	96	m²	95	95
		Levels	5.00	storeys	3,450	m²	4,485	4,830
		RCode Eqivalent	100		-	m²	-	-
Site Cover	80%		35		3,450	m²	4,485	4,830
Podium	85%	Basement	95%	Efficiency		PRatio	1.63	1.75
	-		1.00	Levels				
	-		2,622					
	-		75					

Residential							$5,000	Rounding Factor			
# Apt	**Bed**	**Net Area**	**Total area**	**Carbays/apt**	**Total Carbays**	**$/sqm net**	**Average price**	**Gross Realisation**	**Affordable Component**		
Affordable Stock Added											
2	1	55	110	1.00	2	$3,182	$175,000	$350,000	3%		
2	1	65	130	1.00	2	$3,154	$205,000	$410,000	3%		
2	2	75	150	1.00	2	$3,133	$235,000	$470,000	3%		
2	2	90	180	1.00	2	$3,056	$275,000	$550,000	3%		
1	3	110	110	1.00	1	$3,045	$335,000	$335,000	2%		
0	3	130	-	2.00	0	$2,962	$385,000	$0	0%	14%	20%
Additional Stock to Developer							$235,000	**$2,115,000**			
2	1	55	110	1.00	2	$6,300	$345,000	$690,000	3%		
2	1	65	130	1.00	2	$6,300	$410,000	$820,000	3%		
2	2	75	150	1.00	2	$6,400	$480,000	$960,000	3%		
2	2	90	180	1.00	2	$6,350	$570,000	$1,140,000	3%		
1	3	110	110	1.00	1	$6,050	$665,000	$665,000	2%		
0	3	130	-	2.00	0	$5,950	$775,000	$0	0%	14%	
Complying Yield								**$4,275,000**			
8	1	55	440	1.00	8	$6,300	$345,000	$2,760,000	13%		
10	1	65	650	1.00	10	$6,300	$410,000	$4,100,000	16%	29%	total 1 bed
14	2	75	1,050	1.00	14	$6,400	$480,000	$6,720,000	22%		
8	2	90	720	1.00	8	$6,350	$570,000	$4,560,000	13%	35%	total 2 bed
3	3	110	330	1.00	3	$6,050	$665,000	$1,995,000	5%		
2	3	130	260	2.00	4	$5,950	$775,000	$1,550,000	3%	8%	total 3 bed
63			4,810		65			**$21,685,000**	71%	71%	
					1.03			$28,075,000			
		Average floor area	76.35				Average price	$445,000			
		Balcony Average	15					$4,508			
		Carbay provision	35								
		Amenities - sqm per apartment	-	-							
		Total Apartments	63								
		Visitor Parking	10.0%	7.0							

Commercial	Average Unit	150		75	m²/car bay				
		No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**		
		-	-	-	$6,600	$0	$0	$6,000	$450	7.50%

Retail	Average Unit	75		75	m²/car bay				
		No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**		
		-	-	-	$7,150	$0	$0	$6,500	$400	6.15%

	Total Net Floor Area	4,810	1.74				
	Surplus/Deficit Plot Ratio	**(325)**					
	Total Units	63				**Total Realisation**	**$28,075,000**
	Total Parking	72	75				

					Sale Rate			
Timings					10	4.0		
	Statutory Planning Planning	6	months		Pre Sales	35.0		
	Pre - sales commitment	3	months		56%	$14,292,727		
	Construction Design and Tender/mobilisation	4	months			$19,753,827		
	Development	18	months					
	Selling	3	months					
	Total Duration	**34**	months					
	PR Guide	2.8		6.0%	17.0%			

Development Calculations									$/unit	
Gross Realisation								$28,075,000	$445,635	
LESS	GST	Land						**$2,552,273**		$2,552,273
		Res GR	$28,075,000	Com GR		$0	$28,075,000	$25,522,727		
		GST	**$2,552,273**			**$0**				
LESS										
	Agency Selling Fee			2.00%			$519,200		$8,241	
	Development Management Fee			1.00%			$280,750		$4,456	
	Settlement Fee Vendor			0.15%			$42,113		$668	
	Marketing			0.75%			$194,700		$3,090	
	Ancillary Costs			0.00%			$0		$0	
							$1,036,763			$216
								$24,485,965		
LESS	Profit and Risk			20.00%			$3,760,540		$69,640	$911
								$20,725,425		

LESS	**Development Costs**	**Net Area**	**Efficiency**	**Gross Area**				
	Basement Car Park	2,622	95.0%	2,760	$945	$2,608,200		$41,400	
	Podium Car Park	-	85.0%	-	$770	$0		$0	
	Commercial	-	85.0%	-	$1,925	$0		$0	
	Retail	-	85.0%	-	$1,400	$0		$0	
	Residential	4,810	90.0%	5,344	$2,235	$11,944,833		$189,601	
	Balcony	945			$885	$836,325		$13,275	
	External Works	0.0%		4,810		$400,000		$6,349	
	External Services	0.0%				$0		$0	
	Scheme Costs				$100	$276,000		$4,381	
	Sustainability Initiatives	0.0%				$0		$0	
	Public Art	1.0%				$157,894		$2,506	
	Headworks/Statutory Fees	63			$4,000	$252,000		$4,000	
	Professional Fees	9.0%				$1,482,773		$23,536	
	Contingency	10.0%				$1,795,802		$28,505	
						$19,753,827		$313,553	$4,107

LESS	Rates and Taxes	Completed Product				
	$1,500	pa per unit for half selling period		$11,813		
				$19,765,640		$4,109
					$959,786	
LESS	Interest on Development Costs		**8.00%**			
	Interest on half the development and selling period			$1,383,595		$288
					($423,809)	
LESS	Interest on Land Purchase					
	For Planning, Development and half selling Period			33 months		
	8.00% p.a.			21.67% ($75,473)		($16)
					($499,282)	
LESS	Rates and Taxes					
	Land	**5.00%**	for land during planning and development	($23,775)		($5)
					($523,057)	
LESS	Purchase Costs		**6.00%**	($29,607)		($6)
					($552,664)	#VALUE! Cost Base
						$4,482
				Adopt	**Not Feasible**	#VALUE!

$/unit All	**NA**
$/unit Res Only	**NA**
$/sqm land	**NA**

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	2,695	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	1.50		22	apts	35	39
		Plot Ratio Area	4,043	sqm	96	m²	95	96
		Levels	4.50	storeys	2,117	m²	3,329	3,733
		RCode Eqivalent	100		1,926	m²	1,926	1,926
Site Cover	80%		40		4,043	m²	5,255	5,659
Podium	85%	Basement	95%	Efficiency		PRatio	1.95	2.10
	-		1.00	Levels				
	-		2,560					
	-		73					

Residential							$5,000	Rounding Factor		
# Apt	**Bed**	**Net Area**	**Total area**	**Carbays/apt**	**Total Carbays**	**$/sqm net**	**Average price**	**Gross Realisation**	**Affordable Component**	
Affordable Stock Added										
1	1	55	55	1.00	1	$3,182	$175,000	$175,000	3%	
1	1	65	65	1.00	1	$3,154	$205,000	$205,000	3%	
2	2	75	150	1.00	2	$3,133	$235,000	$470,000	5%	
1	2	90	90	1.00	1	$3,056	$275,000	$275,000	3%	
1	3	110	110	1.00	1	$3,045	$335,000	$335,000	3%	
0	3	130	-	2.00	0	$2,962	$385,000	$0	0%	15% 22%
Additional Stock to Developer							$243,333	**$1,460,000**		
1	1	55	55	1.00	1	$6,300	$345,000	$345,000	3%	
1	1	65	65	1.00	1	$6,300	$410,000	$410,000	3%	
2	2	75	150	1.00	2	$6,400	$480,000	$960,000	5%	
1	2	90	90	1.00	1	$6,350	$570,000	$570,000	3%	
1	3	110	110	1.00	1	$6,050	$665,000	$665,000	3%	
0	3	130	-	2.00	0	$5,950	$775,000	$0	0%	15%
Complying Yield								**$2,950,000**		
3	1	55	165	1.00	3	$6,300	$345,000	$1,035,000	8%	
7	1	65	455	1.00	7	$6,300	$410,000	$2,870,000	18%	26% total 1 bed
8	2	75	600	1.00	8	$6,400	$480,000	$3,840,000	21%	
5	2	90	450	1.00	5	$6,350	$570,000	$2,850,000	13%	33% total 2 bed
4	3	110	440	1.00	4	$6,050	$665,000	$2,660,000	10%	
0	3	130	-	2.00	0	$5,950	$775,000	$0	0%	10% total 3 bed
39			3,050		39			**$13,255,000**	69%	69%
					1.00			$17,665,000		
		Average floor area	78.21				Average price	$455,000		
		Balcony Average	15					$4,346		
		Carbay provision	35							
		Amenities - sqm per apartment	-	-						
		Total Apartments	39							
		Visitor Parking	10.0%	4.0						

Commercial	Average Unit	150		75	m²/car bay				
	No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**		
	7	980	13	$6,600	$924,000	$6,468,000	$6,000	$450	7.50%

Retail	Average Unit	75		75	m²/car bay				
	No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**		
	13	946	13	$7,150	$520,300	$6,763,900	$6,500	$400	6.15%

	Total Net Floor Area	4,976	1.85			
	Surplus/Deficit Plot Ratio	**279**				
	Total Units	59			**Total Realisation**	**$30,896,900**
	Total Parking	69	73			

					Sale Rate				
Timings					8	5.0			
	Statutory Planning Planning		6	months	Pre Sales	38.0			
	Pre - sales commitment		4	months	56%	$15,729,331			
	Construction Design and Tender/mobilisation		4	months		$18,548,360			
	Development		18	months					
	Selling		3	months					
	Total Duration		**35**	months					
	PR Guide		2.9		6.0%	17.5%			

							$/unit	
Development Calculations								
Gross Realisation						$30,896,900	$523,676	
LESS	GST	Land				**$2,808,809**		$2,808,809
		Res GR	$17,665,000	Com GR	$13,231,900	$30,896,900	$28,088,091	
		GST	**$1,605,900**		**$1,202,900**			
LESS								
	Agency Selling Fee			2.00%		$588,738	$9,979	
	Development Management Fee			1.00%		$308,969	$5,237	
	Settlement Fee Vendor			0.15%		$46,345	$786	
	Marketing			0.75%		$220,777	$3,742	
	Ancillary Costs			0.00%		$0	$0	
						$1,164,829		$234
							$26,923,262	
LESS	Profit and Risk			20.00%		$4,265,998	$80,491	$947
							$22,657,264	
LESS	**Development Costs**		**Net Area**	**Efficiency**	**Gross Area**			
	Basement Car Park		2,560	95.0%	2,695	$945	$2,546,775	$43,166	
	Podium Car Park		-	85.0%	-	$770	$0	$0	
	Commercial		980	85.0%	1,153	$1,925	$2,219,412	$37,617	
	Retail		946	85.0%	1,113	$1,400	$1,558,118	$26,409	
	Residential		3,050	90.0%	3,389	$2,235	$7,574,167	$128,376	
	Balcony		585			$885	$517,725	$8,775	
	External Works		0.0%		4,976		$400,000	$6,780	
	External Services		0.0%				$0	$0	
	Scheme Costs					$100	$269,500	$4,568	
	Sustainability Initiatives		0.0%				$0	$0	
	Public Art		1.0%				$148,162	$2,511	
	Headworks/Statutory Fees		59			$4,000	$236,000	$4,000	
	Professional Fees		9.0%				$1,392,287	$23,598	
	Contingency		10.0%				$1,686,215	$28,580	
							$18,548,360	$314,379	$3,728
LESS	Rates and Taxes	Completed Product							
		$1,500	pa per unit for half selling period				$11,063		
							$18,559,422		$3,730
							$4,097,841		
LESS	Interest on Development Costs			**8.00%**					
	Interest on half the development and selling period						$1,299,160		$261
							$2,798,682		
LESS	Interest on Land Purchase								
	For Planning, Development and half selling Period				34	months			
		8.00%	p.a.		22.33%		$510,931		$103
							$2,287,751		
LESS	Rates and Taxes								
	Land	**5.00%**	for land during planning and development				$108,941		$22
							$2,178,810		
LESS	Purchase Costs			**6.00%**			$123,329		$25
							$2,055,481		$4,554 Cost Base
									$4,686
							Adopt	**$2,060,000**	$414
							$/unit All	**$34,915**	
							$/unit Res Only	**$52,821**	
							$/sqm land	**$764**	

APPENDIX C

Scenario 2 + 40%

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	3,500	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	1.25		32	apts	45	50
		Plot Ratio Area	4,375	sqm	95	m²	97	96
		Levels	5.00	storeys	3,040	m²	4,352	4,790
		RCode Eqivalent	100		1,335	m²	1,335	1,335
Site Cover	80%		44		4,375	m²	5,687	6,125
Podium	85%	Basement	95%	Efficiency		PRatio	1.62	1.75
	-		1.00	Levels				
	-		3,325					
	-		95					

Residential — $5,000 Rounding Factor

# Apt	Bed	Net Area	Total area	Carbays/apt	Total Carbays	$/sqm net	Average price	Gross Realisation	Affordable Component		
Affordable Stock Added											
2	1	55	110	1.00	2	$3,182	$175,000	$350,000	3%		
2	1	65	130	1.00	2	$3,154	$205,000	$410,000	3%		
2	2	75	150	1.00	2	$3,133	$235,000	$470,000	3%		
2	2	90	180	1.00	2	$3,056	$275,000	$550,000	3%		
0	3	110	-	1.00	0	$3,045	$335,000	$0	0%		
0	3	130	-	2.00	0	$2,962	$385,000	$0	0%	13%	21%
Additional Stock to Developer							$222,500	**$1,780,000**			
3	1	55	165	1.00	3	$7,000	$385,000	$1,155,000	5%		
3	1	65	195	1.00	3	$7,000	$455,000	$1,365,000	5%		
5	2	75	375	1.00	5	$7,100	$535,000	$2,675,000	8%		
5	2	90	450	1.00	5	$7,050	$635,000	$3,175,000	8%		
0	3	110	-	1.00	0	$6,725	$740,000	$0	0%		
0	3	130	-	2.00	0	$6,600	$860,000	$0	0%	25%	
Complying Yield								**$8,370,000**			
6	1	55	330	1.00	6	$7,000	$385,000	$2,310,000	10%		
10	1	65	650	1.00	10	$7,000	$455,000	$4,550,000	16%	25%	total 1 bed
10	2	75	750	1.00	10	$7,100	$535,000	$5,350,000	16%		
8	2	90	720	1.00	8	$7,050	$635,000	$5,080,000	13%	29%	total 2 bed
3	3	110	330	1.00	3	$6,725	$740,000	$2,220,000	5%		
2	3	130	260	2.00	4	$6,600	$860,000	$1,720,000	3%	8%	total 3 bed
63			4,795		65			**$21,230,000**	62%	62%	
					1.03			$31,380,000			
		Average floor area	76.11				Average price	$500,000			
		Balcony Average	15					$4,428			
		Carbay provision	35								
		Amenities - sqm per apartment	-	-							
		Total Apartments	63								
		Visitor Parking	10.0%	7.0							

Commercial Average Unit 150 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
5	800	11	$6,600	$1,056,000	$5,280,000	$6,000	$450	7.50%

Retail Average Unit 75 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
7	535	7	$7,150	$546,464	$3,825,250	$6,500	$400	6.15%

Total Net Floor Area	6,130	1.75			
Surplus/Deficit Plot Ratio	(5)				
Total Units	75		**Total Realisation**	**$40,485,250**	
Total Parking	90	95			

			Sale Rate			
Timings			8	6.0		
Statutory Planning Planning	6	months	Pre Sales	49.0		
Pre - sales commitment	8	months	60%	$22,082,864		
Construction Design and Tender/mobilisation	4	months		$27,705,059		
Development	18	months				
Selling	3	months				
Total Duration	**39**	months				
PR Guide	3.3		6.0%	19.5%		

						$/unit	
Development Calculations							
Gross Realisation					$40,485,250	$539,803	
LESS GST	Land				$3,680,477		$3,680,477
	Res GR	$31,380,000	Com GR	$9,105,250	$40,485,250	$36,804,773	
	GST	$2,852,727		$827,750			
LESS							
	Agency Selling Fee		2.00%		$774,105	$10,321	
	Development Management Fee		1.00%		$404,853	$5,398	
	Settlement Fee Vendor		0.15%		$60,728	$810	
	Marketing		0.75%		$290,289	$3,871	
	Ancillary Costs		0.00%		$0	$0	
					$1,529,975		$250
						$35,274,798	
LESS	Profit and Risk		20.00%		$5,609,436	$83,723	$1,009
						$29,665,362	

LESS **Development Costs**	Net Area	Efficiency	Gross Area				
Basement Car Park	3,325	95.0%	3,500	$945	$3,307,500	$44,100	
Podium Car Park	-	85.0%	-	$770	$0	$0	
Commercial	800	85.0%	941	$1,925	$1,811,765	$24,157	
Retail	535	85.0%	629	$1,400	$881,176	$11,749	
Residential	4,795	90.0%	5,328	$2,815	$14,997,694	$199,969	
Balcony	945			$885	$836,325	$11,151	
External Works	0.0%		6,130		$400,000	$5,333	
External Services	0.0%				$0	$0	
Scheme Costs				$100	$350,000	$4,667	
Sustainability Initiatives	0.0%				$0	$0	
Public Art	1.0%				$222,345	$2,965	
Headworks/Statutory Fees	75			$4,000	$300,000	$4,000	
Professional Fees	9.0%				$2,079,612	$27,728	
Contingency	10.0%				$2,518,642	$33,582	
					$27,705,059	$369,401	$4,520

LESS	Rates and Taxes	Completed Product			
	$1,500	pa per unit for half selling period	$14,063		
			$27,719,122		$4,522
				$1,946,240	
LESS	Interest on Development Costs	8.00%			
	Interest on half the development and selling period		$1,940,339		$317
				$5,901	
LESS	Interest on Land Purchase				
	For Planning, Development and half selling Period	38 months			
	8.00% p.a.	25.00%	$1,180		$0
				$4,721	
LESS	Rates and Taxes				
	Land 5.00% for land during planning and development		$225		$0
				$4,496	
LESS	Purchase Costs	6.00%	$255		$0
				$4,242	$4,839 Cost Base
					$4,997
			Adopt	**$0**	$0
			$/unit All	**$0**	
			$/unit Res Only	**$0**	
			$/sqm land	**$0**	

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	4,050	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	2.50		107	apts	138	149
		Plot Ratio Area	10,125	sqm	95	m²	95	95
		Levels	9.00	storeys	10,125	m²	13,162	14,175
		RCode Eqivalent	160		-	m²	-	-
Site Cover	80%		63		10,125	m²	13,162	14,175
Podium	85%	Efficiency	95%	Efficiency		PRatio	3.25	3.50
	-	Levels	1.90	Levels				
	-		7,310					
	-		209					

Residential

# Apt	Bed	Net Area	Total area	Carbays/apt	Total Carbays	$/sqm net	$5,000 Average price	Rounding Factor Gross Realisation	Affordable Component		
Affordable Stock Added											
4	1	55	220	1.00	4	$3,182	$175,000	$700,000	2%		
6	1	65	390	1.00	6	$3,154	$205,000	$1,230,000	3%		
8	2	75	600	1.00	8	$3,133	$235,000	$1,880,000	4%		
6	2	90	540	1.00	6	$3,056	$275,000	$1,650,000	3%		
2	3	110	220	1.00	2	$3,045	$335,000	$670,000	1%		
0	3	130	-	2.00	0	$2,962	$385,000	$0	0%	14%	20%
Additional Stock to Developer							$235,769	**$6,130,000**			
4	1	55	220	1.00	4	$7,350	$405,000	$1,620,000	2%		
6	1	65	390	1.00	6	$7,350	$480,000	$2,880,000	3%		
8	2	75	600	1.00	8	$7,450	$560,000	$4,480,000	4%		
6	2	90	540	1.00	6	$7,400	$665,000	$3,990,000	3%		
3	3	110	330	1.00	3	$7,050	$775,000	$2,325,000	2%		
0	3	130	-	2.00	0	$6,925	$900,000	$0	0%	15%	
Complying Yield								**$15,295,000**			
20	1	55	1,100	1.00	20	$7,350	$405,000	$8,100,000	11%		
30	1	65	1,950	1.00	30	$7,350	$480,000	$14,400,000	16%	27%	total 1 bed
35	2	75	2,625	1.00	35	$7,450	$560,000	$19,600,000	19%		
30	2	90	2,700	1.00	30	$7,400	$665,000	$19,950,000	16%	36%	total 2 bed
10	3	110	1,100	1.00	10	$7,050	$775,000	$7,750,000	5%		
5	3	130	650	2.00	10	$6,925	$900,000	$4,500,000	3%	8%	total 3 bed
183			14,175		188			**$74,300,000**	71%	71%	
					1.03			$95,725,000			
		Average floor area	77.46				Average price	$525,000			
		Balcony Average	15					$5,242			
		Carbay provision	35								
		Amenities - sqm per apartment	-	-							
		Total Apartments	183								
		Visitor Parking	10.0%	19.0							

Commercial Average Unit 150 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
-	-	-	$6,600	$0	$0	$6,000	$450	7.50%

Retail Average Unit 75 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
-	-	-	$7,150	$0	$0	$6,500	$400	6.15%

Total Net Floor Area	14,175	3.50		
Surplus/Deficit Plot Ratio	**0**			
Total Units	183		**Total Realisation**	**$95,725,000**
Total Parking	207	209		

Timings			Sale Rate	
			8	17.0
Statutory Planning Planning	6	months	Pre Sales	134.0
Pre - sales commitment	12	months	74%	$63,961,705
Construction Design and Tender/mobilisation	4	months		$63,321,834
Development	24	months		
Selling	3	months		
Total Duration	**49**	months		
PR Guide	4.1		5.0%	20.4%

Development Calculations							$/unit	
Gross Realisation						$95,725,000	$523,087	
LESS GST	Land					$8,702,273		$8,702,273
	Res GR	$95,725,000	Com GR	$0	$95,725,000	$87,022,727		
	GST	$8,702,273		$0				
LESS								
	Agency Selling Fee		2.00%		$1,791,900		$9,792	
	Development Management Fee		1.00%		$957,250		$5,231	
	Settlement Fee Vendor		0.15%		$143,588		$785	
	Marketing		0.75%		$671,963		$3,672	
	Ancillary Costs		0.00%		$0		$0	
					$3,564,700			$251
						$83,458,027		
LESS	Profit and Risk		20.00%		$12,980,883		$82,681	$1,064
						$70,477,144		

LESS **Development Costs**	**Net Area**	**Efficiency**	**Gross Area**					
Basement Car Park	7,310	95.0%	7,695	$945	$7,271,775		$39,736	
Podium Car Park	-	85.0%	-	$770	$0		$0	
Commercial	-	85.0%	-	$1,925	$0		$0	
Retail	-	85.0%	-	$1,400	$0		$0	
Residential	14,175	90.0%	15,750	$2,678	$42,178,500		$230,484	
Balcony	2,745			$885	$2,429,325		$13,275	
External Works	0.0%		14,175		$500,000		$2,732	
External Services	0.0%				$0		$0	
Scheme Costs				$100	$405,000		$2,213	
Sustainability Initiatives	0.0%				$0		$0	
Public Art	1.0%				$523,796		$2,862	
Headworks/Statutory Fees	183			$4,000	$732,000		$4,000	
Professional Fees	9.0%				$4,863,636		$26,577	
Contingency	7.5%				$4,417,802		$24,141	
					$63,321,834		$346,021	$4,467

LESS	Rates and Taxes	Completed Product			
	$1,500	pa per unit for half selling period		$34,313	
				$63,356,147	$4,470
				$7,120,997	
LESS	Interest on Development Costs		8.00%		
	Interest on half the development and selling period			$5,702,053	$402
				$1,418,944	
LESS	Interest on Land Purchase				
	For Planning, Development and half selling Period		48 months		
	8.00% p.a.		31.67%	$341,265	$24
				$1,077,679	
LESS	Rates and Taxes				
	Land	5.00% for land during planning and development		$51,318	$4
				$1,026,361	
LESS	Purchase Costs		6.00%	$58,096	$4
				$968,265	$4,972 Cost Base
					$5,239
				Adopt **$970,000**	$68
				$/unit All	**$5,301**
				$/unit Res Only	**$5,301**
				$/sqm land	**$240**

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	4,435	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	2.50		98	apts	133	144
		Plot Ratio Area	11,088	sqm	95	m²	95	96
		Levels	11.00	storeys	9,310	m²	12,643	13,754
		RCode Eqivalent	160		1,800	m²	1,800	1,800
Site Cover	80%		69		11,110	m²	14,443	15,554
Podium	85%	Basement	95%	Efficiency		PRatio	3.26	3.51
	-		1.90	Levels				
	-		8,005					
	-		229					

Residential

# Apt	Bed	Net Area	Total area	Carbays/apt	Total Carbays	$/sqm net	$5,000 Average price	Rounding Factor Gross Realisation	Affordable Component		
Affordable Stock Added											
4	1	55	220	1.00	4	$3,182	$175,000	$700,000	2%		
5	1	65	325	1.00	5	$3,154	$205,000	$1,025,000	3%		
8	2	75	600	1.00	8	$3,133	$235,000	$1,880,000	4%		
5	2	90	450	1.00	5	$3,056	$275,000	$1,375,000	3%		
2	3	110	220	1.00	2	$3,045	$335,000	$670,000	1%		
0	3	130	-	2.00	0	$2,962	$385,000	$0	0%	13%	20%
Additional Stock to Developer							$235,417	**$5,650,000**			
6	1	55	330	1.00	6	$7,700	$425,000	$2,550,000	3%		
8	1	65	520	1.00	8	$7,700	$500,000	$4,000,000	4%		
12	2	75	900	1.00	12	$7,800	$585,000	$7,020,000	7%		
8	2	90	720	1.00	8	$7,750	$700,000	$5,600,000	4%		
2	3	110	220	1.00	2	$7,400	$815,000	$1,630,000	1%		
0	3	130	-	2.00	0	$7,250	$945,000	$0	0%	20%	
Complying Yield								**$20,800,000**			
20	1	55	1,100	1.00	20	$7,700	$425,000	$8,500,000	11%		
24	1	65	1,560	1.00	24	$7,700	$500,000	$12,000,000	13%	25%	total 1 bed
35	2	75	2,625	1.00	35	$7,800	$585,000	$20,475,000	20%		
25	2	90	2,250	1.00	25	$7,750	$700,000	$17,500,000	14%	34%	total 2 bed
10	3	110	1,100	1.00	10	$7,400	$815,000	$8,150,000	6%		
5	3	130	650	2.00	10	$7,250	$945,000	$4,725,000	3%	8%	total 3 bed
179			13,790		184			**$71,350,000**	66%	66%	
					1.03			$97,800,000			
		Average floor area	77.04				Average price	$545,000			
		Balcony Average	15					$5,174			
		Carbay provision	35								
		Amenities - sqm per apartment	-	-							
		Total Apartments	179								
		Visitor Parking	10.0%	19.0							

Commercial Average Unit 150 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
-	-	-	$6,600	$0	$0	$6,000	$450	7.50%

Retail Average Unit 75 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
24	1,800	24	$7,150	$536,250	$12,870,000	$6,500	$400	6.15%

Total Net Floor Area	15,590	3.52	
Surplus/Deficit Plot Ratio	**(36)**		
Total Units	203		**Total Realisation** **$110,670,000**
Total Parking	227	229	

Timings			Sale Rate		
			10	14.0	
Statutory Planning Planning	6	months	Pre Sales	144.0	
Pre - sales commitment	10	months	71%	$71,432,455	
Construction Design and Tender/mobilisation	4	months		$71,482,408	
Development	24	months			
Selling	3	months			
Total Duration	**47**	months			
PR Guide	3.9		6.0%	23.5%	

Development Calculations								$/unit	
Gross Realisation							$110,670,000	$545,172	
LESS GST	Land						$10,060,909		$10,060,909
	Res GR	$97,800,000	Com GR	$12,870,000		$110,670,000	$100,609,091		
	GST	$8,890,909		$1,170,000					
LESS									
Agency Selling Fee			2.00%			$2,100,400		$10,347	
Development Management Fee			1.00%			$1,106,700		$5,452	
Settlement Fee Vendor			0.15%			$166,005		$818	
Marketing			0.75%			$787,650		$3,880	
Ancillary Costs			0.00%			$0		$0	
						$4,160,755			$267
							$96,448,336		
LESS Profit and Risk			20.00%			$15,218,662		$85,020	$1,105
							$81,229,674		

LESS **Development Costs**	**Net Area**	**Efficiency**	**Gross Area**				$/unit	
Basement Car Park	8,005	95.0%	8,427	$945	$7,963,043		$39,227	
Podium Car Park	-	85.0%	-	$770	$0		$0	
Commercial	-	85.0%	-	$1,925	$0		$0	
Retail	1,800	85.0%	2,118	$1,400	$2,964,706		$14,604	
Residential	13,790	90.0%	15,322	$2,960	$45,353,778		$223,418	
Balcony	2,685			$885	$2,376,225		$11,706	
External Works	0.0%		15,590		$500,000		$2,463	
External Services	0.0%				$0		$0	
Scheme Costs				$100	$443,500		$2,185	
Sustainability Initiatives	0.0%				$0		$0	
Public Art	1.0%				$591,578		$2,914	
Headworks/Statutory Fees	203			$4,000	$812,000		$4,000	
Professional Fees	9.0%				$5,490,435		$27,046	
Contingency	7.5%				$4,987,145		$24,567	
					$71,482,408		$352,130	$4,585

LESS Rates and Taxes	Completed Product					
$1,500	pa per unit for half selling period			$38,063		
				$71,520,470		$4,588
					$9,709,203	
LESS Interest on Development Costs		8.00%				
Interest on half the development and selling period				$6,436,842		$413
					$3,272,361	
LESS Interest on Land Purchase						
For Planning, Development and half selling Period			46	months		
8.00%	p.a.		30.33%	$761,598		$49
					$2,510,763	
LESS Rates and Taxes						
Land 5.00%	for land during planning and development			$119,560		$8
					$2,391,203	
LESS Purchase Costs		6.00%		$135,351		$9
					$2,255,852	$5,211 Cost Base
						$5,456
				Adopt	**$2,260,000**	$145
				$/unit All	**$11,133**	
				$/unit Res Only	**$12,626**	

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	4,330	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	1.25		57	apts	74	80
		Plot Ratio Area	5,413	sqm	95	m²	95	95
		Levels	5.00	storeys	5,415	m²	7,039	7,581
		RCode Eqivalent	100		-	m²	-	-
Site Cover	80%		54		5,415	m²	7,039	7,581
Podium	85%	Basement	95%	Efficiency		PRatio	1.63	1.75
	-		0.95	Levels				
	-		3,908					
	-		112					

Residential — $5,000 Rounding Factor

# Apt	Bed	Net Area	Total area	Carbays/apt	Total Carbays	$/sqm net	Average price	Gross Realisation	Affordable Component		
Affordable Stock Added											
2	1	55	110	1.00	2	$3,182	$175,000	$350,000	2%		
2	1	65	130	1.00	2	$3,154	$205,000	$410,000	2%		
4	2	75	300	1.00	4	$3,133	$235,000	$940,000	4%		
4	2	90	360	1.00	4	$3,056	$275,000	$1,100,000	4%		
2	3	110	220	1.00	2	$3,045	$335,000	$670,000	2%		
0	3	130	-	2.00	0	$2,962	$385,000	$0	0%	14%	20%
Additional Stock to Developer							$247,857	**$3,470,000**			
2	1	55	110	1.00	2	$6,300	$345,000	$690,000	2%		
2	1	65	130	1.00	2	$6,300	$410,000	$820,000	2%		
4	2	75	300	1.00	4	$6,400	$480,000	$1,920,000	4%		
4	2	90	360	1.00	4	$6,350	$570,000	$2,280,000	4%		
2	3	110	220	1.00	2	$6,050	$665,000	$1,330,000	2%		
0	3	130	-	2.00	0	$5,950	$775,000	$0	0%	14%	
Complying Yield								**$7,040,000**			
10	1	55	550	1.00	10	$6,300	$345,000	$3,450,000	10%		
17	1	65	1,105	1.00	17	$6,300	$410,000	$6,970,000	18%	28%	total 1 bed
20	2	75	1,500	1.00	20	$6,400	$480,000	$9,600,000	21%		
12	2	90	1,080	1.00	12	$6,350	$570,000	$6,840,000	12%	33%	total 2 bed
6	3	110	660	1.00	6	$6,050	$665,000	$3,990,000	6%		
4	3	130	520	2.00	8	$5,950	$775,000	$3,100,000	4%	10%	total 3 bed
97			7,655		101			**$33,950,000**	71%	71%	
					1.04			$44,460,000			
		Average floor area	78.92				Average price	$460,000			
		Balcony Average	15					$4,435			
		Carbay provision	35								
		Amenities - sqm per apartment	-	-							
		Total Apartments	97								
		Visitor Parking	10.0%	11.0							

Commercial Average Unit 150 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
-	-	-	$6,600	$0	$0	$6,000	$450	7.50%

Retail Average Unit 75 — 75 m²/car bay

No.	NLA	Total Carbays	$/sqm GST Inc	Average	Gross Realisation	GST Net		
-	-	-	$7,150	$0	$0	$6,500	$400	6.15%

Total Net Floor Area	7,655	1.77	
Surplus/Deficit Plot Ratio	(74)		
Total Units	97		**Total Realisation** **$44,460,000**
Total Parking	112	112	

Timings			Sale Rate		
			10	5.0	
Statutory Planning Planning	6	months	Pre Sales	53.0	
Pre - sales commitment	4	months	55%	$22,230,000	
Construction Design and Tender/mobilisation	4	months		$30,756,385	
Development	18	months			
Selling	3	months			
Total Duration	**35**	months			
PR Guide	2.9		6.0%	17.5%	

Development Calculations							$/unit	
Gross Realisation						$44,460,000	$458,351	
LESS GST	Land					$4,041,818		$4,041,818
	Res GR	$44,460,000	Com GR	$0	$44,460,000	$40,418,182		
	GST	$4,041,818		$0				
LESS								
Agency Selling Fee			2.00%		$819,800		$8,452	
Development Management Fee			1.00%		$444,600		$4,584	
Settlement Fee Vendor			0.15%		$66,690		$688	
Marketing			0.75%		$307,425		$3,169	
Ancillary Costs			0.00%		$0		$0	
					$1,638,515			$214
						$38,779,667		
LESS Profit and Risk			20.00%		$5,937,520		$71,536	$909
						$32,842,147		

LESS **Development Costs**	**Net Area**	**Efficiency**	**Gross Area**				
Basement Car Park	3,908	95.0%	4,114	$945	$3,887,258		$40,075	
Podium Car Park	-	85.0%	-	$770	$0		$0	
Commercial	-	85.0%	-	$1,925	$0		$0	
Retail	-	85.0%	-	$1,400	$0		$0	
Residential	7,655	90.0%	8,506	$2,235	$19,009,917		$195,979	
Balcony	1,455			$885	$1,287,675		$13,275	
External Works	0.0%		7,655		$400,000		$4,124	
External Services	0.0%				$0		$0	
Scheme Costs				$100	$433,000		$4,464	
Sustainability Initiatives	0.0%				$0		$0	
Public Art	1.0%				$245,848		$2,535	
Headworks/Statutory Fees	97			$4,000	$388,000		$4,000	
Professional Fees	9.0%				$2,308,653		$23,801	
Contingency	10.0%				$2,796,035		$28,825	
					$30,756,385		$317,076	$4,018

LESS Rates and Taxes	Completed Product				
$1,500	pa per unit for half selling period		$18,188		
			$30,774,573		$4,020
				$2,067,574	
LESS Interest on Development Costs		**8.00%**			
Interest on half the development and selling period			$2,154,220		$281
				($86,647)	
LESS Interest on Land Purchase					
For Planning, Development and half selling Period		34 months			
8.00% p.a.		22.33%	($15,818)		($2)
				($102,465)	
LESS Rates and Taxes					
Land **5.00%**	for land during planning and development		($4,879)		($1)
				($107,344)	
LESS Purchase Costs		**6.00%**	($6,076)		($1)
				($113,420)	#VALUE! Cost Base
					$4,469
			Adopt	**Not Feasible**	#VALUE!
			$/unit All	**NA**	
			$/unit Res Only	**NA**	

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	3,603	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	1.50		42	apts	59	64
		Plot Ratio Area	5,405	sqm	94	m²	94	95
		Levels	6.00	storeys	3,950	m²	5,570	6,111
		RCode Eqivalent	100		1,455	m²	1,455	1,455
Site Cover	80%		54		5,405	m²	7,025	7,566
Podium	85%	Basement	95%	Efficiency		PRatio	1.95	2.10
	-		1.15	Levels				
	-		3,936					
	-		112					

Residential							$5,000	Rounding Factor			
# Apt	**Bed**	**Net Area**	**Total area**	**Carbays/apt**	**Total Carbays**	**$/sqm net**	**Average price**	**Gross Realisation**	**Affordable Component**		
Affordable Stock Added											
2	1	55	110	1.00	2	$3,182	$175,000	$350,000	2%		
2	1	65	130	1.00	2	$3,154	$205,000	$410,000	2%		
3	2	75	225	1.00	3	$3,133	$235,000	$705,000	4%		
2	2	90	180	1.00	2	$3,056	$275,000	$550,000	2%		
2	3	110	220	1.00	2	$3,045	$335,000	$670,000	2%		
0	3	130	-	2.00	0	$2,962	$385,000	$0	0%	14%	21%
Additional Stock to Developer							$244,091	**$2,685,000**			
2	1	55	110	1.00	2	$7,000	$385,000	$770,000	2%		
3	1	65	195	1.00	3	$7,000	$455,000	$1,365,000	4%		
6	2	75	450	1.00	6	$7,100	$535,000	$3,210,000	7%		
4	2	90	360	1.00	4	$7,050	$635,000	$2,540,000	5%		
2	3	110	220	1.00	2	$6,725	$740,000	$1,480,000	2%		
0	3	130	-	2.00	0	$6,600	$860,000	$0	0%	21%	
Complying Yield								**$9,365,000**			
8	1	55	440	1.00	8	$7,000	$385,000	$3,080,000	10%		
14	1	65	910	1.00	14	$7,000	$455,000	$6,370,000	17%	27%	total 1 bed
18	2	75	1,350	1.00	18	$7,100	$535,000	$9,630,000	22%		
9	2	90	810	1.00	9	$7,050	$635,000	$5,715,000	11%	33%	total 2 bed
4	3	110	440	1.00	4	$6,725	$740,000	$2,960,000	5%		
0	3	130	-	2.00	0	$6,600	$860,000	$0	0%	5%	total 3 bed
81			6,150		81			**$27,755,000**	65%	65%	
					1.00			$39,805,000			
		Average floor area	75.93				Average price	$490,000			
		Balcony Average	15					$4,513			
		Carbay provision	35								
		Amenities - sqm per apartment	-	-							
		Total Apartments	81								
		Visitor Parking	10.0%	9.0							

Commercial	Average Unit	150		75	m²/car bay				
	No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**		
	6	910	12	$6,600	$1,001,000	$6,006,000	$6,000	$450	7.50%

Retail	Average Unit	75		75	m²/car bay				
	No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**		
	7	545	7	$7,150	$556,679	$3,896,750	$6,500	$400	6.15%

	Total Net Floor Area	7,605	2.11			
	Surplus/Deficit Plot Ratio	**(39)**				
	Total Units	94			**Total Realisation**	**$49,707,750**
	Total Parking	109	112			

					Sale Rate			
Timings					8	8.0		
	Statutory Planning Planning		6	months	Pre Sales	60.0		
	Pre - sales commitment		5	months	59%	$26,661,430		
	Construction Design and Tender/mobilisation		4	months		$29,488,666		
	Development		18	months				
	Selling		3	months				
	Total Duration		**36**	months				
	PR Guide		3.0		6.0%	18.0%		

Development Calculations								$/unit	
Gross Realisation							$49,707,750	$528,806	
LESS	GST	Land					$4,518,886		$4,518,886
		Res GR	$39,805,000	Com GR	$9,902,750	$49,707,750	$45,188,864		
		GST	$3,618,636		$900,250				
LESS									
	Agency Selling Fee			2.00%		$940,455		$10,005	
	Development Management Fee			1.00%		$497,078		$5,288	
	Settlement Fee Vendor			0.15%		$74,562		$793	
	Marketing			0.75%		$352,671		$3,752	
	Ancillary Costs			0.00%		$0		$0	
						$1,864,765			$245
							$43,324,099		
LESS	Profit and Risk			20.00%		$6,813,865		$82,095	$1,011
							$36,510,234		
LESS	**Development Costs**		**Net Area**	**Efficiency**	**Gross Area**				
	Basement Car Park		3,936	95.0%	4,143	$945	$3,915,560	$41,655	
	Podium Car Park		-	85.0%	-	$770	$0	$0	
	Commercial		910	85.0%	1,071	$1,925	$2,060,882	$21,924	
	Retail		545	85.0%	641	$1,400	$897,647	$9,549	
	Residential		6,150	90.0%	6,833	$2,235	$15,272,500	$162,473	
	Balcony		1,215			$885	$1,075,275	$11,439	
	External Works		0.0%		7,605		$400,000	$4,255	
	External Services		0.0%				$0	$0	
	Scheme Costs					$100	$360,300	$3,833	
	Sustainability Initiatives		0.0%				$0	$0	
	Public Art		1.0%				$236,219	$2,513	
	Headworks/Statutory Fees		94			$4,000	$376,000	$4,000	
	Professional Fees		9.0%				$2,213,494	$23,548	
	Contingency		10.0%				$2,680,788	$28,519	
							$29,488,666	$313,709	$3,878
LESS	Rates and Taxes	Completed Product							
		$1,500	pa per unit for half selling period				$17,625		
							$29,506,291		$3,880
							$7,003,943		
LESS	Interest on Development Costs			**8.00%**					
	Interest on half the development and selling period						$2,065,440		$272
							$4,938,503		
LESS	Interest on Land Purchase								
	For Planning, Development and half selling Period				35	months			
		8.00%	p.a.		23.00%		$923,460		$121
							$4,015,043		
LESS	Rates and Taxes								
	Land	**5.00%**	for land during planning and development				$191,193		$25
							$3,823,851		
LESS	Purchase Costs			**6.00%**			$216,444		$28
							$3,607,406		$4,801 Cost Base
									$4,994
							Adopt	**$3,610,000**	$475
							$/unit All	**$38,404**	
							$/unit Res Only	**$44,568**	
							$/sqm land	**$1,002**	

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	2,760	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	1.25		36	apts	47	51
		Plot Ratio Area	3,450	sqm	96	m²	95	95
		Levels	5.50	storeys	3,450	m²	4,485	4,830
		RCode Eqivalent	100		-	m²	-	-
Site Cover	80%		35		3,450	m²	4,485	4,830
Podium	85%	Basement	95%	Efficiency		PRatio	1.63	1.75
	-		1.00	Levels				
	-		2,622					
	-		75					

Residential

							$5,000	Rounding Factor			
# Apt	**Bed**	**Net Area**	**Total area**	**Carbays/apt**	**Total Carbays**	**$/sqm net**	**Average price**	**Gross Realisation**	**Affordable Component**		
Affordable Stock Added											
2	1	55	110	1.00	2	$3,182	$175,000	$350,000	3%		
2	1	65	130	1.00	2	$3,154	$205,000	$410,000	3%		
2	2	75	150	1.00	2	$3,133	$235,000	$470,000	3%		
2	2	90	180	1.00	2	$3,056	$275,000	$550,000	3%		
1	3	110	110	1.00	1	$3,045	$335,000	$335,000	2%		
0	3	130	-	2.00	0	$2,962	$385,000	$0	0%	14%	20%
Additional Stock to Developer							$235,000	**$2,115,000**			
2	1	55	110	1.00	2	$6,300	$345,000	$690,000	3%		
2	1	65	130	1.00	2	$6,300	$410,000	$820,000	3%		
2	2	75	150	1.00	2	$6,400	$480,000	$960,000	3%		
2	2	90	180	1.00	2	$6,350	$570,000	$1,140,000	3%		
1	3	110	110	1.00	1	$6,050	$665,000	$665,000	2%		
0	3	130	-	2.00	0	$5,950	$775,000	$0	0%	14%	
Complying Yield								**$4,275,000**			
8	1	55	440	1.00	8	$6,300	$345,000	$2,760,000	13%		
10	1	65	650	1.00	10	$6,300	$410,000	$4,100,000	16%	29%	total 1 bed
14	2	75	1,050	1.00	14	$6,400	$480,000	$6,720,000	22%		
8	2	90	720	1.00	8	$6,350	$570,000	$4,560,000	13%	35%	total 2 bed
3	3	110	330	1.00	3	$6,050	$665,000	$1,995,000	5%		
2	3	130	260	2.00	4	$5,950	$775,000	$1,550,000	3%	8%	total 3 bed
63			4,810		65			**$21,685,000**	71%	71%	
					1.03			$28,075,000			
		Average floor area	76.35				Average price	$445,000			
		Balcony Average	15					$4,508			
		Carbay provision	35								
		Amenities - sqm per apartment	-	-							
		Total Apartments	63								
		Visitor Parking	10.0%	7.0							

Commercial Average Unit 150 — 75 m²/car bay

No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**		
-	-	-	$6,600	$0	$0	$6,000	$450	7.50%

Retail Average Unit 75 — 75 m²/car bay

No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**		
-	-	-	$7,150	$0	$0	$6,500	$400	6.15%

	Total Net Floor Area	4,810	1.74			
	Surplus/Deficit Plot Ratio	**20**				
	Total Units	63			**Total Realisation**	**$28,075,000**
	Total Parking	72	75			

					Sale Rate			
Timings					10	4.0		
	Statutory Planning Planning		6	months	Pre Sales	35.0		
	Pre - sales commitment		3	months	56%	$14,292,727		
	Construction Design and Tender/mobilisation		4	months		$19,753,827		
	Development		18	months				
	Selling		3	months				
	Total Duration		**34**	months				
	PR Guide		2.8		6.0%	17.0%		

								$/unit	
Development Calculations									
Gross Realisation							$28,075,000	$445,635	
LESS	GST	Land					**$2,552,273**		$2,552,273
		Res GR	$28,075,000	Com GR	$0	$28,075,000	$25,522,727		
		GST	**$2,552,273**		**$0**				
LESS									
	Agency Selling Fee			2.00%		$519,200		$8,241	
	Development Management Fee			1.00%		$280,750		$4,456	
	Settlement Fee Vendor			0.15%		$42,113		$668	
	Marketing			0.75%		$194,700		$3,090	
	Ancillary Costs			0.00%		$0		$0	
						$1,036,763			$216
							$24,485,965		
LESS	Profit and Risk			20.00%		$3,760,540		$69,640	$911
							$20,725,425		

LESS	**Development Costs**	**Net Area**	**Efficiency**	**Gross Area**					
	Basement Car Park	2,622	95.0%	2,760	$945	$2,608,200		$41,400	
	Podium Car Park	-	85.0%	-	$770	$0		$0	
	Commercial	-	85.0%	-	$1,925	$0		$0	
	Retail	-	85.0%	-	$1,400	$0		$0	
	Residential	4,810	90.0%	5,344	$2,235	$11,944,833		$189,601	
	Balcony	945			$885	$836,325		$13,275	
	External Works	0.0%		4,810		$400,000		$6,349	
	External Services	0.0%				$0		$0	
	Scheme Costs				$100	$276,000		$4,381	
	Sustainability Initiatives	0.0%				$0		$0	
	Public Art	1.0%				$157,894		$2,506	
	Headworks/Statutory Fees	63			$4,000	$252,000		$4,000	
	Professional Fees	9.0%				$1,482,773		$23,536	
	Contingency	10.0%				$1,795,802		$28,505	
						$19,753,827		$313,553	$4,107

LESS	Rates and Taxes	Completed Product				
	$1,500	pa per unit for half selling period		$11,813		
				$19,765,640		$4,109
					$959,786	
LESS	Interest on Development Costs		**8.00%**			
	Interest on half the development and selling period			$1,383,595		$288
					($423,809)	
LESS	Interest on Land Purchase					
	For Planning, Development and half selling Period			33 months		
	8.00% p.a.			21.67% ($75,473)		($16)
					($499,282)	
LESS	Rates and Taxes					
	Land	**5.00%** for land during planning and development		($23,775)		($5)
					($523,057)	
LESS	Purchase Costs		**6.00%**	($29,607)		($6)
					($552,664)	#VALUE! Cost Base
						$4,482
				Adopt	**Not Feasible**	#VALUE!

$/unit All	**NA**
$/unit Res Only	**NA**
$/sqm land	**NA**

					Hassell Base Case		Hassell Bonus 1	Hassell Bonus 2
		Land	2,695	sqm	Plot Ratio Driver		30%	40%
		Plot Ratio	1.50		22	apts	35	39
		Plot Ratio Area	4,043	sqm	96	m²	95	96
		Levels	5.00	storeys	2,117	m²	3,329	3,733
		RCode Eqivalent	100		1,926	m²	1,926	1,926
Site Cover	80%		40		4,043	m²	5,255	5,659
Podium	85%	Basement	95%	Efficiency		PRatio	1.95	2.10
	-		1.10	Levels				
	-		2,816					
	-		80					

Residential							$5,000	Rounding Factor			
# Apt	**Bed**	**Net Area**	**Total area**	**Carbays/apt**	**Total Carbays**	**$/sqm net**	**Average price**	**Gross Realisation**	**Affordable Component**		
Affordable Stock Added											
1	1	55	55	1.00	1	$3,182	$175,000	$175,000	2%		
1	1	65	65	1.00	1	$3,154	$205,000	$205,000	2%		
2	2	75	150	1.00	2	$3,133	$235,000	$470,000	4%		
1	2	90	90	1.00	1	$3,056	$275,000	$275,000	2%		
1	3	110	110	1.00	1	$3,045	$335,000	$335,000	2%		
0	3	130	-	2.00	0	$2,962	$385,000	$0	0%	13%	22%
Additional Stock to Developer							$243,333	**$1,460,000**			
3	1	55	165	1.00	3	$6,300	$345,000	$1,035,000	6%		
2	1	65	130	1.00	2	$6,300	$410,000	$820,000	4%		
4	2	75	300	1.00	4	$6,400	$480,000	$1,920,000	8%		
4	2	90	360	1.00	4	$6,350	$570,000	$2,280,000	8%		
2	3	110	220	1.00	2	$6,050	$665,000	$1,330,000	4%		
0	3	130	-	2.00	0	$5,950	$775,000	$0	0%	31%	
Complying Yield								**$7,385,000**			
3	1	55	165	1.00	3	$6,300	$345,000	$1,035,000	6%		
7	1	65	455	1.00	7	$6,300	$410,000	$2,870,000	15%	21%	total 1 bed
8	2	75	600	1.00	8	$6,400	$480,000	$3,840,000	17%		
5	2	90	450	1.00	5	$6,350	$570,000	$2,850,000	10%	27%	total 2 bed
4	3	110	440	1.00	4	$6,050	$665,000	$2,660,000	8%		
0	3	130	-	2.00	0	$5,950	$775,000	$0	0%	8%	total 3 bed
48			3,755		48			$13,255,000	56%	56%	
					1.00			$22,100,000			
		Average floor area	78.23				Average price	$460,000			
		Balcony Average	15					$3,530			
		Carbay provision	35								
		Amenities - sqm per apartment	-	-							
		Total Apartments	48								
		Visitor Parking	10.0%	5.0							

Commercial	Average Unit	150		75	m²/car bay				
	No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**		
	7	980	13	$6,600	$924,000	$6,468,000	$6,000	$450	7.50%

Retail	Average Unit	75		75	m²/car bay				
	No.	**NLA**	**Total Carbays**	**$/sqm GST Inc**	**Average**	**Gross Realisation**	**GST Net**		
	13	946	13	$7,150	$520,300	$6,763,900	$6,500	$400	6.15%

	Total Net Floor Area	5,681	2.11			
	Surplus/Deficit Plot Ratio	**(22)**				
	Total Units	68		**Total Realisation**	**$35,331,900**	
	Total Parking	79	80			

					Sale Rate			
Timings					8	5.0		
	Statutory Planning Planning		6	months	Pre Sales	43.0		
	Pre - sales commitment		4	months	56%	$17,987,149		
	Construction Design and Tender/mobilisation		4	months		$21,164,759		
	Development		18	months				
	Selling		3	months				
	Total Duration		**35**	months				
	PR Guide		2.9		6.0%	17.5%		

Development Calculations								$/unit	
Gross Realisation							$35,331,900	$519,587	
LESS	GST	Land					**$3,211,991**		$3,211,991
		Res GR	$22,100,000	Com GR	$13,231,900	$35,331,900	$32,119,909		
		GST	**$2,009,091**		**$1,202,900**				
LESS									
	Agency Selling Fee			2.00%		$677,438		$9,962	
	Development Management Fee			1.00%		$353,319		$5,196	
	Settlement Fee Vendor			0.15%		$52,998		$779	
	Marketing			0.75%		$254,039		$3,736	
	Ancillary Costs			0.00%		$0		$0	
						$1,337,794			$235
							$30,782,115		
LESS	Profit and Risk			20.00%		$4,909,140		$79,180	$942
							$25,872,975		

LESS	**Development Costs**	**Net Area**	**Efficiency**	**Gross Area**				
	Basement Car Park	2,816	95.0%	2,965	$945	$2,801,453	$41,198	
	Podium Car Park	-	85.0%	-	$770	$0	$0	
	Commercial	980	85.0%	1,153	$1,925	$2,219,412	$32,638	
	Retail	946	85.0%	1,113	$1,400	$1,558,118	$22,913	
	Residential	3,755	90.0%	4,172	$2,235	$9,324,917	$137,131	
	Balcony	720			$885	$637,200	$9,371	
	External Works	0.0%		5,681		$400,000	$5,882	
	External Services	0.0%				$0	$0	
	Scheme Costs				$100	$269,500	$3,963	
	Sustainability Initiatives	0.0%				$0	$0	
	Public Art	1.0%				$169,411	$2,491	
	Headworks/Statutory Fees	68			$4,000	$272,000	$4,000	
	Professional Fees	9.0%				$1,588,681	$23,363	
	Contingency	10.0%				$1,924,069	$28,295	
						$21,164,759	$311,246	$3,726

LESS	Rates and Taxes		Completed Product			
		$1,500	pa per unit for half selling period		$12,750	
					$21,177,509	$3,728
					$4,695,465	
LESS	Interest on Development Costs			**8.00%**		
	Interest on half the development and selling period				$1,482,426	$261
					$3,213,039	
LESS	Interest on Land Purchase					
	For Planning, Development and half selling Period			34	months	
		8.00%	p.a.	22.33%	$586,577	$103
					$2,626,463	
LESS	Rates and Taxes					
	Land	**5.00%**	for land during planning and development		$125,070	$22
					$2,501,393	
LESS	Purchase Costs			**6.00%**	$141,588	$25
					$2,359,805	$4,554 Cost Base
						$4,671
					Adopt **$2,360,000**	$415

$/unit All	**$34,706**
$/unit Res Only	**$49,167**
$/sqm land	**$876**

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LANDCORP

PROPOSED COCKBURN COAST DEVELOPMENT

ROAD NOISE ASSESSMENT

OCTOBER 2011

OUR REFERENCE: 13754-2-11070

DOCUMENT CONTROL PAGE

NOISE ASSESSMENT
COCKBURN COAST PROJECT

Job No: 11070

Document Reference: 13754-2-11070

FOR

LANDCORP

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APPENDICES

A Site Layout – Master Plan

B Graphical Representation of Logged Noise Levels

C Noise Contour Plots

D Day Period L_{Aeq} Noise Levels for Quiet House Design

EXECUTIVE SUMMARY

Landcorp commissioned Herring Storer Acoustics to carry out an acoustic study relating to both road and rail related noise for the proposed Cockburn Coast development.

The purpose of this report was to assess noise received within the development from vehicles travelling along both Cockburn Road and the proposed Cockburn Coast Drive and if exceedance with the stated criteria were determined, establish the required attenuation measures to control noise intrusion to acceptable levels. The traffic noise assessment has been carried out in accordance with the new WAPC State Planning Policy 5.4 *"Road and Rail Transportation Noise and Freight Consideration in Land Use Planning"*.

Under the Western Australian Planning Commission (WAPC) Planning Policy 5.4 *"Road and Rail Transport Noise and Freight Considerations in Land Use Planning"* (SPP5.4), we believe that the appropriate criteria for assessment for this development are as listed below for "Noise Limits".

EXTERNAL

$L_{Aeq(Day)}$ of 60 dB(A); and
$L_{Aeq(Night)}$ of 55 dB(A).

INTERNAL

$L_{Aeq(Day)}$ of 40 dB(A) in living and work areas; and
$L_{Aeq(Night)}$ of 35 dB(A) in bedrooms.

Noise received at an outdoor area should also comply with the L_{Aeq} of 50 dB(A) during the night period.

From the monitoring undertaken, we also note that as the difference between the $L_{Aeq(day)}$ and the $L_{Aeq(night)}$ is greater than 5 dB (i.e. 5.3 dB) and the day period is the critical period for compliance. Given the difference, if compliance is achieved for the day period, then compliance would also be achieved for the night period.

Even though with the construction of Cockburn Coast Drive, the flow of vehicles along Cockburn Road will significantly reduced, it is proposed that the current noise emissions from vehicles travelling along Cockburn Road be used for the design criteria and bases for any "Quiet House" design. Based on the acoustic assessment and modelling of current noise emissions from Cockburn Road, the following noise level should be used for developments located adjacent to Cockburn Road:

Facing Cockburn Road	-	62 dB(A)
Side (perpendicular) to Cockburn Road	-	59 dB(A)

Note: For facades on the opposite side to Cockburn Road, except for developments shown on Figure D2 in Appendix D, standard constructions can be used. For those developments indicated on Figure D2, due to the additive effect of noise received from both Cockburn Road and Cockburn Coast Drive, it is recommended that a noise level of 58 dB(A) be used for the facades on the opposite side to Cockburn Road, but not directly exposed to Cockburn Coast Drive.

Initial modelling indicates that noise emissions from the proposed Cockburn Coast Drive would exceed the above acoustic criteria by up to 8 dB(A). Given the given the topography of the land, for this development, a barrier located at the boundary of the lots and the road reserve would be in some locations, fairly ineffectual and in these locations it is recommended that a barrier be incorporated within the road reserve and be included in the design of the road. Additionally, given that the residential developments located adjacent to Cockburn Coast Drive would be multi storey developments, it is recommended that "Quiet House" design be incorporated in the design of all levels (including ground floor). Guidance on the required glazing requirements are outlined in Tables 6.1 and 6.2. The noise that would be received at development located adjacent to the proposed Cockburn Coast Drive varies and the calculated day period noise level that would be received at various locations within the development are shown on Figures D1 and D2 attached in appendix D. It is recommended that these noise levels be used for the determination of "Quiet House" design to achieve compliance with the internal acoustic criteria.

Given the proposed layout, it is noted that the first row of buildings located on the western side of Cockburn Road will act as an acoustic barrier to the developments located behind them. However, to the east of Cockburn Road, with the additive effect of Cockburn Coast Drive, this may not be the case. Therefore, for the locations listed below it is recommended that as part of the design process, an acoustic assessment report be included in the building license submission:

- First row of buildings located adjacent to the western side of Cockburn Road.
- Buildings located between Cockburn Road and Cockburn Coast Drive.

Finally, we note that under the Planning Policy, as noise received within the proposed development would exceed the “Noise Target”, notification on Titles is required for those residence exposed to transportation noise.

1. INTRODUCTION

Landcorp commissioned Herring Storer Acoustics to carry out an acoustic study relating to noise emissions from both Cockburn Road and the proposed Cockburn Coast Drive as part of the proposed Cockburn Coast development.

The purpose of this report was to assess noise received within the development from vehicles travelling along both Cockburn Road and the proposed Cockburn Coast Drive and if exceedance with the stated criteria were determined, establish the required attenuation measures to control noise intrusion to acceptable levels. The traffic noise assessment has been carried out in accordance with the new WAPC State Planning Policy 5.4 *"Road and Rail Transportation Noise and Freight Consideration in Land Use Planning"*.

As part of the study, the following was carried out:

- Undertake noise monitor of noise received from vehicles travelling along Cockburn Road.
- Determine by modelling, the noise that would be received at residences within the development from vehicles travelling on both Cockburn Road and the proposed Cockburn Coast Drive.
- Assess the predicted noise levels for compliance with the appropriate criteria.
- If exceedances are predicted, comment on possible noise amelioration options for compliance with the appropriate criteria.

For information, a locality plan is attached in Appendix A.

2. SUMMARY

For this development, noise emissions from vehicle travelling along both Cockburn Road and the proposed Cockburn Coast Drive need to be considered.

Under the Western Australian Planning Commission (WAPC) Planning Policy 5.4 *"Road and Rail Transport Noise and Freight Considerations in Land Use Planning"* (SPP5.4), we believe that the appropriate criteria for assessment for this development are as listed below for "Noise Limits".

EXTERNAL

$L_{Aeq(Day)}$ of 60 dB(A); and
$L_{Aeq(Night)}$ of 55 dB(A).

INTERNAL

$L_{Aeq(Day)}$ of 40 dB(A) in living and work areas; and
$L_{Aeq(Night)}$ of 35 dB(A) in bedrooms.

Noise received at an outdoor area should also comply with the L_{Aeq} of 50 dB(A) during the night period.

For this development, noise emissions from vehicles travelling along both Cockburn Road and the proposed Cockburn Coast Drive need to be considered.

From the monitoring undertaken, we also note that as the difference between the $L_{Aeq(day)}$ and the $L_{Aeq(night)}$ is greater than 5 dB (i.e. 5.3 dB) and the day period is the critical period for compliance. Given the difference, if compliance is achieved for the day period, then compliance would also be achieved for the night period.

In the future, with development of Cockburn Coast and the construction of Cockburn Coast Drive, the flow of vehicles along Cockburn Road will significantly reduced. However, as it is unclear as to when Cockburn Coast Drive will be constructed, to be conservative and to provide some degree of protection for both residence and future commercial developments it is proposed that the current noise emissions from vehicles travelling along Cockburn Road be used for the design criteria and bases for any "Quiet House" design. Based on the acoustic assessment and modelling of current noise emissions from Cockburn Road, the following noise level should be used for developments located adjacent to Cockburn Road:

Facing Cockburn Road	-	62 dB(A)
Side (perpendicular) to Cockburn Road	-	59 dB(A)

Note: For facades on the opposite side to Cockburn Road, except for developments located at the southern end of the project area (between Cockburn Road and Cockburn Coast Drive) and as shown on Figure D2 in Appendix D, standard constructions can be used. For those developments indicated on Figure D2, due to the additive effect of noise received from Cockburn Coast Drive, it is recommended that a noise level of 58 dB(A) be used for the facades on the opposite side to Cockburn Road, but not directly exposed to Cockburn Coast Drive.

Initial modelling, indicates that without any noise amelioration, noise emissions from the proposed Cockburn Coast Drive would exceed the above acoustic criteria by up to 8 dB(A). For the proposed Cockburn Coast Drive, it is noted that under the WAPC State Planning Policy 5.4, it is a requirement that the infrastructure provider design mitigation measures to achieve the "Noise Limits" these being $L_{Aeq(Day)}$ of 60 dB(A); and $L_{Aeq(Night)}$ of 55 dB(A). Additionally, under State Planning Policy 5.4, all practicable noise mitigation should be implemented. However, given the topography of the land, barriers located at the boundary of the lots and the road reserve would be in some locations, fairly ineffectual (i.e. in locations where the ground level of the road is above that of the residential development) and in these locations, it is recommended that a barrier be incorporated within the road reserve and be included in the design of the road. However, given that the residential developments located adjacent to Cockburn Coast Drive would be multi storey developments, it is recommended that "Quiet House" design be incorporated in the design of all levels (including ground floor). Guidance on the required glazing requirements are outlined in Tables 6.1 and 6.2. The noise that would be received at development located adjacent to the proposed Cockburn Coast Drive varies and the calculated day period noise level that would be received at various locations within the development are shown on Figures D1 and D2 attached in appendix D. It is recommended that these noise levels be used for the determination of "Quiet House" design to achieve compliance with the internal acoustic criteria.

For those developments located adjacent to Cockburn Road or located between Cockburn Road and the proposed Cockburn Coast Drive that, as part of the design process, an acoustic assessment be undertaken. Additionally, an acoustic assessment report should be included in the building licence submission.

We note that under the Planning Policy, as noise received within the proposed development would exceed the “Noise Target”, notification on Titles is required for those residence exposed to transportation noise.

3. ACOUSTIC CRITERIA

3.1 WAPC PLANNING POLICY

The Western Australian Planning Commission (WAPC) released on 22 September 2009 State Planning Policy 5.4 *"Road and Rail Transport Noise and Freight Considerations In Land Use Planning"*. Section 5.3 – Noise Criteria, which outlines the acoustic criteria, states:

"5.3 - NOISE CRITERIA

Table 1 sets out the outdoor noise criteria that apply to proposals for new noise-sensitive development or new major roads and railways assessed under this policy.

These criteria do not apply to –

- *proposals for redevelopment of existing major roads or railways, which are dealt with by a separate approach as described in section 5.4.1; and*
- *proposals for new freight handling facilities, for which a separate approach is described in section 5.4.2.*

The outdoor noise criteria set out in Table 1 apply to the emission of road and rail transport noise as received at a noise-sensitive land use. These noise levels apply at the following locations—

- *for new road or rail infrastructure proposals, at 1 m from the most exposed, habitable façade of the building receiving the noise, at ground floor level only; and*
- *for new noise-sensitive development proposals, at 1 m from the most exposed, habitable façade of the proposed building, at each floor level, and within at least one outdoor living area on each residential lot.*

Further information is provided in the guidelines.

Table 1: Outdoor Noise Criteria

Time of day	***Noise Target***	***Noise Limit***
Day (6 am–10 pm)	$L_{Aeq(Day)}$ *= 55 dB(A)*	$L_{Aeq(Day)}$ *= 60 dB(A)*
Night (10 pm–6 am)	$L_{Aeq(Night)}$ *= 50 dB(A)*	$L_{Aeq(Night)}$ *= 55 dB(A)*

The 5 dB difference between the outdoor noise target and the outdoor noise limit, as prescribed in Table 1, represents an acceptable margin for compliance. In most situations in which either the noise-sensitive land use or the major road or railway already exists, it should be practicable to achieve outdoor noise levels within this acceptable margin. In relation to greenfield sites, however, there is an expectation that the design of the proposal will be consistent with the target ultimately being achieved.

Because the range of noise amelioration measures available for implementation is dependent upon the type of proposal being considered, the application of the noise criteria will vary slightly for each different type. Policy interpretation of the criteria for each type of proposal is outlined in sections 5.3.1 and 5.3.2.

The noise criteria were developed after consideration of road and rail transport noise criteria in Australia and overseas, and after a series of case studies to

assess whether the levels were practicable. The noise criteria take into account the considerable body of research into the effects of noise on humans, particularly community annoyance, sleep disturbance, long-term effects on cardiovascular health, effects on children's learning performance, and impacts on vulnerable groups such as children and the elderly. Reference is made to the World Health Organization (WHO) recommendations for noise policies in their publications on community noise and the Night Noise Guidelines for Europe. See the policy guidelines for suggested further reading.

5.3.1 Interpretation and application for noise-sensitive development proposals

In the application of these outdoor noise criteria to new noise-sensitive developments, the objective of this policy is to achieve –

- *acceptable indoor noise levels in noise-sensitive areas (for example, bedrooms and living rooms of houses, and school classrooms); and*
- *a reasonable degree of acoustic amenity in at least one outdoor living area on each residential lot[1].*

If a noise-sensitive development takes place in an area where outdoor noise levels will meet the noise target, no further measures are required under this policy.

In areas where the noise target is likely to be exceeded, but noise levels are likely to be within the 5dB margin, mitigation measures should be implemented by the developer with a view to achieving the target levels in a least one outdoor living area on each residential lot[1]. Where indoor spaces are planned to be facing any outdoor area in the margin, noise mitigation measures should be implemented to achieve acceptable indoor noise levels in those spaces. In this case, compliance with this policy can be achieved for residential buildings through implementation of the deemed-to-comply measures detailed in the guidelines.

In areas where the outdoor noise limit is likely to be exceeded (i.e. above $L_{Aeq(Day)}$ of 60 dB(A) or $L_{Aeq(Night)}$ of 55 dB(A)), a detailed noise assessment in accordance with the guidelines should be undertaken by the developer. Customised noise mitigation measures should be implemented with a view to achieving the noise target in at least one outdoor living or recreation area on each noise-sensitive lot or, if this is not practicable, within the margin. Where indoor spaces will face outdoor areas that are above the noise limit, mitigation measures should be implemented to achieve acceptable indoor noise levels in those spaces, as specified in the following paragraphs.

For residential buildings, acceptable indoor noise levels are $L_{Aeq(Day)}$ of 40 dB(A) in living and work areas and $L_{Aeq(Night)}$ of 35 dB(A) in bedrooms[2]. For all other noise-sensitive buildings, acceptable indoor noise levels under this policy comprise noise levels that meet the recommended design sound levels in Table 1 of Australian Standard AS 2107:2000 Acoustics—Recommended design sound levels and reverberation times for building interiors.

1 For non residential noise-sensitive developments, (e.g. schools and child care centres) consideration should be given to providing a suitable outdoor area that achieves the noise target, where this is appropriate to the type of use.
2 For residential buildings, indoor noise levels are not set for utility spaces such as bathrooms. This policy encourages effective "quiet house" design, which positions these non-sensitive spaces to shield the more sensitive spaces from transport noise (see guidelines for further information).

These requirements also apply in the case of new noise-sensitive developments in the vicinity of a major transport corridor where there is no existing railway or major road (bearing in mind the policy's 15-20 year planning horizon). In these instances, the developer should engage in dialogue with the relevant infrastructure provider to develop a noise management plan to ascertain individual responsibilities, cost sharing arrangements and construction time frame.

If the policy objectives for noise-sensitive developments are not achievable, best practicable measures should be implemented, having regard to section 5.8 and the guidelines."

The Policy, under Section 5.7, also provides the following information regarding "Notifications on Titles".

"5.7 - NOTIFICATION ON TITLE

If the measures outlined previously cannot practicably achieve the target noise levels for new noise-sensitive developments, this should be notified on the certificate of title.

Notifications on certificates of title and/or advice to prospective purchasers advising of the potential for noise impacts from major road and rail corridors can be effective in warning people who are sensitive to the potential impacts of transport noise. Such advice can also bring to the attention of prospective developers the need to reduce the impact of noise through sensitive design and construction of buildings and the location of outdoor living areas.

The notification is to ensure that prospective purchasers are advised of –

- *the potential for transport noise impacts; and*
- *the potential for quiet house design requirements to minimise noise intrusion through house layout and noise insulation (see the guidelines).*

Notification should be provided to prospective purchasers and be required as a condition of subdivision (including strata subdivision) for the purposes of noise-sensitive development as well as planning approval involving noise-sensitive development, where noise levels are forecast or estimated to exceed the target outdoor noise criteria, regardless of proposed noise attenuation measures. The requirement for notification as a condition of subdivision and the land area over which the notification requirement applies, should be identified in the noise management plan in accordance with the guidelines.

An example of a standard form of wording for notifications is presented in the guidelines."

3.2 APPROPRIATE CRITERIA

Based on the above, the following criteria are proposed for this development:

External

Day	Maximum of 60 dB(A) L_{Aeq}
Night	Maximum of 55 dB(A) L_{Aeq}
Outdoor Living Areas	Maximum of 50 dB(A) L_{Aeq}

Internal

Sleeping Areas	35 dB(A) $L_{Aeq(night)}$
Living Areas	40 dB(A) $L_{Aeq(day)}$

4. MEASUREMENTS AND OBSERVATIONS

Noise logging was conducted on the site to determine the existing noise received from vehicles travelling along the Cockburn Road. Monitoring was carried out between Thursday 14th April 2011 and Thursday 21st April 2011.

Test instrumentation comprised a calibrated RTA Noise Loggers and Rion Calibrator.

The results for the logger located adjacent to the Cockburn Road are summarised in Table 4.1 and are presented graphically in Figure B1 in Appendix B.

TABLE 4.1 – SUMMARY OF MEASURED NOISE LEVELS

Parameter	Measured Level dB(A)*	Difference between $L_{10(18hour)}$ and $L_{Aeq(parameter)}$ dB(A)
$L_{A10\ (18\ hour)}$	63.7	N/A
$L_{Aeq,\ day\ (6am\ to\ 10pm)}$	62.1	= $L_{A10\ (18\ hour)}$ – 1.6
$L_{Aeq,\ night\ (10pm\ to\ 6am)}$	56.8	= $L_{A10(18\ hour)}$ – 6.9

* It is normal practice to quote decibels to the nearest whole number. Fractions are retained here to minimise any cumulative rounding error.

We also note that as the difference between the $L_{Aeq(day)}$ and the $L_{Aeq(night)}$ is 5.3 dB. Given the difference, if compliance is achieved for the day period, then compliance would also be achieved for the night period and the day period is the critical period for compliance.

5. METHODOLOGY

To determine the noise received within the development from the Cockburn Road and the proposed Cockburn Coast Drive, noise modelling was carried out using SoundPlan, using the Calculation of Road Traffic Noise (CoRTN) algorithms. Noise modelling was undertaken in accordance with the "Implementation Guidelines" for the State Planning Policy 5.4.

The input data for the model included:

- Topographical data, with the ground level within the subdivision from information supplied by client;
- Existing traffic volumes as obtained from the Main Roads Metropolitan Traffic Digest.
- Future traffic volumes as obtained from the WorleyParsons traffic study, as listed in Table 5.1.
- A +2.5 dB adjustment to allow for façade reflection.

TABLE 5.1 – NOISE MODELLING INPUT DATA

Parameter	Value	
	Cockburn Road	Cockburn Coast Drive
Existing Traffic for 2006	15540 vpd	NA
Traffic flows for 2031	7000 vpd	21000 vpd
Heavy Vehicles (%)	7.6%	7.6%
Current Speed (km/hr)	60/70	NA
Future Speed (km/hr)	50	70
Receiver Level (m)	+1.5 above ground	+1.5 above ground
Current Road Surface	Chip Seal	NA
Future Road Surface	Dense Graded Asphalt	Dense Graded Asphalt

The traffic volume for the year 2031 was based on the data as provided and as contained within the Transport Study.

The noise model was calibrated, based on the existing traffic volumes detailed in Table 5.1, the current road alignment and the existing topography, the existing traffic noise levels have been calculated to verify the prediction model and calibrated to correlate with the monitored noise levels. Calculations are free field as the noise logger was located away from any building façades. The SoundPlan computer model was calibrated with the monitored data as listed in Table 3.1.

Noise modelling for the future road network, with Cockburn Coast Drive, was undertaken and the noise contour plot is attached in Appendix C as Figure C1.

6. DESIGN CONSIDERATIONS

The policy states that the outdoor criteria apply to the ground floor level only. The policy also states that noise mitigation measures should be implemented with a view to achieving the target levels in least one outdoor living area. Although, we believe that the policy only applies to ground floor of residences, comments and recommendations with regards to first storeys have also been included.

The results of the acoustic assessment indicate that noise received at the residences located adjacent to the proposed Cockburn Coast Drive in the year 2031 would exceed the “Noise Limits” as outlined in the Western Australian Planning Commission (WAPC) Planning Policy 5.4 “Road and Rail Transport Noise and Freight Considerations in Land Use Planning” by up to 8 dB(A).

For the proposed Cockburn Coast Drive, it is noted that under the WAPC State Planning Policy 5.4, it is a requirement that the infrastructure provider design mitigation measures to achieve the "Noise Limits" these being $L_{Aeq(Day)}$ of 60 dB(A); and $L_{Aeq(Night)}$ of 55 dB(A). Additionally, under State Planning Policy 5.4, all practicable noise mitigation should be implemented. However, given the given the topography of the land, a barrier located at the boundary of the lots and the road reserve would be in some locations, fairly ineffectual (i.e. in locations where the ground level of the road is above that of the residential development) and in these locations, it is recommended that a barrier be incorporated within the road reserve and be included in the design of the road. Additionally, given that the residential developments located adjacent to Cockburn Coast Drive would be multi storey developments, it is recommended that "Quiet House" design be incorporated in the design of all levels (including ground floor).

Generally, for these types of developments, the first row of buildings along the road(s) of concern normally act as acoustic barriers to those developments located behind. Hence, improved construction is usually only required for the first row of buildings. Given the proposed layout, we believe that this would apply to the western side of Cockburn Road. However, for developments located between Cockburn Road and the Cockburn Coast Drive, due to the additive effect of noise received from both these roads (especially where these two roads converge at the southern end of the development) this may not be the case. Additionally, for this area, noise received at facades on the opposite sides to Cockburn Road and Cockburn Coast Drive also need to be considered.

In the future, with development of Cockburn Coast and the construction of Cockburn Coast Drive, the flow of vehicles along Cockburn Road will be significantly reduced. However, as it is unclear as to when Cockburn Coast Drive will be constructed, to be conservative and to provide some degree of protection for both residence and future commercial developments it is proposed that the current noise emissions from vehicles travelling along Cockburn Road be used for the design criteria and bases for any "Quiet House" design. Based on the acoustic assessment and modelling of current noise emissions from Cockburn Road, the following noise level should be used for developments located adjacent to Cockburn Road:

Facing Cockburn Road	-	62 dB(A)
Side (perpendicular) to Cockburn Road	-	59 dB(A)

Note: For facades on the opposite side to Cockburn Road, standard constructions can be used on developments located on the western side of Cockburn Road and the northern section of developments located on the eastern side of Cockburn Road. However, for developments located at the southern end of the project area (between Cockburn Road and Cockburn Coast Drive) and as shown on Figure D2 in Appendix D, improved construction is also required. For these developments as shown on Figure D2, it is recommended that a noise level of 58 dB(A) be used for the facades on the opposite side to Cockburn Road, but not directly exposed to Cockburn Coast Drive.

With regards to developments located adjacent to Cockburn Coast Drive, the recommended external noise levels to be used as the design bases for "Quiet House" design are shown on the plan attached as Figures D1 and D2 in Appendix D.

Calculations were carried out to determine the noise that would be received within the proposed apartments due to passing vehicles. Guidance on the calculations was taken from *AS 3671-1989 "Acoustics – Road traffic noise intrusion-Building siting and construction"*.

Based on the calculated noise levels, preliminary calculations were carried out to determine various acoustic ratings required to achieve acceptable internal noise levels. The required R_W ratings were calculated and the preliminary determination of glazing for bedrooms and living spaces are listed in Tables 6.1 and 6.2.

Table 6.1 – Bedroom Glazing Requirements

Noise level (dB(A))	R_w Value	Description of Construction
55 to 57	20 to 24	Openable - 6mm horizontal sliding window Fixed – 4mm glass
58 to 59	25 to 27	Openable – 6mm glass in awning type windows with mechanical winders closing on compressible seals. Fixed – 6mm glass
60 to 61	28 to 30	Openable – 6.38mm laminated glass in awning type windows with mechanical winders closing on compressible seals. Fixed – 6.38mm laminated glass Fixed – 10mm glass
62 to 64	31 to 34	Openable – 10.38mm laminated glass in awning type windows with mechanical winders closing on compressible seals. Fixed – 10.38mm laminated glass
65 to 67	35 to 37	Openable – 10.5mm laminated glass in awning type windows with mechanical winders closing on compressible seals. Fixed – 10.5mm laminated glass

Table 6.2 – living Spaces Glazing Requirements

Noise level (dB(A))	R_w Value	Description of Construction
59 to 61	20 to 24	Openable - 6mm horizontal sliding window Fixed – 4mm glass
62 to 63	25 to 27	Openable – 6mm glass in awning type windows with mechanical winders closing on compressible seals. Fixed – 6mm glass
64 to 65	28 to 30	Openable – 6.38mm laminated glass in awning type windows with mechanical winders closing on compressible seals. Fixed – 6.38mm laminated glass Fixed – 10mm glass
66 to 69	31 to 34	Openable – 10.38mm laminated glass in awning type windows with mechanical winders closing on compressible seals. Fixed – 10.38mm laminated glass
69 to 71	35 to 37	Openable – 10.5mm laminated glass in awning type windows with mechanical winders closing on compressible seals. Fixed – 10.5mm laminated glass

Notes:

1. The increased construction requirements detailed above are only effective when doors and windows are closed.
2. For glazing requiring an R_W rating in the order of 38 dB and higher is likely to require a double glazed system with a reasonable air gap (in the order of 125mm and higher).

7. CONCLUSION

In accordance with the WAPC Planning Policy 5.4, an assessment of the noise that would be received within the Cockburn Coast Development, from vehicles travelling on both Cockburn Road and the proposed Cockburn Coast Drive has been undertaken.

In accordance with the Policy, the following would be the acoustic criteria applicable to this project:

External

Day	Maximum of 60 dB(A) L_{Aeq}
Night	Maximum of 55 dB(A) L_{Aeq}
Outdoor Living Areas	Maximum of 50 dB(A) $L_{Aeq\ (Night\ Period)}$

Internal

Sleeping Areas	35 dB(A) $L_{Aeq(night)}$
Living Areas	40 dB(A) $L_{Aeq(day)}$

For this development, noise emissions from vehicle travelling along both Cockburn Road and the proposed Cockburn Coast Drive need to be considered.

From the previous monitoring undertaken, we also note that as the difference between the $L_{Aeq(day)}$ and the $L_{Aeq(night)}$ is greater than 5 dB (i.e. 5.3 dB) and the day period is the critical period for compliance. Given the difference, if compliance is achieved for the day period, then compliance would also be achieved for the night period.

In the future, with development of Cockburn Coast and the construction of Cockburn Coast Drive, the flow of vehicles along Cockburn Road will be significantly reduced. However, as it is unclear as to when Cockburn Coast Drive will be constructed, to be conservative and to provide some degree of protection for both residence and future commercial developments it is proposed that the current noise emissions from vehicles travelling along Cockburn Road be used for the design criteria and bases for any "Quiet House" design. Based on the acoustic assessment and modelling of current noise emissions from Cockburn Road, the following noise level should be used for developments located adjacent to Cockburn Road:

Facing Cockburn Road	-	62 dB(A)
Side (perpendicular) to Cockburn Road	-	59 dB(A)

Note: For facades on the opposite side to Cockburn Road, standard constructions can be used, except for developments located at the southern end between Cockburn Road and Cockburn Coast Drive, as shown on Figure D2 in Appendix D. For these developments, due to the additive effect of noise received from Cockburn Coast Drive, it is recommended that a noise level of 58 dB(A) be used for the facades on the opposite side to Cockburn Road, but not directly exposed to Cockburn Coast Drive.

Initial modelling, indicates that noise emissions from the proposed Cockburn coast Drive would exceed the above acoustic criteria by up to 8 dB(A). For the proposed Cockburn Coast Drive, it is noted that under the WAPC State Planning Policy 5.4, it is a requirement that the infrastructure provider design mitigation measures to achieve the "Noise Limits" these being $L_{Aeq(Day)}$ of 60 dB(A); and $L_{Aeq(Night)}$ of 55 dB(A). However, given the topography of the land, barriers located at the boundary of the lots and the road reserve would be in some locations, fairly ineffectual and in these locations it is recommended that a barrier be incorporated within the road reserve and be included in the design of the road. Additionally, given that the residential developments located adjacent to Cockburn Coast Drive would be multi-storey developments, it is recommended that "Quiet House" design be incorporated in the design of all levels (including ground floor). Guidance on the required glazing requirements are outlined in Tables 6.1 and 6.2. The noise that would be received at development located adjacent to the proposed Cockburn Coast Drive varies and the calculated day period noise level that would be received at various locations within the development are shown on Figures D1 and D2 attached in Appendix D. It is recommended that these noise levels be used for the determination of "Quiet House" design to achieve compliance with the internal acoustic criteria.

Given the proposed layout, it is noted that the first row of buildings located on the western side of Cockburn Road will act as an acoustic barrier to the developments located behind them. However, to the east of Cockburn Road, with the additive effect of Cockburn Coast Drive, this may not be the case. Therefore, for the locations listed below it is recommended that as part of the design process, an acoustic assessment report be included in the building license submission:

- First row of buildings located adjacent to the western side of Cockburn Road.
- Buildings located between Cockburn Road and Cockburn Coast Drive.

Finally, we note that under the Planning Policy, as noise received within the proposed development would exceed the “Noise Target”, notification on Titles is required for those residence exposed to transportation noise.

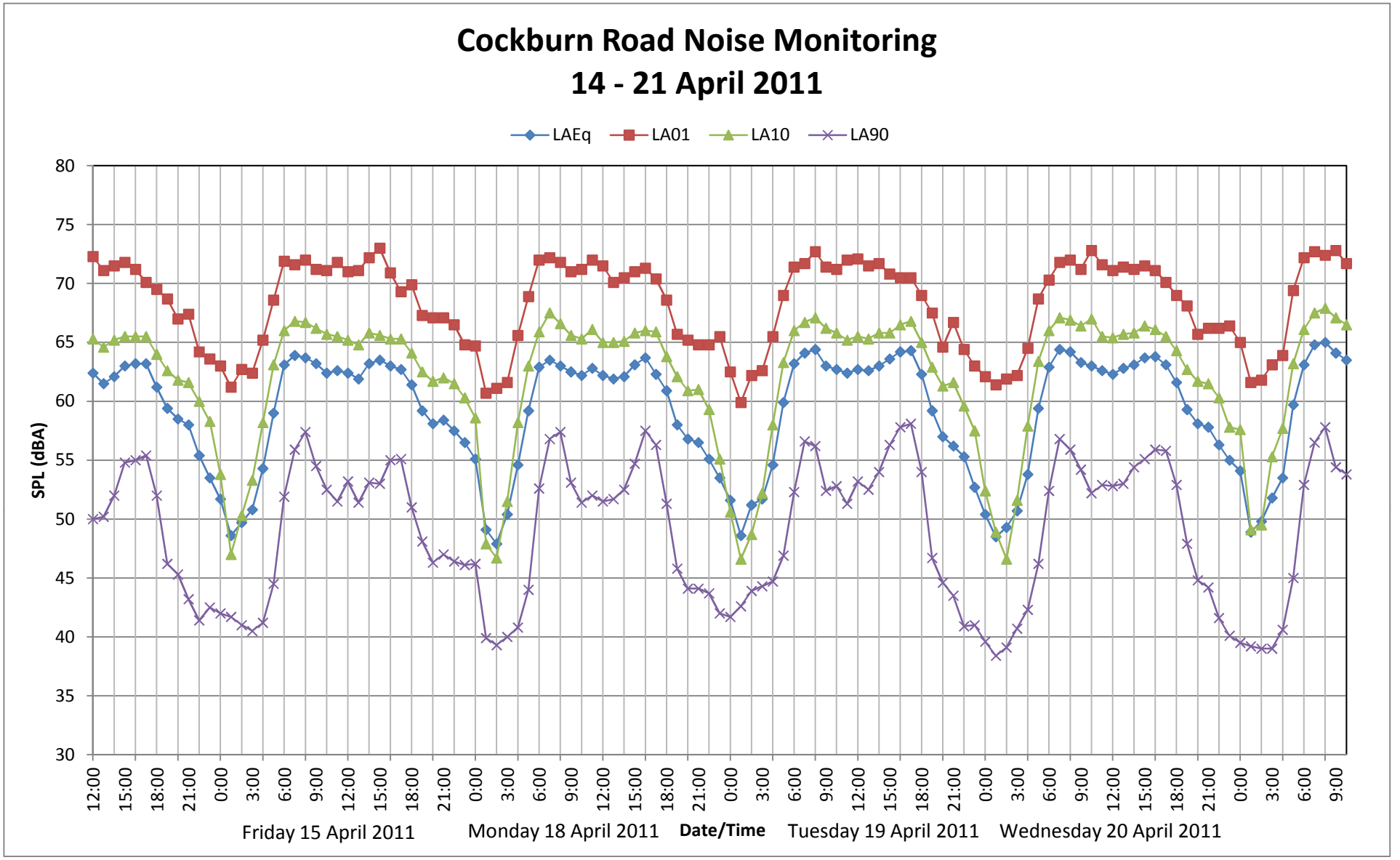
APPENDIX A

MASTER PLAN


Noise Monitoring Location

APPENDIX B

GRAPH OF LOGGED NOISE LEVELS

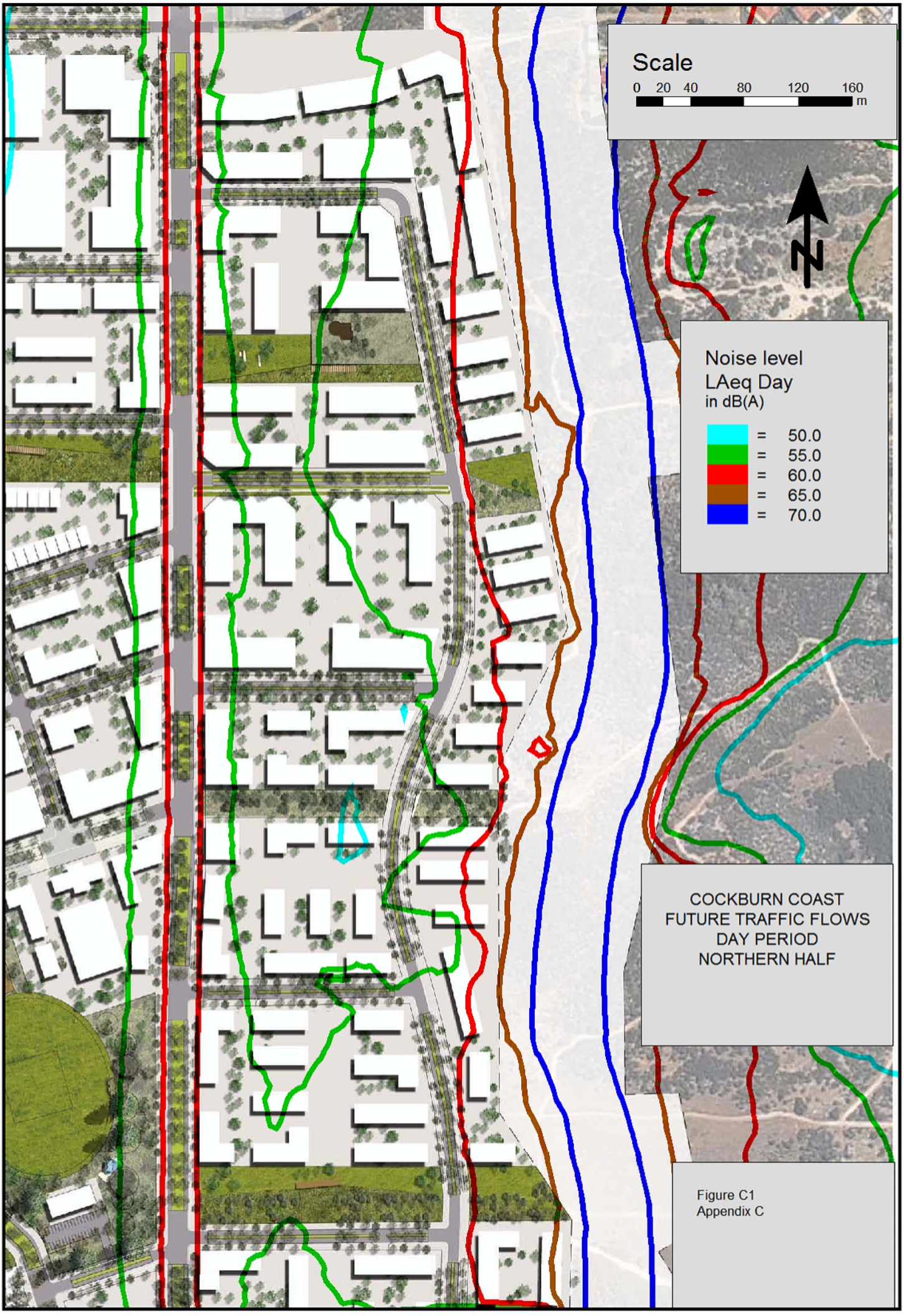


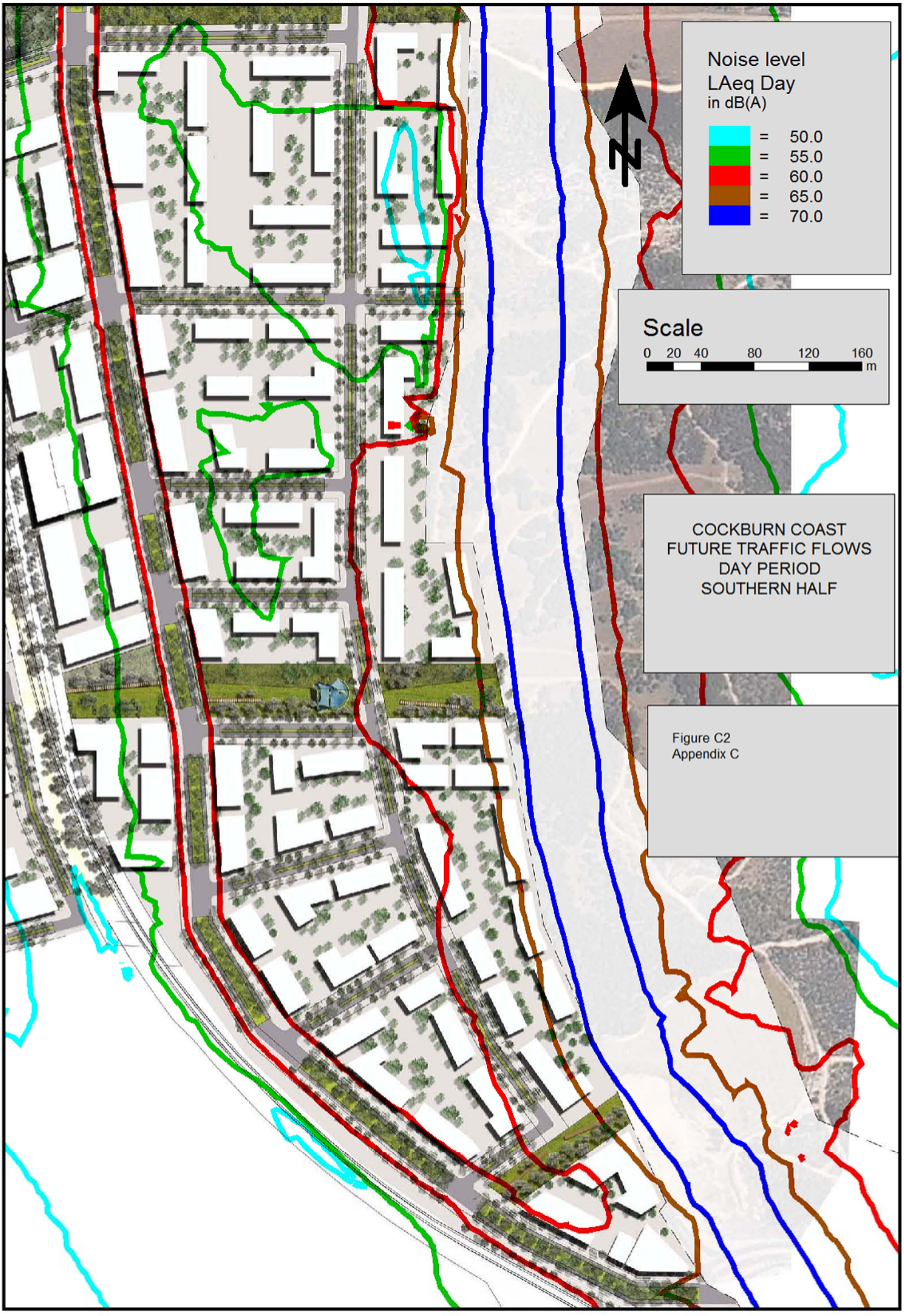
Herring Storer Acoustics
Job No : 11070
File : Logger

Figure B1
Appendix B

APPENDIX C

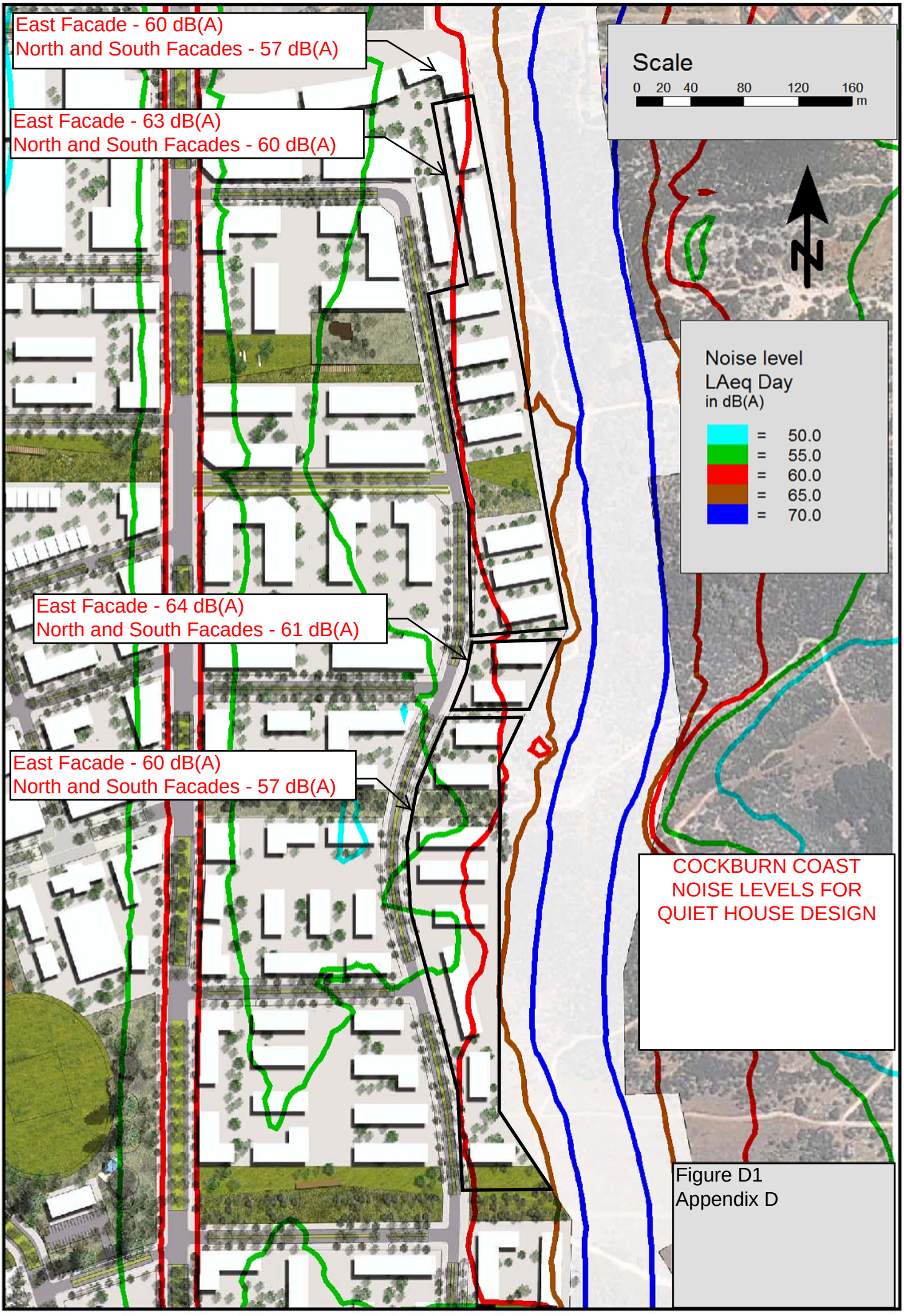
NOISE CONTOUR PLOTS

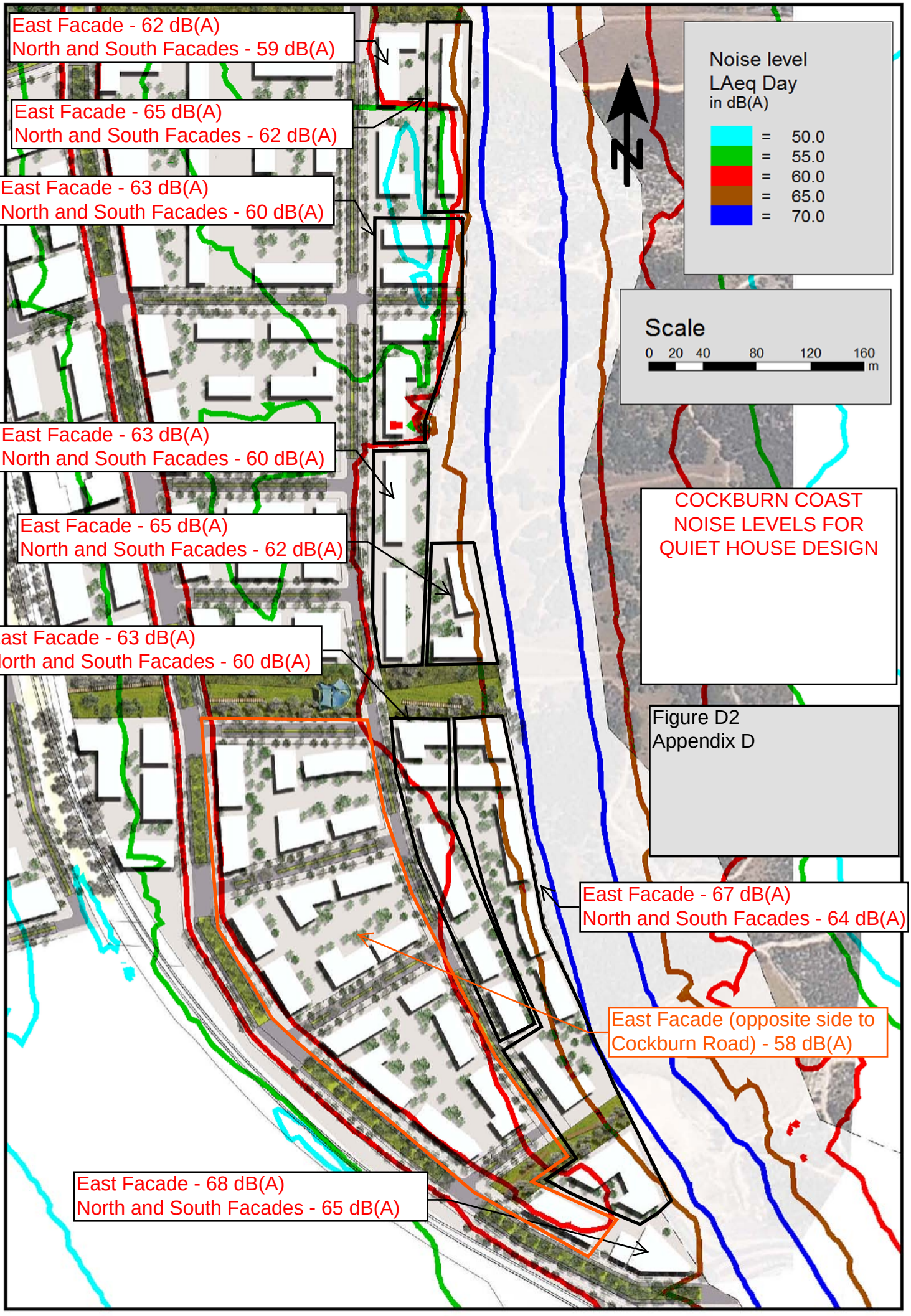

Scale
0 20 40 80 120 160
m
N
Noise level
LAeq Day
in dB(A)
= 50.0
= 55.0
= 60.0
= 65.0
= 70.0
COCKBURN COAST
FUTURE TRAFFIC FLOWS
DAY PERIOD
NORTHERN HALF
Figure C1
Appendix C


Noise level
LAeq Day
in dB(A)
= 50.0
= 55.0
= 60.0
= 65.0
= 70.0
N
Scale
0 20 40 80 120 160
m
COCKBURN COAST
FUTURE TRAFFIC FLOWS
DAY PERIOD
SOUTHERN HALF
Figure C2
Appendix C

APPENDIX D

NOISE LEVELS FOR QUIET HOUSE DESIGN


East Facade - 60 dB(A)
North and South Facades - 57 dB(A)
East Facade - 63 dB(A)
North and South Facades - 60 dB(A)
East Facade - 64 dB(A)
North and South Facades - 61 dB(A)
East Facade - 60 dB(A)
North and South Facades - 57 dB(A)
Scale
0 20 40 80 120 160
m
N
Noise level
LAeq Day
in dB(A)
= 50.0
= 55.0
= 60.0
= 65.0
= 70.0
COCKBURN COAST
NOISE LEVELS FOR
QUIET HOUSE DESIGN
Figure D1
Appendix D


East Facade - 62 dB(A)
North and South Facades - 59 dB(A)
East Facade - 65 dB(A)
North and South Facades - 62 dB(A)
East Facade - 63 dB(A)
North and South Facades - 60 dB(A)
East Facade - 63 dB(A)
North and South Facades - 60 dB(A)
East Facade - 65 dB(A)
North and South Facades - 62 dB(A)
East Facade - 63 dB(A)
North and South Facades - 60 dB(A)
East Facade - 67 dB(A)
North and South Facades - 64 dB(A)
East Facade (opposite side to Cockburn Road) - 58 dB(A)
East Facade - 68 dB(A)
North and South Facades - 65 dB(A)
Noise level
LAeq Day
in dB(A)
= 50.0
= 55.0
= 60.0
= 65.0
= 70.0
N
Scale
0 20 40 80 120 160
m
COCKBURN COAST
NOISE LEVELS FOR
QUIET HOUSE DESIGN
Figure D2
Appendix D

Appendix C
Emplacement Ecological Assessment

C

CLIENTS | PEOPLE | PERFORMANCE

LandCorp

Report for Hilltop/Emplacement Crescent

Ecological assessment

June 2012



INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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1. Background

1.1 Project

The Cockburn Coast Area has been subject to various development pressures in recent times. This recent pressure is additional to the area's long history of industrial development including transport, agriculture and heavy industry. The City of Cockburn is planning the development of the Cockburn Coast Area, including the Hilltop/Emplacement Crescent Area (the Project Site) which is situated east of Cockburn Road and south of Emplacement Crescent in the City of Cockburn. The location of the Project Site is shown at Figure 1 (Appendix A).

1.2 Purpose of study

This report (The Cockburn Coast; Hilltop/Emplacement Crescent Ecological Assessment Report) has been commissioned by LandCorp as a technical study to support the Local Structure Plan. It has been conducted to provide information on the ecological attributes of the Hilltop/Emplacement Crescent Project Site and will assist in supporting the City of Cockburn Development Area Provisions for the Cockburn Coast Project. The work is also a requirement of the City of Cockburn prior to adoption of the Scheme Amendment No. 89 for final approval.

1.3 Scope of works

The scope of works for this study involved both desktop and field components, with results obtained to establish any known and potential ecological constraints to development. The assessment included the following:

- Review of previous assessments and surveys undertaken by GHD for LandCorp in the vicinity;
- Review of Federal and State databases for the potential presence of threatened and other conservation significant flora and fauna species and ecological communities on the Project Site;
- Site survey of the area resulting in vegetation mapping, significant tree assessment, flora list and fauna habitat assessment;
- Consideration of any potential risks as a result of the outcomes of the review and survey, and recommendations for potential next steps; and
- Mapping of relevant environmental constraints and provision of Project Site photographs.

The field component consisted of a Level 2 flora and Level 1 fauna survey of the Hilltop/Emplacement Crescent Project Site and aimed to satisfy all scoping requirements documented within the request for tender. The survey was undertaken in accordance with:

- Environmental Protection Authority (EPA) guidelines for flora surveys as outlined in Guidance Statement No. 51 Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA, 2004a);
- EPA Guidelines for Terrestrial Biological Surveys as an Element of Biodiversity Protection, Position Statement No. 3 (EPA, 2002); and
- EPA Assessment of Environmental Factors for Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia. Guidance Statement No. 56 (EPA, 2004b).

1.4 Limitations

This Report: has been prepared by GHD for LandCorp and may only be used and relied on by LandCorp for the purpose agreed between GHD and LandCorp as set out in section 1.2 of this Report.

GHD otherwise disclaims responsibility to any person other than LandCorp arising in connection with this Report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this Report were limited to those specifically detailed in the Report and are subject to the scope limitations set out in the Report.

The opinions, conclusions and any recommendations in this Report are based on conditions encountered and information reviewed at the date of preparation of the Report. GHD has no responsibility or obligation to update this Report to account for events or changes occurring subsequent to the date that the Report was prepared.

The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD described in this Report (section 1.5). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this Report on the basis of information provided by LandCorp and Government authorities, which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the Report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this Report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the Project Site may be different from the Project Site conditions found at the specific sample points. Investigations undertaken in respect of this Report are constrained by the particular Project Site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant Project Site features and conditions may have been identified in this Report.

Site conditions (including the presence of hazardous substances, Project Site contamination, species and communities of conservation significance) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the Project Site conditions. GHD is also not responsible for updating this Report if the Project Site conditions change.

Due to the low likelihood of any Department of Environment and Conservation (DEC)-listed plant species being present on the Project Site, data for significant flora was accessed from free, publicly available databases, rather than through a specific request for data through DEC, which can take up to 4 weeks to be provided.

1.5 Assumptions

The assessment is based on the Project Site footprints provided by LandCorp in the Project brief and shown in Plate 1 and Figure 1, Appendix A. Any changes to the Project Site or scope, outside the description provided above, are outside the scope of this assessment.

GHD has relied upon external data, namely publicly available databases, to identify species previously recorded in the area. The accuracy of this data lies with the provider, not with GHD.

2. Previous studies

Previous assessments of the wider Cockburn Coast area for LandCorp conducted by GHD in December 2009 (Cockburn Coast) (GHD, 2009) and March 2012 (Robb Jetty) (GHD, 2012) reported limited environmental constraints. The eastern area of the 2009 Project Site is immediately adjacent to the Hilltop/Emplacement Crescent Project site; the western area is immediately adjacent to the 2012 Project Site.

The 2012 Project Site reported no ecological aspects that required further investigation, nor was referral to the DSEWPaC required. Management of the three Declared Weeds and the retention of three Moreton Bay Fig trees growing in association with the Robb Jetty Chimney were recommended.

The 2009 Project Site was assessed as at variance with two of the ten clearing principles because parts of the vegetation were regarded as potential Black Cockatoo feeding habitat. PATN (statistical) analysis of the flora quadrat data from that study did not align any of the flora quadrats with Threatened or Priority Ecological Communities that may be present in the vicinity of the Project Site. The majority of the vegetation in the 2009 survey area was reported to be in completely degraded or degraded condition. Two specially protected fauna species were recorded utilising the Project Site during the 2009 study; Carnaby's Cockatoo (*Calyptorhynchus latirostris*) and the priority three skink *Lerista lineata*. The 2009 study also recorded the presence of *Lomandra maritima* which indicates the Project Site may be used by the threatened Graceful Sunmoth (*Synemon gratiosa*), and a targeted survey was recommended. A Graceful Sunmoth survey was undertaken in March 2011 in areas of likely habitat.

3. Desktop investigation

3.1 Conservation significant species

Desktop reviews for the Hilltop/Emplacement Crescent Project Site were conducted using the Department of Sustainability, Environment, Water, People and Community (DSEWPaC) *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and DEC NatureMap databases for the potential presence of conservation significant flora and fauna. These reviews revealed:

- Twenty-six conservation significant flora species have been previously reported within 10 km of the Project Site; and
- Thirty-nine conservation significant terrestrial fauna species have been previously reported within 10 km of the Project Site.

These species are shown at Appendices C and D.

3.2 Threatened and Priority Ecological Communities

Ecological communities are defined as naturally occurring biological assemblages that occur in a particular type of habitat (English & Blythe, 1997). Threatened Ecological Communities (TECs) are ecological communities that have been assessed and assigned to one of four categories related to the status of the threat to the community i.e. Presumed Totally Destroyed, Critically Endangered, Endangered and Vulnerable.

TECs are listed under both State and Federal legislation; Federally-listed TECs are protected under the EBPC Act administered by the DSEWPaC. DEC maintains a list of TECs for Western Australia; some of these TECs are also protected under the EPBC Act.

DEC also maintains a Priority Ecological Community (PEC) List. PECs are not listed under any formal Federal or State legislation but are considered by DEC as important as whole ecosystems (including their processes and communities). Priorities 1, 2 and 3 PECs are ecological communities that are adequately known; are rare but not threatened, or meet criteria for Near Threatened. PECs that have been recently removed from the threatened list are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Further information on the conservation codes is provided in Appendix B.

A desktop review of the DEC NatureMap database for the potential presence of TECs and PECs within 5 km of the Project Site identified five occurrences of a TEC. This TEC is most likely Floristic Community Type (FCT) 30c (*Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands, Swan Coastal Plain), listed by the State as Vulnerable (Appendix C). No Federally-listed TECs were identified in the EPBC Act Protected Matters Search (Appendix C).

4. Flora field survey

4.1 Vegetation and flora

The flora and vegetation of the Project Site was assessed using quadrat and opportunistic sampling methodologies on 16 May 2012. The location of the assessment points (quadrats and photo points) are shown in Figure 1 (Appendix A). Field surveys were undertaken with regard to the EPA Guidance Statement No. 51, Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia and included a representative number of quadrats located in each vegetation type. Quadrat sampling sites were an area of 10 m × 10 m and the position of each quadrat was recorded using a GPS unit. In addition to quadrat sampling, opportunistic sampling was conducted throughout the Project Site to provide more thorough spatial coverage. Eight quadrats (Appendix C) were sampled, with the following five vegetation types (Figure 1, Appendix A) identified by means of a combination of aerial photography, topographical features and field observation:

- **VT1** Shrubland of *Melaleuca huegelii* and *Banksia sessilis* var. *cygnorum* over *Templetonia retusa* and *Grevillea preissii* subsp. *preissii* over weed-dominated understorey;
- **VT2** Open Shrubland of *Acacia rostellifera*, *Banksia sessilis* var. *cygnorum* and *Templetonia retusa* with **Leptospermum laevigatum* over a weed-dominated understorey;
- **VT3** Cleared area now dominated by weed grassland;
- **VT5** Tall Shrubland of *Melaleuca huegelii*, *Acacia rostellifera* and *Banksia sessilis* var. *cygnorum* over *Spyridium globulosum* over a weed-dominated understorey; and
- **VT7** Very Open Shrubland of **Leptospermum laevigatum* over a weed-dominated understorey.

These vegetation types are matched to the vegetation types described in the Cockburn Coast Supplementary Flora and Fauna Assessment (GHD, 2009).

Where field identification of plant taxa was not possible, specimens were collected in a systematic manner and then later identified at the West Australian Herbarium by comparison with the reference collection and use of taxonomic identification methods.

4.2 Vegetation condition

The vegetation condition of the Project Site was assessed using the vegetation condition rating scale developed by Keighery (1994) that recognises the intactness of vegetation, which is defined by the following:

- Completeness of structural levels;
- Extent of weed invasion;
- Historical disturbance from tracks and other clearing or dumping; and
- The potential for natural or assisted regeneration.

The scale, therefore, consists of six rating levels as outlined in Table 1.

Table 1 Vegetation condition rating scale

Vegetation condition rating	Vegetation condition	Description
1	*Pristine or nearly so*	No obvious signs of disturbance.
2	*Excellent*	Vegetation structure intact, disturbance affecting individual species, and weeds are non-aggressive species.
3	*Very Good*	Vegetation structure altered, obvious signs of disturbance.
4	*Good*	Vegetation structure significantly altered by very obvious signs of multiple disturbances retains basic vegetation structure or ability to regenerate it.
5	*Degraded*	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not in a state approaching good condition without intensive management.
6	*Completely Degraded*	The structure of the vegetation is no longer intact and the area is completely or almost without native species.

(Keighery, 1994)

The vegetation condition of the Project Site ranges from *Completely Degraded* to *Very Good–Good* with the majority *Completely Degraded* where clearing and infrastructure developments have resulted in a complete modification of the vegetation in the southern and middle sections of the Project Site (Plates 1, 2 and 5). Densely vegetated areas of the Project Site were generally in *Very Good–Good* condition with the extensive presence of the aggressive weed, bridal creeper (**Asparagus asparagoides*) (see section 4.5 for details). The northern extent of the Project Site has been recently burned (Plates 3 and 4). Vegetation condition mapping is provided in Figure 2 (Appendix A).



Plate 1 ***Completely Degraded*** **vegetation condition (Photo Point 2)**



Plate 2 ***Completely Degraded*** **vegetation condition (Photo Point 5)**



Plate 3 **Recently burned vegetation (Photo Point 6)**



Plate 4 **Recently burned vegetation (Photo Point 6)**



Plate 5 ***Completely Degraded*** **vegetation condition (Photo Point 5)**

4.3 Flora diversity

Desktop searches identified 900 species having been recorded within 10 km of the Project Site. A total of 55 plant taxa (including subspecies and varieties) representing 29 families and 46 plant genera were

recorded in the survey area. This total is comprised of 28 native species and 27 introduced (exotic) and planted species. A flora species list is provided in Appendix C.

Dominant families recorded from the Project Site were:

- Myrtaceae 11 taxa; and
- Fabaceae seven taxa.

The majority of the Project Site is dominated by introduced species, including coast teatree (**Leptospermum laevigatum*) and castor oil plant (**Ricinus communis*). As the survey was undertaken in autumn (instead of spring, which is recommended), many herb species and annual weedy grasses were not present or unidentifiable.

4.4 Threatened and Priority Ecological Communities

Although vegetation types identified in previous surveys by GHD (2009 and 2012) did not appear to align with any TECs or PECs, vegetation type VT1 appears to share some species with FCT 26a (*Melaleuca huegelii – Melaleuca acerosa* [currently *M. systena*] shrublands on limestone ridges), which is a DEC-listed TEC; a vegetation survey in spring (when annual species are present) would be required to confirm this.

4.5 Weeds

A total of 27 introduced (exotic) species were recorded during the survey. One species (bridal creeper) is listed as a Declared Plant under Section 37 of the *Agricultural and Related Resources Protection Act 1976 (WA)* and as a Weed of National Significance (WoNS) by the Australian Government. “The WoNS program coordinates the national effort against 20 of Australia’s worst invasive plants. These weeds have degraded large portions of Australia’s natural and productive landscape and require action at a national level to reduce their impacts” (Australian Weeds Committee, 2010).

4.5.1 Bridal creeper (**Asparagus asparagoides*) – Declared (Priority 1) and WoNS

According to Agriculture & Resource Management Council of Australia & New Zealand, Australian & New Zealand Environment & Conservation Council and Forestry Ministers (2000), “bridal creeper is a South African vine that smothers native plants in many areas of southern Australia. It forms a thick mat of underground tubers, impeding root growth of native plants and preventing seedling establishment. Seed dispersal by birds has enabled rapid spread within and between remnant native vegetation and bridal creeper now poses a major threat to biodiversity and conservation in Australia’s temperate natural ecosystems. It is widespread in Western Australia, South Australia and Victoria and is spreading in New South Wales and Tasmania. Unless effective and efficient management is implemented and maintained, rare or threatened plant species are at risk of extinction and the Aboriginal, tourism and recreational uses of native vegetation will significantly decline. Significant progress has been made on control techniques for bridal creeper, including the use of herbicides and biological control. There is a strong need to implement these techniques in a coordinated and sustained manner on a large scale against the weed”.

Bridal creeper is listed as a Declared Plant (Priority 1 for the whole of the state which prohibits movement of plants or their seeds within the State; prohibits the movement of contaminated machinery and produce including livestock and fodder) and a WoNS (Australian Weeds Committee, 2004).

Bridal creeper was found extensively across the Project Site, predominantly in dense remnant vegetation.

5. Fauna field survey

The fauna assessment was consistent with a Level 1 assessment (reconnaissance survey) in accordance with Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia – Guidance Statement No. 56.

The fauna assessment undertaken was a reconnaissance survey only and thus only sampled those species that can be easily seen, heard or have distinctive signs, such as tracks, scats, diggings etc. Many cryptic and nocturnal species cannot be identified during a reconnaissance survey

5.1 Fauna habitat

The fauna habitat types at the Project Site are closely aligned with the five vegetation types and vegetation conditions identified (reported in sections 4.1 and 4.2, respectively).

The Project Site would provide habitat for assembles of small reptiles, some birds species and small ground mammals, though the mammals are all likely to be introduced taxa (such as rabbits and cats). The presence of housing, industrial areas and roads reduces the habitat values of the Project Site. The value of the Project Site as Black Cockatoo habitat is discussed further in detail in section 6.2.

5.2 Fauna diversity

Twenty-two fauna species were recorded during the field survey on the 16 May 2012 including 16 native and six introduced species; these are listed in Appendix D. Two migratory species were recorded; the Black-faced Cuckoo-shrike and Black shouldered Kite; however, these species are widespread and the Project Site is not considered to constitute significant habitat for them. One conservation significant fauna species, Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*), was recorded during the field survey.

5.3 Introduced species

Six introduced species were observed during the field assessment. These included the European rabbit, cat, domesticated dog, horse, pigeon and rainbow lorikeet. These species are commonly recorded in developed areas throughout the Perth metropolitan area. The presence of the domesticated dog and horse provide evidence that the Project Site is used for recreational activities.

6. Conservation significant species

6.1 Conservation significant flora species

Species of significant flora are protected under both Federal and State legislation. Any activities that are deemed to have a significant impact on species that are recognised by the EPBC Act, and/or the *Wildlife Conservation Act 1950* (WC Act) can warrant referral to the DSEWPaC and/or the EPA.

In Western Australia, DEC also maintains a list of Priority Listed Flora species. Conservation codes for Priority species are assigned by DEC to define the level of conservation significance. Priority species are not currently protected under the WC Act. For the purposes of this assessment, all species listed under the EPBC Act, WC Act and DEC Priority species are considered conservation significant. Further information on the conservation codes relevant to this report is provided in Appendix B.

Desktop identifications identified 27 species of conservation significance as potentially occurring within 10 km of the Project Site (Appendix C). No species of conservation significance were recorded during the GHD field assessment.

6.1.1 Likelihood of occurrence assessment

A likelihood of occurrence assessment of conservation significant species identified (based on the range, habitat requirements and previous records of the species) (Appendix C) determined that nine species (one EPBC Act- and WC Act-listed and eight DEC-listed) are likely to or could possibly occur at the Project Site. Due to a lack of habitat information available, a further six species have the potential to occur at the Project Site (Table 2).

The Threatened species, *Caladenia huegelii*, could potentially occur at the Project Site, but is only present and identifiable during a few weeks in spring. This species generally occurs in *Banksia* woodland, and the habitat at the Project Site is marginal for this species.

Table 2 Summary of conservation significant flora species likely to or to possibly occur at the Project Site

Species	Status		Likelihood of occurrence
	State	Federal	
Austrostipa mundula	P2		Unknown
Beyeria cinerea subsp. *cinerea*	P3		Unknown
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid	T	E	Possible
Dampiera triloba	P1		Unknown
Dodonaea hackettiana Hackett's Hopbush	P4		Likely
Grevillea olivacea Olive Grevillea	P4		Likely
Grevillea thelemanniana subsp. *thelemanniana* Spider Net Grevillea	P4		Unknown
Hibbertia spicata subsp. *leptotheca*	P3		Likely
Jacksonia gracillima	P3		Unknown
Jacksonia sericea Waldjumi	P4		Likely
Microtis quadrata	P4		Unknown
Phlebocarya pilosissima subsp. pilosissima	P3		Possible
Pimelea calcicola	P3		Likely
Stylidium maritimum	P3		Likely
Thelymitra variegata Queen of Sheba	P3		Possible

Conservation codes are available in Appendix B.

6.2 Conservation significant fauna species

The Federal conservation level of fauna species and their significance status is assessed under the EPBC Act. The significance levels for fauna used in the EPBC Act are those recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN).

The State conservation level of fauna species and their significance status is assessed under State the *Wildlife Conservation Act 1950* (WC Act) *(Wildlife Conservation (Specially Protected Fauna) Notice 2010(2))*. The WC Act uses a set of Schedules but also classifies species using some of the IUCN categories. Schedule 3 fauna species are those which are "subject to an agreement between the Government of Australia and the Governments of Japan, China and the Republic of Korea relating to the protection of migratory birds, are declared to be fauna that is in need of special protection" (Government of Western Australia, 2010)

Additionally, in Western Australia, DEC produces a supplementary list of Priority Fauna, these being species that are not considered Threatened under the WC Act but for which the Department feels there is a cause for concern. These species have no special legislative protection, but their presence would normally be considered relevant to an assessment of the conservation status of an area. Such taxa need further survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

Desktop investigations identified 39 species of conservation significance as potentially occurring within 10 km of the Project Site (Appendix D). The EPBC Act-listed Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) was observed feeding on *Banksia sessilis* within the Project Site (Plate 6). In addition, two conservation significant fauna species are considered to possibly occur in the Project Site:

- *Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo)
- *Calyptorhynchus baudinii* (Baudin's Black Cockatoo)



Plate 6 Carnaby's Cockatoo foraging on *Banksia sessilis* within the Project Site

6.2.1 Likelihood of occurrence

A likelihood of occurrence assessment of conservation significant species identified (based on the range, habitat requirements and previous records of the species) (Appendix D) determined that eight species (four EPBC Act-listed, five WC Act-listed and four Priority species) are likely to or could possibly occur at the Project Site (Table 3).

Reports of conservation significant marine fauna species were generated by desktop investigations as the Project Site is within 1 km of the coastline; however, these species do not occur within the project Site as it does not have marine habitat.

The presence of EPBC Act-listed species and their habitat may trigger referral of the Project to the DSEWPaC, while those with State protection may trigger referral of the Project to the EPA.

Table 3 Summary of conservation significant terrestrial fauna species likely to or to possibly occur at the Project Site

Species	Status		Likelihood of occurrence
	State	Federal	
Birds			
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo	Threatened	Vulnerable	Likely
Calyptorhynchus baudinii Baudin's Cockatoo	Threatened	Vulnerable	Likely
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo	Threatened	Endangered	Known
Insects			
Leioproctus contrarius Bee	P3		Possible
Hylaeus globuliferus Bee	P3		Possible
Synemon gratiosa Graceful Sun Moth	Threatened	Endangered	Possible
Reptiles			
Lerista lineata Skink	P3		Possible
Morelia spilota subsp. *imbricate* Carpet Python	S		Possible
Neelaps calonotos Black-striped Snake	P3		Possible

Conservation codes are available in Appendix B.

6.2.2 Black cockatoos

There are three species of Black cockatoo that occur on the Swan Coastal Plain (potentially including the Project Site):

- *Calyptorhynchus latirostris* (Carnaby's Black Cockatoo) is listed as *Endangered* by the EPBC Act and *Threatened* by the WC Act. This species has previously been recorded within 5 km of the Project Site, and was recorded during the field survey;
- *Calyptorhynchus baudinii* (Baudin's Black Cockatoo) is listed as *Vulnerable* by the EPBC Act and *Threatened* by the WC Act. This species has been recorded within 5 km of the Project Site; and
- *Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo) is listed as *Vulnerable* by the EPBC Act. This species has been recorded within 5 km of the Project Site.

Foraging

These cockatoo species are known to feed on *Banksia* and *Eucalyptus* species, both of which were identified at the Project Site (DSEWPaC, 2011; Groom, 2011). The *Banksia sessilis* present throughout the Project Site would provide potential foraging habitat for Black Cockatoo species, and is a high value foraging species for Carnaby's Black Cockatoo (Groom, 2011). Three of the vegetation types within the Project Site (a total area of 2.96 ha) contain *Banksia sessilis* (Figure 3, Appendix A). The majority of this area is located on the limestone outcrop area in the east of the Project Site, and within the fenced area which was not accessed. Only a small amount of the foraging habitat falls within Lot 31 and 32. Black Cockatoos are also known to opportunistically use a wide variety of plant taxa as food resources; therefore all vegetation within the Project Site was generally assessed for signs of use by Black Cockatoos. There was evidence that the Project Site was being used by Black Cockatoos for foraging, with Carnaby's Black Cockatoo being observed feeding on *Banksia sessilis* (Plate 6) and chew marks found on *Banksia sessilis* branches.

Roosting

Baudin's and Carnaby's Black Cockatoos generally roost in or near riparian environments, or permanent water sources, in *Eucalyptus* species; Forest Red-tailed Black Cockatoos generally roost in tall Jarrah (*Eucalytpus marginata*) or Marri (*Corymbia calophylla*) trees within or on the edges of forests (DSEWPaC, 2011). As the Project Site is not situated within a riparian environment or forest, it is unlikely that the area is used by Black Cockatoo species for roosting. However, there is one Carnaby's Cockatoo known roosting site located less than 1 km south of the Project Site, within Manning Park (Department of Planning, 2011). Therefore, the Project Site is likely to provide a habitat linkage between other foraging and roosting sites.

Breeding

Trees with potential nesting qualities are Tuart (*Eucalyptus gomphocephala*), Wandoo (*Eucalyptus wandoo*), Jarrah and Marri with a diameter at breast height (DBH) of greater than 500 mm. Trees of this size are considered to have nesting potential now, or will develop hollows within 100 years. One Tuart tree with a DBH greater than 500 mm was recorded during this field survey. This Tuart tree was located on the western edge of the site near Cockburn road (at 383103 mE, 6449183 mN); this tree is mapped on Figure 3 (Appendix A) and shown in Plate 7. There was, however, no evidence that the Project Site was being used by Black Cockatoos for breeding.



Plate 7 Significant habitat tree – Tuart (*Eucalyptus gomphocephala*) Photo Point 4

6.2.3 Assessing Impact on Black Cockatoos

Significant Impact Guidelines

The *Matters of National Environmental Significance – Significant Impact Guidelines 1.1* (DSEWPaC, 2009) provide guidance on whether or not any person should submit a referral to DSWEPaC for assessment under the EPBC Act. Under these guidelines a 'significant impact' is defined an impact which is important, notable, or of consequence, having regard to its context or intensity. For this significant impact to be considered 'likely' that impact on the environment has a real, or not remote chance or possibility of happening (DSEWPaC, 2009).

Following these guidelines, clearing of the Project Site has the potential for impact on matters of national environmental significance due the presence of Black Cockatoo foraging habitat. In order to assess whether clearing of the Project Site is likely to have a significant impact, the 'significant impact criteria' were used. Carnaby's Black Cockatoo is listed as *Endangered* by the EPBC Act and Baudin's Black Cockatoo and Forest Red-tailed Black Cockatoo are listed as *Vulnerable* by the EPBC Act, and therefore the criteria for both *Endangered* and *Vulnerable* species were used. Clearing of the Project Site is likely to have a significant impact on Black Cockatoos if there is a real chance or possibility that it will meet any of the significant impact criteria. A summary of the significant impact assessment of clearing the Project Site is provided in Table 4.

Outcome

Clearing of the Project Site is unlikely to have a **significant** impact as a result of clearing 2.96 ha of high quality foraging Black Cockatoo habitat (Table 4)

It should be noted, however, that there is no defined measure or threshold within the Significant Impact Guidelines to assess whether clearing the 2.96 ha would be considered significant. Therefore, the assessment of this significance took into account the broader regional context. This regional context is included in Table 4 and is discussed further below.

Table 4 Department of Sustainability, Environment, Water, Population and Communities' Significant Impact Assessment

Significant Impact Criteria		Project assessment
Endangered species	Vulnerable species	
Lead to a long-term decrease in the size of a population	Lead to a long-term decrease in the size of an important population of a species	Clearing the Project Site is unlikely meet this criteria for a significant impact.
Reduce the area of occupancy of the species	Reduce the area of occupancy of an important population	Clearing the Project Site is unlikely meet this criteria for a significant impact.
Fragment an existing population into two or more populations	Fragment an existing important population into two or more populations	Clearing the Project Site is unlikely meet this criteria for a significant impact.

Significant Impact Criteria		Project assessment
Endangered species	Vulnerable species	
Adversely affect habitat critical to the survival of a species	Adversely affect habitat critical to the survival of a species	Habitat critical to the survival of a species is defined in the guidelines as 'areas that are necessary for activities such as foraging, breeding, roosting, or dispersal'. Only one potential nesting tree was recorded within the Project Site. Clearing of this tree is unlikely to adversely affect Black Cockatoo potential breeding habitat. There is 2.96 ha of high quality Black Cockatoo foraging habitat (*Banksia sessilis* woodland) present within the Project Site. Clearing of the Project Site will adversely affect this foraging habitat. The 2.96 ha of high quality foraging habitat is connected to a larger strip of bushland including Manning Park, which provides foraging habitat for Black Cockatoos. The Project Site has also been mapped by the Department of Planning as potential feeding vegetation for Carnaby's Black Cockatoo on the Swan Coastal Plain (Department of Planning, 2011). Therefore, while the majority of the Project Site is degraded and borders developed areas, due to its linkage to other foraging habitat the 2.96 ha extends the available protected habitat in Beeliar Regional Park. Clearing the 2.96 ha will have an impact on the species' regional feeding resources, but it is unlikely to be critical in terms of the species long term survival. The majority of the foraging habitat is located on the limestone outcrop area in the east of the Project Site, and within a fenced industrial area. It is recommended that clearing of the habitat in these areas be minimized or avoided if possible.
Disrupt the breeding cycle of a population	Disrupt the breeding cycle of an important population	Clearing the Project Site is unlikely meet this criteria for a significant impact.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Clearing the Project Site is unlikely meet this criteria for a significant impact.

Significant Impact Criteria		Project assessment
Endangered species	Vulnerable species	
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Clearing the Project Site is unlikely meet this criteria for a significant impact.
Introduce disease that may cause the species to decline	Introduce disease that may cause the species to decline	Clearing the Project Site is unlikely meet this criteria for a significant impact.
Interfere with the recovery of the species.	Interfere substantially with the recovery of the species	Clearing the Project Site is unlikely meet this criteria for a significant impact.

Draft Federal referral guidelines

In late 2011, DSEWPaC released draft referral guidelines for the assessment of projects for potential impacts on Black Cockatoos (DSEWPaC, 2011). These draft guidelines are for all Black Cockatoo species, and do not provide information relative to particular areas of the State, but provide information to decide whether a project may trigger referral.

Within these draft guidelines, DSEWPaC provides a risk table that gives guidance on what it views as risks/impacts to Black Cockatoos that will trigger referral (Table 5). Risk is broken into three categories, high, uncertain and low, and primarily focuses on breeding, feeding and roosting areas as well as indirect impacts. If there is uncertainty with regard to risks on Black Cockatoos then the DSEWPaC recommends referring the project or contacting the DSEWPaC to ensure legal certainty.

It is important to note, however, that the referral guidelines used in this assessment are in the draft phase and are open to interpretation; referral may not be required unless ensuring legal certainty is required. If there is uncertainty in regards to risks on Black Cockatoos then the DSEWPaC recommends referring the project or contacting the Department to ensure legal certainty.

Outcome

Clearing of the Project Site may trigger referral to DSEWPaC due to there being greater than 1 ha of foraging habitat (*Banksia sessilis* Shrubland) within the Project Site (Table 5).

Table 5 Department of Sustainability, Environment, Water, Population and Communities Black Cockatoo risk referral table

Risk type	Referral trigger
High risk of significant impacts: referral to DSEWPaC recommended	
Clearing of any known nesting tree.	Referral is not triggered; there are no known breeding trees within the Project Site.
Clearing of any part or degradation of breeding habitat in a woodland or forest within a species' known breeding range.	Referral is not triggered
Clearing of more than 1 ha of quality foraging habitat.	Referral is triggered. There is more than 1 ha of high quality foraging habitat (*Banksia sessilis* woodland – 2.96 ha) present within the Project Site.
Creating a gap or greater than 4 km between patches of Black Cockatoo habitat (breeding, foraging or roosting).	Referral is not triggered
Clearing or degradation (including pruning of top canopy) of a known roosting site.	Referral is not triggered
Uncertainty: referral recommended or contact the DSEWPaC	
Degradation (such as through altered hydrology or fire regimes) of more than 1 ha of foraging habitat. Significance will depend on the level and extent of degradation and the quality of the habitat.	Referral should be sought for legal certainty as there is 2.96 ha of foraging habitat present within the Project Site. This potential foraging habitat varies from *Good* to *Degraded* condition.

Risk type	Referral trigger
Clearing or disturbance in areas surrounding Black Cockatoo habitat that has the potential to degrade habitat through introduction of invasive species, edge effect, hydrological changes, increase human visitation or fire.	Referral is not triggered as the site is already disturbed and fragmented within the industrial and urban environment.
Actions that do not directly affect the listed species but that have the potential for indirect impacts such as increasing competitors for nest hollows.	Referral is not triggered
Actions with the potential to introduce known plant diseases such as *Phytophthora* spp.	Referral is not triggered: given the highly fragmented nature of the surrounding environment, plant diseases are likely to be present within the site. *Phytophthora* spp. is known to widely occur on the Swan Coastal Plain and is potentially present at the site.
Low risk of significant impacts: referral may not be required but may refer to DSEWPaC for legal certainty	
Actions that do not affect Black Cockatoo habitat or individuals.	Not applicable
Actions whose impacts occur outside the modelled distribution of the three Black Cockatoos.	Not applicable

Regional context

The Project site is located on the Swan Coastal Plain, which is considered to be important to Black Cockatoos (Department of Planning, 2012). The Swan Coastal Plain becomes an important feeding ground for Carnaby's Black Cockatoo at the end of the breeding season as large flocks of this species migrate towards coastal areas. Between late summer and winter, woodlands in these higher rainfall areas are the main feeding habitat for these species (Department of Planning, 2012). The Swan Coastal Plain is also considered to be important as a feeding ground for the Forest Red-tailed Black Cockatoo.

The area of Black Cockatoo foraging habitat within the Project Site is 2.96 ha, which is a relatively small area compared to nearby reserves and Bush Forever sites which could be utilised by Black Cockatoos. These reserves and sites are summarised below.

Regional reserves

There are several conservation reserves within close proximity to the Project Site, including Beeliar Regional Park (Bibra Lake, Manning Park and Thomsons Lake), Yangebup Lake Reserve and Lake Coogee Reserve.

Bush Forever

The Bush Forever Strategy is a 10 year strategic plan which formally commenced in 2000 to protect approximately 51 200 ha of regionally significant bushland within approximately 290 Bush Forever Sites. This strategy represents, where achievable, a target of at least 10% of each of the original 26 vegetation

complexes of the Swan Coastal Plain portion of the Perth Metropolitan Region (The Government of Western Australia, 2000).

The Project Site is located adjacent to Bush Forever Site No. 247 (Manning Lake and adjacent bushland, Hamilton Hill/Spearwood) which is part of Beeliar Regional Park. This site covers an area of 50.6 ha and includes open water, vegetated wetland, vegetated upland and limestone ridge. The Site meets the selection criteria for providing a representation of ecological communities, rarity, general criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation.

Other regionally significant Bush Forever Sites surrounding the Project Site include:

- Site No. 244 – North Lake and Bibra Lake, North Lake/Bibra Lake
- Site No. 254 – South Lake
- Site No. 256 – Yangebup and Little Rush Lakes, Yangebup
- Site No. 261 – Lake Coogee and Adjacent Bushland, Munster
- Site No. 341 – Woodman Point, Coogee/Munster
- Site No. 346 – Brownman Swamp, Mt Brown Lake and Adjacent Bushland, Henderson/Naval Base
- Site No. 391 – Thomsons Lake Nature Reserve and Adjacent Bushland, Beeliar

Several of these sites are included in the Beeliar Regional Park.

Summary

Each of these reserves and Bush Forever Sites could provide potential habitat for Black Cockatoos, and subsequently it could be considered that clearing the small area of foraging habitat present within the Project Site would be likely to have minimal impact on Black Cockatoos. However, while irregular use of small bushland areas for foraging may not be significant individually, the collective use of these remnants is likely to be important for the long-term survival of Black Cockatoos. Therefore, although only 2.96 ha of high quality Black Cockatoo foraging habitat is present within the Project Site, clearing it could potentially impact the future survival of Black Cockatoos on the Swan Coastal Plain.

6.2.4 Graceful Sun Moth

The Graceful Sun Moth (*Synemon gratiosa*; GSM) is a day-flying moth endemic to the south-west of Western Australia. Once widespread on the Swan Coastal Plain, the moth is now only present in a few scattered conservation areas, due to dramatically increased urban development destroying the moths' habitat. The species is listed as rare or likely to become extinct under the WC Act, and endangered under the EPBC Act.

There is limited information on the ecology and biology of the GSM, however, it appears that the remaining populations are severely fragmented and declining (Department of Environment and Conservation, 2010a). The larvae of the GSM inhabit sandy soils and feed upon root mats formed by *Lomandra maritima* and *L. hermaphrodita*. The GSM is only active in autumn, unlike the majority of Lepidoptera that are most active during spring and summer months. The active periods for the GSM dictate the scheduling for field surveys for the species; DEC has published species and habitat survey guidelines for the GSM (Department of Environment and Conservation, 2010b).

The GSM is closely associated with *Banksia* woodland and this vegetation occurs within the Project site. There is some limited suitable habitat within the Project Site and *Lomandra maritima* was recorded in the

field survey, as well as during the 2009 survey (GHD, 2009). This indicates that the Project Site may be used by the Graceful Sunmoth; however, a GSM survey conducted by GHD in 2011 in several Lot areas to the south of the Project Site recorded no GSM (GHD, 2011), and therefore it is unlikely that the GSM would be present within the Project Site. While this 2011 survey did not include the Project Site, it is still unlikely that the GSM would inhabit the Project site due to the highly degraded nature of the vegetation and surrounding development.

7. Conclusion

7.1 Summary

Overall the Project Site is largely degraded, developed for industry and is dominated by weeds. However, there are patches of vegetation in good condition that would provide potential foraging habitat for Black Cockatoos. Carnaby's Black Cockatoo was identified during the field survey as present and utilising this habitat within the Project Site. Accordingly, an impact assessment of clearing the Project Site was carried out using the Significant Impact Guidelines 1.1 (DSEWPaC, 2009) and the Draft DSEWPaC referral guidelines (DSEWPaC, 2011).

Based on the Significant Impact Guidelines 1.1 (DSEWPaC, 2009), clearing of 2.96 of good quality feeding habitat is unlikely to be considered critical to the survival of Black Cockatoo species. This outcome is partly due to the Project Site being connected to a larger corridor of bushland, Manning Park, which is part of Beeliar Regional Park, and which provides feeding habitat.

Based on the draft DSEWPaC referral guidelines, clearing the vegetation and development of the Hilltop/Emplacement Crescent Project Site would have a direct impact on Black Cockatoo feeding habitat and given this, referral to DSEWPaC may be required. It is important to note, however, that the referral guidelines used in this assessment are in the draft phase and are open to interpretation; referral may not be required unless to ensure legal certainty. It is recommended that clearing of the feeding habitat, which occurs primarily on the eastern edge of the Project Site, be minimised or avoided.

Furthermore, vegetation type VT1, which occurs on the limestone ridge on the eastern side of the Project Site, has similarities to a DEC-listed TEC, (*Melaleuca huegelii – Melaleuca acerosa* [currently *M. systena*] shrublands on limestone ridges). A vegetation survey in spring (when annual species are present) would be required to confirm whether VT1 is a TEC.

One weed species, bridal creeper (**Asparagus asparagoides*) (Declared and WoNS), should be managed during construction phase to prevent the spread of the plants.

7.2 Recommendations

Based on the likely impacts to Black Cockatoos, in particular to Carnaby's Black Cockatoo, it is recommended that:

- Clearing of the 2.96 ha of foraging habitat should be minimised or avoided;
- A further assessment of VT1 is required in Spring to provide certainty on its status as a TEC; and
- Where possible clearing and development be undertaken in areas that are degraded.

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Appendix A

Figures

Figure 1 Vegetation types and quadrat locations

Figure 2 Vegetation condition

Figure 3 Black cockatoo habitat

382,850 383,200 383,550

6,449,750 6,449,400 6,449,050

BELLION DR

ROLLINSON RD

COCKBURN RD

PP1 PP2 PP3 PP4 PP5 PP6

Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8

Locality Map

PERTH

KWINANA

INDIAN OCEAN

Note: These vegetation type descriptions match up with GHD (2009)

LEGEND

- Photo Point
- Quadrat
- Study Area
- Burnt
- No Access
- Cadastre

Vegetation Type

- V1 Shrubland of *Melaleuca huegelii* and *Banksia sessilis* var. *cygnorum* over *Templetonia retusa* and *Grevillea preissii* subsp. *preissii* over weed-dominated understorey
- V2 Open Shrubland of *Acacia rostellifera, Banksia sessilis* var. *cygnorum* and *Templetonia retusa* with **Leptospermum laevigatum* over a weed-dominated understorey
- V3 Cleared area now dominated by weed grassland
- V5 Tall Shrubland of *Melaleuca huegelii, Acacia rostellifera* and *Banksia sessilis* var. *cygnorum* over *Spyridium globulosum* over a weed-dominated understorey
- V7 Very Open Shrubland of **Leptospermum laevigatum* over a weed-dominated understorey
- HD Highly Disturbed

1: 3,500 (at A3)

0 17.5 35 70 105 140 175

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

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Landcorp
Hilltop/Emplacement Crescent
Ecological Assessment

Job Number	61-28212
Revision	0
Date	12 Jun 2012

Vegetation Type

Figure 1

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Data source: Landgate: Road Names - 20120528, Cadastre - 20120501, Metro West 2011 Mosaic - 20120528; GHD: Study Area - 20120528, Vegetation Type - 20120528, No Access - 20120528, Burnt Area - 20120528, Photo Point - 20120524, Quadrat - 20120524; GA: 250K Australian Topographic Series - 2006. Created by: cagilbert

382,850 383,200 383,550

6,449,750 6,449,400 6,449,050

BELLION DR

ROLLINSON RD

COCKBURN RD

6

5

4

4

5

6

4-5

4

Locality Map

PERTH

INDIAN OCEAN

KWINANA

382,850 383,200 383,550

LEGEND

Study Area
Cadastre

Vegetation Condition

1. Pristine or Nearly So
2. Excellent
3. Very Good
4. Good
5. Degraded
6. Completely Degraded

Burnt
No Access

1: 3,500 (at A3)

0 17.5 35 70 105 140 175

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

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GHD

LANDCORP

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Landcorp
Hilltop/Empacement
Crescent Ecological Assessment

Job Number 61-28212
Revision 0
Date 11 Jun 2012

Vegetation Condition

Figure 2

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Data source: Landgate: Road Names - 20120528, Cadastre - 20120501, Metro West 2011 Mosaic - 20120528; GHD: Study Area - 20120528,Vegetation Condition - 20120528; Burnt - 20120528, No Access - 20120528; GA: 250K Australian Topographic Series - 2006. Created by: cagilbert

382,850 383,200 383,550

6,449,750 6,449,400 6,449,050

BELLION DR

ROLLINSON RD

COCKBURN RD



LEGEND

- Black Cockatoo Habitat Tree
- Black Cockatoo Habitat
- Study Area
- Cadastre
- Burnt
- No Access

1: 3,500 (at A3)

0 17.5 35 70 105 140 175

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

GHD

LANDCORP

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Landcorp
Hilltop/Emplacement Crescent
Ecological Assessment

Job Number	61-28212
Revision	0
Date	11 Jun 2012

Black Cockatoo Habitat

Figure 3

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Data source: Landgate: Road Names - 20120528, Cadastre - 20120501, Metro West 2011 Mosaic - 20120528; GHD: Study Area - 20120528, Black Cockatoo Habitat - 20120528, Black Cockatoo HabitatTree - 20120528, Burnt - 20120528, No Access - 20120528; GA: 250K Australian Topographic Series - 2006. Created by: cagilbert

Appendix B

Conservation codes

Categories and Definitions for EPBC Act Listed Flora and Fauna Species

Conservation Category	Definition
Extinct	Taxa not definitely located in the wild during the past 50 years.
Extinct in the Wild	Taxa known to survive only in captivity.
Critically Endangered	Taxa facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	Taxa facing a very high risk of extinction in the wild in the near future.
Vulnerable	Taxa facing a high risk of extinction in the wild in the medium-term.
Near Threatened	Taxa that risk becoming Vulnerable in the wild.
Conservation Dependent	Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classified as Vulnerable or more severely threatened.
Data Deficient (Insufficiently Known)	Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information.
Least Concern	Taxa that are not considered Threatened.

WC Act and DEC Conservation Codes and Descriptions for Threatened (Declared Rare) and Priority Flora Species.

Code	Conservation Category	Definition
X	Presumed Extinct Flora (Declared Rare Flora – Extinct)	Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such (Schedule 2 under the Wildlife Conservation Act 1950).
T	Threatened Flora (Declared Rare Flora – Extant)	Taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedule 1 under the Wildlife Conservation Act 1950). Threatened Flora are further ranked by the Department according the their level of threat using IUCN Red List criteria: ◗ CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild; ◗ EN: Endangered – considered to be face a very high risk of extinction in the wild; and ◗ VU: Vulnerable – considered to be facing a high risk of extinction in the wild.

P1	Priority 1 – Poorly Known Taxa	Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes
P2	Priority 2 – Poorly Known Taxa	Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
P3	Priority 3 – Poorly Known Taxa	Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
P4	Priority 4 – Rare, Near Threatened and other taxa in need of monitoring	Rare. Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands. ◗ Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. ◗ Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
P5	Priority 5 – Conservation Dependent Taxa	Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years.

Department of Agriculture and Food Declared Plant Control Classes

Priority Class	Description
P1	Prohibits movement of plants or their seeds within the State. This prohibits the movement of contaminated machinery and produce including livestock and fodder.
P2	Eradicate infestation to destroy and prevent propagation each year until no plants remain. The infested area must be managed in such a way that prevents the spread of seed or plant parts on or in livestock, fodder, grain, vehicles and/or machinery.
P3	Control infestation in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set all plants.
P4	Prevent the spread of infestation from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set on all plants.
P5	Infestations on public lands must be controlled.

Listed migratory species

The EPBC Act protects lands and migratory species that are listed under International Agreements.

- Appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals) for which Australia is a Range State under the Convention;
- The Agreement between the Government of Australia and the Government of the Peoples Republic of China for the Protection of Migratory Birds and their Environment (CAMBA);
- The Agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA); and
- The Agreement between the Government of Australia and the Government of the Republic of Korea on the Protection of Migratory Birds (ROKAMBA).
- other international agreements approved by the Commonwealth Environment Minister.

An action will require approval from the Environment Minister if the action has, will have, or is likely to have a significant impact on a listed migratory species. Note that some migratory species are also listed as threatened species. The criteria below are relevant to migratory species that are not threatened.

An action has, will have, or is likely to have a significant impact on a migratory species if it does, will, or is likely to:

- substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat of the migratory species, or
- result in invasive species that is harmful to the migratory species becoming established* in an area of important habitat of the migratory species, or
- seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the species.

An area of important habitat is:

1. habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, or
2. habitat utilised by a migratory species which is at the limit of the species range, or
3. habitat within an area where the species is declining.

Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an ecologically significant proportion of the population varies with the species (each circumstance will need to be evaluated).

**Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a migratory species by direct competition, modification of habitat, or predation.*

Western Australian *Wildlife Conservation Act 1950* Fauna Conservation Codes

Conservation Code	Description
Schedule 1	"…fauna that is rare or likely to become extinct, are declared to be fauna that is in need of special protection."
Schedule 2	"… fauna that is presumed to be extinct, are declared to be fauna that is in need of special protection."
Schedule 3	"… birds that are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction are declared to be fauna that is in need of special protection."
Schedule 4	"… fauna that is in need of special protection, otherwise than the reasons mentioned [in Schedule 1-3]".

DEC Priority Fauna Codes

Conservation Category	Description
Priority 1	Taxa with few, poorly known populations on threatened lands.
Priority 2	Taxa with few, poorly known populations on conservation lands. Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown Land , water reserves, etc.
Priority 3	Taxa, which are known from few specimens or sight records, some of which are on lands not under immediate threat of habitat destruction or degradation.
Priority 4	Rare taxa. Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.
Priority 5	Taxa is in need of monitoring. Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Appendix C

Flora

Species list

Quadrat data

Likelihood of occurrence assessment

Threatened and Priority Ecological Communities map

Flora species observed at the Project Site

Family	Name	Status
Apiaceae	*Foeniculum vulgare*	*
Apocynaceae	*Nerium oleander*	*
Arecaceae	*Phoenix dactylifera*	*
Asparagaceae	*Acanthocarpus preissii*	
Asparagaceae	*Asparagus asparagoides*	*
Asparagaceae	*Lomandra maritima*	
Asphodelaceae	*Trachyandra divaricata*	*
Asteraceae	*Taraxacum officinale*	*
Caprifoliaceae	*Scabiosa atropurpurea*	*
Casuarinaceae	*Allocasuarina huegeliana*	
Chenopodiaceae	*Rhagodia baccata*	
Crassulaceae	*Crassula* sp.	
Cyperaceae	*Ficinia nodosa*	
Cyperaceae	*Lepidosperma squamatum*	
Euphorbiaceae	*Euphorbia terracina*	*
Euphorbiaceae	*Ricinus communis*	*
Fabaceae	*Acacia cyclops*	
Fabaceae	*Acacia lasiocarpa*	
Fabaceae	*Acacia rostellifera*	
Fabaceae	*Acacia saligna*	
Fabaceae	*Lupinus cosentinii*	*
Fabaceae	*Templetonia retusa*	
Fabaceae	*Trifolium sp.*	*
Geraniaceae	*Pelargonium capitatum*	*
Hemerocallidaceae	*Dianella revoluta*	
Iridaceae	*Gladiolus sp.*	*
Iridaceae	*Romulea rosea*	*
Meliaceae	*Melia azedarach*	
Moraceae	*Ficus carica*	*
Myrtaceae	*Agonis flexuosa*	
Myrtaceae	*Callistemon sp.*	*
Myrtaceae	*Calothamnus quadrifidus*	
Myrtaceae	*Eucalyptus decipiens*	
Myrtaceae	*Eucalyptus gomphocephala*	
Myrtaceae	*Eucalyptus petrensis*	
Myrtaceae	*Eucalyptus platypus*	*
Myrtaceae	*Leptospermum laevigatum*	*
Myrtaceae	*Melaleuca huegelii*	
Myrtaceae	*Melaleuca lanceolata*	planted
Myrtaceae	*Melaleuca systena*	
Oleaceae	*Olea europaea*	*
Onagraceae	*Oenothera sp.*	*
Poaceae	*Bromus diandrus*	*
Poaceae	*Cynodon dactylon*	*
Poaceae	*Lagurus ovatus*	*
Proteaceae	*Banksia dallanneyi*	
Proteaceae	*Banksia sessilis*	
Proteaceae	*Grevillea preissii*	

Flora species observed at the Project Site

Family	Name	Status
Proteaceae	*Hakea prostrata*	
Ranunculaceae	*Clematis linearifolia*	
Restionaceae	*Desmocladus flexuosus*	
Rhamnaceae	*Spyridium globulosum*	
Scrophulariaceae	*Eremophila glabra*	planted
Solanaceae	*Solanum nigrum*	*
Vitaceae	*Vitis sp.*	*

* weed species

Hilltop/Emplacement Cres **Site** Q1

Described by ML&LZ **Date** 16/05/2012 **Type** Quadrat 10 m x 10 m

MGA Zone 50 383300 **mE** 6449145 **mN** 115.763357 **E** -32.087853 **S**

Habitat Ridge of limestone outcrop

Soil Light grey-white sand

Rock Type Limestone 2-10%

Vegetation Closed Tall Scrub of *Banksia sessilis*, *Spyridium globulosum* and *Templetonia retusa* over mixed weedy Grassland and Very Open Herbland of **Euphorbia terracina* and **Asparagus asparagoides* (Declared P1 and WoNS).

Veg Condition Good

Fire Age Very Old (>20 years)

Notes Flat.
Good drainage.
Weeds (including bridal creeper), rabbits, rubbish.
Bare ground <2%
Logs 0%
Twigs 2-10%
Leaves 10-30%





Species
Acacia cyclops
**Asparagus asparagoides* (Declared P1 and WoNS)
Banksia sessilis
**Euphorbia terracina*
Lomandra maritima
Melaleuca systena
Spyridium globulosum
Templetonia retusa

Hilltop/Emplacement Cres **Site** Q2
Described by ML&LZ **Date** 16/05/2012 **Type** Quadrat 10 m x 10 m
MGA Zone 50 383313 **mE** 6449225 **mN** 115.763504 **E** -32.087133 **S**
Habitat Mid-slope of limestone outcrop
Soil Light grey-white sand
Rock Type Limestone 2-10%
Vegetation Shrubland of *Melaleuca huegelii* and *Templetonia retusa* over Low Open Shrubland of *Banksia sessilis* and *Melaleuca systena* over mixed weedy Very Open Grassland.
Veg Condition Good
Fire Age Very Old (>20 years)
Notes Moderate-steep NNW slope.
Good drainage.
Weeds (including bridal creeper), rabbits.
Bare ground 2-10%
Logs 0%
Twigs 2-10%
Leaves 2-10%





Species
**Asparagus asparagoides* (Declared P1 and WoNS)
Banksia sessilis
**Lagurus ovatus*
Melaleuca huegelii
Melaleuca systena
**Romulea rosea*
Templetonia retusa

Hilltop/Emplacement Cres **Site** Q3

Described by ML&LZ **Date** 16/05/2012 **Type** Quadrat 10 m x 10 m

MGA Zone 50 383198 **mE** 6449126 **mN** 115.762274 **E** -32.088014 **S**

Habitat Flat weedy swale.

Soil Dark grey-light brown sand

Rock Type Limestone <2%

Vegetation Tall Shrubland of **Leptospermum laevigatum* over mixed weedy Grassland and Herbland.

Veg Condition Completely Degraded

Fire Age Old (>5 years)

Notes Gentle W slope.
Good drainage.
Asbestos, dumped rubbish, weeds, 4x4 tracks.
Bare ground <2%
Logs 0%
Twigs <2%
Leaves 2-10%



Species
Acacia saligna
**Foeniculum vulgare*
**Gladiolus* sp.
**Leptospermum laevigatum*
**Pelargonium capitatum*
**Ricinus communis*
**Scabiosa atropurpurea*

Hilltop/Emplacement Cres **Site** Q4

Described by ML&LZ **Date** 16/05/2012 **Type** Quadrat 10 m x 10 m

MGA Zone 50 383237 **mE** 6449112 **mN** 115.762686 **E** -32.088144 **S**

Habitat Weedy lower slope/breakaway.

Soil Light grey-white sand

Rock Type Limestone 30-70%

Vegetation Tall Open Scrub of **Leptospermum laevigatum* with weedy understorey.

Veg Condition Completely Degraded

Fire Age Old (>20 years)

Notes Steep S slope.
Good drainage.
Weeds.
Bare ground 30-70%
Logs 0%
Twigs 0%
Leaves <2%



Species
**Leptospermum laevigatum*
Templetonia retusa

Hilltop/Emplacement Cres **Site** Q5

Described by ML&LZ **Date** 16/05/2012 **Type** Quadrat 10 m x 10 m

MGA Zone 50 383228 **mE** 6449138 **mN** 115.762593 **E** -32.087909 **S**

Habitat Middle slope.

Soil Light grey-white sand

Rock Type Limestone <2%

Vegetation Closed Tall Scrub of *Templetonia retusa*, *Spyridium globulosum* and *Melaleuca huegelii* over Low Open Shrubland of *Melaleuca systena*, *Acacia rostellifera* and *Banksia sessilis* over mixed weedy Grassland and Herbland.

Veg Condition Good

Fire Age Very Old (>20 years)

Notes Moderate W slope.
Good drainage.
Weeds (including bridal creeper), rabbits, 4x4 tracks.
Bare ground <2%
Logs 0%
Twigs 2-10%
Leaves 10-30%



Species
Acacia rostellifera
**Asparagus asparagoides* (Declared P1 and WoNS)
Banksia sessilis
**Euphorbia terracina*
**Lagurus ovatus*
Melaleuca huegelii
Melaleuca systena
Spyridium globulosum
Templetonia retusa

Hilltop/Emplacement Cres **Site** Q6

Described by ML&LZ **Date** 16/05/2012 **Type** Quadrat 10 m x 10 m

MGA Zone 50 383286 **mE** 6449231 **mN** 115.763219 **E** -32.087076 **S**

Habitat Mid-slope.

Soil Light grey-white sand

Rock Type Limestone <2%

Vegetation Tall Open Scrub of *Acacia rostellifera*, **Leptospermum laevigatum* and *Spyridium globulosum* over mixed weedy Very Open Grassland and Very Open Herbland of **Euphorbia terracina*, *Clematis linearifolia*, **Trachyandra divaricata* and **Scabiosa atropurpurea*.

Veg Condition Good

Fire Age Old (5-20 years)

Notes Moderate NW slope.
Good drainage.
Weeds, edge effect rabbits.
This quadrat was assessed from the track as there was no access to this fenced area.
Bare ground <2%
Logs 0%
Twigs 2-10%
Leaves 2-10%





Species
Acacia rostellifera
Acanthocarpus preissii
Clematis linearifolia
**Euphorbia terracina*
**Leptospermum laevigatum*
**Scabiosa atropurpurea*
Spyridium globulosum
**Trachyandra divaricata*

Hilltop/Emplacement Cres **Site** Q7

Described by ML&LZ **Date** 16/05/2012 **Type** Quadrat 10 m x 10 m

MGA Zone 50 383350 **mE** 6449291 **mN** 115.763905 **E** -32.086541 **S**

Habitat Mid-slope/breakaway

Soil Light grey-white sand

Rock Type Limestone 10-30%

Vegetation Closed Tall Scrub of *Melaleuca huegelii* and *Spyridium globulosum* over mixed weedy Very Open Grassland and Very Open Herbland of **Asparagus asparagoides* (Declared P1, WoNS), *Clematis linearifolia* and weedy species.

Veg Condition Good

Fire Age Very Old (>20 years)

Notes Steep N slope.
Good drainage.
Weeds (including bridal creeper).
Bare ground 10-30%
Logs 0%
Twigs 2-10%
Leaves 2-10%



Species
Acacia rostellifera
**Asparagus asparagoides* (Declared P1 and WoNS)
Clematis linearifolia
Melaleuca huegelii
Melaleuca systena
Spyridium globulosum

Hilltop/Emplacement Cres **Site** Q8

Described by ML&LZ **Date** 16/05/2012 **Type** Quadrat 10 m x 10 m

MGA Zone 50 383287 **mE** 6449192 **mN** 115.763225 **E** -32.087428 **S**

Habitat Lower slope.

Soil Light grey-white sand

Rock Type Limestone <2%

Vegetation Tall Open Scrub of *Acacia rostellifera*, **Leptospermum laevigatum* and *Spyridium globulosum* over mixed weedy Very Open Grassland and Very Open Herbland of **Euphorbia terracina* and **Scabiosa atropurpurea*.

Veg Condition Good-Degraded

Fire Age Old (5-20 years)

Notes Gentle NW slope.
Good drainage.
Weeds, edge effect rabbits.
This quadrat was assessed from the track as there was no access to this fenced area.
Bare ground <2%
Logs 0%
Twigs 2-10%
Leaves 2-10%
Ph4266



Species
Acacia rostellifera
**Euphorbia terracina*
**Leptospermum laevigatum*
**Scabiosa atropurpurea*
Spyridium globulosum

Hilltop/Emplacement Cres **Site** PP1

Described by ML&LZ **Date** 16/05/2012 **Type** Photo point

MGA Zone 50 383121 **mE** 6449142 **mN**



Hilltop/Emplacement Cres **Site** PP2
Described by ML&LZ **Date** 16/05/2012 **Type** Photo point
MGA Zone 50 383280 **mE** 6449131 **mN**





Hilltop/Emplacement Cres **Site** PP3

Described by ML&LZ **Date** 16/05/2012 **Type** Photo point

MGA Zone 50 383104 **mE** 6449222 **mN**



Hilltop/Emplacement Cres **Site** PP4

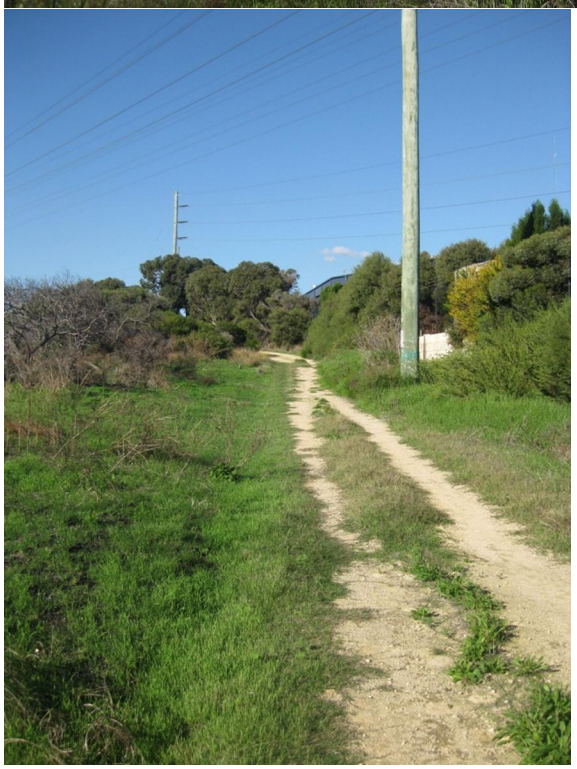
Described by ML&LZ **Date** 16/05/2012 **Type** Photo point

MGA Zone 50 383103 **mE** 6449183 **mN**



Hilltop/Emplacement Cres **Site** PP5
Described by ML&LZ **Date** 16/05/2012 **Type** Photo point
MGA Zone 50 383160 **mE** 6448901 **mN**





Hilltop/Emplacement Cres **Site** PP6
Described by ML&LZ **Date** 16/05/2012 **Type** Photo point
MGA Zone 50 383185 **mE** 6449784 **mN**





Definitions for flora likelihood of occurrence assessment

Likelihood of occurrence	Definition
Known	Species definitely recorded within the Project Site either from previous records or field survey results.
Likely	Species previously recorded within 10 km and suitable habitat occurs at the Project Site.
Possible	Species previously recorded within 10 km with marginally suitable habitat occurring at the Project Site. OR Species not previously recorded within 10 km, but suitable habitat occurs at the Project Site.
Unlikely	Species previously recorded within 10 km but suitable habitat does not occur at the Project Site.
Highly unlikely	Species not previously recorded within 10 km, suitable habitat does not occur at the Project Site and/ or Project Site is outside the species' natural distribution.

Conservation significant flora likelihood of occurrence assessment

Species	Status		Description and habitat requirements	Search		Likelihood of occurrence
	State	Federal		NatureMap	EPBC	
Acacia lasiocarpa var. *bracteolata* long peduncle variant (G.J. Keighery 5026)	P1		Shrub, 0.4-1.5 m high. Fl. yellow, May or Aug. Grey or black sand over clay. Swampy areas, winter wet lowlands.	X		Unlikely Recorded within 10 km but no suitable habitat.
Andersonia gracilis Slender Andersonia	Threatened	Endangered	Slender erect or open straggly shrub, 0.1-0.5(-1) m high. Fl. white-pink-purple, Sep to Nov. White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.		X	Highly Unlikely Not recorded within 10 km and no suitable habitat.

Species	Status		Description and habitat requirements	Search		Likelihood of occurrence
	State	Federal		NatureMap	EPBC	
Angianthus micropodioides	P3		Erect or decumbent annual, herb, 0.03-0.15 m high. Fl. yellow-white, Nov to Dec or Jan to Feb. Saline sandy soils. River edges, saline depressions, claypans.	X		Unlikely Recorded within 10 km but no suitable habitat.
Austrostipa mundula	P2		No description.	X		Unknown. Recorded within 10 km but habitat unknown.
Beyeria cinerea subsp. *cinerea*	P3		No description.	X		Unknown. Recorded within 10 km but habitat unknown.
Bossiaea modesta	P2		Slender, trailing & twining shrub. Fl. yellow & red, Oct to Dec. Soils derived from granite. Damp areas close to stream.	X		Unlikely Recorded within 10 km but no suitable habitat.
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid	Threatened	Endangered	Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green & cream & red, Sep to Oct. Grey or brown sand, clay loam.	X	X	Possible Recorded within 10 km and marginally suitable habitat is present.
Calothamnus graniticus subsp. *leptophyllus*	P4		Erect, multi-stemmed shrub, 1-2 m high. Fl. red, Jun to Aug. Clay over granite, lateritic soils. Hillsides.	X		Unlikely Recorded within 10 km but no suitable habitat.

Species	Status		Description and habitat requirements	Search		Likelihood of occurrence
	State	Federal		NatureMap	EPBC	
Centrolepis caespitosa	P4	Endangered	Tufted annual, herb (forming a rounded cushion up to 25 mm across). Fl. Oct to Dec. White sand, clay. Salt flats, wet areas.		X	Highly unlikely Not recorded within 10 km and no suitable habitat.
Dampiera triloba	P1		Erect perennial, herb or shrub, to 0.5 m high. Fl. blue, Aug to Dec.	X		Unknown. Recorded within 10 km but habitat unknown.
Darwinia foetida Muchea Bell	Threatened	Critically Endangered	Erect, or spreading, shrub to 0.7 m high, often using other shrubs for support. Young branches are slender, green-brown with prominent, decurrent leaf bases, becoming grey and woody. Fl. green, Oct to Nov. Grey or white sand, swampy, seasonally wet sites, alongside sump land (land acting as a pit or well where water collects). Winter-damp to wet clay under *Regelia inops* and *Kunzea recurva* tall shrubland, over Pink-flowered Myrtle (*Hypocalymma robustum)* low shrubland or low Melaleuca spp. shrubland.		X	Highly unlikely Not recorded within 10 km and no suitable habitat.
Dodonaea hackettiana Hackett's Hopbush	P4		Erect shrub or tree, 1-5 m high. Fl. yellow-green/red, mainly Jul to Oct. Sand. Outcropping limestone.	X		Likely Recorded within 10 km and suitable habitat is present.
Grevillea olivacea	P4		Erect, non-lignotuberous shrub, 1-4.5 m high. Fl.	X		Likely

Species	Status		Description and habitat requirements	Search		Likelihood of occurrence
	State	Federal		NatureMap	EPBC	
Olive Grevillea			red/red-pink, Jun to Sep. White or grey sand. Coastal dunes, limestone rocks. Amongst medium trees, or low trees; in gravelly soil, or sand, or loam; occupying limestone cave entrance, lateritic sandplain, limestone swamp flats.			Recorded within 10 km and suitable habitat is present.
Grevillea thelemanniana subsp. *thelemanniana* Spider Net Grevillea	P4		No description.	X		Unknown. Recorded within 10 km but habitat unknown.
Hibbertia spicata subsp. *leptotheca*	P3		Erect or spreading shrub, 0.2-0.5 m high. Fl. yellow, Jul to Oct. Sand. Near-coastal limestone ridges, outcrops & cliffs.	X		Likely Recorded within 10 km and suitable habitat is present.
Hydrocotyle lemnoides Aquatic Pennywort	P4		Aquatic, floating annual, herb. Fl. purple, Aug to Oct. Swamps.	X		Unlikely Recorded within 10 km but no suitable habitat.
Isopogon uncinatus Hook-leaf Isopogon	Threatened	Endangered	Tufted spreading or prostrate, non-lignotuberous shrub, 0.05-0.4 m high. Fl. yellow/cream, Oct to Nov. Loam or sand on granite, peaty sand. Swampy depressions, hillslopes.		X	Highly unlikely – this is probably a misidentification as *Isopogon uncinatus* appears to occur solely on the south coast of Western Australia (Department of Environment and Conservation, 2012).

Species	Status		Description and habitat requirements	Search		Likelihood of occurrence
	State	Federal		NatureMap	EPBC	
Jacksonia gracillima	P3		No description.	X		Unknown. Recorded within 10 km but habitat unknown.
Jacksonia sericea Waldjumi	P4		Low spreading shrub, to 0.6 m high. Fl. orange, usually Dec or Jan to Feb. Calcareous & sandy soils.	X		Likely Recorded within 10 km and suitable habitat is present.
Lepidosperma rostratum Beaked Lepidosperma	Threatened	Endangered	Rhizomatous, tufted perennial, grass-like or herb (sedge), 0.5 m high. Fl. brown. Peaty sand, clay.		X	Highly unlikely Not recorded within 10 km and no suitable habitat.
Microtis quadrata	P4		No description.	X		Unknown. Recorded within 10 km but habitat unknown.
Phlebocarya pilosissima subsp. pilosissima	P3		Shortly rhizomatous, compactly tufted perennial, grass-like or herb, 0.15-0.4 m high. Fl. cream-white, Aug to Oct. White or grey sand, lateritic gravel.	X		Possible Recorded within 10 km and marginally suitable habitat is present.
Pimelea calcicola	P3		Erect to spreading shrub, 0.2-1 m high. Fl. pink, Sep to Nov. Sand. Coastal limestone ridges.	X		Likely Recorded within 10 km and suitable habitat is present.
Stylidium longitubum	P3		Erect annual (ephemeral), herb, 0.05-0.12 m	X		Unlikely

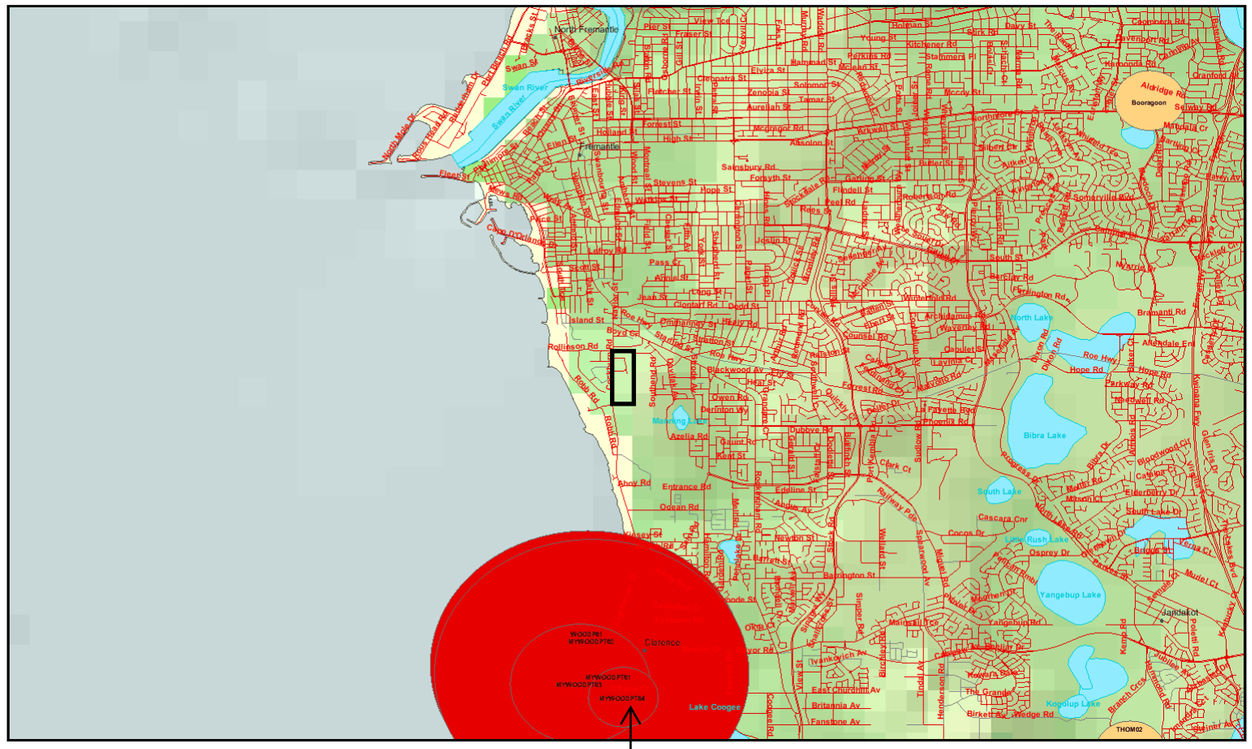
Species	Status		Description and habitat requirements	Search		Likelihood of occurrence
	State	Federal		NatureMap	EPBC	
Jumping Jacks			high. Fl. pink, Oct to Dec. Sandy clay, clay. Seasonal wetlands.			Recorded within 10 km but no suitable habitat.
Stylidium maritimum	P3		Caespitose perennial, herb, 0.3-0.7 m high, Leaves tufted, linear to narrowly oblanceolate, 10-40 cm long, 1-5.5 mm wide, apex acute to mucronate, margin involute, glabrous. Membraneous scale leaves present at base of mature leaves. Scape glandular throughout. Inflorescence paniculate. Fl. white/purple, Sep to Nov. Sand over limestone. Dune slopes and flats. Coastal heath and shrubland, open *Banksia* woodland.	X		Likely Recorded within 10 km and suitable habitat is present.
Thelymitra variegata Queen of Sheba	P3		Tuberous, perennial, herb, 0.1-0.35 m high. Fl. orange & red & purple & pink, Jun to Sep. Sandy clay, sand, laterite.	X		Possible Recorded within 10 km and marginally suitable habitat is present.
Verticordia plumosa var. *ananeotes*	Threatened	Endangered	Erect, sparsely branched shrub, 0.3-0.5 m high. Fl. pink-purple/white, Nov to Dec. Sandy loam. Seasonally inundated plains.	X		Unlikely Recorded within 10 km but no suitable habitat.

NatureMap
Mapping Western Australia's biodiversity

Threatened and Priority Ecological Communities surrounding the Hilltop/Emplacement Cresc Project Site

Printed by Melissa Longman on 6/6/2012

Query details :



Quadrats: MYWOODPT01, MYWOODPT02, MYWOODPT03, MYWOODPT04 and WOOD01
Most likely **TEC FCT 30a**
Callitris preissii (or *Melaleuca lanceolata*) forests and woodlands, Swan Coastal Plain (Vulnerable)

Only TEC/PEC within 5 km of Project Site described

FCT = Floristic Community Type

Department of Environment and Conservation
museum

NatureMap is a collaborative project of the Department of Environment and Conservation, Western Australia, and the Western Australian Museum.

Appendix D

Fauna

Species list

Likelihood of occurrence assessment

Family	Species	Common Name	Introduced	Status	Comments
Birds					
Accipitridae	*Elanus axillaris*	Black-shouldered Kite		Mi	
Artamidae	*Cracticus tibicen*	Australian Magpie			
Cacatuidae	*Eolophus roseicapillus*	Galah			
Psittacidae	*Calyptorhynchus latirostris*	Carnaby's Black-Cockatoo		T, En	2 flocks seen flying over, one group of 8 and one group of 14
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		Mi	
Columbidae	*Columba livia*	Pigeon	*		
Corvidae	*Corvus coronoides*	Australian Raven			
Cracticidae	*Gymnorhina tibicen dorsalis*	Australian Magpie			
Hirundinidae	*Hirundo neoxena*	Welcome Swallow			
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird			
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater			
Meliphagidae	*Phylidonyris niger*	White-cheeked Honeyeater			
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater			
Monarchidae	*Grallina cyanoleuca*	Magpie lark			
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit			
Psittacidae	*Trichoglossus haematodus*	Rainbow Lorikeet	*		
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail			
Timaliidae	*Zosterops lateralis*	Silvereye			
Mammals					
Canidae	*Canis lupus familiaris*	Domesticated Dog	*		
Felidae	*Felis catus*	Cat	*		
Leporidae	*Oryctolagus cuniculus*	European Rabbit	*		
Equidae	*Equus ferus caballus*	Horse	*		

Conservation significant fauna likelihood of occurrence assessment

(see Appendix C for definitions for fauna likelihood of occurrence assessment)

Species	Status		Search		Likelihood of occurrence
	State	Federal	NatureMap	EPBC	
Birds					
Anous tenuirostris melanops Australian Lesser Noddy	Threatened	Vulnerable	X	X	Unlikely No suitable habitat for the species within the Project Site. However, it has been recorded within 10 km of the Project Site.
Botaurus poiciloptilus Australasian Bittern	Threatened	Endangered		X	Highly Unlikely No suitable habitat, as this species prefers wetlands with dense vegetation.
Burhinus grallarius Bush Stone-curlew	P4		X		Unlikely No suitable habitat for the species within the Project Site, as this species prefers grassy woodlands. However, it has been recorded within 10 km of the Project Site.
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo	Threatened	Vulnerable	X	X	Likely Suitable foraging habitat present within the Project Site.
Calyptorhynchus baudinii Baudin's Cockatoo	Threatened	Vulnerable	X	X	Likely Suitable foraging habitat present within the Project Site.
Calyptorhynchus latirostris	Threatened	Endangered	X	X	Known

Species	Status		Search		Likelihood of occurrence
	State	Federal	NatureMap	EPBC	
Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo					Observed flying over the site and feeding on Banksia during the field survey.
Charadrius rubricollis Hooded Plover	P4	Marine	X		Unlikely No suitable habitat for the species. This species prefers sandy beaches, but does habit inland salt lakes and has been recorded within 10 km of the Project Site.
Diomedea chlororhynchos Yellow-nosed Albatross	Threatened	Marine Migratory	X		Highly Unlikely No suitable habitat for the species within the Project Site.
Diomedea exulans amsterdamensis Amsterdam Albatross	Threatened	Endangered Marine Migratory		X	Highly Unlikely No suitable habitat for the species within the Project Site.
Diomedea exulans exulans Tristan Albatross	Threatened	Endangered Marine Migratory	X	X	Highly Unlikely No suitable habitat for the species within the Project Site.
Diomedea exulans gibsoni Gibson's Albatross	Threatened	Vulnerable Marine Migratory		X	Highly Unlikely No suitable habitat for the species within the Project Site.

Species	Status		Search		Likelihood of occurrence
	State	Federal	NatureMap	EPBC	
Diomedea exulans (sensu lato) Wandering Albatross	Threatened	Vulnerable Marine Migratory	X	X	Highly Unlikely No suitable habitat for the species within the Project Site.
Falco peregrinus Peregrine Falcon	S		X		Unlikely The species has been recorded within 10 km of the Project Site and there is some very limited habitat. The surrounding levels of development and disturbance would limit habitat values of the Project Site.
Falco peregrinus subsp. *macropus* Peregrine Falcon	S		X		Unlikely The species has been recorded within 10 km of the Project Site and there is some very limited habitat. The surrounding levels of development and disturbance would limit habitat values of the Project Site.
Ixobrychus minutus subsp. *dubius* Australian Little Bittern	P4		X		Unlikely No suitable habitat for the species within the Project Site, as it prefers terrestrial wetlands that have dense emergent vegetation. However, it has been recorded within 10 km of the Project Site.

Species	Status		Search		Likelihood of occurrence
	State	Federal	NatureMap	EPBC	
Halobaena caerulea Blue Petrel		Vulnerable Marine		X	Highly Unlikely No suitable habitat for the species within the Project Site.
Leipoa ocellata Malleefowl	Threatened	Vulnerable		X	Highly Unlikely This species requires habitat of long un-burnt woodland and there is no suitable habitat within the Project Site or in close proximity.
Macronectes giganteus Southern Giant-Petrel	Threatened	Endangered Marine Migratory	X	X	Unlikely No suitable habitat for the species within the Project Site. However, it has been recorded within 10 km of the Project Site.
Macronectes halli Northern Giant-Petrel	Threatened	Vulnerable Marine Migratory		X	Highly Unlikely No suitable habitat for the species within the Project Site.
Numenius madagascariensis Eastern Curlew	P4	Marine Migratory	X		Unlikely No suitable habitat for the species within the Project Site. However, it has been recorded within 10 km of the Project Site.
Phoebetria fusca	Threatened	Marine	X		Unlikely

Species	Status		Search		Likelihood of occurrence
	State	Federal	NatureMap	EPBC	
Sooty Albatross		Migratory			No suitable habitat for the species within the Project Site. However, it has been recorded within 10 km of the Project Site.
Pterodroma mollis Soft-plumaged Petrel	Threatened	Vulnerable Marine		X	Highly Unlikely No suitable habitat for the species within the Project Site.
Rostratula australis Australian Painted Snipe	Threatened	Vulnerable Marine Migratory		X	Highly Unlikely No suitable habitat for the species within the Project Site. This species prefers wetland areas.
Sternula nereis nereis Fairy Tern (Australian)	Threatened	Vulnerable		X	Highly Unlikely No suitable habitat for the species. This species prefers sandy beaches, but does habit inland salt lakes.
Thalassarche carteri Indian Yellow-nosed Albatross	Threatened	Vulnerable Marine Migratory		X	Highly Unlikely No suitable habitat for the species within the Project Site.
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross	Threatened	Vulnerable Marine Migratory		X	Highly Unlikely No suitable habitat for the species within the Project Site.
Thalassarche melanophris Black-browed Albatross	Threatened	Vulnerable Marine Migratory	X	X	Unlikely No suitable habitat for the species within the Project Site. However, it has been recorded within 10 km of the Project Site.

Species	Status		Search		Likelihood of occurrence
	State	Federal	NatureMap	EPBC	
Tyto novaehollandiae subsp. *novaehollandiae* Masked Owl (southern subsp.)	P3		X		Unlikely Limited suitable habitat for the species within the Project Site, and has been recorded within 10 km of the Project Site.This species roost and nest in large tree hollows near foraging areas.
Insects					
Leioproctus contrarius Native Bee	P3		X		Possible This species appears to be dependent on flowers of Goodeniaceae and possibly *Leschenautia stenosepala* not present within the Project Site. However, it has been recorded within 10 km of the Project Site.
Hylaeus globuliferus Bee	P3		X		Possible This species is thought to favour flowers of *Adenanthos cygnorum* for feeding, and has also been recorded on *Banksia attenuate,* not present within the Project Site. However, it has been recorded within 10 km of the Project Site.
Synemon gratiosa Graceful Sun Moth	Threatened	Endangered	X	X	Possible Some suitable habitat, including *Lomandra maritima* and *Banksia* woodland present within the Project Site, and has been recorded within 10 km of the Project Site.
Mammals					
Dasyurus geoffroii		Vulnerable		X	Highly Unlikely

Species	Status		Search		Likelihood of occurrence
	State	Federal	NatureMap	EPBC	
Chuditch, Western Quoll					This species is locally extinct and has specific habitat requirements not present within the Project Site. The presence of feral cats would reduce the likelihood of the species.
Hydromys chrysogaster Water-rat	P4		X		Unlikely No suitable habitat present within the Project Site, and this species prefers habitat in the vicinity of permanent water. However, it has been recorded within 10 km of the Project Site.
Isoodon obesulus subsp. *fusciventer* Quenda	P5		X		Unlikely Limited suitable habitat present within the Project Site, however has been recorded within 10 km of the Project Site. The presence of feral cats would reduce the likelihood of the species.
Phascogale calura Red-tailed Phascogale	Threatened	Endangered		X	Highly Unlikely No suitable habitat present within the Project Site. This species prefers habitat containing rock sheoak and wandoo, with suitable hollows for nesting and shelter and a dense mid-storey canopy.
Setonix brachyurus Quokka	Threatened	Vulnerable	X	X	Unlikely This species is associated with dense forests and thickets, and is highly susceptible to predation from cats (present within the Project Site). However, it has been recorded within 10 km of the Project Site.
Reptiles					
Lerista lineata Skink	P3		X		Possible Suitable habitat present, as this species prefers sandy coastal heath and shrubland, and it has been recorded within 10 km of the Project Site.

Species	Status		Search		Likelihood of occurrence
	State	Federal	NatureMap	EPBC	
Morelia spilota subsp. *imbricata* Carpet Python	S		X		Possible Some limited habitat present within the Project Site, and has been recorded within 10 km of the Project Site. This species prefers Banksia woodland, eucalypt woodlands, and grasslands.
Neelaps calonotos Black-striped Snake	P3		X		Possible Some limited habitat, as this species tends to inhabit dunes and sand-plains vegetated with heaths and eucalypts/banksias. The species has been recorded within 10 km of the Project Site.

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	J Kuiper M Longman L Zimmermann	A Napier		A Napier		5/7/2012

Appendix D
Cocckburn Coast Cultural Heritage Strategy

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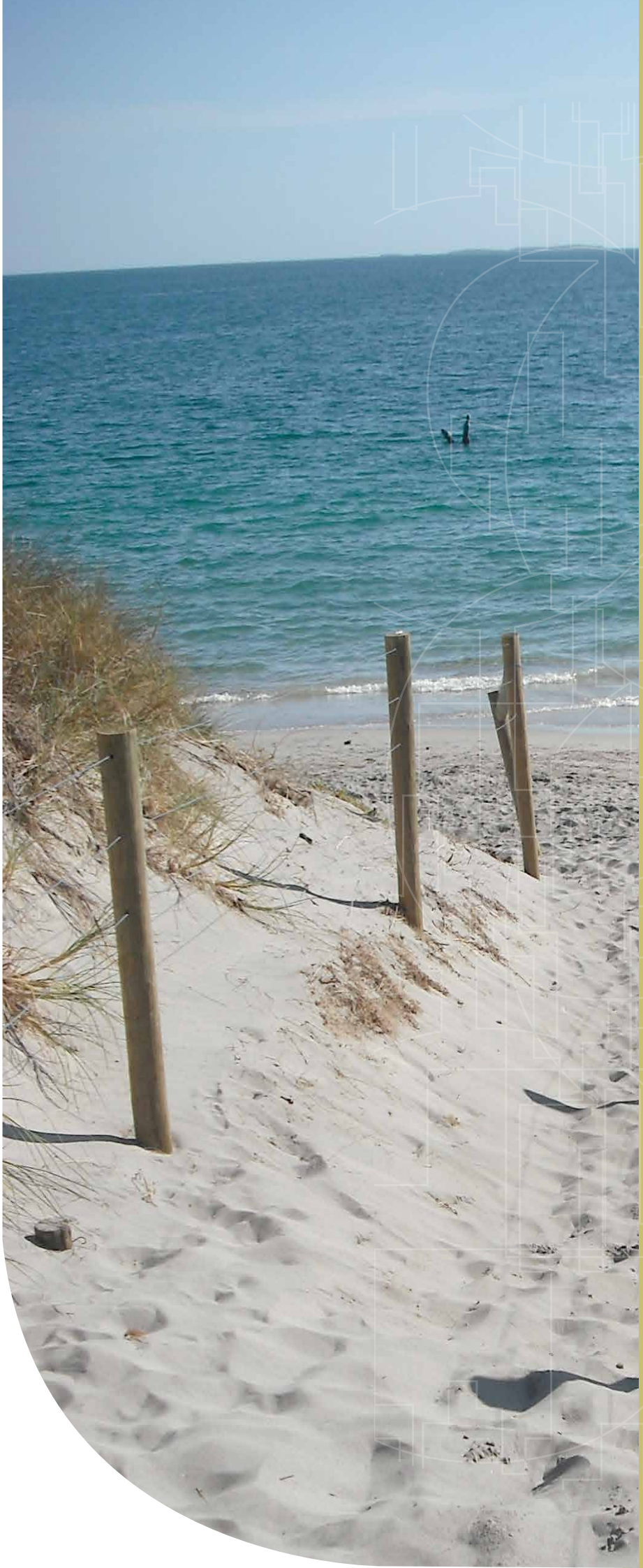

TOWN PLANNING
URBAN DESIGN AND HERITAGE

COCKBURN COAST CULTURAL HERITAGE STRATEGY

711-228
OCTOBER 2012

DOCUMENT CONTROL

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EXECUTIVE SUMMARY

Cockburn Coast is located on the coastline between the Port Coogee and South Beach developments, to the south of Fremantle in Western Australia. Planning is underway to guide the transition of this area from its former industrial use to a vibrant, mixed-use urban environment. This Cultural Heritage Strategy has been commissioned by LandCorp, to inform the development of the Cockburn Coast District Structure Plan Part 2 and associated Local Structure Plans. It provides the basis for the ongoing management, care and interpretation of the indigenous, historic and maritime heritage sites located within in the project area.

The Cockburn Coast coastline and the limestone ridge behind it contains a diverse range of heritage places that provide an insight into the story of the history and development of the area, with the most visually prominent being the South Fremantle Power Station and the Robb Jetty Abattoir Chimney. The area also includes significant shipwrecks, landscape plantings, sculptures, the South Beach Horse Exercise Area and Robb Jetty Camp, an Aboriginal site of historical significance.

The recognition and incorporation of the distinctive heritage of the area is a significant component of the urban renaissance of Cockburn Coast and is integral to creating a distinct and meaningful place. Key themes, stories and associations identified with the heritage of the Cockburn Coast area include:

- Survival of Indigenous People in the post-colonial economy - prior to settlement the coastal dunes are thought to have been used for burial purposes, the last finding being recorded in 1885; from about 1910 until about 1985, an Aboriginal camp was located near Robb Jetty.
- Shipping - Owen Anchorage was used as an early mooring/anchorage area for ships arriving at the newly settled colony.
- Horse Racing - South Beach was the site of the first official horse race in Western Australia in October 1833 and the beach has also been used for exercising racing horses from that time to the present.
- Feeding the State - the area was an integral part of the agricultural industry of the State, particularly through the development of Robb Jetty, the abattoir and associated industries from the mid-1850s through to the early 1990s.
- Power Generation - the area contains the South Fremantle Power Station, a 'Cathedral of Power', which played an integral part in the development of power generation in the State from the 1950s
- Defence – the South Beach Battery is a remnant of a larger military complex that has associations with the military defence operations of Western Australia during World War Two.

The Cockburn Coast study area has been divided into three precincts: the Power Station Precinct, the Robb Jetty Precinct (and Foreshore) and the Hilltop/ Emplacement Precinct. This Strategy provides a management framework for the identified heritage sites in each of the three precincts; setting out how to protect and transmit their heritage values, in accordance with relevant legislative requirements. A summary of the Heritage Management Strategies for each precinct is outlined on the following pages.

1. POWER STATION PRECINCT

1.1 South Fremantle Power Station

- Retain, conserve and adapt the South Fremantle Power Station for new uses.
- Any future conservation, management and/or adaptation works to the South Fremantle Power Station are to be undertaken in accordance with State and local policies and procedures.
- Maintain the visual setting of, and interrelationship between, the significant contributory elements of the South Fremantle Power Station.
- Ensure all opportunities to generate awareness and public interest in the building are capitalised upon.
- Acknowledge the significance of high quality urban art, which has been informally applied on the walls of the Power Station since its closure.
- Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community.

1.2 The Diana Shipwreck

- Retain in situ and do not disturb.
- Any future conservation, management and/or adaptation works to the place are to be undertaken in accordance with Commonwealth and State legislation, policies and procedures.
- Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the wreck to the community.

1.3 The James Shipwreck

- Retain in situ and do not disturb.
- Any future conservation, management and/or adaptation works to the place are to be undertaken in accordance with Commonwealth and State legislation, policies and procedures.
- Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the wreck to the community.

1.4 Indian Ocean Site

- Integrate interpretation of the mythological story of the site into the Cockburn Coast project to communicate the tangible and intangible values of the site.
- Should any development be proposed in Owen Anchorage, conduct a maritime survey.

2. HILLTOP/EMPLACEMENT PRECINCT

2.1 South Beach Battery (remains)

- Retain and conserve the remaining South Beach Battery.
- Views from the South Beach Battery to the Indian Ocean should be retained in future planning.
- Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community.
- Consideration should be given to the partial reinstatement of earth embankments to allow an appreciation of its original form.

3. ROBB JETTY AND FORESHORE PRECINCT

3.1 Robb Jetty Camp

- Any future conservation, management and/or adaptation works to the place are to be undertaken in accordance with State and local policies and procedures.
- Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community.

- Acknowledge that skeletal material has previously been unearthed in the general vicinity.

3.2 South Beach Horse Exercise Area

- South Beach should continue to be used for the horse training, a use with which it has had a long association.
- Any future conservation, management and/or adaptation works to the place are to be undertaken in accordance with State and local policies and procedures.
- Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community.

3.3 Robb Jetty

- Remnants of Robb Jetty should be retained undisturbed.
- Any future conservation, management and/or adaptation works to the place are to be undertaken in accordance with State and local policies and procedures.
- Consideration should be given to providing historic statutory heritage protection to Robb Jetty in its own right.
- Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community.

3.4 Robb Jetty Chimney

- Retain and conserve the Robb Jetty Chimney.
- Any future conservation, management and/or adaptation works to the place are to be undertaken in accordance with State and local policies and procedures.
- Any new development adjacent to the Chimney should ensure it retains its landmark qualities.
- Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community.

3.5 Wyola and Barge (remains)

- Investigate the heritage value of the Wyola and barge (remains).
- Any future actions (including conservation, management and/or adaptation works) to the place are to be undertaken in consultation with key stakeholders.
- Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the wreck.

3.6 Moreton Bay Fig Trees

- Retain and conserve the Moreton Bay Figs.

4. PUBLIC ART

- Retain, conserve and include in any overall interpretation strategy the Human Race Artwork and the C Y O'Connor statue.
- Encourage new forms of Public Art in the project area that interprets the cultural heritage of Cockburn Coast.

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1. INTRODUCTION

The Cockburn coastline and the limestone ridge behind it contains a number of significant indigenous, historic and maritime sites with the most visually prominent being the South Fremantle Power Station and the Robb Jetty Abattoir Chimney. The area also includes landscape plantings, sculptures, shipwrecks, the South Beach Horse Exercise Area and the Robb Jetty Camp a site of importance and significance to Aboriginal people.

Subject to development pressure over a number of years, owing to the prime coastal position and proximity to Fremantle, the Department of Planning has prepared a Cockburn Coast District Structure Plan (CCDSP), to guide the future transition of this area from a industrial landscape to a vibrant, mixed use urban location. The recognition and incorporation of the indigenous, historic and maritime sites is a significant component of the urban renaissance of the Cockburn Coast and is integral to creating a distinct and meaningful place.

This Cultural Heritage Strategy, which builds on the heritage studies prepared for the Department of Planning in 2008 for the CCDSP, was commissioned by Landcorp in April 2011, to ensure the next level of detailed planning for the redevelopment of Cockburn Coast area respects and enhances this significant collection of sites. Specifically, the Strategy will inform the development of Cockburn Coast District Structure Plan Part 2 and Local Structure Plans.

The primary objectives of this study are to:

- Identify places of cultural heritage values in the study area, through a desktop survey
- Develop management strategies to protect the cultural heritage values identified in the study area
- Identify key themes for interpreting, enhancing and promoting the cultural heritage values in the study area
- Set out an implementation plan to guide the heritage management of the study area

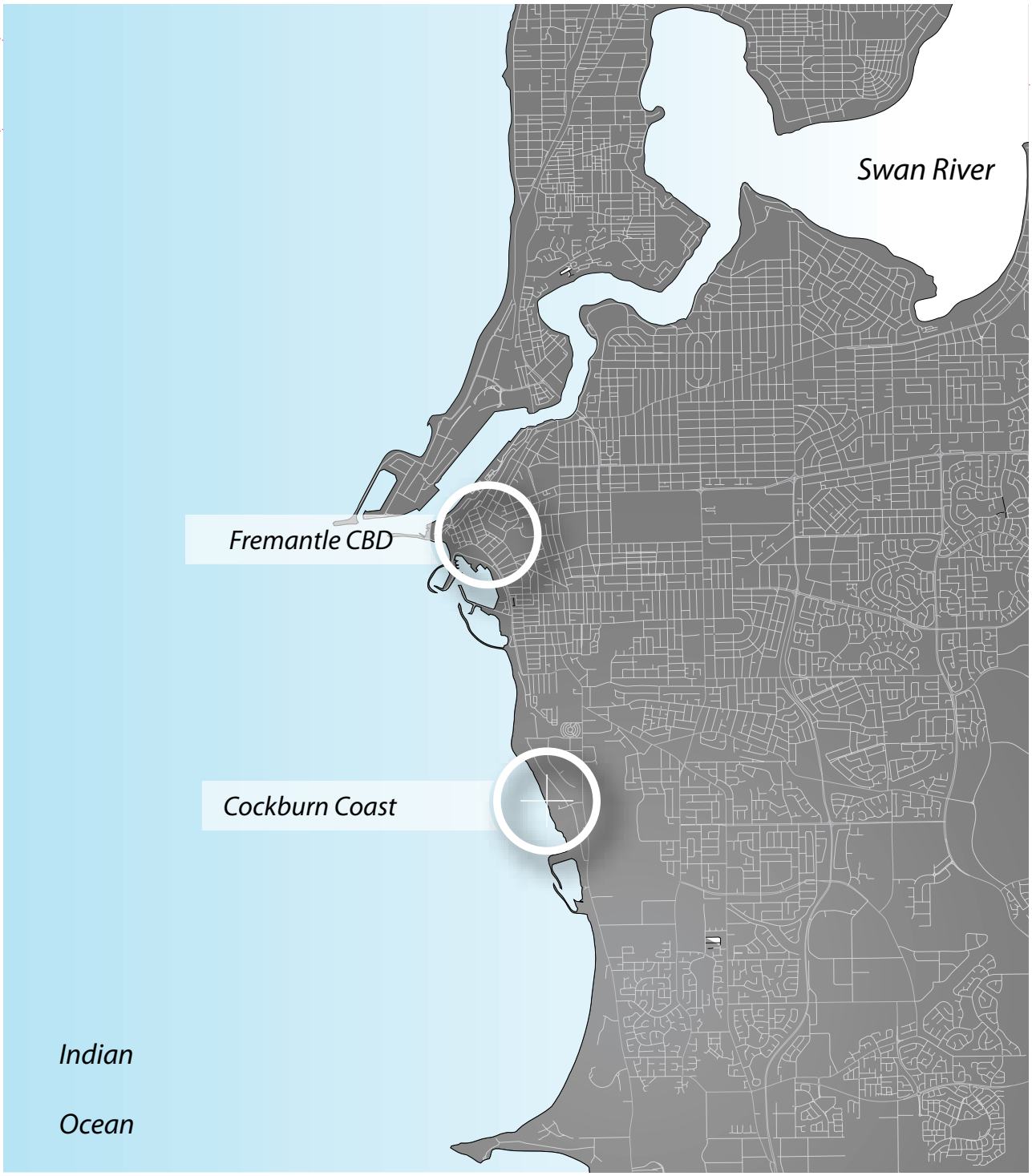

Figure 1 - Location Plan

1.1 BACKGROUND

The Cockburn Coast area covers more than 331 hectares. It is bound by the Indian Ocean to the west and Beeliar Regional Park to the east, the South Beach development to the north and Port Coogee to the south. In its more recent past the area has provided for the location of essential but noxious industries for the Perth region. By the 1970s and into the 1980s, concern regarding the decline in air, water and soil quality and decline in industrial use led the State Government to examine options for the future use of the area.

1.1.1 Cockburn Coast District Structure Plan

In 2005, the State Government facilitated a dialogue with the community to identify aspirations for the industrial area of Cockburn. Since this forum, significant work has been undertaken to progress the aspiration for Cockburn Coast to evolve into an exciting mixed-use community, which celebrates both its unique coastal location and its heritage value.

In August 2009, the Western Australian Planning Commission (WAPC) endorsed the Cockburn Coast District Structure Plan (CCDSP), which was the first step in establishing a high-level land use framework, to inform future detailed planning of the Cockburn Coast area. The CCDSP proposes a wide range of uses from medium to high density, mixed use, mixed business and includes activity nodes, a primary school and the redevelopment of the Power Station.

The Cockburn Coast project will be delivered over a 20 year timeframe and will involve significant public investment to relocate the South Fremantle switchyards and to restore and develop the South Fremantle Power Station site.

The CCDSP project area contains a number of state government and private landholdings. It is located in the City of Cockburn but also abuts the City of Fremantle. The project area has been divided into seven precincts:

1. Power Station Precinct
2. Hilltop Precinct
3. Robb Jetty Precinct
4. Emplacement Precinct
5. Darkan Precinct
6. Newmarket Precinct
7. Fremantle Village

1.1.2 Cockburn Coast District Structure Plan Part 2

The CCDSP set out a number of staged implementation processes, one of which is the preparation of a Masterplan for the Cockburn Coast Project area. The Masterplan, has been renamed Cockburn Coast District Structure Plan Part 2 (CCDSP 2).

The CCDSP 2 illustrates the next layer of detail for the development of Cockburn Coast and builds on the provisions of the CCDSP. It provides a strategic approach for the equitable and coordinated distribution of key infrastructure and provides detail on movement, open space, district scale water management and built form; as a precursor to the preparation of local structure plans. This Cultural Heritage Strategy is one of a suite of guiding documents, which will accompany the CCDSP 2 to assist in the planning and ongoing management of the area.

The CCDSP 2 applies to the Cockburn Coast Project area south of Rollinson Road only. It excludes the Newmarket and Fremantle Village Precincts, which were included in the CCDSP. These precincts are subject to separate planning policy being prepared and facilitated by the relevant planning agencies.

1.1.3 Local Structure Plans

The City of Cockburn Local Planning Scheme No. 3 (LPS No.3) specifies the need for local structure plans or detailed area plans to be prepared for the development zone prior to consideration of development or subdivision of land in the area. The local structure plans are to be consistent with the CCDSP and CCDSP 2.

For the purpose of the CCDSP 2 and the local structure plans, the precinct boundaries have been modified/grouped together and comprise the precinct areas:

1. Power Station Precinct
2. Robb Jetty Precinct (which includes the Darkan Precinct)
3. Emplacement and Hilltop Precinct

The City of Cockburn has initiated an amendment (Amendment No. 89) to the City of Cockburn LPS No. 3, which proposes to rezone the subject area from Industry and Light Industry to Development zone, and include it within a new Development Area. The proposed Development Area provisions set out the requirements for the local structure plans. One requirement stipulates the need for a Cultural Heritage Strategy to support the local structure plan.

In line with this, it is intended that this Cultural Heritage Strategy will support the local structure plan areas to ensure that issues of land use change, infrastructure development and design are coordinated and applied in a manner that respects and enhances the heritage values of each precinct.

1.2 STUDY AREA

This Strategy identifies places of cultural heritage value in the Cockburn Coast District Structure Plan area. However, the management and interpretation strategies are focused on the places located in the area south of Rollinson Avenue, which encompasses the three precinct areas:

1. Power Station Precinct
2. Robb Jetty Precinct
3. Emplacement and Hilltop Precinct

For consistency this Cultural Heritage Strategy is structured in accordance with the above three precincts, for the purpose of setting management and interpretation strategies. The foreshore area, which has not been included in any precinct, will be considered in conjunction with the Robb Jetty Precinct area.



FIGURE 2 - STUDY AREA

1.3 HERITAGE PLACES IN THE STUDY AREA

A number of significant places of indigenous, historic and maritime history are located within the Cockburn Coast study area. The following list identifies each of these places and their current heritage status (if listed) under the statutory provisions afforded to heritage places in Western Australia.

Precinct	Place	Type	Heritage List	Status/Category
Power Station Precinct	South Fremantle Power Station	Historic	State Register of Heritage Places City of Cockburn Heritage List	Interim Listed Category A
	James Shipwreck	Maritime	Register of Historic Shipwrecks Register of the National Estate*	Sailing Vessel Historic
	Diana Shipwreck	Maritime	Register of Historic Shipwrecks Register of the National Estate*	Sailing Vessel Historic
	Indian Ocean	Indigenous	Other Heritage Place - a place of interest however, it is not a formal Aboriginal site	Stored Data Open No Restriction
	Robb Jetty Camp (part of)	Indigenous	Register of Aboriginal sites	Registered Site Open No Restriction
Robb Jetty Precinct and Foreshore	South Beach Horse Exercise Area, inclusive of the following elements: CY O'Connor Statue (see below) Human Race artwork (interpretive element) Robb Jetty (see below) Wyola and barge (see below)	Historic	State Register of Heritage Places City of Cockburn Heritage List (referred to as 'South Beach')	Permanent Listed Category A
	Robb Jetty	Historic	Not individually listed. However, it is included within the State Register of Heritage Places curtilage for the South Beach Horse Exercise Area	N/A
	Robb Jetty Chimney	Historic	State Register of Heritage Places City of Cockburn Heritage List	Interim List Category A
	Robb Jetty Camp (part of)	Indigenous	Register of Aboriginal sites	Registered Site Open No Restriction
	Moreton Bay Fig trees	Historic	City of Cockburn – Local Government Inventory	Trees
	Wyola and barge (remains)	Historic	Not individually listed. However, it is included within the State Register of Heritage Places curtilage for the South Beach Horse Exercise Area	N/A
	CY O'Connor Statue (interpretive element)		City of Cockburn - Local Government Inventory	Category C
Hilltop/ Emplacement Precinct	South Beach Battery (remains)	Historic	City of Cockburn - Local Government Inventory	Category D

Precinct	Place	Type	Heritage List	Status/Category
Outside CCDSP 2 Study Area but within CCDSP area	Newmarket Hotel – 1 Rockingham Road, Hamilton Hill	Historic	State Register of Heritage Places City of Cockburn Heritage List	Permanent Entry Category A
	Azelia Ley Homestead, Manning Estate	Historic	State Register of Heritage Places City of Cockburn Heritage List Register of the National Estate	Permanent Entry Category A Historic
	Manning Park Tuart Trees	Historic	City of Cockburn Heritage List	Category B
	Marks' House – 1 Davilak Avenue, Hamilton Hill	Historic	City of Cockburn Heritage List	Category B
	Randwick Stables – 24 Rockingham Road, Hamilton Hill	Historic	State Register of Heritage Places City of Cockburn Heritage List	Permanent Entry Category A

* The Register of the National Estate recognises places of cultural heritage value but has no statutory implications.



FIGURE 3 - HERITAGE PLACES WITHIN THE STUDY AREA AND IMMEDIATE LOCALITY

1.4 SCOPE AND METHODOLOGY

The following actions have been undertaken to inform this Strategy:

- A desktop survey to identify all heritage places and aboriginal sites pertinent to the project area
- Secondary research was undertaken to identify key themes/stories associated with the study area
- An interview with Patrick Hume was undertaken to gain an insight into how the area has evolved. Mr Hume is an 85 year old Aboriginal man, who has spent most his life (since 1939) living and working around the Fremantle area. The interview was undertaken to assist in identifying themes associated with the project area. The interview was not consultation and does not replace the need for consultation with relevant Aboriginal stakeholders, which will occur as part of any section 18 application
- Site visits to the subject area were undertaken by the project team, to view places identified as being significant

Based on the above investigations, a Chronology of the history of the area and a Thematic History have been prepared. The Thematic History assists in emphasising the layers of history of the place over time and the multiple stories associated with it.

From this understanding, a framework for the management of heritage in Cockburn Coast has been developed to enable the places, history and stories of the study area to be embedded in the planning framework for the Cockburn Coast. An Implementation Plan setting out responsibilities, has also been prepared.

NOTE: Detail of the indigenous association with the study area has been compiled through means of a desktop study using readily available resources. The importance of specific consultation with indigenous groups is recognised and will occur independently of this report and in accordance with the requirements of the *Aboriginal Heritage Act 1972*.

1.5 STUDY TEAM

Historic Heritage - TPG Heritage

Nerida Moredoundt - B. Sc., B. Arch., Grad Dip. Sc., RAIA, M.ICOMOS

Susannah Kendall - MA (Urban & Regional Planning)., B. A. (Cultural Heritage)

Siân Morgan - B. Sc. (Urban & Regional Planning) Hons., BA (Fine Arts & Psychology)

Maritime and Archaeological - Yates Consulting

Dr Amanda Yates – Ph.D (Geography)., B. A. (Archaeology) Hons

Indigenous Heritage - Big Island Research

Dr Guy Wright – Ph.D (Social Anthropology)., MA (Social Anthropology)., B. A. (Anthropology)

1.6 PREVIOUS RESEARCH

This Cultural Heritage Strategy draws substantially on the technical appendices of the Cockburn Coast District Structure Plan released in June 2008, particularly:

- The Changing Cockburn Coast – Appendices: European Heritage, prepared by Dr Amanda Yates and Julie Mackay
- The Changing Cockburn Coast – Appendice: Indigenous Heritage, prepared by Australian Interaction Consultants

2. UNDERSTANDING THE PLACE

2.1 PEOPLE OF THE ANCIENT LANDSCAPE

The modern landscape of the Cockburn Coast formed between 5,000 and 6,500 years ago. Prior to this time a broad coastal plain stretched from the current shoreline to Rottnest Island and beyond.[1] Marked by a series of hills and ridges, that are still visible today as Rottnest, Carnac, and Garden Islands, these lands no doubt provided a variety of food and other resources comparable to that reported for the Swan Coastal Plain in historical times. A lagoon formed during early Holocene times in the central part of Cockburn Sound and was sheltered from prevailing winds by the limestone ridge that was to become Garden Island. This was probably an attractive camping place, well suited for the exploitation of foods associated with the wetlands.[2]

Archaeological evidence for Aboriginal occupation of this area is, not surprisingly, difficult to find. Sea level rise following the last ice age, about 18,000 years ago, has long since drowned the flat lands of the continental shelf between Rottnest Island and our modern shoreline, transforming the hills and ridges into offshore islands and submerged reefs.

The Cockburn Coast featured early in the settlement of Western Australia. A map of Cockburn Sound drawn in 1830 shows structures built where the abandoned South Fremantle Power Station now lies. This, together with the wreck of the passenger vessel, the James, in 1830 and occupation by up to 500 settlers of the recently discovered Peel Town on the coast south of Woodman Point, has more than likely destroyed any evidence of hunter-gatherer occupation.[3]



FIGURE 4 - PART OF SHEET 1 OF COCKBURN SOUND BY R. CLINT 1830 SHOWING THE DIANA AND JAMES WRECK SITE AND NEARBY STRUCTURES. SOURCE: GREEN, J (2006) *SURVEY OF THE PORT COOGEE DEVELOPMENT AREA, P10*

No doubt, the extensive use of the coastline by settlers and industry since the founding of the Swan River Colony in 1829 has destroyed virtually all evidence of its previous occupation by hunter-gatherers. Stone artefacts have however been discovered on both Rottnest and Garden Islands.[4] Accounts of the early settlers and explorers note that local Aboriginal people did not have watercraft of any kind. It is presumed then that the artefacts found on Rottnest and Garden Islands were left by Aboriginal people when the islands were still hills on the coastal plain. Significantly, several of the artefacts are made from Eocene fossiliferous chert, a distinctive stone known to have been sourced from quarries on the now drowned continental shelf.[5] Other artefacts

1 Skene, D., Ryan, D., Brooke, B., Smith, J. and Radke, L. (2005). The Geomorphology and Sediments of Cockburn Sound. Geoscience Australia, Canberra, ACT.

2 Dortch, C.E. 1991. Rottnest and Garden Island Prehistory and the archaeological potential of the adjacent continental shelf, Western Australia. Australian Archaeology vol. 33, pp.38-43.

3 Burke, Shane; Di Marco, Peter and Meath, Simon. The Land 'Flow[ing] ... with Milk and Honey': Cultural Landscape Changes at Peel Town, Western Australia, 1829-1830 [online]. Australasian Historical Archaeology, Vol. 28, pp. 5-12.

4 opcit Dortch, C.E. 1991.

5 Glover, J.E. 1984. 'The geological sources of stone artefacts in the Perth Basin and nearby areas'. Australian Aboriginal Studies, vol. 1, pp.17-25; and, Dortch, C.E. 1991. Rottnest and Garden

include a weathered calcrete flake and a broken quartz flake.

Australians are still arguing about how long before 40,000 years ago the first people arrived here. Most accept that the first Australians probably arrived sometime around 45,000 years ago[6], but some would allow dates of up to 60,000 years BP and even earlier.[7] Dating stone artefacts is often problematic. However, thermoluminescence dating of quartz sands from the palaeosoils in which the Rottnest artefacts were embedded suggests they are some 20,000 years old. Much older dates have also been suggested but are questioned.[8]

The oldest known sites in the Perth metropolitan area are located near the major river systems on the Swan Coastal Plain, with the earliest evidence for Aboriginal occupation radiocarbon dated to 39,500 years ago at Upper Swan Bridge[9] and 27,000 years ago on the Helena River in Midland.[10] Other dated sites show occupation 10,000 years ago at Minim Cove in Mosman Park,[11] 8,000 years ago at Walyunga in the Swan Valley,[12] 4,500 years ago at Orchestra Shell Cave in Wanneroo[13] and 2,500 years ago at Brigadoon in Millendon.[14] These sites confirm Aboriginal occupation of the Swan Coastal Plain, no doubt including the Cockburn Coast area, over tens of thousands of years.

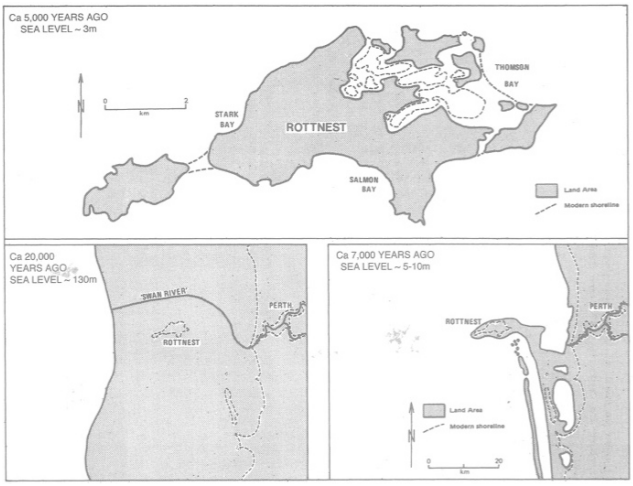

FIGURE 5 - ALTERATIONS IN THE LANDSCAPE WITH SEA LEVEL CHANGES. SOURCE: ERNEST HODGKIN'S, SWANLAND 2005

To date, more than 1,000 Aboriginal sites have been recorded in the Perth metropolitan area. The majority of these are found near fresh water sources on the Swan Coastal Plain, with the largest sites located on elevated dunes and sand ridges near the Swan River and its tributaries, and around lakes and wetlands.[15]

Island Prehistory and the archaeological potential of the adjacent continental shelf, Western Australia. Australian Archaeology vol. 33, pp.38-43.

6 O'Connell JF and Allen J. 1998. 'When did humans first arrive in greater Australia and why is it important to know?' Evolutionary Anthropology, vol. 6, pp. 132–46.

7 Roberts, R.G., R. Jones & M.A. Smith. 1994. Beyond the radiocarbon barrier in Australian prehistory. Antiquity vol. 68, pp. 611-6; and, Hesp, P.A., Murray-Wallace, C.V. & Dortch, C.E. 1999. Aboriginal Occupation on Rottnest Island, Western Australia, Provisionally Dated by Aspartic Racemisation Assay of Land Snails to Greater than 50ka, Australian Archaeology vol. 49, pp. 7-12; and, Turney, C. S. M., M. I. Bird, L. K. Fifield, R. G. Roberts, M. Smith, C. E. Dortch, R. Grun, E. Lawson, L. K. Ayliffe, G. H. Miller, J. Dortch and R.G. Cresswell (2001). 'Early Human Occupation at Devil's Lair, Southwestern Australia 50,000 Years Ago', Quaternary Research vol. 55, pp. 3-13.

8 Hesp, P.A., Murray-Wallace, C.V. & Dortch, C.E. 1999. Aboriginal Occupation on Rottnest Island, Western Australia, Provisionally Dated by Aspartic Racemisation Assay of Land Snails to Greater than 50ka, Australian Archaeology vol. 49, pp. 7-12.

9 Pearce, R.H. and M. Barbetti. 1981. 'A 38,000 year old archaeological site at Upper Swan, Western Australia' Archaeology in Oceania vol. 16, pp. 173-178.

10 Schwede, M. 1983. Supertrench – Phase 2, a report on excavation results. In Smith, M. (ed) Archaeology at ANZAAS, pp. 53-62. Western Australian Museum: Perth.

11 Clarke, J. and Dortch, C. 1977. 'A 10,000 year BP radiocarbon date for archaeological finds within a soil of the Spearwood Dune System, Mosman Park, WA' Search vol. 8, pp. 36-38.

12 Pearce, R.H. 1978. 'Changes in artefact assemblages during the last 8000 years at Walyunga, Western Australia'. Journal of the Royal Society of Western Australia vol. 61, pp. 1-10.

13 Hallam , S. J. 1987. 'Yams, Alluvium and Villages on the West Coastal Plain'. In Smith, M. Archaeology at ANZAAS. Anthropology Department, Western Australian Museum: Perth.

14 Schwede, M. 1990. Quartz, the Multifaceted Stone: A regional prehistory of the Helena River Valley on the Swan Coastal Plain of Southwestern Australia. Unpublished PhD Thesis.

15 Anderson, J 1984. Between Plateau and Plain. Occasional Papers in Prehistory, Research School of Pacific Studies, ANU Canberra; and, Hallam, S. J. 1987. 'Yams, Alluvium and Villages on the West

There is to date however no archaeological evidence for traditional Aboriginal occupation along the Perth coastline; available evidence suggests that the resources of the coast, most notably marine shellfish, were little used.[16]

However, part of the explanation for the paucity of coastal archaeological material may lie in the very active use of the coast by settlers, combined with the shifting and impermanent nature of sandy coastal environments. Archaeological research, together with the records of early settlers indicates that it was the resources of estuaries, rivers and lakes that were key to the economy of local Aboriginal people. It is possible then that further evidence for traditional Aboriginal occupation of the Cockburn area may still be found around the lakes and wetlands that parallel the coast between Manning Park and Lake Coogee.

Remarkably, there appears to be a Noongar cultural remembrance of the inundation of the coastal environment when the current Cockburn Coast was established more than 5,000 years ago. The early settlers were told the Noongar understanding of how the Cockburn Coast was created:

> *"They [the Aboriginal people] state, as a fact handed down to them from their ancestors, that Garden Island was formerly united to the main, and that the separation was caused in some preternatural manner by the Waugal."*[17]

According to the pioneer diarist George Fletcher Moore (1842/1884), the Swan River Tribes told him how the islands off Fremantle separated from the mainland as a result of cataclysmic events:

> *"The natives have a tradition that Rottnest, Carnac and Garden Islands once formed part of the mainland and that the intervening ground was thickly covered with trees; which took fire in some unaccountable way and burned with such intensity that the ground split asunder with great noise and the sea rushed in between, cutting off these islands from the mainland."*[18]

This story appears to be associated with the rising sea levels, which flooded the interdunal lake that became Cockburn Sound. It suggests, *"that some tectonic disturbance may have coincided with the final phase of sea level rise."*[19]

According to archaeologist Sylvia Hallam, other stories from the Southwest such as the Great Shaking and Big Water also suggest tectonic movements. Hallam argues that the Swan River legend demonstrates that Aboriginal burning was practiced in the area prior to the mid-Holocene sea level rise. This legend is vital in establishing the antiquity of Aboriginal burning of the Southwest, because most of the evidence comes from caves and dunes formed during the last marine transgression.[20]

.

Coastal Plain'. In Smith, M. Archaeology at ANZAAS. Anthropology Department, Western Australian Museum: Perth; and, Bowdler, S., Strawbridge, L. and M. Schwede. 1991. 'Archaeological mitigation in the Perth Metropolitan Region'. Australian Archaeology vol. 32, pp. 21-25; and, Strawbridge, L. 1988. Aboriginal sites in the Perth metropolitan area: a management scheme. Report to the Department of Aboriginal Sites, Western Australian Museum, Perth.

16 Dortch, C.E. & Morse, K. 1984. 'Prehistoric Stone Artefacts on Some Offshore Islands in Western Australia'. Australian Archaeology vol. 19, pp. 31-47.

17 Armstrong, F. 1836. Perth Gazette, Vol. XX, 05 November, p. 797.

18 Moore, G.F 1842 (reprinted in 1884). Diary of Ten Years of an Early Settler in WA. UWA Press, as cited in Hallam, S. 1975 (reprinted in 1979). Fire and Hearth. Advocate Press, p. 112.

19 Hallam, S. 1975 (reprinted in 1979). Fire and Hearth. Advocate Press.

20 ibid

2.2 DREAMTIME STORIES

Local Aboriginal Dreamtime stories refer to this period of climate change. They infer that sea level rises may not have occurred as gradual fluctuations over a long period of time but as major events.

Aboriginal mythology exists that describes the formation of the coastal reefs and offshore islands somewhat differently from the Swan River legend recorded by Moore. This myth is called "The Legend of the Crocodile and Waugal" and was recorded as part of the research for Yabaroo Budjarra Heritage Trail:

> *"Whale would come up from the South to meet Shark and Crocodile and cruise around in the warmer waters of the Equator. The area was full of reefs and islands and Whale himself would pretend to be a floating island. Crocodile and Shark used to whack their tails on Whale's sides and imitate the waves washing over the reefs. Fish hearing this would home in looking for food. When they came up to Whale (who floated along with his mouth open) he closed his mouth and any fish that escaped went to Shark and Crocodile.*
>
> *Now, these were lean times and tempers were short. Shark got cranky with Crocodile and said that instead of flapping his tail, Crocodile was smooching up to Whale so he would get more fish. So they changed sides, but Shark was still not satisfied.*
>
> *He went wild as they were swimming south from the Equator, and near the present-day Geraldton region he started attacking Crocodile. When they came as far south as the wetlands they decided to have a big fight out in the Wardandi, as they called this ocean site.*
>
> *This was during the Nyitting , or Ice Age, and all the animals came to this area and gathered around. The two rocks at Two Rocks represent Yonga the Kangaroo and Bibyur the Scrub Turkey. Yonga was the head of the furred animals and the snakes and goannas, while Bibyur represented the feathered animals. They watched as Shark tore strips off Crocodile, which formed the reefs around Two Rocks. It is said that the waves, which flap over the reefs when the sea is high, come from the skin of Crocodile. In the end Shark was so enraged that he just tore Crocodile's tail right off in two chunks and now those two big chunks are Rottnest Island and Garden Island.*
>
> *Now that he had lost his tail, Crocodile could not swim. He had no power to push himself forward and no means of steering himself through the water, so he started walking down the coastline. When Crocodile got to the Fremantle entrance to Swan River, which Aborigines called Derbal-Yarragan, he started to go in there to rest up. But Waugal, the Rainbow Serpent, said he could not go in and told him to get going back up the coast. Waugal was frightened that Crocodile would eat all the animals and flatten the land."*[21]

Several Noongar elders have recounted Dreaming stories for the coast from Fremantle to Yanchep. Whale is associated with sand dunes at Leighton Beach. Shark and Crocodile fought in Cockburn Sound until the Creation Snake 'Waugal' intervened. Crocodile, on Waugal's advice travelled to Yanchep where he metamorphosed into Emu (Waitj).[22] In another Dreaming story, a fight between Crocodile and Waugal broke up the land and created Rottnest, Garden and Carnac Islands.[23]

There is also a Noongar belief that the sea is where the "soul" goes following death. This belief was noted by the pioneer chronicler of Aboriginal cultures Daisy Bates:

> *"The Aborigines along the whole line of the Western Coast believe that when the body dies, the spirit goes away westward through the sea to some country far away, and that there the spirit lives in much the same manner as it has lived when in the flesh ... In the Swan district, Joobaitch, the last Perth man, stated that when his people died, their kaanya of spirit went away over the sea to another country, called Koorannup or Woordanung."*[24]

21 Indigenous Affairs Department Information Sheet.

22 Colbung in Hill, S. 2006. Indigenous Consultation Report, Draft Report, Indigenous Heritage Public Art Project, Leighton Marshalling Yards Redevelopment (Stage 1), Public Art Commission, p. 10 – 13.

23 Richard Wilkes in Hill, S. 2006. Indigenous Consultation Report, Draft Report, Indigenous Heritage Public Art Project, Leighton Marshalling Yards Redevelopment (Stage 1), Public Art Commission, p. 14 – 15.

24 Bates, D. 1985. The Native Tribes of Western Australia. White, I (eds.), p. 222, cited in The Changing Cockburn Coast: Appendices – Indigenous Heritage, June 2008. For the Western Australian Planning Commission and WA Department for Planning and Infrastructure, p. 38

2.3 MIDGEGOOROO'S COUNTRY

At contact, the senior tribal leader of the area containing the Cockburn Coast was almost certainly Midgegooroo. Midgegooroo was the Noongar leader for the country south and west of the Canning River. An unpublished report entitled "The Execution and Burial of Midgegooroo"[25] provides excellent background on this important person. Midgegooroo was Yagan's father, and has been described as a man who was "consistently hostile to the presence of Europeans on his country"[26] and "a dangerous and furious ruffian".[27]

The colonialist view of Midgegooroo's behaviour is likely to have been based in profound ethnocentrism. Midgegooroo is unlikely to have understood his sudden demotion from tribal leader responsible for a large estate, to troublesome "ruffian." He was probably acting on a strong cultural imperative when he apparently avenged the death of one of his people, for stealing food from a farm near Point Walter, by allegedly killing a servant belonging to the same farm. He was soon captured, and without trial he was executed by firing squad on the 22 May 1833 at the Old Deanery site on Saint Georges Terrace. The Deanery was then the location of the first Perth Gaol.

From "The Execution and Burial of Midgegooroo":

> *"Lyon was told that Midgegooroo ('Midjegoorong') was the principal man for 'Beeliar', 'bounded by Melville water and the Canning, on the north; by the mountains on the east; by the sea on the west; and by a line, due east, from Mangles Bay, on the south.' His main camp ('headquarters') was a place known as 'Mendyarrup, situated somewhere in Gaudoo' which, from other place names given by Yagan, may have been in the vicinity of Blackwall Reach and Point Walter.*
>
> *While Beeliar was Midgegooroo's home territory and he was most often encountered at places throughout his country, he appears to have had the right to move and hunt in the country of his neighbours and, over the first few years of the colony, was reported to have been at various places throughout the region including Lake Monger and the Helena River"* [28]

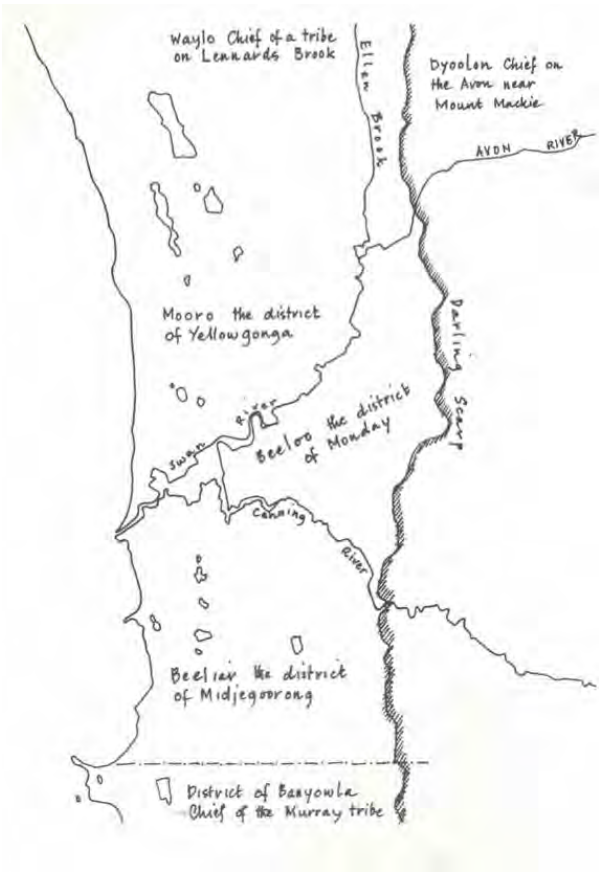

FIGURE 6 - ABORIGINAL FAMILY GROUPS AROUND PERTH ACCORDING TO R M LYON (1833). SOURCE: CANNING RIVER REGIONAL PARK – HISTORICAL SURVEY

25 Allbrook, Jebb and Associates. 2010. The Execution and Burial of Midgegooroo Unpublished Report for Palassis Architects, p. 16.

26 ibid

27 Perth Gazette, 25 May 1833.

28 Hallam, S. J. and Tilbrook, L. 1990. Aborigines of the Southwest Region, 1829–1840 (The Bicentennial Dictionary of Western Australians, Volume VIII). Nedlands, Western Australia: University of Western Australia Press.

2.4 RECENT ABORIGINAL USE OF THE COCKBURN COAST

It is quite certain that the Cockburn Coast continued to be used by Aboriginal people throughout the period of European settlement. Noongar people had well-known travelling routes that linked water-sources and provided access throughout the southwest.

J. E. Hammond, writing in the 1930s, used a metaphor from the cattle industry by calling these 'pads':

> *"All through the South-West there were pads of natives, like cattle pads, and just as plain ... If you take the present site of Perth as the starting point you will find that one pad led along the north bank of the river to where North Fremantle is to-day. There was very shallow water for more than halfway across the river and only a short distance to swim. The pad continued from this crossing to Bibra Lake and through Rockingham to Mandurah, and then pads led up both sides of the Murray River to the ford over the river, above the present site of Pinjarra. It was at this ford that the battle of Pinjarra was fought."*[29]

It seems likely that the beach and area behind the coastal dunes in the Cockburn Coast area was used for traffic between the southern shore of the Swan River and points further south.

The dunes near Robb Jetty were used by Aboriginal people for camping since about 1910.[30] It has been noted that the camping area was located in the sandhills to the south of South Beach, in the vicinity of Catherine Point. Camps were situated between the Bradford Kendall Pty Ltd Iron Foundry and Robb Jetty. It was apparently still being used in 1985: *"although Perth Metropolitan Aboriginal people no longer camp here, it was noticed that Aboriginal visitors from the Kalgoorlie region were living among the sandhills."*

The area is considered likely to have been a traditional camping area, as was the case of other long established fringe camps. However, there was little archaeological remnant of the camp.

> *"Though the sands driven by winter winds cover most evidence of human occupation, making individual camps hard to distinguish, in the deeper interdunal swales, campfire ashes, domestic refuse and the remnants of temporary shelters have been observed."*[31]

Subsequent archaeological investigations of the Robb Jetty Camp Site have not been able to identify any archaeological sites or isolated artefacts. This lack of evidence in a site that is a recorded historical camping area is attributed to the mobility of the coastal dunes.[32]

The Robb Jetty Camp Site has been placed on the Permanent Register of Aboriginal Sites. The site is also listed as containing a man-made structure and this is almost certainly due to the authors reporting the presence of remnants of temporary shelters.[33]

Archival research conducted has identified an Aboriginal campsite adjacent to "The Smelters" to the south of Fremantle. However, the report goes on to say that the available evidence suggests that the Robb Jetty Camp and "The Smelters" camp are in fact one and the same.[34]

29 Hammond, J.E. 1980 [1933]. Winjan's People: The Story of the South-West Australian Aborigines. Perth: Hesperian Press, pp. 17-19.

30 O'Connor, R. Bodney, C. & Little, L. 1985. Preliminary report on the survey of Aboriginal areas of significance in the Perth Metropolitan and Murray River Regions, unpublished report to the Department of Aboriginal Sites, pp. 83-85.

31 ibid

32 Shipley L. 1994. Report of an Aboriginal heritage Survey, Robb Jetty Camp (S2207) and Catherine Point Hamilton Hill, Western Australia. Unpublished Report prepared on behalf of McDonald, Hales & Associates PL, for the Department of Commerce and Trade; and, Shipley L. 1995. Addendum to Report of an Aboriginal heritage Survey, Robb Jetty Camp (S2207) and Catherine Point Hamilton Hill, Western Australia. Unpublished Report prepared on behalf of McDonald, Hales & Associates PL, for the Department of Commerce and Trade; and, Jackson, G. 1996. Report of an Archaeological Monitoring Exercise at Robb Jetty Camp (S2207) and Catherine Point, Western Australia. Unpublished Report by Archae-Aus PL for Department of Commerce and Trade.

33 opcit O'Connor, R. Bodney, C. & Little, L. 1985.

34 Makin, CF. 1970. Socio-economic anthropological survey of people of Aboriginal descent in the metropolitan region of Perth, Western Australia. University of Western Australia. In McDonald, E. and

2.5 EUROPEAN EXPLORATION

The first recorded sighting of the Cockburn Coast comes from the Dutch explorers in 1658 when the skipper of the "Walkende Boey" visited the area in search of the "Gilt Dragon" (which had wrecked off the south west) and charted parts of the shoreline. These charts are held in the Hague Archives, and reportedly show the Cockburn and Fremantle Coastline including Rottnest and Garden Islands.[35] The Islands off Fremantle also appear in the c1700 charts compiled after the exploratory voyages of Dutchman Willem de Vlamingh in 1696.

The exploratory history of the south west then falls silent until the latter half of the next century, when French explorer, Captain de St Alouarn in the "Le Gros Ventre", claimed the entire west coast for the French Crown. Western Australia was explored more carefully by the French during the 1801 scientific exploration to the South Seas under Nicholas Baudin. During this time, the south west coast line was mapped, and many features given French names such as Geographe Bay, Cape Naturalist, Point Peron, Napoleon Bonaparte Archipelago, Bauche and Bertholte Islands. The latter were subsequently renamed by Captain James Stirling to Garden and Carnac Islands, for the British did not recognise the French's claim to Western Australia.[36]

Along with the early explorers, the Cockburn Coast and adjacent off shore Islands were well known by whalers and sealers who operated along the West Coast. American and French whalers in particular, are known to have frequented the south west oceans during most of the nineteenth century in search of the humpback, right and sperm whales.[37]

The maritime history of the Cockburn and Fremantle Coast begins in earnest with Captain Stirling's exploration of the Swan River District in 1827 on the HMS "Success" which led to establishment of a new colony on the Swan River.

Grove, D. 2003. Desktop Aboriginal Survey of the Proposed South Beach Village Development, South Fremantle. Unpublished report prepared for Landcorp. June 2003.

35 Cowan,D.C., Caldwell, K, (1937). Garden Island, Western Australia, p. 1

36 Ibid

37 Green, Neville Unpublished History - Garden Island History Prior to the Turn of the Century

2.6 SETTLEMENT AND DEVELOPMENT OF COCKBURN COAST

The Cockburn Coast is associated with the earliest settlement of the Swan River Colony with the first settlers anchoring off Owen Anchorage and taking up land grants in 1830.

Owen Anchorage continued to be used for shipping throughout the nineteenth century and was particularly busy during the Gold Rush era. While the anchorage was relatively safe, a number of shipwrecks have occurred over the years with several wrecks washed up on the shoreline.

Robb Jetty was constructed in the late nineteenth century to service the cattle industry. While the rural landholdings gradually changed to residential suburbs, the coastal strip steadily grew as an industrial area from the late nineteenth century with the introduction of the rail line between Fremantle Port and Robb Jetty in 1898.

Following the war, the construction of the South Fremantle Power Station represented the pinnacle of industrial development in Western Australia. The closure of the power station in 1985 marked the beginning of a transformation of this coastal area from primarily industrial use. This culminated in the release of the Cockburn Coast District Structure Plan in 2009 with the vision for mixed use urban development.

The following chronology provides an overview of the history of the study area. Aerial images are also presented, after the chronology, and provide an understanding of the changes that have occurred in the landscape from 1953.



FIGURE 7 - UNLOADING CATTLE AT ROBB JETTY (C 1920)
SOURCE: FREMANTLE CITY LIBRARY LOCAL HISTORY COLLECTION IMAGE NUMEBR 2500



FIGURE 8 - THE KOOLINDA AT ROBB JETTY (C 1930) SOURCE: FREMANTLE CITY LIBRARY LOCAL HISTORY COLLECTION IMAGE NUMBER 1702

2.6.1 Chronology

The following chronology has been prepared to provide an understanding of the post settlement history of the whole Cockburn Coast project area (inclusive of the Newmarket Precinct and Fremantle Village Precinct which are outside the study area). It is not considered a complete history of the place.

1829 Swan River Colony founded in Perth with the landing of the first settlers at Garden Island, and later at Fremantle

1829/30 The first European settlement in Cockburn was Thomas Peel's short lived settlement at Clarence, now Woodman Point Reserve, which is south of the study area.[38] The settlement was dogged by bad luck and indifferent management and two years after its beginning the Town of Clarence lay deserted.[39]

Jan 1830 The Leda commanded by Captain George Robb anchored at Owen Anchorage, just south of Catherine Point.

Captain Robb took up a 2000 acre land grant, and unloaded stock, grain and building materials for the establishment of a farm. Robb left Sidney Smith behind to tend to his investments in the new colony. In a letter dated 27 August 1839, Smith gives the address of the farm as Hamilton Hill, from which the district takes its name.[40]

Oct 1830 Charles McFaull was assigned a grant of land near the coast close to Robb's grant. He constructed a house, well and outhouses and established the colony's first vineyard.

May 1830 The **James** was shipwrecked in Owen Anchorage, close to James Rocks, about 50 metres from shore.[41] A map of Cockburn Sound drawn in 1830 (refer to section 2.1) shows structures built near the wreck of the James, where the abandoned South Fremantle Power Station now lies. These structures are evidence of the early use of the area by settlers.

1833 On 2 October 1833, the first recorded official horse race in Western Australia was run on 'The Downs' at South Fremantle by seven Timor ponies. This began the association of horse racing with **South Beach** that has continued through into the 21st century.[42]

1836 Clarence townsite was surveyed. However, by 1840 blocks in the townsite were still held in the hands of absentee landowners and the area remained undeveloped.[43]

1841 A new road was established that stretched from Fremantle to Pinjarra on Murray River via the Cockburn coast. The road retraced two original tracks: Old Clarence Road (now Cockburn Road) and Dunnage's Track (now Russell Road). The road was serviced by seven wells along its 46 mile length.

1850 Henry Manning directed his younger brother Charles Manning to move to the Swan River Colony to represent the interests of the Manning Family. The Mannings were a shipping merchant family from High Holborn, London. The family bought up land around Davilak Lake.

1854 John Wellard purchased, Charles Macfaull's original land grant. Here sheep were slaughtered for the convict establishment and represents the pioneering of the area's the meat industry. Later the slaughter house of Copley and Co, operated on this site.

38 Berson, M , (1978), Making of a Community, Shire of Cockburn p 2
39 ibid, p13
40 ibid, p19
41 Australian National Shipwreck Database
42 Heritage Council of Western Australia Assessment Documentation for South Beach Horse Exercise Area, 30 March 2007, p. 4
43 O'Brien Planning Consultants (date unknown) City of Cockburn Heritage Inventory – Thematic Framework, p 2

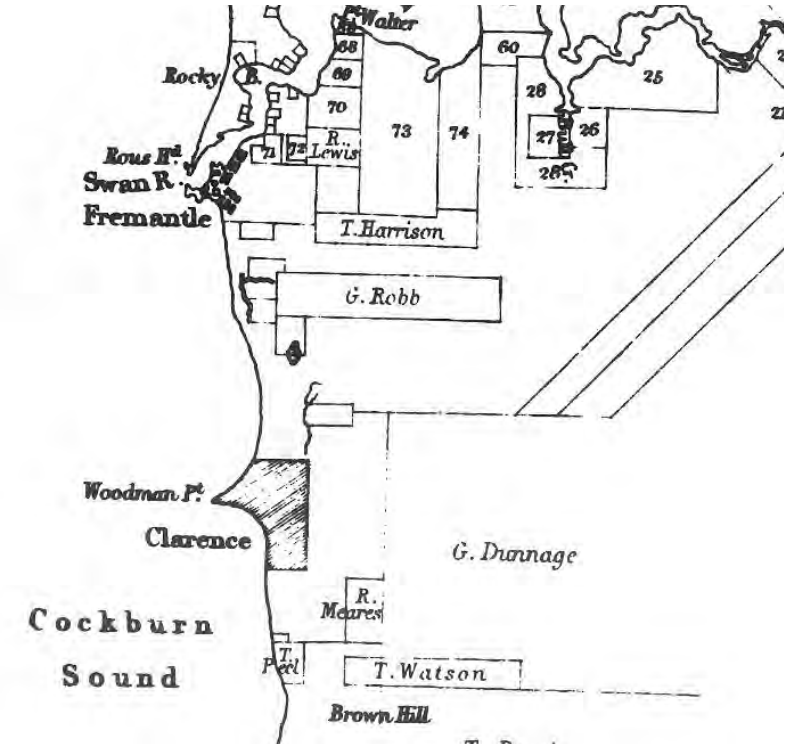

FIGURE 9 - EARLY LAND GRANTS IN COCKBURN AREA 1833, SHOWING ORIGINAL LOCATION OF THE CLARENCE TOWNSITE SOURCE: BERSON(1979) P14

1858 Charles Manning, now acting as the French Consul and leading merchant, built a 10-room farmhouse north of Davilak Lake, to supply his grand residence in Fremantle, Manning Hall.

The produce from the farm; fruit, vegetables, meat and condiments graced the table at receptions of visiting ships and other guests.

1866 The Davilak Homestead was built by Charles Manning for his son Lucius and his new wife. This homestead located to the south of Davilak Lake comprised a solid limestone house with 14 rooms and a shingled roof. The limestone was quarried on the Manning Estate and the timber, including the Yorkshire flags that made the kitchen floor, were pit sawn on site.[44]

1869 Charles Manning died, leaving behind a massive estate that stretched from the coast to Bibra Lake and down to Coogee.

1876 170 hectares of the Clarence town site west of Cockburn road was gazetted as a Quarantine Ground for Stock. This was first used in 1897 in response to the outbreak of cattle diseases in the Kimberley region.[45]

1877 An article in the Western Australian, dated 27 July 1877, outlines that a tender was accepted by the Government for James Brown to erect a **jetty** at Owen Anchorage, for a sum of £385. An article in the Inquirer and Commercial News, dated 16 January 1878, states that the jetty has been built by this time. This Jetty is believed to be what is referred to as **Robb's Jetty**.

1878 The **Diana** was shipwrecked at Owen Anchorage on 16 July 1878. Its port of origin was Port of Natal, Brazil.[46]

44 Berson, op. cit, p 100
45 Heritage Council of Western Australia Assessment Documentation for Quarantine Station (fmr), Woodman Point, 31 March 2006, p. 6
46 Australian National Shipwreck Database

1887 The Mannings lost a large part of their estate when the Government rejected their claim to George Robb's original land grant.

1886 The first recorded arrival of passengers into Quarantine Station (fmr), Woodman Point was in December 1886 from the ship Elderslie, which carried two cases of Scarlet Fever among its 127 passengers. The Quarantine Station (fmr), was a disembarkation point, and therefore the first experience of Australia, for many overseas visitors and new migrants from 1886 to the 1970s.[47]

1888 Electricity arrived in Western Australian in the form of lighting, provided by the Western Australian Electric and Power company.[48]



FIGURE 10 - CATTLE YARDS AND SHIPS AT ROBB JETTY (C 1890) SOURCE: FREMANTLE CITY LIBRARY LOCAL HISTORY COLLECTION IMAGE NUMBER 4816

1892 Lucius Manning died and the Manning Estate was run by his son Alfred.

Gold Rush The population of Perth and Fremantle grew rapidly during the gold rush years, bringing a demand for food and building materials. In the Cockburn district new settlements and industries sprung up to meet this demand.

By the turn of the century: the slaughter houses of Forrest, Emanuel and Co and Conner, Doherty and Durack, were in full swing and literally fed the metropolitan area and Goldfields. These slaughter houses were located near Robb Jetty.

Next to the abattoir at Robb Jetty an explosives magazine was built in the sand hills for use in the Goldfields to assist with mining.

1896 With the growth of the cattle trade, **Robb Jetty** was extended to a length of 427 foot (approximately 130 metres).[49]

1896 The Davilak Murder Mystery - Afghan cameleer Abdul Hoosin was found dead at Lampey's Hollow at Davilak. The ensuing police investigation and inquest identified the murderer; far too late because by the time they put two and two together the culprit, a fellow Afghan, had fled to Karachi. Abdul Hoosin's murderer was never brought to justice.

47 Heritage Council of Western Australia Assessment Documentation for Quarantine Station (fmr), Woodman Point, 31 March 2006, p. 6

48 Bodycoat, R, (2003). South Fremantle Power Station Conservation Plan, p 16

49 The Western Australian. 29 January 1896, p5

1898 A railway from Fremantle to Robb Jetty, was opened and the two slaughter houses continued to expand to meet the demand of their products.

1900 Fremantle smelting works were established south of Island Street. Smoke poured into the sky as it processed lead and base bullion from Kalgoorlie.[50]

The railway from Robb Jetty was extended south to Woodman Point. The explosive magazines were also moved there, further away from Fremantle.[51]

Azelia Ley Homestead built on the Manning Estate on the west side of Davilak Lake as a home for newlyweds Azelia Manning and John Ley.

1902 Engineer **C. Y. O'Connor** tragically took his life at South Beach. The site of the tragedy has been commemorated with the installation of an interpretive statue in the water off the beach in 1999.

1903 A lighthouse was built, to replace the limestone obelisk at Clarence townsite. It was used as a navigation aid to mark the Challenger passage between Carnac and Garden Islands

1904 Lime kilns were established at Hamilton Hill for the growing building trade.

1912 The **Newmarket Hotel** was built on the corner of Rockingham and Cockburn Roads, and soon became a popular watering hole for the workers in the industrial areas. It later became a focal point for the southern metropolitan racing fraternity.

The larger estates at Hamilton Hill such as the Manning's were subdivided into smallest lots.

Shops began to spring up along Rockingham Road in north Cockburn.

Three skeletons were discovered at Coogee Beach.



FIGURE 11 - NEWMARKET HOTEL (DATE UNKNOWN) SOURCE: AZELIA LEY HOMESTEAD MUSEUM IMAGE NUMBER: AL.84.37

50 Berson, op. cit, p 100
51 Berson, op. cit, p 102

1915 10th Light Horsemen camped at Woodman Point and trained on the Cockburn beach from Woodman Point to Robb Jetty.

1919/20 The **Robb Jetty Abattoir** opened. At this time it operated under the name 'Fremantle Freezing and Meat Works.'

1920 **Randwick stable** and house constructed on Rockingham Road. The owners of this place – the Marks family - are leading members of the local horse racing fraternity.

1942 As a result of management difficulties, the State Government purchased the Fremantle Freezing and Meat Works (the **Robb Jetty Abattoir**). The name of the company was changes to the 'Western Australian Meat Preservers', although several years later this was again altered to become the 'Western Australian Meat Exporters'.[52]

1944 The **South Beach Battery** located in Emplacement Crescent was constructed to provide high level anti-aircraft and coast artillery cover for Cockburn Sound. One of the three original emplacements remain, though the guns were never installed.

1946 Construction began on **South Fremantle Power Station**.



FIGURE 12 - SOUTH FREMANTLE POWER STATION (1957) SOURCE BATTYE LIBRARY 239097PD

1951 Bradford Kendal Foundry constructed on the original site of the lead smelter on Island Street.

On 27 June the **South Fremantle Power Station** officially opened to supply the South West with electricity. The new station was 'built like a fortress – a magnificent cathedral of power' a symbol of the commanding place electricity would play in the future of Western Australia.[53]

1970 The 306–ton steam tug **Wyola** was run ashore at **Robb Jetty** for dismantling and scrapping in 1970.

1975 **Robb Jetty** was burnt and dismantled, although some timber piles remain.

52 Gibbs, M (1995) Robb Jetty Abattoir – Archeological report, p 3

53 Bodycoat, op. cit, p.19

1985 **South Fremantle Power Station** officially closed. The surviving Main Building, now stripped of all plant, equipment and services, remains as a significant landmark on the coast. The switchyard to the north of the site remains operational.

Robb Jetty Camp (DIA ID 3707) recorded as an Aboriginal Site

Indian Ocean site (DIA ID 3776) entered in the Department of Indigenous Affairs database

1992 The **Robb Jetty Abattoir** ceased operation.

1996 On 14 May 1996 the **Robb Jetty Chimney** was entered onto the State Register of Heritage Places on an interim basis.

1997 On 28 October 1997 the **South Fremantle Power Station** was entered onto the State Register of Heritage Places on an interim basis.

1999 A statue of C.Y. O'Connor on horseback was erected 50 metres from the shore of the South Beach Horse Exercise Area. Executed by sculptor Tony Jones at a cost of $70,000.[54]

2007 On 30 March 2007 the **South Beach Horse Exercise Area** was entered onto the State Register of Heritage Places on a permanent basis.

2009 Cockburn Coast District Structure Plan released with a vision for the transformation of the area into a mixed use urban development.



FIGURE 13 - ROBB JETY (REMAINS) AND C.Y.O'CONNOR STATUE (2011)

54 Heritage Council of Western Australia Assessment Documentation for South Beach Horse Exercise Area, 30 March 2007, p. 16

2.6.2 Aerial Photographs

The following selection of aerial photographs, sourced from City of Cockburn Intramaps, demonstrate the evolution of the subject area and its surrounds from 1953. The South Fremantle Power Station has been identified as a point of reference.

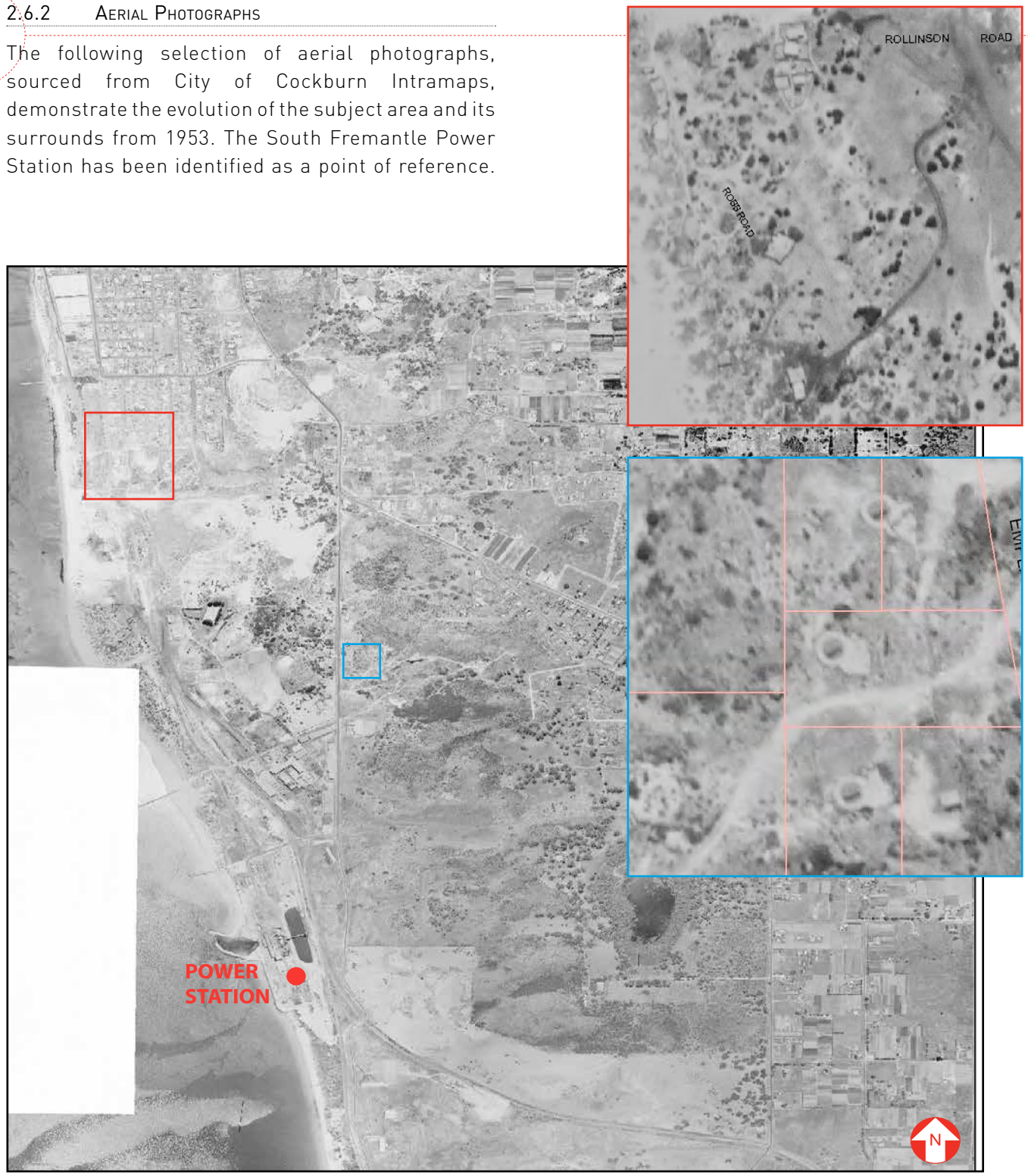

Figure 14 - Aerial 1953 - Red inset showing structures in foreshore area, possibly remnant camping areas
Blue inset showing the three gun emplacements of the South Beach Battery



FIGURE 15 - AERIAL 1965 - INSET SHOWING ROBB JETTY



Figure 16 - Aerial 1974 - Inset showing Wyola and Barge (remains) adjacent to Robb Jetty, which ran ashore in 1970



FIGURE 17 - AERIAL 1981 - INSET SHOWING SOUTH FREMANTLE POWER STATION IN OPERATION



Figure 18 - Aerial 1995 - Inset showing the extensive operations of the Robb Jetyy Abattoir, which was demolished in 1995



Figure 19 - Aerial 2006 - Inset showing South Fremantle Power Station, which closed in 1985

3. KEY INTERPRETIVE THEMES



Figure 20 - View of the Former Cattle Run at Robb Jetty with Interpretive Artwork

The Australian Historic Themes Framework (AHTF) published by the Australian Heritage Council provides a consistent framework that is a useful tool for heritage management and is particularly beneficial in assisting in the interpretation of heritage places.

The framework emphasises the human activities that have produced the places we value, and the human response to Australia's natural environment. Places are related to the processes and stories associated with them, rather than to simply the type or function of place. Themes provide a way of investigating and interpreting the history of a place.

The themes are not intended to follow a chronological order. Rather, they are designed to be applied and interlinked, regardless of the period or place. They embrace prehistory to the modern period and a multiplicity of human activities.

The following themes are those that most particularly apply to the heritage of the Cockburn Coast study area.

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3.1 TRACING CLIMATIC AND TOPOGRAPHICIAL CHANGE

Australian Historic Themes Framework 1.1

The modern landscape of the Cockburn Coast formed between 5,000 and 6,500 years ago. Prior to this time a broad coastal plain stretched from the current shoreline to Rottnest Island and beyond.[55] The plain was marked by a series of hills and ridges, that are still visible today as Rottnest, Carnac, and Garden Islands.

Sea level rise following the last ice age has long since drowned the flat lands of the continental shelf between Rottnest Island and our modern shoreline, transforming the hills and ridges into offshore islands and submerged reefs.

There are local Aboriginal Dreamtime beliefs that refer to this period of climate change, and infer that sea level rises may not have occurred as gradual fluctuations over a long period of time, but as major events. These beliefs were noted by early settlers:

"They [the Aboriginal people] state, as a fact handed down to them from their ancestors, that Garden Island was formerly united to the main, and that the separation was caused in some preternatural manner by the Waugal."[56]

"The natives have a tradition that Rottnest, Carnac and Garden Islands once formed part of the mainland and that the intervening ground was thickly covered with trees; which took fire in some unaccountable way and burned with such intensity that the ground split asunder with great noise and the sea rushed in between, cutting off these islands from the mainland." [57]

55 Skene, D., Ryan, D., Brooke, B., Smith, J. and Radke, L. (2005). The Geomorphology and Sediments of Cockburn Sound. Geoscience Australia, Canberra, ACT.

56 Armstrong, F. 1836. Perth Gazette, Vol. XX, 05 November, p. 797.

57 Moore, G.F 1842 (reprinted in 1884). Diary of Ten Years of an Early Settler in WA. UWA Press, as cited in Hallam, S. 1975 (reprinted in 1979). Fire and Hearth. Advocate Press, p. 112.

3.2 EXPLORING THE COASTLINE

Australian Historic Themes Framework 3.1

Owen Anchorage near Catherine Point on the Cockburn Coast was the focus of shipping from the first days of settlement, as it offered relatively safe anchorage and landing.

One of the first ships to land was the Leda commanded by Captain George Robb (from which Robb Jetty takes it name) in January 1830. By the gold rush at the turn of the century Owen Anchorage was jammed full with tall masted sailing ships. At this time the Fremantle port was considered inadequate and one of the proposals was to open up a passage through Success Bank at Owen Anchorage and build to a wharf at Catherine Point that could be connected by rail to the customs house at Cliff Street. However, this proposal was rejected and the Fremantle inner harbour was built[58].

After Perth was founded in 1829, many ships were wrecked along the coastline and around Fremantle. Islands, reefs and uncharted rocks, and poor navigational aids all played their part in the fate of many colonial period ships.[59] Owen Anchorage is now the grave yard for a number of ship wrecks and associated maritime relics and features, including the now submerged remnants of Robb Jetty.

The earliest wreck site and potentially the most significant is the James which was driven ashore in 1830. A cannon was found recently and more artefacts may still exist. Other wrecks in Owen Anchorage include the Diana and the Omeo. Other unfound ships are known to have been lost near Catherine Point such as the Sea Nymph. Graves said to be associated with the James were exposed in 1912. A letter to the editor of the West Australian, displayed in the 3 February 1912 edition gives an insight into the graves:

"I remember that when I was a lad nearly half a century ago there was to be seen a few yards from the beach in the vicinity of where Robbs Jetty now is a dilapidated railing enclosing the grave of two seamen who were drowned in the wrecks of the Brig James (after which James Rocks were named) about 70 years ago. A decaying jarrah slab recorded their names and fate, but the rude memorial was so hidden by the dense scrub that its existence was but little known save to a few boys who had come across it in their quest for birds nests or "yorkie Nuts". It is probably the remains of these two sailors that they have found."

Another account in another article in the Western Argus, dated 6 February 1912, states that the inscription on the oar set out that the grave was the resting place of *'Edward Henry Lively and Edward Seal, owners of the brig James.'*

58 Berson, M ,(1978), Making of a Community, Shire of Cockburn.

59 Visit the Fremantle Wreck Trail, Western Australian Museum, p 2

3.3 MOVING GOODS & FEEDING PEOPLE

Australian Historic Themes Framework 3.8 & 3.12

3.3.1 Shipping to Owen Anchorage (Australian Historic Themes Framework 3.8.1)

Robb Jetty, located in Owen Anchorage, was built circa 1877. Initially it consisted of a few bays of piles, driven into the beach, on which rough decking was provided to assist in the landing from boats and small craft generally. The jetty was also connected with the developing northwest meat trade.

The population of Perth and Fremantle grew rapidly during the gold rush years, bringing a demand for food and building materials. In the Cockburn district new settlements and industries sprung up to meet this demand. The growth of the cattle trade resulted in the need for an improved means of landing stock at Owen Anchorage and the Government extended the jetty to a length of 427 ft.

Stock from the pastoral stations in the Kimberly were shipped down the coast to Owen Anchorage. Initially stock were off-loaded into the water and forced to swim, as opposed to using Robb's Jetty. A fleet of small boats then directed the cattle to shore, where stockman were waiting to herd them into galvanised yards, which ran parallel to the beach. An account in the Western Mail, dating from 17 March 1899, gives an account of why the stock were initially forced to swim to shore:

> *'to prevent the spread of the tick the vessels are not allowed to come alongside. After being inspected by the Stock Department officials the cattle are swam ashore, and then driven into the yards.'*

The jetty was the first obvious landmark in the area and, along with the Robb Jetty Chimney, it forms recognisable markers in the historic landscape that assist in the interpretation of historical photographs and early maps.



Figure 21 - Unloading Cattle at Robb Jetty (date unknown)
Image courtesy of Dr M McCarthy



Figure 22 - Landing Cattle at Robb Jetty (Date Unknown)
Source: Fremantle City Library Local History Collection Image Number -1478A



FIGURE 23 - CATTLE UNLOADING FROM THE KIMBERLY - WA MEATWORKS AND ROBB JETTY CHIMNEY IN BACKGROUND (DATE UNKNOWN)
SOURCE: DALGETY ALBUM PG 68

3.3.2 Building a Railway (Australian Historic Themes Framework 3.8.6)

In 1898 a railway from Fremantle to Robb Jetty was opened and a few years later extended south to Woodman Point. An article in the Western Australian, dated 10 November 1896, outlines how stock was moved prior to the construction of the railway:

> *"The importance of a short line of about three miles from Fremantle to Robbs' Jetty, could not be too highly estimated. Thousands of head of cattle, horses, sheep, etc., had to be landed at Robbs' Jetty, and driven through the town to the railway stock- yards at Fremantle and elsewhere, much to the danger and nuisance of the townspeople, and large quantities of explosives and inflammable substances also had to be carted from the magazine near Robb's Jetty through the town. If a line were constructed all this would be obviated..."*

Early in the twentieth century, success in the agricultural areas of Jandakot and Forrestdale led to an increasing demand for a railway to the area from the port of Fremantle. After much lobbying the Fremantle-Jandakot railway was completed in 1906 and a link to Armadale was completed in 1907. The railway led to a regular service to the siding at Robbs Jetty and also connected with Spearwood, Bibra Lake, Jandakot, Banjup, Skeets Crossing, East Crossing and Murphy's Crossing. This rail greatly improved communication with the Cockburn Coast area and assisted in the transport of goods to market.

In 1963, part of the Fremantle to Armadale railway via Forrestdale was closed and later removed as a result of the completion of a new line linking Jarrahdale and Kwinana.

Today the rail from Fremantle, through the subject area, is used as a freight line delivering goods through to Kewdale and Kwinana.



Figure 24 - Aerial view of Robb Freight Terminal with South Fremantle Power Station in Background (undated) Source: Maunsell Collection State Library of Western Australia

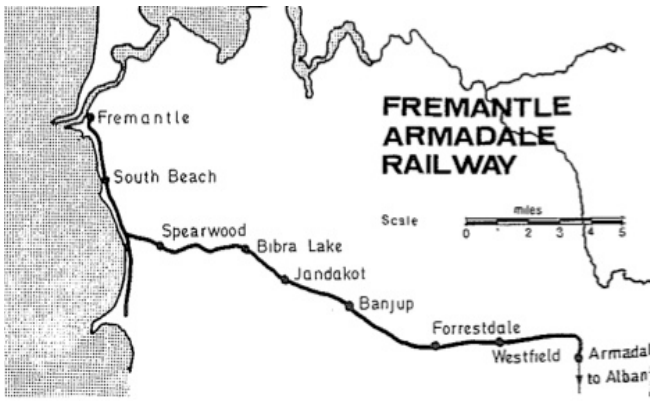

Figure 25 - Former Fremantle to Armadale Railway Source: Technic 10 National Estate Study (1975)

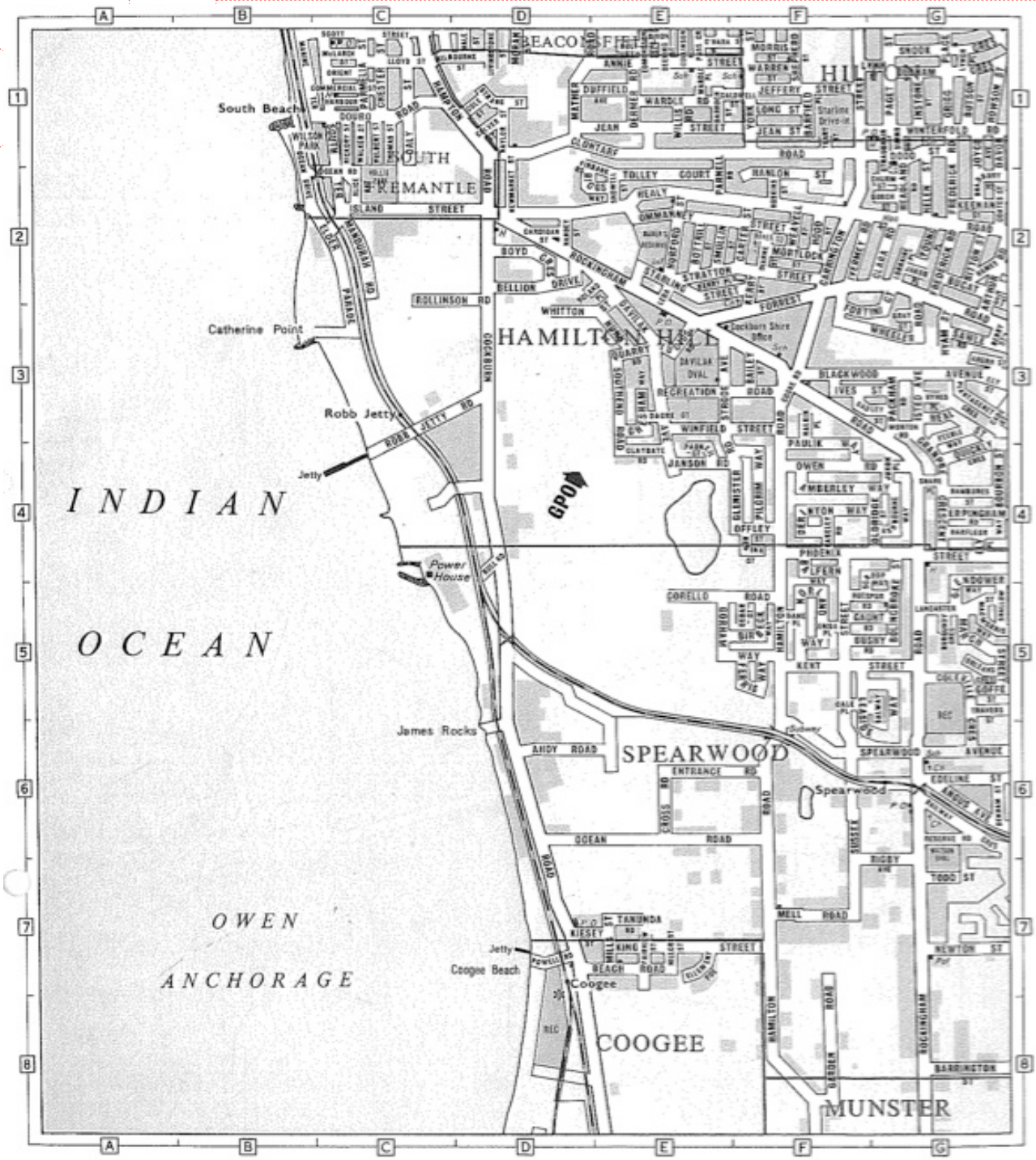

FIGURE 26 - STREET MAP SHOWING LOCATION OF RAILWAY AND ASSOCIATED SIDING AT ROBB JETTY (1972) SOURCE: METROPOLITAN STREET DIRECTORY 13TH ED

3.3.3 Developing Sources of Fresh Local Produce (Australian Historic Themes Framework 3.12.2)

The slaughterhouses of Forrest, Emanual and Co and Conner, Doherty and Durack, were in full swing at the turn of the twentieth century. Located in the vicinity of Robb Jetty, the slaughterhouses literally fed the metropolitan area and Goldfields, at this time. These companies were called the 'Kimberley Ring' because they held large pastoral properties in the Kimberley and controlled the shipping of all stock to Owen Anchorage.

Stock was shipped down from the Kimberly and off loaded into Owen Anchorage or onto Robb Jetty. The beach had yards to hold the cattle upon arrival. Prior to the development of cold storage stock had to be pastured until it was ready for slaughter. Thousands of acres of the Cockburn district was used for pasturage and holding paddocks.

The Robb Jetty abattoir appears to date from 1919. During the 1920s, the abattoir operated under the name 'Fremantle Freezing and Meat Works'. In its early stages the company not only slaughtered animals and butchered meat, but also provided cold storage for potatoes and fruit, manufactured ice and carried out wool scouring.

The Robb Jetty abattoir struggled financially through the post WW2 era, until it ceased trading in 1992. The abattoir and most associated infrastructure have been demolished, removed and the landscape environmentally remediated. The Robb Jetty Chimney, the railway and some remains of the Jetty remain in the modern landscape as reminders of this important phase of history.



Figure 27 - Robb Jetty Chimney (1993) Source: The Robb Jetty Abattoir Site Archaeological Report, Gibbs, M & Bush, F (1995) p. 29

> *"Between the coast and the Jandakot Agricultural area three quarters of the Fremantle Roads Board District was used as holding paddock leaving small enclosures of cultivated land at Lake Coogee and Hamilton Hill. For the settlers who were ringed by these paddocks of sheep and long-horned, half wild cattle travel along the District's few roads was a chancy business"*
>
> *(Berson, M (1978) Making of a Community, Shire of Cockburn).*

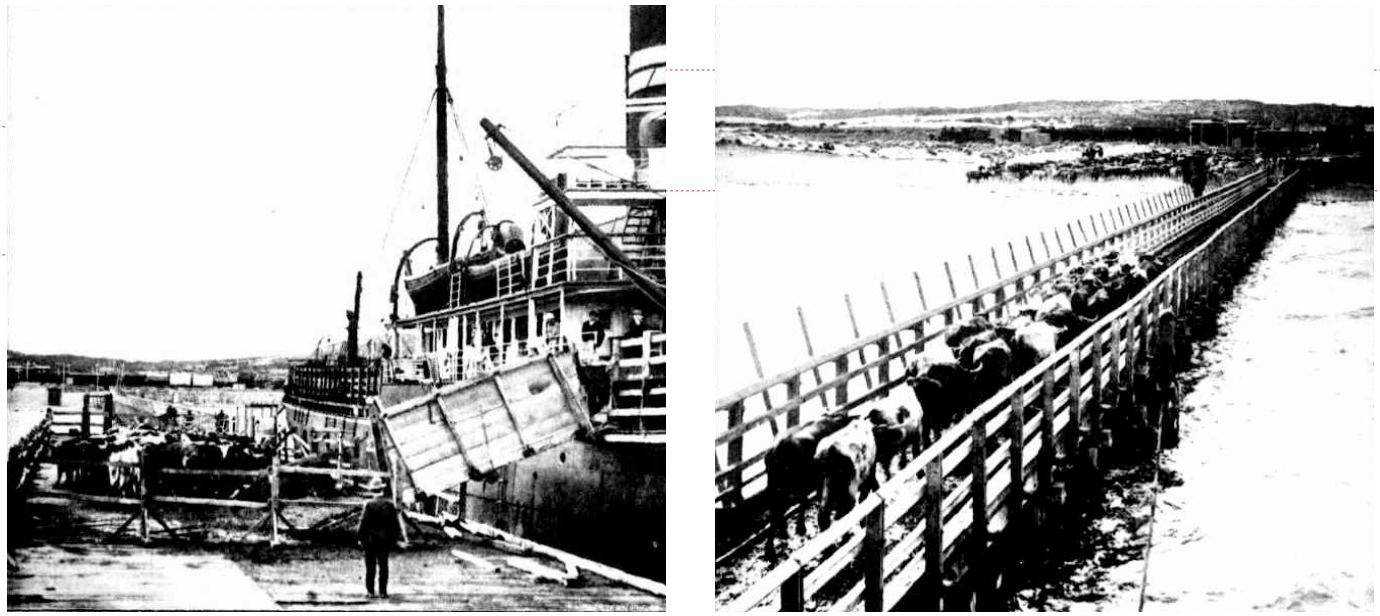

Figure 28 - Cattle Unloading onto Robb Jetty (1911) Source: The Western Mail, Saturday 5 August 1911, p. 52

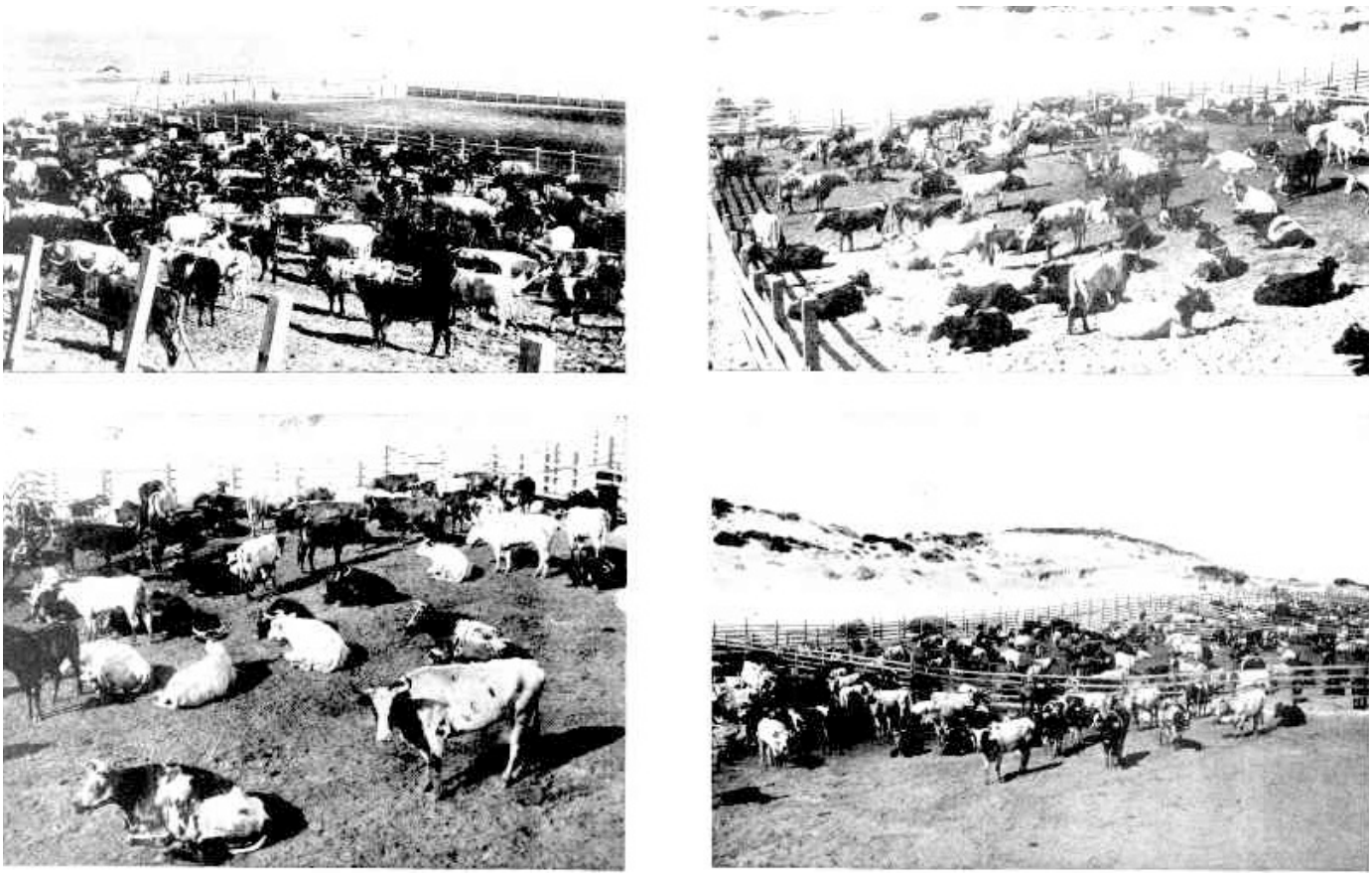

Figure 29 - Cattle being held onshore in yards near Robb Jetty (1905) Source: The Western Mail, Sunday 27 May 1905

3.4 SUPPLYING URBAN SERVICES

Australian Historic Themes Framework 4.2

The South Fremantle Power Station officially opened in 1951 to supply the southwest with electricity. It was the second and largest purpose-built thermal power station in Western Australia, operating for 34 years until 1985. In 1994 some parts were demolished, however the surviving main buildings, now stripped of all plant, equipment and services, remain highly significant. Another significant feature of the Power Station is the two groynes that project into Cockburn Sound to contain a water basin for the unusual practice of the intake of circulating seawater that was used in the process of steam and power generation.



FIGURE 30 - SOUTH FREMANTLE POWER STATION (C1964)
SOURCE: FREMANTLE CITY LIBRARY LOCAL HISTORY COLLECTION IMAGE NUMEBR 2497



FIGURE 31 - SOUTH FREMANTLE POWER STATION (1953)
SOURCE: EDMONDS, L; CATHEDRALS OF POWER PG 38

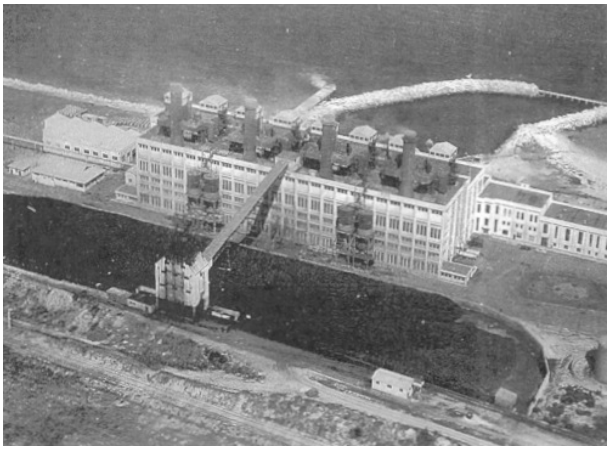

FIGURE 32 - SOUTH FREMANTLE POWER STATION (1955)
SOURCE: EDMONDS, L; CATHEDRALS OF POWER PG 39

3.5 SURVIVING AS INDIGENOUS PEOPLE IN A WHITE-DOMINATED ECONOMY

Australian Historic Themes Framework 5.7

The dunes near Robb Jetty were used by Aboriginal people for camping since about 1910. It has been noted that the camping area was located in the sandhills to the south of South Beach, in the vicinity of Catherine Point. It was apparently still being used in 1985 by Aboriginal visitors from the Kalgoorlie.

In an interview Mr Patrick Hume, an Aboriginal man who has spent most of his 85-years living and working around the study area, recalled the use of the dunes for camping:

> *"Over there, there is a registered site and that's where mostly Aboriginal people used to come down from the Wheatbelt and camp. They built their little tin houses and they painted them white with the limestone... the lime-paint... We called it "Hollywood", all these humpies (laughs)."*[60]

The local shire eventually moved everyone off the site due to there being no public amenities. This occurred around 3-4 years after World War II had finished.

Mr Hume also remembered other Aboriginal, as well as European, holiday-goers coming to the site later on, but again the government put a stop to this. He believes this was around the 1980's.[61]



FIGURE 33 - SANDHILLS ALONG THE FORESHORE WITH SOUTH FREMANTLE POWER STATION IN THE BACKGROUND



FIGURE 34 - PICINIC SHELTER INSTALLED AT CATHERINE POINT, WHICH HAS BEEN DESIGNED TO INTERPRET THE STRUCTURES ONCE FOUND IN THE DUNES

60 Big Island Research (2011/12) Oral Histories Paper Interview with Patrick Hume for TPG Town Planning and Urban Design and Heritage, pp. 14-15.

61 ibid

3.6 ORGANISING RECREATION & GOING TO THE BEACH

Australian Historic Themes Framework 8.1 & 8.2

The foreshore has been used as a horse exercise area since the early stages of settlement and it continues through until today. The nearby Randwick Stables continue to operate.

The Cockburn Coast association with Horse Racing began in 1833 with the first recorded official horse race in WA being run on "the Downs" at South Fremantle. This race was so successful it was repeated again the following year.[62]

Horse exercising continued along the Cockburn Coast through the 19th Century. In the early 1900s the Cockburn coast horse exercisers boasted a famous member, noted engineer Charles Yelverton O'Connor, who is reported to have ridden the length of the Cockburn Coast with his daughter every morning before work.[63] Sadly, this is the place that the State's Engineer in Chief took his own life, amidst a public controversy over his presumed failure of the Coolgardie Water Scheme. This area is now memorialised with a stature showing O'Connor riding his horse into the water.

As the numbers of Registered horse trainers in the Fremantle area grew during the pre WW1 era, so too did the usage of the Cockburn Coast. The stretch from James Rocks to Robb Jetty was about 750 metres, and when the tide was out there was enough room to gallop 5 abreast. During the war the 10th light horsemen used the horse exercise area for training, prior to campaigns in the First World War, including Palestine and Gallipoli.[64]



FIGURE 35 - THE10TH LIGHT HORSEMEN TRAINED ON THE BEACH (UNDATED) SOURCE: FREMANTLE CITY LIBRARY LOCAL HISTORY COLLECTION

More stables were established in Fremantle during the interwar and post WW2 period, such as the Randwick Stables that still exist today. By the 1950s there were about 400 horses that were stabled and trained on the Cockburn Coast. However, the growing urban encroachment into Fremantle and Cockburn during the 1960s and 70s forced the long established stables to either move to another district or close. By the 1990s the number of horses regularly using the South Beach Horse Exercise Area had reduced to 50, with some of them travelling from stables outside the area.

In 1991 there was a re-enactment of the first horse race that was widely attended by the Horse Racing Fraternity and the wider community. Since this time there has been steady pressure by the local horse trainers to revive and maintain the South Fremantle Horse Exercise area in the face of urban coastal redevelopment. This has led to the site being formally recognised for its heritage value by its nomination for inclusion on the State Heritage Register.

62 Perth Gazette 5 October 1833 p2
63 West Australian 11 March 1902 p 5
64 Heritage Council of Western Australia Assessment Documentation for South Beach Horse Exercise Area, 30 March 2007



FIGURE 36 - HORSE ON SOUTH BEACH (UNDATED) SOURCE: FREMANTLE CITY LIBRARY LOCAL HISTORY SECTION IMAGE NUMBER 3339

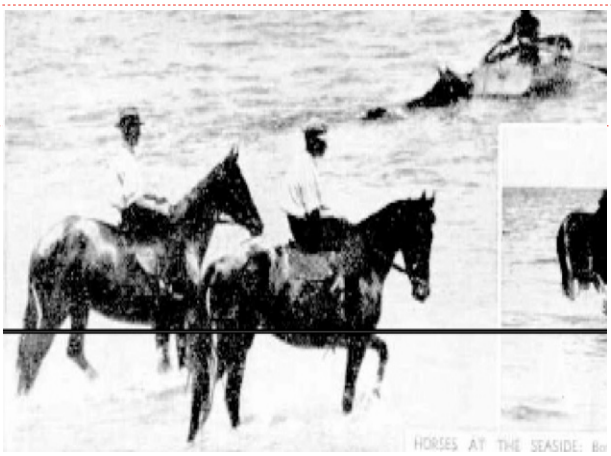

FIGURE 37 - HORSES ON SOUTH BEACH SOURCE: THE WEST AUSTRALIAN 9 NOVEMBER 1936, P. 19

The South Fremantle Horse Exercise Area is an unusual listing in that it pertains to the usage of a place rather that the built fabric. The horse exercise area is still being used regularly as a horse training area by the local trainers from the Patterson, Randwick and Johnston Stables. Trainers are beginning to come from Claremont and Jandakot to train on the beach. This continued usage as a horse training area is a significant example of living history. Although the training is regularly conducted early in the mornings, it attracts appreciative onlookers which inturn promotes the unique heritage value of the place and its association with horse racing.

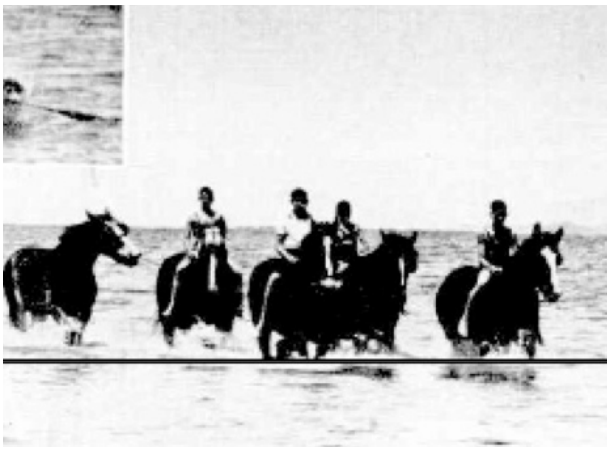

FIGURE 38 - HORSES ON SOUTH BEACH SOURCE: THE WEST AUSTRALIAN 9 NOVEMBER 1936, P. 19

3.7 DEFENDING AUSTRALIA

Australian Historic Themes Framework 7.7

Defence has been a dominant theme in the Cockburn Sound area since initial settlement, when the threat of French intervention to the developing Swan River settlement was ever present. It has been argued that Stirling's decision to establish a temporary settlement at Garden Island was motivated by the strategic advantages of Cockburn Sound to defend against a possible naval attack by the French.

Cockburn Coast was used as a training area for the 10th light horsemen during WW1. Plans to secure Cockburn Sound against attack re-surfaced during the Second World War. Subsequent to the loss of the Singapore naval facilities to the Japanese in 1942, the British Admiralty urgently required a secure base for the British Far Eastern Fleet. Having already surveyed Cockburn Sound for the Henderson Naval Base proposal, the British Admiralty was aware of the strategic advantages of the sound. This deep expanse of water is practically land locked by the mainland, Garden Island and the Parmelia and Success sand banks, and could be easily protected by the placement of anti-aircraft guns on Garden Island and the mainland[65].

Efforts to secure the sound commenced in 1942, with the construction of boom defences to protect against enemy submarines. This involved driving jarrah poles five metres into the sea bed, from the northern end of Garden Island across to Woodman's Point on the Mainland. These poles were set in clusters of four and were spaced about 100 meters apart to carry submerged nets. A boom gate to admit shipping was built across Parmelia Bank.

The southern naval boom comprised a hurdle type tabular steel bridge between Cape Peron and the southern end of Garden Island, and approximated the alignment of the current causeway.[66]

The next step to securing Cockburn Sound was the establishment of further artillery batteries along the coast and off-shore islands to supplement Fremantle Fixed Defences. The South Beach Battery, located on what is now Emplacement Crescent represented part of the mainland coastal defence installations.

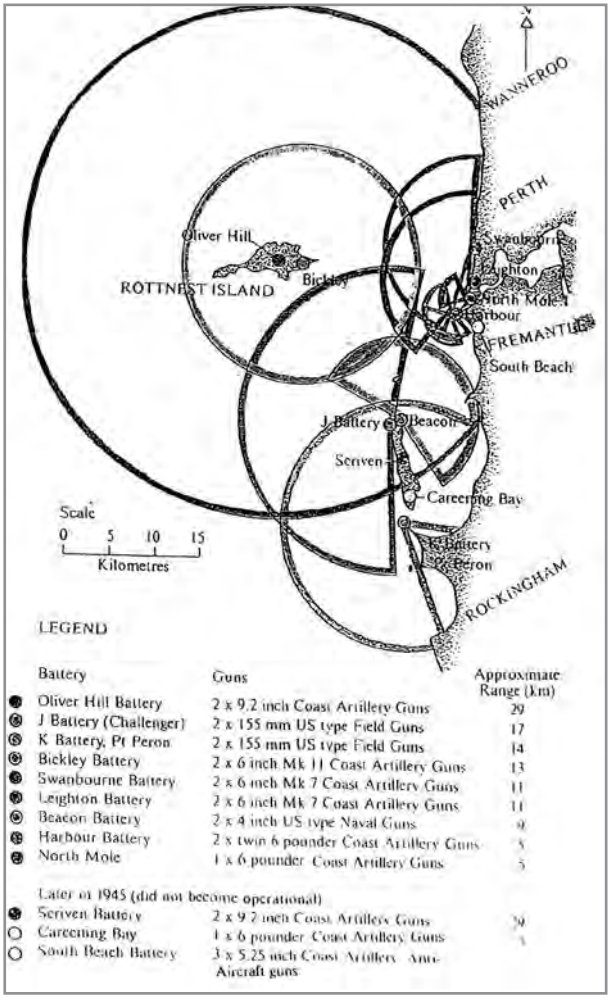

FIGURE 39 - MAP OF FREMANTLE FIXED DEFENCE COASTAL ARTILLERY BATTERIES 1943 SOURCE: OLIVER HILL CONSERVATION ASSESSMENT, G B HILL & PARTNERS (1995) APPENDIX 4

65 Jeffery, V. 1984 "H.M.A.S. Stirling" H.M.A.S. Stirling Supplement – October

66 ibid

In an interview, Mr Patrick Hume remembered when the entire coast near the Robb Jetty Chimney site was covered with barbed wire entanglement. The Japanese were perceived as an imminent threat at the time, especially after the bombing in Darwin. Along the hill behind the study area, large Ack-ack (anti-aircraft) guns were in place to protect the area.

"Mostly this all here was barbed wire fences... All along these sand hills here... All along this coast here they had the guns, machine guns, and the big 'Ack-ack' guns up there, up on top of that hill up there."[67]

Access to the beach in this area was difficult as the barbed wire entanglement was put in thick and high (around 6-feet). It ran from the Robb Jetty area right up to the tip (near Fremantle Harbour). Patrick recalled at that time the whole area was all bush, there were no houses there like there is today. This was the same all down the coast, right down to Rockingham where several more Ack-ack guns were placed.

"You couldn't get in along the beach because of the barbed wire entanglement... It was all rolled out all along the beach. It went all the way up to the tip, South Fremantle tip and it stopped there."[68]

67 Big Island Research (2012) Interview with Patrick Hume
68 ibid

4. HERITAGE MANAGEMENT FRAMEWORK

4.1 GUIDING PRINCIPLES

Heritage management is an essential means of preserving the stories of the past, enhancing the 'sense of place' and shaping the future identity of Cockburn Coast. This section provides a framework for the management of heritage in Cockburn Coast, setting out how to protect and transmit the heritage values inherent in the study area.

Guiding Principles:

- The management of heritage places should use the best available knowledge, skills and standards for those places, and include ongoing technical and community input to decisions and actions that may have a significant impact on them

- The management of heritage places should respect all heritage values of the place and seek to integrate the input of agencies with responsibilities for those places

- The management of heritage places should ensure that their use and presentation is consistent with the conservation of their heritage values

- The management of heritage places should make appropriate provision for community involvement, especially by people who have a particular interest in, or associations with, the place

4.2 STATUTORY FRAMEWORK

In Western Australia the statutory protection of heritage places is set out in three main pieces of legislation, all three are relevant to the study area:

- Indigenous Heritage - *Aboriginal Heritage Act 1972*
- Maritime Heritage – *Maritime Archaeology Act 1973*
- Historic Heritage - *Heritage of Western Australia Act 1990*

The *Planning and Development Act 2005* also sets out provisions for heritage protection in local government areas.

Commonwealth legislation that is relevant to the study are is as follows:

- Maritime Heritage – *Historic Shipwrecks Act 1976*

4.2.1 INDIGENOUS HERITAGE

The *Aboriginal Heritage Act 1972* provides *"for the preservation on behalf of the community of places and objects customarily used by or traditional to the original inhabitants of Australia or their descendants, or associated therewith, and for the purpose incidental thereto."*

The Department of Indigenous Affairs maintains the Aboriginal Sites Register. All places reported to the Registrar of Aboriginal Sites are assessed within the terms of section 5 of the Act. The Register has seven types of site status, those that are relevant to the study area are as follows:

R Registered Site

S Stored Data (lodged information is assessed as not meeting the terms of section 5 of the Act)

Sites can be a diverse range of places. They can be put into two basic but overlapping categories:

- Archaeological sites – places where material remains associate with past Aboriginal land use
- Anthropological sites – places of spiritual importance and significance to Aboriginal people.

Many sites have both archaeological and anthropological aspects.

There are a large range of Aboriginal site types that can be found in Western Australia. The following types have been identified in the Cockburn Coast area.

Mythological - A place that is connected to the great spirit ancestors, in their various manifestations, of the 'Dreamtime' which continues to be important and of special significance to persons of Aboriginal descent.

Historical - A place that has historical associations with Aboriginal people and may or may not contain physical evidence of those associations.

Man-made Structures - The placement or arrangement, by Aboriginal people, of stone, wood or other material made into a structure for ceremonial or utilitarian purposes.[69]

If any proposed ground disturbance will affect an Aboriginal site protected by the *Aboriginal Heritage Act*, a Section 18 application to disturb the site under the Aboriginal Heritage Act will be required. The Department of Indigenous Affairs, Aboriginal Material Cultural Committee (ACMC) considers applications from landowners to use land on which Aboriginal sites and objects are located.

69 Government of Western Australia, Department of Indigenous Affairs and Department of Premier and Cabinet, "Cultural Heritage Due Diligence Guidelines, Version 2.0, 18 November 2011"

4.2.2 MARITIME HERITAGE

The *Historic Shipwrecks Act 1976* protects historic wrecks and associated relics in Commonwealth waters (or those that were in Commonwealth waters at the time of listing) for their heritage values and for recreational, scientific and educational purposes. Each of the States has complementary legislation, which protects historic shipwrecks in State waters, such as bays, harbours and rivers. The Act is administered by the Australian Government in conjunction with Delegates in each of the States.

The State of Western Australia has its own legislation, the *Maritime Archaeology Act 1973* that protects maritime archaeological sites on land and in State waters, such as bays, harbours and rivers. In addition to shipwrecks the Act also protects relics, such as an anchors, and land sites associated with historic ships.

Commonwealth ministerial approval is required prior to any proposed disturbance of a Commonwealth registered shipwreck. The Maritime Museum of Western Australia's advice must be sought prior to any action on or near any registered shipwreck. In addition, because of historical use of the Owen Anchorage, the area below the low water mark will require a Maritime Archaeological Survey under the *Historic Shipwrecks Act,* should any development be proposed.

4.2.3 HISTORIC HERITAGE

Historic heritage in Western Australia is afforded statutory protection under the *Heritage of Western Australia Act 1990* and the *Planning and Development Act 2005.*

The Heritage Council of Western Australia maintains the State Register of Heritage Places under the *Heritage of Western Australia Act,* which aims to recognise and protect places of cultural heritage significance to the people of Western Australia. The Register includes historic buildings, structures, gardens, cemeteries, landscapes and archaeological sites. Any proposals in relation to a State listed place must be referred to the Heritage Council for advice.

Places of local heritage value are identified by local government through inclusion on their Local Government Inventory (previously referred to as a Municipal Heritage Inventory) and/or their Heritage List. These lists have different intentions and implications. The Local Government Inventory is a requirement under the *Heritage of Western Australia Act* and is a document that records the places in the City that are or may have cultural heritage value and explains why these places are special. The City of Cockburn has recently endorsed changes to its Scheme to afford some level of statutory protection to these places. It has also endorsed changes to its Scheme, which will afford protection to trees on its Significant Tree List, as there are no current provisions to protect trees on the Inventory or Heritage List.

The Heritage List is a statutory list prepared under the *Planning and Development Act 2005* and places on this list are afforded protection under the City of Cockburn Town Planning Scheme No.3 and the provisions of the *State Planning Policy 3.5 Historic Heritage Conservation.*

5. MANAGEMENT OF HERITAGE PLACES IN EACH PRECINCT

This section provides a framework for the management of indigenous, maritime and historic heritage in the study area. It provides a separate framework for each place in the three precincts of the CCDSP Part 2: Power Station Precinct, Hilltop/Emplacement Precinct and the Robb Jetty Foreshore Precinct.

A framework for each place been developed based on the methodology contained in the Burra Charter:

Identify – places of indigenous, maritime and historic heritage in each precinct have been identified and a description of each place has been provided.

Understand – A Statement of Significance for each place, where available, has been included to provide an understanding of the heritage value of the place.

Develop – The philosophy embodied in the Burra Charter has been used as a basis for the formulation of strategies, which seek to safeguard the heritage value of each place as part of any future development of the area. Strategies also outline what approvals are required to meet the various legislative requirements.

Manage – an implementation plan for each place has also been developed to outline who should be responsible for each strategy and the timeframe for implementation.

Note: The Burra Charter forms an important reference document for the present and future custodians of the significant places in the Cockburn Coast project area and may assist in resolving any issues relating to the conservation of places that are not explicitly dealt with in this Strategy.

5.1 POWER STATION PRECINCT

The Power Station precinct is located on the coast at the southern end of the Cockburn Coast project area.

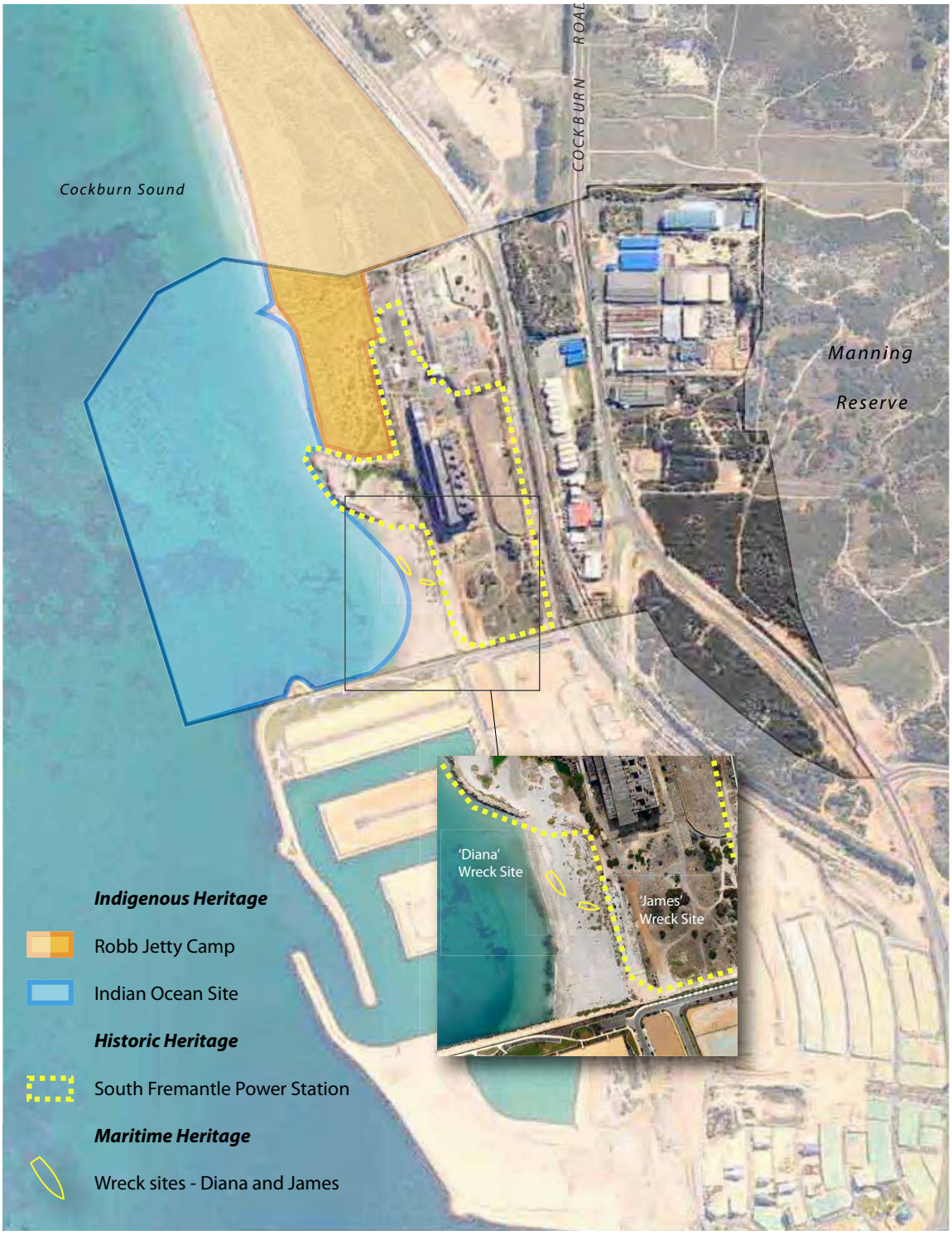

FIGURE 40 - THE POWER STATION PRECINCT PLAN

5.1.1 South Fremantle Power Station



Figure 41 - South Fremantle Power Station (2010) Source NearmapS

Heritage Type

Historic

Key Interpretive Theme

Supplying Urban Services (AHTF 4.2)

Heritage Status

State Register of Heritage Places

HCWA Database No.	3381
Interim Listed	28 October 1997

City of Cockburn Heritage List

Place No. 075

Category A

Listed 14 July 2011

Statement of Significance

South Fremantle Power Station has cultural heritage significance for the following reasons:

the surviving Main Building, now stripped of all plant, equipment and services, remains aesthetically significant; the building demonstrates the strong expression of a structure specifically designed for an industrial process;

the internal areas of the cleared building are impressive in the former Boiler House and Turbine Room, where the structural elements are of striking dominance, the vistas through the building are significant and the transparency of the external walls is uncompromisingly apparent in the empty building;

the place is a good example of an Art Deco Industrial structure, being the largest one to be built in Western Australia, and,

the building and site housed the first major power generating equipment in the State specifically designed to generate alternating current at the Australian and British Standard Frequency of 50 Hertz. It therefore enabled the initial changeover of the Metropolitan Area Power Supply from 40 Hertz to 50 Hertz operation.[70]

70 Heritage Council of Western Australia Registration Documentation for South Fremantle Power Station 28 October 1997, p. 1

Heritage Management

South Fremantle Power Station is recognised in the CCDSP as a significant component of the Cockburn Coast area owing to its physical dominance and uniqueness. The heritage values of the site are to be retained and the significance of the place interpreted.

1. Retain, conserve and adapt the South Fremantle Power Station for new uses.
2. Any future conservation, management and/or adaptation works to the South Fremantle Power Station are to be undertaken in accordance with State and local policies and procedures.
3. Maintain the visual setting of, and interrelationship between, the significant contributory elements of the South Fremantle Power Station.
4. Ensure all opportunities to generate awareness and public interest in the building are capitalised upon.
5. Acknowledge the significance of high quality urban art, which has been informally applied on the walls of the Power Station since its closure.
6. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community.

Refer to Section 6 for the Implementation Plan which provides detail on the key actions for each management strategy.

Description

The South Fremantle Power Station remains as a prominent element on the shoreline in the coastal sand dunes south of Fremantle. An important step in the development of power generation in the State, as the second largest thermal power station in Western Australia, construction on the facility commenced in January 1946. It was officially opened 5 years later. The Power Station closed in 1985 because power generation in the site had become uneconomic and had been superseded by other power plants in the grid.

Today the Power Station survives as a building shell stripped of all plant and machinery (except for the original overhead crane in the Turbine Room) and external elements including smoke stacks, coal conveyors and subsidiary buildings. Road access to the Power Station is located on the northern approach to the site from McTaggart Cove.

The main power station building is a high volume, industrial building designed specifically for the function of power generation. It is a prominent landmark, which is cream in colour, with large areas of glazing. It comprises the following elements:

- Station A - boiler house
- Station A - turbine room
- Station B - boiler house
- Station B - turbine room
- Coal handling
- Ash disposal
- Switch house, control room and transformers

The historical placement of infrastructure in close proximity to the shoreline has resulted in the need for coastal engineering works, which have altered the original coastal form. Extending into the ocean on the western side of the Power Station are two rock groynes, which formed a water basin for the extraction of cooling water formerly used in the power generation process. [71]

The railway formerly servicing the Power Station runs close to the inland eastern boundary of the site. There are no other structures in close proximity to the Station Building, which now stands isolated and unused in the coastal landscape. Since the closure of the facility, un-commissioned urban artworks have been applied to both internal and external walls of the building. These various layers of art are significant in their own right and are evidence of the community's on-going use and sense of ownership of the building.

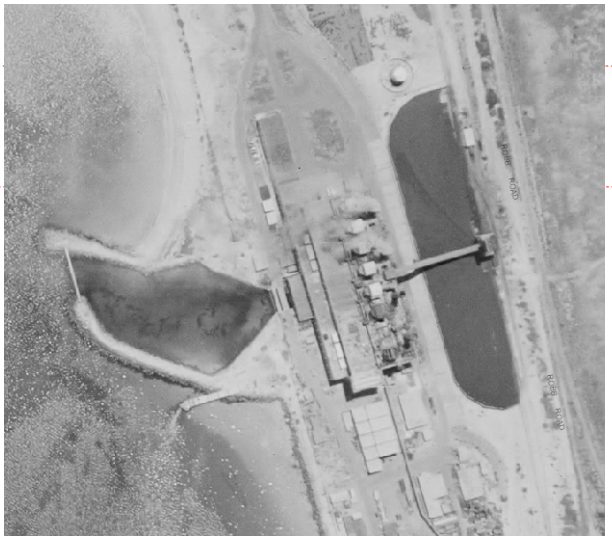

FIGURE 42 - SOUTH FREMANTLE POWER STATION (1952)
SOURCE: LANDGATE



FIGURE 43 - SOUTH FREMANTLE POWER STATION (1981)
SOURCE: LANDGATE



FIGURE 44 - SOUTH FREMANTLE POWER STATION (2010)
SOURCE: NEARMAPS

71 Bodycoat, op. cit

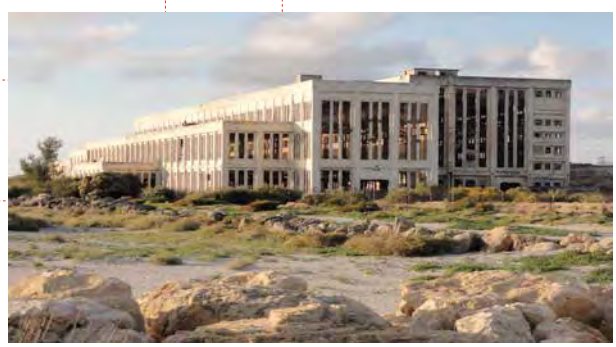

Figure 45 - South Fremantle Power Station



Figure 46 - South Fremantle Power Station



Figure 47 - Switch Yard and Power Station



Figure 48 - South Fremantle Power Station and Coal Store



Figure 49 - Cooling Ponds and Groyne at South Fremantle Power Station



Figure 50 - Turbine Hall of the South Fremantle Power Station



Figure 52 - Internal Staircase within South Fremantle Power Station







Figure 51 - Urban Art within South Fremantle Power Station

5.1.2 The Diana Shipwreck



Figure 53 - The Diana Shipwreck

Heritage Type

Maritime

Key Interpretive Theme

Exploring the coastline (AHTF 3.1)

Heritage Status

Register of Historic Shipwrecks

Shipwrecks ID No. 3951

Heritage Management

1. Retain in situ and do not disturb.
2. Any future conservation, management and/or adaptation works to the place are to be undertaken in accordance with Commonwealth and State legislation, policies and procedures.
3. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the wreck to the community.

Refer to Section 6 for the Implementation Plan which provides detail on the key actions for each management strategy.

Description

The Diana was shipwrecked on 16 July 1878. This wreckage site lies south west of the South Fremantle Power Station and is concealed beneath the sand.

The wreck event:

The Diana came into Fremantle with a load of ballast from Port Natal on 4 July 1878. The first record of the arrival was a telegram from the harbour-master to the colonial secretary reporting that it had struck the Parmelia Bank while sailing into Gage Roads without a pilot. The vessel was safely disembarked and anchored at Owen Anchorage.

On the night of 15 July a severe storm drove four vessels (Clarence Packet, Argo, Will Watch, and Myth) ashore at Fremantle. Captain Humphery had Diana's royal yards taken down and two anchors layed out.

> *"I had about 97 1/2 fathoms (177 metres) chain on the starboard anchor and about 38 (69 metres) on port - in a heavy squall about 3 p.m. of 16th she parted both cables and went on the beach and has become a total wreck and been sold as such. I produce a certificate of the testing of the chain (starboard) which was a new one. The port one was the same link (Inquirer, 10 July 1878)"*

From the inquiry it was considered that no blame could be layed with the captain or crew. Diana, full of water and with its back broken was condemned as a wreck and sold at auction by Messrs L. A. Manning. The hull was bought by Mr McCleery for £85.[72]

Details:

Built:	Teignmouth, Devon, UK
Length:	33.6 metres (110.2 feet)
Breadth:	7.2 metres (23.5 feet)
Depth:	5.5 metres (18.1 feet)
GPS position:	Latitude 32° 05.9000 ' S
	Longitude 115° 45.4530 ' E

72 Western Australian Museum. 2011.

5.1.3 The James Shipwreck



Figure 54 - The James Shipwreck

Heritage Type

Maritime

Key Interpretive Theme

Exploring the coastline (AHTF 3.1)

Heritage Status

Register of Historic Shipwrecks

Shipwrecks ID No. 4276

Heritage Management

1. Retain in situ and do not disturb.
2. Any future conservation, management and/or adaptation works to the place are to be undertaken in accordance with Commonwealth and State legislation, policies and procedures.
3. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the wreck to the community.

Refer to Section 6 for the Implementation Plan which provides detail on the key actions for each management strategy.

Description

The James was shipwrecked on 21 May 1830. This wreckage site lies south west of the South Fremantle Power Station and the Diana. It is now concealed beneath the sand.

James was an American-built vessel owned by Chapman and Company. The vessel was sheathed in copper (1828), carried two chain and one hempen cable, and was armed with three cannons. It had a single deck with beams, a raised new deck and new upperworks in 1828. The vessel was involved in the passenger trade from Europe. There is archival evidence that drowned sailors from the wreck of the James were buried in the sand dunes near Robb's Jetty.

The wreck event:

The James reached the Swan River on 8 May 1830, with twelve crew and 74 passengers and moored at Owen Anchorage. On 21 May James was blown ashore along with the brig Emily Taylor.

The Captain, Captain Goldsfield refused to deliver passengers their goods until ordered to do so by the colonial secretary. Several incidents occurred involving injury to a man using explosives on the vessel, and another drowned during the transfer of goods by boat from the wreck to Fremantle.

Plans were made for the wreckage of the vessel to be incorporated into the building of a jetty but this never eventuated. [73]

Details:

Built: America

Depth: 3.6 metres (12 feet)

GPS position: provisional

Latitude 32° 05.8562 ' S

Longitude 115° 45.4643 ' E

73 Western Australian Museum. 2011.

5.1.4 Indian Ocean Site

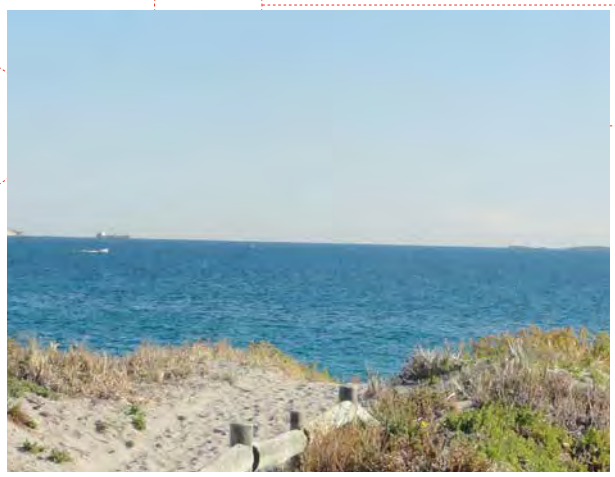

Figure 55 - Indian Ocean

Heritage Type

Indigenous

Place ID: 3776

Stored Data[74], Open, Non Restricted

Significance – Mythological

Maritime

Potential artefacts from shipwrecks

Heritage Management

1. Integrate interpretation of the mythological story of the site into the Cockburn Coast project to communicate the tangible and intangible values of the site.
2. Should any development be proposed in Owen Anchorage, conduct a maritime survey.

Refer to Section 6 for the Implementation Plan which provides detail on the key actions for each management strategy.

Description

This mythological site covers the large area of water between the mainland and the three islands (Rottnest, Carnac & Garden) and relates to mythological narratives concerning the creation of Cockburn Sound and the offshore islands, especially Rottnest.

5.1.5 Robb Jetty Camp

A portion of the Robb Jetty Camp, which is a Registered Aboriginal site, is located within the Power Station Precinct. Refer to Sections 5.3.1 and 6.3 relating to the Robb Jetty Precinct and Foreshore for the Heritage Management and Implementation Plan details for the Robb Jetty Camp.

74 Data Status. This site was on the Permanent Register of Aboriginal Sites, but was reassessed as 'Not a Site' under the Aboriginal Heritage Act 1972 (AHA). Places that are assessed as not meeting the terms of Section 5 of the AHA have a status of 'stored data' on the Register of Aboriginal Sites. The provisions of the AHA do not apply to these places unless further information is lodged with the Registrar requiring a reassessment of the place. Information relating to stored data is not deleted from the Register, but is retained and displayed for a number of reasons:

- It is possible that information provided about a place at one point in time may be incomplete and further information will be provided in the future that may change the assessment of the place.
- To alert people to the possibility that even though a place may not meet the terms of the AHA, there may still be some level of Aboriginal heritage value associated with a place.
- To identify the location of places reported as sites but assessed as not meeting the terms of the AHA for planning purposes.

5.2 HILLTOP/EMPLACEMENT PRECINCT

The Hilltop/Emplacement Precinct is located on a ridge immediately north of the Power Station precinct and extends up to Rollinson Road between Manning Reserve to the east and Cockburn Road in the west.



FIGURE 56 - THE HILLTOP/EMPLACEMENT PRECINCT PLAN

5.2.1 South Beach Battery (remains)



Figure 57 - The remains of the South Beach Battery

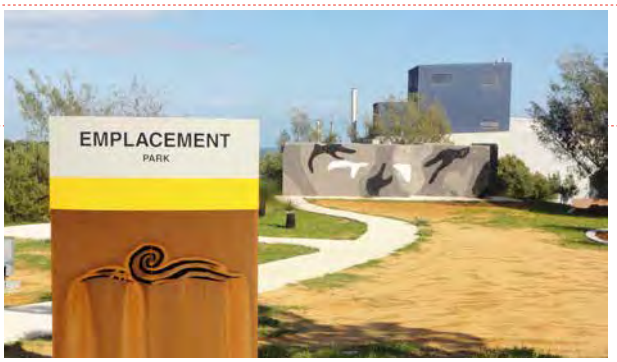

Figure 58 - The remains of the South Beach Battery

Heritage Type

Historic

Key Interpretive Theme

Defending Australia (AHTF 7.7)

Heritage Status

City of Cockburn Local Government Inventory
Place No. 106
Category D
Listed 14 July 2011

Statement of Significance

South Beach Battery has cultural heritage significance for the following reasons:

> *South Beach Battery (remains) is evidence of the importance of defending the Western Australian coastline, and in particular Fremantle Harbour and Cockburn Sound; and,*
>
> *South Beach Battery (remains) may have some archaeological potential to reveal information about military construction techniques in the 1940s.*[75]

Heritage Management

1. Retain and conserve the remaining South Beach Battery.
2. Views from the South Beach Battery to the Indian Ocean should be retained in future planning.
3. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community.
4. Consideration should be given to the partial reinstatement of earth embankments to allow an appreciation of its original form.

Refer to Section 6 for the Implementation Plan which provides detail on the key actions for each management strategy.

75 City of Cockburn, 2011. Local Government Inventory, p. 311

Description

A former gun emplacement is located in a Local Parks and Recreation Reserve (Reserve No. 43945), which is accessed from Emplacement Crescent. The Reserve is nestled amongst new commercial buildings and has been landscaped with native plantings. The remains of the battery is setback approximately 45 metres from the street boundary and has been painted grey with a black and white 'camouflage' pattern.

The South Beach Battery was constructed as part of the coastal defence system during World War II for the Fremantle Port. The system also included batteries at Rottnest and Garden Islands, Swanbourne, Arthur Head, Fremantle Harbour and Point Peron. During the war the threat from air attack prompted the construction of gun emplacements for three 5.25 inch dual role coast artillery/anti aircraft in mid 1944.[76]

Leighton Battery and South Beach Battery were the two places earmarked for the location of the new 5.25 inch emplacements and three emplacements were to be constructed at each site. Three emplacements were constructed at the subject site however guns were never installed and the battery was never operational. Leighton Battery was the only place in Australia where the plans for the 5.25 inch battery actually became operational.[77]

The South Beach Battery is a remnant of one of three gun emplacements. The entire structure now in evidence would have originally been buried to the roof line, and would have been concealed.[78]

The remnant semi-circular structure, constructed on concrete, would have been set into the ground with the gun protruding above. A concrete structure of underground rooms including engine room, two small rooms, a passage and entrance steps would have connected to the 5.25 inch gun emplacement.[79]



Figure 59 - Aerial photograph of the South Beach Battery, South Fremantle, 7 June 1968 Source: Battye Library 261930PD



Figure 60 - Remnant pit of 5.25 inch battery at Leighton Battery. Banner in background shows 5.25 inch gun at Port Moresby

76 Heritage Council of Western Australia (HCWA). 1999. Assessment Documentation – Leighton Battery

77 ibid.

78 City of Cockburn. 2011. Draft Municipal Heritage Inventory p. 306

79 HCWA 1999

5.3 ROBB JETTY PRECINCT AND FORESHORE

The Robb Jetty Precinct and Foreshore is located at the northern end of the study area.



FIGURE 61 - ROBB JETTY PRECINCT AND FORESHORE PLAN

5.3.1 Robb Jetty Camp



Figure 62 - Robb Jetty Camp Source Googlemaps

Heritage Type

Indigenous

Key Interpretive Theme

Living as Australia's earliest inhabitants (AHTF 2.1)

Surviving as Indigenous people in a white-dominated economy (AHTF 5.7)

Heritage Status

Register of Aboriginal sites

Place ID: 3707

Permanent Register, Open, Non Restricted

Significance – Man-Made Structure, Historical

Heritage Management

1. Any future conservation, management and/or adaptation works to the place are to be undertaken in accordance with State and local policies and procedures.
2. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community.
3. Acknowledge that skeletal material has previously been unearthed in the general vicinity.

Refer to Section 6 for the Implementation Plan which provides detail on the key actions for each management strategy.

Description

The register documentation for the Robb Jetty Camp is focused on the location of Robb Jetty and the site extends approximately 1.2 km long, its width no greater than 100m.

The dunes near Robb Jetty were used by Aboriginal people for camping since about 1910.[80] It has been noted that the camping area was located in the sandhills to the south of South Beach, in the vicinity of Catherine Point. Camps were situated between the Bradford Kendall Pty Ltd Iron Foundry and Robb Jetty. It was apparently still being used in 1985: *"although Perth Metropolitan Aboriginal people no longer camp here, it was noticed that Aboriginal visitors from the Kalgoorlie region were living among the sandhills."*

The area is considered likely to have been a traditional camping area, as was the case of other long established fringe camps. However, there was little archaeological remnant of the camp.

The coastal dunes of the Swan Coastal Plain are considered to be a favoured area for prehistoric burials because the soils are easy to dig by hand. A number of Aboriginal burials have been found along the coast sand dunes. Including one, which was noted in the West Australian dated 12 December 1885, as follows:

> *"Yesturday the skeleton of a man was found in a sand hill on the south of Fremantle. By direction of the Resident Magistrate, the remains were examined by Dr. Barnett, who found the bones to be those of an old male aboriginal, hearing evidence of having been very many years under the ground."*

80 O'Connor, R. Bodney, C. & Little, L. 1985. Preliminary report on the survey of Aboriginal areas of significance in the Perth Metropolitan and Murray River Regions, unpublished report to the Department of Aboriginal Sites, pp. 83-85.

5.3.2 South Beach Horse Exercise Area



Figure 63 - South Beach Horse Exercise Area Source Googlemaps

Heritage Type

Historic

Key Interpretive Theme

Organising recreation & going to the beach (AHTF 8.1 & 8.2)

Heritage Status

State Register of Heritage Places

HCWA Database No.	16120
Interim Listed	9 May 2006
Permanent Listed	30 March 2007

City of Cockburn Heritage List

Place No. 082

Category A

Listed 14 July 2011

Statement of Significance

South Beach Horse Exercise Area, a managed coastal landscape of parks, beach facilities, groynes, public art, fenced and unfenced tracks, dune vegetation and re-vegetation, and a beach with archaeological remains, has cultural heritage significance for the following reasons:

the place was the site of the first official horse race in Western Australia in October 1833 and has been used for exercise and training of horses, both recreational and sporting, in particular horse racing from that time to the present;

the place was used regularly for horse training by C.Y. O'Connor, Engineer-in-Chief, who died there in 1902, and by the 10th Light Horse Regiment during World War I in preparation for service overseas;

the place has associations with numerous champion horses and outstandingly successful trainers and jockeys;

the place has played an integral part in the history of the horse racing industry in Western Australia, in particular in the 1830s, and in the period from c. 1900 to the mid-1970s, when the industry thrived in Fremantle;

the place includes sites of Aboriginal heritage significance, including mythological sites pre-dating European settlement, and the site of the Aboriginal stockmen's camp at Robb Jetty;

the place is valued by the horse racing community for the integral role it played and continues to play in the lives of many involved in the State's horse racing industry, as commemorated in the public artworks erected at the place in the late 20th century, and by the wider community who value its recreational use as a beach and park; and,

the place is an attractive managed coastal landscape with views to Garden, Carnac and Rottnest Islands, together with vistas to Woodman Point and Fremantle.[81]

81 Heritage Council of Western Australia Registration Documentation

Heritage Management

1. South Beach should continue to be used for the horse training, a use with which it has had a long association.
2. Any future conservation, management and/or adaptation works to the place are to be undertaken in accordance with State and local policies and procedures.
3. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community.

Refer to Section 6 for the Implementation Plan which provides detail on the key actions for each management strategy.

Description

South Beach Horse Exercise Area is the portion of South Beach extending south past Catherine Point to McTaggart Cove. It includes the southern portion of South Beach south of Ocean Road and the whole of the C.Y. O'Connor Reserve. Since 1833, this portion of the coast has been used for the exercise and training of horses and in the period before the completion of South Fremantle Power Station, the area extended to Woodman Point in the south and back to Fremantle in the north.



FIGURE 64 - HORSES FROM RANDWICK STABLES ON THEIR WAY TO THEIR REGULAR SATURDAY MORNING TRAINING SESSION
SOURCE: YATES HERITAGE CONSULTING



FIGURE 65 - HORSES AT THE SOUTH BEACH EXERCISE AREA
SOURCE: YATES HERITAGE CONSULTING

5.3.3 Robb Jetty



Figure 66 - Aerial showing the remains of Robb Jetty

Heritage Type

Historic

Key Interpretive Theme

Moving goods & feeding people (AHTF 3.8 & 3.12)

Heritage Status

Robb Jetty is not Heritage Listed, however, it partially sits within the State Register of Heritage Places curtilage for the South Beach Horse Exercise Area (HCWA Database No. 16120)

Statement of Significance

Robb Jetty has cultural heritage significance for the following reasons:

the remains are a visual reminder and marker of the former Robb Jetty that was connected to the northwest meat trade. It contributes to the community's sense of place and history

the place is representative of the importance of shipping in the provision of stock for slaughter, to feed the growing metropolitan area and Goldfields, in the nineteenth and early twentieth century.

Robb Jetty has played an integral part in the agricultural industry of the State, particularly as it facilitated the development of slaughter-houses and associated industries in the Cockburn area from the nineteenth century through to the twentieth century

Heritage Management

1. Remnants of Robb Jetty should be retained undisturbed.
2. Any future conservation, management and/or adaptation works to the place are to be undertaken in accordance with State and local policies and procedures.
3. Consideration should be given to providing historic statutory heritage protection to Robb Jetty in its own right.
4. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community.

Refer to Section 6 for the Implementation Plan which provides detail on the key actions for each management strategy.

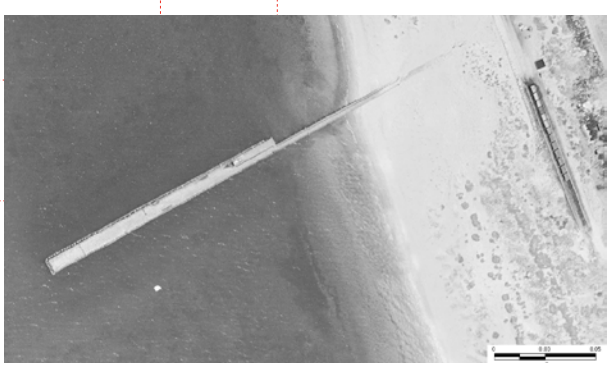

FIGURE 67 - AERIAL SHOWING ROBB JETTY IN 1965 SOURCE: CITY OF COCKBURN INTRAMAPS



FIGURE 68 - REMAINS OF ROBB JETTY 2012



FIGURE 69 - REMAINS OF ROBB JETTY 2012

Description

The remains of Robb Jetty are located off C Y O'Connor Beach, approximately 550 metres north of the South Fremantle Power Station site. Submerged piles extend from the foreshore out into the Indian Ocean.

Robb Jetty, constructed circa 1877, was used for the unloading of cattle from the state's north-west to the abattoirs situated here that operated between 1890s–1970s. An article in the West Australian 1896, identifies that the jetty initially consisted of a few bays of piles driven into the beach, on which a rough decking was provided. With the growth of the cattle trade the Jetty was extended by the government to a length of 427 ft (approximately 130 metres).[82] Robb Jetty was later extended to 265 metres, to meet the needs of the expanding abattoir in 1920s. It was a notable landmark at Cockburn Sound until it was burnt and dismantled in 1975.[83]

82 The West Australian. 1896. P. 5

83 Heritage Council of Western Australia (HCWA). 2007. Assessment Documentation Assessment Documentation – South Beach Horse Exercise Area

5.3.4 Robb Jetty Chimney



Figure 70 - Robb Jetty Chimney Source Googlemaps

Heritage Type

Historic

Key Interpretive Theme

Moving goods & feeding people (AHTF 3.8 & 3.12)

Heritage Status

State Register of Heritage Places

HCWA Database No. 3211

Interim Listed 14 May 1996

City of Cockburn Heritage List

Place No. 063

Category A

Listed 14 July 2011

Statement of Significance

Robb Jetty Chimney has cultural heritage significance for the following reasons:

> *as the sole remaining structure of the Robb Jetty Abattoir, it is a visual reminder and marker of the former complex, and contributes to the community's sense of place and history, and*
>
> *it is a significant landmark in the industrial area south of Fremantle.*[84]

84 Heritage Council of Western Australia Registration Documentation for Robb Jetty Chimney, 14 May 1996, p. 1

Heritage Management

1. Retain and conserve the Robb Jetty Chimney.
2. Any future conservation, management and/or adaptation works to the place are to be undertaken in accordance with State and local policies and procedures.
3. Any new development adjacent to the Chimney should ensure it retains its landmark qualities.
4. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community.

Refer to Section 6 for the Implementation Plan which provides detail on the key actions for each management strategy.

Description

The Robb Jetty Chimney is situated to the west of Cockburn Road and the east of Robb Road. The Chimney stands as the only remnant of the former Robb Jetty abattoir, which was demolished in 1995. The Abattoir was for many years a component of the meat industry in Western Australia, and a major source of employment.

The remaining Chimney is a cylindrical stack resting on a square block of masonry with a total height of approximately 28 metres.[85] The brickwork is English bond with stretcher bricks curved to the radius of the shaft and header bricks tapered to maintain a uniform thickness of the mortar joints. The chimney is unlined, with the wall thickness decreasing from 470 mm just above the plinth to 230 mm at the top.[86]



FIGURE 71 - ROBB JETTY CHIMNEY



FIGURE 72 - ROBB JETTY CHIMNEY

85 Gibbs, M & Bush, F (1995) The Robb Jetty Abattoir Site Archaeological Report, p. 21

86 ibid. p. 5

5.3.5 Wyola and Barge (remains)

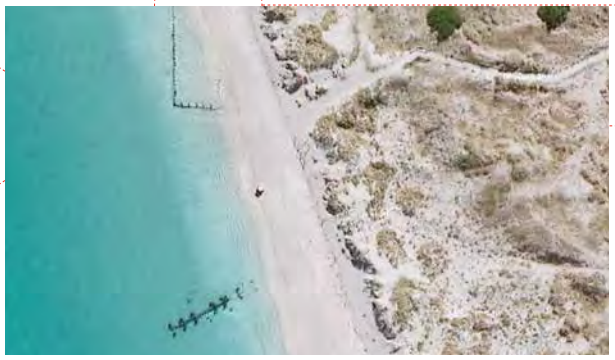

Figure 73 - The Remains of the Wyola and Barge Source Googlemaps



Figure 74 - The Remains of the Wyola

Heritage Type

Historic

Key Interpretive Theme

Moving goods & feeding people (AHTF 3.8 & 3.12)

Heritage Status

The Wyola Wreck is not Heritage Listed, however, it sits within the State Register of Heritage Places curtilage for the South Beach Horse Exercise Area (HCWA Database No. 16120)

Heritage Management

1. Investigate the heritage value of the Wyola and barge (remains).
2. Any future actions (including conservation, management and/or adaptation works) to the place are to be undertaken in consultation with key stakeholders
3. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the wreck.

Refer to Section 6 for the Implementation Plan which provides detail on the key actions for each management strategy.

Statement of Significance

The Wyola and barge (remains) has cultural heritage significance for the following reasons:

the Wyola and barge (remains) remain as a tangible and visible reminder of the maritime history associated with Owen Anchorage.

the Wyola is associated with both World Wars and had a long and important association with the Fremantle Harbour shipping industry, through its involvement in long-distance towing, salvage and rescue.

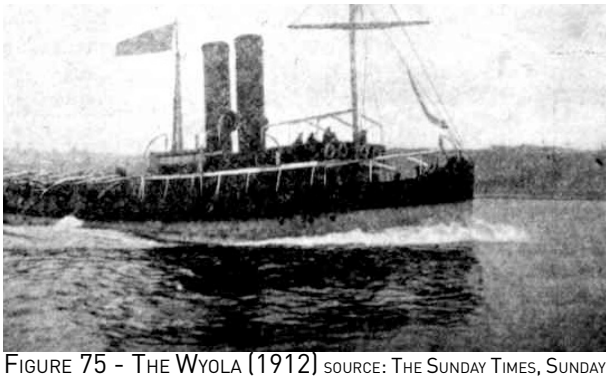

FIGURE 75 - THE WYOLA (1912) SOURCE: THE SUNDAY TIMES, SUNDAY 27 OCTOBER 1912, P. 32

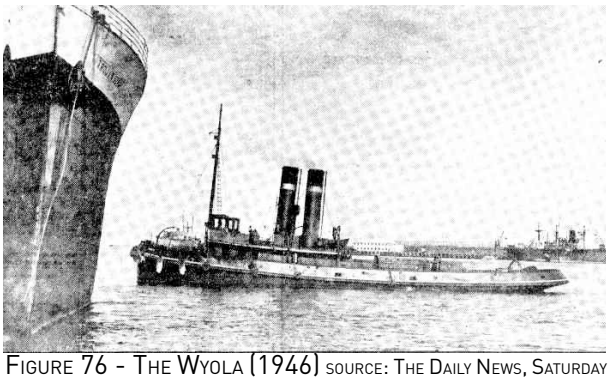

FIGURE 76 - THE WYOLA (1946) SOURCE: THE DAILY NEWS, SATURDAY 20 APRIL 1946, P. 24



FIGURE 77 - THE WYOLA (C 1963) SOURCE: THE WESTERN AUSTRALIAN MUSEUM



FIGURE 78 - THE REMAINS OF THE BARGE (2012)

Description

The stern frame of the 306–ton steam tug Wyola can be seen protruding from the beach just north of Robb Jetty. The bottom of the hull lies buried in the sand. The Wyola worked in the Port of Fremantle. It was built in South Shields, UK in 1912 and run ashore at Robb Jetty for dismantling and scrapping in 1970.

An article in The Daily News, dated Saturday 20 April 1946, provides an insight into the use and operation of the Wyola:

> *'One of the busiest crafts in the harbour the Wyola is run by the Swan River Shipping Company...*
>
> *The Wyola served in World War I in the Mediterranean and Dardanelles. Her skipper was then and still is 63-year old Carl Douglas, of East Fremantle.*
>
> *During busy war years the Wyola handled all types of vessels, wartime requirements calling for work at all hours in and out at harbour. She has participated in long-distance towing jobs, salvage and rescue, and has a long life ahead.'* [87]

A timber barge buried in the sand just to the north of the Wyloa and sometimes visible is said to have been used in the scrapping of Wyola.

87 The Daily News, *Tugboat,* Saturday 20 April 1946, p. 24

5.3.6 Moreton Bay fig trees



Figure 79 - Aerial showing Moreton Bay Fig trees in 2010

Heritage Type

Historic

Key Interpretive Theme

Moving goods & feeding people (AHTF 3.8 & 3.12)

Heritage Status

City of Cockburn Local Government Inventory

Place No. 88

Listed 14 July 2011

Statement of Significance

The Moreton Bay Figs have cultural heritage significance for the following reasons:

An historic connection exists with these Fig trees as they are the only reminder of the areas past use (apart from the Robb Jetty Chimney).

It is also unusual to have trees of this type lining a main road through the City.[88]

Heritage Management

1. Retain and conserve the Moreton Bay Figs.

Refer to Section 6 for the Implementation Plan which provides detail on the key actions for each management strategy.



Figure 80 - Moreton Bay Fig trees

Description

There are approximately 25 Moreton Bay Fig trees which are around 50 years of age. The trees run parallel to Cockburn Road and start at the Mc Taggart Cove/Cockburn Road intersection. It is understood that the stand of Moreton Bay Fig trees was once part of the Robb Jetty abattoir complex.

88 City of Cockburn, 2011. Local Government Inventory, p. 270

5.3.7 Public Art



Figure 81 - Public Art near Robb Jetty Source Googlemaps



Figure 82 - CY O'Connor statue

Heritage Type

Interpretation

Key Interpretive Theme

N/A

Heritage Status

Contained within the State Register of Heritage Places curtilage of the South Beach Horse Exercise Area (HCWA Database No. 16120).

Heritage Management

1. Retain, conserve and include in any overall interpretation strategy the Human Race Artwork and the C Y O'Connor statue.
2. Encourage new forms of Public Art in the project area that interprets the cultural heritage of Cockburn Coast.

Refer to Section 6 for the Implementation Plan which provides detail on the key actions for each management strategy.

Description

There are two pieces of public art in South Beach Horse Exercise Area, both located in the vicinity of the southern end of the C.Y. O'Connor Reserve. Both artworks were installed as part of the North Coogee Landscape project.

1. *CY O'Connor Statue*

   The CY O'Connor statue is a bronze statue located in the Indian Ocean approximately 20 - 30 metres off the South Beach. The statue of a man on a horse aims to depict C.Y. O'Connor on the occasion of his suicide on 10 March 1902 at South Beach.

   The monument to O'Connor was sculpted by Tony Jones and put in place at an unveiling ceremony in 2001. The location of the statue recognises not just the scene of his suicide but his close association with the horse training that still occurs on South Beach.

2. *Human Race Artwork*

   Located east of Robb Jetty, past the sand dunes an artwork in the form of metal fencing, gates and wind veins, designed by Artist Tony Jones, has been installed. The artwork, titled 'Human Race' has been designed to follow part of the line of the original race that ran from Robb Jetty to the slaughter yards. Made of recycled fencing salvaged from the original structure, the fencing runs in two long lines spaced according to the dimensions of the original cattle race. The fencing on both sides features metal cut out shapes of cattle.[89] There is a pole mounted weather vane at the western end of the race on the beach side of the cycle way.



Figure 83 - Human Race Artwork

89 City of Cockburn (2011)

5.4 PLACES OUTSIDE CCDSP 2 STUDY AREA

A desktop heritage survey has identified heritage-listed places in the larger Coast District Structure Plan study area. Specifically, heritage listed places were identified in the Newmarket Precinct and in areas not designated with a specific precinct.

This section documents these places.



FIGURE 84 - NEWMARKET PRECINCT PLAN



FIGURE 85 - PLACES OUTSIDE A CCDSP PRECINCT

5.4.7.1 NEWMARKET HOTEL



FIGURE 86 - AERIAL SHOWING THE NEWMARKET HOTEL SOURCE: CITY OF COCKBURN INTRAMAPS 2011

HERITAGE TYPE

Historic

Key Interpretive Themes

Eating and Drinking & Lodging People (AHTF 8.4 & 3.22)

Heritage Status

State Register of Heritage Places

HCWA Database No. 00504

Interim Listed 23 September 2005

Permanent Listed 7 September 2006

City of Cockburn Heritage List

Place No. 038

Category A

Listed 14 July 2011

Statement of Significance

The Newmarket Hotel is a two-storey building originally constructed in the Federation Filigree style with random rubble limestone and brick walls, an iron roof and a two-storey timber verandah, has cultural heritage significance for the following reasons:

the place is a landmark as an imposing two-storey building located on a prominent corner site and featuring a distinctive parapeted form that is truncated at the corner;

the place is associated with the horse racing industry – which thrived in the area from the early 1900s to the 1970s – as a consequence of the Hotel's location near South Beach Horse Exercise Area;

the place is associated with the expansion of industry and agriculture south of Fremantle from the late nineteenth century, in particular the horse racing industry which thrived in the area from the 1900s to the 1970s; and,

the place was run from 1945 to 1949 by hotelier George Russell Thompson, a professional boxer from 1922 to 1930 who was the Australian heavyweight boxing champion.[90]

90 Heritage Council of Western Australia Registration Documentation for Newmarket Hotel , 7 September 2006 p. 1



FIGURE 87 - NEWMARKET HOTEL 2011

Heritage Management

1. Retain and conserve.
2. Any new development adjacent to the building should ensure it retains its landmark qualities.
3. Interpret the story of how the place was developed to service the expansion of industry and agriculture south of Fremantle from the late nineteenth century and its association with horse racing industry.

Description

The Newmarket Hotel is a two-storey limestone and brick building with an iron roof, constructed in the Federation Filigree style of architecture. It is situated at the southeastern section of the intersection of Rockingham Road and Cockburn Road, Hamilton Hill. It was built c.1912 to service the expansion of industry and agriculture south of Fremantle from the late nineteenth century.

The Hotel was named after the town of Newmarket, in Suffolk, England, which remains as the centre of British horseracing. In early times market gardeners, dairy farmers and orchardists from the Cockburn district stopped off at Newmarket Hotel on their way home from the Fremantle Markets; nearby racehorse owners, trainers and jockeys; and workers from the surrounding meat processing and other industries also frequented the Hotel. The Hotel was a starting place for many bicycle races which were popular before the advent of the motor car.

The building features random rubble limestone walls. The main street facing north and west elevations have a flush-pointed limestone finish with coursed joints, and tuck-pointed brick quoining. The horizontal brick banding and the quoining has been painted white. The building features a two-storey wrap-around veranda; vertically proportioned double-hung and arched windows and two entries, one located on the truncated corner and the other, off Cockburn Road.

At the time of writing this Cultural Heritage Strategy the Hotel is vacant and subject to various conservation works.

5.4.7.2 Azelia Ley Homestead, Manning Estate



FIGURE 88 - AERIAL SHOWING THE AZELIA LEY HOMESTEAD, MANNING ESTATE SOURCE: CITY OF COCKBURN INTRAMAPS 2011

Heritage Type

Historic

Key Interpretive Theme

Developing sheep and cattle industries; working in the home; & associating to preserve traditions and group memories (AHTF 3.4, 5.5 & 8.5.1)

Heritage Status

State Register of Heritage Places

HCWA Database No.	0533
Interim Listed	5 June 1992
Permanent Listed	22 June 2001

City of Cockburn Heritage List

Place No. 01

Category A

Listed 14 July 2011

Statement of Significance

Azelia Ley Homestead, Manning Estate, comprising a single storey residence of limestone construction with features from the Victorian Regency style, set in mature, established gardens, the freestanding lavatories, the single roomed limestone building and the stables, and the Davilak Homestead ruin, has cultural heritage significance for the following reasons:

the place is an uncommon and intact example of a precinct of farm buildings in the Cockburn area and in the Perth metropolitan area;

the place is part of the original estate first established by prominent Fremantle merchant Charles Manning in the 1850s and 1860s. The place has a long association with the Manning family who owned the estate from the 1850s up until the 1950s, and with Azelia Ley (nee Manning) in particular, for whom the homestead residence was built;

the limestone homestead is a well proportioned example of a home in the Victorian Regency style, set in the Paradise Oasis style gardens of Manning Park;

the place is representative of the early settlement and development of the Cockburn district and has rarity value for its association with a farming land use that is no longer practised in this area;

the place has aesthetic value as a precinct of farm buildings of uniform construction and style, which contribute to the aesthetic qualities of the landscape of Manning Park; and,

the place, especially the ruins of Davilak Homestead and the archaeological remains of the first Manning homestead on the site, has the potential to reveal information about the lives of the Manning family and the farming occupations associated with the estate.[91]

91 Heritage Council of Western Australia Registration Documentation for Azelia Ley Homestead, Manning Estate 22 June 2001, p. 1

FIGURE 89 - PLACES OUTSIDE A CCDSP 2 STUDY AREA



FIGURE 90 - AZELIA LEY HOMESTEAD 2011

Heritage Management

1. Retain and conserve.
2. Interpret the association with farming and the Manning family.

Description

Azelia Ley Homestead is located within Manning Estate. The estate was originally owned by Charles Manning a prominent Fremantle merchant in the 1850s and 1860s. Charles acquired a considerable number of land grants in the vicinity of Manning Lake (former Davilak Lake) that grew to several thousand acres. Although Charles died in 1869, the land was kept in the Manning family until 1959. A 'to let' notice in the West Australian in 1891 provides a detailed description of the extent of Davilak, which consisted of:

"...large paddocks, 700 acres; 2 orchards, a vineyard, walled in; grass meadows, all well watered; dwelling house of 14 rooms; numerous and substantial stone outhouses, consisting of stables, coach-houses, dairy, poultry-houses, laundry, servants lodge (14 rooms); deep well of pure water with windmill, with piping laid on to house, laundry and private garden; carpenter shop; small forge; a good read running through the estate; valuable lime kilns. Paddocks suitable for butchers or grazing horses. The house would be let separate or with the whole. It is a pleasant country residence. The farm has every advantage for dairy, market garden and poultry- breeding."

Today Manning Estate comprises a main homestead residence (c.1900) and associated outbuildings, the ruins of another former Manning homestead, Davilak (1866) and possible archaeological evidence of the first Manning homestead constructed on the site (c.1850s). The precinct is located in the Manning Park recreation reserve. The Azelia Ley homestead residence is a single storey building of limestone construction with stylistic features from the Victorian Regency period.

Azelia Helena Manning, the oldest daughter of Lucius Alexander Manning and granddaughter to Charles Manning, was born at Davilak House in 1872. When Azelia married, a residence for her was erected on the west side of Lake Manning around 1920. This residence is now known as Azelia Ley Homestead. After Azelia died in 1959 the estate was sold. In September 1963, the property was transferred to the Metropolitan Region Planning Authority for the purpose of 'parks and recreation'.

5.4.7.3 Randwick Stables



FIGURE 91 - AERIAL SHOWING THE RANDWICK STABLES SOURCE: CITY OF COCKBURN INTRAMAPS 2011

Heritage Type

Historic

Key Interpretive Theme

Breeding animals & making suburbs (AHTF 3.5.2 & 4.1.2)

Heritage Status

State Register of Heritage Places

HCWA Database	No. 09242
Interim Listed	23 November 2001
Permanent Listed	14 May 2002

City of Cockburn Heritage List

Place No. 079

Category A

Listed 14 July 2011

Statement of Significance

Randwick Stables, a complex comprising a single storey timber framed dwelling, stone and timber framed stables, laundry, well, and other minor improvements, in a culturally modified landscape setting has cultural heritage significance for the following reasons:

with its open culturally modified landscape setting, scattered mature parade Palms, and the homestead with curious fully enclosed verandahs the place has a landmark quality;

it represents the large number of registered horse stables that operated in the Cockburn region in the first half of the twentieth century, when the area played an integral role in the development of the State's horse racing industry;

it is representative of the establishment and growth of the horse racing industry in Western Australia, and of the consequent development of horse racing stables and associated industries such as blacksmith shops in the areas of South Fremantle and Hamilton Hill;

the built elements of the Randwick Stables have a rustic charm in their culturally modified landscape setting, and the interior of the house is of particular aesthetic interest with its simple system of flat galvanized metal sheet lining, timber floors, and French doors leading onto the verandahs;

it represents an ethic of 'making do' and improvisation over a considerable period of time from the establishment of the stables to the present; and,

it was developed by local South Fremantle racing identities and trainers brothers Frederick 'Jack' Marks and Sol Marks, and Jimmy Banks.[92]

92 Heritage Council of Western Australia Registration Documentation for Randwick Stables 14 May 2002, p. 1

Heritage Management

1. Retain and conserve.
2. Interpret the historical association of the place with horse racing and as part of the development of horse racing stables and associated industries in the areas of South Fremantle and Hamilton Hill in the first half of the twentieth century.



FIGURE 92 - RANDWICK STABLES 2011

Description

Randwick Stables comprises a series of paddocks, timber framed bungalow, stables, laundry, stone well, water closet, and metal clad stables constructed in the 1920s for Frederick Charles John 'Jack' Marks, a member of the prominent horse racing Marks family. It was not until 1927/1928, that the name of the property and business is recorded as Randwick Stables, a year after the death of Jack Marks.

A large number of registered horse stables operated in the Cockburn region in the first half of the twentieth century, when the area played an integral role in the development of the State's horse racing industry. At the height of the industry, it is believed that approximately 400 horses were stabled in the area and trained at South Beach. Associated businesses such as blacksmiths and saddlers were established, and the trainers and jockeys such as the Collison, Millers, Cockell and Marks families became well known local identities.

The extant house was originally built in Cheetham Street, Kalgoorlie. It was owned by Jack Marks when he was living in the Goldfields prior to residing in South Fremantle. When Jack was unable to sell his house he dismantled it and transported it by train, along with all the family's furniture and belongings, to his newly purchased property in Rockingham Road, Hamilton Hill. The original four-roomed house complete with walls and ceilings of compressed tin was reassembled by Jack on Lots 26 and 27 fronting Rockingham Road. A verandah was added on three sides of the house after it had been reconstructed. The lattice work which encloses the verandah is also said to date from this time.

In 1999 Randwick stables was sold to the Main Roads WA. The purchase of the property by Main Roads was part of a scheme for a road highway network. Randwick Stables is occupied by tenants, who continue to operate the place as a licensed stable.

5.4.7.5 Manning Park and Tuart Trees



FIGURE 93 - AERIAL SHOWING MANNING PARK SOURCE: CITY OF COCKBURN INTRAMAPS 2011

Heritage Type

Historic

Key Interpretive Theme

Developing sheep and cattle industries; working in the home; & associating to preserve traditions and group memories (AHTF 3.4, 5.5 & 8.5.1)

Heritage Status

City of Cockburn Local Government Inventory
Place No. 33
Category B
Listed 14 July 2011

Statement of Significance

Manning Park and Tuart Trees have cultural heritage significance for the following reasons:

Manning Park has high social significance as a place of both active and passive recreation.;

Manning Park has high significance for its association with the Manning family; and

Manning Park is associated with the Azelia Ley Homestead and Davilak Ruins, both of which are located within the Park.[94]

Heritage Management

1. Retain and conserve.
2. Interpret the association with farming and the Manning family.

Description

Manning Park was named after a prominent citizen of Cockburn in the early 19th century, Lucius Manning. The Manning family developed a large estate with two homes around the lake which was once known as Davilak (now Manning). The Aboriginal name for the lake was Dgilgie's Lake which was changed to Devil's Lake by Manning. The Aborigines then pronounced it Davilak. Devil's Lake refers to the local Aboriginal people's belief that devils haunted the lake after dark, and Davies was a hermit who frequented the area around the lake

Close to the park is one of the houses built by Manning for his daughter Azelia Ley. It remains as a museum for the district.

The vegetation around Manning Lake consists of swamp paper bark and some large tuart trees. There are not many of these stands of trees left in Cockburn. The lake is currently recognised for its value for recreation and leisure pursuits. The banks are cleared and some landscaping has taken place around the natural trees. Children's play equipment attracts families to the setting.



FIGURE 94 - MANNING PARK SOURCE: CITY OF COCKBURN

94 City of Cockburn, 2011. Local Government Inventory, p. 108

5.4.7.4 Marks' House



FIGURE 95 - AERIAL SHOWING MARK'S HOUSE SOURCE: CITY OF COCKBURN INTRAMAPS 2011

Heritage Type

Historic

Key Interpretive Theme

Breeding animals & making suburbs (AHTF 3.5.2 & 4.1.2)

Heritage Status

City of Cockburn Local Government Inventory

Place No. 34

Category B

Listed 14 July 2011

Statement of Significance

Marks' House has cultural heritage significance for the following reasons:

Marks' House has a high level significance for its architectural style, and setting; and

Marks' House is associated with prominent local residents, the Marks family.[93]

Heritage Management

1. Retain and conserve.
2. Interpret the historical association of the place with horse racing and as part of the development of horse racing stables and associated industries in the areas of South Fremantle and Hamilton Hill in the first half of the twentieth century.

Description

Marks' House was built for Percy Marks, a racehorse trainer, circa 1929. The house was built on a 10-acre plot, which was used for stables, vegetable and flower gardens. By 1943 the property was not used for stabling horses. The Marks sold the property in 1947.



FIGURE 96 - MARK'S HOUSE SOURCE: CITY OF COCKBURN

93 City of Cockburn, 2011. Local Government Inventory, p. 113

6. IMPLEMENTATION PLAN

This section outlines how the Heritage Management Strategies identified in the previous section should be implemented, who should be responsible and the timeframe for implementation.

The Burra Charter sets out the principles generally accepted in Australia for the conservation of heritage places. The philosophy embodied in that document has been used as a basis for the formulation of the Heritage Management Strategies in this Cultural Heritage Strategy. As such, the Burra Charter forms an important reference document for the present and future custodians of the significant places in the Cockburn Coast project area and may assist in resolving any issues relating to the conservation of places that are not explicitly dealt with in this Strategy.

6.1 POWER STATION PRECINCT

STRATEGY	KEY ACTIONS TO BE UNDERTAKEN	REASON FOR ACTION	RESPONSIBLE AUTHORITY	TIMING
South Fremantle Power Station (Ref: 5.1.1)				

1. Retain, conserve and adapt the South Fremantle Power Station for new uses	• Adaptation works should include the retention of the following significant fabric:
	  • The steel framing exposed internally
	  • The overhead crane in the Turbine Hall and associated support framing
	  • Large internal central space in the Turbine Hall
	  • The exposed wall dividing the Turbine Hall and Boiler
		• To ensure the significance of the Power Station is maintained by retaining those elements that contribute to its significance	• Owner of the Power Station	Ongoing

	• Relocate the switchyard. Should the switchyard remain, it should be appropriately screened	• To optimise the adaptive reuse potential of the South Fremantle Power Station	• Owner of the switchyard	Long term
2. Any future conservation, management and/or adaptation works to the place are to be undertaken in accordance with State and local policies and procedures	• Seek approval for any works, alteration or adaptation of the South Fremantle Power Station from the Heritage Council of Western Australia	• To ensure compliance with the *Heritage Act of Western Australia 1990*	• Owner of the Power Station	Development application stage
	• All future planning and development of the South Fremantle Power Station should involve the input from appropriately qualified specialists including structural engineers and a heritage architect	• To ensure the place is conserved and adapted in accordance with best practice heritage management	• Owner of the Power Station	On going

3. Maintain the visual setting of, and interrelationship between, the significant contributory elements of the South Fremantle Power Station	• Ensure future planning maintains:
	  • The open space and associated link between the main building and the Indian Ocean
	  • The open thoroughfare on the eastern side of the Power Station building
	  • The open space of the entry forecourt between the northern side of the main building and the eastern side of the administration wing
		• To ensure that an appropriate setting and context for the Power Station is maintained and enhanced
		• To ensure that the Power Station retains its visual prominence
			• Owner of the land
			• Landcorp
				As part of:
				• Power Station Masterplan
				• Local Structure Planning

	• Ensure future planning incorporates and/or interprets the cooling pond and groynes into any future development	• To enhance the public understanding of the original layout of the site and relationship of the Power Station to the Indian Ocean	• Owner of the land • Landcorp	As part of: • Power Station Masterplan • Local Structure Planning

STRATEGY	KEY ACTIONS TO BE UNDERTAKEN	REASON FOR ACTION	RESPONSIBLE AUTHORITY	TIMING
4. Ensure all opportunities to generate awareness and public interest in the building are capitalised upon	• Encourage ephemeral uses and events to generate awareness and activate the site. An events based program is considered an effective means of activating the site and 'sparking' community interest and involvement	• To establish the South Fremantle Power Station as the key activator in the Cockburn Coast area • To generate interest in the Cockburn Coast Project • To establish a sense of public ownership and pride in the building	• Owner of the Power Station • Landcorp • City of Cockburn	Ongoing
5. Acknowledge the significance of high quality urban art, which has been informally applied on the walls of the Power Station since its closure	• Identify high quality urban art throughout the building and develop strategies for the conservation of the artworks	• To ensure the sense of identity, public ownership and pride in the building is maintained • To contribute to a unique, lively and dynamic environment • To demonstrate that a period of abandonment and neglect has been part of the history and evolution of the building	• Owner of the Power Station • Landcorp	As part of the Public Art and Cultural Interpretation Strategy

6. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community	• Ensure that the Public Art and Cultural Interpretation Strategy being prepared for Cockburn Coast interprets history of the site. Interpretation should include reference to:
	  • Its important contribution to the development of power generation in the state
	  • The involvement of the workforce which designed, built and operated the public utility
	  • The importance of the design of the utility as a 'Cathedral of Power'
	  • The changes and advancement in power generation, which led to the close of the utility
	  • The period of abandonment, subsequent informal use of the building and associated application of urban art
		• To reveal the history of the place and to provide an insight into its significance
		• To enrich the visitor's experience by making it more meaningful
			• Owner of the Power Station
			• Landcorp
				As part of the Public Art and Cultural Interpretation Strategy

STRATEGY	KEY ACTIONS TO BE UNDERTAKEN	REASON FOR ACTION	RESPONSIBLE AUTHORITY	TIMING
The Diana Shipwreck (Ref: 5.1.2)				
7. Retain the Diana shipwreck in situ and do not disturb	• Ensure that the land above the wreck is maintained in public ownership with provisions for future accessibility. Construction of any structure shall not disturb the wreck	• To comply with the requirements of the *Historic Shipwrecks Act 1976* • To ensure the shipwreck will remain accessible to future research	• Landcorp • City of Cockburn	As part of: • Power Station Masterplan • Local Structure Planning
8. Any future conservation, management and/ or adaptation works to the place are to be undertaken in accordance with Commonwealth and State legislation, policies and procedures	• Seek Commonwealth Ministerial approval prior to any proposed disturbance the shipwreck	• To ensure compliance with the *Historic Shipwrecks Act 1976*	• Landcorp • City of Cockburn	Prior to any ground disturbance
	• Obtain the Maritime Museum of Western Australia's advice prior to any action on or near the shipwreck	• To ensure compliance with relevant statutory mechanisms	• Landcorp • City of Cockburn	Prior to any ground disturbance
9. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the wreck to the community	• Ensure that the Public Art and Cultural Interpretation Strategy being prepared for Cockburn Coast interprets the story of the wreck and wreck event	• To identify the location of the wreck which is concealed by sand • To reveal the history of the place and to provide an insight into its significance • To enrich the visitor's experience by making it more meaningful	• Landcorp	As part of the Public Art and Cultural Interpretation Strategy
The James Shipwreck (Ref: 5.1.3)				
10. Retain the James Shipwreck in situ and do not disturb	• Ensure that the land above the wreck is maintained in public ownership with provisions for future accessibility. Construction of any structure shall not disturb the wreck	• To comply with the requirements of the *Historic Shipwrecks Act 1976* • To ensure the shipwreck will remain accessible for future research	• Landcorp • City of Cockburn	As part of: • Power Station Masterplan • Local Structure Planning
11. Any future conservation, management and/ or adaptation works to the place are to be undertaken in accordance with Commonwealth and State legislation, policies and procedures	• Seek Commonwealth Ministerial approval prior to any proposed disturbance the shipwreck	• To ensure compliance with the *Historic Shipwrecks Act 1976*	• Landcorp • City of Cockburn	Prior to any ground disturbance
	• Obtain the Maritime Museum of Western Australia's advice prior to any action on or near the shipwreck	• To ensure compliance with relevant statutory mechanisms	• Landcorp • City of Cockburn	Prior to any ground disturbance
12. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the wreck to the community	• Ensure that the Public Art and Cultural Interpretation Strategy being prepared for Cockburn Coast interprets the story of the wreck and wreck event	• To identify the location of the wreck which is concealed by sand • To reveal the history of the place and to provide an insight into its significance • To enrich the visitor's experience by making it more meaningful	• Landcorp	As part of the Public Art and Cultural Interpretation Strategy

STRATEGY	KEY ACTIONS TO BE UNDERTAKEN	REASON FOR ACTION	RESPONSIBLE AUTHORITY	TIMING
Indian Ocean Site (Ref: 5.1.4)				
13. Should any development be proposed in Owen Anchorage, conduct a maritime survey.	• Given the historically significant use of Owen Anchorage for shipping, investigations are required to be undertaken to identify any potential underwater cultural heritage material, inclusive of shipwrecks and associated relics	• To comply with the *Historic Shipwrecks Act 1976,* which protects all wrecks more than 75 years old, together with their associated relics, whether or not the existence and location of the remains are known.	• Landcorp	As part of the design phase for any future water based structures
14. Integrate interpretation of the mythological story of the site into the Cockburn Coast project to communicate the tangible and intangible values of the site	• Ensure that the Public Art and Cultural Interpretation Strategy being prepared for Cockburn Coast interprets the mythological story regarding the separation of the islands from the mainland	• To reveal the history of the place and to provide an insight into its significance • To enrich the visitor's experience by making it more meaningful	• Landcorp	As part of the Public Art and Cultural Interpretation Strategy
Robb Jetty Camp (Ref: 5.3.1)				
• A portion of the Robb Jetty Camp, which is a Registered Aboriginal site, is located within the Power Station Precinct. Refer to Sections 5.3.1 and 6.3 relating to the Robb Jetty Precinct and Foreshore for the Heritage Managment and Implementation Plan details for the Robb Jetty Camp				

6.2 EMPLACEMENT PRECINCT

STRATEGY	KEY ACTIONS TO BE UNDERTAKEN	REASON FOR ACTION	RESPONSIBLE AUTHORITY	TIMING
South Beach Battery (Remains) (Ref: 5.2.1)				
1. Retain and conserve the remaining South Beach Battery	• Inspect structure for cracks, spalling and signs of movement or other failure and repair as required	• To protect the place from harm, loss or deterioration • To ensure the place remains as a link to the past, a reminder of the history and former use of the area	• City of Cockburn	Annually
	• Ensure any graffiti is removed as quickly as practicable as a deterrent	• To manage the incidences of graffiti	• City of Cockburn	On-going
2. Views from the South Beach Battery to the Indian Ocean should be retained in future planning	• Ensure future planning maintains views to the Indian Ocean from the Battery site. This can be achieved by setting appropriate building heights for new development in the area to the west of the South Beach Battery.	• To ensure that the historic connection of the Battery to the Indian Ocean can be suitably interpreted	• Landcorp	As part of Local Structure Planning

3. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community	• Ensure that the Public Art and Cultural Interpretation Strategy being prepared for Cockburn Coast interprets defence history of the site. Interpretation should include reference to:
	  • the two other gun emplacements that were constructed at the same time and in close vicinity; and
	  • the connection of the South Beach Battery to the defence network established along the coast during World War II
		• To reveal the history of the place and to provide an insight into its significance
		• To enrich the visitor's experience by making it more meaningful
			• Landcorp	As part of the Public Art and Cultural Interpretation Strategy

4. Consideration should be given to the partial reinstatement of earth embankments to allow an appreciation of its original form	• Conduct further investigations into the original design and layout of the South Beach Battery to enable an accurate reconstruction of the emplacement facility	• To enhance the public understanding of the place and its original design intent	• City of Cockburn	Long term

6.3 ROBB JETTY PRECINCT AND FORESHORE

STRATEGY	KEY ACTIONS TO BE UNDERTAKEN	REASON FOR ACTION	RESPONSIBLE AUTHORITY	TIMING
Robb Jetty Camp (Ref: 5.3.1)				
1. Any future conservation, management and/ or adaptation works to the place are to be undertaken in accordance with State and local policies and procedures	• Submit a Section 18 application to the Department of Indigenous Affairs for any proposed disturbance in this registered area • Consultation with relevant Aboriginal people having native title links and/or heritage knowledge of the Cockburn Coast area should be undertaken at this time	• To ensure compliance with the *Aboriginal Heritage Act 1972* • To ensure any works have minimal impacts on Aboriginal cultural heritage • To ensure Aboriginal community concerns or requests made with respect to a proposed project/ development are addressed	• Private landowners • Landcorp • City of Cockburn • Developers	Development application stage or prior to the commencement of works
2. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community	• Ensure that the Public Art and Cultural Interpretation Strategy being prepared for Cockburn Coast interprets the Robb Jetty Camp and stories associated with it	• To reveal the history of the place and to provide an insight into its significance • To enrich the visitor's experience by making it more meaningful	• Landcorp	As part of: • Public Art and Cultural Interpretation Strategy • Foreshore Management Plan
	• Oral histories should be undertaken with indigenous people who have had an association with the Robb Jetty Camp to inform future interpretation	• To gain an understanding of the coastal landscape from a different perspective, providing an opportunity to learn stories that are not written down • Incorporate these experiences and factors into the development and management of the Cockburn Coast project	• Landcorp	Immediately and prior to the Public Art and Cultural Interpretation Strategy
3. Acknowledge that skeletal material has previously been unearthed in the general vicinity.	• Prior to the commencement of construction works a suitably qualified archaeologist should be engaged to develop an Archeological Watching Brief to ensure any sub surface archaeological material located in the area are not unduly disturbed. This will be need to be done in consultation with and include the participation of the Traditional Owners • Note: This is generally a condition of a Section 18 consent.	• To ensure any artefacts located in the area are not unduly disturbed and managed in accordance with relevant legislation and the wishes of the Traditional Owners	• Landcorp • City of Cockburn • Developers	Development application stage or prior to the commencement of works

STRATEGY	KEY ACTIONS TO BE UNDERTAKEN	REASON FOR ACTION	RESPONSIBLE AUTHORITY	TIMING
South Beach Horse Exercise Area (Ref 5.3.2)				
4. South Beach should continue to be used for the horse training, a use with which it has had a long association	• Provide facilities, such as areas for horse float parking to enable the ongoing use of the beach for horse training	• To maintain the long standing association with training horses in the area. • To ensure that the established unique, and dynamic environment is maintained for use by both horse riders and the general public	• Landcorp • City of Cockburn	As part of: • Foreshore Management Plan • Local Structure Planning
5. Any future conservation, management and/ or adaptation works to the place are to be undertaken in accordance with State and local policies and procedures	• Seek approval for any works, alteration or adaptation of the place from the Heritage Council of Western Australia	• To ensure compliance with the *Heritage Act of Western Australia 1990*	• Landcorp • Developers • City of Cockburn	Development application stage or prior to the commencement of works
6. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community	• Ensure that the Public Art and Cultural Interpretation Strategy being prepared for Cockburn Coast interprets the historical association and significance of horse training at South Beach	• To reveal the history of the place and to provide an insight into its significance • To enrich the visitor's experience by making it more meaningful	• Landcorp	As part of the Public Art and Cultural Interpretation Strategy
Robb Jetty (Ref: 5.3.3)				
7. Remnants of Robb Jetty should be retained undisturbed	• Any potential new jetty development or other structure should be offset from the original alignment, to ensure the original structure is not damaged or obscured. This will also enable a variety of interpretive opportunities for the jetty	• To ensure the jetty remains as a link to the past, a reminder of the history and former use of the area	• Landcorp • City of Cockburn	As part of: • Foreshore Management Plan • Local Structure Planning
8. Any future conservation, management and/ or adaptation works to the place are to be undertaken in accordance with State and local policies and procedures	• Given the Jetty falls within the Register Curtilage of the South Each Horse Exercise Area approval for any works, alteration or adaptation of the jetty should be sought from the Heritage Council of Western Australia • Given the Jetty partially falls within the Robb Jetty Camp, submit a Section 18 application to the Department of Indigenous Affairs for any proposed disturbance to the Jetty	• To ensure compliance with the *Heritage Act of Western Australia 1990* • To ensure compliance with the *Aboriginal Heritage Act 1972*	• Landcorp • Developers	Development application stage or prior to the commencement of works

STRATEGY	KEY ACTIONS TO BE UNDERTAKEN	REASON FOR ACTION	RESPONSIBLE AUTHORITY	TIMING
9. Consideration should be given to providing historic statutory heritage protection to Robb Jetty in its own right	• Liaise with the Heritage Council of Western Australia and the City of Cockburn to consider potential heritage listing	• Listing gives public recognition to heritage places and acknowledges it as an important place of distinction	• Landcorp	Immediately
10. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community	• Ensure that the Public Art and Cultural Interpretation Strategy being prepared for Cockburn Coast interprets the importance of Robb Jetty as an integral part of the industrial history and development of the area	• To reveal the history of the place and to provide an insight into its significance • To enrich the visitor's experience by making it more meaningful	• Landcorp	As part of the Public Art and Cultural Interpretation Strategy
Robb Jetty Chimney (Ref: 5.3.4)				
12. Retain and conserve the Robb Jetty Chimney	• Conduct periodic structural assessments to ensure the Chimney retains its structural integrity • Ensure any graffiti is removed as quickly as practicable as a strict deterrent	• To protect the place from harm, loss or deterioration • To manage the incidences of graffiti	• City of Cockburn • City of Cockburn	Annually On-going
13. Any future conservation, management and/or adaptation works to the place are to be undertaken in accordance with State and local policies and procedures	• Seek approval for any works, alteration or adaptation of the place from the Heritage Council of Western Australia	• To ensure compliance with the *Heritage Act of Western Australia 1990*	• Landcorp • Developers	Development application stage or prior to the commencement of works
14. Any new development adjacent to the Chimney should ensure it maintains its landmark qualities	• Development immediately surrounding the Chimney should sit appropriately below the height of the chimney	• To ensure that new buildings adjacent to the chimney are sympathetic to and do not visually overwhelm the significance of the place	• Landcorp • City of Cockburn	As part of: • Local Structure Planning • Design Guidelines
15. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community	• Ensure that the Public Art and Cultural Interpretation Strategy being prepared for Cockburn Coast interprets the former abattoir use of the site, its role in feeding the people of Perth and the goldfields, and its former connection to Robb Jetty	• To reveal the history of the place and to provide an insight into its significance • To enrich the visitor's experience by making it more meaningful	• Landcorp	As part of the Public Art and Cultural Interpretation Strategy

STRATEGY	KEY ACTIONS TO BE UNDERTAKEN	REASON FOR ACTION	RESPONSIBLE AUTHORITY	TIMING
Moreton Bay Figs (Ref: 5.3.6)				
16. Retain and conserve the Moreton Bay Figs	• An arboricultural assessment of the trees should be undertaken to ensure the health and vigour of the trees is maintained • New development in the vicinity should not negatively impact on the trees • A tree replacement strategy should be prepared and implemented if and when required	• To ensure the health and vigour of the trees is maintained	• Owner of land and/or developer • City of Cockburn	Development application stage or prior to the commencement of works
Wyola and Barge (remains) (Ref: 5.3.5)				
17. Investigate the heritage value of the Wyola and barge (remains)	• Liaise with the Heritage Council of Western Australia, the Maritime Museum of Western Australia and the City of Cockburn to consider the heritage value of the remains and the potential for heritage listing	• The Wyola and barge remain as the only visible evidence of shipwrecks in the area. They provide an important opportunity for interpretation and an important link to the maritime history of the area.	• Landcorp • City of Cockburn	• Prior to any disturbance
18. Any future actions (including conservation, management and/ or adaptation works) to the place are to be undertaken in consultation with key stakeholders	• Given the Wyola and barge (remains) falls within the Register Curtilage of the South Beach Horse Exercise Area approval for any works, alteration or adaptation to the remains should be sought from the Heritage Council of Western Australia • Obtain the Maritime Museum of Western Australia's comment prior to any action involving the Wyola and barge (remains) • Given the remains fall within the Robb Jetty Camp, submit a Section 18 application to the Department of Indigenous Affairs for any proposed disturbance to the remains	• To ensure compliance with the *Heritage Act of Western Australia 1990* • To ensure compliance with the *Aboriginal Heritage Act 1972*	• Landcorp • Developers	Development application stage or prior to the commencement of works
19. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the wreck to the community	• Ensure that the Public Art and Cultural Interpretation Strategy being prepared for Cockburn Coast interprets the story of the Wyola and barge (remains)	• To reveal the history of the place and to provide an insight into its significance • To enrich the visitor's experience by making it more meaningful	• Landcorp	As part of the Public Art and Cultural Interpretation Strategy

STRATEGY	KEY ACTIONS TO BE UNDERTAKEN	REASON FOR ACTION	RESPONSIBLE AUTHORITY	TIMING
Public Art (Ref: 5.3.7)				
20. Retain, conserve and include in any overall interpretation strategy the Human Race Artwork and the C Y O'Connor statue	• Ensure the future planning for the Cockburn Coast project incorporates the existing public art in the area	• To recognise the importance of existing interpretation that serves as a reminder of the history and former use of the area	• City of Cockburn	As part of: • Foreshore Management Plan • Public Art and Cultural Interpretation Strategy
21. Encourage new forms of Public Art in the project area that interprets the cultural heritage of Cockburn Coast	• Ensure new public art interprets the history of the area generally and the stories associated with the various places within it	• To ensure the Cockburn Coast Project reveals and celebrates the history of the area • To enrich the visitor's experience by making it more meaningful	• Landcorp	As part of the Public Art and Cultural Interpretation Strategy

Appendix E
Local Transport and Traffic Management Strategy



Cockburn Coast Local Transport and Traffic Management Strategy

14 May 2013

Hassell

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1. Introduction

1.1 Background

Parsons Brinckerhoff has been commissioned by Hassell to assess the traffic and transportation issues relating to the proposed Cockburn Coast development. The Cockburn Coast development is a mixed use development consisting of residential dwellings, commercial and retail space. There is the potential to construct a marina on this site, however this report assumes a 'no marina' scenario. The development consists of three precincts, Robb Jetty, Hill Top and Power Station.

The Cockburn Coast District Structure Plan (DSP) No. 2, was approved by the City of Cockburn in February 2012. The DSP Part 2 includes an Integrated Transport Plan (ITP) which sets forth the framework for future transportation improvements in the Cockburn Coast study area.

The ITP reflects the outcome of a collaborative effort of a number of stakeholders. The ITP was developed and endorsed through the Transport Planning Group which includes representatives from LandCorp, Department of Transport, Department of Planning, Main Roads WA, the Public Transport Authority, the City of Fremantle and the City of Cockburn. The ITP:

- incorporates the views of the many project stakeholders and takes account of relevant state and local government planning strategies impacting on the region
- outlines timely and achievable outcomes to provide local and regional planning certainty
- optimises the economic potential of the Cockburn Coast development to influence regional development and growth for integrated outcomes
- contains sufficient road and public transport system capacity to accommodate shifts and increases in travel demand
- balances the safety, efficiency and effectiveness of the local and regional transport network in a way that is appropriate and consistent with the approved DSP and transport network and
- provides clarity and certainty for Precinct Based Planning to proceed.

As such, the ITP provides the foundation for the following assessment of the movement strategy and parking being considered for the development. As a fundamental strategy, the DSP recommended the creation of a Bus Rapid Transit system (BRT) focussed on Cockburn Road and Hampton Road connecting the Fremantle CBD and train station with the project area. Buses using the BRT would also provide service to and from Murdoch Activity Centre and Rockingham. The DSP also recommended stations for the BRT be located within mixed use activity areas within the Cockburn Coast. Accordingly, the Cockburn Coast development will be served by the BRT and as such the development is considered to be a Transit Oriented Development.

In the short to medium term, the flexibility of bus rapid transit (BRT), its ability to offer similar service quality to rail (speed, reliability and comfort) and to provide certainty through investment in infrastructure while still being cost effective, resulted in BRT being the favoured approach to servicing the Cockburn Coast and surrounding communities. In the

long term, it is the aspiration of LandCorp and the Cities of Cockburn and Fremantle that the alignment is served by light rail.

1.2 Location

The Cockburn Coast development area is located approximately 4km to the south of Fremantle and 18km southwest of the Perth CBD. The development area is approximately 330 hectares and is abutted to the north and south by the South Beach and Port Coogee urban renewal projects. The development site location in the context of the wider regional area is shown in Figure 1.1.

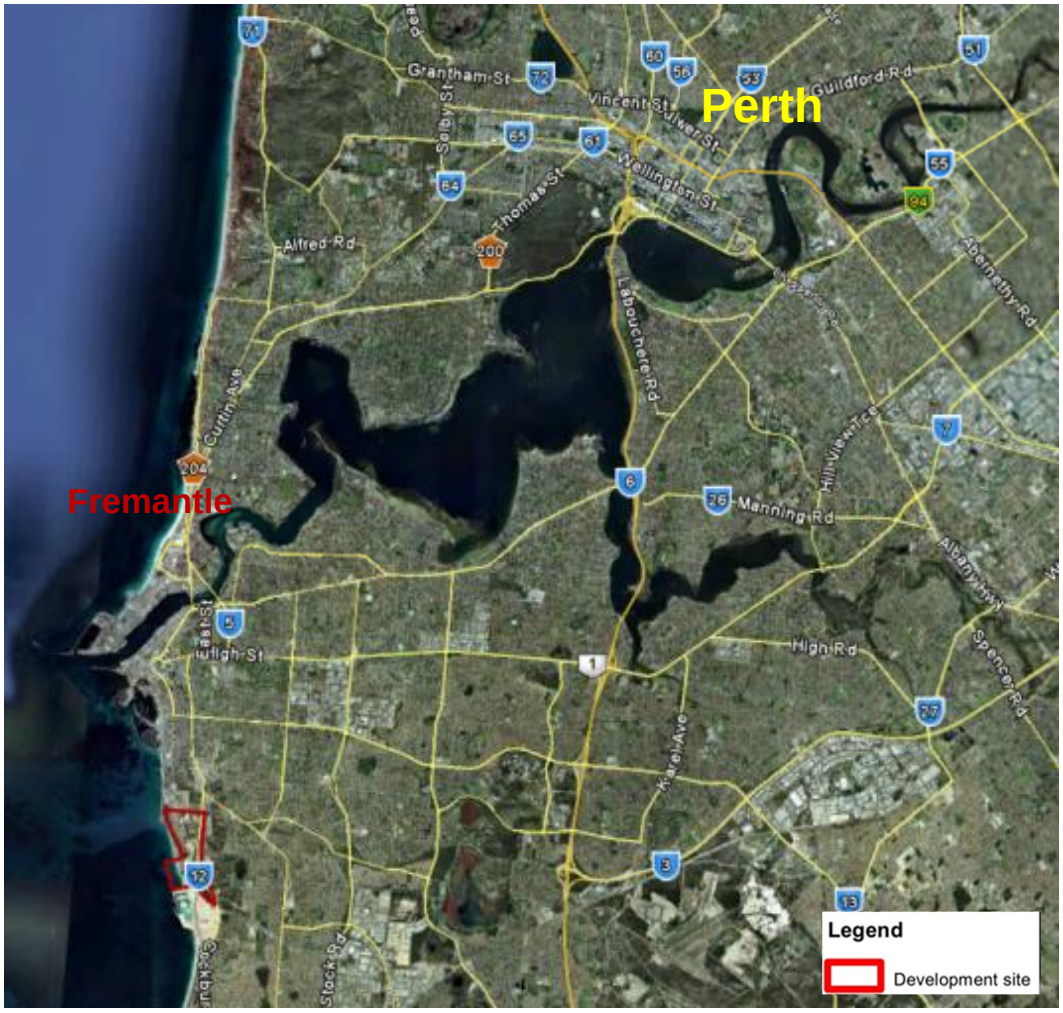


Figure 1-1 Development location *(Source: Landgate (SLIP, 2012))*

The study area that was originally proposed extended from south of Spearwood Avenue to Douro Road in the north, covering Cockburn Road to the east and Robb Road to the west. Following discussions with the City of Cockburn, the study area has been extended further north to include the South Street / Hampton Road intersection. A more detailed illustration of the study area is illustrated in Figure 1.2.



Figure 1-2 Development area and study area *(Source: Landgate (SLIP, 2012))*

1.3 Aim of this study

The aim of this Transport Assessment (TA) is to ensure that the development will:

- Provide safe and efficient access for all modes
- Be well integrated with the surrounding land uses
- Not adversely impact on the surrounding area
- Not adversely impact on the surrounding transport networks and the users of those networks

This TA has been produced in line with the Western Australian Planning Commission Transport Assessment "*Guidelines for Developments*" (August 2006).

2. The proposal

2.1 Regional context

As detailed in the DSP Part 2, Cockburn Coast is well located between economically significant centres, namely Fremantle, Rockingham, Kwinana and Henderson. It is also well connected to other major employment areas at Cockburn Central and Spearwood Industrial area. Within the South-West Sub-region, Rockingham is the principal centre of mixed use activity and is classified under Directions 2031 as a Primary Centre; Kwinana and Henderson are strategic industrial centres with a major focus on heavy industrial and export-oriented industry, employing over 10,000 workers. According to the employment targets set within Directions 2031, the south-west sub-region is expected to increase its employment self-sufficiency rate to 70% by 2031, requiring the creation of 41,000 new jobs, an increase from the already existing 52,000 in 2008. If the Cockburn Coast economy is to fully mature, it would provide a significant lift to the sub regional economy by improving the economy's competitive edge and value propositions on offer. In addition, it should directly contribute between 2,310 and 3,125 jobs (depending on the Scenario) towards the Directions 2031 employment target of 41,000 new jobs.

2.2 Proposed land uses

The Local Structure Plan boundaries and proposed land uses are illustrated in Figure 2.1 and the development yields for the Cockburn Coast development area are outlined in Table 2.1. These yields have been provided by Hassell and are the yields that have been assessed in this report.

In creating a projected yield for the Cockburn Coast area, a realistic take of the development status in the year 2031 has been made by Hassell. To begin, a base yield of 85% of the maximum capacity of the site has been created. It is necessary to calculate only 85% of the maximum potential of the site as a result of Amendment 89 to the City of Cockburn Town Planning Scheme No. 3. This amendment requires all development within the Cockburn Coast to achieve a minimum of 85% of the potential yield for any given site. It can thus be stated with certainty that 85% of the potential yield for the site will be present upon completion.

It is then necessary to consider what of this 85% of development will be present in 2031. It is predicted in 2031 that not all possible development will have occurred. Given the staging of development, timing of approvals and market characteristics it is likely that whilst a large percentage of the Robb Jetty precinct will be constructed, the Emplacement and Power Station precincts will not be as progressed. The yield projection makes the following assumptions on the staging of development.

In the year 2031:

- 50% of the Power Station precinct will be developed
- 60% of the Emplacement precinct will be developed
- 90% of the Robb Jetty precinct will be developed

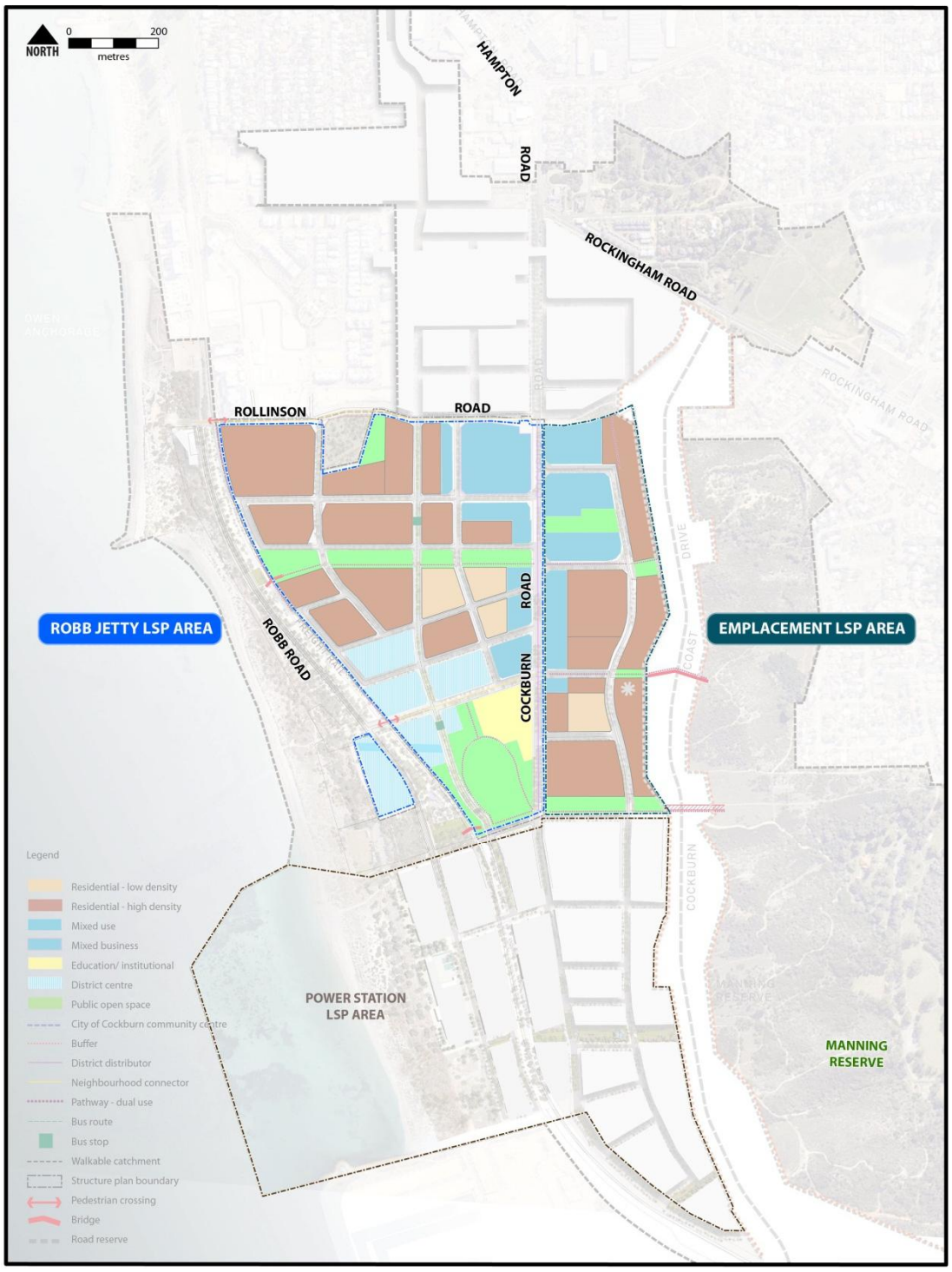


Figure 2-1 Proposed land use Robb Jetty and Emplacement precincts

Table 2.1 Yield summary

COCKBURN COAST TOTAL			
Land use type	**Residential units (dwellings)**	**Commercial area (sqm)**	**Retail area (sqm)**
Low density residential	433	0	0
Medium density residential	1,077	0	0
High density residential	749	0	0
Mixed use	293	22,228	8,335
Activity centre	614	41,023	11,710
Community / commercial	0	0	468
Total	**3,166**	**63,251**	**20,513**

The development will consist of a range of residential units along with Retail and Commercial areas. These will cover the Robb Jetty, Hill Top and Power Station precincts. Yields for each of the three precincts are detailed in Table 2.2.

Table 2.2 Individual precinct yields summary

ROBB JETTY PRECINCT			
Land use type	**Residential units (dwellings)**	**Commercial area (sqm)**	**Retail area (sqm)**
Low density residential	261	0	0
Medium density residential	812	0	0
High density residential	244	0	0
Mixed use	160	10,836	4,063
Activity centre	238	16,105	6,040
Community / commercial	0	0	468
Total	**1,715**	**26,941**	**10,571**

HILL TOP PRECINCT			
Land use type	**Residential units (dwellings)**	**Commercial area (sqm)**	**Retail area (sqm)**
Low density residential	116	0	0
Medium density residential	165	0	0
High density residential	484	0	0
Mixed use	119	8,063	3,024
Total	**884**	**8,063**	**3,024**

POWER STATION PRECINCT			
Land use type	**Residential units (dwellings)**	**Commercial area (sqm)**	**Retail area (sqm)**
Low density residential	56	0	0
Medium density residential	100	0	0
High density residential	21	0	0

POWER STATION PRECINCT			
Land use type	**Residential units (dwellings)**	**Commercial area (sqm)**	**Retail area (sqm)**
Mixed use	14	3,329	1,248
Activity centre	376	24,918	5,670
Total	**567**	**28,247**	**6,918**

In addition to the yields detailed above, a primary school is proposed in the Robb Jetty precinct. This has a total area of 15,260 sqm.

2.3 Major attractors / Generators

The Cockburn Coast Economic Development Strategy indicates that Cockburn Coast has a limited catchment as a result of its location on the edge of the ocean and with Manning Reserve to the east. The catchment of Cockburn Coast is further limited by the existing (and improving) offer of South Fremantle as a competing activity centre and by the competing activity centre in Port Coogee. A large proportion of trips are however still expected to originate from South Fremantle and Coogee, with areas such as Cockburn Central to the east also being a major attractor / generator of trips to the Cockburn Coast area.

3. Existing situation

3.1 Existing land uses within and surrounding Cockburn Coast

The Cockburn Coast development site is a former industrial area, housing the South Fremantle Power Station and switchyard. A small number of industrial uses are still in operation; however the majority of the land is suitable for redevelopment.

Although the site itself is a former industrial area, the surrounding areas are predominantly urban in nature. The surrounding areas of South Fremantle, Coogee, Hamilton Hill and Spearwood are existing residential suburbs. The surrounding land use is illustrated on Figure 3.1

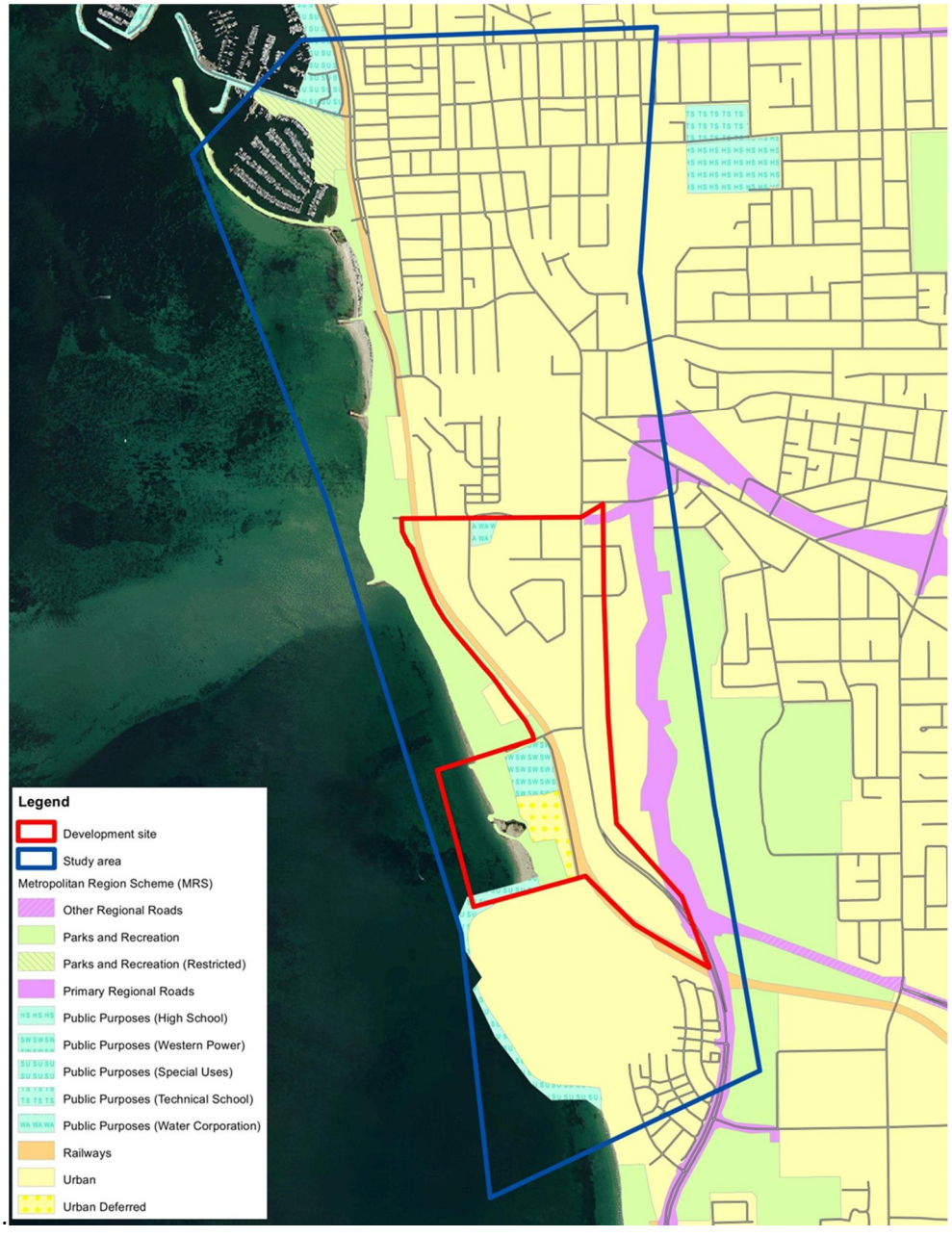


Figure 3-1 Surrounding land use *(Source: Landgate (SLIP, 2012))*

3.2 Existing pedestrian and cycle networks

There are already a number of pedestrian and cycle facilities within and surrounding the development area as shown in Figure 3.2.

There is a sealed shoulder on both sides of Cockburn Road to the southern end of the study area whilst a shared pedestrian / cycle path also runs from the south east of the study area along the coast to the northwest. Route SW10 which forms part of the Perth Bicycle Network enters the study area at Rockingham Road.

Although there are a number of pedestrian routes in the area, there are currently limited opportunities for pedestrians to cross Cockburn Road. Pedestrian stages are included in the signals at the intersections of Cockburn Road with Spearwood Avenue, Rockingham Road and Douro Road providing crossing points at these locations.



Figure 3-2 Existing cycle routes and facilities

(Source: Department of Transport, Perth Bike Map Series, Cockburn)

3.3 Existing public transport services within and surrounding Cockburn Coast

The bus services currently operating in the Cockburn Coast study area are illustrated on Figure 3.3 and detailed in Table 3.1. These services provide a connection to and from the Cockburn Coast area. Only one bus service (service 825) runs north – south along the extent of the Cockburn Coast study area however, operating between Fremantle Station and Rockingham Station. The frequency of this service is limited with a maximum of two services operating in the peak hours.

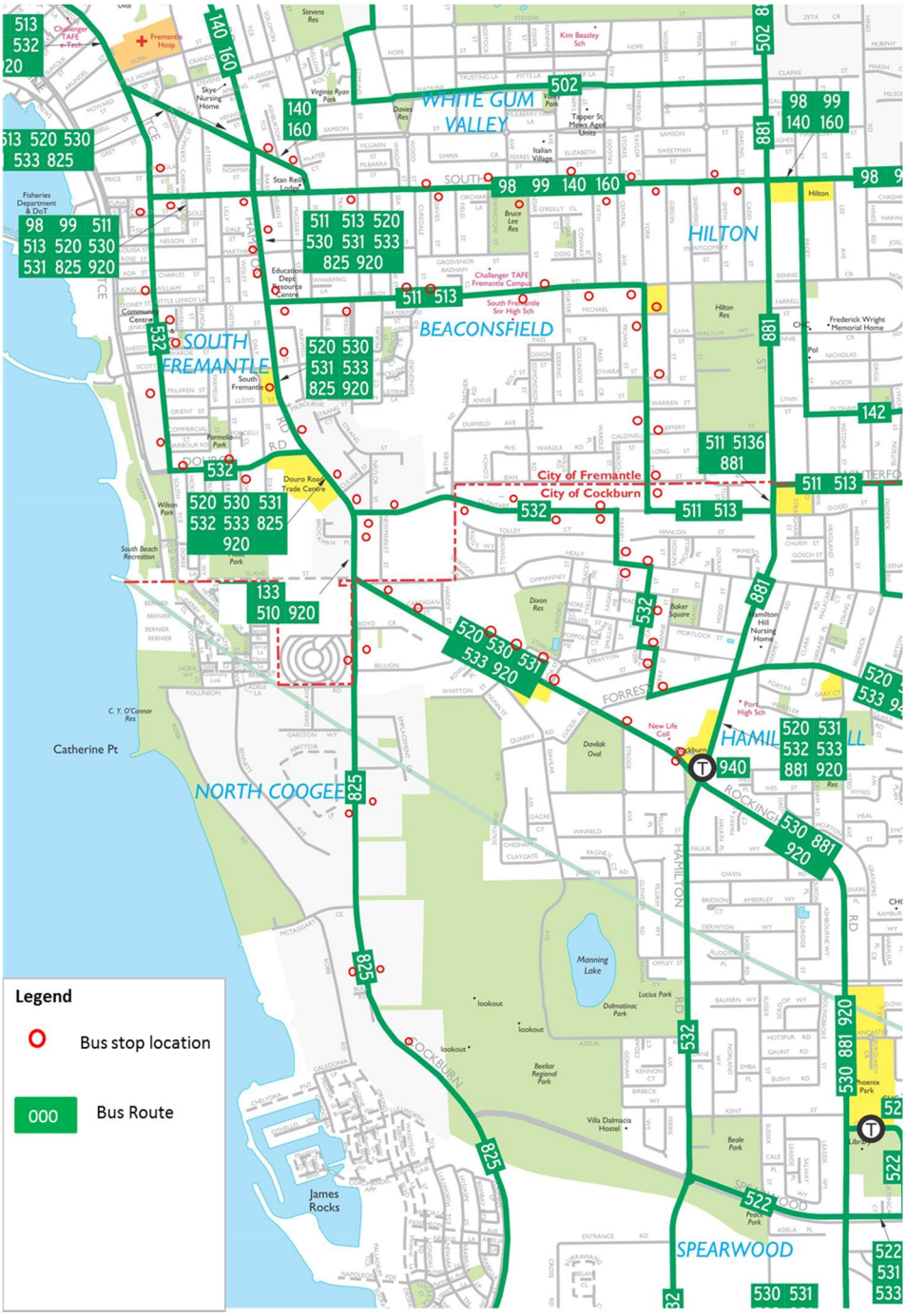


Figure 3-3 Bus services and stops (Source: *Transperth*)

Table 3.1 Existing bus frequencies

Service	Route	Frequency
511	Fremantle Station - Hampton Rd - Lefroy Rd - York St - Hamilton Senior High School - Kardinya Shopping Centre – Winterfold Rd/Stock Rd. - Somerville Rd./Keall Pass	Every 15-20mins
513	Fremantle Station - Hampton Rd - Lefroy Rd - York St - Hamilton Senior High School - Kardinya Shopping Centre – Winterfold Rd/Stock Rd. - Somerville Rd./Keall Pass	Every 15-20mins
520	Fremantle Station - Hampton Rd.- Rockingham Rd./Carrington St. - Lakes shopping centre - Cockburn Central Station	Every 15-20mins
530	Fremantle Station - Hampton Rd. - Rockingham Rd./ Carrington St.- Marvell Av - Rockingham Rd. - Beeliar Dr/Durnin Av. - Emmanuel Catholic College - Cockburn Central Station	Every 15-20mins
531	Fremantle Station - Hampton Rd. - Rockingham Rd./ Carrington St.- Marvell Av - Rockingham Rd. - Beeliar Dr/Durnin Av. - Emmanuel Catholic College - Cockburn Central Station	Every 15-20mins
532	Port Pire St./Port Kembla Dr. - Fremantle Station - Hampton Rd. - Carrington St./Rockingham Rd. - Beeliar Dr/Durnin Av - Cockburn Central station	Every 15-20mins
533	Fremantle Station - Hampton Rd. - Rockingham Rd./ Carrington St.- Marvell Av - Rockingham Rd. - Beeliar Dr/Durnin Av. - Emmanuel Catholic College - Cockburn Central Station	Limited service (approx. 2 a day)
825	Fremantle Station - Hampton Rd. - Cockburn Rd. – Cockburn Rd/Magazine Ct - Rockingham Rd./Macedonia St. - Rockingham Station	Every 30-45mins
920	Fremantle Station - South St./Hampton Rd. - Rockingham Rd./Carrington St.- Kwinana Hub Bus Station - Rockingham Station	Every 15-30mins (every 10 mins in the peak)

A railway line runs through the study area operating between Cockburn and Fremantle. This line is not used for passenger travel; it is solely used for the movement of freight. According to the Network Manager at Brookfield Rail, eight freight trains per day operate on the Cockburn-Fremantle line with none currently operating in the peak periods (06:00 – 09:00 and 15:00 – 18:00). There are therefore no passenger railway services or facilities in this area.

3.4 Existing road network within and surrounding the Cockburn Coast

The existing road network is illustrated in Figure 3.4. Cockburn Road (State Route 12) is a strategic road running north-south. This route connects destinations in the south such as Coogee, the Australian Marine Complex at Henderson, the Kwinana Industrial area and Rockingham with Fremantle to the north. The route functions as the primary north – south route for freight and regional traffic. It has a speed limit of 60kph at the northern end and 70kph at the southern end with the transition point located south of the intersection with Emplacement Crescent. Robb Road provides an additional north-south link through the development site; it has a speed limit of 40kph.

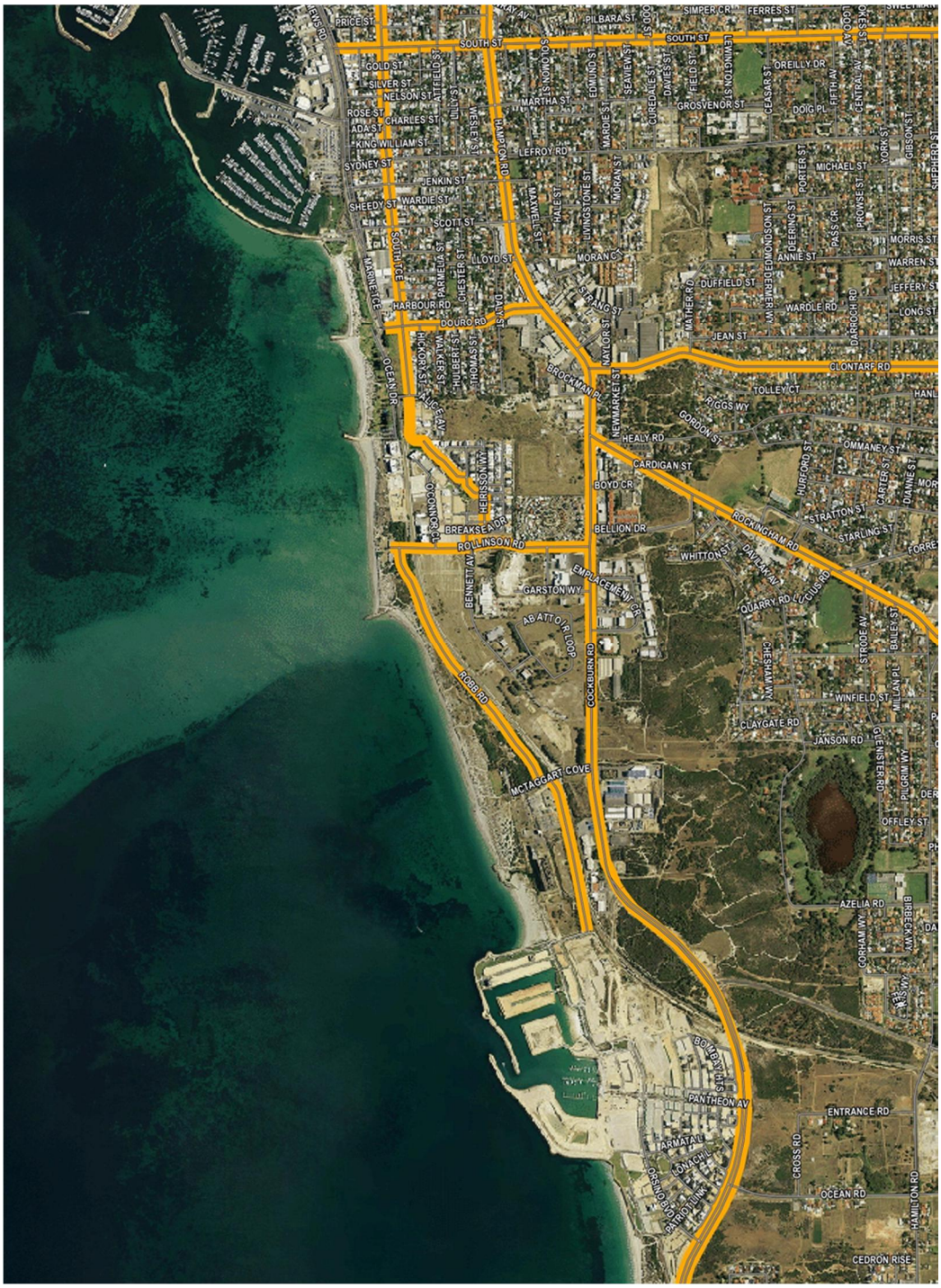


Figure 3-4 Existing road network *(Source: Landgate (SLIP, 2012))*

Rockingham Road is located to the north of the development area and connects Cockburn Road with Carrington Street to the east. Rockingham Road has a speed limit of 60kph. The impact of the development on the operation of the intersection of Rockingham Road and Cockburn Road will be considered as part of this Transport Assessment.

The railway line runs north to south through the development site. There are currently two locations where it is possible to cross the rail line. These are Rollinson Road and McTaggart Cove. Rollinson Road is a local road with a 50kph speed limit running east-west between Cockburn Road and Robb Road. It provides the only existing east-west access to the north of the development site. McTaggart Cove provides an east-west connection in the south. The crossing over the rail line at McTaggart Cove is shown in Photo 3.1.



Photo 3.1 McTaggart Cove rail crossing

3.5 Traffic flows on roads during the AM and PM peak hours

Base year traffic flows have been determined for links and intersections within the Cockburn Coast study area. These have been established from manual classified link and intersection counts. Automatic Traffic Counts were carried out by Austraffic between Monday 6 February and Thursday 23 February 2012. These were located at key mid-block locations in the study area. Turning counts were undertaken on Thursday 16 February and Thursday 23 February 2012 at the following intersections:

- Rollinson Road / Cockburn Road intersection
- Bellion Drive / Cockburn Road intersection
- Rockingham Road / Cockburn Road / Hampton Road intersection
- Hampton Road / Douro Road intersection
- Douro Road / Daly Street intersection
- Douro Road / South Terrace / Marine Terrace intersection
- South Street / South Terrace intersection

Further intersection counts were undertaken at the South Street / Hampton Road and the Wray Avenue / Hampton Road intersections on 21 June 2012.

SCATS data was provided by Main Roads WA for the period Monday 13 February 2012 to Sunday 26 February 2012 for a number of intersections.

The location of the data collected is shown in Figure 3.5.

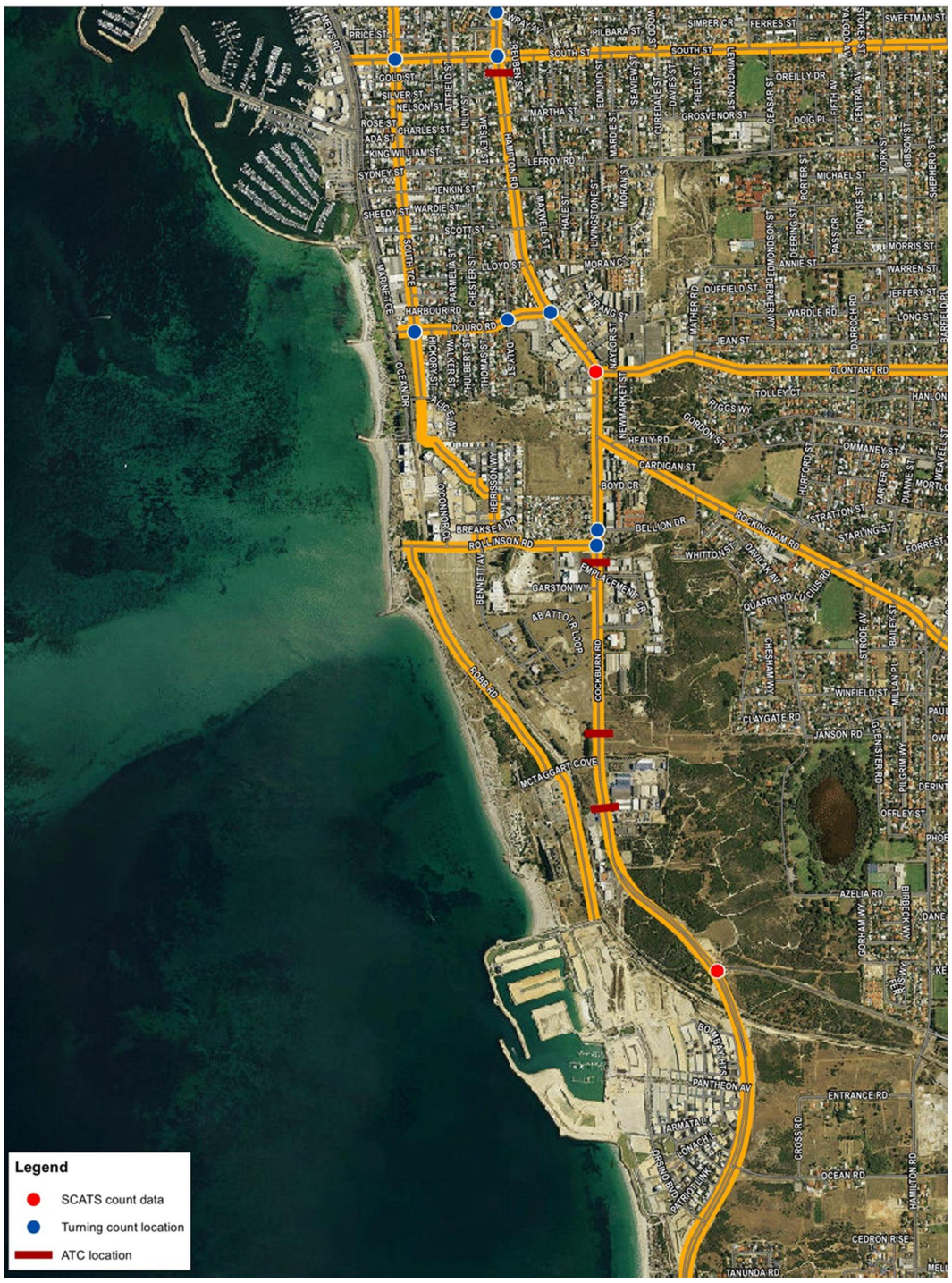


Figure 3-5 Data collection locations *(Source: Landgate (SLIP, 2012))*

Base year traffic flows are illustrated in Appendix A.

Signal timing charts were also sourced from Main Roads WA for the signalised intersections in the study area.

3.6 Crash data review

The Cockburn Coast Road Safety Audit (RSA) was undertaken by Parsons Brinckerhoff in January 2012. The RSA shows that in the five years up to December 2010 the section of Cockburn Road within the study area had a crash rate of 1.3 crashes per million vehicle kilometres of travel (MVKT). This compares favourably with a network average of 2.35 MVKT for a major undivided road in a built up area (Main Roads WA "Network Average Crash Rates," May 2001).

The RSA identified that there are no cycle facilities along Cockburn Road between the Rockingham Road intersection and just south of the Boyd Crescent intersection. South of Boyd Crescent to the Old Cockburn Road intersection, an un-designated narrow hard shoulder is present and is being used by cyclists. The hard shoulder varies in width and at times terminates without warning to either drivers or cyclists. South of Old Cockburn Road the road is recently constructed and includes a formal hard shoulder designated for use by cyclists. Only 1 crash in the 5 year period involved a pedestrian being hit. The crash severity on Cockburn Road is detailed in Table 3.2.

Table 3.2 Cockburn Road crash severity (2006 - 2010)

Severity	Intersections	Midblock	Total
Fatal	0	0	0
Hospital	2	3	5
Medical	5	12	17
Property damage only: Major	26	39	65
Property damage only: Minor	10	21	31
Totals	**43**	**75**	**118**

4. Proposed transport networks

4.1 Pedestrian and cycle networks and crossing facilities

As detailed in the ITP, pedestrian and cycling facilities will be provided within Cockburn Coast. Pedestrian and cyclist routes will make the site accessible for non-motorised users, whilst also helping to minimise traffic flows in the area.

The ITP recommended that priority be given to pedestrians at key street crossings and in the overall design speeds of the streets. A hierarchy for pedestrian movement has been developed to ensure safe and direct access for pedestrians throughout Cockburn Coast. The network will consist of:

- Informal tracks to the beach
- Footpaths within the road system
- Shared paths, for pedestrians and cyclists
- Shared surfaces, accommodating vehicles, cyclists, pedestrians
- Plaza spaces for pedestrians
- At grade pedestrian crossings at particular points along the freight rail alignment
- Controlled crossing points built into the road network

The proposed routes for pedestrians and cyclists are illustrated on Figure 4.1

The pedestrian and cycle network at a regional and district level will remain as it is currently.



Figure 4-1 Proposed pedestrian and cycle network for the development

There will be a number of controlled crossing points throughout the development as detailed on Figure 4.1. Signalised intersections on Rollinson Road, Main Street, McTaggart Cove, and to the south of the study area will provide crossing points for pedestrians and cyclists in the study area. Pedestrian movements will be accommodated in the proposed signal timings. Two pedestrian activated crossings will also be provided in the southern part of the study area.

Secure and convenient cycle parking will be provided. This will be located within or adjacent to buildings with fully secure cycle lock-up facilities in overlooked locations. This will provide added security and user safety.

Pedestrian crossings across the railway line will be provided in a number of locations. There will be at-grade crossing facilities for both pedestrians and vehicles on Rollinson Road and Main Street. A crossing point will also be provided further south within the Power Station Precinct.

The Cockburn Coast development will be a shared space designed with slow speeds in mind as illustrated on Figure 4.2. The majority of shared streets will be provided in the Robb Jetty precinct, although some will also be provided in the Hill Top / Emplacement and Power Station precincts.

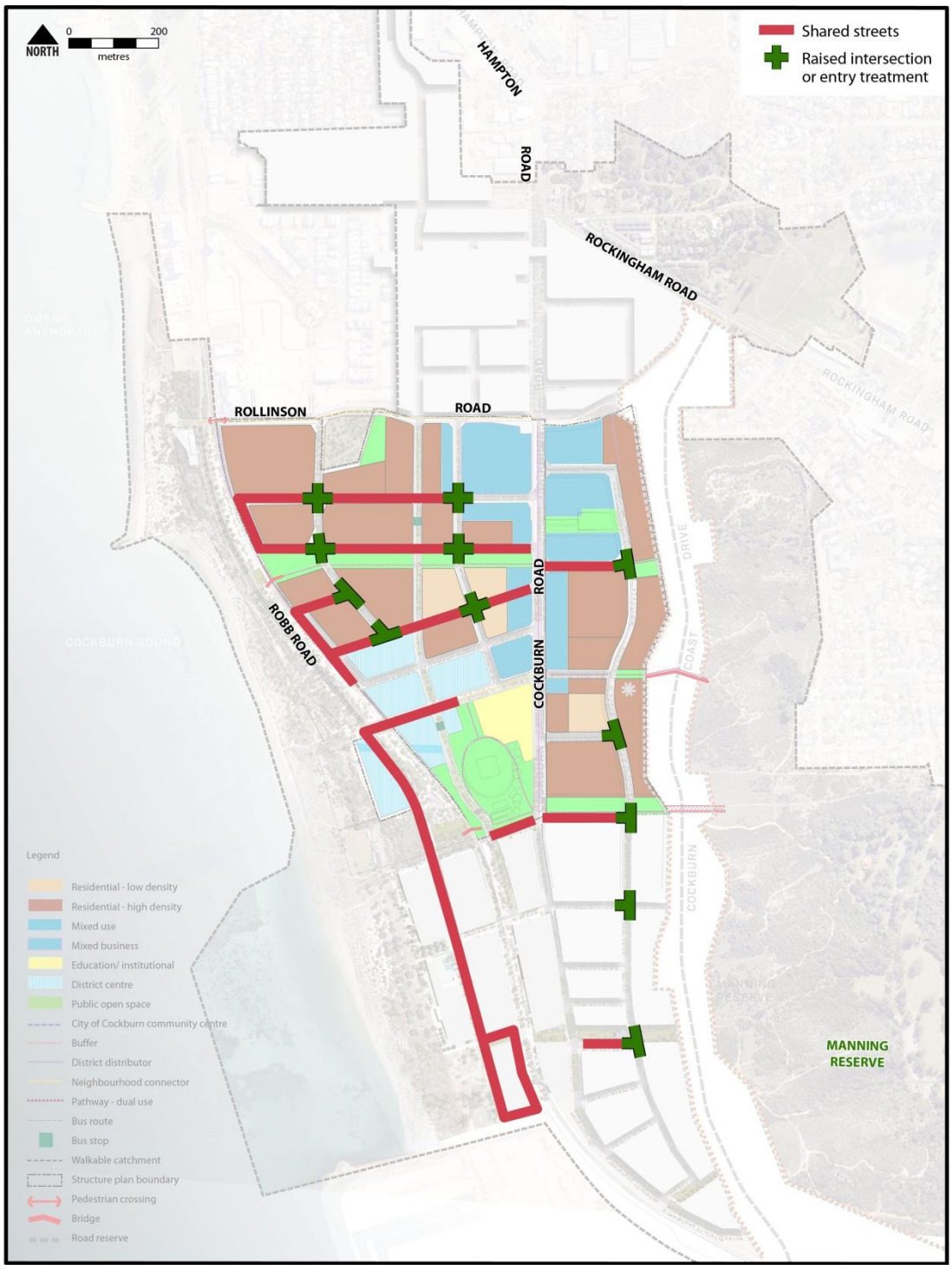


Figure 4-2 Proposed shared streets

Shared zones are proposed on Main Street and a number of east-west streets. These will form an east-west greenway linking the coast and Manning Reserve. Shared surfaces will also be provided on a number of north-south links through the development including Robb Road. These links will form part of a coastal greenway connecting the existing Principal Shared Pathway network to the north and south of Cockburn Coast.

4.2 Public transport routes

A Bus Rapid Transit (BRT) corridor will be created along Cockburn Road and through the site, connecting Fremantle to Rockingham. Figure 4.3 shows the proposed route and associated bus stops.

The BRT will help to encourage public transport use within Cockburn Coast and will reduce the reliance on private car travel.

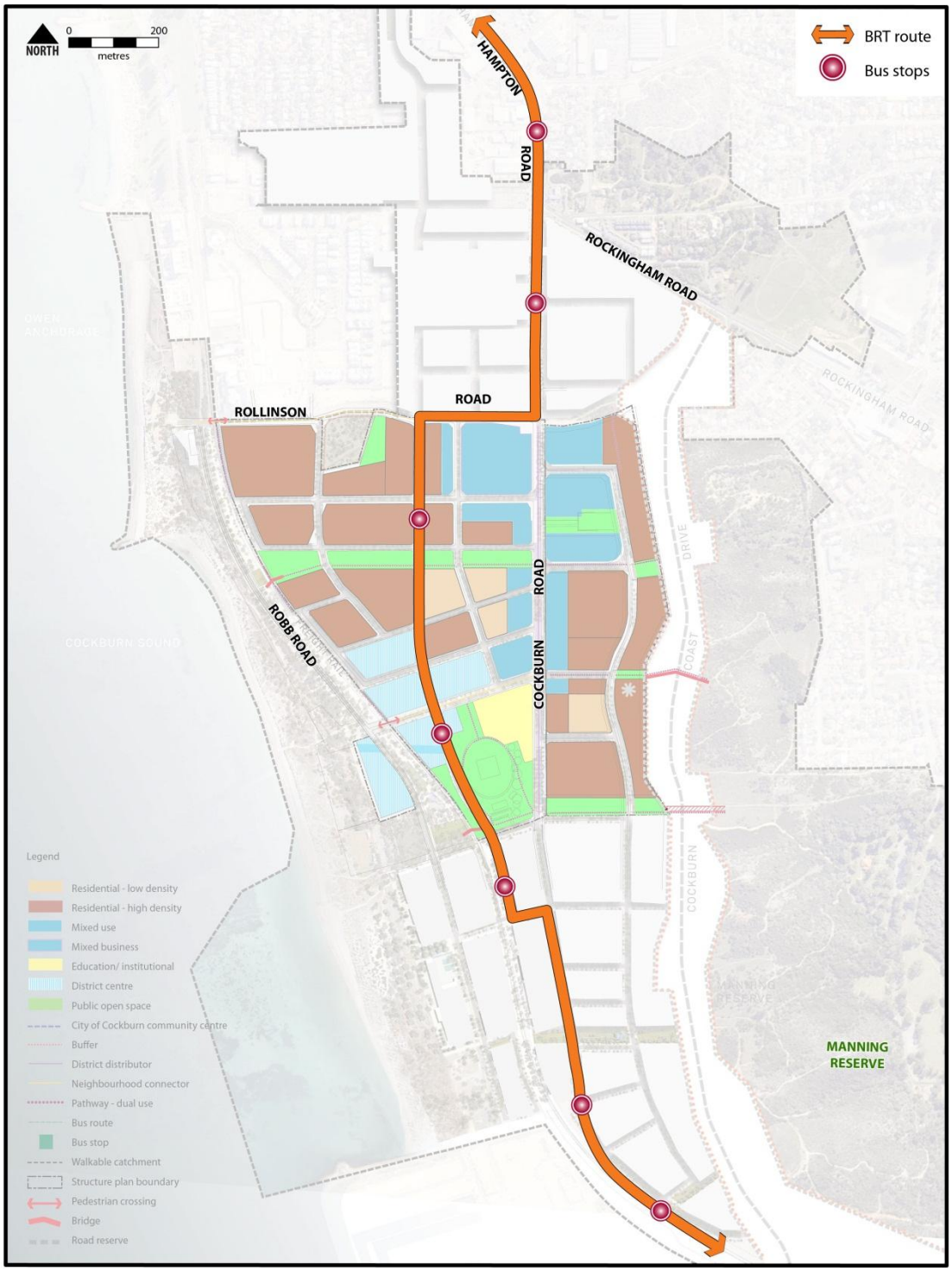


Figure 4-3 Proposed BRT route

The BRT stops are located approximately every 400-600 metres and will therefore be within walking distance for the majority of the development.

The local, district and regional services that currently operate in the study area will remain.

4.3 Changes to existing road network

Figure 4.4 shows the proposed road network layout in the study area. A number of routes will be constructed through the development, providing both north-south and east-west links through the site. These routes will provide access to and from the development itself.



Figure 4-4 Proposed road network

There are three key types of road throughout the development. These are local streets, main streets (key routes into and out of the development) and regional routes (Cockburn Road).

Of these different road types some will have a shared surface and some will need to accommodate the BRT. Figure 4.5 illustrates the proposed road hierarchy of streets throughout the development.

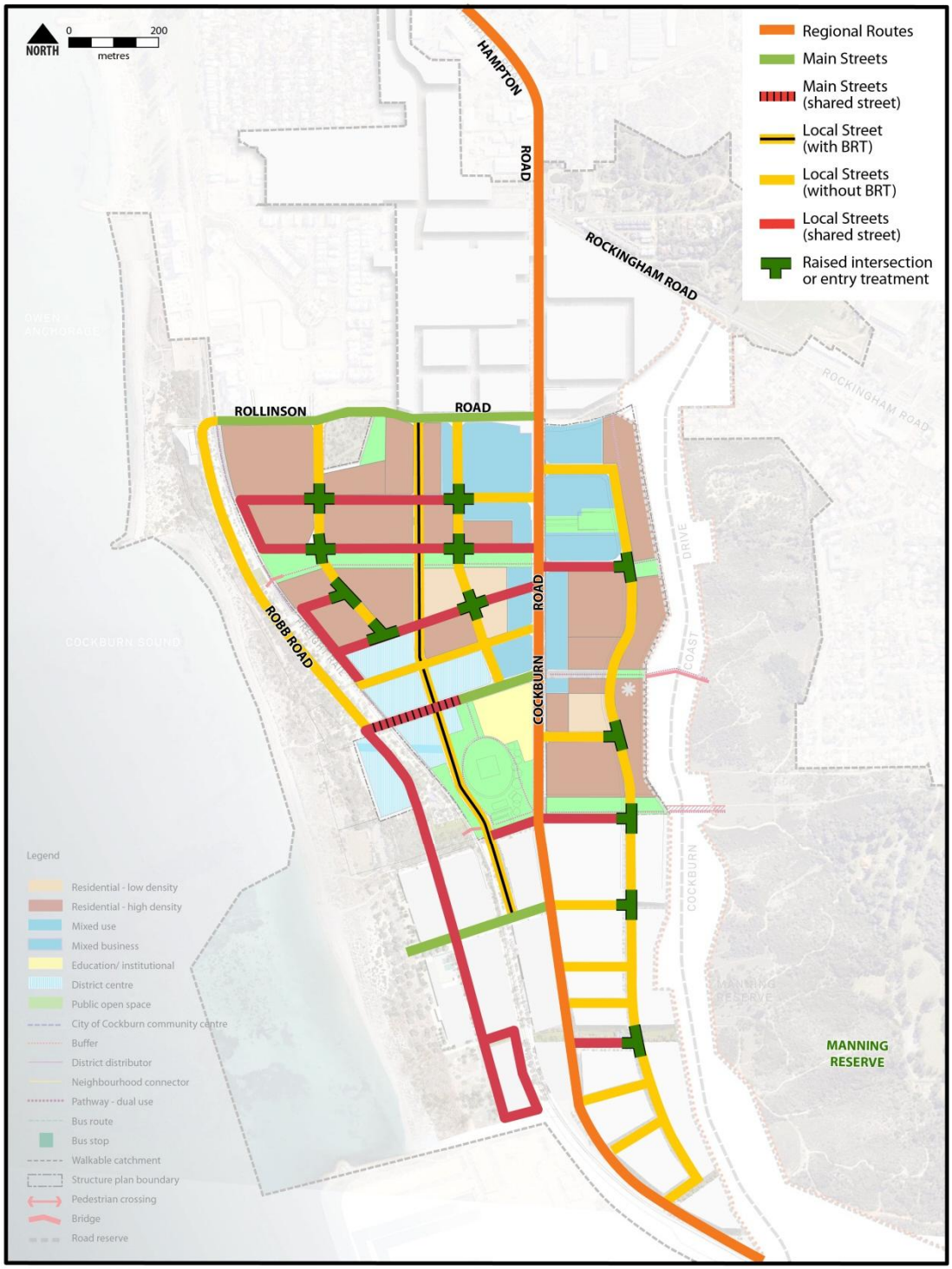


Figure 4-5 Proposed Road Hierarchy for the development

Figure 4.6 and Figure 4.7 show possible road cross sections for Main Street for the sections with and without shared surfaces. The same cross section would be expected for the other key routes into the development such as Rollinson Road and McTaggart Cove.

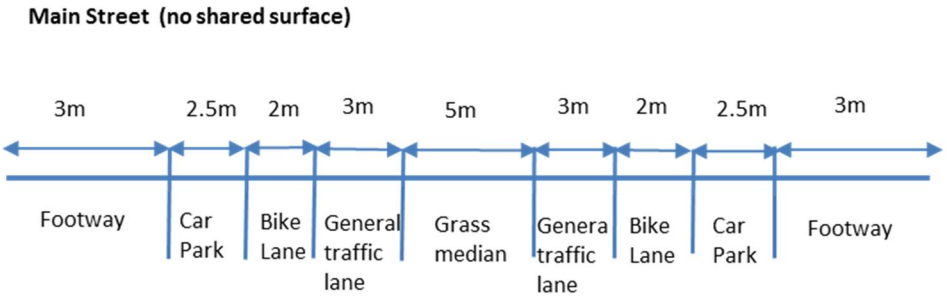


Figure 4-6 Cross section for Main Street assuming no shared surface

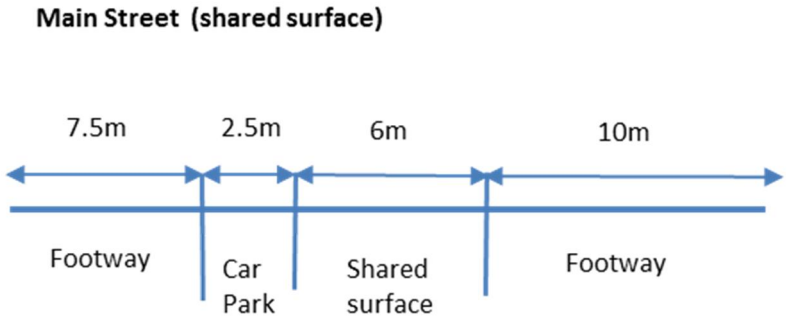


Figure 4-7 Cross section for Main Street for the shared surface section

As Main Street is one of the key routes into the Robb Jetty precinct, the road will need to accommodate slightly higher traffic volumes than other internal roads. The road cross section therefore needs to be designed in a different way to the local roads within the development. Figure 4.8, Figure 4.9 and Figure 4.10 show possible cross sections for a local road within the development. Some local roads will have shared zones whilst others will need to be able to accommodate the BRT.

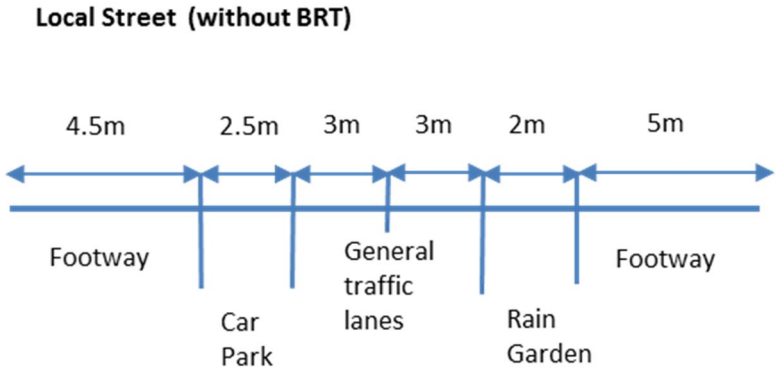


Figure 4-8 Cross section for a local street (without the BRT)

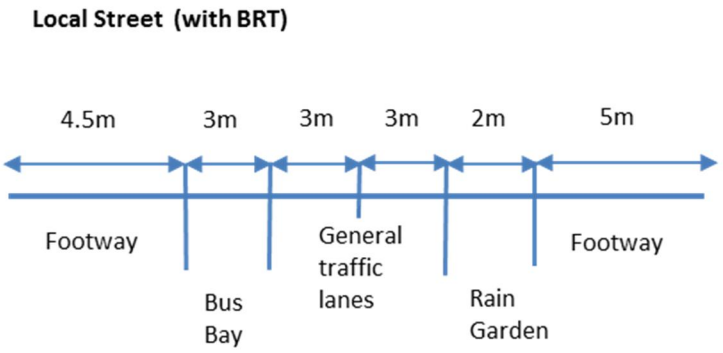


Figure 4-9 Cross section for a local street (with the BRT)

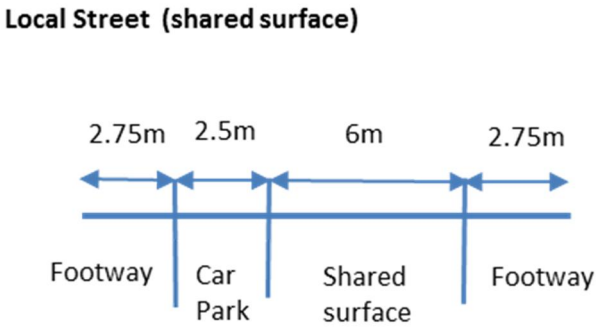


Figure 4-10 Cross section for a local street (with a shared surface)

Cockburn Road will perform both a local and regional traffic function and therefore will be widened to include two lanes in each direction from Rockingham Road through to Spearwood Avenue. A median will be introduced along Cockburn Road. A typical cross section for Cockburn Road is illustrated on Figure 4.11. Although Cockburn Road will continue to perform a local and regional traffic function, the speed limit will be reduced to 50kph providing a route that is also suitable for cycling and walking.

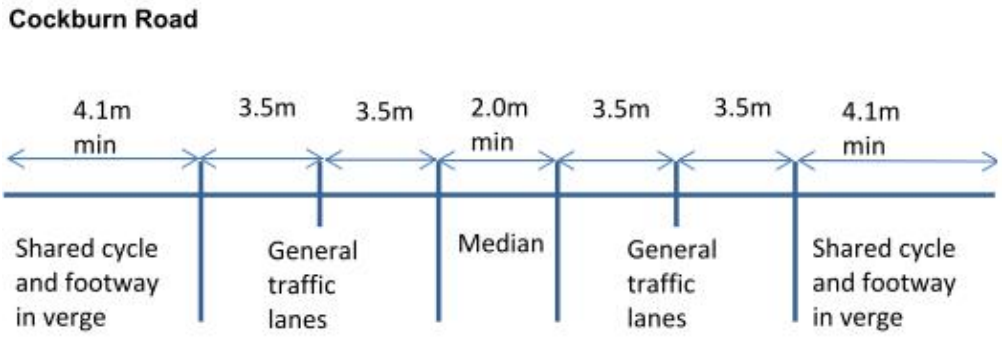


Figure 4-11 Typical Cross section for Cockburn Road

Along Cockburn Road, the Rollinson Road intersection will be upgraded to a signalised intersection and signals will also be introduced at the Main Street / Cockburn Road and McTaggart Cove / Cockburn Road intersections.

This report assumes that Cockburn Coast Drive is not in place as this project is currently unfunded and its timing is uncertain. For information Cockburn Coast Drive is shown on Figure 4.4 as a potential future regional road.

No change is proposed at either intersection of Emplacement Crescent with Cockburn Road. The northern intersection will continue to be restricted to Left in / Left out only. The southern intersection will remain as an all movements uncontrolled intersection.

McTaggart Cove will be relocated further south. The level crossing currently situated on McTaggart Cove will however be relocated to Main Street. This will provide a link through the development to Robb Road and the beach. A new level crossing (likely to be grade separated) will be constructed to provide a rail crossing point to the south of the development within the Power Station Precinct.

Figure 4.12 shows the proposed speed limits within the study area. Speed limits have intentionally been kept low within the development to create an environment that encourages and enables safe walking and cycling. The internal roads will have speed limits of 30kph and 10kph. As previously detailed the speed on Cockburn Road will be reduced to 50kph, again to encourage non-motorised modes of travel within the area.

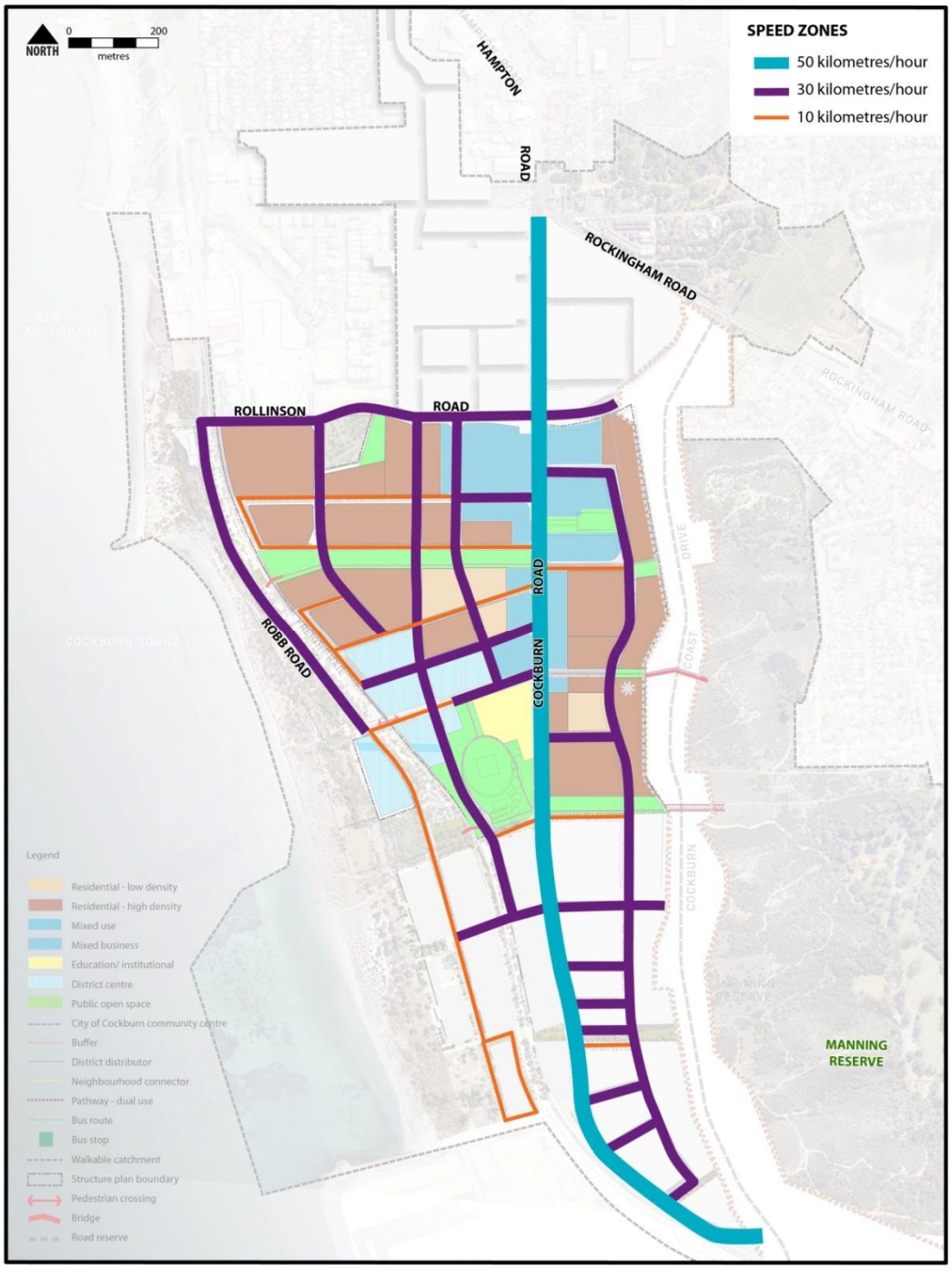


Figure 4-12 Proposed speed limits in the study area

5. Integration with surrounding area

5.1 Surrounding attractors / generators

Figure 5.1 indicates the development site and a perimeter 800 metres from the boundary of the Cockburn Coast structure plan area. Figure 5.1 illustrates the key attractors and generators within this perimeter.

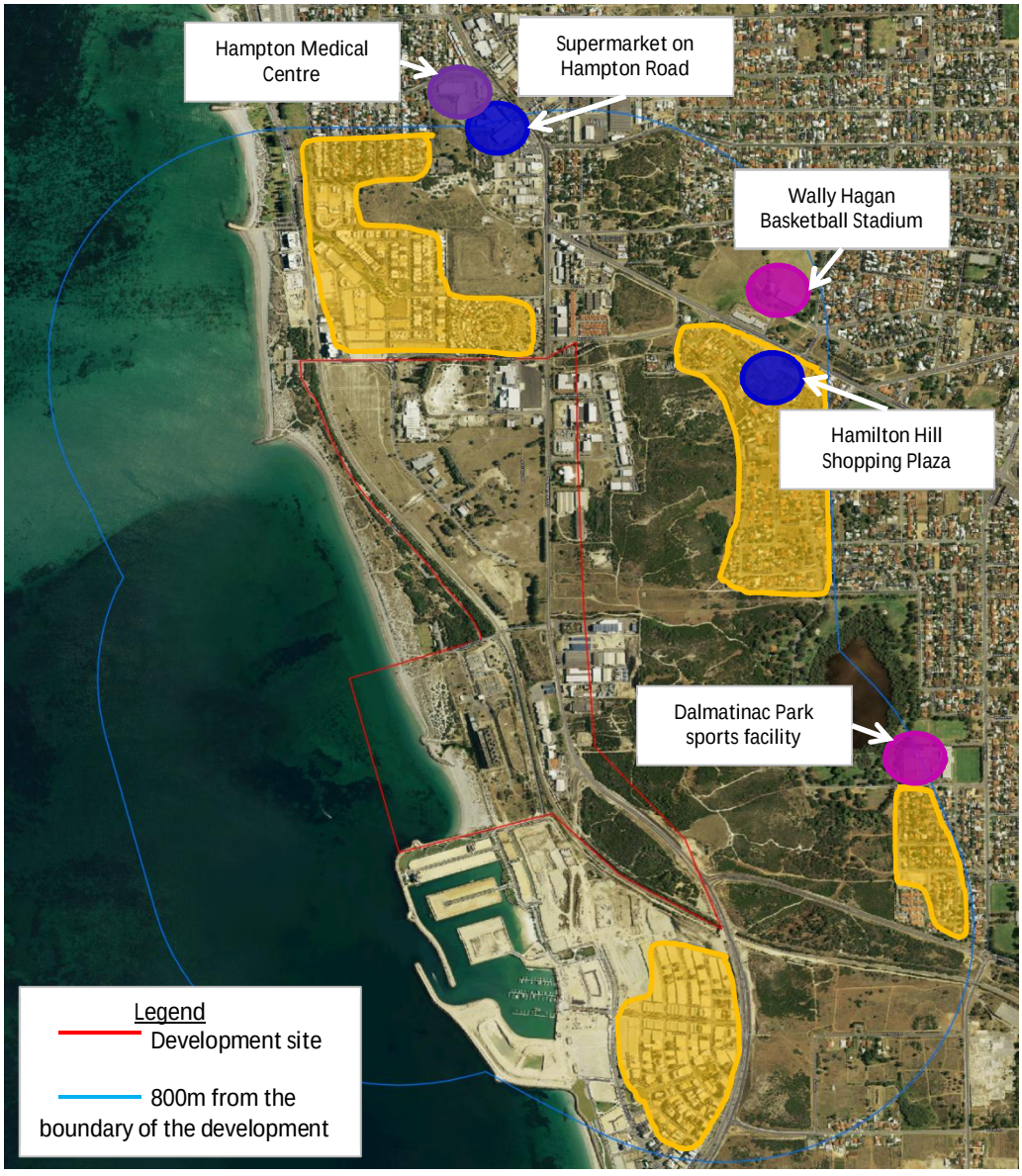


Figure 5-1 Key attractors and generators

There are a number of residential areas within the 800m perimeter that would be classed as major generators. These include the residential area to the north of Rollinson Road, the area to the east of Emplacement Crescent around Davilak Avenue, the area to the south east around Gorham Way and the area to the south around Pantheon Avenue. People from these residential areas would be attracted to land uses within Cockburn Coast such as the activity centres, the community and commercial land use and the mixed use development. There is potential that people from these areas could travel to the primary school proposed within the

Robb Jetty precinct, however it is likely that existing schools located outside the 800m perimeter would serve these existing residential developments.

Within the perimeter there are also a number of attractors that would attract people from within Cockburn Coast. There is a shopping plaza at Hamilton Hill on Rockingham Road which includes a grocery store, fast food outlets and other small retail outlets. There is also a supermarket on Hampton Road within the 800m perimeter. A number of sports and recreation facilities are located within the perimeter. The Wally Hagan Basketball Stadium is located on Starling Street off Rockingham Road, whilst Dalmatinac Park sports facility is located on the perimeter on Azelia Road. These would potentially attract residents of the Cockburn Coast development. The Hampton Medical Centre is located just outside the 800m perimeter, however this could potentially be a major attractor for people within the development, although medical facilities will be provided within the development itself.

5.2 Proposed changes to surrounding land uses

No other major changes are proposed within the 800 metre perimeter.

5.3 Travel desire lines from Cockburn Coast to these attractors / generators

The travel desire lines between each of the attractors and generators are illustrated on Figure 5.2. This illustrates east-west and north-south movements to and from the development.

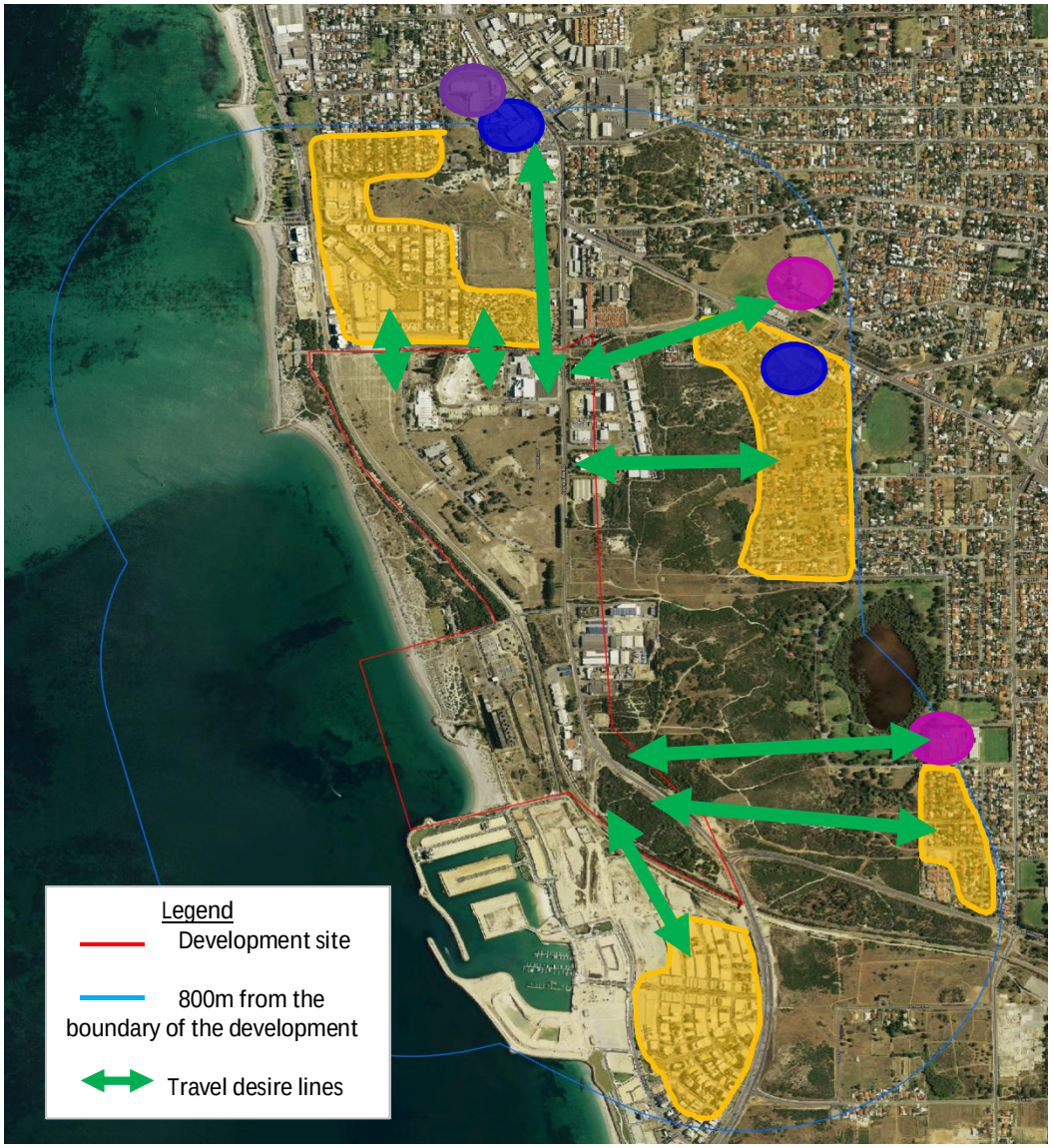


Figure 5-2 Travel desire lines

5.4 Adequacy of existing transport networks to match the desire lines and remedial measures to address any deficiencies

The existing transport network allows for east-west movements on the road network via Rockingham Road and Spearwood Avenue. Off road routes are currently provided for pedestrians and cyclists from Cockburn Road eastwards through the Manning Reserve to the developments in the east. There are currently only a small number of crossing points on Cockburn Road connecting these links to the development however, primarily at the signals at the Rockingham Road intersection.

As part of the Cockburn Coast development, signalised intersections are proposed at Rollinson Road, McTaggart Cove and Main Street. These will provide potential crossing points for pedestrians and cyclists, improving the connections between Cockburn Coast and the areas to the east. Two pedestrian crossing points will also be provided along Cockburn Road, further enhancing the connectivity of the development and adequately matching the desire lines. The location of the crossings will allow for more direct access for pedestrians and cyclists.

With regards to the existing north-south transport network, there are currently no cycle facilities along Cockburn Road between Rockingham Road and just south of Boyd Crescent. The road safety audit identified that there is an undesignated narrow hard shoulder that is being used by cyclists south of Boyd Crescent to Old Cockburn Road. Ultimately, Cockburn Coast will create a number of potential north-south routes. These will provide high quality routes for pedestrians and cyclists through the development, also connecting the development to the areas in the north and south. These routes will be in the form of shared paths providing an attractive route for non-motorised modes of travel. The BRT will provide an additional north-south connection through the area.

6. Analysis of transport networks: traffic assessment

6.1 Introduction

The WAPC Transport Assessment Guidelines for Developments outlines the need to provide a quantitative analysis of the proposed internal and external transport networks to demonstrate that they will provide a high level of accessibility and safety for all modes. To aid this assessment, a SATURN traffic assignment model has been developed for the Cockburn Coast study area. This allows for the estimation of traffic flows in the future, both with and without Cockburn Coast, taking into account how motorists may travel within the study area.

In order to assess the traffic impact in the future, a best practice approach of developing a model to represent the current situation was produced (a base year model). Developing a base model which replicates current travel movements to a good level of detail provides confidence that results from the future year models (which are built from it) used to conduct the traffic assessment are robust. Once the base model had been developed, future year models representing two scenarios were built. These represent a Do Minimum scenario (a model without the Cockburn Coast proposals) and a Do Something model (a model with the Cockburn Coast proposals). Both of these were forecast to represent traffic movements in 2031. The traffic assessment then considers the difference in network operation between the Do Minimum and Do Something scenarios to determine the impacts of the Cockburn Coast development.

The methodology used to develop the base and future year models and to determine the traffic flows in the Do Minimum (without Cockburn Coast) and Do Something (with Cockburn Coast) scenarios are outlined in the following paragraphs.

6.2 Assessment years

An assessment year of 2031 has been chosen as this is the year of practical completion for the development. This future year is also considered in the ITP and also ties in with forecasts from the Department of Planning's Strategic Transport Evaluation Model (STEM). This is important as STEM has been used to initially estimate the distribution of trips in both the base year and future year and also to inform traffic growth in the future other than that contributed to by the Cockburn Coast development. This will be discussed in more detail in subsequent paragraphs.

6.3 Time periods for assessment

Two time periods have been modelled. These are an average weekday AM Peak hour (0700 – 0800) and PM Peak hour (1600 – 1700). These hours have been chosen to be modelled as the traffic counts indicated a peak in traffic volumes and therefore represent the traffic volumes most critical to the operation of the surrounding network.

6.4 Base year model development

Methodology

A base year model has been developed for 2012 using the SATURN software package. Figure 6.1 illustrates the process undertaken to develop the base year model.

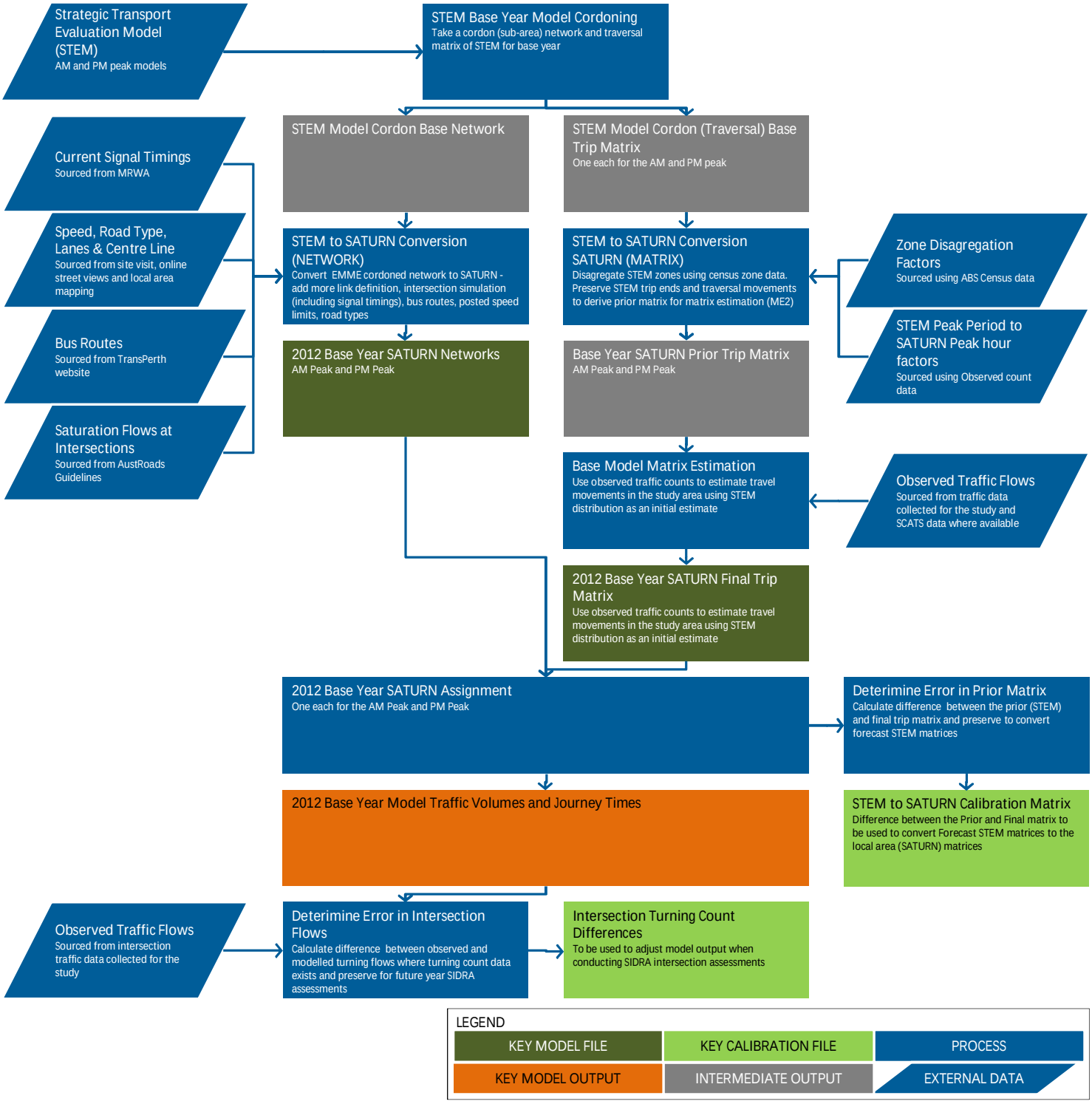


Figure 6-1 Flow diagram illustrating the process to develop the base year SATURN model

Study area and zone system

A local road network has been built to consider movements around the study area. The network covers the study area as detailed in Figure 1.2. Trip volumes to areas further afield are indirectly accounted for in the model as trip movements through the study area have been informed from STEM. However, highway network beyond the study area has not been explicitly modelled in SATURN.

The study area has been divided into a number of zones within the model. The zone system assumed in STEM was used as a starting point. The study area in STEM is however represented by a relatively small number of zones covering reasonably large areas. As it is necessary within this assessment to consider trip movements in detail within the study area, it was decided that the larger zones be split into a series of smaller zones. This was done based on area statistics extracted from the 2006 Census via the ABS website.

Vehicle classes

The model has been developed assuming two user classes, one each for light and heavy vehicles. Bus services in the area have been represented in the model as 'fixed flows', whilst the BRT movements have been added manually.

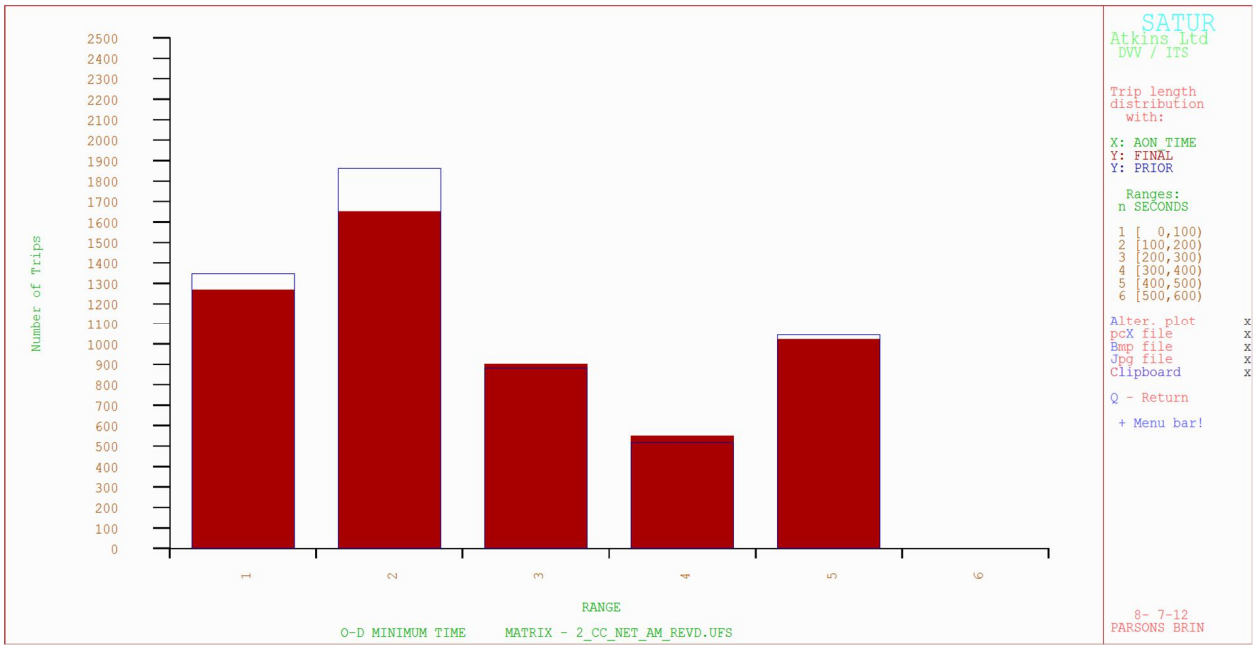
Signal timing

Signal phase plans and actual signal timings in operation at signalised intersections in the study area were sourced from Main Roads WA. The signal plans and timings shown as operating in each peak hour were incorporated into the network coding for the base year model.

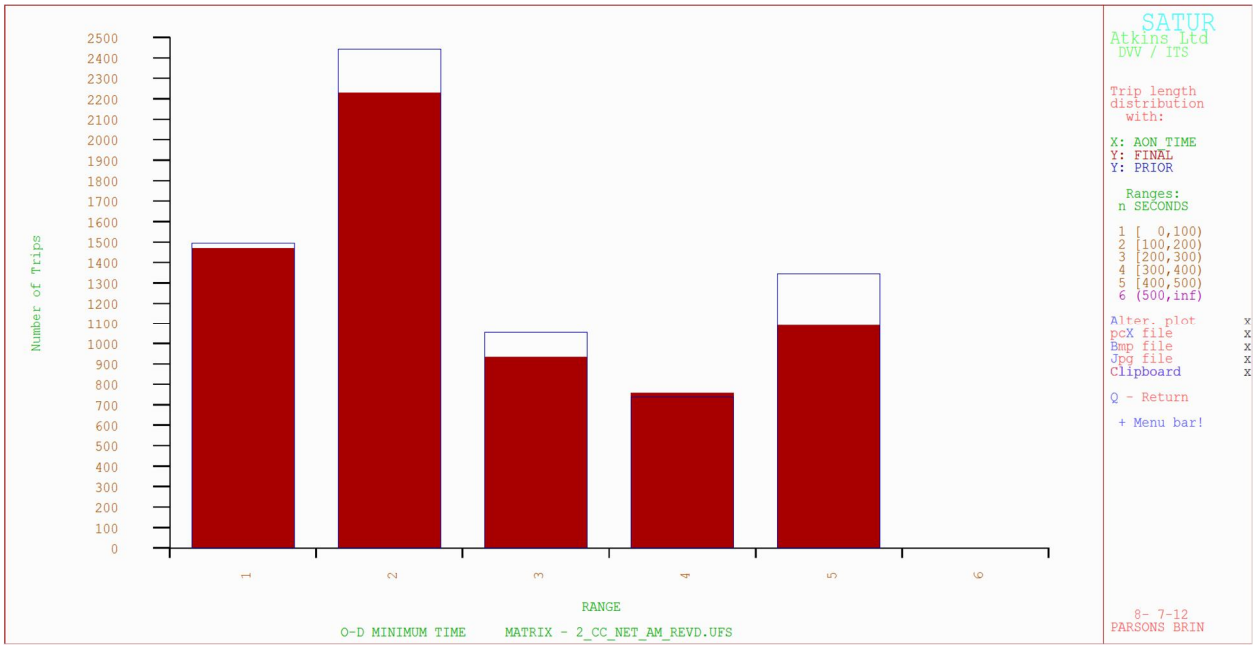
Matrix formation

The matrix was cordoned out of STEM and the trips within the STEM matrix retained. This formed what is known as a prior matrix (the best estimate of trip distribution using available data sources). Matrix estimation (using the SATURN ME2 module) has then been used to estimate a more accurate trip matrix which matches more closely with observed traffic flows. The ME2 process was carried out for the light vehicle user class, limited to a maximum of two iterations to avoid any excessive distortion to the model.

If used incorrectly, ME2 can significantly distort the trip distribution between the prior and final trip matrices. One common issue is that ME2 can significantly shorten the trip length distribution of trips in a model in its attempt to match origin / destination movements to observed traffic counts. It is therefore important to compare trip lengths before and after ME2 has run in order to ensure trip lengths have not changed significantly. Graph 6 1 and Graph 6.2 illustrate the trip length distributions for the morning and evening peak hours.



Graph 6.1 Comparison of AM peak hour trip length distribution

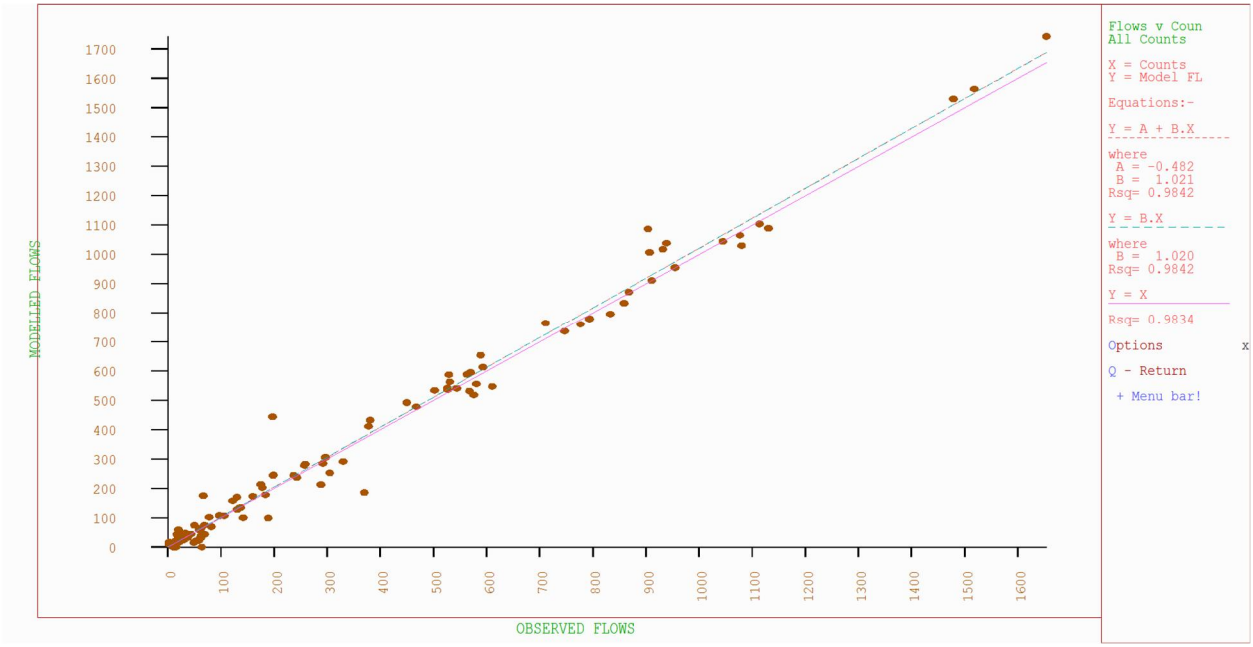


Graph 6.2 Comparison of PM peak hour trip length distribution

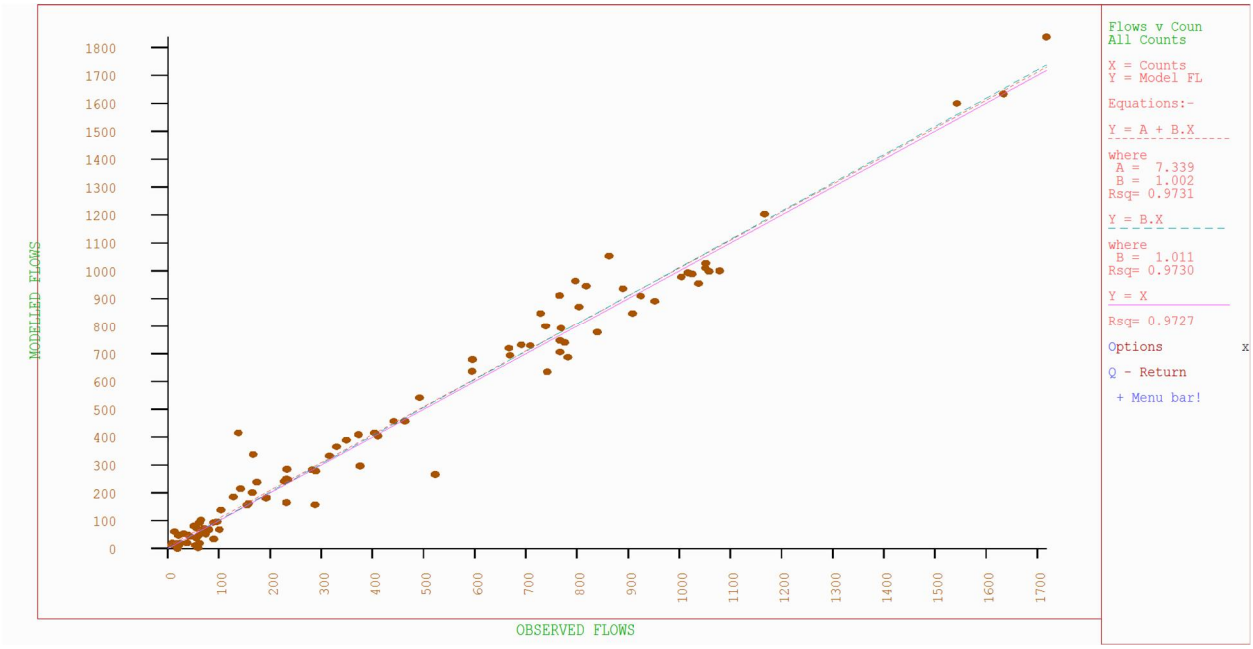
The graphs show that the trip length distribution between the prior matrix (blue bars) and the final trip matrix in both peaks are very similar. In a number of cases, the final trip matrix totals lie beneath the prior matrix totals implying an overestimate of trip levels input to the ME2 process for those cost bins. The graphs however, show that the ME2 process has not increased the number of short distance trips which can be a commonly incurred issue if the process is not run correctly.

Model calibration

Due to the small size of the study area, the limited number of parallel routes (i.e. a low level of route choice in the model) and the amount of traffic count data which was available; all the available traffic counts were used to calibrate the model in the ME2 process. To assess how well the model replicates observed traffic flows, scatter plots of observed versus modelled flows can be produced. In a model which perfectly represents observed traffic flows, data points would appear on a 45 degree angle line (known as a y=x line) and be perfectly correlated (R2=1). Scatter plots for the SATURN model produced here can be seen in Graph 6.3 and Graph 6.4 below.



Graph 6.3 Comparison of AM peak hour observed vs modelled flow plot



Graph 6.4 Comparison of PM peak hour observed vs modelled flow plot

The calibration results shown in Graph 6.3 and Graph 6.4 demonstrate that the model is replicating observed traffic flows to an excellent level of accuracy. The model is therefore considered sufficiently accurate and robust for forecast purposes.

6.5 'Do minimum' scenario (without Cockburn Coast)

Figure 6.2 illustrates the process undertaken to develop the Do Minimum model.

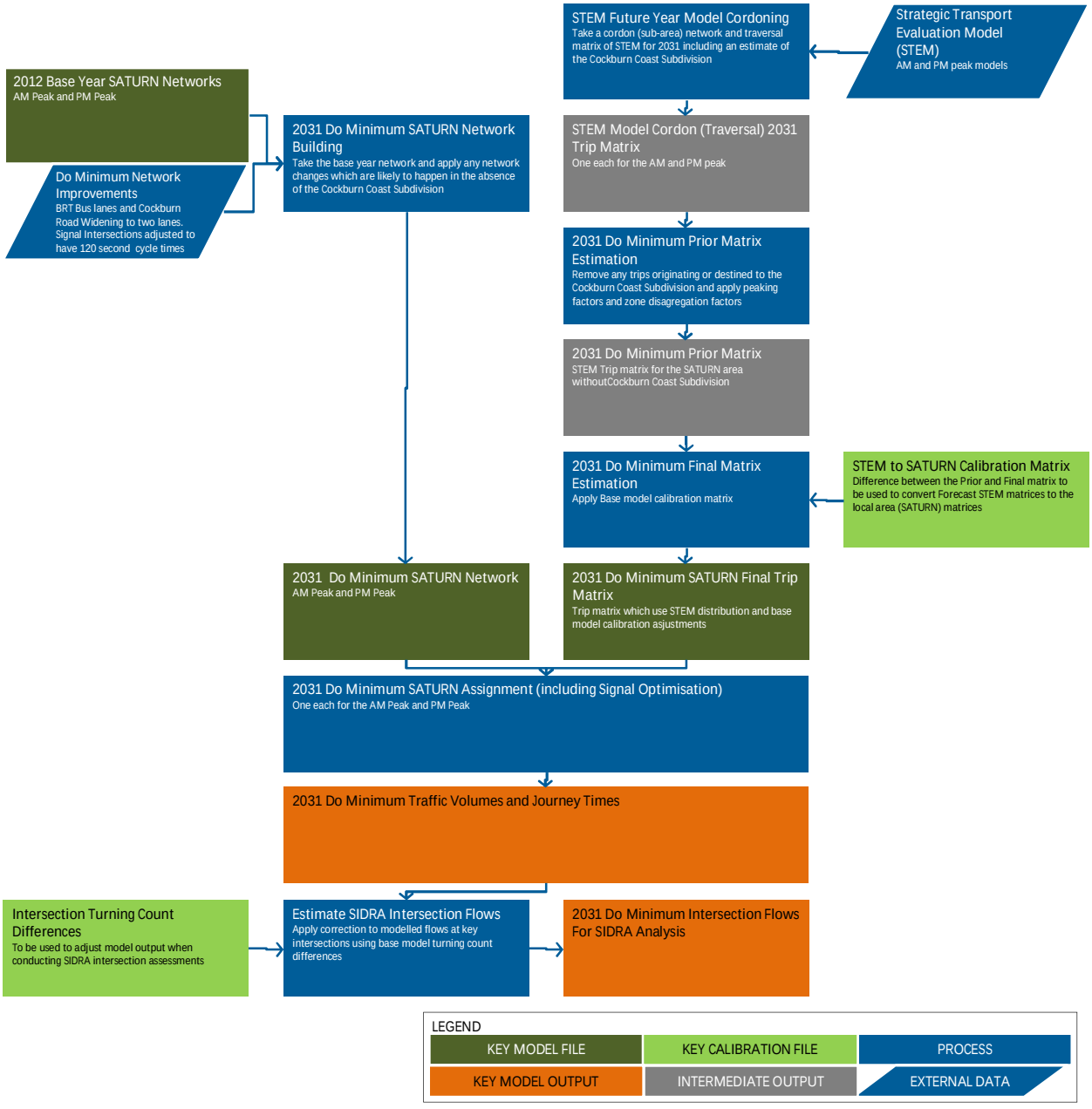


Figure 6-2 Flow diagram illustrating the process to develop the Do Minimum SATURN model

STEM has been used to provide an appropriate distribution of trips in the future year and to inform the background traffic growth which may result due to transport schemes and developments located outside the SATURN study area. STEM outputs from the 2031 model formed the prior matrix for 2031 for this study. Again the zone system was broken down into an increased number of zones in the study area. The difference between the base year prior

and final matrices was calculated and this difference was applied to the 2031 prior matrix to form the Do Minimum (without Cockburn Coast) trip matrix.

The Do Minimum network includes BRT intersection layouts north of Rollinson Road and includes two lanes in each a northbound and southbound direction between Rockingham Road and Spearwood Avenue.

6.6 'Do something' scenario (with Cockburn Coast)

Figure 6.3 illustrates the process undertaken to develop the Do Something model.

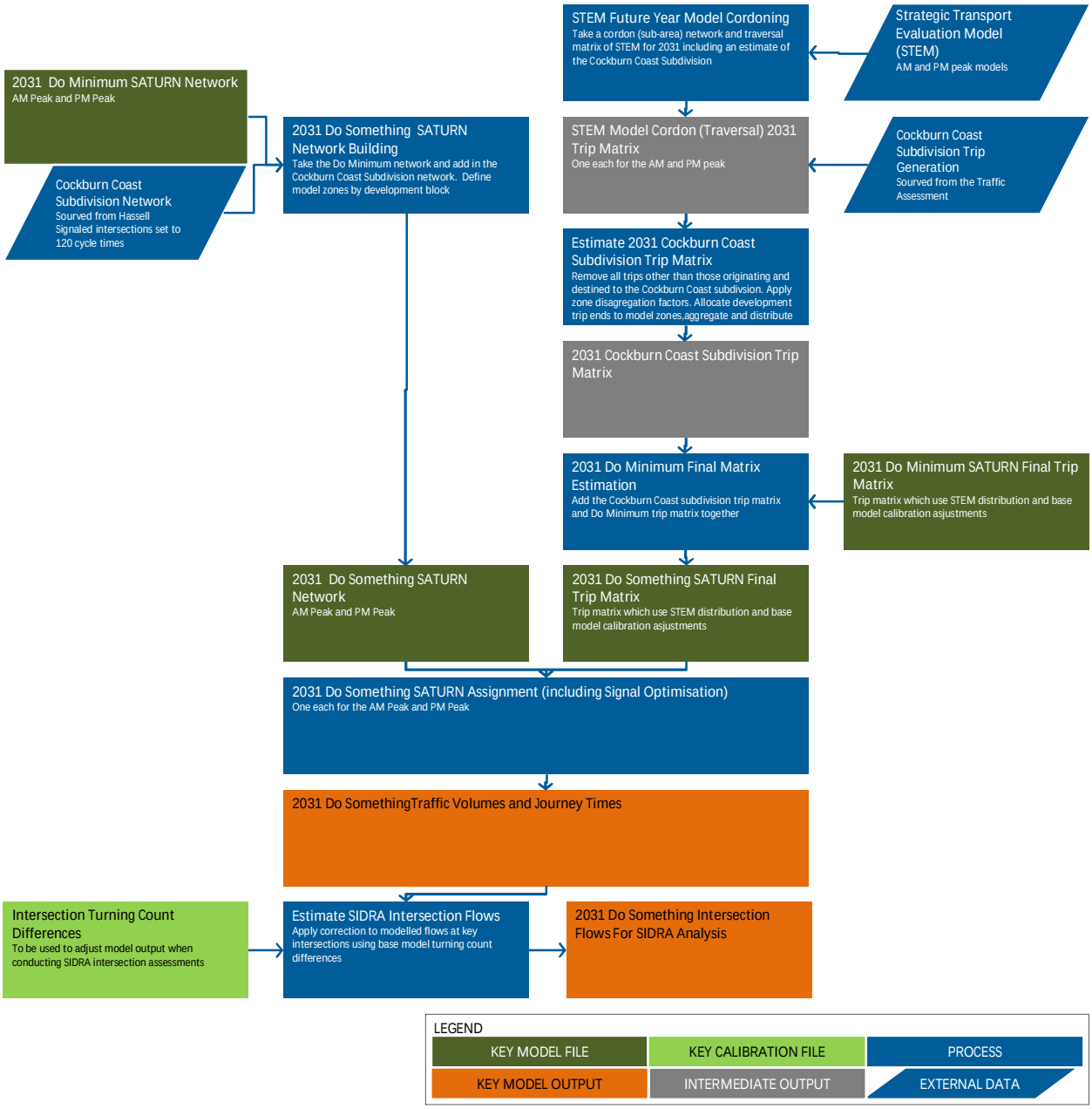


Figure 6-3 Flow diagram illustrating the process to develop the Do Something SATURN model

The traffic generated by the Cockburn Coast development has been assessed using trip rates and the distribution has been identified using STEM.

Trip generation and mode share

Trip generation involved calculating the predicted volume of trips associated with the Cockburn Coast development. The trip rates presented in the typical land use vehicle trip rates table of the Western Australia Planning Commission publication: 'Transport Assessment Guidelines for Developments' have been assumed as a starting point. These are illustrated in Table 6.1.

Table 6.1 Trip generation rates

		AM peak hour trip rate		PM peak hour trip rate	
Land use	**Unit**	**In**	**Out**	**In**	**Out**
Residential	Dwellings	0.2	0.6	0.5	0.3
School	Pupils	0.5	0.5	0.5	0.5
Commercial	100m^2 GFA	1.6	0.4	0.4	1.6
Food retail	100m^2 GFA	2	0.5	5	5
Non-food retail	100m^2 GFA	1	0.25	2	2

These are based on surveys of comparable land uses or extracted from recognised land use traffic generation databases such as the Land Use Traffic Generation Guidelines, the Guide to Traffic Generating Developments (Roads and Traffic Authority NSW) and Trip Generation 7th edition (Institute of Transportation Engineers (ITE)).

Cockburn Coast is part of a Transit Oriented Development as a result of the introduction of the BRT. As detailed in the Cockburn Coast Integrated Transport Plan, residents in TODs tend to own fewer cars and drive less compared to automobile-dependent communities. Households often reduce their vehicle travel when they move to transit oriented locations. It is therefore proposed that the trip rates for the Cockburn Coast development would be lower than those proposed by the WAPC.

Research has been carried out into the impact of Transit Oriented Developments on vehicle trips. This has been documented in the Transit Cooperative Research Program (TCRP) Report 128 'Effects of TOD on Housing, Parking, and Travel'. The results show that Transit Oriented Developments averaged 44% fewer vehicle trips than estimated by the ITE Manual. During peak periods the differentials were even larger with 49% lower rates during the AM Peak hour and 48% lower rates during the PM Peak hour for a Transit Oriented Development. Another study carried out by Gard entitled 'Quantifying Transit Oriented Development's Ability to Change Travel Behaviour' looked at a mixed use Transit Oriented Development. This study identified that the number of new vehicle trips is reduced by 32%. The case studies used in both pieces of research had light rail systems in place as opposed to a Bus Rapid Transit. An LRT system will potentially attract a higher patronage than a BRT system and thus a more pessimistic percentage reduction would probably be more suitable for this study.

Muley (2011) used the Kelvin Grove Urban Village, located 2km north west of the Brisbane Central Business District to evaluate the transport impacts of a TOD from an Australian perspective. The analysis showed that when Kelvin Grove Urban Village was considered as a whole, a reduction of about 27 to 48% was observed for the AM and PM Peak hours when compared to ITE rates, whilst a reduction of 42% was observed for peak period traffic when

compared to the RTA rates. This concurs with the American studies into Transit Oriented Developments.

The 'Public Transport for Perth in 2031' document produced by the Department of Transport suggests that by 2031 public transport will account for one-in-five motorised trips in the morning peak period. Currently public transport accounts for one-in-eight motorised trips. This equates to 20% mode share for public transport in 2031. A reduction of 20% in vehicle trips to account for the switch onto public transport is therefore considered to be reasonable for the Cockburn Coast development. It is proposed that the remaining 12% (to total the 32% stated in the Gard research) would switch mode to either walking or cycling and there would be a small number of internal trips. The percentage from the Gard research has been used as this will allow for a more pessimistic assessment of trips.

This assessment has therefore calculated the total number of trips for the proposed development assuming the trip rates detailed in the Western Australia Planning Commission publication as indicated in Table 6.1, and then reduced this number of trips by a total of 32% in both the AM Peak and PM peak hours as per the Gard research. This is indicated by the 'adjusted total' in Table 6.2. 20% of this reduction will switch to public transport and the remaining 12% will shift to walking and cycling modes and a small number will be internal trips.

Table 6.2 Trip generation totals for each precinct

ROBB JETTY PRECINCT										
AM PEAK HOUR (0700 – 0800)										
Land use	Residential trips		Commercial trips		Retail Trips		Total		Adjusted Total	
	In	Out	In	Out	In	Out	In	Out	In	Out
Low density residential	52.1	156.4	0.0	0.0	0.0	0.0	52.1	156.4	35.4	106.3
Medium density residential	162.4	487.2	0.0	0.0	0.0	0.0	162.4	487.2	110.4	331.3
High density residential	48.7	146.2	0.0	0.0	0.0	0.0	48.7	146.2	33.1	99.4
Mixed use	32.1	96.2	173.4	43.3	40.6	8.1	246.1	147.7	167.3	100.4
Activity centre	47.7	143.0	257.7	64.4	60.4	12.1	365.8	219.5	248.7	149.3
Community / commercial	0.0	0.0	0.0	0.0	4.7	0.9	4.7	0.9	3.2	0.6
Total	**343.0**	**1029.0**	**431.1**	**107.8**	**105.7**	**21.1**	**879.8**	**1158.0**	**598.3**	**787.4**
PM PEAK HOUR (1600 – 1700)										
Land use	Residential trips		Commercial trips		Retail Trips		Total		Adjusted Total	
	In	Out	In	Out	In	Out	In	Out	In	Out
Low density residential	130.3	78.2	0.0	0.0	0.0	0.0	130.3	78.2	88.6	53.2
Medium density residential	406.0	243.6	0.0	0.0	0.0	0.0	406.0	243.6	276.1	165.6
High density residential	121.8	73.1	0.0	0.0	0.0	0.0	121.8	73.1	82.8	49.7
Land use	Residential trips		Commercial trips		Retail Trips		Total		Adjusted Total	
	In	Out	In	Out	In	Out	In	Out	In	Out

ROBB JETTY PRECINCT										
Mixed use	80.2	48.1	43.3	173.4	81.3	32.5	204.8	254.0	139.3	172.7
Activity centre	119.2	71.5	64.4	257.7	120.8	48.3	304.4	377.5	207.0	256.7
Community / commercial	0.0	0.0	0.0	0.0	9.4	3.7	9.4	3.7	6.4	2.5
Total	**857.5**	**514.5**	**107.8**	**431.1**	**211.4**	**84.6**	**1176.7**	**1030.2**	**800.2**	**700.5**

HILL TOP PRECINCT

AM PEAK HOUR (0700 – 0800)

Land use	Residential trips		Commercial trips		Retail Trips		Total		Adjusted Total	
	In	Out	In	Out	In	Out	In	Out	In	Out
Low density residential	23.2	69.7	0.0	0.0	0.0	0.0	23.2	69.7	15.8	47.4
Medium density residential	33.0	99.0	0.0	0.0	0.0	0.0	33.0	99.0	22.4	67.3
High density residential	96.7	290.2	0.0	0.0	0.0	0.0	96.7	290.2	65.8	197.3
Mixed use	23.9	71.6	129.0	32.3	30.2	6.0	183.1	109.9	124.5	74.7
Total	**176.8**	**530.5**	**129.0**	**32.3**	**30.2**	**6.0**	**336.1**	**568.8**	**228.5**	**386.8**

PM PEAK HOUR (1600 – 1700)

Land use	Residential trips		Commercial trips		Retail Trips		Total		Adjusted Total	
	In	Out	In	Out	In	Out	In	Out	In	Out
Low density residential	58.0	34.8	0.0	0.0	0.0	0.0	58.0	34.8	39.5	23.7
Medium density residential	82.5	49.5	0.0	0.0	0.0	0.0	82.5	49.5	56.1	33.7
High density residential	241.8	145.1	0.0	0.0	0.0	0.0	241.8	145.1	164.5	98.7
Mixed use	59.7	35.8	32.3	129.0	60.5	24.2	152.4	189.0	103.6	128.5
Total	**442.1**	**265.3**	**32.3**	**129.0**	**60.5**	**24.2**	**534.8**	**418.5**	**363.7**	**284.6**

POWER STATION PRECINCT

AM PEAK HOUR (0700 – 0800)

Land use	Residential trips		Commercial trips		Retail Trips		Total		Adjusted Total	
	In	Out	In	Out	In	Out	In	Out	In	Out
Low density residential	11.2	33.5	0.0	0.0	0.0	0.0	11.2	33.5	7.6	22.8
Medium density residential	20.0	59.9	0.0	0.0	0.0	0.0	20.0	59.9	13.6	40.7
High density residential	4.2	12.5	0.0	0.0	0.0	0.0	4.2	12.5	2.8	8.5
Mixed use	2.7	8.2	53.3	13.3	12.5	2.5	68.5	24.0	46.6	16.3

POWER STATION PRECINCT										
AM PEAK HOUR (0700 – 0800)										
Land use	Residential trips		Commercial trips		Retail Trips		Total		Adjusted Total	
	In	Out	In	Out	In	Out	In	Out	In	Out
Activity centre	75.3	226.0	398.7	99.7	56.7	11.3	530.7	337.0	360.9	229.1
Total	**113.4**	**340.1**	**452.0**	**113.0**	**69.2**	**13.8**	**634.5**	**466.9**	**431.5**	**317.5**
PM PEAK HOUR (1600 – 1700)										
Land use	Residential trips		Commercial trips		Retail Trips		Total		Adjusted Total	
	In	Out	In	Out	In	Out	In	Out	In	Out
Low density residential	27.9	16.7	0.0	0.0	0.0	0.0	27.9	16.7	19.0	11.4
Medium density residential	49.9	30.0	0.0	0.0	0.0	0.0	49.9	30.0	34.0	20.4
High density residential	10.4	6.2	0.0	0.0	0.0	0.0	10.4	6.2	7.1	4.2
Mixed use	6.8	4.1	13.3	53.3	25.0	10.0	45.1	67.4	30.7	45.8
Activity centre	188.3	113.0	99.7	398.7	113.4	45.4	401.4	557.0	272.9	378.8
Total	**283.4**	**170.0**	**113.0**	**452.0**	**138.4**	**55.3**	**534.8**	**677.3**	**363.6**	**460.6**

Trip distribution

The trips generated for the development were distributed using STEM. Specifically, STEM was run with a representation of the Cockburn Coast development and a trip matrix for the SATURN study area extracted. Following a conversion exercise to the SATURN zone system and network, the trip ends calculated in the trip generation stage were allocated to an appropriate SATURN zone in the Cockburn Coast development and factored by the STEM trip generation. Essentially, the number of development trips in the SATURN model matches those discussed in the Trip Generation section above but are distributed according to STEM which as well as considering trips to zones within the SATURN study area also considers travel to destinations and from origins which lie outside of it. STEM's distribution model is of a gravity model form which is common place in large strategic transport models. It has been assumed that vehicles will park close to the zones that they are travelling to in the model. Car parks have not been explicitly modelled.

6.7 Modelling results

Link flows

The link results for the Do Minimum scenario for the AM Peak hour and the PM Peak hour in 2031 are illustrated in Figure 6.4 and Figure 6.5. The link results for the Do Something scenario for the AM Peak hour and PM peak hour in 2031 are illustrated in Figure 6.6 and Figure 6.7. The flows are recorded in passenger car units (PCUs). The PCU estimates the relative impact that different types of vehicles have on the highway network compared to a single car.

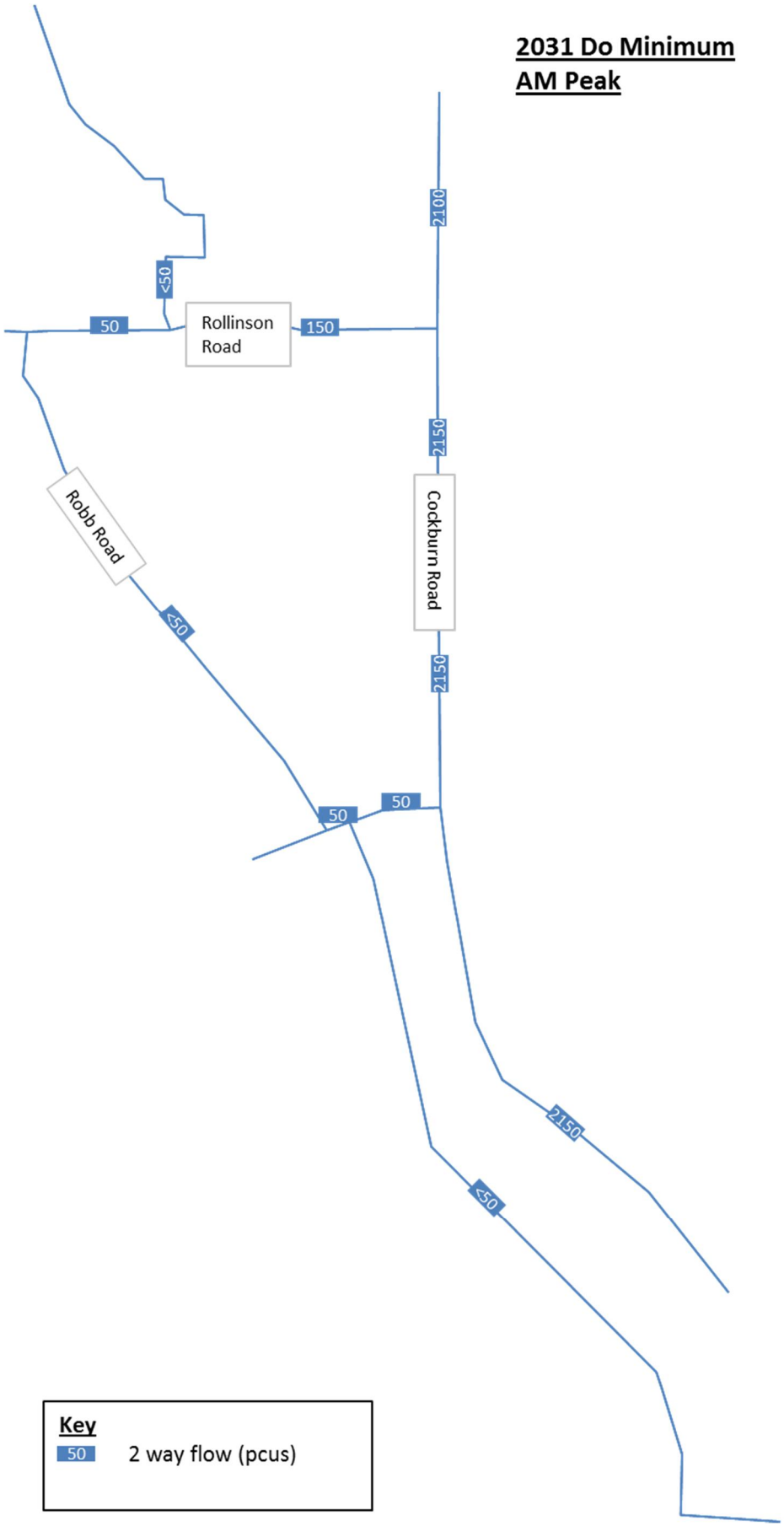


Figure 6-4 Do Minimum 2-way flows for the AM peak hour

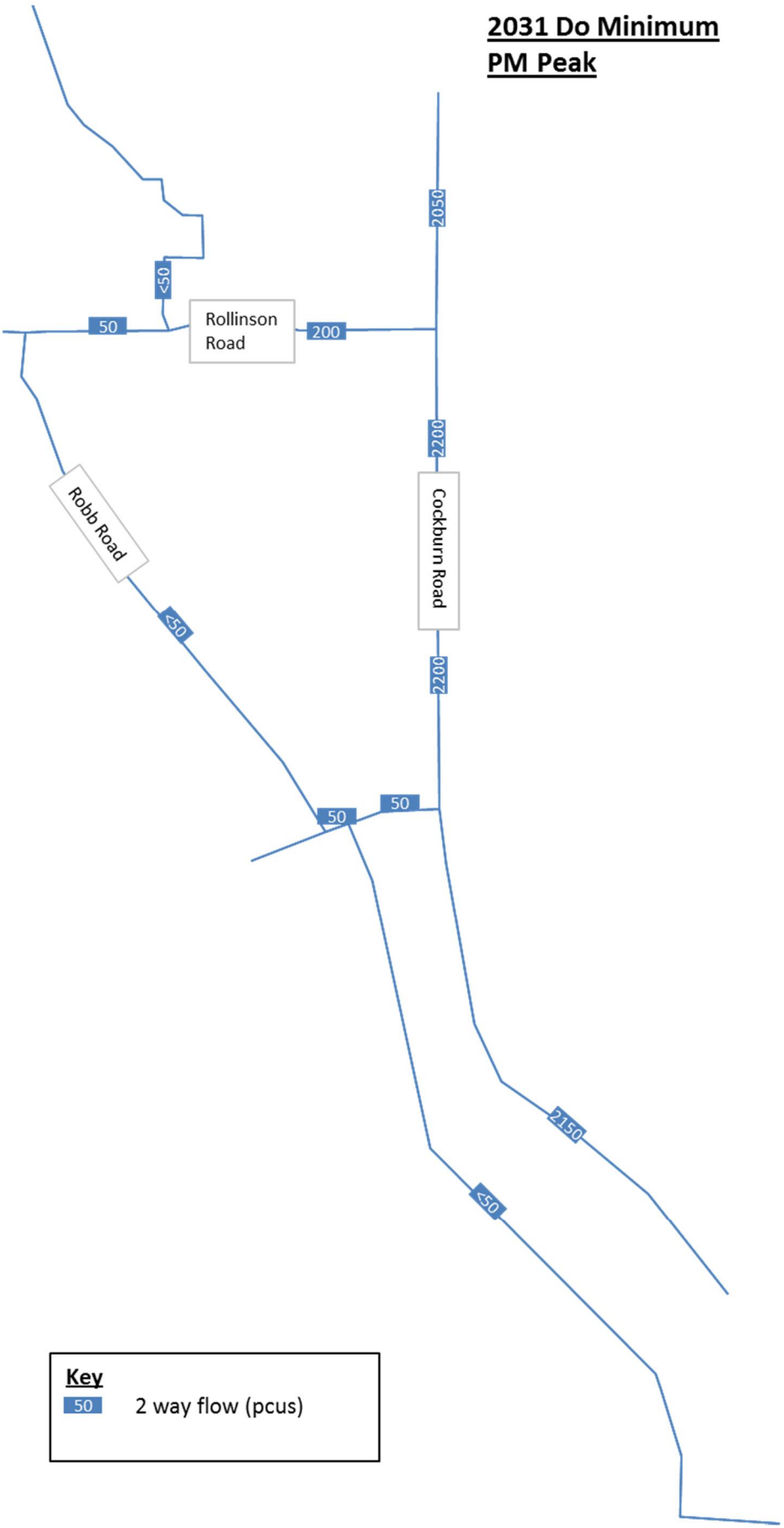


Figure 6-5 Do Minimum 2-way flows for the PM peak hour

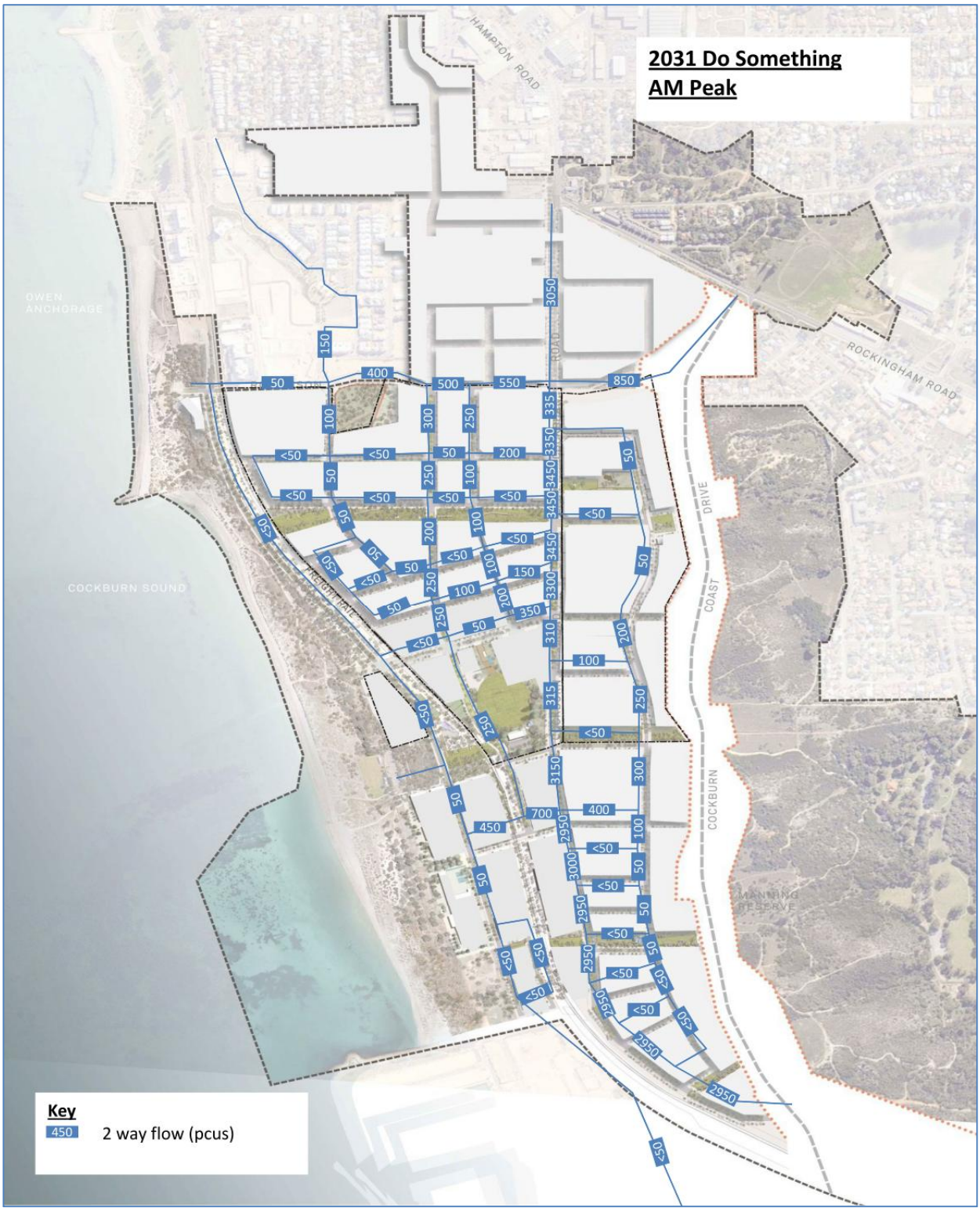


Figure 6-6 Do Something 2-way flows for the AM peak hour

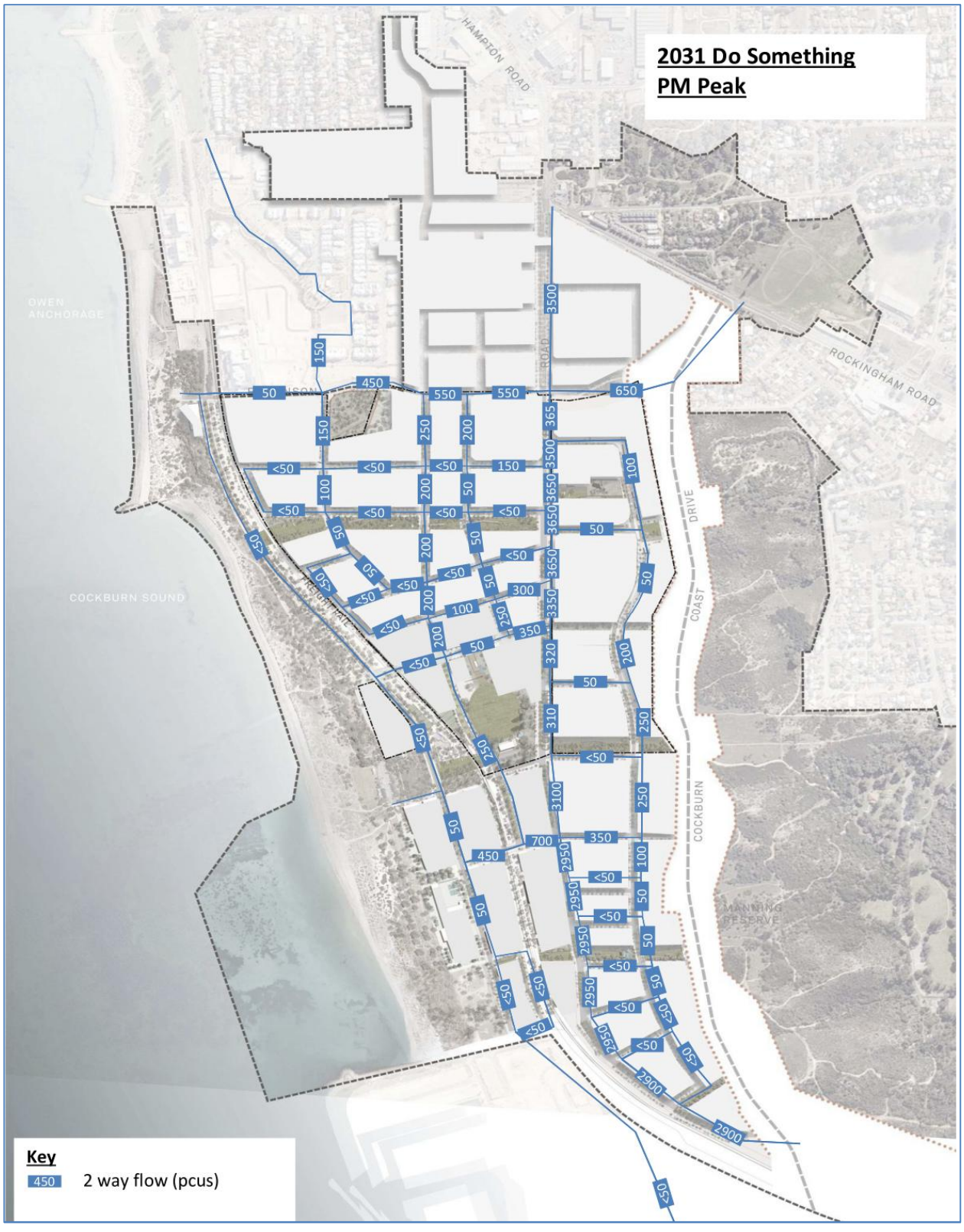


Figure 6-7 Do Something 2-way flows for the PM peak hour

As would be expected there is an increase in flows between the Do Minimum and Do Something scenarios in both the AM and PM Peak hours. The flow on Cockburn Road more than doubles between the base year and the Do Something scenario in both the morning and evening peak hours, whilst the flow on Rollinson Road increases by more than 50% between the Do Minimum and Do Something scenarios.

Although there are a number of routes into and out of the area, the majority of trips use Rollinson Road, Main Street and McTaggart Cove to access the development as illustrated in Figure 6.6 and Figure 6.7. This is as expected due to the fact that there are signals in each of these locations.

Journey times

In order to identify the impacts on the operation of Cockburn Road, consideration was made of the journey times along this route. A 'joy ride' was undertaken in each of the different model scenarios in both a northbound and southbound direction between the South Street intersection and south of the Spearwood Avenue intersection as illustrated on Figure 6.8.

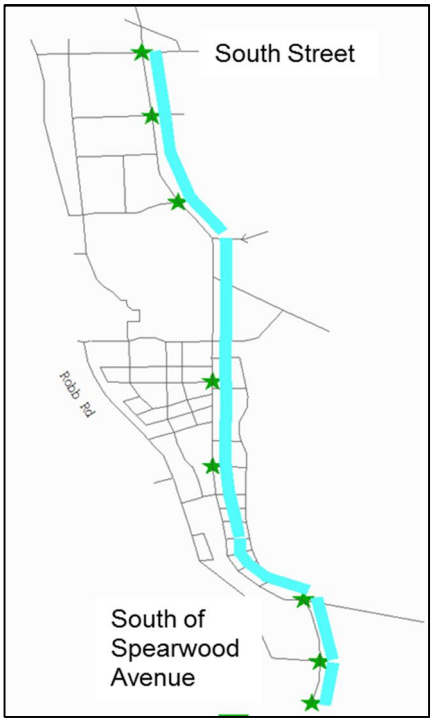


Figure 6-8 Joy ride along Cockburn Road

The journey times for each of the different modelled scenarios are detailed in Table 6.3.

Table 6.3 Journey times for each of the scenarios

	Journey Times (minutes)			
	AM peak		PM peak	
Scenario	Northbound	Southbound	Northbound	Southbound
Base year (2012)	6.0	5.5	5.5	8.5
Do Minimum (2031)	5.5	5.5	5.5	6.0
Do Something (2031)	9.5	7.5	7.5	10.5

It is evident that there is an improvement in the journey times between the base year and the Do Minimum scenario. This is as a result of the introduction of the BRT, the two lanes in each direction between Rockingham Road intersection and the Spearwood Avenue intersection, and the optimisation of signal timings across the study area. The journey time increases in both a northbound and southbound direction in the Do Something scenario as

would be expected when the development is introduced. The Do Something journey times are however not significantly greater than those in the base year.

Rat running traffic

As discussed previously speeds within the development have been reduced in order to encourage walking and cycling. Reducing the speed of the road will also discourage rat running traffic as the journey time will increase and the route will become less attractive. Speeds have been reduced in the model to try to reduce the amount of rat running through Cockburn Coast. Reducing rat running traffic will also assist in the operation of the BRT.

Table 6.4 shows the percentage of non-development trips that are rat-running through the development.

Table 6.4 The percentage of non-development trips that are rat-running

	% of non-development trips which are rat running			
	AM peak		PM peak	
Scenario	Northbound	Southbound	Northbound	Southbound
Do Something (2031)	4%	3%	1%	2%

As Table 6.4 illustrates, with the development in place in 2031 and assuming two lanes in each direction on Cockburn Road between Rockingham Road and Spearwood Avenue, the majority of through trips chose to use Cockburn Road. There are only a small percentage of non-development trips that are rat-running through the development. This suggests that trips with an origin and destination outside the study area are tending to remain on the strategic routes rather than using the local routes through the development. Minimising rat running traffic through the development will have a positive impact on the internal roads and will allow priority to be given to the pedestrians and cyclists rather than the motor vehicle.

7. Analysis of transport networks: non-motorised user assessment

7.1 Pedestrian / cycle networks

Roads potentially difficult for pedestrians and cyclists to cross

The traffic assessment has identified the traffic volumes on roads within the Cockburn Coast study area. The traffic volumes for 2031 with Cockburn Coast are illustrated in Figure 6.6 and Figure 6.7. The WAPC Transport Assessment Guidelines for Developments details the traffic volumes affecting pedestrian crossing amenity. These traffic volumes are detailed in Table 7.1.

Table 7.1 Traffic volumes affecting pedestrian crossing amenity

Road cross-section	Traffic volume affecting ability of pedestrians to cross (vehicles per hour – two way)
2 lane undivided	1100 vph
2 lane divided (or with pedestrian refuge islands)	2800 vph
4 lane undivided (without pedestrian refuge islands)	700 vph
4 lane divided (or with pedestrian refuge islands)	1600 vph

Cockburn Road will be a 4 lane divided road with a median along its extent. This will have a two-way volume in excess of 1600 vph as detailed in Table 7.1. With these volumes, the ability of pedestrians and cyclists to cross Cockburn Road will be affected.

Hampton Road south of Douro Road is a 4 lane divided road. The traffic volumes are in excess of those detailed in Table 7.1. The ability of pedestrians and cyclists to cross this road will therefore also be affected.

Hampton Road north of Douro Road will be a 2 lane road. This will be divided to Scott Street however north of Scott Street to South Street the road will be a 2 lane undivided road. On the divided section the traffic volumes on Hampton Road do not exceed those detailed in Table 7.1 thereby will not affect the ability of pedestrians to cross. The traffic volumes on the undivided section of Hampton Road do however exceed those detailed in Table 7.1, so the ability of pedestrians and cyclists to cross this section of road will be affected.

The traffic volumes within the remainder of the study area are lower than those detailed in Table 7.1 for their respective road cross section category. Pedestrian crossing ability will therefore not be affected.

Proposed crossing facilities

When considering the WAPC guidelines and traffic volumes, it is evident that safe crossing facilities should be provided on Cockburn Road, Hampton Road south of Douro Road, and Hampton Road between Scott Street and South Street.

As part of the development, a number of crossing points will be provided on Cockburn Road. Pedestrians and cyclists will be able to cross at the Rollinson Road, Main Street and McTaggart Cove signalised intersections, with a further two dedicated signalised mid-block pedestrian crossings provided along the extent of Cockburn Road. These tie in with the pedestrian desire lines running east-west as previously discussed. These are illustrated in Figure 4.1. As detailed in the ITP the signals are to be pedestrian activated and signal phase timing should increase green time for pedestrian crossings rather than vehicular operations.

To ensure an efficient and safe pedestrian and cyclist network, safe crossing facilities should be considered at intervals no greater than those illustrated in Table 7.2.

Table 7.2 Intervals for crossing facilities

Road type	Maximum spacing of safe pedestrian crossing facilities
Arterial – minimal frontage activity	400 metres
Arterial – significant frontage activity	200 metres
Local distributor / Neighbourhood connector	100 metres

The greatest distance between crossing points on Cockburn Road is 324m between McTaggart Cove intersection and the pedestrian activated crossing to the south. Cockburn Road performs both a local and regional traffic function so it is appropriate to make reference to the 'Arterial' road type in this instance. The section between the McTaggart Cove intersection and the pedestrian activated crossing is expected to have minimal frontage activity. The spacing between crossing facilities is therefore within the guidelines for the maximum spacing of safe pedestrian crossing facilities. The distance between crossing points along Cockburn Road is reduced to the north of McTaggart Cove facilitating pedestrian and cyclist movements in the area. Pedestrian crossings will have generous pedestrian crossing provision to further facilitate pedestrian and cyclist movements in the area.

Zebra crossings are to be used throughout the residential streets within the development that cross the east west greenways. These will be combined with raised intersections and entry treatments in strategic locations for additional traffic calming as illustrated on Figure 4.3. Modelling shows that the traffic volumes on these routes will not exceed the specified traffic volumes for a 2 lane undivided road.

7.2 Safe walk to school assessment

A school is proposed within the Robb Jetty precinct on the corner of Main Street and Cockburn Road. This will be a primary school and will serve the development itself. There are no other schools within 800m of the boundary of the structure plan area.

There is potential that people from outside the study area could travel to the primary school proposed within Cockburn Coast, however it is likely that existing schools located outside the 800m perimeter would serve the existing residential developments. The catchment for the proposed primary school is likely to be restricted to the Cockburn Coast area. The most likely walk and cycle routes to the school from the catchment area are illustrated in Figure 7.1.



Figure 7-1 Pedestrian routes to school

The majority of trips to and from the school will travel ithin Cockburn Coast, converging in the locations indicated on Figure 7.1. The routes through the development will be designed to give priority to pedestrians and cyclists. The traffic flows on these internal roads are lower than those detailed in Table 7.1 for two lane undivided roads. It is recognised that school children, particularly primary school children may experience difficulties at lower traffic levels. The traffic volumes on the internal routes through the development are sufficiently low to

allow for the safe movement of children to and from the school. The presence of zebra crossings throughout the residential streets will also provide safe crossing points.

In the immediate vicinity of the school where the walk / cycle trips converge, there is an off-road shared path. This is immediately adjacent to the school and will provide safe access to the school site. An on-road cycle track runs north-south on the internal streets through the development. This will connect to the off-road shared path. An on-road cycle track will also run north-south along Cockburn Road.

As previously discussed the two-way traffic volumes on Cockburn Road will be in excess of 1600vph. The ability of pedestrians and cyclists to cross the road will be affected. This will obviously have an impact on the ability of the school children to cross safely. A signalised intersection is therefore proposed at the Main Street / Cockburn Road intersection. This intersection will have pedestrian activated signals. This intersection is directly adjacent to the proposed school site and will provide a crossing point for those travelling to and from the school from the east of the development. There is also a pedestrian refuge to the south of the Main Street / Cockburn Road intersection. This will provide an additional crossing point to the south of the school.

Footpaths will be constructed on the internal routes through the development and along Cockburn Road, providing a safe route to school for residents. A number of streets will be designed as shared streets. These are illustrated on Figure 4.3. These will have a speed limit of 10 km/hr. The speeds on streets throughout the remainder of the development will have a maximum posted speed of 30 km/hr with the exception of Cockburn Road which will have a 50km/hr posted speed. Cockburn Road (within the school zone) will be 30 km/hr during school times. The posted speeds and higher level of pedestrian activity will promote slower than conventional travel speeds.

The section of Main Street directly outside the school is not proposed to be a shared street. It is therefore recommended that a dedicated crossing point be introduced on Main Street outside the school to provide a safe crossing location. This could be in the form of a supervised children's crossing. This would ensure there is a safe, controlled environment in the area closest to the school.

The majority of trips to and from the school will travel within Cockburn Coast, and thus sustainable modes of travel will be encouraged to access the school site. It is however recognised that sustainable modes may not be suitable for all trips to the school. Traffic congestion and parking can be an issue around schools as children are dropped off and collected in private vehicles. A short drop off and pick up point will need to be considered as part of the school site design to ensure that vehicles are not blocking Main Street or any of the other internal streets and most importantly not waiting on Cockburn Road.

7.3 Pedestrian permeability and access to public transport

Cockburn Coast will be designed to provide a permeable walking and cycling network, with visual and physical connectivity to other streets and places. There will be clear visual links between streets and places with adequate lighting provision along the routes. The design of the streets has been carefully linked with the design of the BRT. The BRT corridor will be created along Cockburn Road and through the development connecting Fremantle to Rockingham. BRT stops are located approximately every 400-600 metres. The proposed BRT coupled with the stop locations for existing services in the area, means that all of the residential dwellings in the proposed development are within 500m walk of bus stops as

illustrated on Figure 7.2. It has been assumed in subsequent analysis that 95% of the development is located within 400m of quality public transport.

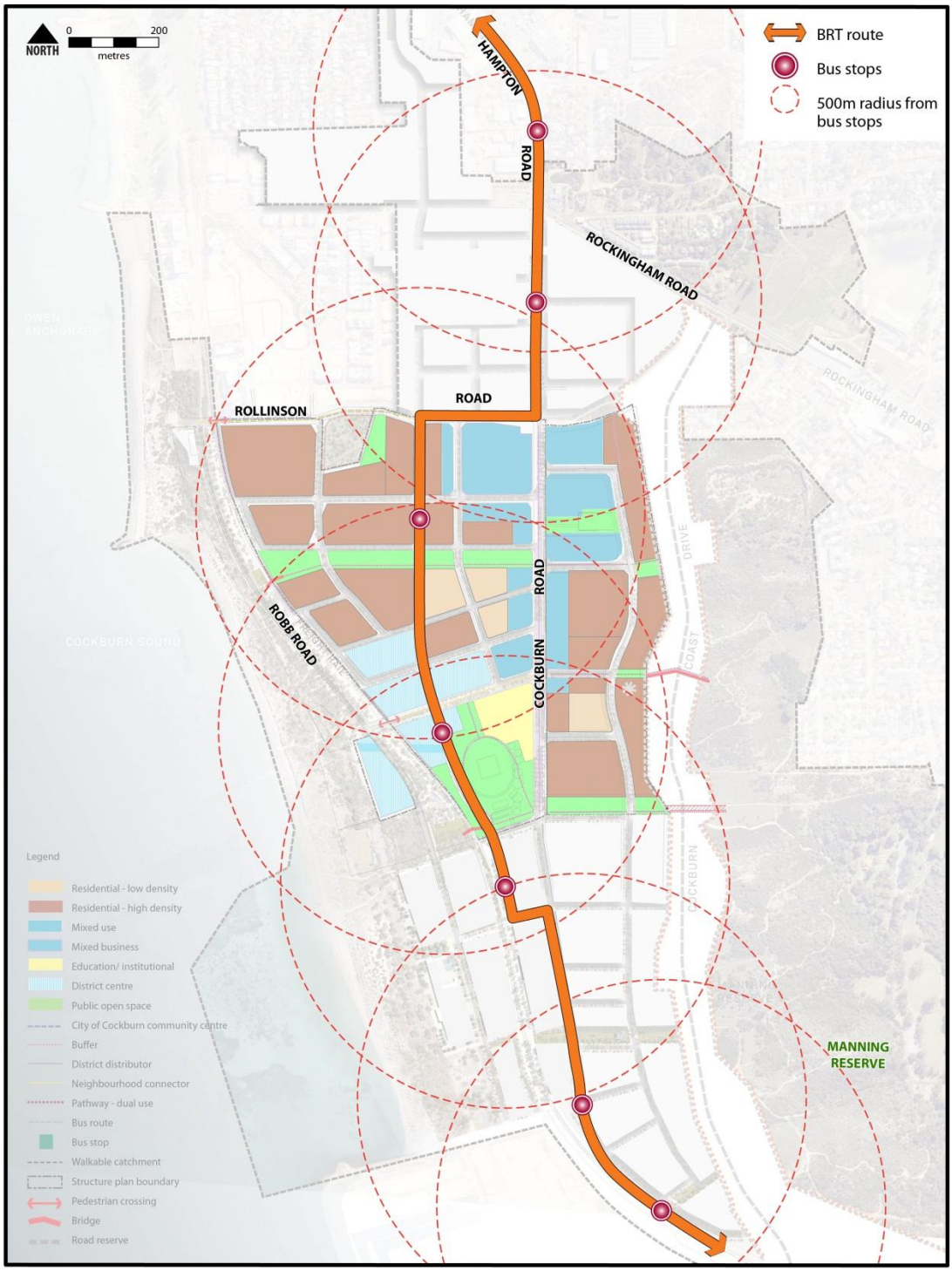


Figure 7-2 500m radius from bus stops

8. Intersection operation

8.1 Assessment method

A detailed intersection operational analysis has been undertaken for the following intersections:

- Rollinson Road / Cockburn Road
- Main Street / Cockburn Road
- McTaggart Cove / Cockburn Road
- Spearwood Avenue / Cockburn Road

SIDRA 5.1 has been used to undertake this assessment. The above intersections have been chosen for analysis as they are situated on the Cockburn Road corridor immediately adjacent to Cockburn Coast. The development is likely to have the most significant impact on these intersections.

The traffic flows from the 2031 Do Minimum and 2031 Do Something SATURN model have been used in the assessment of the individual intersections. The flows output from the SATURN model have been adjusted according to the difference between the modelled and the observed flows in the base year. The flows for each of the Do Minimum and Do Something scenarios for the AM and PM Peak hours are illustrated in Appendix B. These flows are recorded in vehicles for use in the SIDRA software.

The following sections provide an analysis of the performance of each intersection in the Do Minimum and Do Something scenarios.

8.2 Rollinson Road / Cockburn Road

The Rollinson Road / Cockburn Road intersection is currently a 3 arm priority intersection with Rollinson Road as the minor arm. The existing layout is shown in Figure 8.1.



Figure 8-1 Rollinson Road / Cockburn Road existing layout

The proposed future year layouts as modelled in SIDRA are illustrated in Figure 8.2. In the Do Minimum scenario the intersection will remain as a 3 arm intersection. There will be a bus lane on the approach to the intersection on Cockburn Road North and Rollinson Road and on the exits of these arms to accommodate the BRT. In the Do Something scenario, the intersection will be a 4 arm intersection to allow access to the development to the west and east of Cockburn Road. There will again be a bus lane on the approach to the intersection on Cockburn Road North and Rollinson Road and on the exits to these arms to accommodate the BRT.

The BRT intersections have been optimised in SIDRA. The proposed layout is shown below and has the bus lane terminating before reaching the stop line and the bus sharing the left turn lane with other vehicles. The bus would 'jump' the queue to the end of the bus lane and would be able to clear the stop line in one cycle of the lights.

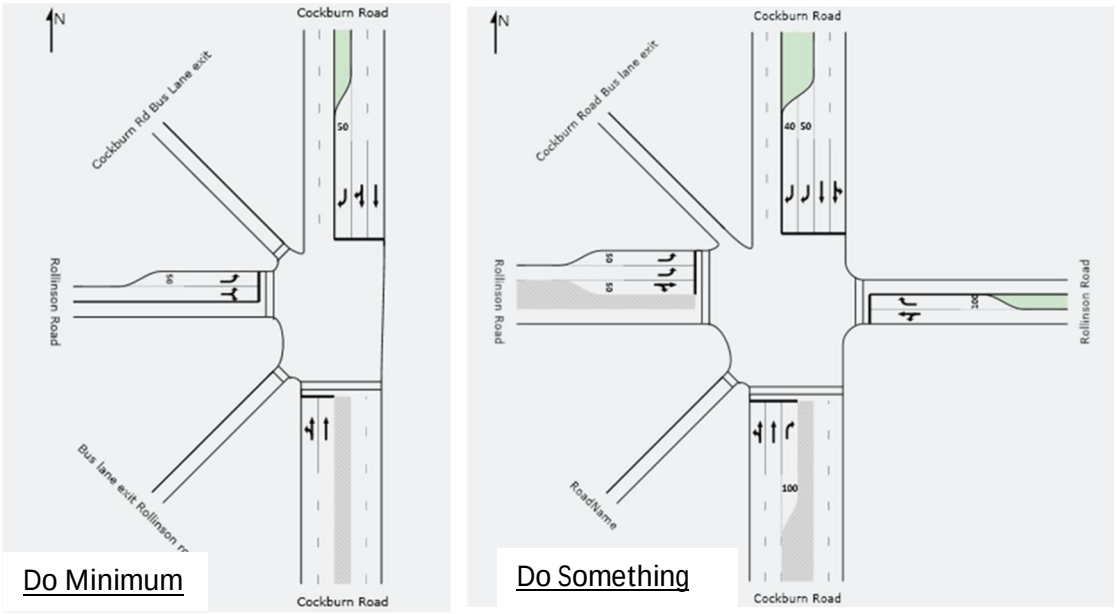


Figure 8-2 SIDRA layout for Rollinson Road / Cockburn Road intersection

The signal phasing adopted and the signal cycle and phase times are shown in Figure 8.3 and Table 8.1.

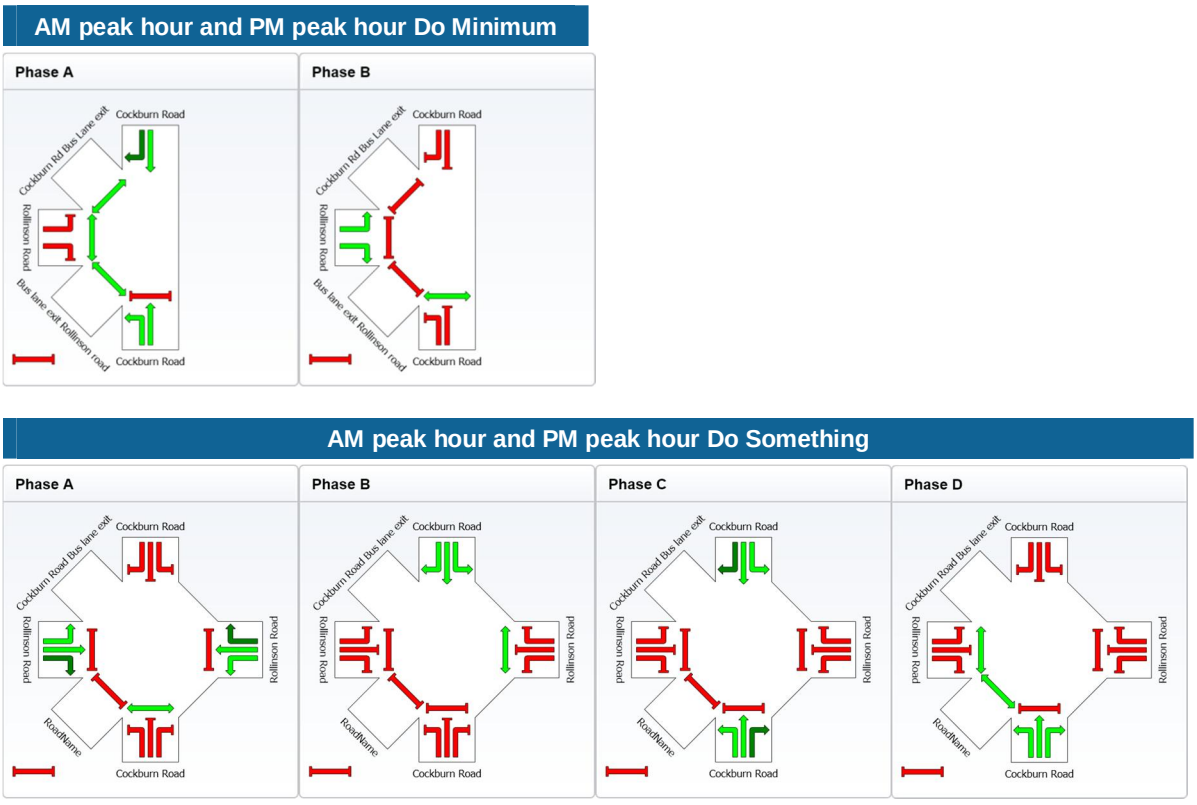


Figure 8-3 Signal phasing for Rollinson Road / Cockburn Road intersection

Table 8.1 Phase times and cycle times for Rollinson Road / Cockburn Road intersection (seconds)

Phase	Do Minimum		Do Something	
	AM Peak Hour	PM Peak hour	AM Peak Hour	PM Peak hour
A	80	80	30	28
B	20	40	23	24
C	N/A	N/A	44	44
D	N/A	N/A	23	24
Cycle Time	**100**	**120**	**120**	**120**

The performance of the intersection is detailed in Table 8.2 and Table 8.3 for the AM and PM peak hours respectively.

Table 8.2 AM Peak hour SIDRA results for Rollinson Road / Cockburn Road

AM Peak Approach	Movement	Do Minimum				Do Something			
		DoS	LoS	Delay (s)	Queue (m)	DoS	LoS	Delay (s)	Queue (m)
Cockburn Road North	Left / Through	N/A				0.748	C	25.2	248.8
	Through	0.384	A	5.0	71.2	0.748	C	24.9	249.3
	Right	0.214	B	15.4	8.8	0.272	C	29.7	18.1
	Right	N/A				0.272	C	29.6	15.8
Rollinson Road (West)	Left	0.215	D	49.0	15.8	0.507	D	50.9	38.8
	Left	N/A				0.507	D	53.2	70.0
	Through / Right	N/A				0.508	E	57.3	41.6
	Left/Right	0.215	D	49.2	17.9	N/A			
Cockburn Road South	Left / Through	0.307	A	5.2	51.2	0.575	C	22.1	163.9
	Through	0.307	A	4.6	51.3	0.575	C	21.8	164.1
	Right	N/A				0.997	E	67.0	163.2
Rollinson Road (East)	Left / Through	N/A				0.884	E	68.8	154.3
	Right	N/A				0.186	E	67.2	8.1
Overall Intersection		**0.384**	**A**	**7.4**	**71.2**	**0.997**	**D**	**35.7**	**249.3**

Table 8.3 PM Peak hour SIDRA results for Rollinson Road / Cockburn Road

AM Peak	Movement	Do Minimum				Do Something			
Approach		DoS	LoS	Delay (s)	Queue (m)	DoS	LoS	Delay (s)	Queue (m)
Cockburn Road North	Left / Through	N/A				0.957	E	62.8	541.6
	Through	0.597	B	14.8	179.8	0.957	E	62.6	542.1
	Right	0.191	C	24.0	10.4	0.322	C	31.3	19.6
	Right	N/A				0.322	C	31.1	17.0
Rollinson Road (West)	Left	0.160	D	40.3	11.6	0.281	D	51.4	21.0
	Left	N/A				0.281	D	52.5	34.3
	Through / Right	N/A				1.101	F	268.2	81.6
	Left/Right	0.160	D	41.3	26.0	N/A			
Cockburn Road South	Left / Through	0.293	B	12.9	67.2	0.669	C	22.9	205.2
	Through	0.293	B	11.3	9.4	0.669	C	22.8	205.4
	Right	N/A				0.253	D	52.0	32.6
Rollinson Road (East)	Left / Through	N/A				1.226	F	485.6	655.1
	Right	N/A				0.093	E	58.8	6.6
Overall Intersection		**0.597**	**B**	**15.5**	**179.8**	**1.226**	**F**	**92.9**	**655.1**

The results indicate that the Rollinson Road / Cockburn Road intersection is operating satisfactorily in both the AM and PM Peak hours in the Do Minimum scenario. The Degree of Saturation is within acceptable limits on all arms of the intersection. It is generally accepted that the Degree of Saturation must be below 0.85 to operate satisfactorily. The average vehicle delay does not exceed the 55 seconds detailed in the WAPC Transport Assessment Guidelines for Developments for any of the movements. Queuing is evident on Cockburn Road North in the PM Peak hour, however the delay to these vehicles is minimal and they cross the stop line within one cycle of the lights.

In the Do Something scenario, delay starts to become apparent at the intersection. Adding an additional arm to the intersection, coupled with bus priority and development traffic results in delays in excess of 55 seconds for the right turn into Rollinson Road East and all movements on the Rollinson Road arm in the AM Peak hour. The delay is not significant however with the maximum delay (68.8 seconds) recorded on Rollinson Road East for the left / through movement. Delays in excess of 55 seconds are evident on Cockburn Road North in the PM Peak hour, and out of the development on Rollinson Road West and Rollinson Road East. Although queuing is evident on Cockburn Road, the delay to vehicles is only 62.8 seconds which is not considerable and vehicles in the queue will clear the stop line in one cycle of the lights. The operation of the main line traffic is therefore considered to be acceptable. The most delay is experienced by vehicles on the side roads with considerable queuing evident on Rollinson Road East in particular. Although congestion is evident on this arm, congestion in general may be beneficial in the study area as this could encourage greater uptake of the BRT which would in turn reduce the demand on the intersections.

8.3 Main Street / Cockburn Road

The Main Street / Cockburn Road intersection currently does not exist. This intersection would allow access to and from the development. The proposed layout as modelled in SIDRA is illustrated in Figure 8.4. The intersection will be a 3 arm signalised intersection with all movements permitted from all arms of the intersection.

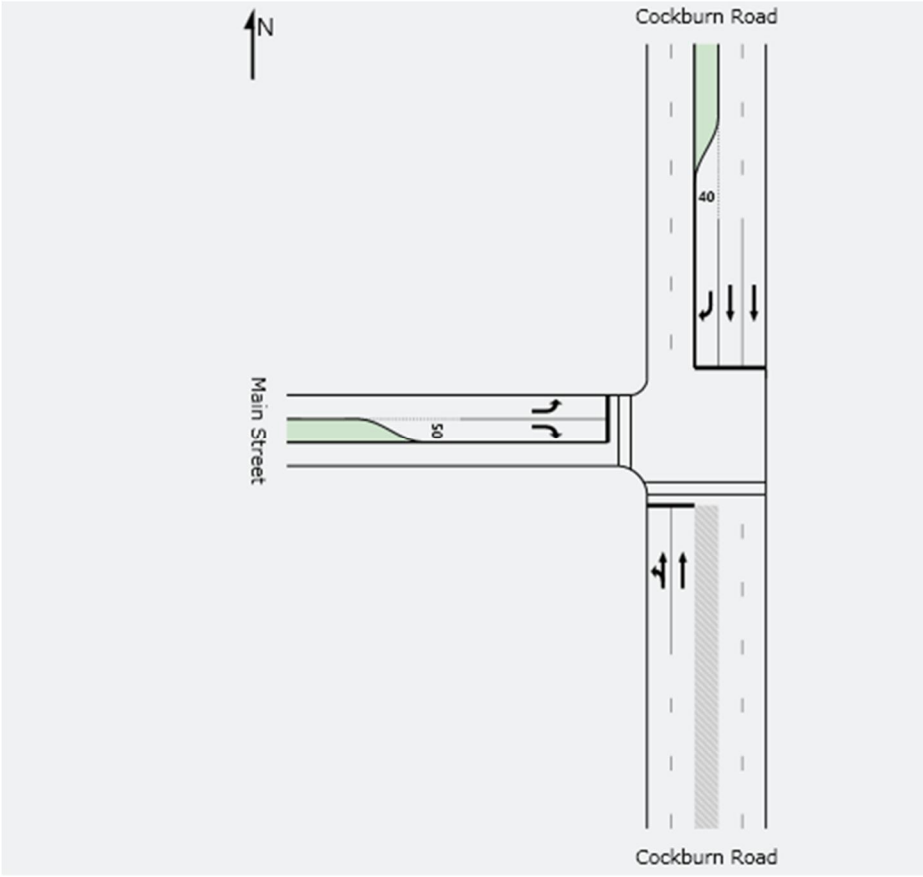


Figure 8-4 SIDRA layout for Main Street / Cockburn Road intersection

The signal phasing adopted and the signal cycle and phase times are shown in Figure 8.5 and Table 8.4.

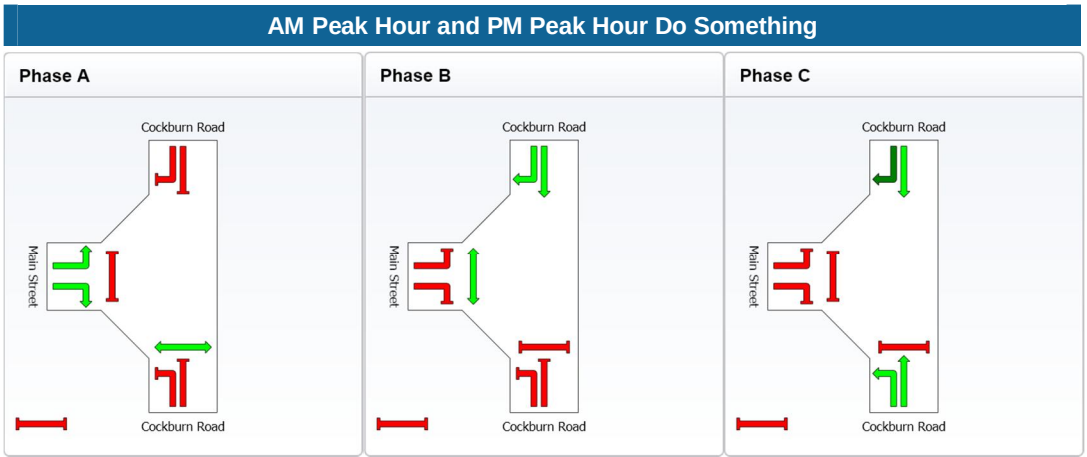


Figure 8-5 Signal Phasing for Main Street / Cockburn Road intersection

Table 8.4 Phase times and cycle time (seconds)

Phase	AM Peak Hour	PM Peak hour
A	21	21
B	21	22
C	58	47
Cycle Time	**100**	**90**

The performance of the intersection is detailed in Table 8.5 and Table 8.6 for the AM and PM peak hours respectively. As the intersection would not be required if the development were not in place, this intersection has only been modelled for the Do Something scenario.

Table 8.5 AM Peak hour SIDRA results for Main Street / Cockburn Road

AM Peak Approach	Movement	Do Something			
		DoS	LoS	Delay (s)	Queue (m)
Cockburn Rd North	Right	0.769	C	34.8	63.9
	Through	0.512	A	6.2	109.0
Main Street	Left	0.039	D	47.7	3.2
	Right	0.133	D	48.6	9.6
Cockburn Rd South	Left / Through	0.743	C	20.5	202.1
	Through	0.743	C	20.1	202.7
Overall Intersection		**0.769**	**B**	**15.8**	**202.7**

Table 8.6 PM Peak hour SIDRA results for Main Street / Cockburn Road

PM Peak Approach	Movement	Do Something			
		DoS	LoS	Delay (s)	Queue (m)
Cockburn Road North	Right	0.698	C	23.7	47.9
	Through	0.688	A	8.3	166.4
Main Street	Left	0.032	D	42.3	2.6
	Right	0.198	D	43.7	14.3
Cockburn Road South	Left / Through	0.682	C	21.2	148.3
	Through	0.682	C	20.8	148.6
Overall Intersection		**0.698**	**B**	**14.7**	**166.4**

The results indicate that the intersection operates satisfactorily in both the AM and PM peak hours in the Do Something scenario (with Cockburn Coast). The Degree of Saturation is within acceptable limits on all arms of the proposed intersection. It is generally accepted that the Degree of Saturation must be below 0.85 to operate satisfactorily. The average vehicle delay does not exceed the 55 seconds detailed in the WAPC Transport Assessment Guidelines for Developments for any of the movements, with the overall average vehicle delay at the intersection being 15.8 seconds and 14.7 seconds in the AM and PM Peak hours respectively. Although the queuing is reasonably high on Cockburn Road, the delay is such that the vehicles are clearing the stop line within the cycle of the lights. A Level of Service B is experienced at the intersection.

8.4 McTaggart Cove / Cockburn Road

The McTaggart Cove / Cockburn Road intersection is currently a minor priority intersection with McTaggart Cove as the minor approach. The existing layout is shown in Figure 8-6.



Figure 8-6 McTaggart Cove / Cockburn Road existing layout

It is proposed that the McTaggart Cove / Cockburn Road intersection be moved further south to provide an access to and from the development. The proposed layout for this intersection as modelled in SIDRA is illustrated in Figure 8.7. McTaggart Cove / Cockburn Road intersection will be a 4 arm signalised intersection in the future providing access to and from the development either side of Cockburn Road.

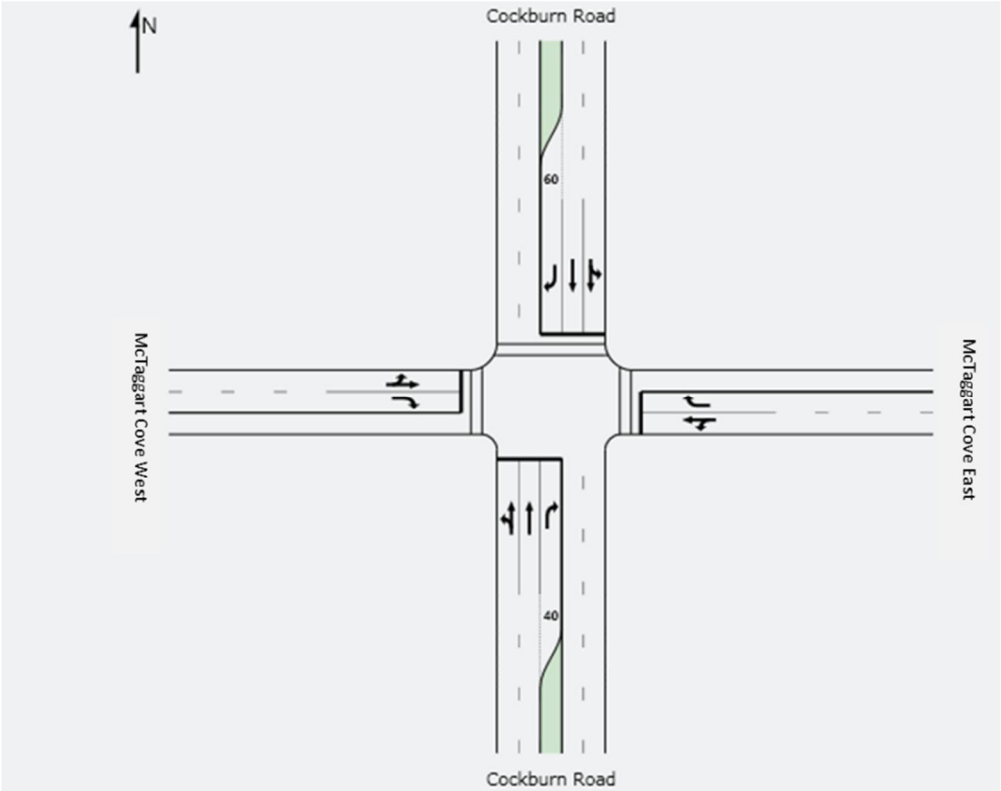


Figure 8-7 SIDRA layout for McTaggart Cove / Cockburn Road intersection

The signal phasing adopted and the signal cycle and phase times are shown in Figure 8.8 and Table 8.7.

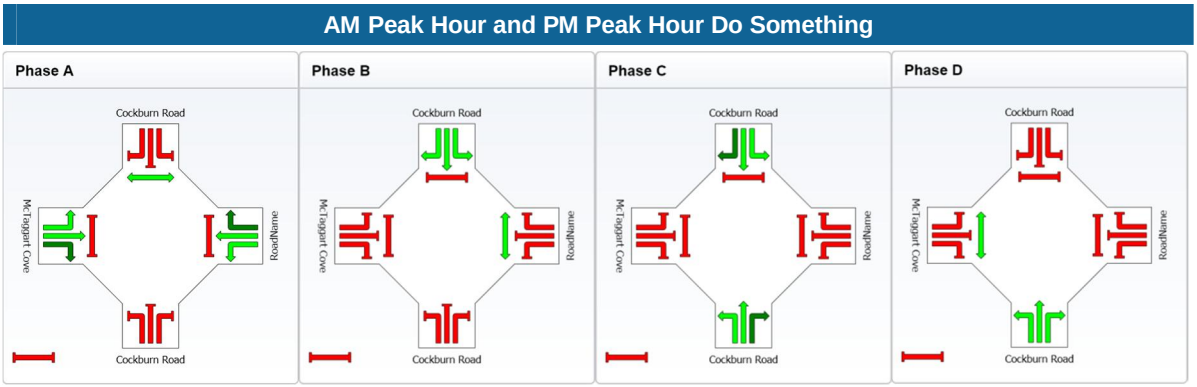


Figure 8-8 Signal Phasing for McTaggart Cove / Cockburn Road intersection

Table 8.7 Phase times and cycle time (seconds)

Phase	AM Peak Hour	PM Peak hour
A	39	40
B	19	20
C	24	40
D	18	20
Cycle Time	**100**	**120**

The performance of the intersection is detailed in Table 8.8 and Table 8.9 for the AM and PM peak hours respectively. As the proposed layout would not be required in the Do Minimum Scenario (without Cockburn Coast), this intersection has only been modelled for the Do Something scenario.

Table 8.8 AM Peak hour SIDRA results for McTaggart Cove / Cockburn Road

AM Peak Approach	Movement	Do Something			
		DoS	LoS	Delay (s)	Queue (m)
Cockburn Road North	Right	0.811	D	41.4	74.2
	Through	0.876	D	42.8	249.1
	Left / Through	0.876	D	43.0	248.7
McTaggart Cove East	Left / Through	0.124	C	26.0	18.7
	Right	0.855	E	58.7	106.9
Cockburn Road South	Left / Through	0.880	D	46.3	234.7
	Through	0.880	D	43.4	240.3
	Right	0.494	D	46.4	38.7
McTaggart Cove West	Left/ Through	0.351	D	35.6	55.9
	Right	0.595	D	38.2	77.7
Overall Intersection		**0.880**	**D**	**43.8**	**249.1**

Table 8.9 PM Peak hour SIDRA results for McTaggart Cove / Cockburn Road

PM Peak Approach	Movement	Do Something			
		DoS	LoS	Delay (s)	Queue (m)
Cockburn Road North	Right	0.736	D	37.8	71.5
	Through	0.918	D	50.7	387.3
	Left / Through	0.918	D	50.8	387.1
McTaggart Cove East	Left / Through	0.129	D	42.3	20.6
	Right	1.061	F	214.4	174.5
Cockburn Road South	Left / Through	0.489	C	27.5	122.1
	Through	0.489	C	24.8	124.6
	Right	0.529	E	56.7	41.6
McTaggart Cove West	Left/ Through	0.590	D	47.9	110.3
	Right	0.762	E	56.3	115.1
Overall Intersection		**1.061**	**D**	**53.3**	**387.3**

The results indicate that the McTaggart Cove / Cockburn Road intersection is operating close to capacity. During the AM Peak hour the Degree of Saturation exceeds the acceptable value on Cockburn Road North and South. The Degree of Saturation is not significantly above the 0.85 limit however. Although the Degree of Saturation is slightly above the acceptable limits, the average delay for vehicles is lower than the 55 seconds detailed in the WAPC Transport Assessment Guidelines for Developments, for all movements except the right turn out of McTaggart Cove East. Although this movement exceeds the acceptable level in guidance, the delay is not occurring to the main line traffic. It is considered acceptable to have this level of delay on the minor arm of the intersection. A

certain amount of delay could be beneficial within Cockburn Coast as this may encourage greater uptake of the BRT. Again queuing is evident on Cockburn Road however as the delay is not significant it is anticipated that the vehicles will clear the stop line within one cycle of the lights.

In the PM Peak hour the Degree of Saturation exceeds acceptable levels on Cockburn Road North and on McTaggart Cove (right turn). Although there is queuing evident on Cockburn Road, the delay is not considerable and it is below the 55 seconds detailed in the WAPC guidelines. As the delay is minimal, it is expected that the queuing vehicles will clear the stop line within one cycle of the lights. SIDRA shows an excessive delay and a Level of Service on McTaggart Cove East for right turning traffic. Level of Service F represents a gridlock situation for that movement and in reality that would not occur. This result combined with a poor Level of Service for vehicles turning right out of Rollinson Road indicates that there will be significant difficulty turning to the north from the Emplacement precinct in the evening peak. This is due to the high flow of traffic leaving the Fremantle area at the end of the day. In reality, people would choose not to make this movement in the evening peak or would travel straight ahead into Robb Jetty or Power Station precincts and find their way north through the development. The volume of vehicles turning to the north is not high in this peak hour. Consideration could be given to the introduction of peak hour turn bans for these movements. The overall delay in the PM Peak hour is still below the 55 seconds threshold detailed in WAPC guidance and a Level of Service D is experienced for the intersection as a whole.

8.5 Cockburn Road / Spearwood Avenue

The Cockburn Road / Spearwood Avenue intersection is currently a 3 arm intersection. The existing layout is illustrated in Figure 8.9.



Figure 8-9 Cockburn Road / Spearwood Avenue intersection existing layout

The layout for Cockburn Road / Spearwood Avenue remains unchanged in the future in both the Do Minimum and Do Something scenarios. The layout for Cockburn Road / Spearwood Avenue intersection as modelled in SIDRA is illustrated in Figure 8.10.

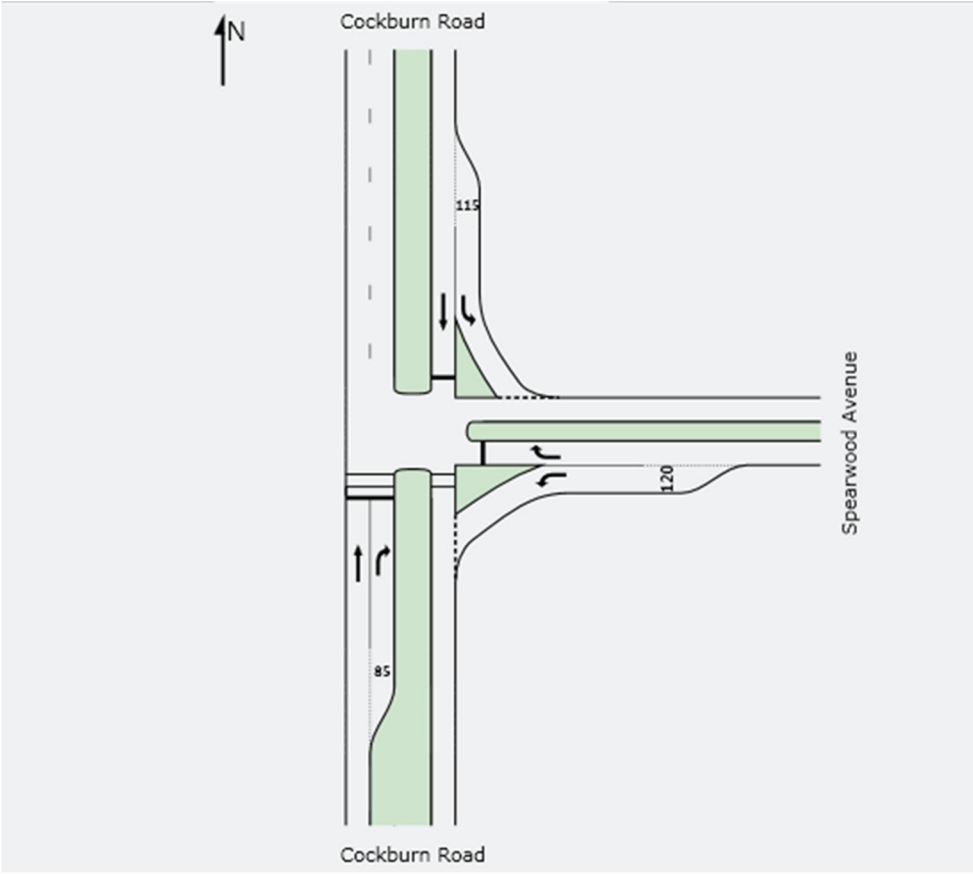


Figure 8-10 SIDRA layout for Cockburn Road / Spearwood Avenue intersection

The signal phasing adopted and the signal cycle and phase times in the future year scenarios are shown in Figure 8.11 and Table 8.10.

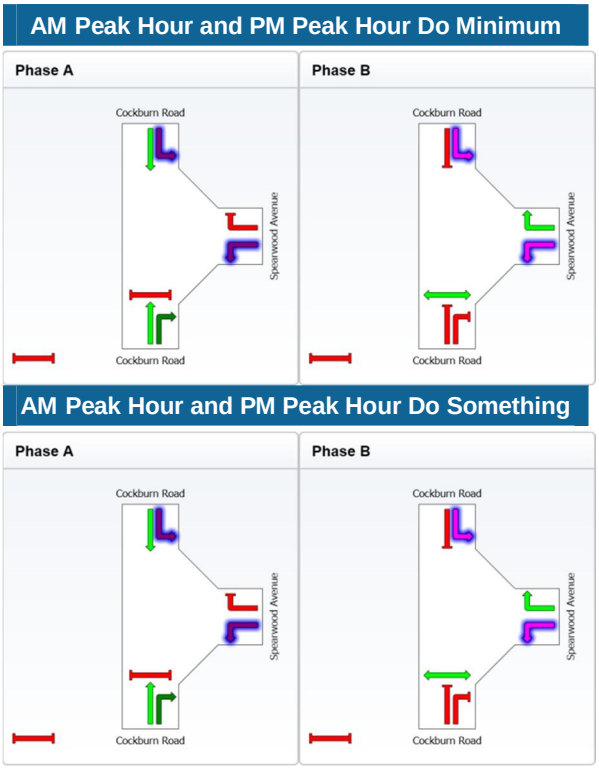


Figure 8-11 Signal phasing for Cockburn Road / Spearwood Avenue intersection

Table 8.10 Phase times and cycle time (seconds)

Phase	Do Minimum		Do Something	
	AM Peak Hour	PM Peak hour	AM Peak Hour	PM Peak hour
A	77	103	70	50
B	23	17	50	20
Cycle Time	**100**	**120**	**120**	**70**

The performance of the intersection is detailed in Table 8.11 and Table 8.12 for the AM and PM peak hours respectively.

Table 8.11 AM Peak hour SIDRA results for Cockburn Road / Spearwood Avenue

AM Peak Approach	Movement	Do Minimum				Do Something			
		DoS	LoS	Delay (s)	Queue (m)	DoS	LoS	Delay (s)	Queue (m)
Cockburn Road North	Left	0.362	B	10.6	16.6	0.533	B	10.4	32.4
	Through	0.465	A	7.1	98.5	0.702	C	22.2	227.9
Spearwood Avenue	Left	0.046	B	12.1	2.7	0.047	B	17.1	5.4
	Right	0.527	D	51.9	55.3	0.753	D	45.7	189.5
Cockburn Road South	Through	0.540	A	7.7	122.5	0.799	C	24.2	279.6
	Right	0.110	C	21.2	7.6	0.238	D	49.3	15.9
Overall Intersection		**0.540**	**B**	**12.3**	**122.5**	**0.799**	**C**	**24.6**	**279.6**

Table 8.12 PM Peak hour SIDRA results for Cockburn Road / Spearwood Avenue

PM Peak Approach	Movement	Do Minimum				Do Something			
		DoS	LoS	Delay (s)	Queue (m)	DoS	LoS	Delay (s)	Queue (m)
Cockburn Road North	Left	0.476	B	10.2	22.8	0.658	B	11.0	45.6
	Through	0.577	A	4.7	136.0	0.851	B	18.2	239.1
Spearwood Avenue	Left	0.065	B	13.0	3.6	0.067	C	20.4	5.2
	Right	0.433	E	67.9	30.1	0.862	D	48.0	89.7
Cockburn Road South	Through	0.331	A	3.4	56.7	0.503	A	8.1	81.1
	Right	0.354	C	21.5	22.9	0.692	D	43.3	29.7
Overall Intersection		**0.577**	**A**	**8.9**	**136.0**	**0.862**	**B**	**18.2**	**239.1**

The results indicate that the Cockburn Road / Spearwood Avenue intersection operates satisfactorily in both the AM and PM Peak hours in the Do Minimum and Do Something scenarios.

In the Do Minimum scenario the Degree of Saturation is within acceptable limits on all arms of the intersection in both the AM and PM Peak hours. The average vehicle delay only exceeds the 55 seconds detailed in the WAPC guidelines for the right turn movement on Spearwood Avenue during the PM Peak hour. The modelled delay is not significantly greater

than 55 seconds however and the queuing is minimal on this approach. Queuing is reasonably high on Cockburn Road South and North for the through movements; however the delay indicates that these vehicles are clearing the stop line in one cycle of the lights. A Level of Service B is experienced in the AM Peak hour whilst a Level of Service A is experienced in the PM Peak hour in the Do Minimum scenario.

The intersection operates slightly worse in both the AM and PM peak hours in the Do Something scenario as would be expected with increased flows at the intersection as a result of the development. The intersection still operates satisfactorily in the Do Something scenario however. The Degree of Saturation is below or just above the acceptable limit of 0.85 and the delay is below 55 seconds on all arms of the intersection. The delay experienced in the Do Minimum scenario on Spearwood Avenue is reduced in the Do Something scenario. This is likely to be as a result of the distribution of flows at the intersection. Queuing is again evident on the Cockburn Road South and North, however these vehicles will clear the stop line in one cycle of the lights as the delay is minimal. A Level of Service C is experienced in the AM Peak hour whilst a Level of Service B is experienced in the PM Peak hour in the Do Something scenario.

8.6 Intersection summary

Satisfactory intersection operation is achieved in the Do Minimum and Do Something scenarios for the majority of the intersections assessed. The McTaggart Cove / Cockburn Road and Rollinson Road / Cockburn Road intersections are however operating close to capacity and therefore will be sensitive to changes in travel behaviour. The results assume the reduced trip rate for a Transit Oriented Development as detailed in Section 6. If these trip rates cannot be achieved there will be an impact on the operation of these intersections. As stated previously a certain degree of congestion may be acceptable on the highway network in the Cockburn Coast study area however, as this could encourage greater uptake of the BRT.

9. Emplacement Crescent

The intersections of Emplacement Crescent with Cockburn Road will continue to operate as they operate at present. The northern intersection will be restricted to left-in / left-out movements as it is at present while the southern intersection will operate as an unsignalised all-movement intersection. Additional connectivity will be provided by connection of the north south road to the signalised Power Station access intersection further south. The layout of the intersections is shown in Figure 9-1 below:

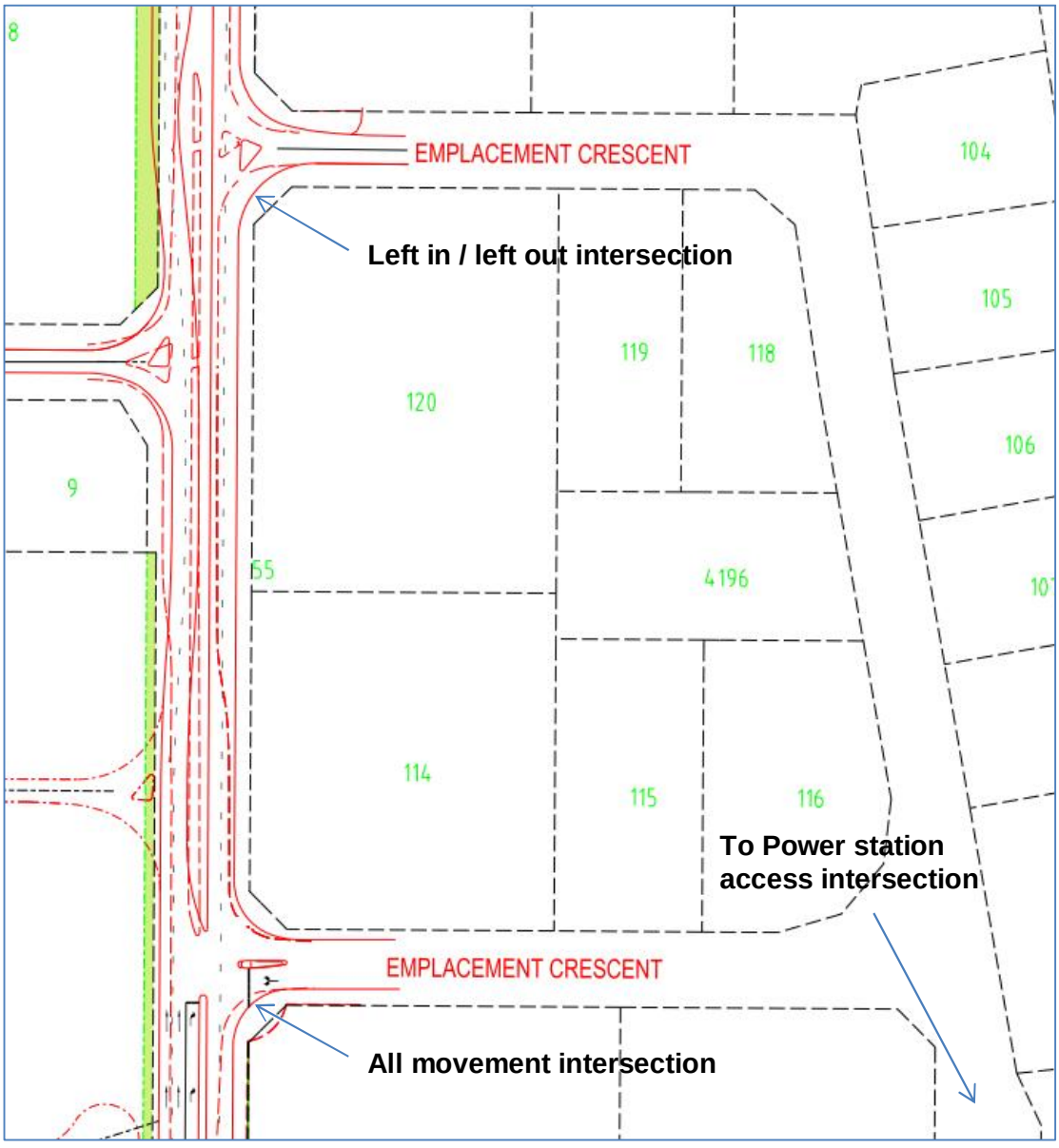


Figure 9-1Emplacement Crescent intersections

10. Parking

The ITP recommended the minimization of the amount of private car parking to promote active and public transport; to reduce greenhouse gas emissions, reduce the amount of time spent travelling in private motor vehicles and to increase household affordability. The standards set forth for parking are generally more restrictive than conventional standards and market expectations for parking in the metropolitan region. The aim is to take advantage of the presence of the BRT and the diverse mix of uses in a compact area, to diminish the demand for private and visitor parking.

The proposed parking areas are illustrated in Figure 10-1.

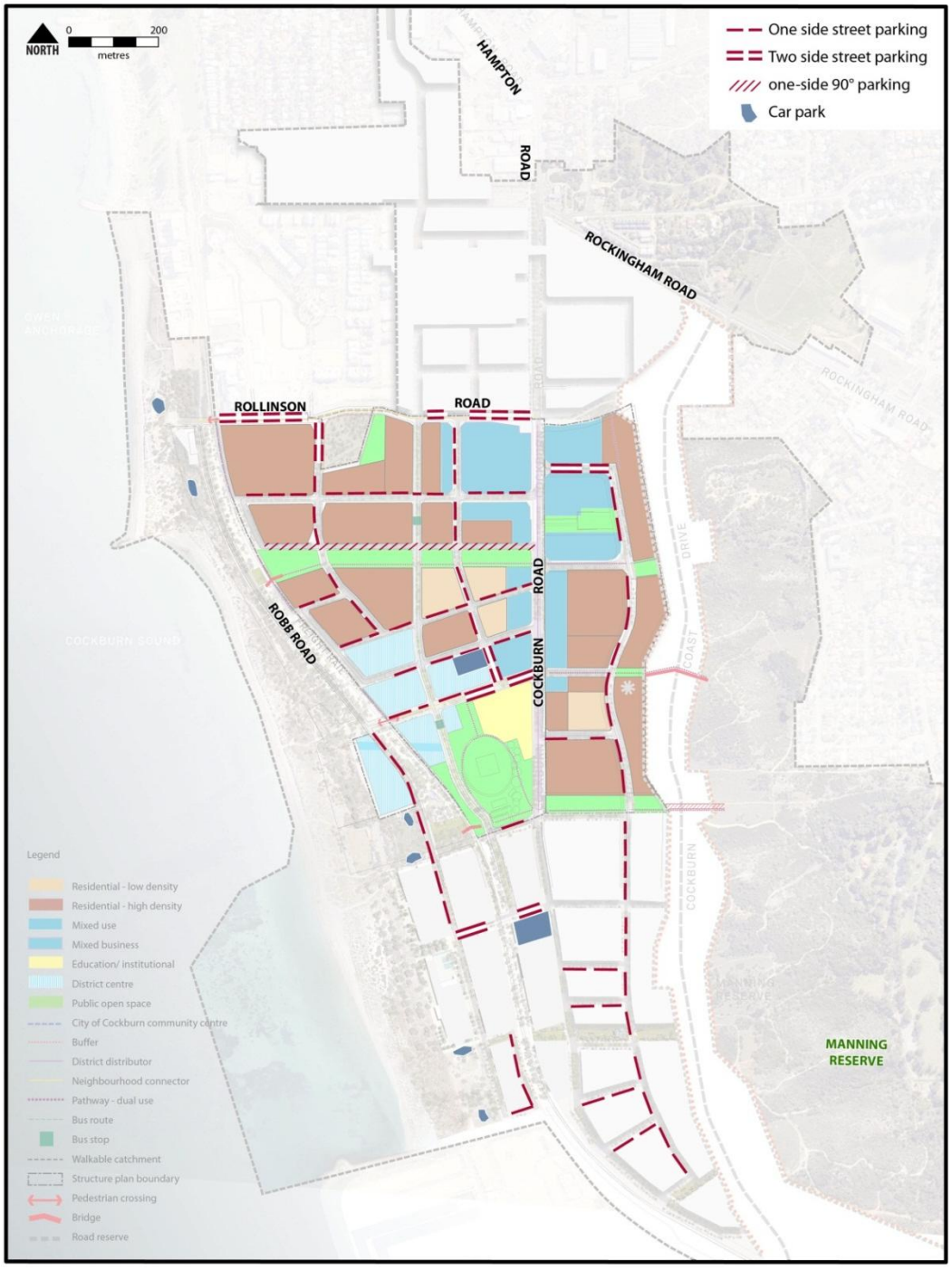


Figure 10-1 Parking provision

The ITP sets out the proposed parking rates recommended as a maximum for off-street parking. The rates detailed in the ITP are as follows:

Residential

- 1 per dwelling (regardless of size), including visitor bays, within 400m of quality public transport
- 1 per dwelling (regardless of size), plus 1 visitor bay per 4 units, greater than 400m from quality public transport

Retail / Commerce / Office

- 1 per 75m^2 GFA, within 400m of quality public transport
- 1 per 50m^2 GFA, greater than 400m from quality public transport

Assuming the ITP rates and based on the number of dwellings and area of commercial and retail space detailed in Table 2.2, the number of parking spaces in each of the three precincts has been calculated. The information is detailed in Table 10.1, Table 10.2 and Table 10.3.

Table 10.1 Number of parking spaces for Robb Jetty

ROBB JETTY PRECINCT			
Residential	**Number of dwellings**	**Number of parking spaces**	**Assumptions**
Residential dwellings within 400m of quality public transport	1,629	1,629	• 1 per dwelling including visitors bays • 95% of dwellings within 400m of quality public transport
Residential dwellings not within 400m of quality public transport	86	107	• 1 per dwelling plus 1 visitor bay per 4 units • 5% of dwellings not within 400m of quality public transport
Total Residential	**1,715**	**1,736**	
Commercial	**Area (sqm)**	**Number of parking spaces**	**Assumptions**
Commercial within 400m of quality public transport	25,594	341	• 1 per 75m2 GFA, within 400m of quality public transport • 95% of commercial within 400m of quality public transport
Commercial not within 400m of quality public transport	1,347	27	• 1 per 50m2 GFA, greater than 400m from quality public transport • 5% of commercial not within 400m of quality public transport
Total Commercial	**26,941**	**368**	

Retail	Area (sqm)	Number of parking spaces	Assumptions
Retail within 400m of quality public transport	10,042	134	• 1 per 75m2 GFA, within 400m of quality public transport • 95% of commercial within 400m of quality public transport
Retail not within 400m of quality public transport	529	11	• 1 per 50m2 GFA, greater than 400m from quality public transport • 5% of commercial not within 400m of quality public transport
Total Retail	**10,571**	**144**	
Total Parking spaces Robb Jetty		**2,249**	

Table 10.2 Number of parking spaces for Hill Top

HILL TOP PRECINCT			
Residential	**Number of dwellings**	**Number of parking spaces**	**Assumptions**
Residential dwellings within 400m of quality public transport	840	840	• 1 per dwelling including visitors bays • 95% of dwellings within 400m of quality public transport
Residential dwellings not within 400m of quality public transport	44	55	• 1 per dwelling plus 1 visitor bay per 4 units • 5% of dwellings not within 400m of quality public transport
Total Residential	**884**	**895**	
Commercial	**Area (sqm)**	**Number of parking spaces**	**Assumptions**
Commercial within 400m of quality public transport	7,660	102	• 1 per 75m2 GFA, within 400m of quality public transport • 95% of commercial within 400m of quality public transport
Commercial not within 400m of quality public transport	403	8	• 1 per 50m2 GFA, greater than 400m from quality public transport • 5% of commercial not within 400m of quality public transport
Total Commercial	**8,063**	**110**	

Retail	Area (sqm)	Number of parking spaces	Assumptions
Retail within 400m of quality public transport	2,873	38	• 1 per 75m2 GFA, within 400m of quality public transport • 95% of commercial within 400m of quality public transport
Retail not within 400m of quality public transport	151	3	• 1 per 50m2 GFA, greater than 400m from quality public transport • 5% of commercial not within 400m of quality public transport
Total Retail	**3,024**	**41**	
Total Parking spaces Hill Top		**1,047**	

Table 10.3 Number of parking spaces for the power station

POWER STATION PRECINCT			
Residential	**Number of dwellings**	**Number of parking spaces**	**Assumptions**
Residential dwellings within 400m of quality public transport	539	539	• 1 per dwelling including visitors bays • 95% of dwellings within 400m of quality public transport
Residential dwellings not within 400m of quality public transport	28	35	• 1 per dwelling plus 1 visitor bay per 4 units • 5% of dwellings not within 400m of quality public transport
Total Residential	**567**	**574**	
Commercial	**Area (sqm)**	**Number of parking spaces**	**Assumptions**
Commercial within 400m of quality public transport	26,835	358	• 1 per 75m2 GFA, within 400m of quality public transport • 95% of commercial within 400m of quality public transport
Commercial not within 400m of quality public transport	1,412	28	• 1 per 50m2 GFA, greater than 400m from quality public transport • 5% of commercial not within 400m of quality public transport
Total Commercial	**28,247**	**386**	
Retail	**Area (sqm)**	**Number of parking spaces**	**Assumptions**

POWER STATION PRECINCT			
Residential	**Number of dwellings**	**Number of parking spaces**	**Assumptions**
Retail within 400m of quality public transport	6,572	88	• 1 per 75m2 GFA, within 400m of quality public transport • 95% of commercial within 400m of quality public transport
Retail not within 400m of quality public transport	346	7	• 1 per 50m2 GFA, greater than 400m from quality public transport • 5% of commercial not within 400m of quality public transport
Total Retail	**6,918**	**95**	
Total Parking spaces Power Station		**1,055**	

There are three main parking locations within the development, located at the Power Station, Rollinson Road (90 degree on street parking along one side) and a multistorey car park located above the shops on Main Street. Parking in these locations will be shared between different parts of the development and multistorey car parks will be concealed with active frontages. The remainder of the parking within the development will be located on-street as illustrated in Figure 10.1. These will be accommodated on the local roads within the development and the key routes into the development as per the road cross sections detailed in Section 5.

The existing number of car parking spaces in the foreshore area will be retained, although in designed car parks as per the Foreshore Strategy. No additional parking will be provided at the beach. Due to the close proximity of the freight rail line to the beach, it is important that car trips to the beach are limited to prevent queuing across the rail line. Minimising the amount of parking at the beach will also help to preserve the amenity and encourage walking and cycling, a concept that will be promoted within the development. The BRT through the Cockburn Coast development will provide an excellent opportunity to access the beach by public transport instead of by car. Some additional parking spaces will however be provided on the green strip on the eastern side of the rail line available for use by those visiting the beach. It will also be possible to use the shopping centre parking when the shops are closed.

There are other beaches in Perth which are more accessible by car and where significant amounts of car parking are provided. These should continue to be promoted for car based access.

On street parking will be short term during daylight hours to discourage use by employees within the development. Short-term parking will also help to improve the activity and vitality of the area. A range of parking limits (up to 4 hours) will be used for the 90 degree parking. Parking will be priced appropriately to promote sustainable travel behaviour. Rather than relying on the car, people working at the development site will be encouraged to use the BRT and non-motorised modes.

A Green Travel Plan will be required for commercial and retail space on the Cockburn Coast site to promote non-motorised modes of travel, use of the BRT and car sharing. Through this, employers will be able to influence the travel behaviour of their employees.

11. Conclusion

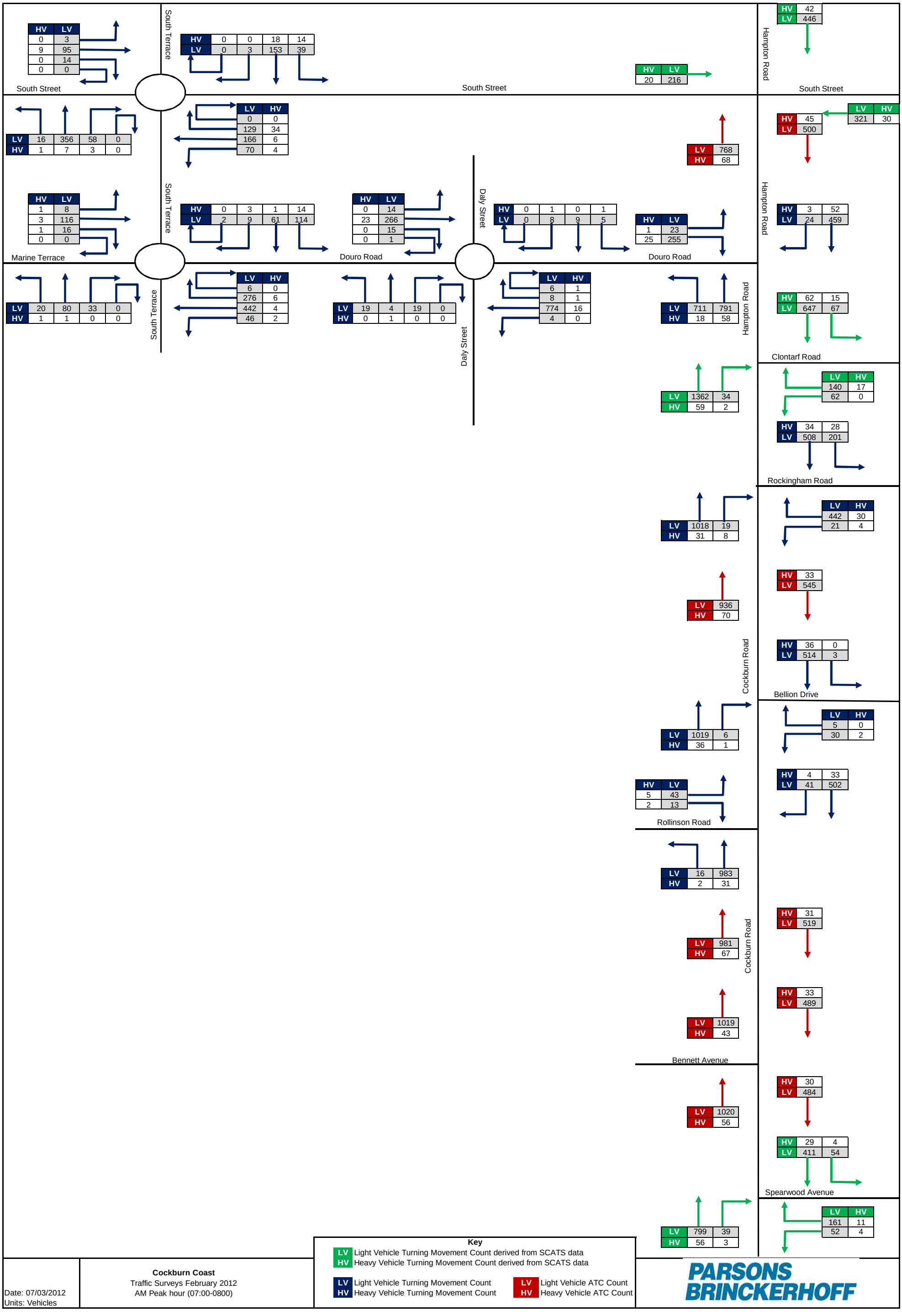
This report has considered the traffic on the network in and surrounding the Cockburn Coast Local Structure Plan area, determining the impact of the proposed development. Consideration has also been made of public transport, and pedestrian and cyclist networks in the area, discussing the level of permeability and accessibility provided by the proposals.

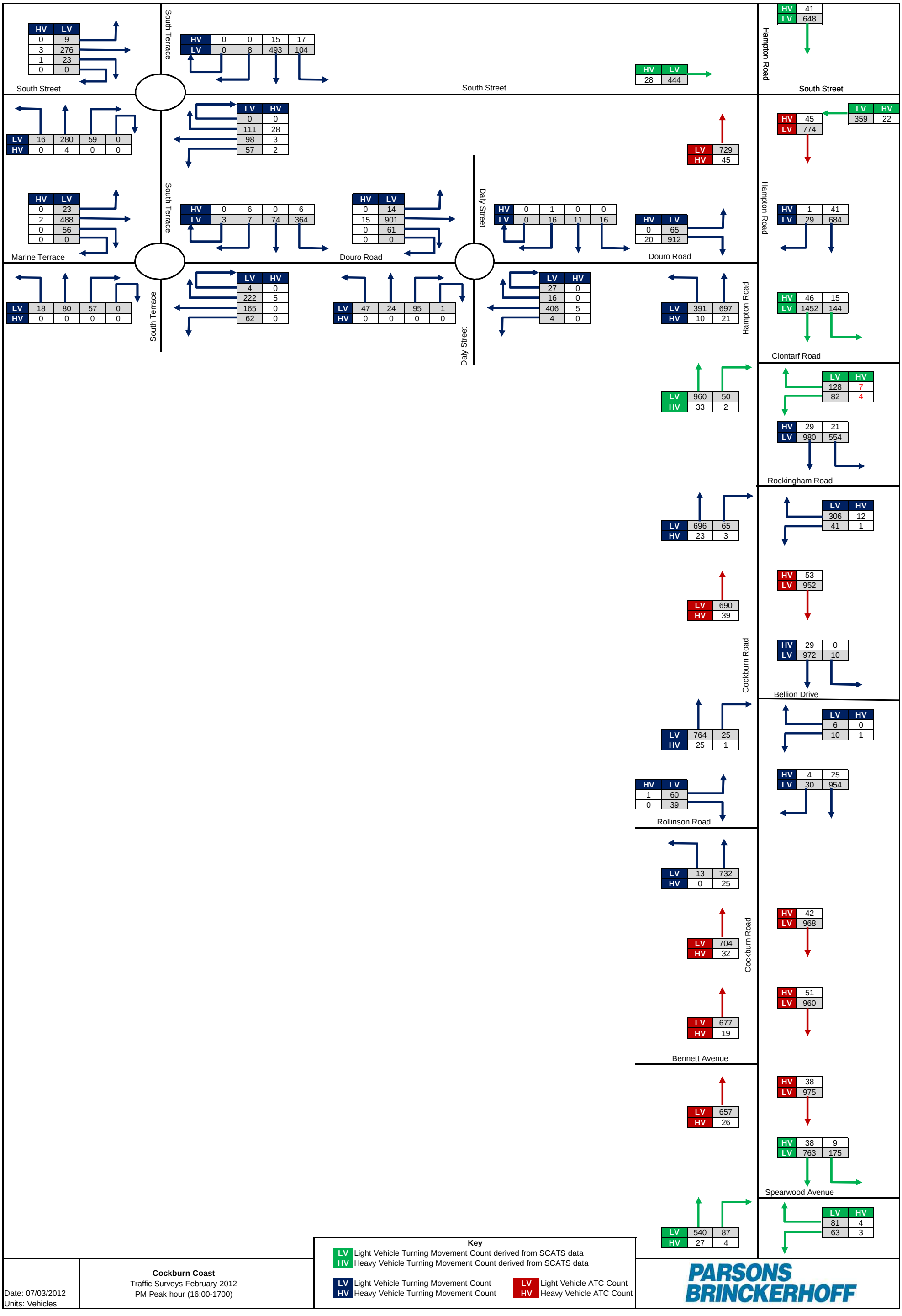
The results of the traffic assessment indicate that there are some congestion issues at certain intersections in the future. A certain level of congestion may however be beneficial in that it could encourage greater use of the BRT. Further investigation of the intersections may be necessary in subsequent stages of this study once greater detail is known about the development.

Consideration has also been made of the parking provision in the Local Structure Plan area. As planning proceeds for the development, and more specific land use types are identified, it is recommended that further consideration be given to applicable parking rates that are consistent with the ITP.

Appendix A

Traffic counts


South Street
South Terrace
South Street
Hampton Road
South Street
Marine Terrace
South Terrace
Douro Road
Daly Street
Douro Road
Hampton Road
Clontarf Road
South Terrace
Daly Street
Hampton Road
Rockingham Road
Cockburn Road
Bellion Drive
Rollinson Road
Cockburn Road
Bennett Avenue
Spearwood Avenue
Key
LV Light Vehicle Turning Movement Count derived from SCATS data
HV Heavy Vehicle Turning Movement Count derived from SCATS data
LV Light Vehicle Turning Movement Count
HV Heavy Vehicle Turning Movement Count
LV Light Vehicle ATC Count
HV Heavy Vehicle ATC Count
Cockburn Coast
Traffic Surveys February 2012
AM Peak hour (07:00-0800)
Date: 07/03/2012
Units: Vehicles
PARSONS BRINCKERHOFF



Key

LV Light Vehicle Turning Movement Count derived from SCATS data
HV Heavy Vehicle Turning Movement Count derived from SCATS data

LV Light Vehicle Turning Movement Count
HV Heavy Vehicle Turning Movement Count

LV Light Vehicle ATC Count
HV Heavy Vehicle ATC Count

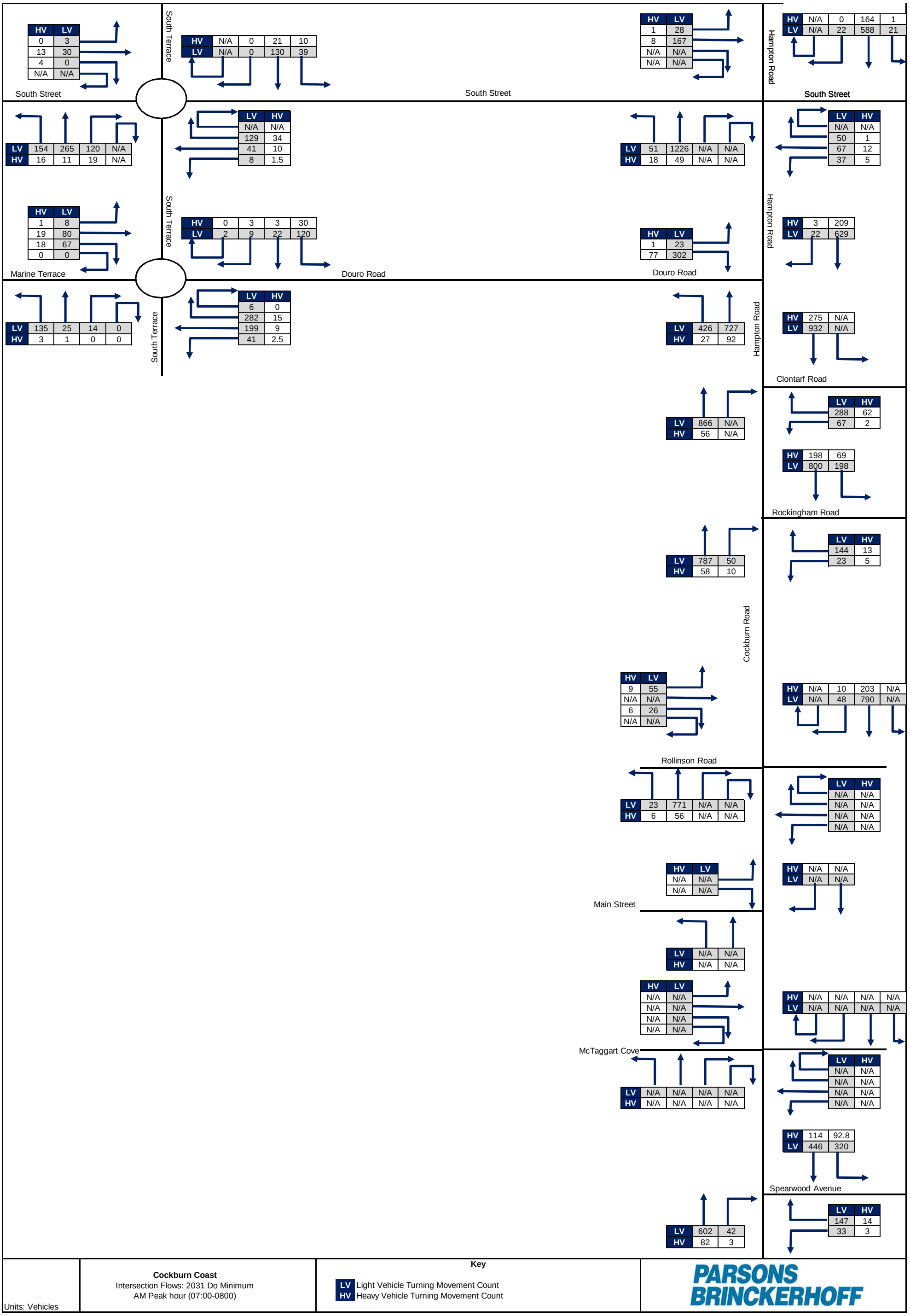
Cockburn Coast
Traffic Surveys February 2012
PM Peak hour (16:00-1700)

Date: 07/03/2012
Units: Vehicles

PARSONS BRINCKERHOFF

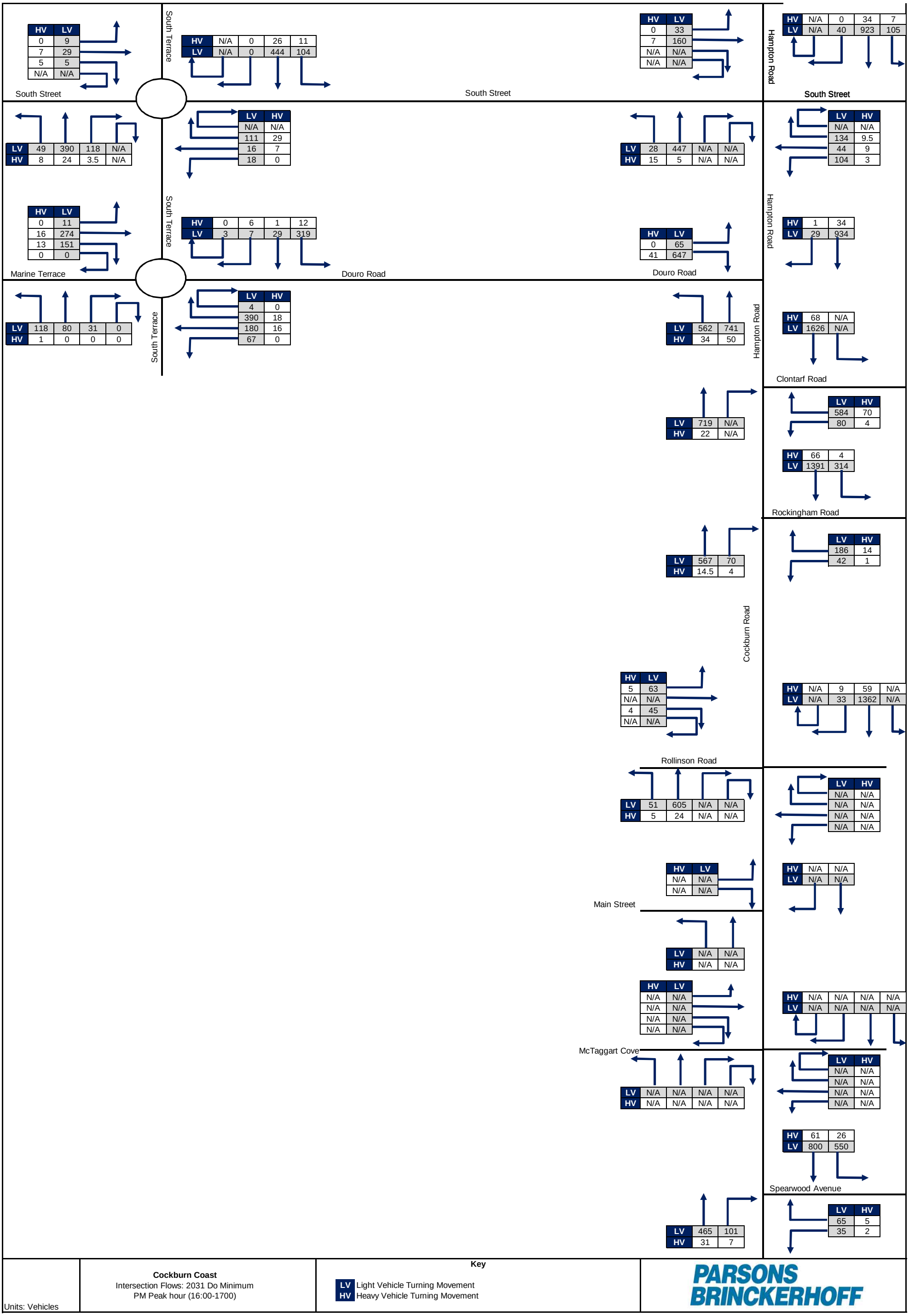
Appendix B

Do Minimum and Do Something Intersection Flows

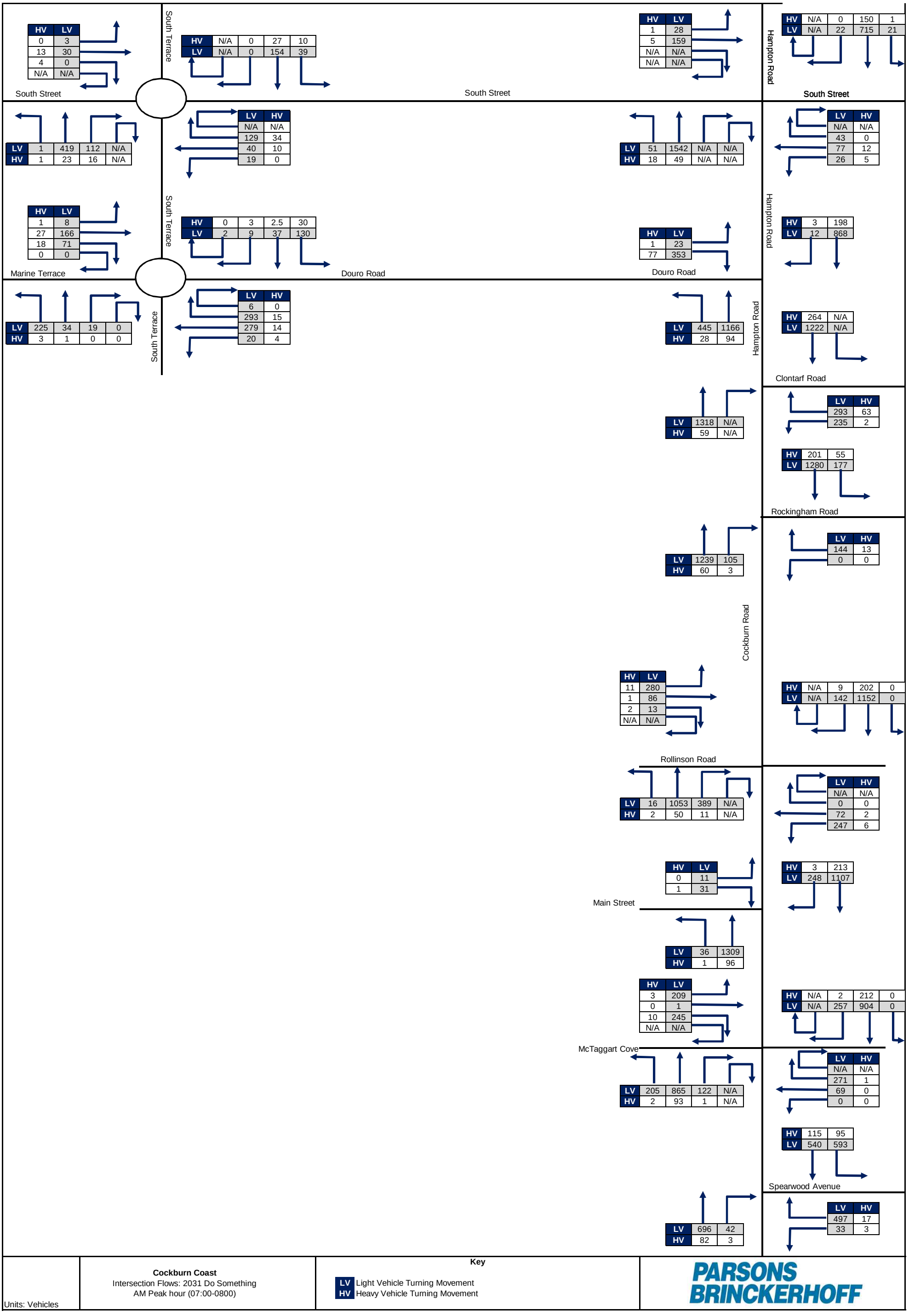


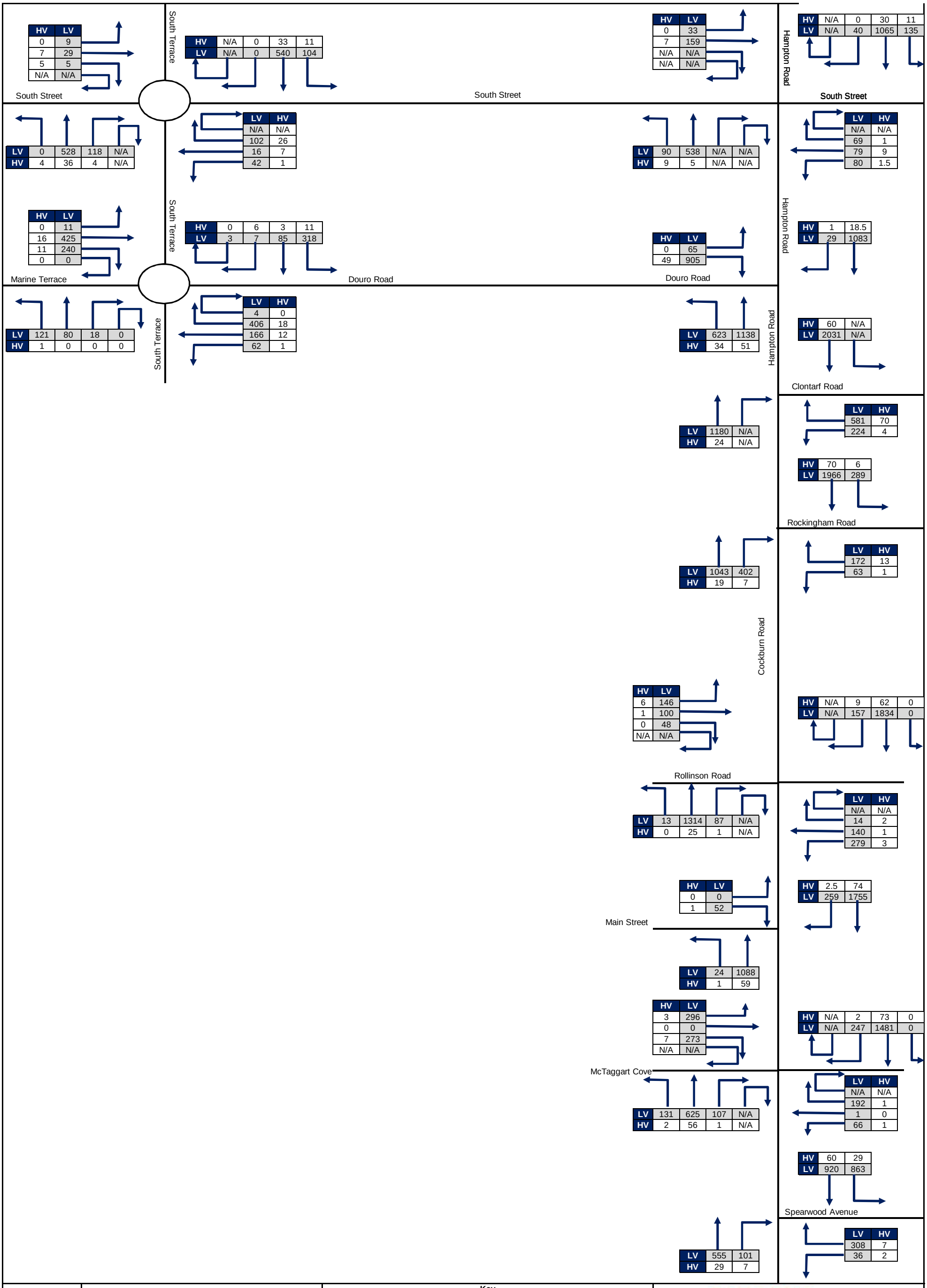
Units: Vehicles	**Cockburn Coast** Intersection Flows: 2031 Do Minimum AM Peak hour (07:00-0800)	**Key** LV Light Vehicle Turning Movement Count HV Heavy Vehicle Turning Movement Count

PARSONS BRINCKERHOFF



Units: Vehicles	**Cockburn Coast** Intersection Flows: 2031 Do Minimum PM Peak hour (16:00-1700)	**Key** LV Light Vehicle Turning Movement HV Heavy Vehicle Turning Movement


South Terrace
South Street
South Street
Hampton Road
South Street
South Terrace
Marine Terrace
Douro Road
Douro Road
Hampton Road
South Terrace
Hampton Road
Clontarf Road
Rockingham Road
Cockburn Road
Rollinson Road
Main Street
McTaggart Cove
Spearwood Avenue
Key
LV Light Vehicle Turning Movement
HV Heavy Vehicle Turning Movement
Cockburn Coast
Intersection Flows: 2031 Do Something
AM Peak hour (07:00-0800)
Units: Vehicles
PARSONS BRINCKERHOFF



Units: Vehicles	**Cockburn Coast** Intersection Flows: 2031 Do Something PM Peak hour (16:00-1700)	**Key** LV Light Vehicle Turning Movement HV Heavy Vehicle Turning Movement	PARSONS BRINCKERHOFF

Appendix F
Infrastructure and
Servicing Report



WOOD & GRIEVE ENGINEERS

Infrastructure Servicing Report Emplacement Crescent & Hilltop Local Structure Plan Area Cockburn Coast Development

for

LandCorp
Attention: Sergio Famiano

23 October 2012

Revision No. 1

Prepared by **Anthony McGrath** Project Number: 20146-PER-C-LSP

Ground Floor, 226 Adelaide Terrace, Perth WA 6000

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APPENDIX 2 Sewer Sketch Plans Showing Extent of Existing Gravity Sewer Reticulation
APPENDIX 3 Water Corporation – Proposed Water Supply Upgrade Works
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APPENDIX 5 Western Power Feasibility Study
APPENDIX 6 Western Power Transmission Lines and Substation Site
APPENDIX 7 Existing Telstra Cabling and Required Relocations
APPENDIX 8 Existing Gas Mains

1 Introduction

Wood & Grieve Engineers (WGE) were commissioned by LandCorp to provide an Infrastructure Servicing Report to support the Emplacement Crescent and Hilltop Local Structure Plan Area. Hassell are leading the Local Structure Plan development and we have liaised with them on the planning specifics for the area.

This report has been prepared to provide information on the service infrastructure for the area. It discusses existing infrastructure in the area, upgrades, relocations, changes required and likely timing of infrastructure upgrades and requirements.

The structure of the report is such that each particular element of infrastructure is discussed separately to give a full account of each service.

2 Wastewater and Effluent Disposal

In this section of the report we discuss the existing wastewater and effluent disposal services in the area. Development in accordance with the Local Structure Plan will require modifications and upgrading of the existing system. We will also address the issue of likely timing and funding of the major upgrades.

2.1 Existing Sewerage System

The development area currently has a number of lots which are served by a reticulated gravity sewer system. The current Water Corporation Sewer Strategy for the area is shown in Appendix 1.

The existing system in this area consists of the following:

- Gravity sewer lines serving all existing lots in the area. Typically pipe sizes are 225mm ∅.
- A small private sewer pumping station.

All sewerage infrastructure is owned and operated by the Water Corporation excepting the private pumping station. All serviced lots in the area would be rated and pay an annual charge. Industrial uses may have specific agreements in place with the Water Corporation.

2.2 Wastewater Service Upgrades and Modifications

Although a well developed sewerage system exists in the area, on development some changes will be required over time to cater for different cadastral boundaries, subdivision and increased effluent load.

2.2.1 Gravity Sewer Reticulation

The attached plan in Appendix 2 (SK12) shows the extent of existing gravity sewer reticulation over and beyond this Local Structure Plan area.

Particularly in the Emplacement Crescent area the proposed Local Structure Plan keeps the existing road and property cadastral boundaries. An existing sewer system located within Emplacement Crescent currently serves the existing lots.

On development of the Emplacement Crescent area this reticulated sewer system may be used with little modification to serve the area. It may be that some revised lot boundaries would require retro-fitting sewer junctions by cutting into the existing lines to provide a point-of-service.

Further south in the Hilltop area the existing gravity sewer system comes to an end. Development of this area would require some modifications to existing gravity sewer mains and the extension of this system to provide a service for new subdivisional lots. These likely extensions are shown on SK12 in Appendix 2.

These works will be timed to match into construction of the particular area at the time of subdivision.

3 Water Supply

3.1 Existing Water Supply Infrastructure

As in the case of sewer infrastructure, all existing lots within the development area are served with reticulated potable water supply delivered by a piped system which exists within current road reserves.

All existing lots are served in accordance with minimum Water Corporation criteria regarding quality and pressure.

Water supply is served from the Hamilton Hill high level tank and supply area. All water supply assets are owned and operated by the Water Corporation of WA. Lots within the area would be rated by the Water Corporation.

3.2 Water Supply Planning

The Water Corporation has completed a comprehensive review of water infrastructure planning for the Hamilton Hill Gravity Supply Scheme. This planning review has incorporated the anticipated dwelling/service yields from the full development of the Cockburn Coast land. The main recommendations and projects relevant to future servicing of the Cockburn Coast development include: (The attached plans in Appendix 3 show these upgrades).

i) Approximately 800m of DN375 water main from Bellion Drive intersection heading southwards along Cockburn Road (this could be done in stages depending on demand, spatial staging of land development, and having regard to any Council plans to reconstruct/upgrade this section of Cockburn Road).

   At planning level, it is estimated that this DN375 main will be required around 2014 (dependent on the pattern and rate of development of the Cockburn Coast land). The final pipe route and sizing will be refined based on the spatial pattern of the development in Cockburn Coast. It may be possible for equivalent pipe volumes to be constructed as two separate feeds in other roads through the development area parallel to Cockburn Road.

ii) Approximately 1,430m of DN500 distribution main from the end of the existing Forrest Road DN610 (coming out of the Hamilton Hill Reservoir) heading westwards as indicated on the attached plan to join up with the Cockburn Road DN300-375 at Bellion Drive (see point (i) above).

   At planning level, it is estimated that this DN500 main will be required around 2016 depending on the pattern and rate of development of the Cockburn Coast land. The operational trigger for the DN500 is when the peak day demands in the Cockburn Coast development area exceed 1.6ML/day (the equivalent of approximately 1,000 services) and/or the HGL at the intersection of the proposed DN500 with the DN300-375 main at Bellion Drive approaches RL53m AHD. See Water Corporation plan in Appendix 3.

These mains are all Water Corporation Headworks assets. As such, developers will need to liaise with the Water Corporation for the timing and funding of the works. Some pre-funding may be required in order to facilitate these works.

3.3 Water Supply Reticulation

The attached plan (SK14 at Appendix 4) shows the location of existing water supply reticulation pipework overlayed onto the Local Structure plan area.

Where possible, that is where water mains exist in future road reserves, these mains will be maintained. Where existing mains do not match future road reserves, then new mains will be reconstructed within the new reserve areas. In this Local Structure Plan area, particularly in the Emplacement Crescent area, the existing mains will service the new development.

Development of the Hilltop area will require extending the water mains into the new subdivisional area.

4 Roadworks

4.1 Existing Roadworks

Existing lots within this development area are fronted by a sealed and kerbed roads system. The main through road is Cockburn Road which carries traffic into and out of the area. Cockburn Road is the main freight route for existing commercial business in the area.

All major services at one point or another exist within the Cockburn Road road reserve.

The integrated Transport Network report and further traffic studies being undertaken by others informs the project more fully on roads and transportation issues and plans.

4.2 Roadwork Upgrading

Major roadworks infrastructure consists of two main elements for the Cockburn Coast area, namely:

- Cockburn Coast Drive; This main road may be constructed outside of the 10 year horizon and would likely be decided by State Government and/or Main Roads WA as to the need and timing. It is shown to the immediate east of the Cockburn Coast development area.

- Cockburn Road; This road is the current north-south artery through the development area. It will remain as an important transportation link. It is likely that Cockburn Road will be upgraded as part of the development process. The exact form of the upgrading works will depend on the final configuration of the integrated transportation plan, existing road user requirements and City of Cockburn requirements. Upgrading of Cockburn Road may also include the relocation of existing services within the existing and/or future reserve boundaries. Currently many services exist within the Cockburn Road verges.

We envisage that the transportation studies will inform what roadworks and road widths are required. From a services point-of-view the main issue will be in the design of Cockburn Road. In addition to providing transportation solutions such as bus lanes or light rail, the road reserve will be required to accommodate servicing infrastructure. The aim of Cockburn Road's design should be to ensure a minimum of existing services are disturbed or require relocation. Due to the nature of services along Cockburn Road, any servicing relocations would be relatively costly to implement.

5 Drainage

Currently all rain that falls within the Cockburn Coast development area is infiltrated on site. Upon development we would require the same situation to occur. As such, all new lots would be required to infiltrate their rainfall runoff on site up to a return period stipulated by the Local Authority. We understand that the City of Cockburn standard for drainage retention on site is for a 1 in 20 year, 5 minute duration storm event.

Flows greater than this and all roadworks would be pipe and pit drained. These flows would be directed to infiltration areas. Our expectation is that the existing drainage sumps would be phased out and aesthetically pleasing infiltration areas incorporated within POS areas and highly landscaped areas would take their place.

Landscaping and engineering design of the new infiltration areas will be critical in that it can turn existing ugly infiltration areas into POS assets.

As part of the Urban Water Management Plan, GHD have analysed flows within the development area and calculated the volume of storage/infiltration areas required in the various locations.

These volumes may be accommodated by a variety of means and will be incorporated as part of the engineering and POS landscaping detailed designs.

6 Power Supply

6.1 Power Supply Upgrading

Western Power have carried out a feasibility study looking at how the development may be served with a power supply from now until ultimate development from a distribution point of view. The Western Power feasibility study is included at Appendix 5.

Geographically SF505 is an ideal feeder to supply the initial stages of development. However, this feeder has high fault ratings and is not recommended due to its poor reliability. It is noted that the South Fremantle sub-station may be relocated in future and it is planned not to have any distribution feeders from this sub-station. As a result, SF505 may not exist in the future.

AMT507 L346 Orsino Boulevard runs through Cockburn Coast south along Cockburn Road and is currently lightly loaded. It may be utilised to supply the initial stages. However, AMT507 was initially installed to primarily supply Port Coogee. When Port Coogee requirements increase over time, this feeder may not have enough capacity to cater for any significant Cockburn Coast load.

AMT512 Lefroy Road feeder is considered one of the critical feeders due to its limited capacity and various reliability issues. Western Power currently has a project planned to install a new feeder in order to transfer some load from the AMT512 feeder. The project is likely to be implemented in the near future.

In summary:

- Planning study indicates that the existing feeders within the vicinity are likely to not be able to supply the total load.
- AMT507 may be able to supply the initial stages of development, but this is dependent on the load take up timing of the Port Coogee development.

Ultimately a new feeder is likely to be required to be installed from the Amherst sub-station to the development area. It is also likely that major reinforcement will be required for both transmission and distribution assets to increase capacity.

The order of magnitude cost of installing a new feeder is approximately $1.4 million.

Further discussion with Western Power following their feasibility study indicates a sub-station may be required within the Cockburn Coast area. A sub-station typically requires a land area of 1 hectare and hence has land planning implications. Western Power is addressing this possible requirement in conjunction with the Terminal Substation relocation.

Installation of a new feeder is proposed to occur by direct horizontal drilling within existing road reserves. Hence, future road reserves need to take into account the installation of HV infrastructure.

Existing power supply infrastructure in Cockburn road indicates that underground power cables adjacent to Cockburn Road are within private property. As such, the planning of the revised Cockburn Road reserve needs to accommodate these cables so that expensive relocations do not occur.

6.2 Power Supply Planning Issues

Further discussion with Western Power following their feasibility study indicates a sub-station may be required within the Cockburn Coast area. A sub-station typically requires a land area of 1 hectare and hence has land planning implications. Western Power is addressing this possible requirement in conjunction with the Terminal Substation relocation. The likely substation area is shown on the attached plan (SK15 in Appendix 6).

6.3 Transmission Lines

Within the Emplacement Crescent and Hilltop Local Structure Plan Area exists a section of aerial power transmission lines running from the Terminal Sub-Station area eastward across a portion of the area and also along Cockburn Road.

As part of the overall development, it is proposed to relocate the zone substation currently adjacent to the old South Fremantle Power Station to an area on the eastern side of Cockburn Road. This will therefore underground a portion of the transmission lines.

The transmission lines running within Cockburn road are proposed to remain as aerial transmission lines.

The plan shown in Appendix 6 shows the location of these transmission lines.

7 Telecommunications

Telstra landline telecoms system exists in this area to a reasonable level.

The newly announced National Broadband Network (NBN) would be involved in the provision of telecommunications for the development area. Current policy is that for developments greater than 100 dwellings the NBN will provide optic fibre to each dwelling. The developer will be required to provide pipe and pit for each stage of development in accordance with NBN specifications.

This infrastructure would ensure a very high level of connectivity for the development.

A plan attached in Appendix 7 shows the current extent of Telstra cabling. Where cadastral boundaries change, particularly in the Hilltop Local Structure Plan area, some of this infrastructure will be redundant and possibly require relocation. This would require early liaison with Telstra to minimise cost and timing of these service relocations.

8 Gas Supply

The area is currently supplied with a reticulated gas system. A main high pressure gas main exists within Cockburn Road. Other mains also exist within existing road reserves as shown on the sketch plans in Appendix 8.

On development of this Local Structure Planning area reticulation gas mains would be constructed in the new road reserves. Existing gas mains would be kept in the existing road reserves (particularly Emplacement Crescent area) to serve the new development.

9 Conclusions

Overall the Emplacement Crescent and Hilltop Local Structure Plan area is well serviced by servicing infrastructure or can be serviced by extensions from the existing systems. Attached plans show the existing services in plan and how extensions to these services can effect servicing of the entire LSP area.

On development some of the existing infrastructure will require upgrading, relocating or extending to fit and serve new subdivisional cadastral boundaries.

Liaison with the Authorities is recommended to effect timely upgrading and changes to the Authorities networks.

Appendix 1

WOOD & GRIEVE ENGINEERS

Water Corporation Sewer Strategy

FREMANTLE

SD026

CATCHMENT '151 - 026'
SEWER DESIGN FLOW - 0.6 L/s

CATCHMENT '161 - 026'
SEWER DESIGN FLOW - 1.9 L/s

CATCHMENT '137 - 026'
SEWER DESIGN FLOW - 5.8 L/s

CATCHMENT '138 - 026'
SEWER DESIGN FLOW - 3.2 L/s

CATCHMENT '139 - 066'
SEWER DESIGN FLOW - 0.4 L/s

SPEARWOOD P.S 13 -
DURFORD ST
PUMP STN. '13 066'
REDUCTION '08210 - 066'
SEWER DESIGN FLOW - 25.6 L/s
EXISTING PUMP RATE - 36.3 L/s
LONG TERM PUMP RATE - 46.0 L/s

CATCHMENT 'W7715 - 066'
SEWER DESIGN FLOW - 3.3 L/s

CATCHMENT 'V9419 - 026'
SEWER DESIGN FLOW - 4.1 L/s

CATCHMENT 'W2041 - 026'
SEWER DESIGN FLOW - 4.3 L/s

CATCHMENT '150 - 026'
SEWER DESIGN FLOW - 2.6 L/s

FREMANTLE MAIN P.S.2 -
BENNETT AVE
PUMP STN. '22 - 026'
REDUCTION 'Q8541 - 066'
SEWER DESIGN FLOW - 142.3 L/s
EXISTING PUMP RATE - 155.0 L/s
LONG TERM PUMP RATE - 286.8 L/s

CATCHMENT '73 - 026'
SEWER DESIGN FLOW - 3.2 L/s

Min. fill required
to 2.25m AHD

CATCHMENT '136 - 026'
SEWER DESIGN FLOW - 4.8 L/s

CATCHMENT '194 - 026'
SEWER DESIGN FLOW - 4.2 L/s

CATCHMENT '172 - 026'
SEWER DESIGN FLOW - 2.0 L/s

Min. fill required
to 2.5m AHD

CATCHMENT '177 - 026'
SEWER DESIGN FLOW - 1.5 L/s

Min. fill required
to 2.2m AHD

FREMANTLE P.S. A -
COCKBURN RD
PUMP STN. 'A - 026'
REDUCTION 'V9418 - 026'
SEWER DESIGN FLOW - 22.8 L/s
LONG TERM PUMP RATE - 30.4 L/s

CATCHMENT '132 - 026'
SEWER DESIGN FLOW - 4.7 L/s

CATCHMENT '191 - 026'
SEWER DESIGN FLOW - 2.5 L/s

CATCHMENT '171 - 026'
SEWER DESIGN FLOW - 4.1 L/s

CATCHMENT '181 - 026'
SEWER DESIGN FLOW - 10.2 L/s

CATCHMENT '101 - 066'
SEWER DESIGN FLOW - 1.6 L/s

PUMP STN. '290 - 066'
COOGEE BEACH CARAVAN PARK
REDUCTION 'X3868 - 066'

CATCHMENT 'V8236 - 066'
SEWER DESIGN FLOW - 1.7 L/s

CATCHMENT 'W7669
SEWER DESIGN FLOW

CATCHMENT 'V8297 - 066'
SEWER DESIGN FLOW - 1.2 L/s

CATCHMENT 'Y9729 - 066'
SEWER DESIGN FLOW - 3.3 L/s

SPEARWOOD P.
BLACKWOOD A
PUMP STN.
REDUCTION
SEWER DESIG
EXISTING PU
LONG TERM P
CAT
SEW

CATCHMENT 'Y9691 - 066'
SEWER DESIGN FLOW - 9.5 L/s

CATCHMENT 'Y9807 - 066'
SEWER DESIGN FLOW - 2.

SPEARWOOD P.S 16
GEENISTER RD
PUMP STN. '16 - 066'
REDUCTION 'S0204 - 066'
SEWER DESIGN FLOW - 11.6 L/s
EXISTING PUMP RATE - 29.8 L/s
LONG TERM PUMP RATE - 15.4 L/s

CATCHMENT 'Y9778 - 066'
SEWER DESIGN FLOW - 2.4 L/s

CATCHMENT '92 - 066'
SEWER DESIGN FLOW - 1.8 L/s

CATCHMENT '89 - 066'
SEWER DESIGN FLOW - 2.2 L/s

PUMP STN. 'K - 06
REDUCTION
SEWER DE
LONG TERM PUMP RA

CATCHMENT '300 - 066'
SEWER DESIGN FLOW - 2.0 L/s

CATCHMENT '303 - 066'
SEWER DESIGN FLOW - 2.

SPEARWOOD P.S J -
HAMILTON RD
PUMP STN. 'J - 066'
REDUCTION 'S0065 - 066'
SEWER DESIGN FLOW - 15.7 L/s
LONG TERM PUMP RATE - 20.9 L/s

CATCHMENT '306 - 066'
SEWER DESIGN FLOW - 3.8 L/s

CATCHMENT '307 - 066'
SEWER DESIGN FLOW - 2.3 L/s

CATCHMENT '305 - 066'
SEWER DESIGN FLOW - 4.

CATCHMENT 'V6118 - 066'
SEWER DESIGN FLOW - 1.9 L/s

CATCHMENT 'W1504 - 06
SEWER DESIGN FLOW

CATCHMENT 'V6185 - 066'
SEWER DESIGN FLOW - 3.9 L/s

SPEARWOOD P.S 8 -
PARAKEET WAY
PUMP STN. '8 066'
REDUCTION '[illegible] - 066'
SEWER DESIGN FLOW - [illegible] L/s
EXISTING PUMP RATE - 13.4 L/s
LONG TERM PUMP RATE - [illegible] L/s

CATCHMENT 'V438
SEWER DESIGN FL

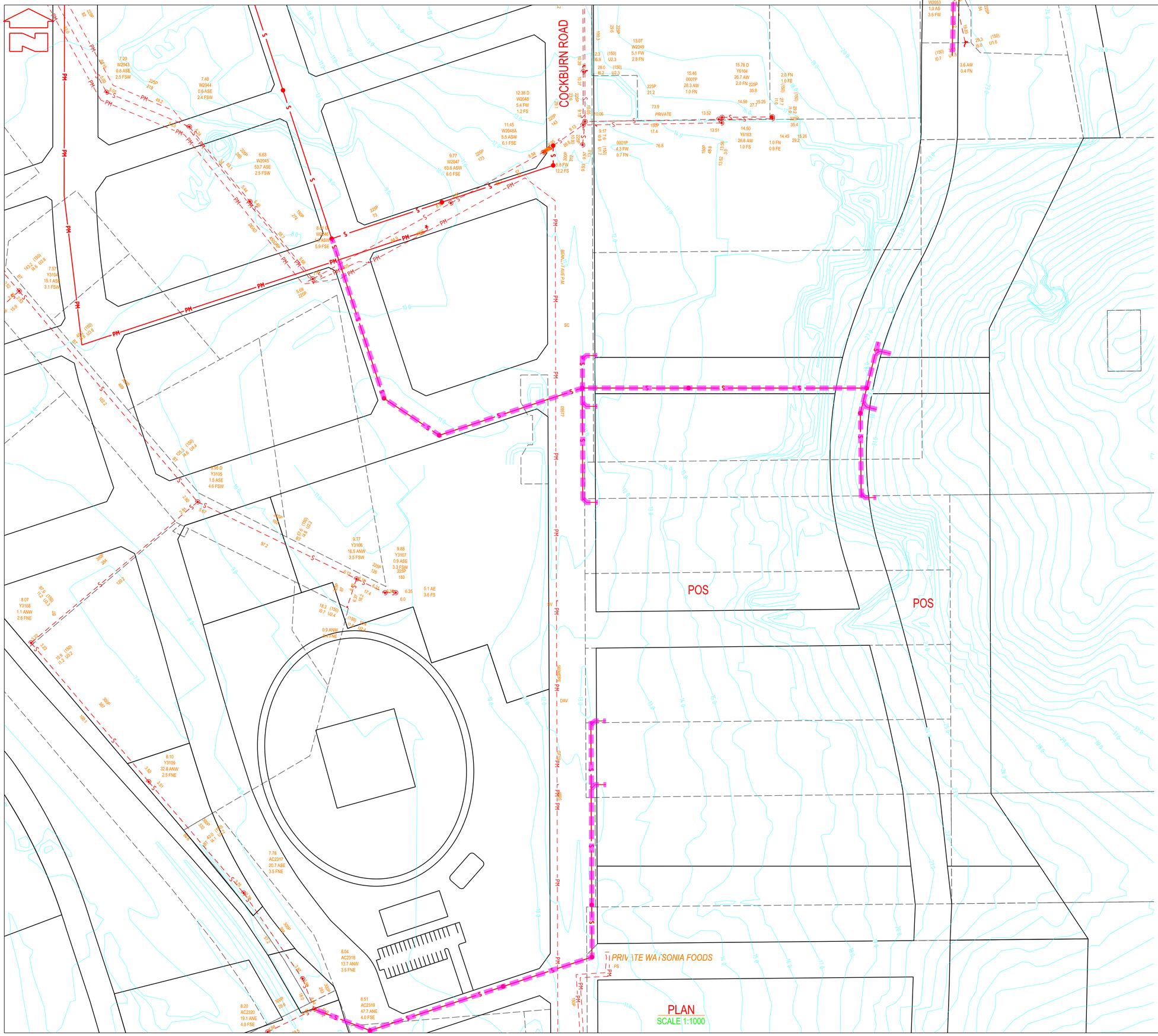
Owen

Anchorage

Appendix 2

WOOD & GRIEVE ENGINEERS

Sewer Sketch Plans Showing Extent of Existing Gravity Sewer Reticulation



LEGEND

- PROPOSED EXTENSION TO GRAVITY SEWER
- PROPOSED SEWER OVERFLOW DIVERSION
- PROPOSED GRAVITY SEWER DIVERSION
- PROPOSED PRESURE MAIN DIVERSION
- EXISTING CONTOURS
- EXISTING GRAVITY SEWER
- EXISTING PRESSURE MAIN
- EXISTING CADSTRAL
- PROPOSED CADSTRAL

NOTATION

FR 0.3 (0.3m FILL REQUIRED)

- PROPOSED ACCESS CHAMBER
- EXISTING ACCESS CHAMBER

REV.	DESCRIPTION	DRAWN	VER	APPROVED
A	ORIGINAL ISSUE			

CELEBRATING 50 YEARS
WOOD & GRIEVE ENGINEERS

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Web www.wge.com.au

PERTH
MELBOURNE
SYDNEY
BRISBANE
ALBANY
BUSSELTON
SHENZHEN

CLIENT:
LANDCORP

PROJECT:
COCKBURN COAST

TITLE:
GRAVITY SEWER

PRELIMINARY

SECTION: CIVIL SERVICES	VERIFIED :	SCALE : A1 @ 1:2000
DESIGNED : JJ	APPROVED FOR TENDER:	DATUM : A.H.D.
DRAWN : LZ	APPROVED FOR CONSTRUCTION :	WAPC : -

PROJECT No.	DRAWING No.	REVISION
20146-PER-LSP-C	SK12	A

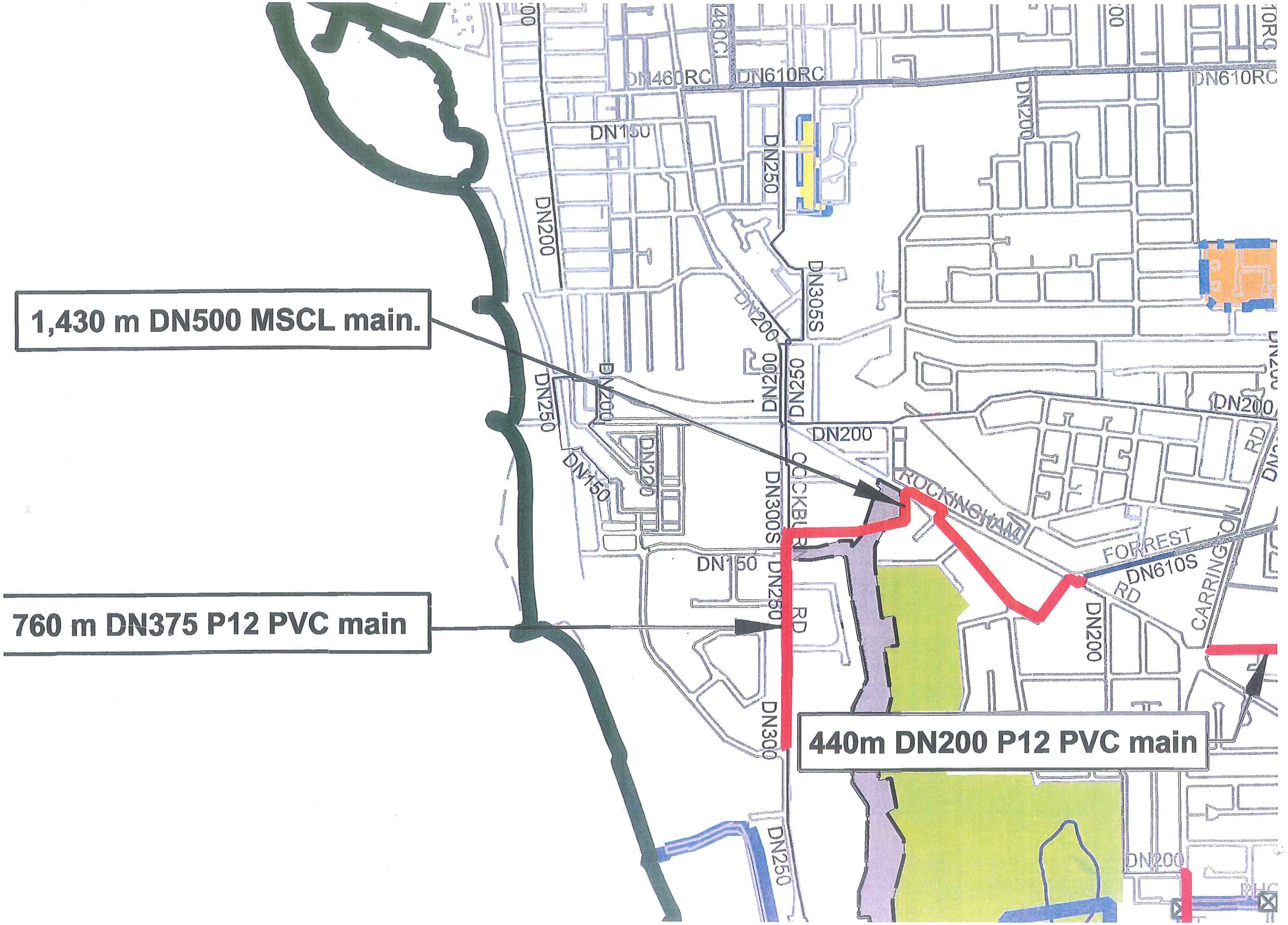
L:\TECH\20100\46\LSP\12\SK12.dgn

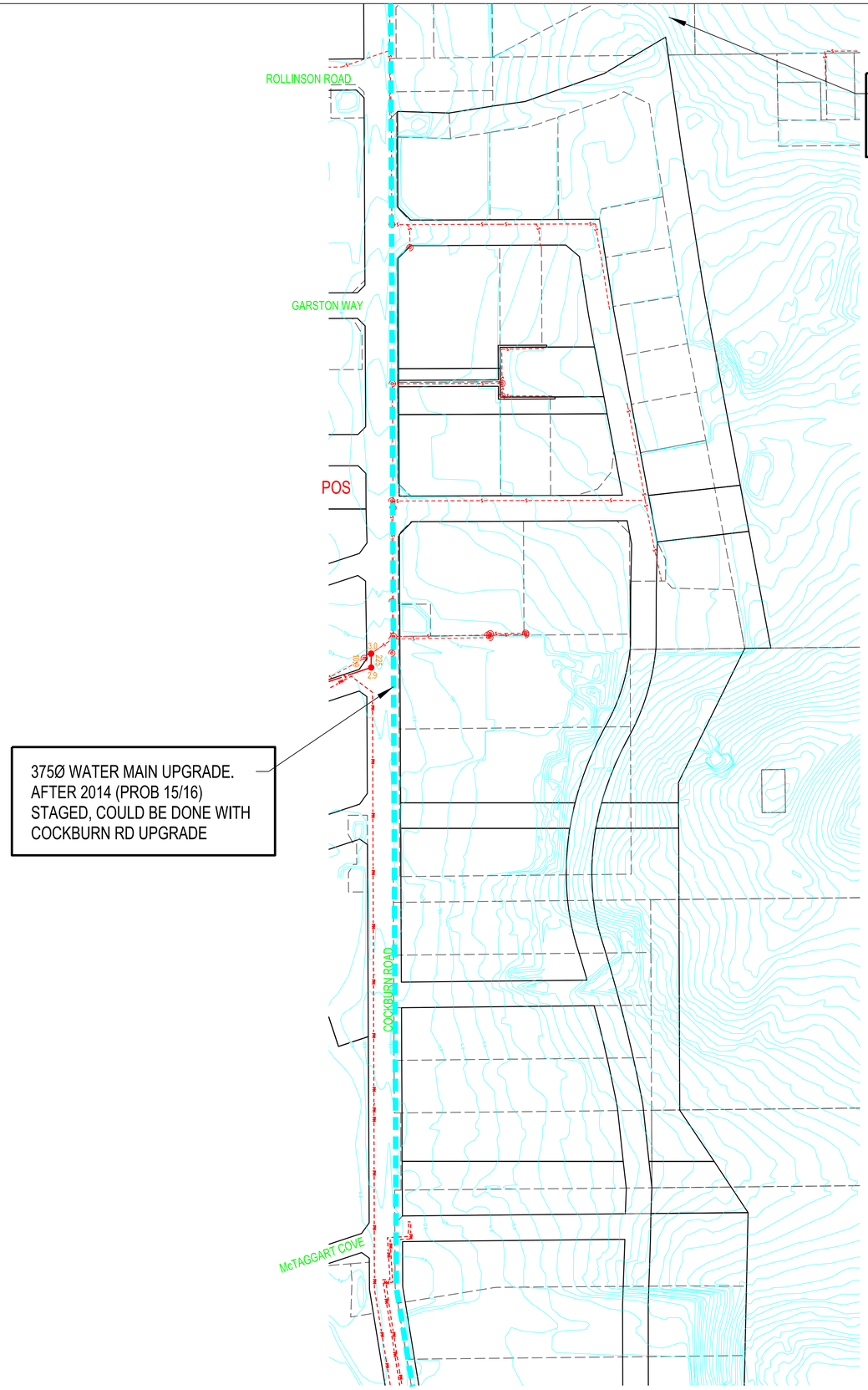
A1 @ 1:1000
A3 @ 1:2000

Appendix 3

WOOD & GRIEVE ENGINEERS

Water Corporation
Proposed Water Supply Upgrade Works


1,430 m DN500 MSCL main.
760 m DN375 P12 PVC main
440m DN200 P12 PVC main
DN460RC
DN610RC
DN150
DN200
DN250
DN305S
DN300S
DN300
DN610S
ROCKINGHAM
FORREST
RD
CARRINGTON
RD



PLAN
SCALE 1:2000

LEGEND

- WATER MAIN UPGRADE
- PROPOSED SEWER OVERFLOW DIVERSION
- PROPOSED GRAVITY SEWER DIVERSION
- PROPOSED PRESURE MAIN DIVERSION
- EXISTING CONTOURS
- EXISTING GRAVITY SEWER
- EXISTING PRESSURE MAIN
- EXISTING CADSTRAL
- PROPOSED CADSTRAL

NOTATION

- FR 0.3 (0.3m FILL REQUIRED)
- PROPOSED ACCESS CHAMBER
- EXISTING ACCESS CHAMBER

REV.	DESCRIPTION	DRAWN	VER	APPROVED
A	ORIGINAL ISSUE			

CELEBRATING 50 YEARS
WOOD & GRIEVE ENGINEERS
Wood & Grieve Engineers Ltd
A.C.N. 137 999 609
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226 Adelaide Tce, Perth
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Email wge@wge.com.au
Web www.wge.com.au
PERTH
MELBOURNE
SYDNEY
BRISBANE
ALBANY
BUSSELTON
SHENZHEN

CLIENT:
LANDCORP

PROJECT:
COCKBURN COAST

TITLE:
WATER UPGRADES

PRELIMINARY

SECTION: CIVIL SERVICES	VERIFIED :	SCALE : A1 @ 1:2000
DESIGNED : JJ	APPROVED FOR TENDER:	DATUM : A.H.D.
DRAWN : LZ	APPROVED FOR CONSTRUCTION :	WAPC : -

PROJECT No.	DRAWING No.	REVISION
20146-PER-LSP-C	SK13	A

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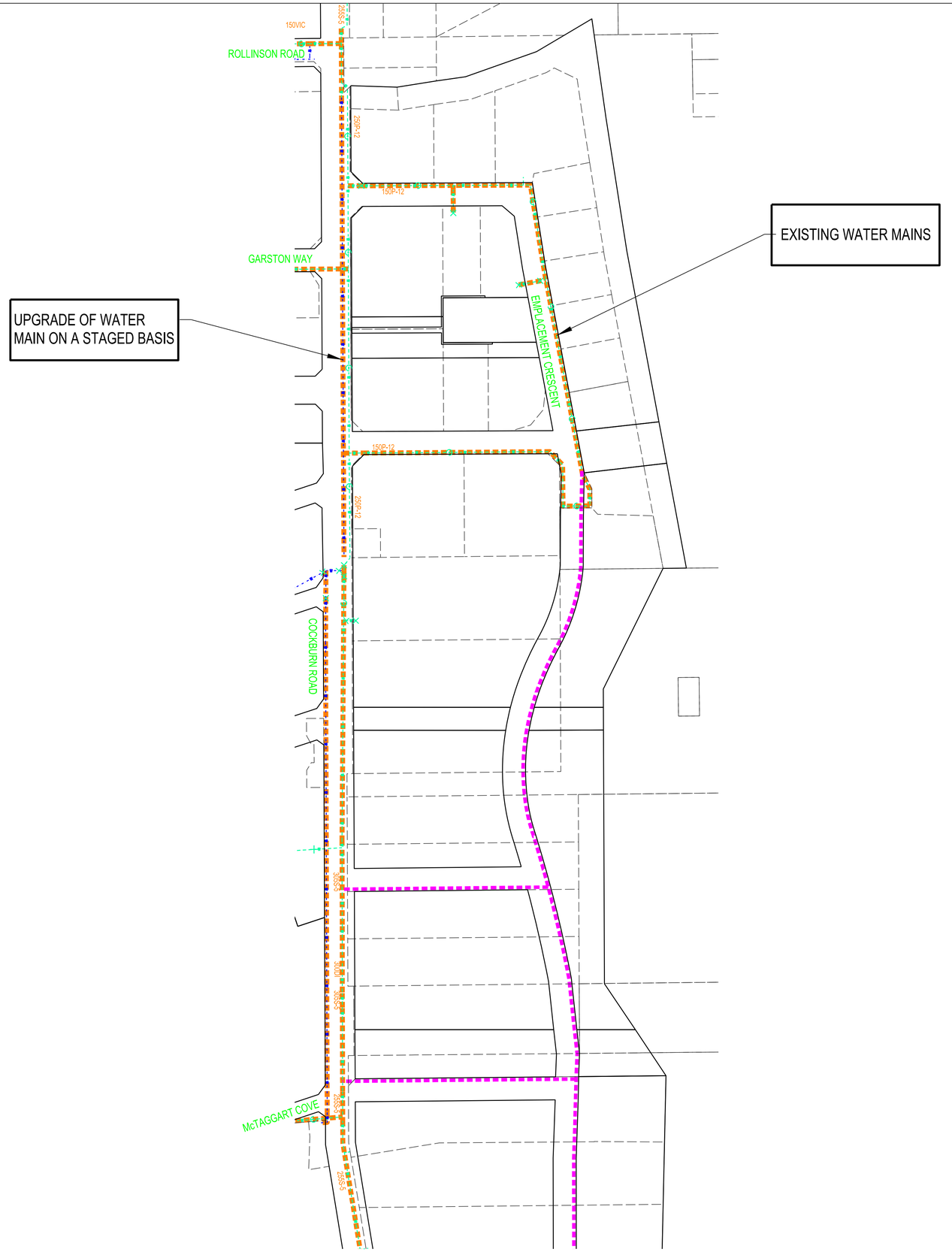
A1 @ 1:2000
A3 @ 1:4000

Appendix 4

WOOD & GRIEVE ENGINEERS

Water Supply Existing Services and Proposed Relocations



PLAN
SCALE 1:2000

LEGEND

- PROPOSED WATER MAINS
- EXISTING WATER MAINS
- EXISTING WATER MAIN
- EXISTING DEAD WATER MAIN
- EXISTING VALE
- EXISTING WATER HYDRANT
- EXISTING CADASTRAL
- PROPOSED CADASTRAL

REV.	DESCRIPTION	DRAWN	VER	APPROVED
A	ORIGINAL ISSUE			

CELEBRATING 50 YEARS
WOOD & GRIEVE ENGINEERS

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Web www.wge.com.au

PERTH
MELBOURNE
SYDNEY
BRISBANE
ALBANY
BUSSELTON
SHENZHEN

CLIENT:
LANDCORP

PROJECT:
COCKBURN COAST

TITLE:
WATER MAINS

PRELIMINARY

SECTION: CIVIL SERVICES	VERIFIED :	SCALE : A1 @ 1:2000
DESIGNED :	APPROVED FOR TENDER:	DATUM : A.H.D.
DRAWN : LZ	APPROVED FOR CONSTRUCTION :	WAPC : -

PROJECT No.	DRAWING No.	REVISION
20146-PER-LSP-C	SK14	A

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A1 @ 1:1000
A3 @ 1:2000

Appendix 5

WOOD & GRIEVE ENGINEERS

Western Power Feasibility Study

20146 - PER - C

Feasibility Study

Project Name:	Cockburn Coast
Customer Ref:	20146 – PER – U
Number of lots:	4850 Lots
Project Number:	MF010044

1. INTRODUCTION

Landcorp has requested a Feasibility Study in South Fremantle. The project name is Cockburn Coast. The following information was provided for us to conduct this study:

Number of lots	4860
Number of stages	20
Number of lots per stage	243
Construction to begin	July 2011
Rate of development	one stage per year

Based on the customer request of 9kVA per lot, the total load required therefore is approximately 43.74 MVA. Please refer to **Appendix 1** for details.

2. EXISTING INFRASTRUCTURE

The location of Cockburn Coast and existing infrastructure of HV distribution network supplying the surrounding area are as shown in Figure 1 and Figure 2. There are three 22 kV feeders within the vicinity of the development, *AMT512 Lefroy Rd (yellow)*, *AMT507 346 Orsino Bvd 1 (pink)* which are from Amherst zone Substation, and *SF505 Cockburn Rd North (blue)* which is from South Fremantle substation.

The majority of this development is within the Amherst zone substation's catchment area.

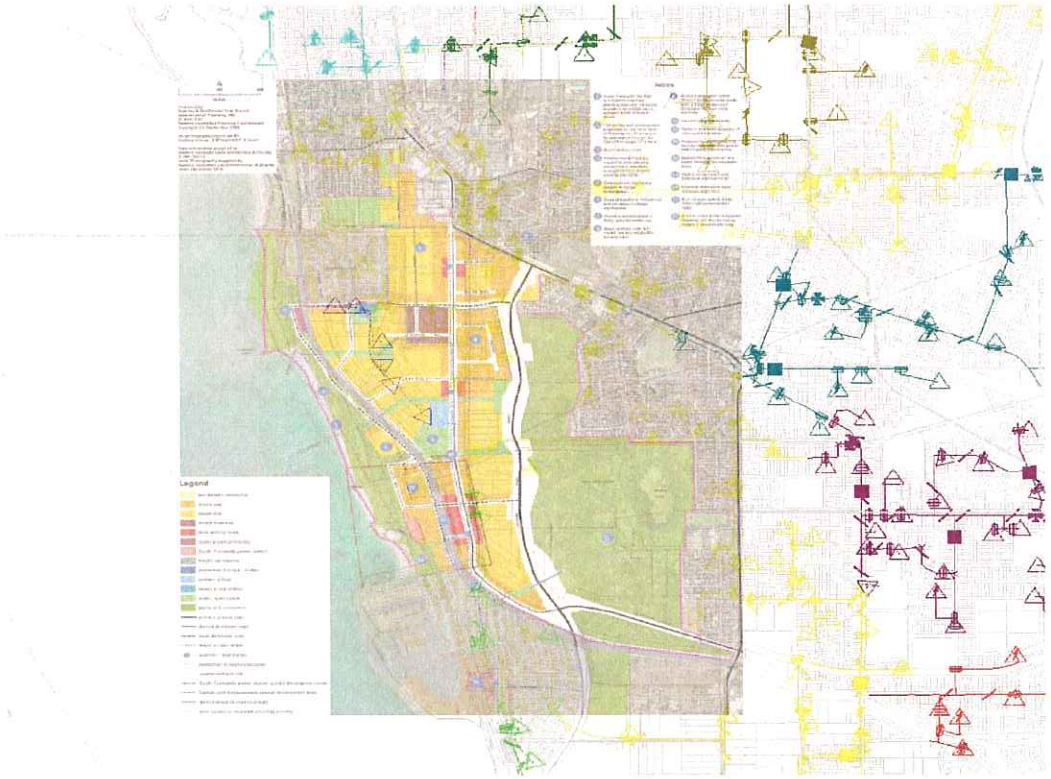


Figure 1: Location of Cockburn Coast

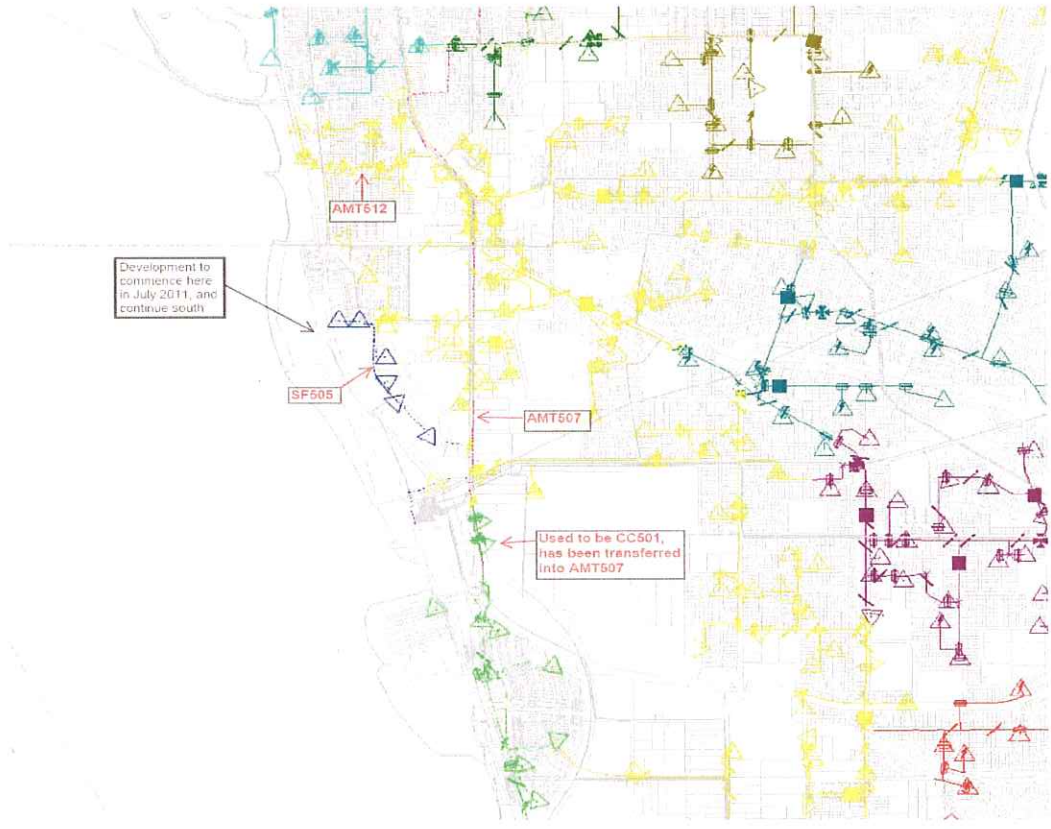


Figure 2: Existing Infrastructure – Distribution

3. STUDY DETAILS

The initial analysis revealed that the existing network infrastructure does not have capacity to supply the new load requested as a whole (43.65MVA) due to the large size of the development.

As shown on **Appendix 1**, the initial stages are to commence around 'area 3' of the structure plan and will continue south. Please see **Appendix 2** for structure plan. Geographically, SF505 is an ideal feeder to supply the initial stages. However, this feeder has high fault ratings and not recommended due to its poor reliability. South Fremantle substation maybe relocated in the future and it is planned not to have any distribution feeders from this substation. As a result, SF 505 may not exist in the future.

AMT507 L346 Orsino Bvd 1 runs through Cockburn Coast south along Cockburn Rd, and it is currently lightly loaded. It may be utilised to supply the initial stages. However, AMT507 was installed to primarily supply Port Coogee and if the load on Port Coogee increases in the near future, this feeder may not have enough capacity to cater for this load take up at Cockburn Coast, particularly at 'area 3'.

AMT512 Lefroy Rd feeder is considered as one of the critical feeders due to limited capacity and the various reliability issues with it. There is a project planned to install a new feeder to transfer some of the loads from AMT 512 feeder but it may be implemented beyond July 2011.

In summary, planning study reveals that the existing feeders within the vicinity of this development are not able to supply the total load request. AMT 507 maybe possible to supply the initial stages but it is highly dependent on the load take up timing at Port Coogee development.

4. REINFORCEMENT REQUIREMENTS

Based on the study details above, the estimated scope of works required is listed below:

- New feeders from Amherst substation
- Major reinforcement required for both Transmission and distribution assets to increase the capacity

The timing of the above reinforcements is highly dependent on the rate of this development and future load growth in the area surrounding.

5. CONCLUSION/ GENERAL ASSESSMENT

Based on the study, the existing HV distribution network infrastructure surrounding the areas of the development may not be able to support this new load. A new feeder is highly recommended to connect the initial loads for this development. The timing of this is best to be evaluated when the formal application for load connection has been received. It may be possible to connect the initial load of approximately 2 MVA on to AMT 507 while it is lightly load at the moment. However, this is not a guaranteed approval as the large amount of load is expected on AMT 507. Due to the large load take up area, major reinforcements for both Transmission and Distribution assets are necessary to cater for this development.

The details in this feasibility enquiry report are only indicative. Further in-depth study and analysis will be required to determine the exact requirement of the reinforcement works once a formal application to Western Power has been lodged. It would be appreciated that at the time of the initial application, a staging plan with expected takeoff dates be provided to Western Power.

Western Power can neither reserve capacity nor guarantee supply to this development without a formal request being lodged. In order to provide a firm connection proposal and cost, a formal application to Western Power will have to be made, in accordance with our connection policies.

6. LAND DEVELOPMENT COMMENTS

Unless the Port Coogee development utilises the spare capacity on the AMT 507 feeder, the current network should be able to supply the first stage of this development.

The following stages will need to be supplied from a new HV feeder from Amherst Zone substation. The approximate cost of direct drilling a 400mm HV cable over 3 kilometres is **$1.4 million (unbinding).**

This new feeder should be able to supply the development for the next 4 to 5 stages, depending on uptake from other projects in the area.

The above estimation is based on but not limited to the aforementioned assumptions and design variables. Normal Subdivision Policy applies.

Appendix 1

westernpower

Electricity Networks Corporation ABN 18 540 492 861

Part A - Application type

☐ Feasibility Enquiry ☑ Feasibility Study

Applicant details - for tax invoice

Title (e.g. Mr, Mrs)	Mr
Surname	Hazelden
Given name(s)	Glenn
Company or busines name	Landcorp C/o Wood and Grieve Engineers
ABN	
Postal address	Level 3, 3 Plain Street
Suburb or town	East Perth
Post code	6004
Email (optional)	
Mobile (optional)	
Telephone	(08) 6222 7000
Fax (optional)	( )
Western Power reference number (if applicable)	

Part B - Land use

Residential ☐	Commercial/Industrial ☐ Special Rural ☐
Other (please describe)	
Number of lots	4850
Number of stages	
Number of lots per stage	
Approximate commencement date for each stage	Stage 1 to commence in July 2011, subsequent stages (243 lots per annum) each year after that. Staging to commence around 'area 3' of the structure plan and will continue south, the last area of development to be 'area 1' (south Fremantle tip site).
Comments	This project is on the WAPC planning website and includes the relocation of the Western Power South Fremantle switchyard.

Part C - Project details

Please attached Stage Plan with this document.

Project name	Cockburn Coast
Your project reference number	20146-PER-U

Part D - Site address/location plan

Please attach a location plan or concept plan with this document.

Site address	Cockburn Coast
Suburb or town	Cockburn — Post code:
Nearest cross street	Cockburn Coast Drive
Map number	
Grid reference	From street directory

Part E - Proposed loading

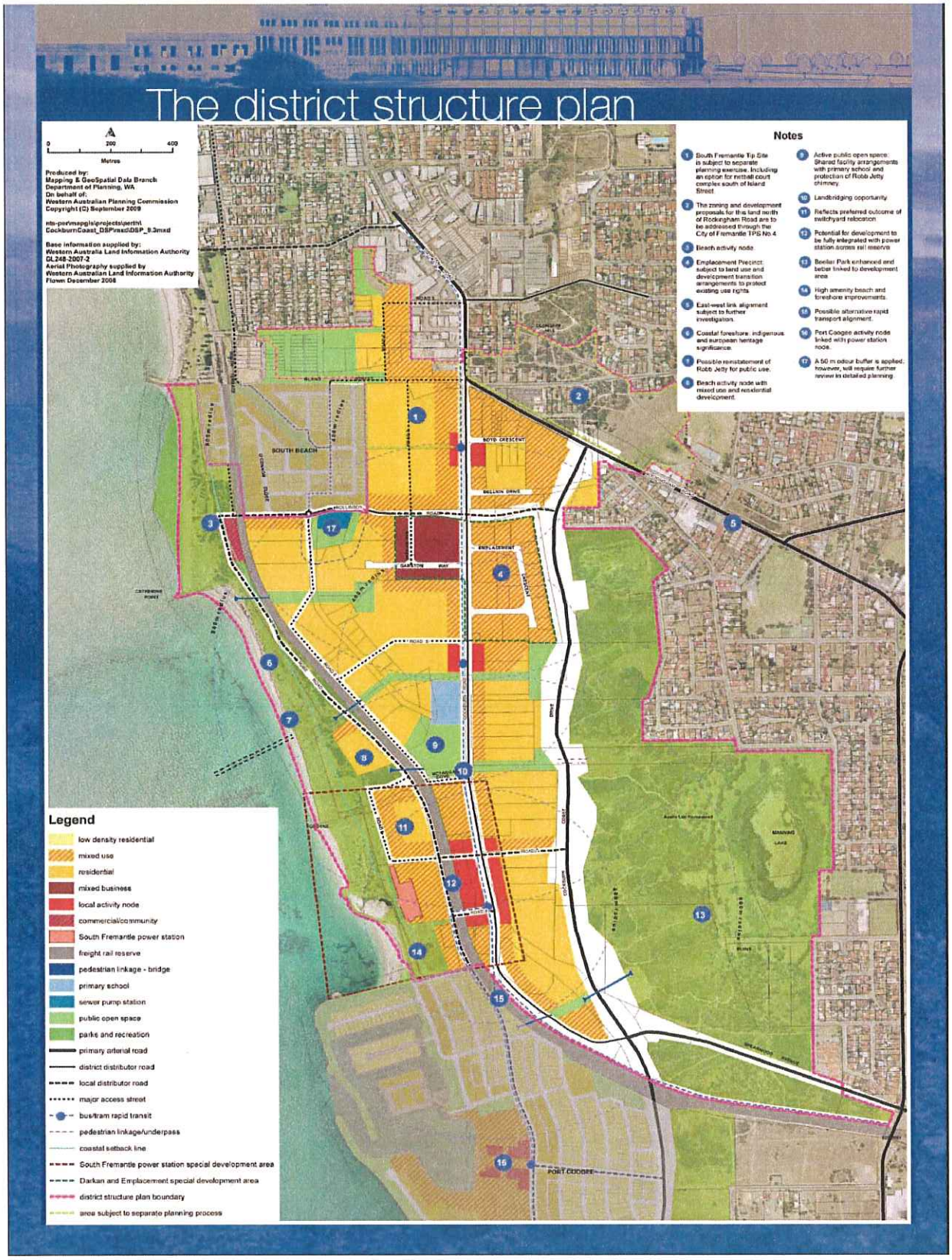
ADMD per lot	9kVA
Comments	

Part F - Approval

On signing this form as the duly authorised representative, the signatory accepts liability for payment of $315.00 (inc GST) for a Feasibility Enquiry or $775.00 (inc GST) for a Feasibility Study. Please refer to 'Terms & Conditions'.

Name	Glenn Hazelden		
Mobile (optional)		Telephone	(08) 6222 2000
Signature	G. Hazelden	Date	20 / 4 / 2010

Appendix 2


The district structure plan
Notes
1 South Fremantle Tip Site is subject to separate planning exercise, including an option for netball court complex south of Island Street
2 The zoning and development proposals for this land north of Rockingham Road are to be addressed through the City of Fremantle TPS No.4
3 Beach activity node
4 Emplacement Precinct: subject to land use and development transition arrangements to protect existing use rights
5 East-west link alignment subject to further investigation.
6 Coastal foreshore: indigenous and european heritage significance.
7 Possible reinstatement of Robb Jetty for public use.
8 Beach activity node with mixed use and residential development.
9 Active public open space: Shared facility arrangements with primary school and protection of Robb Jetty chimney.
10 Landbridging opportunity
11 Reflects preferred outcome of switchyard relocation
12 Potential for development to be fully integrated with power station across rail reserve
13 Beeliar Park enhanced and better linked to development area
14 High amenity beach and foreshore improvements.
15 Possible alternative rapid transport alignment.
16 Port Coogee activity node linked with power station node.
17 A 50 m odour buffer is applied, however, will require further review in detailed planning.
Produced by:
Mapping & GeoSpatial Data Branch
Department of Planning, WA
On behalf of:
Western Australian Planning Commission
Copyright (C) September 2009
Base information supplied by:
Western Australia Land Information Authority
DL248-2007-2
Aerial Photography supplied by
Western Australian Land Information Authority
Flown December 2006
Legend
low density residential
mixed use
residential
mixed business
local activity node
commercial/community
South Fremantle power station
freight rail reserve
pedestrian linkage - bridge
primary school
sewer pump station
public open space
parks and recreation
primary arterial road
district distributor road
local distributor road
major access street
bus/tram rapid transit
pedestrian linkage/underpass
coastal setback line
South Fremantle power station special development area
Darkan and Emplacement special development area
district structure plan boundary
area subject to separate planning process
SOUTH BEACH
PORT COOGEE

Your Ref: 20146-PER-U
Our Ref: MF010044
Enquiries: Customer Contact Centre
Telephone 13 10 87
Fax: 9225 2073

Western Power
Connections Manager
Locked Bag 2520
PERTH, WA 6001
Electricity Networks Corporation
ABN 18 540 492 861

25 June 2010

Wood & Grieve Engineers
Unit 3, 3 Plain Street
EAST PERTH WA 6004

Attention: Mr Glenn Hazelden

Dear Sir/Madam,

COCKBURN COAST
WESTERN POWER REF: MF010044, WAPC No: N/A

In response to your request for a Feasibility Study, 21 April 2010, I am pleased to provide you with the attached report.

Our Tax Invoice will be sent to you in due course. The amount due includes the standard fee of $775.00.

The following is an estimated cost of the high voltage distribution works to provide electricity distribution capacity to your proposed development. This estimate is based on a desktop review of your requirements and the existing electrical network.

FEASIBILITY ESTIMATE

The estimated cost of the reinforcement works to your proposed development is $1,394,627.00, including GST.

Please note the following important information about this estimated cost:

- It is an indicative figure only, to assist you to plan and make decisions about your project.
- The final quoted cost may be higher or lower than this estimate. In some cases, final quotes are significantly higher than estimates, because of ground conditions and other impediments identified during the site visit and / or fluctuations in the cost of materials and labour etc.
- This estimated cost is non-binding.

DISCLAIMER

- This information is based on information available today.
- Western Power cannot reserve any capacity to accommodate the proposed development unless a quotation is offered and accepted.

- Western Power accepts no responsibility for any consequences resulting from decisions made on the basis of information provided in this response.

ANY QUESTIONS?

If you have any questions, please telephone our Customer Contact Centre on 13 10 87 during business hours.

Yours faithfully,

Customer Services Officer
for
Connections Manager
Customer Assist

enc: Terms and Conditions

Electricity Networks Corporation
ABN 18 540 492 861

FEASIBILITY STUDY TERMS AND CONDITIONS

1. **Terms and Conditions**
These terms and conditions shall form part of the contract unless specifically excluded in writing by an authorised representative of Western Power.

2. **Consequential Loss**
Damages shall be limited to damages for direct and foreseeable loss attributable to breach or default under this Agreement. The rights of either party to damages for indirect or consequential loss are hereby excluded. Neither party shall be liable to the other for any loss of profit suffered by a party to this Agreement or any other person.

3. **Modification**
A purported modification, variation or amendment of this Agreement including the scope of works or any waiver of any rights of any party or any approval or consent shall have no effect unless in writing and signed by the party to be charged, and may attract a subsequent fee.

4. **Application of Acts and By-Law**
Nothing contained in these Terms and Conditions shall in any way limit the operation or effect of the Electricity Corporation Act 1994, Energy Corporations (Powers) Act 1994, Energy Corporations (Transitional and Consequential Provisions) Act 1994, or any Regulations, By-Laws or Orders made pursuant thereto.

5. **Ownership of Works**
The whole of the electricity extension that forms the works carried out in accordance with the proposal is the property of Western Power and Western Power has the right to connect additional customers to any part of the extension.

6. **Indicative Estimate**
This indicative estimate of the cost of electrical distribution [and transmission] works is ONLY AN INDICATIVE ESTIMATE.

7. **Assumptions**
Western Power has calculated the indicative estimate on the basis of a "desktop study" only which includes information readily available at the time and certain assumptions regarding the project and costs. The information and assumptions may turn out to be incorrect or incomplete.

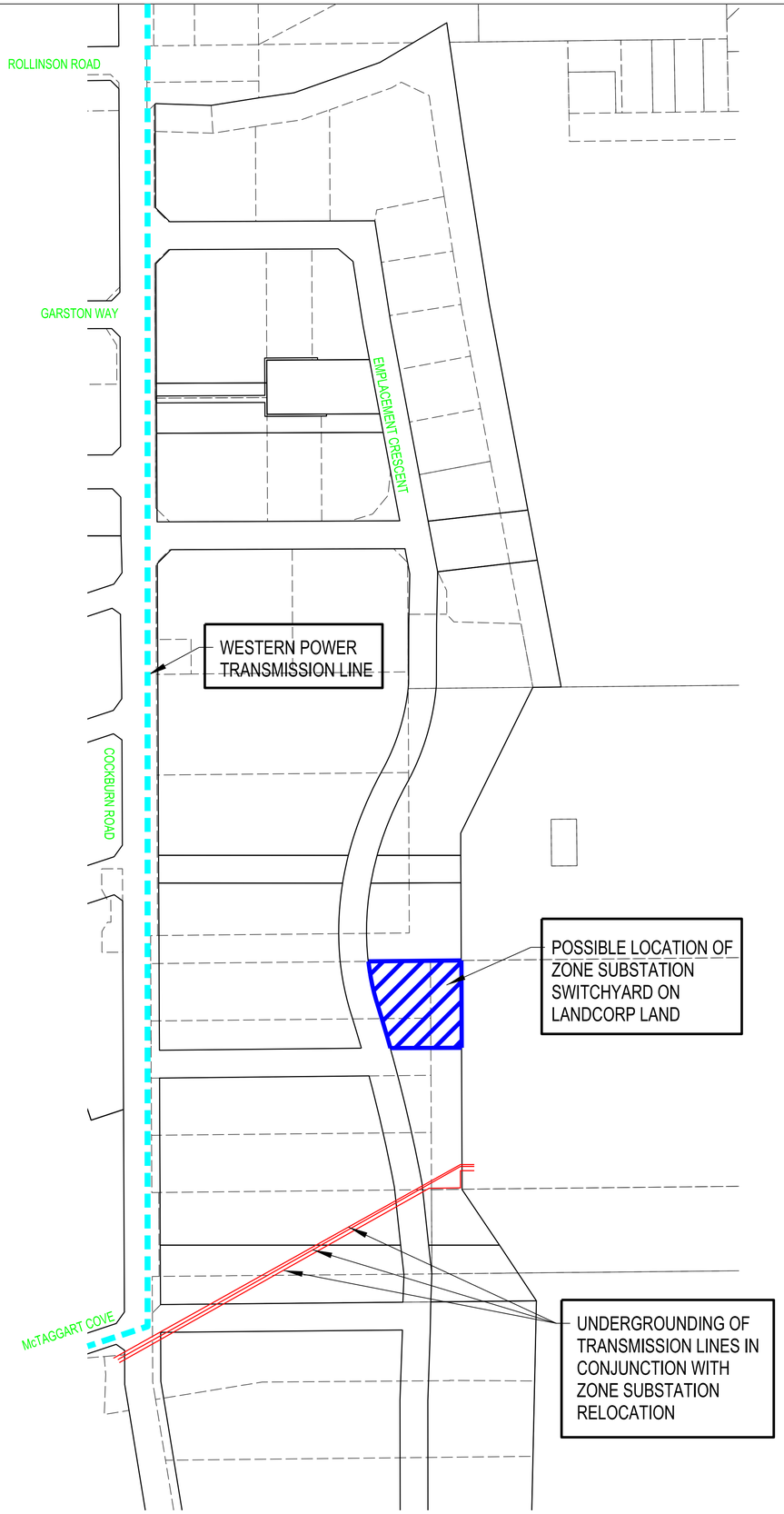
8. **Fluctuations**
Construction costs, including materials and labour, are subject to fluctuation and may change significantly over time. The final quoted cost may be higher or lower. In some cases final quoted costs are SIGNIFICANTLY HIGHER than indicative estimates.

9. **Liability**
Western Power has calculated the indicative estimate in good faith however Western Power, to the extent permitted by law, accepts no liability for any errors or omissions or for any discrepancy between the indicative estimate and the final quoted cost, if any.

Appendix 6

WOOD & GRIEVE ENGINEERS

Western Power Transmission Lines and Substation Site



PLAN
SCALE 1:2000

LEGEND

WESTERN POWER TRANSMISSION LINE

UNDERGROUNDING OF TRANSMISSION LINES

REV.	DESCRIPTION	DRAWN	VER	APPROVED
A	ORIGINAL ISSUE			

CELEBRATING 50 YEARS
WOOD & GRIEVE ENGINEERS

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BUSSELTON
SHENZHEN

CLIENT:
LANDCORP

PROJECT:
COCKBURN COAST

TITLE:
WESTERN POWER TRANSMISSION LINES

PRELIMINARY

SECTION: CIVIL SERVICES	VERIFIED :	SCALE : A1 @ 1:2000
DESIGNED :	APPROVED FOR TENDER:	DATUM : A.H.D.
DRAWN : LZ	APPROVED FOR CONSTRUCTION :	WAPC : -

PROJECT No.	DRAWING No.	REVISION
20146-PER-LSP-C	SK15	A

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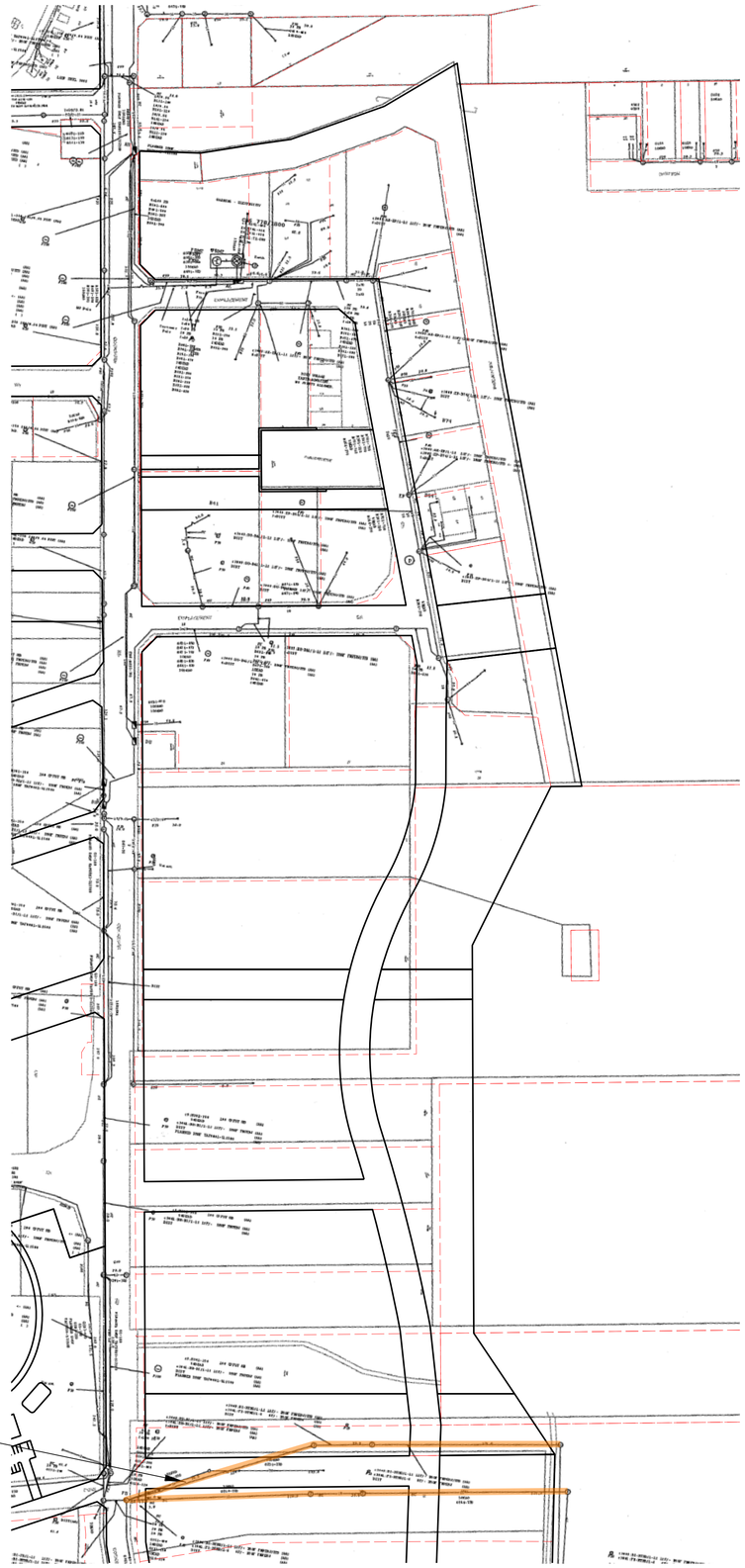
A3 @ 2000

Appendix 7

WOOD & GRIEVE ENGINEERS

Existing Telstra Cabling and Required Relocations



TELSTRA SERVICES
NEEDING RELOCATION

PLAN
SCALE 1:2000

LEGEND

TELSTRA SERVICES
NEEDING RELOCATION

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CLIENT:
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PROJECT:
COCKBURN COAST

TITLE:
TELSTRA SERVICING

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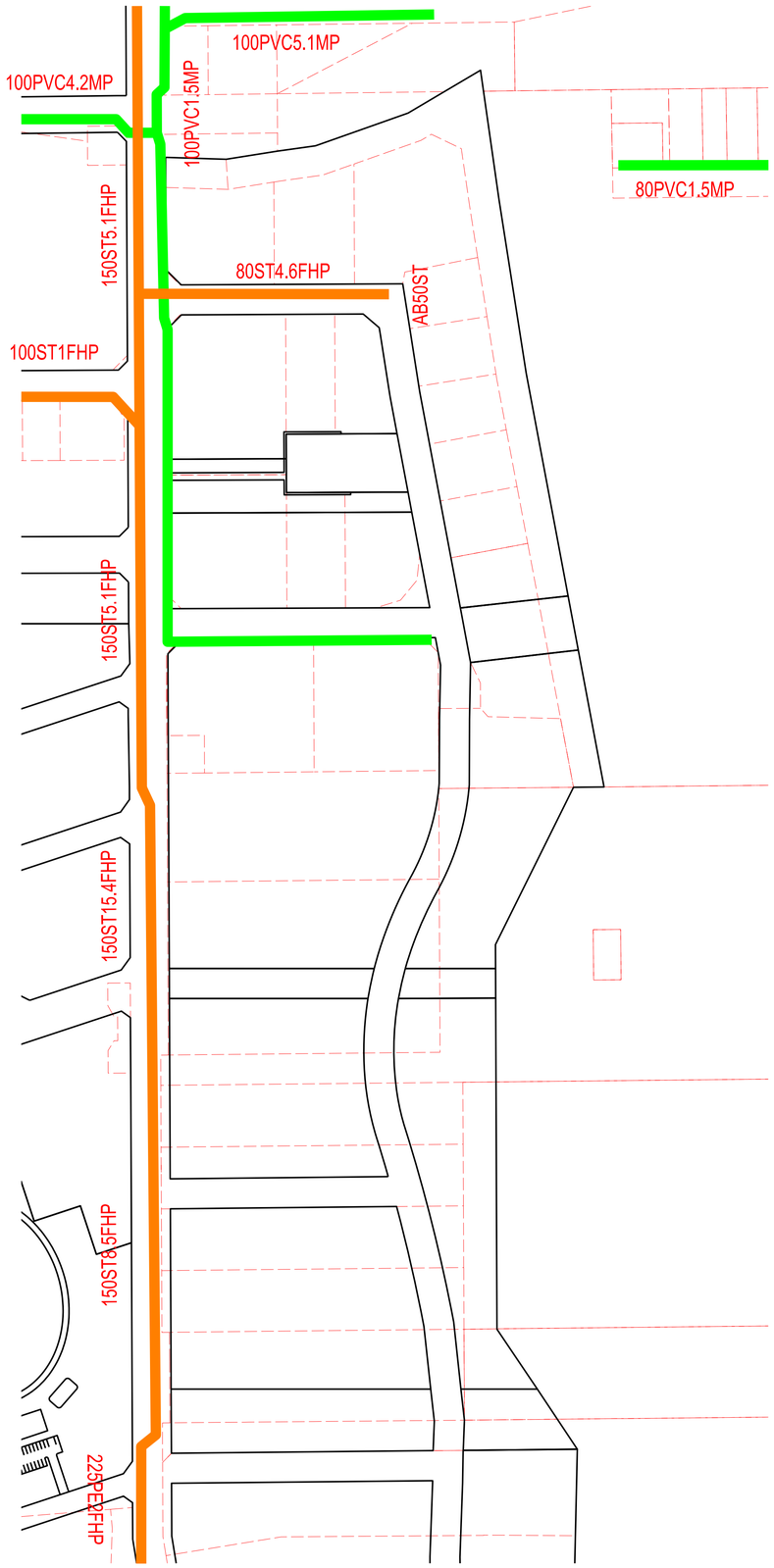
Appendix 8

WOOD & GRIEVE ENGINEERS

Existing Gas Mains



PLAN
SCALE 1:2000

LEGEND

EXISTING HIGH PRESSURE MAINS

EXISTING STANDARD PRESSURE MAINS

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CLIENT:
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PROJECT:
COCKBURN COAST

TITLE:
GAS SERVICES

PRELIMINARY

SECTION: CIVIL SERVICES	VERIFIED :	SCALE : A1 @ 1:2000
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DRAWN : LZ	APPROVED FOR CONSTRUCTION :	WAPC : -

PROJECT No.	DRAWING No.	REVISION
20146-PER-LSP-C	SK16	A

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i **Appendix G**
Cockburn Economic Development Strategy & Emplacement Briefing Note

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LANDCORP

COCKBURN COAST ECONOMIC DEVELOPMENT STRATEGY

REPORT

FEBRUARY 2012

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Document Control				
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1.0

1 INTRODUCTION

1.1 SCOPE

The purpose of this brief is to provide a comprehensive Employment and Economics Strategy to accompany the Cockburn Coast Masterplan (City of Cockburn OCM 14/04/2011) (from here on referred to as DSP2). This aims to provide a more comprehensive briefing to stakeholders on the:

- Economic opportunities and constraints of Cockburn Coast;
- Economic vision for Cockburn Coast in the context of State Strategic objectives;
- Employment goals for Cockburn Coast; and
- Way in which the DSP2 addresses these goals

The Strategy does this through a series of analytical tasks including:

- A top-down assessment of the projected employment burden required to be taken by the Cockburn Coast Activity Centres for the South-West Sub-region to achieve its Employment Self Sufficiency Targets;
- Examination of the range of employment targets set for the Cockburn Coast development and consideration of their appropriateness given present day context;
- Assessment of the quantity of population-driven and strategic employment that may potentially be generated within Cockburn Coast to 2031 and at build out;
- Projecting floorspace demand for different types of activity use; and
- Assessing the proposed Cockburn Coast DSP2's provision and configuration of floorspace in the context of the above analysis.

An employment and economics strategy is necessary for the justification of provision of different types of floorspace (retail, office, and residential), and the user mix and employment burdens that will be supported by the developed area.

It should be noted that more detailed work will be undertaken during the Local Structure Planning Phase of Cockburn Coast planning, with detailed distribution and configuration of commercial floorspace outlined.

1.2 CONTEXT

Cockburn Coast has historically played a significant role in the economy of Perth and Western Australia, with Robb Jetty being Perth's first significant freight port with trade initially focused on lime, cattle from the Kimberley and timber. Over the year's, major infrastructure such as an abattoir, railway marshaling yards and the South Fremantle Power Station located at the site, or in close proximity, has continued to contribute to the economic development of the City with the location becoming a critical juncture between Fremantle Port and heavy industry to the south in Henderson and Kwinana.

The envisioned revitalisation of Cockburn Coast has sought, through both the District Structure Plan (DSP) and DSP2, to recognise it's unique location within Perth's value chains, whilst envisaging a much more urban context for the site. This changing economic function of Cockburn Coast is largely what will be addressed through this strategy.

2.0

2 ECONOMIC OPPORTUNITIES AND CONSTRAINTS OF COCKBURN COAST

2.1 OPPORTUNITIES

2.1.1 Proximity to Value Chains

Cockburn Coast sits in a unique location within Perth and Western Australia's major export value chains. This is largely due to the significant logistics and industrial infrastructure surrounding the area. This includes:

- Fremantle Port
- Fremantle Freight Rail Line
- Australian Marine Complex
- Latitude 32
- Kwinana Industrial Area
- Kwinana Bulk Terminal

This critical infrastructure provides much of the capacity required by Western Australia's strategic industries to manufacture, process and export goods to major markets (intrastate – North-West resource projects, interstate – major consumer markets in the Eastern States, and internationally – SE Asia). A brief list of major strategic industries found within the greater Western Trade Coast value chains are outlined Figure 1.

Figure 1: Western Trade Coast Major Strategic Industries

Bulk Commodity Exports	Manufacturing	Logistics
Wheat export	Pertro-chemicals	Shipping agents
Alumina export	Ship-building	Freight forwarding
Live cattle/sheep export	Mining equipment manufacture, repair and maintenance	Commodity blending
Coal export	Oil and gas platform, drilling equipment and piping manufacture, assembly and maintenance	Bulk handling
Iron ore export		

Source: Pracsys 2011

Cockburn Coast has the potential to develop strong relationships with surrounding activity centres including:

- Fremantle (Strategic Metropolitan Centre)
- Cockburn Central (Secondary Centre)
- Murdoch (Specialised Centre)
- Henderson (Specialised Industrial Centre)

The opportunity to integrate with infrastructure, industries and activity centres will be dependent upon a range of factors including:

- Capacity constraints of surrounding sites
- Perceived value proposition of Cockburn Coast activity centres comparative to surrounding centres for specific industries
- The development of agglomerations of economic activity (both urbanisation and localisation)

2.1.2 South Fremantle Powerstation

The South Fremantle Powerstation is an iconic feature of the City's coastline that provides significant identity, amenity and infrastructure around which to develop agglomerations of activity. In particular, the Powerstation may act as a point of focus for a much larger user mix than that which would otherwise be likely to visit the site. This therefore can provide the basis for attraction of investment and tenancies that seek to meet the needs of this user mix.

2.1.3 Urbanisation Economy

The introduction of a residential population of 10,000 residents provides a significant pool of available expenditure around which the urbanisation economies of scale can develop. This is especially the case if the South Fremantle Powerstation asset can expand upon this pool through the attraction of visitors from a regional catchment. The effective configuration of population-driven activities (including retail, education, healthcare and entertainment) to maximise the capture and quality of transactions will be critical for these urbanisation economies to develop.

2.1.4 Effective density

Cockburn Central's location allows it to leverage from the very significant existing economic activity resulting from nearly two centuries of economic development in Perth. City's typically evolve and mature from central areas of activity (in Perth's case the CBD and Fremantle), with surrounding areas acting to support these functions through the provision of a workforce and support activities. Over time strategic activities overflow into adjacent areas, with industrial and supporting activities forced out further and further. The structure of Cockburn Coast's economy has evolved significantly, as population growth and the structure of Perth's economy has evolved. This has meant that the location of the site, in relation to major infrastructure, value chains and activity centres may allow for leverage of a significant amount of effective density (the increased gravitational pull of activity to an area based upon it's proximity to hubs of strategic employment). This means the potential to capture significantly greater expenditure and users to an activity centre than that expected from traditional residence based modeling.

2.2 CONSTRAINTS

2.2.1 Limited Catchment

Cockburn Coast's location on the edge of the Indian Ocean, with Manning Reserve to the east, means that the potential catchment for the site is relatively constrained. The implications of this can be seen right along the Perth coastline, with coastal activity centre's growth being relatively constrained due to a limitation on the ability to capture growing expenditure from a limited catchment (with the historic lack of growth in centres including Cottesloe, Scarborough, and Fremantle at least partially due to the limitations of catchment). The limitations on Cockburn Coast's catchment may be further multiplied by the existing (and improving) offer of South Fremantle as a competing activity centre, and by the development of a competing activity centre in Port Coogee. Due to the barrier of Manning Reserve, traffic flows mean that these centres are likely to be passed by a potential user heading to the coast from the east, prior to arrival at Cockburn Coast.

The density of housing planned for within Cockburn Coast (estimate population of 10,000 residents) will therefore be critical to the success of population-driven activities within the development as these are likely to be the primary users of everyday offerings. In contrast, the potential impact of the iconic South Fremantle Powerstation may attract a range of destination-based users who visit on a less regular basis to meet specific needs.

2.2.2 Fremantle Freight Rail Line

Vibrant, resilient activity centres that have matured to contain a diverse range of economic activity are typified by a number of key characteristics including:

- Intensity – user transactions (economic and social) occur within a contained area that encourages multiple transactions per visit
- Accessibility – users being able to efficiently and safely access the centre, and move throughout the centre via a range of modes

The presence of the Fremantle freight rail line running through the Cockburn Coast development potentially impacts upon the ability of activity centres within the development to achieve intense and accessible characteristics. This is due to the potential barrier that the railway presents, and the introduction of dead space in the middle of activity centres. This may limit the manner in which users interact with the centre, with transactions being impacted due to real or perceived barriers, as well as perceptions of amenity and safety. The DSP2 focuses much attention on mitigating these factors through planned building orientation and scale, at-grade crossings and the use of vegetation to soften edges.

2.2.3 Competition from major centres

Recent strategic planning, and public and private sector driven investment in activity centres surrounding Cockburn Coast includes:

- Incremental unlocking of land-use constraints in Fremantle to foster in-fill development and activity centre maturation
- State government structure planning and investment in Murdoch Specialised Centre
- LandCorp planning and investment in mixed use precincts in Cockburn Central
- PTA investment in the Mandurah passenger rail line

The resultant planning and investment at these surrounding centres potentially changes the value proposition of these centres (for land-owners, public and private investors, existing and potential residents, existing and potential businesses), and thereby impacting upon the value proposition of Cockburn Coast. This is particularly the case in regards to the perception of Cockburn Coast as a location for future employment. The potential for Cockburn Coast to develop localisation agglomeration economies based upon strategic infrastructure investment or the attraction of major projects will be impacted upon by the competition impacts and collaboration opportunities associated with these centres.

2.2.4 Organic Maturation

Many of the activity centres referenced as case studies for diverse, vibrant urban centres (including Subiaco, Fremantle and Leederville), have evolved in urban form and function over decades, if not centuries. For a new activity centre to develop in form and function to the same extent in a relatively short period of time one of two things must have occurred. The first is that an existing competitive advantage exists around which the activity centre develops (e.g. major transport infrastructure, a university or major public infrastructure). The second situation is that major microeconomic and macroeconomic factors cause a significant structural change in the local economy. This may in part occur passively, as markets and activities happen by chance around the centre, however more likely will require active intervention in the local economy to actively seek out opportunities, foster collaborations and unlock capital.

In the case of Cockburn Coast activity centres the South Fremantle Powerstation may offer a point of differentiation, however it's function as a driver of a point of competitive advantage is uncertain, given the timeframes for redevelopment, and reliance on the relocation of the adjacent switchyard. The rapid maturation of Cockburn Coast's activity centres to deliver the employment objectives outlined in the District Structure Plan and DSP2 therefore will likely require active intervention in the local economy, with a common focus of investment held by all tiers of government and the private sector. Passively waiting for economic development to occur within Cockburn Coast activity centres will likely mean slow and incremental development, with major investment in the South-West sub-region being channeled into Murdoch, and potentially Fremantle.

The potential diference in timing between the onset of the Robb Jetty and Powerstation precincts also provides an opportunity for the coastal village to develop on independent value proposition based upon daily visitation over the next 1 - 10 years prior to development in and around the powerstation.

3.0

3 THE BASIS FOR ECONOMIC DEVELOPMENT

3.1 EMPLOYMENT QUALITY

Public sector strategies, business plans and impact statements often focus on the quantum of jobs required (or purported to be generated) at the detriment of the quality of industries and jobs. This is due to a number of reasons including:

- The disparity between the location of jobs and workforce settlement patterns in Perth focusing attention on quantity
- Available local employment data (primarily ABS census 2006) providing easy access to quantity information whilst quality requires significantly more analysis
- Difficulty in defining a 'quality' job, especially given that perceptions of quality are often subjective, and that what may be quality employment in one area, may not be in another
- Difficulty in understanding how 'quality' jobs influence local economies

It is critical to have a basic understanding of employment quality within an area if one is going to seek to influence the future economic development of an area. The key reason for this is the inherent differences in characteristics between different types of employment, in particular, the differences between population-driven and strategic employment.

Population-driven employment may be defined as employment resulting from economic activity servicing the needs of a particular population. This activity is oriented to meet the needs of that population, including; retail and hospitality, construction and industrial services, civic, healthcare and education, and the business-to-business supply chains that service these industries. This type of activity will largely occur in the presence of a population. The overall level of employment is dependent upon factors including:

- Macro-economic conditions (e.g. GDP growth, CPI levels, interest rates)
- Local unemployment rate
- Local household income
- Constraints on local activity (e.g. availability of land, statutory planning policies, taxation structures)
- Ability of enterprises to capture expenditure

By contrast, strategic employment results from economic activity focused on the creation and transfer of goods and services to an external market. Employment resulting from this activity may be distinct, in industries where there is little or no local demand (e.g. iron ore/uranium mining), or in the same industries as population-driven activity but with a different focus (e.g. manufacture of food/wine, higher education). Strategic employment does not automatically happen, it results from an enterprise actively seeking to meet the needs of an external market and developing a competitive advantage in meeting these needs. Strategic employment is therefore highly variable across different locations.

The presence of significant levels of strategic employment within a local economy is critical to the long-term prosperity and resilience of the economy as:

- There is no 'saturation point' to strategic employment (whereas there is only so much population-driven activity that a particular population needs/can afford)

- A diverse range of economic activity servicing external markets diversifies the risk associated with downturns in a single market
- Strategic economic activity tends to include higher 'value-add' activities that are more likely to result in greater flow-on benefits to the local economy
- Strategic economic activity tends to result in higher wage-productivity for employees and significant business opportunities for small to medium enterprises

The difference between population-driven and strategic employment extends to the behaviour of workers attracted to these jobs. Employees in strategic jobs tend to be willing to travel further for work, and are more inclined to remain in a given industry or sector for longer. The absence of strategic employment in a sub-region will result in lower employment self-containment, as these workers travel further afield to their place of work (in the case of Perth in the central sub-region). By contrast, the low-salary and skill requirements of many population-driven jobs makes them more attractive to residents in close proximity to their place of work.

3.2 PROXIMITY TO JOBS

3.2.1 Definition

A general assumption around which a modern urban planning and infrastructure provision is based is that the proximity of a residential population to its place of work should be as close as possible. This relates to a number of factors including:

- Perceived quality of life, impacts of time spent commuting, in particular, road congestion
- Productivity impacts of road congestion on the movement of goods and people
- The perceived social impacts of dormitory suburbs (suburbs in which are largely empty for a large proportion of the day due to workers being away)
- The public sector costs of maintaining and expanding transport networks (road, passenger rail, buses etc) to move the workforce to and from their place of employment

3.2.2 Relevance for Cockburn Coast

Cockburn Coast's density, amenity, infrastructure and potential employment nodes make it a location where residents in, or in close proximity to the development, can benefit significantly from living in close proximity to their place of employment. The development of the site into one where this value proposition is obvious to a consumer, rather than a plan, will be critical to the success of the development.

3.3 LOCALISATION AND URBANISATION ECONOMIES

3.3.1 Definition

Strategic economic activity occurs through the development of agglomerations of economic activity. Such agglomerations result from the development of localisation and/or urbanisation economies.

Localisation economies are the result of a number of firms and enterprises (including

research institutions, not-for-profit organisations and government departments) in complementary industries and supply chains locating in the same area. Localisation economies are the result of one or more of three factors. These are:

- Availability of specific skilled and specialised labour
- Availability of specialised/essential inputs at a more competitive value due to economies of scale
- Increased efficiency in knowledge transfer/technology, spillovers/ collaborations and partnerships due to proximity of partners

Urbanisation agglomerations of activity result from the general benefits that a firm will gain from locating in a particular urban environment. This includes access to general labour pools, access to financial and commercial services and proximity to transport and communication networks.

3.3.2 Relevance to Cockburn Coast

The achievement of the employment targets for the South-West sub-region outlined in Directions 2031 will largely depend on the development of significant agglomerations of activity within activity centres in the sub-region over a short time-frame (activity centres such as Subiaco have taken well over a century to develop their modern-day agglomerations). A clear understanding of the differences between drivers of localisation and urbanisation economies are critical, if successful, targeted investment decisions are to be made by public and private sector stakeholders.

Urbanisation economies can develop as a result of population growth and the sheer scale of an activity centre. An example is the development of agglomerations of retail activity that naturally emerge in response to the consumption demands of a population. In the case of Cockburn Coast this paper will provide an overview of demand modeling and the potential land use planning implications to flow from this.

The development of localisation economies in the short-medium term will need to be based upon the development of one or more competitive advantages for firms in strategic industries locating in the South-West sub-region. This will typically result from infrastructure or a major project that provides the drivers for one of the three factors mentioned in 3.3.1. Infrastructure may relate to hard and soft assets that provide a sustainable, unique advantage for firms that utilise it. Major projects typically seek to attract 'anchor' enterprises around which other firms may be attracted. Unless the reason for attraction of these enterprises is a sustainable competitive advantage (e.g. often a natural resource or piece of infrastructure) these firms will often elicit the benefits offered to entice them (e.g. tax breaks, free land etc) and then move on when a better offer comes along. This is often referred to as 'smokestack chasing'.

In the longer term a sustainable competitive advantage may arise from endogenous growth within an activity centre or sub-region (local firms/entrepreneurs growing and filling a niche). Economic development, focused on the development of endogenous growth, focuses on the facilitation of innovation, entrepreneurship, development of networks, unlocking of capital, and removal

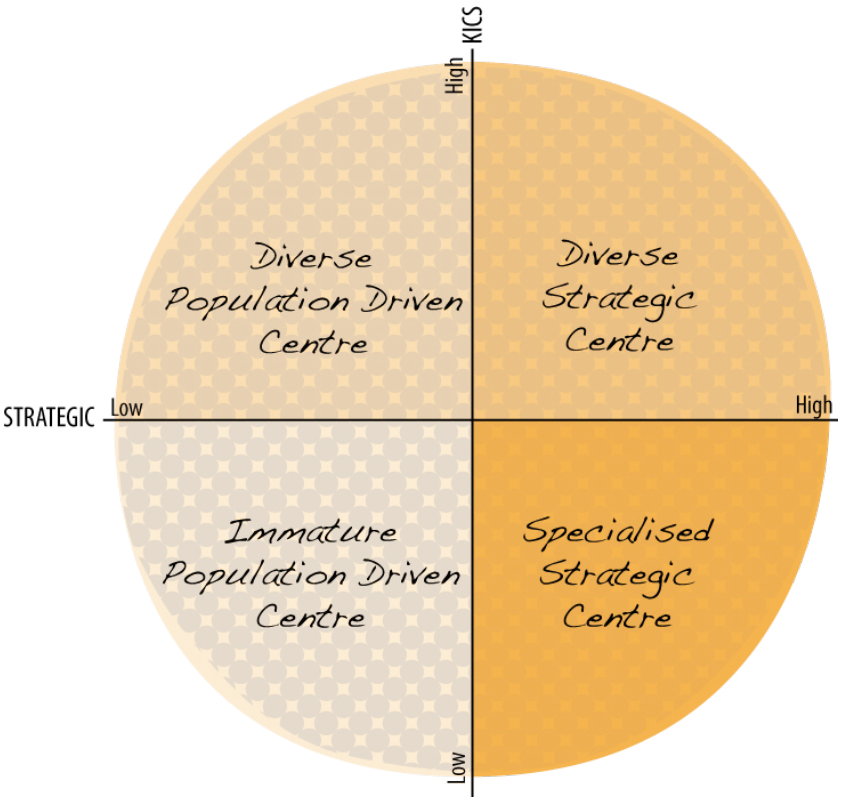
of government barriers. It therefore requires ongoing engagement within the economy with a view to long-term, incremental development.

3.4 MATURATION OF ACTIVITY CENTRES

3.4.1 Definition

The economic maturity of a centre is defined by the quality, not quantity of activity. Immature centres are those typified by low productivity, population-driven activity, whilst mature centres are characterised by high productivity activity, 'channelling' wealth through the export of goods or services.

Figure 2: Maturity Matrix



Source: Pracsys

By assessing the concentration of quality employment located within a centre, we can identify the relative maturity of a centre, and begin to develop economic development strategies appropriate to this level.

The matrix in Figure 2 illustrates four degrees of activity centre maturity, based upon the relative concentrations of Knowledge Intensive Consumer Services (KICS) and Knowledge Intensive Export Oriented (KIEO) employment.

3.4.2 Relevance to Cockburn Coast

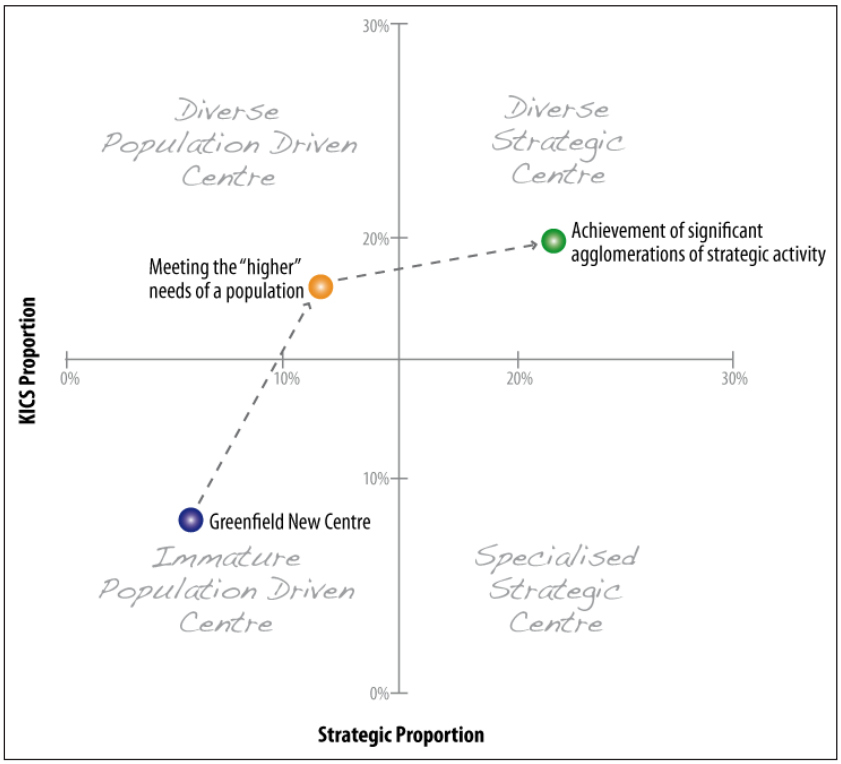
Commercially-oriented activity centres often begin life as an Immature Population Centre, servicing the basic consumer needs of a local population catchment. With low concentrations of KICS and KIEO employment, these centres rely on increasing amounts of expenditure capture through population growth, catchment expansion or increased expenditure by the catchment in order to keep growing. If centres remain as Immature Population Centres, then the scale of the centre will eventually plateau as competitive forces impact upon floorspace productivity, or statutory controls limit continued expansion of individual land-uses (in particular retail).

For an Immature Population Centre to mature, consumption–based growth must be combined with a shift in focus to diversifying activity away from the basic consumption needs of a catchment. This requires servicing the higher order needs of the population (KICS including education and healthcare) with the centre becoming a Diverse Population Centre, or the attraction of KIEO (strategic) industries resulting with the centre becoming a diverse strategic centre (Figure 3). The reasons for this maturation are likely to be the development of agglomerations of activity (as discussed above).

In Australian cities, commercially oriented activity centres located outside of CBDs are most often Immature Population or Diverse Population Centres. More mature and diverse centres lie within the inner suburbs, having grown up over decades (and even centuries), benefiting from the effective density of a city's centralised employment characteristics.

The consequences of Australian cities continuing to encourage centralised quality employment, and decentralised settlement patterns, are becoming well understood. Looking beyond the often arbitrary hierarchies assigned by planning agencies, there is an urgent need for activity centres within middle and outer rings to mature much faster than before, becoming productive adults before their time. A considerable targeted effort is required on behalf of both the private and public sector.

Figure 3: Potential Maturation Path of a Greenfield Activity Centre



Source: Pracsys 2011

4.0

4 COCKBURN COAST DSP2 ECONOMIC DEVELOPMENT OBJECTIVES

4.1 VISION

Cockburn Coast is a high quality mixed-use urban development project that attracts a high level of visitation. It is well known for its commitment to sustainable built form and a high proportion of high-level green-star rated buildings that incorporate low-level alternative technology systems. The high-density residential areas host a diverse and vibrant local community that successfully integrates the provision of affordable housing. The Cockburn Coast economy is connected with economic activity in surrounding areas and some regional supply chains.

4.2 GOALS

4.2.1 Employment

The Cockburn Coast District Structure Plan and DSP2 have produced a range of employment targets based upon differing assumptions (Figures 4 and 5).

Figure 4: DSP Employment Targets

Cockburn Coast District Structure Plan	
Target by 2031	
Population	10,000
Dwelling	4,850
Working Population	6,800
Min ESS	40%
Preferred ESS	60%
Min Jobs	2,720
Preferred Jobs	4,080

Source: Cockburn Coast District Structure Plan

Figure 5: Cockburn Coast DSP2 Employment Targets

Measure	Target
Residential Population	10,000
Labour workforce	5,000
Total jobs available within Cockburn Coast	2,750

Source: Cockburn Coast Masterplan 2011

This strategy recognises the ranges in these targets, with the DSP target being considered an optimal employment outcome, and the DSP2 target being considered a minimal achievement. As such the economic development strategy is seeking to achieve total employment outcomes of between 2,750 (Scenario 1) and 4,080 jobs (Scenario 2). Analysis that examines the potential breakdown of these jobs is provided in later sections

4.2.2 Economic Maturation

The economic maturity of the Cockburn Coast economy is based upon the proportion of quality employment. The land use implications for each scenario will vary depending on the quantity and type of employment prevalent, as different types of jobs have different land use requirements. Figure 6 provides a visual representation of the different maturation required by the Cockburn Coast economy for employment scenarios to be achieved.

The DSP2 sets a range of targets that reflect this required maturation. This includes the development of agglomerations of strategic activity within the site as reflected by the achievement of significant employment concentration of strategic industries.[1]

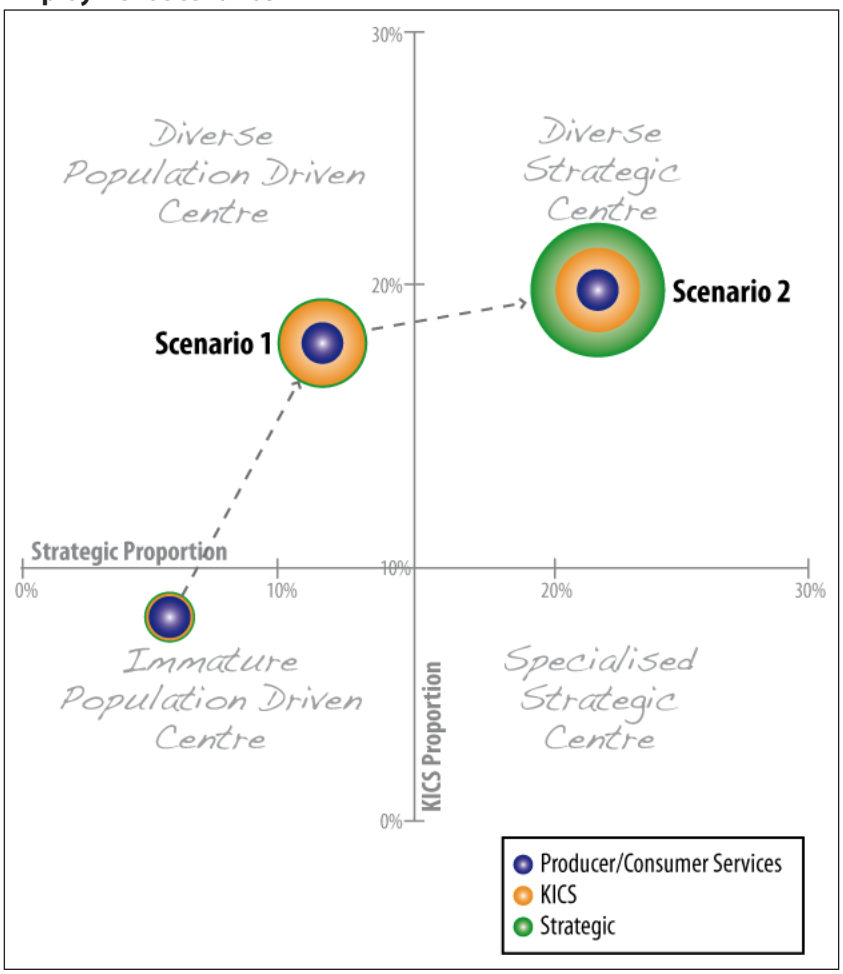
Measure	Scenario 1	Scenario 2
Cockburn Coast Job Target	2,750	4,080
Number of population driven jobs per one resident	0.23	0.3
Real increase in average weekly wages from 2011 census (working population)	10%	20%
Economic concentration of top three strategic industries, with a minimum of 100 workers	ECF = 2.0+	ECF=7.5+

4.3 STRATEGY PRINCIPLES

1. Encourage strong comparative advantages around which strategic employment may be based.

Perth's centralised employment characteristics are based upon the comparative value propositions of the various activity centres. Enterprises make locational decisions based upon judgement as to what an area offers compared to another. Considerations for a location include proximity to important supply chains, proximity to essential infrastructure, connectivity to other activity centres, availability of skilled workforce and the cost to business in locating there.

Figure 6: Required Maturation of Cockburn Coast Economy to Achieve Employment Scenarios



Source: Pracsys 2011

1 Employment concentration factors describe the relative concentration of an industry at a specific location comparative to the Western Australian average. As such Scenario 1 seeks to attract three strategic industries to level of double the concentration found on average across the state.

2. Focus on the development of industry that meets ongoing national and international needs.

Strategic economic activity is differentiated from population-driven activity by the generation of net new income for an economy through the creation of knowledge, goods and services that are of value to markets outside the immediate catchment.

3. Proactive Management of Potential Site Capacity and Performance Constraints

Significant uncertainties and constraints may have an ongoing impact upon the ability of Cockburn Coast to achieve its desired economic development goals. This includes factors such as:

- Relocation of Western Power's switchyard
- Stabilisation and refurbishment of the South Fremantle Power Station
- Management of impacts of the Fremantle Freight Rail Line
- Potential construction of Cockburn Coast Drive

Ongoing planning for, and development of, Cockburn Coast requires a proactive approach to managing and resolving these uncertainties and risks if sufficient public and private sector investment is to be attracted to the site.

4. Development of Population-Driven Urbanisation Economies

The potential limitations on Cockburn Coast's catchment means that its activity centres will need to be heavily focused on meeting the needs of a user mix in an efficient and effective configuration that builds consumer habits and encourages multiple purpose trips. This however, needs to occur in the context of the assigned hierarchy of a district centre as outline in SPP 4.2.

5. Development of Strong Symbiotic Relationships with Surrounding Activity Centres

Key to the economic development of Cockburn Coast, will be the relationship of the district centre with surrounding major centres in Fremantle and Murdoch. The infrastructure and economic functions of these centres should not be replicated nor competed against with Cockburn Coast, with a focus instead on finding niches of activity that complement the development of these higher order centres.

6. Activities should support the endogenous development of strategic economic activity.

Endogenous growth refers to activity originating from within a region or sub-region. It is the development of export oriented industries based upon capacity developed internally, although with strong connections to international supply chains and markets. In the case of Cockburn Coast, endogenous growth structures may focus specifically on the development of a skilled workforce required by sub-regional strategic enterprises.

5.0

5 KICS AND STRATEGIC EMPLOYMENT

5.1 DRIVERS FOR CHANGE

The timeframes for development of Cockburn Coast's major economic assets (especially the Power Station), make prediction and planning for the development's economic context at that far into the future challenging. This strategy chooses to examine the plausible drivers that will determine Cockburn Coast's economic development at the time, with a view to ensure that there are the appropriate structures to leverage the development's asset's, and to ensure that there are minimal unnecessary inhibitors to growth. The approach aims to ensure the strategy remains relevant over a range of plausible futures, rather than picking a preferred future for 10-20 years time, and planning a singular outcome around it. The 'cone of plausibility' model is useful in understanding this. The Model recognises that there is often an identified 'most probable' or preferred future, but a range of alternative futures fit within the limits of plausibility. This range of plausibility expands the further into the future that we try to examine. Figure 7 describes the strategy of many agencies and organisations. A preferred future is identified with a detailed strategy describing the 'vision' of the future and the pathway of action and activities required to get there. What is largely ignored is the myriad of other plausible futures that may impact upon the success of the strategy.

Figure 8 describes a strategy that, whilst still defining the preferred future of the firm, builds in mechanisms that may recognise and correct the strategy's trajectory in the event that it doesn't follow the preferred route. In extreme cases it may even have mechanisms in place that result in a change in the identified preferred future.

Figure 7: Traditional Strategy Approach

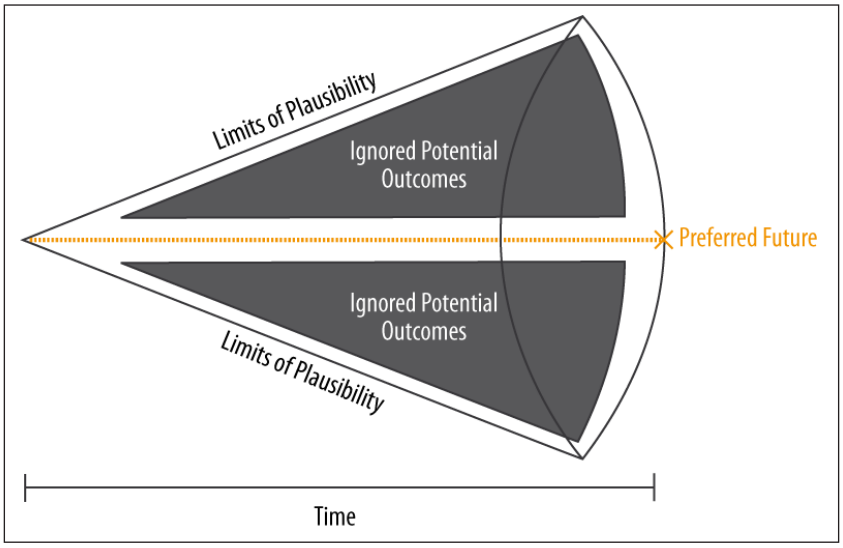
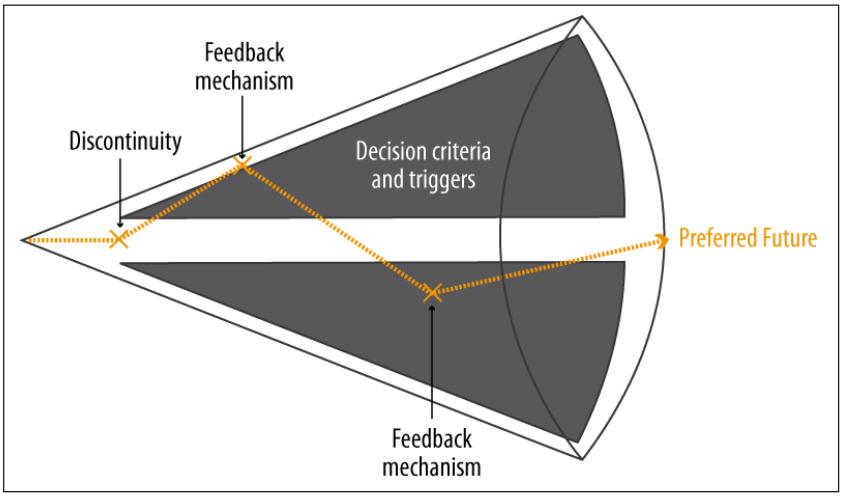


Figure 8: Alternative Strategy Approach



The 'preferred future' identified by the district structure plan and DSP2 is the creation of strategic jobs. By definition these jobs will need to be in industries that directly export, or facilitate the export of goods and services to external markets. Progress to this outcome will likely be incremental, with macro-and micro-economic drivers presenting ever-changing

challenges and opportunities for Cockburn Coast. A number of the future drivers that may be critical to Cockburn Coast include:

- Decentralisation of employment
- Working-age population growth
- Expansion of the knowledge and service sectors of the economy

5.2 OPPORTUNITIES FOR LOCALISATION ECONOMIES

5.2.1 Supply Chain Augmentation

Cockburn Coast's location at the centre of major logistical and export supply chains of Perth provide significant opportunities for enterprises locating within the development to act effectively as a supplier, collaborator, investor, or customer. Enterprises may choose Cockburn Coast as the location for these activities due to a number of factors including:

- Benefits from colocation with major customers/suppliers/collaborators
- Benefits from access to major infrastructure
- Capacity constraints limiting development in surrounding centres
- Benefits from established urbanisation economies within activity centres at Cockburn Coast

Successful economic development at Cockburn Coast will be the result of a number of these factors ultimately providing a compelling value proposition to potential enterprises. The existing capacity constraints being experienced by enterprises in Fremantle may be a significant driver in encouraging enterprises naturally attracted to the Strategic Metropolitan Centre in looking further afield for a location for their activities. This may provide the impetus for investment by a number of seed tenants around which agglomerations may be developed over time. Investment by the public and/or private sector in public transport infrastructure, a potential marina, and targeted workforce training facilities may provide an additional attractor for enterprises in or supporting industries including:

- Shipbuilding
- Industrial chemical manufacture
- Marine and export logistics
- Agricultural exports
- Oil and gas equipment manufacture

5.2.2 KICS Agglomerations

Knowledge intensive consumer services employment includes activities such as education, healthcare, aged care, personal finance, architecture, construction, and accountancy and real estate. Cockburn Coast's activity centre designation as a District Centre suggests that, based upon the traditional view of district centres as suburban box-retail outlets, there are limited opportunities for KICS employment. It is likely however that Cockburn Coast's District Centre is significantly different, with more in common with Leederville than Spearwood. This will be in part due to the:

- Provision of most of the convenience retail required by the catchment population within the Robb Jetty coastal village
- A significant workforce population providing effective density for KICS activities

- High density resident population in a development focused on encouraging local expenditure, minimal car-based activities, and a local focus on meeting life needs

Based upon this, there is potential for KICS activities to become a major contributor to employment within Cockburn Coast, with agglomerations of high-productivity activity focused on servicing local, and external markets. The inclusion of targeted workforce training activities focused upon strategic value chains would also contribute to this.

6.0

6 COCKBURN COAST RETAIL DEMAND ANALYSIS

Retail floorspace demand is derived from the modelled pools of expenditure and floorspace productivity thresholds of respective retail types. The model assumed that productivity across all areas would improve over time, indicating that businesses within the City will become more productive per sqm of floorspace as the local economy matures and user population expands. This reflects more activated activity centres that effectively capture greater levels of expenditure within the same provisions of floorspace.

6.1 USER MIX

An understanding of the future provision of retail floorspace required needs to begin with an analysis of the future users of retail offerings within the area. Key user groups for the Cockburn Coast commercial and retail offerings were considered to be:

- Local Residents
- Local Workers
- Day Visitors
- Night Visitors

One significant limiting factor for the Cockburn Coast development site is its isolation from surrounding population or industrial centres. Combined with its coastal location (an already limiting factor for catchment potential), results in a very limited catchment area from which to draw upon. In addition to this, its relative proximity to a major retail precinct in Fremantle has the potential for significant leakage from its limited catchment area.

In order to generate the user mix for each scenario, it is necessary to make various assumptions around the calculation of number of residents (measured in terms of dwellings) and the number of workers and visitors for the area.

The first category within the user mix is local residents within the Cockburn Coast area. To this end, the residential floorspace was combined with the total projected number of dwellings for Cockburn Coast, provided by Colliers 2011 (Refer to Figure 9).

Figure 9: Estimated Residential Floorspace and Dwelling Yields

	No Marina	Marina
Residential floorspace (sqm)	105,064	140,129
Dwellings within Power Station Precinct	652	1,034
Total Cockburn Coast Dwellings	4,850	4,850

Source: South Fremantle Power Station Draft Masterplan Yields December 2011)

The second category contributing to the Cockburn Coast user mix are the workers that will be servicing the main industries located there (Refer to Figure 10). These are broadly split into three sub-types:

- Commercial
- Retail
- Hotel

Figure 10: Assumptions for the Calculation of Worker Numbers

Floorspace (sqm)/ Commercial Worker	20
Floorspace (sqm) / Retail Worker	30
Floorspace (sqm)/ Hotel Worker	70

Source: Pracsys Analysis 2011

As with both residential and worker numbers, various assumptions have been made around the number of visitors to a particular site, and the average spend per individual while they are at the destination (Refer to Figure 11).

'Visitors' to a particular location is a term that needs to be broken down in order to better determine who will be visiting the particular area, from where, and for what purpose. Where groups and individuals will be visiting from is primarily determined from the locations catchment area across certain radiuses.

Figure 11: Number of Day and Night Visitors and average spend per visitor

Visitor group	Total possible visitor Number	Marina and Main Street	No Marina and Main Street
Day-time visitors			
Cockburn	91,313	60%	50%
Rockingham	104,130	60%	50%
Fremantle	28,626	60%	50%
Kwinana	29,029	60%	50%
Melville	102,434	60%	50%
South Perth	43,908	60%	50%
Canning	88,433	60%	50%
Mandurah	70,413	60%	50%
Intrastate visitor	3,890,000	10%	7%
Interstate Visitors	1,090,500	20%	13%
International visitors	689,500	20%	13%
Total day-time visitors		334,972	279,143
Night-time Visitors			
Cockburn	91,313	30%	25%
Rockingham	104,130	30%	25%
Fremantle	28,626	30%	25%
Kwinana	29,029	30%	25%
Melville	102,434	30%	25%
South Perth	43,908	30%	25%
Canning	88,433	30%	25%
Mandurah	70,413	30%	25%
Intrastate visitor	3,890,000	3%	2%
Interstate Visitors	1,090,500	7%	4%
International visitors	689,500	7%	4%
Total night-time visitors		415,819	305,127

Source: Pracsys Analysis 2011

In order to calculate the total expenditure pools by floorspace type, we need to calculate the user mix multiplied by the expenditure pattern of each group. The expenditure calculations for each user group gives total expenditure for different types of retail floorspaces. Based upon modelled population projections, estimates of available pools of expenditure for each user group were developed.

The pools of expenditure currently available within the City of Cockburn were calculated based on the current population of each user group, with estimated expenditure patterns and leakages applied. Worker, day and overnight visitor expenditure patterns were assumed to correlate with ABS HHES (2009-10) retail expenditure for each night spent within the city.

Retail floorspace consists of three main elements:

- Convenience goods
- Comparison goods
- Entertainment

Convenience goods are those that are required by local residents and visitors to enable daily living activities. They are usually perishable in nature, and need to be consumed shortly after purchase, necessitating proximate supply. The nature of these goods often means that they are purchased multiple times per week.

Comparison goods are those that are generally acquired by a population outside of their area of residence. In contrast to convenience goods, they are generally more durable in nature, and therefore allow greater travelling time from residences to suppliers. Household goods such as white goods, furniture, or clothing are usually supplied by large, bulky goods warehouses outside of major residential areas.

Entertainment facilities are the final element that comprise total retail floorspace demand. In contrast to the previous two elements, this is generally a service, rather than a good, that is provided.

In order to calculate the total retail floorspace required, the total expenditure pool is converted to a demand by productivities of comparison that show a sqm demand for the three different floorspace types and therefore a demand for total retail floorspace.

The demand for floorspace type needs to be divided by the floorspace productivity and assumes a level of turnover required to sustain a major tenant at a comfortably productive level (Refer to Figure 12).

Figure 12: Floorspace Productivity Assumptions

Convenience floorspace productivity	$7,500
Comparison floorspace productivity	$6,000
Entertainment floorspace productivity	$6,000

Source: Pracsys Analysis 2011

6.2 FUTURE DEMAND RESULTS

The population-driven demand analysis findings suggest that based upon the modelled user mix and the latest yields prepared as part of the Powerstation Masterplan, the non-marina option could support 16,500sqm nla of retail and entertainment floorspace, whilst the marina option could support 19,800sqm nla of retail and entertainment floorspace.

Figure 13: Retail and Entertainment Demand Breakdown

	No Marina	Marina
Convenience floor space supported	9,000	9,400
Comparison floor space supported	4,000	4,900
Entertainment floor space supported	3,500	5,500
Total ground floor commercial floor space supported by retail and entertainment (sqm)	16,500	19,800

Source: Pracsys 2011

These yields are based upon the difference in the user mix resulting from the Powerstation Precinct's characteristics as per the assumptions described in 6.2.

7.0

7 EMPLOYMENT ANALYSIS

Envisaging the achievement of the employment goals of Cockburn Coast requires consideration of development of a unique local economy that meets the needs of a range of users and markets. Employment analysis conducted as part of this report expands upon the high-level analysis included in the DSP2, to consider the potential breakdown of employment by quality under both scenarios, and the floorspace implications of each.

A key characteristic of employment that needs to be examined within district level developments like Cockburn Coast is the breakdown of centre-based versus decentralised employment. These assume that employment becomes increasingly centralised within the development's two centres, with activities like healthcare and education being integrated into centres rather than dispersed throughout the suburb. Decentralised activities such as producer services will initially be dominant as a construction workforce builds housing and infrastructure. These activities will however decrease over time as the construction phase of the development is completed and economic activity becomes focused on the longer-term centre-based activities.

Figure 14: Centre-Based Employment Assumptions

	% of Centre-Based Employment
KICS	75%
Strategic	85%
CS/PS	70%

This breakdown of centre-based employment was applied in both scenarios as a basis for estimating centre-based employment, and the subsequent floorspace demand that may flow from this economic activity.

7.1 SCENARIO 1 – DSP2

The DSP2's stated goal of 2,750 jobs is aspirational for a development with limited potential for continued retail expansion and development (as discussed in Chapter 7). In this scenario Cockburn Coast is a high quality mixed-use urban development project that attracts a high level of regional visitation based upon a vibrant redeveloped Powerstation precinct that is recognised throughout the metropolitan area as a destination of choice for families, events and a range of experiences. High-density residential areas host a diverse and vibrant local community that successfully integrates the provision of affordable housing. The Cockburn Coast economy is connected with economic activity in surrounding areas and to some regional supply chains.

Key economic outcomes that may need to occur for Scenario 1 to be achieved include:

- Early investment in high frequency public transport that facilitates strong linkages between Cockburn Coast, Fremantle and Murdoch
- Prioritisation of investment in Cockburn Coast infrastructure by the Western Australian State Government (including but not exclusive to the switchyard relocation, Powerstation redevelopment, and public transport)
- Maturation of the Perth apartment and residential market to ensure envisaged densities are commercially viable
- Development of a strong urbanisation economy at Cockburn Coast based upon high amenity, complementary activity centres that service the needs of local residents and regional visitors and workers

- Strong economic linkages between commercial activity within Cockburn Coast's district centre, and major sub-regional economic nodes at Fremantle, Murdoch, Henderson, Latitude 32 and Kwinana through initiatives including workforce training, microbusiness incubation, and development of at least one strategic localisation economy (potentially focused on export logistics, oil and gas consulting services, or shipbuilding consulting services)

7.1.1 Employment Quality Breakdown

As per the DSP2, Scenario 1 modelling assumed the achievement of 0.25 population-driven jobs per resident within Cockburn Coast. The breakdown of this employment is shown in Figure 16, with consumer/producer services related industries providing 0.15 jobs per resident, whilst knowledge intensive consumer services provide 0.10 jobs per resident. This is similar to the breakdown for Leederville, with the activity centres containing significant convenience retail and specialty stores, but no major department or discount department stores (as per the modeling in Chapter 7), and a range of KICS services catering to a significant residential and worker population. This breakdown also would assume attraction of a major piece of KICS infrastructure such as a workforce training institution catering to approximately 150-200 jobs.

Figure 15: Scenario 1 Breakdown of Population-Driven Employment

CS/PS	0.15
KICS	0.10

Source: Pracsys 2011

An employment breakdown for Cockburn Coast that realistically achieves the employment targets set in Scenario 1 is shown in Figure 16.

Figure 16: Scenario 1 Employment Profile

DSP2	CS/PS	KICS	Strategic	Total
Centre	1,050	750	213	2,013
Decentralised	450	250	37	737
Total Jobs	1,500	1,000	250	2,750

Source: Pracsys 2011

The key characteristics of this breakdown include:

- 0.25 population-driven jobs for the residential population of 10,000
- A significant increase in centre-based employment from levels experienced in most suburbs of Perth due to the consolidation of education and healthcare activities into centres
- Achievement of the attraction of 250 strategic jobs through the development of a strategic agglomeration economy and attraction of footloose strategic enterprises to the area

7.1.2 Floorspace Implications

Figure 17 provides an indicative breakdown of floorspace demand by employment type for centre-based jobs. It is highly indicative, but serves to provide planners with yields around which to plan activity centres. Flexibility should be ensured in implementing Cockburn Coast so that these yields do not tie development to a certain economic trajectory particularly, when the economic context of the development has evolved.

Figure 17: Indicative Activity Centre Floorspace Yields Based Upon Scenario 1 Employment

Ground Floor demand by type (sqm) MP	Number of Jobs	Floorspace Required/ Employee (sqm)	Floorspace Demand (sqm)
CS/PS	1,050	25	26,250
KICS	750	30	22,500
Strategic	213	18	3,728
Total	2,013		52,478

Source: Pracsys (2011)

These yields should be considered an update to those provided in the original DSP2 document as they are based upon more detailed analysis and significantly scale back floorspace in industrial and peri-industrial uses. Based upon the latest available yields for the Robb Jetty and Powerstation precincts, current plans provide for between 59,445 and 61,165 square metres of commercial net lettable area floorspace. This activity has not been broken down into more detailed yields at this time.

Given that future local structure planning will provide detailed planning of commercial floorspace within the Robb Jetty, the Powertation and the District Centre it is reasonable to assume that these yields will be achievable over the site. (Figure 18)

Figure 18: Scenario 1 Projected Floorspace Requirements as a Proportion of Current Planned Commercial Floorspace

Total Commercial nla Proposed (with marina)	59,445
Total Commercial nla Proposed (without marina)	61,165
Projected Required Floorspace to Support DSP2 Employment Targets	52,478
% of provision of Total Required Floorspace in Robb Jetty and the Powerstation (with marina)	113%
% of provision of Total Required Floorspace in Robb Jetty and the Powerstation (without marina)	116%

Source: Pracsys (2011)

7.2 SCENARIO 2 – DSP

The District Structure Plan's stated goal of 4,080 jobs is very aspirational for a development with the locational, infrastructure and existing economic characteristics of Cockburn Coast. This Scenario assumes a significant restructure in the immediate economy of the Western Trade Coast, along with Perth as a whole, with the function of the planned district centre evolving over time to be more like that envisioned for a secondary centre in SPP 4.2. In this scenario much of the Western Trade Coast has been redeveloped with high-density residential activity, with Cockburn Coast the natural centerpiece of this development and activity. Sustained economic growth over the decades has meant that Perth's current and existing activity centres are at capacity, with strategic economic activity overflowing further and further away from major centres to niche locations such as Cockburn Coast. The redeveloped Powerstation has become a jewel of Perth and Australia with visitors the site being a major drawcard for national and international visitors.

Key economic outcomes that may need to occur for Scenario 2 to be achieved include:

- Early investment in light rail linking Cockburn Coast, Fremantle and Murdoch
- Significant public sector investment in the Powerstation Precinct based upon recognition of the potential of this asset to be an iconic location not just for residents of Perth, but also for national and international visitors. This investment includes a possible harbour, as well as ongoing management of the asset for a multitude of events, festivals and shows
- Capacity constraints at Fremantle have seen a number of major enterprises move to Cockburn Coast to expand
- Maturation of the Perth apartment and residential market has evolved to accept medium-high density living as the norm
- Development of a regionally signifcant urbanisation economy at Cockburn Coast focusing on meeting the needs of a regional population of residents, workers and visitors. Cockburn Coast is recognised as 'the place to go' to meet specific needs (including high-end retailing, weddings, etc)
- Cockburn Coast's economy interweaves with major sub-regional economic nodes at Fremantle, Murdoch, Henderson, Latitude 32 and Kwinana with major companies operating along Western Trade Coast choosing to locate offices at the site

7.2.1 Employment Quality Breakdown

Scenario 2 assumes the achievement of 0.3 population-driven jobs per resident within Cockburn Coast. This is a highly aspirational target that assumes the Powerstation becoming a hub for entertainment and recreational opportunities that activates a significant retail offer in the adjacent district centre. The breakdown of this employment is shown in Figure 19, with consumer/producer services related industries providing 0.18 jobs per resident, whilst knowledge intensive consumer services provide 0.12 jobs per resident. This breakdown is significantly higher than that which currently exists in Perth, but assumes Cockburn Coasts value proposition for retail results from the combination of an immediate catchment of 10,000 residents, a very vibrant Powerstation precinct catering to national and international visitors, and a very vibrant employment node with workers travelling from all over Perth to work in high quality jobs. Under this scenario more floorspace intensive offers such as department and discount department stores start to become viable within the district centre. KICS services will cater to a significant residential and worker population with attraction of a number of pieces of KICS infrastructure such as a workforce training institution catering to approximately 300-400 jobs.

Figure 19: Scenario 2 Population-Driven Jobs Breakdown

CS/PS	0.18
KICS	0.12

Source Pracsys 2011

An employment breakdown for Cockburn Coast that realistically achieves the employment targets set in Scenario 2 is shown in Figure 20.

Figure 20: Scenario 2 Employment Profile

District Structure Plan	CS/PS	KICS	Strategic	Total
Centre	1,260	900	918	3,078
Decentralised	540	300	162	1,002
Total Jobs	1,800	1,200	1,080	4,080

Source: Pracsys 2011

The key characteristics of this breakdown include:

- 0.3 population-driven jobs for the residential population of 10,000
- A major increase in strategic employment from Scenario 1, with 1,080 jobs require in industries creating or facilitating the export of goods or services to external markets. This equates to approximately 8% of the total new strategic employment required in the South-West sub-region for Direction 2031 employment targets to be achieved

7.2.2 Floorspace Implications

Figure 21 provides an indicative breakdown of floorspace demand by employment type for centre-based jobs to deliver the employment outcomes modelled for Scenario 2. It is highly indicative, but serves to provide planners with yields around which to plan activity centres. Flexibility should be ensured in implementing Cockburn Coast that these yields do not tie development to a certain economic trajectory, when the economic context of the development has evolved.

Figure 21: Indicative Floorspace Requirements to Achieve Scenario 2 Employment

Ground Floor demand by type (sqm) MP	Number of Jobs	Floorspace Required/ Employee (sqm)	Floorspace Demand (sqm)
CS/PS	1,260	25	31,500
KICS	900	30	27,000
Strategic	918	17.5	16,065
Total	3,078		74,565

Source: Pracsys (2011)

A significant challenge of upcoming local structure planning processes will be planning for the ability to meet these yields, whilst not unduly quarantining or restricting land uses given the aspirational nature of these targets. Based upon yields prepared to date, and with an understanding of the potential for increased commercial yields in the District Centre, as well as the mixed business zone in the north of the development, it is reasonable to assume that this employment can be accommodated (Figure 22).

Figure 22: Scenario 2 Projected Floorspace Requirements as a Proportion of Current Planned Commercial Floorspace

Total Commercial nla Proposed (with marina)	59,445
Total Commercial nla Proposed (without marina)	61,165
Projected Required Floorspace to Support DSP2 Employment Targets	74,565
% of provision of Total Required Floorspace in Robb Jetty and the Powerstation (with marina)	80%
% of provision of Total Required Floorspace in Robb Jetty and the Powerstation (without marina)	85%

Source: Pracsys 2011

The challenge of future planning processes will be configuring built form to help drive economic development, whilst allowing flexibility in outcomes to meet the changing context of the sites over the extended life of the project.

This may entail actions ranging from ensuring flexibility in built form, encouraging adaptive re-use and ensuring land-use zonings and structure plan guidelines are flexible enough to remain relevant as Cockburn's context changes.

8.0

8 COCKBURN COAST EMPLOYMENT INITIATIVES

Within the existing planning that has occurred for Cockburn Coast, a number of initiatives and interventions have consciously been proposed that will impact upon the achievement of Scenario 1 and 2 employment goals.

8.1 SOUTH FREMANTLE POWERSTATION

The South Fremantle Powerstation is the natural differentiator for Cockburn Coast. It provides identity for the site, as well as a historic asset that can be leveraged to generate significant urbanistion economies based upon attraction of visitors from regional (and potentially national and international) markets. Currently, planning for the powerstation is considering two plans, a harbour and non-harbour option. Both of these seek to leverage the asset and build upon it to deliver something unique to Perth.

The non-harbour option will likely provide a high amenity sub-regional attractor that will be a destination for leisure, events and recreation for users primarily from south of Perth. As such it is aligned with the employment goals of Scenario 1.

By contrast the harbour option provides an additional asset around which to build a value proposition for enterprises and users. If the harbour successfully positions itself as a marine-based destination for users from Perth and Fremantle, as well as a yacht club, ferry and even cruise ship destination then the prospect of achievement of Scenario 2 becomes increased.

Critical to the success of the Powerstation redevelopment will be an entrepreneurial business case that manages the needs of a range of public and private sector stakeholders, and facilitates financial outcomes that deliver the investment and development required for the vision to be achieved. This includes finding a solution to the relocation of the adjacent switchyard.

8.2 ROBB JETTY COASTAL VILLAGE

Planning for Robb Jetty Coastal Village envisages an intense, vibrant precinct that provides for the daily convenience needs of Cockburn Coast's residential population. Critical to the creation of a daily-user focused urbanisation economy at this location will be it's strong relationship with the surrounding residential catchment, and the ability of the centre to facilitate multi-purpose trips where a range of transactions (economic and social) occur each visit. As such the integration of the school into the site, as well as the intensification of activity into a defined area between the school and the rail line will be critical to the development and maturation of the centre. Landcorp is currently facilitating the preparation of such a business case.

8.3 PUBLIC TRANSPORT INFRASTRUCTURE

Planning for a high frequency public transport spine through Cockburn Coast has the potential to drive significant investment and economic activity if it is supported by other targeted economic development initiatives that facilitate the inflow of workers rather than the outflow of commuters. Whilst urbanisation economies can be shown to be facilitated to a greater extent

by light rail rather than high-frequency bus services, the critical feature of this line will be connection to not only Fremantle, but also the Murdoch Activity Centre.

There has been significant study of the potential for such links including the South-west Metro Corridor Study which helped inform the Public Transport Authority's 20-year plan.

8.4 PLANNING FOR CAPACITY AND FLEXIBILITY

There is significant opportunity within existing planning for Cockburn Coast for development to occur based upon the context and demands of the day. This occurs through the designation of the mixed-business zone in the north, as well as transitionary spaces of mixed use development surrounding activity centres. These zones will be controlled for uses that should be consolidated within the centres (retail in particular).

The natural staging of Robb Jetty and the Powerstation precinct will allow for ongoing adaptation of land-uses and activities to meet the economic context of the day.

9.0

9 IMPLEMENTATION AND GOVERNANCE

The successful implementation of the strategy is reliant upon the delivery of the key objectives required to support the development of the Cockburn Coast economy. The implementation plan discusses the economic development priorities for Cockburn Coast and suggests a governance mechanism capable of producing the optimal outcomes required.

9.1 PRIORITIES FOR ECONOMIC DEVELOPMENT

9.1.1 Resolution for Powerstation and Switchyard

Critical to the achievement of the strategy is the redevelopment of the Powerstation site. The ongoing uncertainty surrounding a preferred solution for the Powerstation refurbishment and relocation of the switchyard is a major constraint to future investment for Cockburn Coast. Ongoing planning for, and development of, Cockburn Coast requires a proactive approach to managing and resolving these uncertainties and risks if sufficient public and private sector investment is to be attracted to the site.

The Powerstation site is a catalyst for investment as it provides Cockburn Coast with a major piece of infrastructure to act as an anchor for activity. The Powerstation refurbishment would be a driver for identity, investment and attraction of a wider range of users to the site by improving the value proposition of Cockburn Coast and creating a sustainable competitive advantage for the area. The increased attraction of residents, visitors, workers and enterprises and associated transactions can also create the activity needed for the development of urbanisation and localisation economies in Cockburn Coast.

The immediate future focus of employment generation and economic development at Cockburn Coast should be in facilitating the optimal outcome for this site. This includes settling on a preferred option for a Powerstation masterplan and the prioritisation of investment for the site and the switchyard through an entrepreneurial business case.

9.1.2 Activity Centre Planning

The successful development of Cockburn Coast will require detailed activity centre planning for the Powerstation and Robb Jetty precincts. The Powerstation is the natural differentiator for Cockburn Coast. It provides identity for the site, as well as a historic asset that can be leveraged to generate significant urbanistion economies based upon attraction of visitors from regional (and potentially national and international) markets. Planning for Robb Jetty Coastal Village envisages an intense, vibrant precinct that provides for the daily convenience needs of Cockburn Coast's residential population.

Following on from the preparation and approval of strong business cases for these sites should be an activity centre planning process to create detailed local structure plans which are supportive of the Cockburn Coast vision. This includes:

- Refining the site yields
- Assessing local economic activation using six principles of economic activation:
    1. Purpose of Place – Define the purpose of place for its intended user mix
    2. Arrival Points – Identify where various user types arrive and by what means

3. Origins – Locate the car parking and transport nodes
4. Exposure – Pedestrian thoroughfares between origins and destinations drive street-level activation
5. Destinations – Major attractions that draw users to the centre
6. Strategic Sites – Identify strategic sites where uses should by controlled by retaining tenure or specific use controls

- Assessing activity centre performance using the criteria below:
  1. Diversity
  2. Intensity
  3. Employment
  4. Accessibility
  5. Urban form
  6. Economic activation
- Addressing the need for high frequency public transport within the precincts, and Cockburn Coast as a whole, to drive significant investment and economic activity.

The local structure planning process should provide a logical and robust framework for the future subdivision and site development within the Robb Jetty and the Powerstation precinct.

9.1.3 Staging and Brand Development

Staging and brand development is important for timing the progress of key sites to maximise returns and fulfilling the vision for Cockburn Coast.

The appropriate staging of Cockburn Coast will consider the role of strategic sites in promoting the economic maturity of the development. Local structure plans need to identify and control strategic sites integral to the growth and maturity of such areas as Robb Jetty and the Powerstation precinct. For example, staging needs to recognise the importance of the Powerstation as the natural differentiator and early activity generator for Cockburn Coast. The staging of Cockburn Coast also needs to consider the release of retail and commercial land only when there is a suitable catchment to support these uses.

Staging plans should not limit the transition or adaption of uses. There is significant opportunity within existing planning for Cockburn Coast for development to occur based upon the context and demands of the day. The natural staging of Robb Jetty and the Powerstation precinct will allow for ongoing adaptation of land-uses and activities to meet the economic context for the development.

A structured marketing and brand development campaign will continue to be a high priority for Cockburn Coast if it is to deliver the optimal product for economic development. This requires that the vision for the project is adhered to and promoted as strongly as possible.

Deliberately developing an economic development brand for Cockburn Coast will require ongoing initiatives in public relations and marketing focused upon communicating the vision, initiatives being undertaken, resources attracted, and milestones achieved. Brand development should not focus solely on residents and businesses within Cockburn and the South-West corridor, but also with local,

state and federal decision makers, key persons of influence and strategic industry decision makers.

9.2 GOVERNANCE

A key factor missing from economic development strategies in Western Australia is the development of a robust governance structure to deliver targeted, tangible and accountable outcomes. Economic development implies active creation of quality employment through targeting strategic industry with a nationally and internationally competitive value proposition. A coordinated governance structure is required to interact effectively with dynamic commercial value chains by leveraging financial and human resources to produce optimal outcomes.

Landcorp will continue to play a constructive role in leading the planning and development of Cockburn Coast, in a manner positively impacting upon the economic development of the south-west sub region. When transitioning from planning to delivery phases of works the project managers, the City of Cockburn, and individual stakeholders will need consistently refer to the vision articulated for Cockburn Coast in the DSP and MAsterplan documents as the guiding principles around which decisions should be made.

In their role as project managers LandCorp would also oversee the priorities for economic development (section 1.1) including:

- The development of an entrepreneurial business case for the Powerstation refurbishment and switchyard relocation to provide a practical pathway for public sector investment and risk management across all involved agencies – including a proposed land-assembly strategy.
- The preparation of detailed local structure plans for the key project areas of Robb Jetty and the Powerstation precinct, which will provide a logical and robust framework for the future subdivision and site development in a manner that ensures intense, diverse and well activated areas
- The attraction of infrastructure for Cockburn Coast such as major public transport nodes, or major public infrastructure to create a sustainable competitive advantage for the project. This includes LandCorp being the vehicle for actively identifying and pursuing funding for infrastructure and other opportunties through initiatives such as the Suburban Jobs Program.

LandCorp possesses the expertise and experience needed to oversee the implementation of the strategy and the Cockburn Coast project as a whole. This includes the ability to attract and allocate resources to significant initiatives for Cockburn Coast and to continue consistent engagement with the public and private stakeholders vital to the project.

10.0

10 CONCLUSION

Cockburn Coast has the potential to be a unique place within the urban fabric of Perth, with high amenity, higher density residences integrated into a historic coastal environment characterised by a vibrant, diverse range of activities. Achievement of this vision relies on a range of factors internal and external to the development. The Cockburn Coast DSP2 has sought to address the factors within the control of the development, whilst ensuring flexibility to address the future context of the site. The reality of employment within Cockburn is that it will be largely impacted upon by the surrounding economic development of Fremantle and Murdoch. This may dampen employment growth if state and private infrastructure investment is diverted away from Cockburn Coast, whilst it may present opportunities for Cockburn Coast to leverage capacity constraints and localisation economies at these locations.

Analysis described in this paper supports the scale and configuration suggested in the DSP2, with sufficient floorspace being provided for, and the prospect of development of unique and multiple value propositions around which economic development may occur.

Overall, the successful redevelopment of the South-Fremantle Powerstation will be critical to the achievement of either employment scenario, with it being a driver for identity, investment and attraction of a wider range of users to the site. The immediate future focus of employment generation and economic development at Cockburn Coast therefore should be in facilitating the optimal outcome for this site. This will require balancing the needs of individual stakeholders including LandCorp, Western Power, Verve, the Heritage Council, the WAPC and the City of Cockburn with the vision articulated for the site in the District Structure Plan and DSP2.

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ROBB JETTY LSP

BRIEFING NOTE

OCTOBER 2012

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1.0

1 EXECUTIVE SUMMARY

The revitalisation of Cockburn Coast has sought to recognise its unique location within Perth's value chains, whilst envisaging a more urban context for the site. Planning for Robb Jetty envisages an intense, vibrant main street that provides for the daily convenience needs of Cockburn Coast's residential population.

The local structure planning (LSP) phase for the Robb Jetty neighbourhood centre seeks to expand upon previous planning by providing the framework for the coordinated provision of services, infrastructure, land use and development of the area. The purpose of this briefing note is to guide the planning of the LSP by informing the project team of the types and scale of activity proposed for Robb Jetty that would be considered feasible, and in alignment with the Cockburn Coast vision.

It is expected that the Robb Jetty precinct will support 10,800 m^2 of retail floorspace and 3,700 m^2 of commercial floorspace. Although these revised floorspace figures are scaled down from previous estimates it is proposed that a modest undersupply of retail floorspace is preferable to an oversupply as it will provide the tenancies with the opportunity to achieve higher floorspace productivities and improve the overall vitality of the centre.

The floorplates depicted for the Robb Jetty precinct suggest a mix of primarily retail land uses (e.g. supermarket and specialities) integrated with a diverse range of non-retail uses (e.g. gym, restaurant, medical centre and bank) focused on serving the needs of the immediate catchment. The floorplates represent different land uses which may be located within the LSP area if it is to achieve the vision established for Robb Jetty.

An assessment of the economic activation matters for the Robb Jetty precinct identified several key issues. These were the integration of the school into the site, achieving activation across 18 hours of the day, promoting pedestrian movement between the centre and the coast, reinforcing the complimentary roles of the centre and the coast, and the integration of a proposed rapid transit route into the main street.

The Cockburn Coast District Structure Plan (DSP) established an employment target 4,080 jobs, with DSP2 having a target of 2,750 jobs. The Cockburn Coast Economic Development Strategy recognises the ranges in these targets, with the DSP being considered an optimal employment outcome, and the DSP2 target being considered a minimal achievement. As such the employment analysis for the three LSP areas of Robb Jetty, Hillside/Emplacement and Powerstation is seeking to achieve total employment outcomes of at least 2,750 jobs in Cockburn Coast.

The analysis indicates that Robb Jetty will likely contribute 780 jobs (28%) toward the Cockburn Coast total. Of these jobs, around 97% will be in population-driven activities with the remaining 3% consisting of strategic jobs. The majority of these jobs (62%) will be centralised along the main street with the rest (38%) distributed throughout the LSP area. This is seen as appropriate for a centre that will serve a primarily population-driven function for the residential catchment of Cockburn Coast.

Additional population-driven and strategic employment within Robb Jetty and throughout Cockburn Coast may be driven by establishing a sustainable competitive advantage to maximise the development of urbanisation and localisation economies. In this regard, the importance of the Powerstation precinct in achieving the overall employment targets cannot be overstated as it will be required to accommodate around 62% of the total jobs for Cockburn Coast.

2.0

2 INTRODUCTION

The revitalisation of Cockburn Coast has sought to recognise its unique location within Perth's value chains, whilst envisaging a more urban context for the site. Planning for Robb Jetty envisages an intense, vibrant precinct that provides for the daily convenience needs of Cockburn Coast's residential population. Critical to the creation of a daily-user focused urbanisation economy at this location will be its strong relationship with the surrounding residential catchment, and the ability of the centre to facilitate multi-purpose trips where a range of transactions (economic, social and environmental) occur each visit.

This briefing note for the Robb Jetty precinct needs to be considered in the greater project context. It draws upon a comprehensive planning and development framework for Cockburn Coast including:

- District Structure Plan (DSP)
- DSP 2
- Economic Development Strategy

Planning for the Robb Jetty activity centre has entered the more detailed local structure plan (LSP) phase. This phase is informed by the documents above and seeks to expand upon them by providing the framework for the coordinated provision of services, infrastructure, land use and development of the area.

The purpose of this briefing note is to guide the planning of the LSP by informing the project team of the types of activity proposed for the Robb Jetty neighbourhood centre. The briefing note does this by providing:

- Potential retail and commercial floorspace for the LSP area
- Indicative floorplates to guide planning of retail and commercial land uses
- Discussion of economic activation principles and the specific implications for the Robb Jetty LSP area
- Potential employment for the LSP area

3.0

3 RETAIL AND COMMERCIAL FLOORSPACE

The Cockburn Coast Economic Development Strategy establishes the population-driven demand for retail and commercial floorspace across the Robb Jetty and Power Station precincts.

Floorspace demand is derived from modelled pools of expenditure and floorspace productivity thresholds of defined floorspace types. The Cockburn Coast model assumed that productivity across all areas will improve over time, indicating that businesses within the project area will become more productive per square metre of floorspace as the local economy matures and user population expands. This reflects activity centres with higher levels of activation that effectively capture greater levels of expenditure within the same provisions of floorspace.

This section of the briefing note contains a summary of the future floorspace demand projections and provides indicative floorplates to assist planning across commercial land use in the activity centre.

3.1 FLOORSPACE DEMAND

Figure 1: Floorspace Demand for Robb Jetty

Retail Floorspace (m^2)	12,500
Commercial Floorspace (m^2)	42,000*

* Describes the total commercial floorspace across Cockburn Coast. This is distributed amongst the three LSP areas of Robb Jetty, Powerstation and Hillside/ Emplacement.

Source: Pracsys 2011

3.1.1 Retail Floorspace

The demand analysis findings in Figure 1 suggest that, based upon the modelled user mix, Robb Jetty could provide approximately 12,500 m^2 of retail floorspace. Retail demand has generally been focused within the Robb Jetty and Power Station precincts. No retail demand has been allocated to Hillside/ Emplacement precinct as activity in this area is more likely to be based around knowledge intensive consumer services (e.g. population-driven industrial and strategic office space) which will consume a proportion of the total commercial floorspace.

3.1.2 Commercial Floorspace

Total estimated commercial floorspace across Cockburn Coast is expected to be in the order of 42,000 m^2. The commercial floorspace will be distributed amongst the three LSP areas of Robb Jetty, Power Station and Hillside/ Emplacement. The population-driven demand analysis suggests that approximately 3,700 m^2 of commercial floorspace could be supported at Robb Jetty. The population-driven commercial floorspace will be accompanied by additional demand for strategic uses increasing the consumption of commercial floorspace in Robb Jetty.

3.1.3 Strategic Uses

Demand for strategic floorspace is measured independently of population-driven demand as it relies on the existence of other factors in addition to the presence of users in an area (e.g. residents, workers, visitors and firms). An example of this would be businesses seeking to gain a competitive advantage by locating in the Robb Jetty area.

3.2 FLOORPLATES

To assist planning in the Robb Jetty area the following floorplates have been suggested to guide the configuration of potential land uses. The floorplates have been developed utilising benchmark floorspace requirements for various retail and commercial land uses across Western Australia. The floorplates include such uses as supermarkets, specialties, entertainment/ tavern, offices, medical, and restaurant/café.

3.2.1 Retail Land Uses

Figure 2 suggests the amount of floorspace which can potentially be allocated for retail land uses in the Robb Jetty area. Although the modelling suggests that there will be demand for 12,500 m^2 of retail, these centres tend to grow and develop systematically. Without the development of another anchor tenant such as a discount department store, which is inappropriate for a centre at this level in the hierarchy, or the development of larger supermarkets, which are likely to be inappropriate for main street development, it will be difficult to accommodate this level of floorspace at Robb Jetty. A modest undersupply of retail floorspace is preferable to an oversupply as it will allow the tenancies the opportunity to achieve higher floorspace productivities and improve the overall vitality of the centre.

Figure 2: Retail Land Use Floorplates

Retail Land Uses	Total Floorspace Required (m^2)	Indicative Number of Tenancies
Supermarkets	5,000	1 tenancy at 5,000 m^2 (Option 1) 2 tenancies at 2,500 m^2 each (Option 2) 2 tenancies at 3,200 m^2 & 1,800 m^2 (Option 3)
Specialty	5,900	50 tenancies at 120 m^2 each
Total Retail	10,800	

Source: Pracsys 2012

Based on an analysis of neighbourhood centres in the Perth and Peel region, it is understood there is a positive correlation between the scale of a supermarket and the quantity of specialty floorspace that can be supported. On average, a neighbourhood centre can be expected to achieve a ratio of supermarket floorspace to specialty floorspace of 1.00:1.19. That is a 1,000 m^2 supermarket can be expected to support 1,190 m^2 of other retail activity. The mix proposed in consistent with this result.

Typically a neighbourhood centre is anchored by only one supermarket, however some larger neighbourhood centres do incorporate two supermarket tenants. Spatially, the supermarket floorspace will be distributed across one or two tenancies and configured as either:

- A single full line supermarket (5,000 m^2)
- Two equal size supermarkets (2,500 m^2 each)
- A large supermarket (3,200 m^2) and a smaller independent supermarket (1,800 m^2)

In the context of a main street development, some configuration of two tenancies is preferable.

In terms of speciality retail floorspace, the number of tenancies that can be accommodated depends of the floorspace requirements of the specific tenants. The average floorspace of a specialty store in a neighbourhood centre in Perth and Peel is 117 m^2. On this basis, approximately 50 specialties can be expected to be accommodated in Robb Jetty.

3.2.2 Commercial Land Uses

Although a diversity target is not specified for neighbourhood centres in State Planning Policy 4.2: Activity Centres for Perth and Peel (SPP 4.2), it is possible and desirable to incorporate a diverse range of non-retail uses within these centres. Figure 3 suggests the amount of floorspace which can potentially be allocated for commercial land uses in the Robb Jetty area. The proposed tenant mix is focused on serving the needs of the immediate catchment, which is consistent with the centre's position in the activity centres hierarchy.

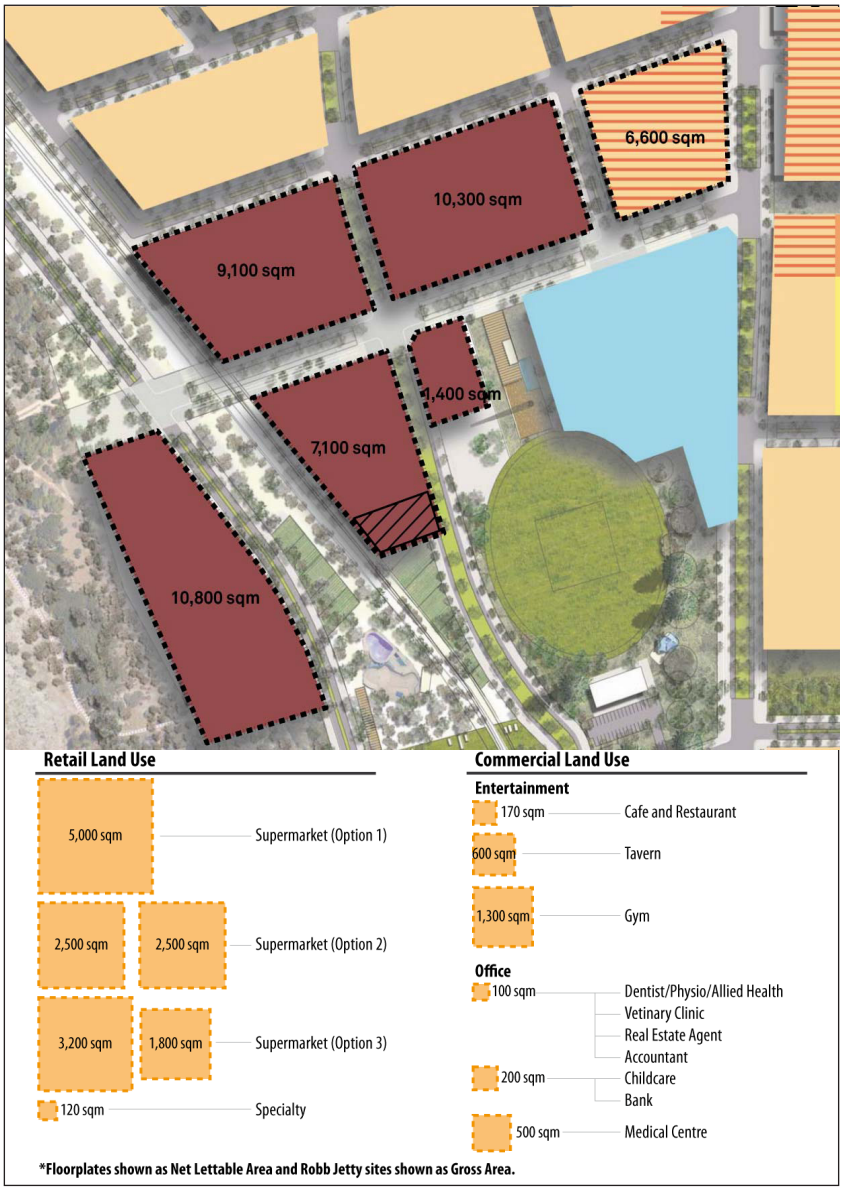
Figure 3: Commercial Land Use Floorplates

Commercial Land Uses	Total Floorspace Required (m^2)	Indicative Number of Tenancies
Entertainment		
Café and Restaurant	500	3 tenancies at 170 m^2 each
Gym	1,300	1 tenancy
Tavern	600	1 tenancy
Office		
Medical Centre	500	1 tenancy
Childcare	200	1 tenancy
Dentist/Physio/Allied Health	100	1 tenancy
Veterinary Clinic	100	1 tenancy
Real Estate Agent	100	1 tenancy
Bank	200	1 tenancy
Accountant	100	1 tenancy
Total Commercial	3,700	

Source: Pracsys 2012

The figures described in the tables above suggest the total floorspace requirements for different land uses across Robb Jetty. These recommendations can be divided into a number of individual floorplates based on the indicative number of tenancies proposed for the area.

Figure 4: Floorplates for Robb Jetty LSP



Source: Pracsys 2012

3.2.3 Floorplates for Robb Jetty LSP

The floorspace and tenancy information provided in the previous section has been used to spatially depict a series of floorplates as shown in Figure 4. The diagram below has been produced as a guide to assist the spatial planning of the Robb Jetty LSP area.

The study area focuses on the sites highlighted in the main street and beachside plaza as this is where the majority of Robb Jetty's retail and commercial floorspace will be concentrated. The map also demonstrates how important the planning of the school site, highlighted light blue, is for the LSP process.

The floorplates, shown as orange blocks, represent different land uses as segments of floorspace which may be located within the highlighted sites if the vision established for Robb Jetty is to be achieved. These floorplates can be arranged in a variety of ways however the configuration must be consistent with economic activation, urban design, and traffic management principles.

The purpose of the floorplates is to provide an indication of the amount of floorspace required in Robb Jetty and describe the various expected land uses. They also allow the project team to envision how these floorspace types may be configured according to size of the suggested floorplates.

4.0

4 ECONOMIC ACTIVATION

Through the redevelopment process, and with ongoing management, there is the potential for Robb Jetty to be an intense, vibrant precinct that provides for the daily convenience needs of Cockburn Coast's residential population. Activating the Robb Jetty precinct will involve linking the residents and visitors to core activity precincts; concentrating retail tenancies to encourage life and vibrancy; maximising possible modes of transport for easy access; and minimising access routes to channel traffic past shop fronts.

Pracsys has developed six principles of economic activation into a coherent framework to apply to urban renewal projects. This section of the briefing note provides a description of Pracsys' six principles of economic activation and highlights some of the key issues to be considered when preparing Robb Jetty LSP.

4.1 SIX PRINCIPLES OF ECONOMIC ACTIVATION

From a centre design and ongoing management perspective, there are certain economic activation principles that can be implemented to ensure the place is as user friendly as possible to maximise the number and length of visits, and the quality of transactions that occur on each visit.

Economic activation is defined as the frequency and concentration of social and economic transactions carried out by the diverse user groups of a place. A successful place must understand what its users need and want in order to provide an environment that both attracts and retains people.

The predicted user mix for the Robb Jetty precinct will be residents, workers and visitors. The population and expenditure of each group forms Robb Jetty's economic base and drives the commercial vitality of office and retail tenancies.

Pracsys' six principles of economic activation are outlined below.

1. Purpose of Place

- Address the question – what does the Robb Jetty precinct represent to its target user population (residents, workers, visitors)?
- Enhance land economics by using design to maximise frequency and concentration of transactions

2. Access – Arrival Points

- Decisions about access begin 5 km from the place
- Do not allow transport networks to bypass the place – does the design funnel people and traffic into the core?
- Congestion and mix of transport nodes is good
- Arrive at the "front door" of the place, not around the back

3. Origins – Car Parking and Transport Nodes

- Parking is the driver of pedestrian movement
- Strategic distribution of car parks and transport nodes will maximise pedestrian movement
    - o Location is more important than numbers
    - o Space the car parks around the centre

- Street parking is important for commercial areas
    - o Charge no fees
    - o Relax time limits

4. Exposure – Pedestrian Movement

- Economic activation is driven by frequency and concentration of transactions
- Channel movements
    - o Concentrate transactions by pushing people past as many shop windows as possible
    - o Rents and sales are directly related to pedestrian traffic (e.g. Butcher will pay three-times the rent to be at supermarket entry)
- Minimise possible routes from origin to destination points (e.g. car park to main attraction) as architectural "permeability" is not always a good thing

5. Destinations – Major attractions

- Identify main destination – what will bring users into the core?
- Assess user behaviour
    - o Number of visits
    - o Timing of visits (time of day, seasonality)
- Give major destinations special treatment
    - o Understand what they need
    - o Build centre around them
- Amplify the impact of attractions by creating support amenity and infrastructure to maximise frequency, length of stay and expenditure

6. Control – Strategic Sites

- Tenure control is vital for overall development success – which sites (supporting what uses) must stay in public ownership?
- Identify active frontages and take control of key sites
- Corner sites drive uses on either side
- Not all areas in a place need to be active – be selective
- Have a plan and stick to it

Following these six principles, Pracsys has identified some initial issues which will need to be considered in order to maximise the economic activation of the project area.

4.2 IMPLICATIONS FOR ROBB JETTY

Planning for the Robb Jetty LSP area requires careful consideration of key economic activation factors critical to the development and maturation of the centre.

4.2.1 Integration of the School

The integration of the school into the site, as well as the intensification of activity into a defined area between the school and the rail line, will be critical to the success of the centre.

4.2.2 Diurnal Activation

It is envisioned that Robb Jetty will be an intense, vibrant precinct providing for the daily convenience needs of Cockburn Coast's residential population while also providing an additional level of activity for residents, employees and visitors. Targeting an 18 hour

activation period, or diurnality, needs to be an important goal when planning for the LSP area. Achieving diurnality requires ensuring an appropriate mix of convenience, office and entertainment uses is provided.

4.2.3 Centre-Coast Relationship

The attraction of people from the centre to the coast (and vice versa) is a key challenge for the planning and design for Robb Jetty. The main street will generally accommodate local retail needs, and will include some small scale offices, apartments, restaurants and cafes, but should also lead people along an activated street environment to the beach. Pedestrian movement will therefore be an important consideration when linking the coast and the centre.

4.2.4 Robb Jetty Plaza

The Robb Jetty Plaza, located adjacent to the beach, requires a strong focus on users and function. As a key destination of Cockburn Coast the plaza should provide an additional level of activity to compliment the location's role as the day to day shopping district for residents, employees and visitors alike. As such the plaza needs to provide a flexible space for activities such as markets, alfresco dining, concerts, outdoor cinema, performances and seasonal festivals to occur.

4.2.5 BRT Integration

The integration of a proposed rapid transit route intersecting with the main street should also be an important component of the LSP. The proposed rapid transit alignment will have a designated stop adjacent to the Robb Jetty main street with the aim of focusing activity in the vicinity and maximising access to nearby services.

5 EMPLOYMENT

The Cockburn Coast District Structure Plan (DSP) and DSP2 have produced a range of employment targets based on differing assumptions.

Figure 5: DSP and DSP2 Employment Targets

Document	Employment Target
District Structure Plan (DSP)	4,080
DSP2	2,750

Source: Cockburn Coast District Structure Plan & Cockburn Coast Masterplan 2011

The Cockburn Coast Economic Development Strategy recognises the ranges in these targets, with the DSP being considered an optimal employment outcome, and the DSP2 target being considered a minimal achievement. As such the employment analysis for the three LSP areas is seeking to achieve total employment outcomes of at least 2,750 jobs in Cockburn Coast.

The employment profile for Robb Jetty establishes the LSP area's contribution toward the DSP2 employment target and discusses the role the area plays in the broader context of the Cockburn Coast development. The planning implications of potential gaps in the employment estimates and the DSP/DSP2 targets are also discussed.

5.1 EMPLOYMENT ANALYSIS

The following table contains the estimated employment distribution for Robb Jetty LSP. The assumptions and methodology used to determine these employment figures are described in in Appendix 1.

Figure 6: Robb Jetty LSP Employment Distribution

	Population-driven Jobs	Strategic Jobs	Total Jobs
Centre-based Jobs	465	21	486
Decentralised Jobs	296	0	296
Total Jobs	761	21	782

Source: Pracsys 2012

5.2 EMPLOYMENT CONTEXT

Employment in Robb Jetty will primarily be centralised within an intense, vibrant main street. The main street will provide for the daily convenience needs of Cockburn Coast's residential population while also incorporating some small scale offices, apartments, restaurants and cafes.

The main street activity will continue to flow through to the Robb Jetty plaza. This coastal plaza will complement the location's role as the day-to-day shopping district for residents, employees and visitors alike. The plaza will be a flexible space for activities such as markets, alfresco dining, concerts, outdoor cinema, performances and seasonal festivals to occur.

The role of Robb Jetty is to create a daily-user focused urbanisation economy having a strong relationship with the surrounding residential catchment. Achieving this requires a primarily population-driven employment profile including some knowledge intensive consumer services such as education and healthcare.

The Robb Jetty profile will include some decentralised employment (e.g. home-based businesses and residential construction) dispersed throughout the LSP area's residential

catchment. This activity is likely to become more centralised over time as the employment profile for Robb Jetty matures.

The majority of Cockburn Coast's strategic employment will be located within the Powerstation precinct as this major piece of infrastructure will act as an anchor for developing urbanisation and localisation activities. It is expected that some strategic employment will spill over into the surrounding LSP areas of Robb Jetty and Hillside/ Emplacement. However, no decentralised strategic employment has been allocated to Robb Jetty as any such spill over is expected to be based in the main street.

5.3 IMPLICATIONS FOR PLANNING

5.3.1 DSP and DSP2 Employment Scenarios

The Cockburn Coast Economic Development Strategy establishes two scenarios under which the development may achieve the employment targets set by the DSP and DSP2.

The District Structure Plan's stated goal of 4,080 jobs is very aspirational for a development with the locational, infrastructure and existing economic characteristics of Cockburn Coast. This scenario assumes a significant restructure in the immediate economy of the Western

Trade Coast, along with Perth as a whole, with the function of the planned district centre evolving over time to be more like that envisioned for a secondary centre in SPP 4.2.

The DSP2's refined employment goal of 2,750 jobs is aspirational for a development with limited potential for continued retail expansion and development. In this scenario Cockburn Coast is a high quality mixed-use urban development project that attracts a high level of regional visitation based upon a vibrant redeveloped Powerstation precinct that is recognised throughout the metropolitan area as a destination of choice for families, events and a range of experiences. High-density residential areas host a diverse and vibrant local community that successfully integrates the provision of affordable housing.

5.3.2 Bridging the Employment Gap

The divergence of the DSP and DSP2 employment targets is a product of these two possible scenarios for Cockburn Coast. Achieving the refined employment target of DSP2, and indeed exceeding this to produce an outcome closer to the DSP target, relies on several factors discussed in the Cockburn Coast Economic Development Strategy:

- Cockburn Coast needs to use its proximity to major export value chains to develop strategic relationships with surrounding logistics and industrial infrastructure and other activity centres
- The LSP precincts, particularly Robb Jetty and Powerstation, need to ensure that the configuration of population-driven activities maximises the quantity and quality of transactions critical to the development of urbanisation economies
- Over time strategic activities may overflow from surrounding areas, such as Fremantle, into Cockburn Coast. The location of the development in relation to major infrastructure, value chains and activity centres may allow for leverage of a significant amount of effective density

- The development of a competitive advantage can provide the anchor around which a strong localisation economy can grow, increasing the level of strategic economic activity in the area. Localisation economies are the result of a number of firms and enterprises in complementary industries and supply chains locating in the same area
- Cockburn Coast will need to mature from a population-driven centre servicing basic consumer needs to a centre that services the higher order needs of the population while attracting some strategic industry

5.3.3 Distribution of LSP Employment

The analysis for the three LSP areas of Robb Jetty, Hillside/Emplacement and Powerstation seeks to achieve a total employment outcome of at least 2,750 jobs in Cockburn Coast. This employment figure is considered to be a baseline target upon which further opportunities can be developed.

Robb Jetty is expected to contribute approximately 780 jobs (28%) toward the DSP2 employment target for Cockburn Coast, the majority of these being population-driven. With Hillside/Emplacement expected to contribute approximately 265 jobs (10%), the Powerstation precinct will likely contribute the remaining 1,700 (62%) of jobs for Cockburn Coast.

Once again the majority of jobs in the Powerstation precinct will be population-driven. As discussed, strategic jobs will eventually need to make up a greater share of the total jobs but population-driven jobs will still dominate. Up to 90% of jobs in the Powerstation precinct will be centralised with very few jobs dispersed amongst the LSP area.

The role of the Powerstation precinct will be critical if Cockburn Coast is to achieve the overall employment targets for DSP and DSP2. The ongoing uncertainty surrounding a preferred solution for this site presents a constraint for development in the short term. However, this delay also presents an opportunity for mid-to-long term planning as the development of the Robb Jetty and Hillside/Emplacement profiles it will help to shape the Powerstation's future role.

5.3.4 Importance of the Powerstation Precinct

The importance of Powerstation cannot be overstated if Cockburn Coast is to achieve the employment targets set by DSP2 or even the DSP. The Powerstation site is a catalyst for investment as it provides Cockburn Coast with a major piece of infrastructure to act as an anchor for activity. The Powerstation refurbishment would be a driver for identity, investment and attraction of a wider range of users to the site by improving the value proposition of Cockburn Coast and creating a sustainable competitive advantage for the area. The increased attraction of residents, visitors, workers and enterprises and associated transactions can also create the activity needed for the development of urbanisation and localisation economies in Cockburn Coast.

The immediate future focus of employment generation and economic development at Cockburn Coast should be in facilitating the optimal outcome for this site.

6.0

6 CONCLUSION

Cockburn Coast has the potential to be a unique place within the urban fabric of Perth, with high amenity, higher density residences integrated into a historic coastal environment characterised by a vibrant, diverse range of activities.

The analysis in this paper describes the scale and configuration of floorspace required for Robb Jetty if it is to achieve the employment outcomes established by DSP2. It also demonstrates that the employment profile for Robb Jetty is consistent with its role as an intense, vibrant precinct that provides for the daily convenience needs of Cockburn Coast's residential population.

Overall, the success of the development is strongly linked to the outcome of the Powerstation precinct as it provides a driver for identity, investment and attraction of a wider range of users to the site. The Robb Jetty LSP area has the ability to support the Powerstation precinct and broader vision for Cockburn Coast by being a daily-user focused urbanisation economy with strong links with the surrounding residential catchment.

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APPENDIX 1: EMPLOYMENT ANALYSIS

The following analysis seeks to refine the high level employment profile from DSP2 into estimated employment figures for each of the three Cockburn Coast LSP areas.

Figure 7: DSP2 Employment Profile

	CS/PS Jobs	KICS Jobs	Strategic Jobs	Total Jobs
Centre Jobs	1,050	750	213	2,013
Decentralised Jobs	450	250	37	737
Total Jobs	1,500	1,000	250	2,750

Source: Pracsys and Hassell 2012

Using the DSP2 employment profile as the basis for analysis, the following assumptions were applied to distribute the total Cockburn Coast employment figures amongst the LSP areas. For concise analysis, consumer-producer services (CS/PS) and knowledge intensive consumer services (KICS) have been grouped together as "population-driven employment" from this point forward.

POPULATION-DRIVEN AND STRATEGIC EMPLOYMENT

The total employment profile for Robb Jetty is first divided into two categories of employment quality. These categories are population-driven and strategic employment.

Population-driven employment may be defined as employment resulting from economic activity servicing the needs of a particular population. This activity is oriented to meet the needs of that population, including; retail and hospitality, construction and industrial services, civic, healthcare and education, and the business-to-business supply chains that service these industries. This type of activity will largely occur in the presence of a population.

By contrast, strategic employment results from economic activity focused on the creation and transfer of goods and services to an external market. Employment resulting from this activity may be distinct, in industries where there is little or no local demand (e.g. iron ore/ uranium mining), or in the same industries as population-driven activity but with a different focus (e.g. manufacture of food/wine, higher education). Strategic employment does not automatically happen, it results from an enterprise actively seeking to meet the needs of an external market and developing a competitive advantage in meeting these needs. Strategic employment is therefore highly variable across different locations.

CENTRALISED AND DECENTRALISED EMPLOYMENT

The total employment profile for Robb Jetty is then divided into two further categories of employment concentration. These categories are centralised and decentralised employment.

The employment analysis assumes that employment will become increasingly centralised within the development's two centres, Robb Jetty and Powerstation, with activities like healthcare and education being integrated into centres rather than dispersed throughout the suburb. Decentralised activities such as producer services will initially be dominant as a construction workforce builds housing and infrastructure. These activities will however decrease over time as the construction phase of the development is completed and economic activity becomes focused on the longer-term centre-based activities.

CENTRALISED EMPLOYMENT – POPULATION-DRIVEN

The centralised population-driven employment for each of the LSP areas has been calculated using the refined retail/commercial floorspace estimates for Robb Jetty. Population-driven floorspace in the Robb Jetty main street will accommodate centralised workers, as decentralised workers will generally be working from home or small offices distributed amongst residential areas. Figure 8 contains the refined floorspace estimates for population-driven activities in Robb Jetty.

Figure 8: Population-Driven Floorspace in Robb Jetty

Floorspace Type	Floorspace (m^2)
Commercial floorspace	1,300
Retail floorspace	10,950
Entertainment floorspace	2,400

Source: Pracsys and Hassell 2012

To determine the centralised population-driven employment required for Robb Jetty the following assumptions were applied to the floorspace estimates in Figure 9.

Figure 9: Centralised Population-Driven Workers per m^2

Type of Worker	Floorspace (m^2) / Worker
Commercial Worker	20
Retail Worker	30
Entertainment Worker	70

Source: Pracsys 2012

Applying the assumptions above to the floorspace demand estimates for Robb Jetty provides a total centralised population-driven employment estimate for that LSP area. It is assumed that most employment in Cockburn Coast will be centralised within the development's two centres, Robb Jetty and Powerstation. The balance of the centralised population-driven employment figure from DSP2 is therefore allocated to the Powerstation LSP area.

No centralised population-driven employment has been allocated to Hillside/Emplacement as all employment in this LSP area is expected to be decentralised.

The following table summarises the total centralised population-driven employment across all LSP areas.

Figure 10: Total Centralised Employment - Population-driven

LSP Area	Centralised Employment – Population-driven Jobs
Robb Jetty	464
Hillside/Emplacement	0
Powerstation	1,336
Total Jobs	1,800

Source: Pracsys 2012

CENTRALISED EMPLOYMENT – STRATEGIC

As previously mentioned, it is assumed that most employment in Cockburn Coast will be centralised within the development's two centres. It is also assumed that majority of centralised strategic employment will be located within the Powerstation LSP area. This would develop via strong economic linkages to other major economic nodes and through the development of at least one strategic localisation economy. In keeping with these

assumptions 10% of the centralised strategic employment from DSP2 has been allocated to Robb Jetty with the remaining 90% allocated to the Powerstation.

No centralised strategic employment has been allocated to Hillside/Emplacement as all employment in this LSP area is expected to be decentralised.

The following table summarises the total centralised strategic employment across all LSP areas.

Figure 11: Total Centralised Employment - Strategic

LSP Area	Centralised Employment – Strategic Jobs
Robb Jetty	21
Hillside/Emplacement	0
Powerstation	192
Total Jobs	213

Source: Pracsys 2012

DECENTRALISED EMPLOYMENT – POPULATION-DRIVEN

Decentralised population-driven employment (e.g. home-based businesses, residential construction etc.) is distributed according to the share of residential yield for each LSP area. The following table summarises the total decentralised population-driven employment across all LSP areas.

Figure 12: Total Decentralised Employment - Population-driven

LSP Area	Residential Yield (m^2)	% of Total Residential Yield	Decentralised Population-Driven Jobs
Robb Jetty	2,239	42%	296
Hillside/ Emplacement	1,734	33%	229
Powerstation	1,320	25%	175
Total Jobs	5,293	100%	700

Source: Pracsys and Hassell 2012

DECENTRALISED EMPLOYMENT – STRATEGIC

As it is assumed that all strategic employment within the two main centres of Robb Jetty and Powerstation will be centralised, the remaining component of decentralised strategic employment is to be located within the Hillside/Emplacement LSP area. The following table summarises the total decentralised strategic employment across all LSP areas.

Figure 13: Total Decentralised Employment - Strategic

LSP Area	Decentralised Employment – Strategic Jobs
Robb Jetty	0
Hillside/Emplacement	37
Powerstation	0
Total Jobs	37

Source: Pracsys 2012

TOTAL LSP EMPLOYMENT DISTRIBUTION

The analysis above describes the process for distributing the DSP2 employment profile amongst the three LSP areas for Cockburn Coast. The following table summarises the analysis of centralised and decentralised employment into population-driven and strategic employment estimates for each LSP area. These employment estimates are further dissected in the employment section of the economic report for each LSP area.

Figure 14: Employment Distribution for Cockburn Coast LSP Areas

LSP Area	PD Jobs	Strategic Jobs	Total Jobs
Robb Jetty	760	21	782
Hillside/Emplacement	229	37	266
Powerstation	1510	192	1702
Total Jobs	2500	250	2750

Source: Pracsys 2012



29 October 2012

Our ref: 61/25038/08/125962
Your ref:

Sergio Famiano
Project Manager
LandCorp
Level 3 Wesfarmers House, 40 The Esplanade
Fremantle WA 6000

Dear Serge,

Cockburn Coast Urban Redevelopment
Local Structure Plan Response

LandCorp submitted a Proposed Scheme Amendment (No. 89) to the City of Cockburn Town Planning Scheme No. 3 (Cockburn Coast Development Area). The City of Cockburn subsequently resolved to adopt the Cockburn Coast District Structure Plan Part 2 for the purposes of providing a guiding document to inform the preparation of future Local Structure Plans within the District Structure Plan area subject to certain modifications.

The modifications included requirements to be addressed in the Local Structure Plans (LSP) related to contaminated sites for the Cockburn Coast Redevelopment (Item 3.19). GHD has prepared the following responses to be included in the LSPs for Robb Jetty (Precinct 2 and 8) and Hilltop and Emplacement Crescent (Precinct 3 and 7) for the Cockburn Coast Redevelopment related to contaminated sites.

These responses are subject to, and must be read in conjunction with, the limitations set out in Attachment 1 and the assumptions and qualifications contained throughout the responses.

If you have any queries regarding these responses, please do not hesitate to contact the undersigned.

Yours sincerely,



Simon French
Principal Scientist
6222 8203

Attachment 1: Disclaimer

This Local Structure Plan Response ("LSP Response") for the Cockburn Coast Urban Redevelopment document has been prepared by GHD for LandCorp and may only be used and relied on by LandCorp for the purpose agreed between GHD and LandCorp.

GHD otherwise disclaims responsibility to any person other than LandCorp arising in connection with the LSP Response. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing the LSP Response were limited to providing responses to the three City of Cockburn modifications requested for contaminated sites in the Cockburn Coast District Structure Plan Part 2 (Section 3.19) and are subject to the limitations stated in this disclaimer. The services undertaken by GHD were carried out in accordance with the existing GHD/LandCorp Panel Contract (2007/03).

The opinions, conclusions and any recommendations in the LSP Response are based on conditions encountered and limited information reviewed at the date of preparation of the LSP Response. GHD has no responsibility or obligation to update the LSP Responses to account for events of changes occurring subsequent to the date that the LSP Responses were prepared.

The opinions, conclusions and any recommendations in the LSP Response are based on assumptions made by GHD described in the LSP Response. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared the LSP Response on the basis of information provided the Department of Environment and Conservation (DEC) and Landgate, which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the LSP Response which were caused by errors or omissions in that information.

GHD has not been involved in the preparation of the Local Structure Plan and has had no contribution to, or review of the Local Structure Plan other than in the LSP Responses, provided herein. GHD shall not be liable to any person for any error in, omission from, or false or misleading statement in, any other part of the Local Structure Plan.

The LSP Response must be read in full and no excerpts are taken to be representative of the findings of the LSP Response.

Attachment 2: Local Structure Plan Response Robb Jetty (Precinct 2 and 8) and Hilltop and Emplacement Crescent (Precinct 3 and 7)

Describe how contaminated sites will be (or have been) suitably dealt with across the whole Local Structure Plan area in accordance with the Contaminated Sites Act 2003.

The *Contaminated Sites Act 2003* (CS Act) provides for the "*identification, recording, management and remediation of contaminated sites*". The CS Act is administered by the Department of Environment and Conservation (DEC). The CS Act is supported by the *Contaminated Sites Regulations 2006* and the Contaminated Sites Management Series Guidelines. The CS Act is the main mechanism for identification of known and suspected contaminated sites in Western Australia and reporting of known or suspected contaminated sites is a mandatory requirement under the CS Act for:

- An owner or occupier;
- Person who caused, or contributed to, the contamination; and
- A contaminated sites auditor engaged to report on the site in accordance with the CS Act.

Contamination is an important issue for the Cockburn Coast Urban Redevelopment, particularly as development may introduce generally more sensitive land uses than currently exist in the Local Structure Plan (LSP) areas. Contaminated sites have been addressed in each of the LSPs in accordance with the CS Act (and relevant regulations and guidelines) as summarised in the Preliminary Assessment undertaken as part of LSP consideration or are to be addressed using a staged approach to investigation and management. Further details of these are provided below.

Local Structure Plan (LSP) Consideration

Awareness of the potential for contaminated sites issues has been raised at consultation meetings with stakeholders during the District Structure Plan (DSP) consultation process and will also receive appropriate consideration in the forthcoming LSP consultation process.

As required by DSP modifications and as recommended in relevant guidelines[1], GHD has undertaken a Preliminary Assessment of all lots within the LSP areas to identify known and suspected contaminated sites that have been reported to the DEC in accordance with the CS Act (presented at Attachment 3). This Preliminary Assessment comprised a review of the Basic Summary of Records (BSR) information provided by the DEC to determine if a site had been reported to DEC as a known or suspected contaminated site, review of previous investigations undertaken by GHD and, where no investigations have been undertaken, a review of available historical aerial photographs to determine if there are any further indications of potentially contaminating land uses/activities at lots within the LSP area.

The LSP process including provision of the Preliminary Assessment described above will therefore assist in informing stakeholders, including land owners, of possible contaminated sites issues for land to be brought forward for development so that these can be suitably dealt with in accordance with the CS Act and relevant guidelines.

[1] Contaminated Sites and the Landuse Planning Process, Department of Environment, Government of Western Australia, Contaminated Sites Management Series, April 2006.

Staged Approach to Contaminated Site Investigations and Management

Relevant guidelines including those published by the DEC recommend a staged approach[2] be adopted for investigation and management of potential or known contamination issues which provides for the following:

- Preliminary Site Investigation (e.g. collecting background knowledge, such as historical, geographical, geological and hydrogeological information to determine if past or present land uses have or have potential to have caused contamination);
- Detailed Site Investigation (e.g. investigation to collect soil, groundwater, gas/vapour samples at a site to determine if contamination is present, substance types, concentrations, extent and assessment of risks posed to human health and the environment);
- Site Management Plan (development of an effective and practical management strategy to address the risks posed by contamination); and
- Remediation, validation, ongoing management (e.g. remediation by methods such as on site or off site treatment of contamination, off-site disposal and subsequent testing to demonstrate the remediation has been effective, or other management measures such as modification of proposed land uses or controls on access via management plans or Memorial On Title).

This staged approach ensures that each stage of work is appropriately informed, provides greater opportunity to characterise sites in sufficient detail and allows appropriate action to be taken (where necessary) to address identified contamination issues in accordance with the CS Act.

As an example, GHD has been commissioned by LandCorp to undertake staged contaminated sites investigations at each of its owned lots within the LSP areas to determine if any potential contamination exists that would restrict proposed development and determine requirements for further action (such as remediation) to address identified issues. These investigations have been undertaken with reference to the CS Act and associated regulations and guidelines. Furthermore, LandCorp has commissioned a DEC accredited Contaminated Sites Auditor to undertake an independent and critical review of each of the investigations undertaken by GHD. A summary of these investigations is provided in Tables 1 and 2 of Attachment 3.

As identified in the Preliminary Assessment for this LSP response, similar investigation and management activities have previously been or are being undertaken by some other landowners in the LSP areas to ensure contamination issues are suitably addressed in accordance with the CS Act. Consideration of contamination issues within the LSP process as described above will further assist stakeholders such as landowners in determining requirements for investigation and management activities area to ensure contamination issues are suitably addressed in accordance with the CS Act.

As acknowledged in relevant guidelines[1] the planning process, which operates in parallel with the CS Act, is a key method for addressing unknown contaminated sites, whereby contamination is considered before planning decisions are made and conditions are imposed for further investigation where necessary to allow decisions to be made. In conjunction with consideration under the LSP process and subsequent actions by relevant stakeholders, the planning process, in addition to the CS Act provides a

[2] Staged approach to site assessments, Department of Environment and Conservation Contaminated Sites Fact Sheet 2.

key part of the overall framework to ensure that contaminated sites are suitably dealt with in accordance with the CS Act.

Describe how the land use plan responds to issues of contamination across the whole Local Structure Plan area.

The land use plan responds to issues of contamination across the LSP areas according knowledge gained from a staged approach to investigation and management that has already been implemented for a number of key land holdings throughout the area. In the staged approach to assessment, consideration of known and potential contamination issues has been undertaken for these land holdings and their surroundings with respect to proposed forms of development and potential or actual risks these may pose for such development.

From current information, contamination issues have not however been identified to impose constraints requiring widespread land use responses across the LSP areas. Where contamination issues have been identified at particular land holdings, consideration has been given to the severity, extent and possible management options to address them where deemed necessary in accordance with a risk based approach. Consideration of land use has been part of this process where locating forms of land use at/near known contamination which are suitable from a risk perspective can offer a more sustainable management option than undertaking remediation work. For example, in a location where a historic bunker oil leak has resulted in contamination at depth below ground level, the land use plan has been revised to ensure that no buildings are located over the known impacted area.

It is expected that development proposals will be further refined where needed in response to contamination issues by informed stakeholders. This will either as part of work already being undertaken, consideration in the LSP process and future work to be undertaken to bring sites forward for development in accordance with a staged approach to investigation and management of contaminated sites.

While recognising the obligations for landowners under the Contaminated Sites Act 2003, list for each lot contained within the whole Local Structure Plan area as part of the Local Structure Plan report, whether any investigation of contaminated sites have been undertaken. Where no investigation has been considered warranted also list details of previous and historic land uses to assert the conclusion the site is not potentially contaminated. Where sites have been reported to DEC as a potentially contaminated site, also list the details of the referral and if available the outcome of the referral.

As required by DSP modifications GHD has undertaken a Preliminary Assessment of all lots within the LSP areas to identify known and suspected contaminated sites that have been reported to DEC in accordance with the CS Act.

This Preliminary Assessment comprised a review of the Basic Summary of Records (BSR) information provided by the DEC to determine if a site had been reported to DEC as a known or suspected contaminated site, review of previous investigations undertaken by GHD and, where no investigations have been undertaken, a review of available historical aerial photographs to determine if there are any further indications of potentially contaminating land uses/activities at lots within the LSP area.

GHD has prepared tables for Robb Jetty (Precinct 2 and 8) and Hilltop and Emplacement Crescent (Precinct 3 and 7), which summarise the current status of contaminated sites investigations, known to GHD, at each of the lots contained within the LSP areas. These tables are presented in Attachment 3.

Table 1 Robb Jetty (Precinct 2 and 8)

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
1946 Rollinson Rd	LR3099 / 951		DEC BSR (DEC12478) ***Classification:*** *22/05/2012 - Report not substantiated* ***Reason for Classification:*** *The site was reported to the DEC as per reporting obligations under section 11 of the Contaminated Sites Act 2003. The classification is based on information submitted to DEC by May 2007.* *The site was used as a wastewater pump station for the Water Corporation and as a suspected affected site. DEC understands that no indications of possible contamination have been observed or are known at this time.* *The site was reported because an internal risk assessment identified that the site could be affected by contamination from nearby industrial sites.* *No groundwater investigations have been carried out and the quality of soil and groundwater beneath the site is unknown.* *Based on the information provided, the site appears suitable for continued use as a wastewater pump station, but may not be suitable for more sensitive land uses, such as residential housing and child care centres.* *The report of a known or suspected contaminated site, in conjunction with DEC enquiries, has provided insufficient grounds to indicate that possible contamination of the site is present from the current or historical land use or surrounding land uses. As such, the site is classified as 'report not substantiated'.* Aerial Photographs Aerial photographs indicate that the site has been used as a wastewater pump station since the mid-1990s. Prior to this the site appears to be used for agricultural purposes. Conclusion The site may have limited contamination present due to the use as a wastewater pump station and former nearby industrial sites, however the potential likelihood of this is considered low. The site appears suitable for ongoing use as a wastewater pump station.
2017 Cockburn Rd	LR3146 / 795		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs The site appears to have been occupied entirely by part of an industrial building, potentially associated with the nearby former railway yard to the west or the former abattoir to the north, during 1953. This onsite building was removed in 1974 and a row of trees were planted as a road barrier. A small building was additionally built on the western boundary of the site in 1979. The site has remained unchanged to present. Conclusion Based on a review of DEC BSR information and historic aerial photographs, there appears to be limited potential only for contamination at this site subject to confirmation of former use of the building present onsite from 1953-1974.
2082 Bennett Ave	LR3100 / 667		DEC BSR (DMO 3355) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Aerial photographs indicate the site was used for agricultural purposes from the 1950s to the 1980s. The site has remained vacant with no buildings evident in any of the available aerial photographs. There is evidence of ad hoc use as for laydown of materials from the adjacent sites from 1999 onwards. Conclusion Based on a review of DEC BSR information and historic aerial photographs there appears to be limited potential only for contamination at this site.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
1 Bennett Ave	2059 / 330		DEC BSR (DEC4369) ***Classification:*** *02/11/2007 – Possibly contaminated – investigation required* ***Nature and Extent of Contamination:*** *Chromium is present in surface soils at isolated locations. Heavy metals and nutrients are present in groundwater in a plume that extends below the entire site.* ***Reason for Classification:*** *The site was reported to the DEC as per reporting obligations under section 11 of the Contaminated Sites Act 2003. The classification is based on information submitted to DEC by September 2007.* *A limited contamination assessment was carried out to provide a baseline level of soil and groundwater contaminants prior to a new tenant occupying the premises.* *The site was reported under section 11 of the Act because the assessment found that chromium was present in soils at contaminations exceeding Ecological Investigation Levels, but below Health Investigation Levels as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment, 2003).* *Heavy metals were present in groundwater at contaminations exceeding Australian Drinking Water and Marine Aquatic Ecosystem Guidelines, as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment, 2003).* *Concentrations of contaminants have been found to exceed adopted assessment levels. A Screening Risk Assessment has therefore indicated that further investigation is required to determine the risk to human health, the environment and environmental values.* *As there are grounds to indicate possible contamination of the site, further investigation of soil and groundwater and risk assessment are required to determine the contamination status of the site, the site is therefore classified as 'possibly contaminated – investigation required'.* *When the results of further soil and groundwater investigations are submitted to DEC, these will be reviewed, and the site may be re-classified.* Aerial Photographs Prior to the 1980s the site appears to be used for agricultural purposes, with evidence of stock yard in the south of the site during this period. The site was developed as an industrial facility some time between 1981 and 1995 (including operation by Gosh Leather). The site subsequently currently operated as a waste recycling facility until closure following loss of the building structure due to a fire. Conclusion This site has the potential to be contaminated due to past use, including the presence of a livestock yard. Potential contamination associated with the more recent use is likely to be mitigated by the significant lateral extent of the building footprint. Loss of the building structure to a fire may have caused surficial/limited depth contamination of surrounding ground at the site.
1 Darkan Ave	2175 / 172		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Between 1999 and 1995 the site was developed, with the construction of a large warehouse. GHD understands this warehouse is currently used by Harvey Industries Processing Centre for food processing. Prior to 1995 the site was vacant and appeared to be covered by sparse coastal vegetation. Conclusions Review of DEC BSR information and historic aerial photographs indicates there is limited potential only for contamination at this site.
3 Garston Way	2049 / 131		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1965 the site was vacant and appeared to be covered by sparse coastal vegetation. Between 1965 and 1981 the site appears to be used for stock grazing. From 1981 onwards the site has remained vacant. There is some evidence of vehicle movement (i.e. tracks) across the site between 1981 and currently. Conclusions Based on a review of DEC BSR information and historic aerial photographs there appears to be limited potential for contamination at this site.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
5 Garston Way	2049 / 132		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1965 the site was vacant and appeared to be covered by sparse coastal vegetation. Between 1965 and 1981 the site appears to be used for stock grazing. From 1981 onwards the site has remained vacant, with laydown of building materials from the adjacent site. Conclusions Based on a review of DEC BSR information and historic aerial photographs there appears to be limited potential only for contamination at this site.
7 Garston Way	2049 / 133		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1981 the site was used for agricultural purposes, with evidence of stock grazing. Between 1981 and 2003 the site was vacant. In 2003 a large warehouse was constructed at the site. GHD understands that this warehouse is occupied by Complete Electrical Services. Conclusions Review of DEC BSR information and historic aerial photographs indicates there is limited potential only for contamination at this site.
15 Garston Way	2049 / 137		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1981 the site was vacant, cleared and appeared to be used for stock grazing. The site comprised the centre corner of three adjacent lots. Around 1995, the site was completely cleared aligned with Garston Way and became the lot as it appears today. Following 1995, the site remained vacant, with evidence of vehicle movement (i.e. tracks) across the site until present. Conclusions Based on a review of DEC BSR information and historic aerial photographs there appears to be limited potential only for contamination at this site.
17 Garston Way	2049 / 138		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1981 the site was vacant, cleared and appeared to be used for stock grazing. The majority of the site comprised part of one lot, with a small portion of the northern and southern lots encroaching on the north-west and south-east corners of the site. Around 1995, the site was completely cleared, aligned with Garston Way and became the lot as it appears today. Following 1995, the site remained vacant, with evidence of vehicle movement (i.e. tracks) across the site until 2010, where the site appears to have been bitumised and used as a laydown/storage area for trucks, machinery and metal pipes, to present. Conclusions A review of DEC BSR information and historic aerial photographs indicates there apprears to be limited potential only for contamination at this site.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
19 Garston Way	2049 / 139		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1981 the site was vacant, cleared and appeared to be used for stock grazing. The site comprised half of one lot and half of another, separated horizontally in a north-east to south-west orientation. Around 1995, the site was completely cleared, aligned with Garston Way and became the lot as it appears today. Following 1995, the site remained vacant, with evidence of vehicle movement (i.e. tracks) across the site until present. Conclusions Based on a review of DEC BSR information and historic aerial photographs there appears to be limited potential only for contamination at this site.
2102 Garston Way	LR3098 / 736		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1981 the site was vacant, cleared and appeared to be used for stock grazing. The site comprised sections of several adjacent lots. Around 1995, the site was completely cleared aligned with Garston Way and became the lot as it appears today. Following 1999, the site remained vacant, with evidence of vehicle movement (i.e. tracks) across the site until present. Conclusions Based on a review of DEC BSR information and historic aerial photographs there appears to be limited potential only for contamination at this site.
20 Darkan Ave	2049 / 423		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1999 the site was vacant, cleared and appeared to be used for stock grazing. Around 1999, an electrical pad-mount TX transformer unit was installed on the site, which appears to have remained unchanged to the present day. Conclusions Western Power has indicated that oils used in their transformers have not contained polychlorinated biphenyls (PCBs) since 1980, when they were phased out on all Western Power equipment. As this unit appears to have been installed around 1999, it is unlikely that this transformer unit would contain PCBs. Due to the small size of the transformer there appears to be limited potential only for contamination at this site.
2 Garston Way	2052 / 864		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1981 the site was vacant, cleared and appeared to be used for stock grazing. During 1995, further vegetation clearance appears to have occurred. During 1999, vehicular movements and an unsealed track are apparent around the boundary of the site. Between 1999 and 2000, a small area in the south-west corner of the site is cleared, potentially for parking purposes. In 2000, a crane and other construction vehicles are onsite associated with the construction of the adjacent site in this cleared parking area. The site appears otherwise to have remained relatively unchanged to present, with the exception of occasional vehicular movements and car parking onsite. A sign advertising the lease of this land for use as four hardstand sites for a short term lease of 5 years is noted in the south-eastern corner of the site since 2010. Between September 2011 and December 2011, a hardstand was poured across the entire site. Minor vehicle movements and car parking were noted until approximately April 2012, where the site is utilised as a laydown area to present. Conclusions Review of DEC BSR information and historic aerial photographs indicates there is a limited potential for contamination at this site, most likely limited to temporary parking of vehicles/materials prior to hardstanding construction.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
1 Garston Way	2052 / 865		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1974 the site was vacant, cleared and appeared to be used for stock grazing. During 1974, the site appears to have been cleared. Between 1995 and 1999 a warehouse and car-parking hardstand has been constructed onsite. The site has remained unchanged to present, but displays frequent vehicle movements (e.g. cars and trucks visiting site). GHD understands that this warehouse is occupied by Hempel Paints Marine and Industrial Services. Conclusions Review of DEC BSR information and historic aerial photographs indicates a low potential only for warehousing of paint products increasing to moderate or high potential should manufacturing, blending or mixing of paint also have taken place.
2103 Cockburn Rd 2109 McTaggart Cove 27 Bennett Ave 49 Bennett Ave 69 Bennett Ave 79 Bennett Ave	2691 / 399 2108 / 146 2125 / 967 2125 / 971 2125 / 974 2125 / 975	SKM (1994) Robb Jetty Abattoir Site, Hamilton Hill, Phase I Contaminated Site Assessment Draft Report. November 1994. SKM (2000) Robb Jetty Contamination Study: Final. July 2000. SKM (2004) Former Robb Jetty Abattoir Site, Groundwater Monitoring Event. January 2004. GHD (2004) North Coogee Master Plan Area, Groundwater Data Review. GHD (2006) Cockburn Coast Urban Redevelopment, Phase 1: Project Inception Report. October 2006. GHD (2007) Cockburn Coast Urban Redevelopment, Environmental Services Phase 2: Desk Based Review, Package 2 – Former Abattoir Area. September 2007. GHD (2010) Cockburn Coast Urban Redevelopment, Sampling and Analysis Plan. January 2010. GHD (2010) Cockburn Coast Detailed Site Investigation, Package 2, Former Abattoir Area, North Coogee. November 2010.	DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Onsite Investigations GHD was commissioned by LandCorp to undertake contaminated sites investigations to determine if the former use of these sites, as part of the Robb Jetty Abattoir, had resulted in contamination that restricted the proposed development. These investigations have been subject to review by a DEC accredited contaminated sites auditor.. 2103 Cockburn Rd, 69 Bennett Ave & 79 Bennett Ave: Based on the results of the onsite investigations it was concluded that the provisional exclusion zone relating to a historic bunker oil impact at 82 Bennett Ave impinges upon a small part of 2103 Cockburn Rd, 69 Bennett Ave and 79 Bennett Ave and there should therefore be no groundwater abstraction or recharge within this provisional exclusion zone (note that the zone is provisional as this is subject to amendment). The investigation also identified the presence of localised Asbestos Containing Material (ACM) at 2103 Cockburn Rd. GHD recommended that the known locations of ACM be removed as part of the Remediation and Validation Plan (to be developed) and that a Construction Environment Management Plan (CEMP) be developed to manage any future ACM that may be identified during the development works at 2103 Cockburn Rd, 69 Bennett Ave or 79 Bennett Ave. As long as these issues are addressed these sites are considered suitable for proposed mixed use development. 2109 McTaggart Cove & 27 Bennett Ave: Based on the results of the onsite investigations it was concluded that these sites were suitable for the proposed development, which includes open space and road reserve. It is noted that ACM was identified on some of the adjacent lots and therefore management measures should be put in place, such as development of a CEMP, to ensure that if ACM is identified during the site development works it is managed appropriately. 49 Bennett Ave: Following the onsite investigation it was concluded that this site was suitable for the proposed development, which includes low density residential and road reserve. It is noted that ACM was identified on some of the adjacent lots and therefore management measures should be put in place, such as development of a CEMP, to ensure that if ACM is identified during the site development works it is managed appropriately.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
2108 Bennett Ave	2124 / 082	GHD (1996) Robb Jetty Marshalling Yards: Stage III Sampling. April 1996. GHD (1996) Robb Jetty Marshalling Yards: Site Assessment – Current Status. May 1996. GHD (1996) Robb Jetty Marshalling Yards Site Assessment: Methodology for Risk Assessment. August 1996. GHD (1996) Robb Jetty Marshalling Yards – Site Assessment: assessment Report – Part 1. August 1996. GHD (1996) Robb Jetty Marshalling Yards: Proposed Methodology for Determination of Remediation (or Clean-Up) Goals and Requirements (Part 2). September 1996. GHD (1996) Robb Jetty Marshalling Yards – Site Assessment: Assessment Report – Part 1. October 1996. GHD (1996) Robb Jetty Clean Up – Part 1: Validation Results. November 1996. GHD (1996) Robb Jetty Marshalling Yards – Site Assessment: Assessment Report – Part 2. December 1996. GHD (1997) Robb Jetty Marshalling Yards – Site Assessment: Addendum to Part 2 Report. April 1997. GHD (1997) Former Robb Jetty Marshalling Yards: Site Management Plan. June 1997. GHD (1998) Robb Jetty: Further Information. January 1998. GHD (1998) Robb Jetty: Groundwater Monitoring. May 1998. GHD (2012) Report for Lot 2108 Bennett Avenue, North Coogee (Part of Former WAGR Marshalling Yards): Preliminary Site Investigation. February 2012. GHD (2012) Report for Lot 2108 Bennett Avenue, North Coogee (Part of Former WAGR Marshalling Yards): Sampling and Analysis Plan. May 2012.	DEC BSR (11/90/102) ***Classification:*** *16/07/2012 – Possibly contaminated – investigation required* ***Nature and Extent of Contamination:*** *Metals and hydrocarbons are present in soils and groundwater at various locations beneath the site.* ***Reason for Classification:*** *The site was reported to the DEC prior to the commencement of the Contaminated Sites Act 2003 and portions of it were reported again in May 2007, after the commencement of the Act. The classification is based on information submitted to DEC by May 2007.* *The site was used as a railway yard, which is a land use that has the potential to cause contamination as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004). DEC understands that the site is proposed for redevelopment and is currently vacant.* *The site was reported because contamination assessments carried out in the 1900s to 2007 found soil and groundwater were contaminated with metals and hydrocarbons from historical land uses at the site. Reports for investigations carried out up to 1998 have been submitted to DEC. DEC understands that additional desktop investigations were carried out in 2006 and 2007; and further site investigations are currently underway.* *Contaminated fill soils were reportedly imported to the site in the 1970s and 1980s. Soil investigations found that metals (arsenic, manganese, lead, zinc and copper) were present in soils at concentrations exceeding Health-based Investigation Levels for residential land use and exceeding Ecological Investigation Levels, as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment and Conservation, 2010). Lead was present in soils at concentrations exceeding Health-based Investigation Levels for commercial/industrial land use. Hydrocarbons (such as from fuel oil) are present in soils at concentrations potentially exceeding Health-based Investigation Levels for all land uses and exceeding Ecological Investigation Levels (DEC, 2010).* *Groundwater investigations carried out up to 1998 found copper, zinc and lead were present in groundwater at concentrations exceeding aquatic ecosystems – marine guidelines, as published in 'Assessment Levels for Soil, Sediment and Water' (DEC, 2010). Hydrocarbons (such as from petrol/diesel/oil) were also present in groundwater.* *DEC understands that some remedial works have been carried out at the site, such as capping contaminated soils onsite; however, evidence of the success of remedial works in a suitable validation report is yet to be submitted to DEC.* *As the site has only been partially investigated, a comment cannot be made on the suitability of the site as a whole for any land use.* *As there are grounds to indicate possible contamination of the site and soil and groundwater have not been fully investigated, and a risk assessment to determine the risk to human health, the environment, or any environmental value has not been carried out, the site is classified as 'possibly contaminated – investigation required'.* *When the results of further soil and groundwater investigations are submitted to DEC, these will be reviewed, and the site may be re-classified.* *A memorial stating the site's classification has been placed on the certificate of title, and will notify any prospective owners of the contamination status of the site.* ***Action Required:*** *Further soil and groundwater investigations are required to adequately delineate and characterise the nature and extent of soil and groundwater contamination across the site. Investigations should meet the standards outlined in the DEC's Contaminated Sites Management Series of guidelines.* Onsite Investigations GHD has been commissioned to undertake ongoing contaminated sites investigations at Lot 2108 to determine the suitability for the proposed development. These investigations are being audited by a DEC accredited contaminated sites auditor. Onsite investigations have commenced and are expected to be complete by end 2012. GHD is currently undertaking onsite investigations to determine the current status of contamination at the site, however as part of the Preliminary Site Investigation (PSI), GHD undertook a review of all previous investigations that have been undertaken at the site. Previous investigations undertaken at the site identified the presence of two types of contamination at the site: • A series of small, isolated hot-spots of relatively low level contamination scattered across the site, which were excavated and disposed of to landfill; and • The western portion of the site, which showed significantly elevated levels of principally heavy metal and metalloid contaminants. This contamination was isolated by perimeter fencing and hydromulching of the soil surface. GHD is currently in the process of further assessing the extent of this contamination with respect to suitability for the proposed land use and requirements for further action.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
35 Bennett Ave (Lot 62 Bennett Ave)	2125 / 968		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1965 the site was vacant, cleared and appeared to be used for stock grazing. During 1974, the site appears to have been cleared and approximately half of the site was covered by unsealed blue metal gravel until 1999 for car parking purposes, with the other half remaining vacant land. During 1999, the car parking area has been removed and the site remained vacant land. Between January 2002 and October 2003, a commercial building was constructed onsite, including two large sheds and a bitumised car parking area and is understood to have been used for food processing with associated offices and a cold store. The site remains unchanged to present, with the exception of vehicular movement onsite. Conclusions The DEC does not list food processing as a potentially contaminating activity and potential for contamination associated with stock grazing appears limited. Based on a review of DEC BSR information and historic aerial photographs there appears to be limited potential only for contamination at this site.
41 Bennett Ave (Lot 63 Bennett Ave)	2125 / 969		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1965 the site was vacant, cleared and appeared to be used for stock grazing. During 1974, the site appears to have been cleared and covered by unsealed blue metal gravel from until 1999, for car parking purposes. During 1999, the car parking area has been removed and the site remained vacant land until January 2001, when a white building was constructed onsite. During January 2002, a sealed bitumen car park was constructed along the northern boundary of the site. Following April 2011, the eastern portion of the site appears to have been used as a laydown and vehicle parking area. The site remains unchanged to present, with the exception of vehicular movement. GHD understands that the site is currently occupied by Marine and General Constructions. Conclusions Potential for contamination associated with stock grazing appears limited. Based on a review of DEC BSR information and historic aerial photographs there appears to be limited potential only for contamination at this site.
45 Bennett Ave (Lot 64 Bennett Ave)	2125 / 970		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1965 the site was vacant, cleared and appeared to be used for stock grazing. During 1974, the site appears to have been cleared and covered by unsealed blue metal gravel until 1999, for car parking purposes. Between February 1995 and May 1999, a green corrugated iron building was constructed in the south-eastern corner of the site and a sealed bitumised car park was constructed in the north-western portion of the site. Landscaping has been introduced on the north and south-western corners of the site and the north-eastern corner remains unsealed yellow sand. During January 2009, sections of the landscaping area are in the process of being removed and by August 2010, it appears that the site is being used as a laydown area for industrial vehicles. The site remains unchanged to present, with the exception of vehicular movements. It is understood this site is operated by ERS Equipment, a plant hire company with limited on site fabrication and sales of bespoke plant/equipment trailers. Conclusions Potential for contamination associated with stock grazing appears limited. Based on a review of DEC BSR information and historic aerial photographs there appears to be limited potential only for contamination at this site.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
57 Bennett Ave	2125 / 972		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953 the site was vacant, cleared and appeared to be used for stock grazing. During 1965, the site appeared to have two small buildings, located near the eastern boundary and in the centre of the site, with unsealed vehicular tracks leading to the structures. The site remains relatively unchanged until May 1999. The site remains unchanged until October 2003, when a white shed was constructed in the centre of the site, with associated sealed, bitumised car parking area located along the western boundary of the site. The site remains unchanged (with the exception of vehicular movements) until December 2007, where it appears that the site is occupied by Don Vica Gourmet Olives, due to the presence of shipping containers and large orange olive barrels. The site remains unchanged to present, with the exception of movement of shipping containers, olive barrels and vehicles. GHD understands that Don Vica Gourmet Olives currently occupy the site. Conclusions Based on a review of DEC BSR information and historic aerial photographs there appears to be limited potential only for contamination at this site.
61 Bennett Ave	2125 / 973	SKM (1994) Robb Jetty Abattoir Site, Hamilton Hill, Phase I Contaminated Site Assessment Draft Report. November 1994. SKM (2000) Robb Jetty Contamination Study: Final. July 2000. SKM (2004) Former Robb Jetty Abattoir Site, Groundwater Monitoring Event. January 2004. GHD (2004) North Coogee Master Plan Area, Groundwater Data Review. GHD (2006) Cockburn Coast Urban Redevelopment, Phase 1: Project Inception Report. October 2006. GHD (2007) Cockburn Coast Urban Redevelopment, Environmental Services Phase 2: Desk Based Review, Package 2 – Former Abattoir Area. September 2007. GHD (2010) Cockburn Coast Urban Redevelopment, Sampling and Analysis Plan. January 2010. GHD (2012) Cockburn Coast Detailed Site Investigation, Package 2, Former Abattoir Area, North Coogee. August 2012.	DEC BSR (DEC3279) Awaiting classification. Onsite Investigations GHD was commissioned by LandCorp to undertake contaminated sites investigations to determine if the former use of the site, as part of the Robb Jetty Abattoir, had resulted in contamination that restricted the proposed development. These investigations have been subject to review by a DEC accredited contaminated sites auditor. Based on the results of the onsite investigations, the site requires limited management in the form of remediation of a localised area of elevated lead concentrations. Management will be implemented as part of the works commissioned by LandCorp to render the site suitable for the proposed development. The onsite investigation also identified the presence of localised Asbestos Containing Materials (ACM). GHD recommended that the known locations of ACM be removed as part of the Remediation and Validation Plan (to be developed) and that a CEMP be developed to manage any future ACM that may be identified during the development works. As long as these issues are addressed the site is considered suitable for the proposed development, which includes low density residential, activity centre and road reserve.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
76 Bennett Ave 82 Bennett Ave	2125 / 976 2125 / 982	SKM (1994) Robb Jetty Abattoir Site, Hamilton Hill, Phase I Contaminated Site Assessment Draft Report. November 1994. SKM (2000) Robb Jetty Contamination Study: Final. July 2000. SKM (2004) Former Robb Jetty Abattoir Site, Groundwater Monitoring Event. January 2004. GHD (2004) North Coogee Master Plan Area, Groundwater Data Review. GHD (2006) Cockburn Coast Urban Redevelopment, Phase 1: Project Inception Report. October 2006. GHD (2007) Cockburn Coast Urban Redevelopment, Environmental Services Phase 2: Desk Based Review, Package 2 – Former Abattoir Area. September 2007. GHD (2010) Cockburn Coast Urban Redevelopment, Sampling and Analysis Plan. January 2010. GHD (2012) Cockburn Coast Detailed Site Investigation, Package 2, Former Abattoir Area, North Coogee. August 20	<u>DEC BSR (11/90/102)</u> ***Classification:*** *16/07/2012 – Possibly contaminated – investigation required* ***Nature and Extent of Contamination:*** *Metals and hydrocarbons are present in soils and groundwater at various locations beneath the site.* ***Reason for Classification:*** *The site was reported to the DEC prior to the commencement of the Contaminated Sites Act 2003 and portions of it were reported again in May 2007, after the commencement of the Act. The classification is based on information submitted to DEC by May 2007.* *The site was used as a railway yard, which is a land use that has the potential to cause contamination as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004). DEC understands that the site is proposed for redevelopment and is currently vacant.* *The site was reported because contamination assessments carried out in the 1900s to 2007 found soil and groundwater were contaminated with metals and hydrocarbons from historical land uses at the site. Reports for investigations carried out up to 1998 have been submitted to DEC. DEC understands that additional desktop investigations were carried out in 2006 and 2007; and further site investigations are currently underway.* *Contaminated fill soils were reportedly imported to the site in the 1970s and 1980s. Soil investigations found that metals (arsenic, manganese, lead, zinc and copper) were present in soils at concentrations exceeding Health-based Investigation Levels for residential land use and exceeding Ecological Investigation Levels, as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment and Conservation, 2010). Lead was present in soils at concentrations exceeding Health-based Investigation Levels for commercial/industrial land use. Hydrocarbons (such as from fuel oil) are present in soils at concentrations potentially exceeding Health-based Investigation Levels for all land uses and exceeding Ecological Investigation Levels (DEC, 2010).* *Groundwater investigations carried out up to 1998 found copper, zinc and lead were present in groundwater at concentrations exceeding aquatic ecosystems – marine guidelines, as published in 'Assessment Levels for Soil, Sediment and Water' (DEC, 2010). Hydrocarbons (such as from petrol/diesel/oil) were also present in groundwater.* *DEC understands that some remedial works have been carried out at the site, such as capping contaminated soils onsite; however, evidence of the success of remedial works in a suitable validation report is yet to be submitted to DEC.* *As the site has only been partially investigated, a comment cannot be made on the suitability of the site as a whole for any land use.* *As there are grounds to indicate possible contamination of the site and soil and groundwater have not been fully investigated, and a risk assessment to determine the risk to human health, the environment, or any environmental value has not been carried out, the site is classified as 'possibly contaminated – investigation required'.* *When the results of further soil and groundwater investigations are submitted to DEC, these will be reviewed, and the site may be re-classified.* *A memorial stating the site's classification has been placed on the certificate of title, and will notify any prospective owners of the contamination status of the site.* ***Action Required:*** *Further soil and groundwater investigations are required to adequately delineate and characterise the nature and extent of soil and groundwater contamination across the site. Investigations should meet the standards outlined in the DEC's Contaminated Sites Management Series of guidelines.* <u>Onsite Investigations</u> GHD was commissioned by LandCorp to undertake contaminated sites investigations to determine if the former use of these sites, as part of the Robb Jetty Abattoir, had resulted in contamination that restricted the proposed development. These investigations have been subject to review by a DEC accredited contaminated sites auditor. 76 Bennett Ave: Based on the results of the onsite investigations, it was concluded that the visional exclusion zone relating to ta historic bunker oil impact at 82 Bennett Ave impinges upon part of 76 Bennett Ave and there should therefore be no groundwater abstraction or recharge within this provisional exclusion zone (note that the zone is provisional as this is subject to amendment). The onsite investigation also identified the presence of localised Asbestos Containing Material (ACM) at 76 Bennett Ave. GHD recommended that the known locations of ACM be removed as part of the Remediation and Validation Plan (to be developed) and that a CEMP be developed to manage any future ACM that may be identified during the development works at 76 Bennett Ave. As long as these issues are addressed these sites are considered suitable for the proposed development, which includes activity centre, road reserve and open space.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
			82 Bennett Ave: Based on the results of the onsite investigations, it was concluded that a historic bunker oil impact is located at 82 Bennett Ave. Given the presence of this bunker oil impact, GHD was commissioned to undertake additional investigations to confirm the extent of the bunker oil impact and a quantitative risk assessment to identify if the bunker oil impact posed a risk to the identified receptors. The additional investigations concluded that the bunker oil impact is not likely to pose a risk to the identified receptors providing that management measures are implemented with respect to prevention of groundwater abstraction or reinjection within an influencing distance of the bunker oil impact and adoption of appropriate construction/maintenance mitigation measures and materials.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
66 Bennett Ave	2125 / 977	GHD (2010) 66 Bennett Avenue, North Coogee: Preliminary Site Investigation. July 2010. GHD (2010) 66 Bennett Avenue, North Coogee: Hazardous Materials Report. July 2010. GHD (2010) 66 Bennett Avenue, North Coogee: Pre-Demolition Sampling Results. July 2010. GHD (2011) 66 Bennett Avenue, North Coogee: Sampling and Analysis Plan. February 2011. GHD (2011) 66 Bennett Avenue, North Coogee: Detailed Site Investigation. November 2011.	<u>DEC BSR (11/90/102)</u> ***Classification:*** *16/07/2012 – Possibly contaminated – investigation required* ***Nature and Extent of Contamination:*** *Metals and hydrocarbons are present in soils and groundwater at various locations beneath the site.* ***Reason for Classification:*** *The site was reported to the DEC prior to the commencement of the Contaminated Sites Act 2003 and portions of it were reported again in May 2007, after the commencement of the Act. The classification is based on information submitted to DEC by May 2007.* *The site was used as a railway yard, which is a land use that has the potential to cause contamination as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004). DEC understands that the site is proposed for redevelopment and is currently vacant.* *The site was reported because contamination assessments carried out in the 1900s to 2007 found soil and groundwater were contaminated with metals and hydrocarbons from historical land uses at the site. Reports for investigations carried out up to 1998 have been submitted to DEC. DEC understands that additional desktop investigations were carried out in 2006 and 2007; and further site investigations are currently underway.* *Contaminated fill soils were reportedly imported to the site in the 1970s and 1980s. Soil investigations found that metals (arsenic, manganese, lead, zinc and copper) were present in soils at concentrations exceeding Health-based Investigation Levels for residential land use and exceeding Ecological Investigation Levels, as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment and Conservation, 2010). Lead was present in soils at concentrations exceeding Health-based Investigation Levels for commercial/industrial land use. Hydrocarbons (such as from fuel oil) are present in soils at concentrations potentially exceeding Health-based Investigation Levels for all land uses and exceeding Ecological Investigation Levels (DEC, 2010).* *Groundwater investigations carried out up to 1998 found copper, zinc and lead were present in groundwater at concentrations exceeding aquatic ecosystems – marine guidelines, as published in 'Assessment Levels for Soil, Sediment and Water' (DEC, 2010). Hydrocarbons (such as from petrol/diesel/oil) were also present in groundwater.* *DEC understands that some remedial works have been carried out at the site, such as capping contaminated soils onsite; however, evidence of the success of remedial works in a suitable validation report is yet to be submitted to DEC.* *As the site has only been partially investigated, a comment cannot be made on the suitability of the site as a whole for any land use.* *As there are grounds to indicate possible contamination of the site and soil and groundwater have not been fully investigated, and a risk assessment to determine the risk to human health, the environment, or any environmental value has not been carried out, the site is classified as 'possibly contaminated – investigation required'.* *When the results of further soil and groundwater investigations are submitted to DEC, these will be reviewed, and the site may be re-classified.* *A memorial stating the site's classification has been placed on the certificate of title, and will notify any prospective owners of the contamination status of the site.* ***Action Required:*** *Further soil and groundwater investigations are required to adequately delineate and characterise the nature and extent of soil and groundwater contamination across the site. Investigations should meet the standards outlined in the DEC's Contaminated Sites Management Series of guidelines.* <u>Onsite Investigations</u> Given that this site was formerly used as part of the Robb Jetty Abattoir and Robb Jetty Marshalling Yards, GHD were commissioned by LandCorp to undertake contaminated sites investigations to determine if the former site uses had resulted in contamination that restricted the proposed development. These investigations have been subject to review by a DEC accredited contaminated sites auditor. Following the onsite investigations it was concluded that the site was suitable for mixed residential (including residential, parks, recreational open space and/or playing fields), commercial and light industrial land uses. Based on the conclusions of the report, GHD made the following recommendations: • Should remnant underground services of asbestos construction be identified during the development, management measures including preparation and implementation of a Site Management Plan (SMP) should be undertaken; and • For any groundwater abstraction proposed for development use at the site, consideration of saline intrusion should be included in relevant assessment.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
50 Bennett Ave	2125 / 978	GHD (1996) Robb Jetty Marshalling Yards – Site Assessment Report Part 1 and 2, report for Westrail. GHD (1997) Robb Jetty Marshalling Yards – Site Management Plan, report for Westrail. GHD (2002) Groundwater Monitoring Robb Jetty: Report of Findings, report for Western Australian Government Railways Commission. GHD (2003) Robb Jetty Marshalling Yards Groundwater Monitoring Report, report for Public Transport Authority. GHD (2004) North Coogee Master Plan Area, Groundwater Data Review. GHD (2006) Cockburn Coast Urban Redevelopment, Phase 1: Project Inception Report. October 2006. GHD (2007) Cockburn Coast Urban Redevelopment, Environmental Service Phase 2: Desk Based Review, Package 1 – Lot 111. September 2007. GHD (2010) Cockburn Coast Urban Redevelopment, Sampling and Analysis Plan. January 2010. GHD (2012) Report for Cockburn Coast Detailed Site Investigation: Package 1, Lot 111 Bennett Avenue, North Coogee. May 2012.	<u>DEC BSR (11/90/102)</u> ***Classification:*** *16/07/2012 – Possibly contaminated – investigation required* ***Nature and Extent of Contamination:*** *Metals and hydrocarbons are present in soils and groundwater at various locations beneath the site.* ***Reason for Classification:*** *The site was reported to the DEC prior to the commencement of the Contaminated Sites Act 2003 and portions of it were reported again in May 2007, after the commencement of the Act. The classification is based on information submitted to DEC by May 2007.* *The site was used as a railway yard, which is a land use that has the potential to cause contamination as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004). DEC understands that the site is proposed for redevelopment and is currently vacant.* *The site was reported because contamination assessments carried out in the 1900s to 2007 found soil and groundwater were contaminated with metals and hydrocarbons from historical land uses at the site. Reports for investigations carried out up to 1998 have been submitted to DEC. DEC understands that additional desktop investigations were carried out in 2006 and 2007; and further site investigations are currently underway.* *Contaminated fill soils were reportedly imported to the site in the 1970s and 1980s. Soil investigations found that metals (arsenic, manganese, lead, zinc and copper) were present in soils at concentrations exceeding Health-based Investigation Levels for residential land use and exceeding Ecological Investigation Levels, as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment and Conservation, 2010). Lead was present in soils at concentrations exceeding Health-based Investigation Levels for commercial/industrial land use. Hydrocarbons (such as from fuel oil) are present in soils at concentrations potentially exceeding Health-based Investigation Levels for all land uses and exceeding Ecological Investigation Levels (DEC, 2010).* *Groundwater investigations carried out up to 1998 found copper, zinc and lead were present in groundwater at concentrations exceeding aquatic ecosystems – marine guidelines, as published in 'Assessment Levels for Soil, Sediment and Water' (DEC, 2010). Hydrocarbons (such as from petrol/diesel/oil) were also present in groundwater.* *DEC understands that some remedial works have been carried out at the site, such as capping contaminated soils onsite; however, evidence of the success of remedial works in a suitable validation report is yet to be submitted to DEC.* *As the site has only been partially investigated, a comment cannot be made on the suitability of the site as a whole for any land use.* *As there are grounds to indicate possible contamination of the site and soil and groundwater have not been fully investigated, and a risk assessment to determine the risk to human health, the environment, or any environmental value has not been carried out, the site is classified as 'possibly contaminated – investigation required'.* *When the results of further soil and groundwater investigations are submitted to DEC, these will be reviewed, and the site may be re-classified.* *A memorial stating the site's classification has been placed on the certificate of title, and will notify any prospective owners of the contamination status of the site.* ***Action Required:*** *Further soil and groundwater investigations are required to adequately delineate and characterise the nature and extent of soil and groundwater contamination across the site. Investigations should meet the standards outlined in the DEC's Contaminated Sites Management Series of guidelines.* <u>Onsite Investigations</u> GHD was commissioned by LandCorp to undertake contaminated sites investigations to determine if the former use of the site, as part of the Robb Jetty Marshalling Yard, had resulted in contamination that restricted the proposed development. These investigations have been subject to review by a DEC accredited contaminated sites auditor. Based on the results of the onsite investigations, the site requires limited management in the form of remediation of a localised area of elevated mercury concentrations. Management will be implemented as part of the works commissioned by LandCorp to render the site suitable for the proposed development. The onsite investigation also identified the presence of localised Asbestos Containing Materials (ACM). GHD recommended that the known locations of ACM be removed as part of the Remediation and Validation Plan (to be developed) and that a CEMP be developed to manage any future ACM that may be identified during the development works. As long as these issues are addressed the site is considered suitable for the proposed mixed use development.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
Lot 2120 on plan 22416 (Lot 2120 Bennett Avenue)	LR3112 / 771		DEC BSR (11/90/102) ***Classification:*** *16/07/2012 – Possibly contaminated – investigation required* ***Nature and Extent of Contamination:*** *Metals and hydrocarbons are present in soils and groundwater at various locations beneath the site.* ***Reason for Classification:*** *The site was reported to the DEC prior to the commencement of the Contaminated Sites Act 2003 and portions of it were reported again in May 2007, after the commencement of the Act. The classification is based on information submitted to DEC by May 2007.* *The site was used as a railway yard, which is a land use that has the potential to cause contamination as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004). DEC understands that the site is proposed for redevelopment and is currently vacant.* *The site was reported because contamination assessments carried out in the 1900s to 2007 found soil and groundwater were contaminated with metals and hydrocarbons from historical land uses at the site. Reports for investigations carried out up to 1998 have been submitted to DEC. DEC understands that additional desktop investigations were carried out in 2006 and 2007; and further site investigations are currently underway.* *Contaminated fill soils were reportedly imported to the site in the 1970s and 1980s. Soil investigations found that metals (arsenic, manganese, lead, zinc and copper) were present in soils at concentrations exceeding Health-based Investigation Levels for residential land use and exceeding Ecological Investigation Levels, as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment and Conservation, 2010). Lead was present in soils at concentrations exceeding Health-based Investigation Levels for commercial/industrial land use. Hydrocarbons (such as from fuel oil) are present in soils at concentrations potentially exceeding Health-based Investigation Levels for all land uses and exceeding Ecological Investigation Levels (DEC, 2010).* *Groundwater investigations carried out up to 1998 found copper, zinc and lead were present in groundwater at concentrations exceeding aquatic ecosystems – marine guidelines, as published in 'Assessment Levels for Soil, Sediment and Water' (DEC, 2010). Hydrocarbons (such as from petrol/diesel/oil) were also present in groundwater.* *DEC understands that some remedial works have been carried out at the site, such as capping contaminated soils onsite; however, evidence of the success of remedial works in a suitable validation report is yet to be submitted to DEC.* *As the site has only been partially investigated, a comment cannot be made on the suitability of the site as a whole for any land use.* *As there are grounds to indicate possible contamination of the site and soil and groundwater have not been fully investigated, and a risk assessment to determine the risk to human health, the environment, or any environmental value has not been carried out, the site is classified as 'possibly contaminated – investigation required'.* *When the results of further soil and groundwater investigations are submitted to DEC, these will be reviewed, and the site may be re-classified.* *A memorial stating the site's classification has been placed on the certificate of title, and will notify any prospective owners of the contamination status of the site.* ***Action Required:*** *Further soil and groundwater investigations are required to adequately delineate and characterise the nature and extent of soil and groundwater contamination across the site. Investigations should meet the standards outlined in the DEC's Contaminated Sites Management Series of guidelines.* Aerial Photographs During 1953, the site was utilised as a railway yard, with several tracks and trains with carriages intersecting the site. Train tracks dominated the western portion of the site, whilst part of a building was constructed in the eastern portion of the site in 1965. The railway yard and associated infrastructure was removed between 1995 and 2000, and the site had remained vacant to present, with minimal sparse coastal vegetation present onsite. Conclusions The DEC BSR listed this site as *"the site was used as a railway yard, which is a land use that has the potential to cause contamination as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004). DEC understands that the site is proposed for redevelopment and is currently vacant)."* The historical aerial photographs indicate that this site was utilised as a railway prior to1953 until its decommissioning during 1995 to 2000. The DEC list railways as a potentially contaminating activity, additionally a review of DEC BSR information and historic aerial photographs indicates that there appears to be potential for contamination at this site.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
74 Bennett Ave	2125 / 979		DEC BSR (11/90/102) ***Classification:*** *16/07/2012 – Possibly contaminated – investigation required* ***Nature and Extent of Contamination:*** *Metals and hydrocarbons are present in soils and groundwater at various locations beneath the site.* ***Reason for Classification:*** *The site was reported to the DEC prior to the commencement of the Contaminated Sites Act 2003 and portions of it were reported again in May 2007, after the commencement of the Act. The classification is based on information submitted to DEC by May 2007.* *The site was used as a railway yard, which is a land use that has the potential to cause contamination as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004). DEC understands that the site is proposed for redevelopment and is currently vacant.* *The site was reported because contamination assessments carried out in the 1900s to 2007 found soil and groundwater were contaminated with metals and hydrocarbons from historical land uses at the site. Reports for investigations carried out up to 1998 have been submitted to DEC. DEC understands that additional desktop investigations were carried out in 2006 and 2007; and further site investigations are currently underway.* *Contaminated fill soils were reportedly imported to the site in the 1970s and 1980s. Soil investigations found that metals (arsenic, manganese, lead, zinc and copper) were present in soils at concentrations exceeding Health-based Investigation Levels for residential land use and exceeding Ecological Investigation Levels, as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment and Conservation, 2010). Lead was present in soils at concentrations exceeding Health-based Investigation Levels for commercial/industrial land use. Hydrocarbons (such as from fuel oil) are present in soils at concentrations potentially exceeding Health-based Investigation Levels for all land uses and exceeding Ecological Investigation Levels (DEC, 2010).* *Groundwater investigations carried out up to 1998 found copper, zinc and lead were present in groundwater at concentrations exceeding aquatic ecosystems – marine guidelines, as published in 'Assessment Levels for Soil, Sediment and Water' (DEC, 2010). Hydrocarbons (such as from petrol/diesel/oil) were also present in groundwater.* *DEC understands that some remedial works have been carried out at the site, such as capping contaminated soils onsite; however, evidence of the success of remedial works in a suitable validation report is yet to be submitted to DEC.* *As the site has only been partially investigated, a comment cannot be made on the suitability of the site as a whole for any land use.* *As there are grounds to indicate possible contamination of the site and soil and groundwater have not been fully investigated, and a risk assessment to determine the risk to human health, the environment, or any environmental value has not been carried out, the site is classified as 'possibly contaminated – investigation required'.* *When the results of further soil and groundwater investigations are submitted to DEC, these will be reviewed, and the site may be re-classified.* *A memorial stating the site's classification has been placed on the certificate of title, and will notify any prospective owners of the contamination status of the site.* ***Action Required:*** *Further soil and groundwater investigations are required to adequately delineate and characterise the nature and extent of soil and groundwater contamination across the site. Investigations should meet the standards outlined in the DEC's Contaminated Sites Management Series of guidelines.* Aerial Photographs Prior to May 1999, the site remained a part of the abattoir infrastructure. It is unclear whether there are only trees or the electrical pad-mount TX transformer unit onsite from 1999 to 2001, however by January 2002; the electrical pad-mount TX transformer unit is clearly visible in the better quality aerial. The site remained unchanged to present. Conclusions The DEC BSR listed this site as *"the site was used as a railway yard, which is a land use that has the potential to cause contamination as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004). DEC understands that the site is proposed for redevelopment and is currently vacant)."* However, the site actually formed part of the former abattoir infrastructure, rather than the railway yard. Western Power has indicated that oils used in their transformers have not contained polychlorinated biphenyls (PCBs) since 1980, when they were phased out on all Western Power equipment. As this unit appears to have been installed around 1999, it is unlikely that this transformer unit would contain PCBs. Furthermore, site investigations undertaken at 66 Bennett Ave (located to the north of 74 Bennett Ave) included targeted sampling within the vicinity of this transformer. This sampling did not detect any contamination associated with the electrical transformer.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
			Based on review of DEC BSR information and historic aerial photographs there appears to be very limited potential only for contamination at this site.
48 Bennett Ave	2125 / 980		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, the site was vacant, cleared and appeared to be used for stock grazing. From 1965, the site became a part of the Bennett Avenue road reserve. This site is located next to a railway yard, with several tracks and trains with carriages intersecting the site. Around May 1999, an electrical pad-mount TX transformer unit was constructed onsite. The site remained unchanged to present. Conclusions Western Power has indicated that oils used in their transformers have not contained polychlorinated biphenyls (PCBs) since 1980, when they were phased out on all Western Power equipment. As this unit appears to have been installed around 1999, it is unlikely that this transformer unit would contain PCBs. Due to the small size of the transformer there appears to be limited potential only for contamination at this site.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
Lot 2121 on plan 22417	LR3112 / 772		DEC BSR (11/90/102) ***Classification:*** *16/07/2012 – Possibly contaminated – investigation required* ***Nature and Extent of Contamination:*** *Metals and hydrocarbons are present in soils and groundwater at various locations beneath the site.* ***Reason for Classification:*** *The site was reported to the DEC prior to the commencement of the Contaminated Sites Act 2003 and portions of it were reported again in May 2007, after the commencement of the Act. The classification is based on information submitted to DEC by May 2007.* *The site was used as a railway yard, which is a land use that has the potential to cause contamination as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004). DEC understands that the site is proposed for redevelopment and is currently vacant.* *The site was reported because contamination assessments carried out in the 1900s to 2007 found soil and groundwater were contaminated with metals and hydrocarbons from historical land uses at the site. Reports for investigations carried out up to 1998 have been submitted to DEC. DEC understands that additional desktop investigations were carried out in 2006 and 2007; and further site investigations are currently underway.* *Contaminated fill soils were reportedly imported to the site in the 1970s and 1980s. Soil investigations found that metals (arsenic, manganese, lead, zinc and copper) were present in soils at concentrations exceeding Health-based Investigation Levels for residential land use and exceeding Ecological Investigation Levels, as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment and Conservation, 2010). Lead was present in soils at concentrations exceeding Health-based Investigation Levels for commercial/industrial land use. Hydrocarbons (such as from fuel oil) are present in soils at concentrations potentially exceeding Health-based Investigation Levels for all land uses and exceeding Ecological Investigation Levels (DEC, 2010).* *Groundwater investigations carried out up to 1998 found copper, zinc and lead were present in groundwater at concentrations exceeding aquatic ecosystems – marine guidelines, as published in 'Assessment Levels for Soil, Sediment and Water' (DEC, 2010). Hydrocarbons (such as from petrol/diesel/oil) were also present in groundwater.* *DEC understands that some remedial works have been carried out at the site, such as capping contaminated soils onsite; however, evidence of the success of remedial works in a suitable validation report is yet to be submitted to DEC.* *As the site has only been partially investigated, a comment cannot be made on the suitability of the site as a whole for any land use.* *As there are grounds to indicate possible contamination of the site and soil and groundwater have not been fully investigated, and a risk assessment to determine the risk to human health, the environment, or any environmental value has not been carried out, the site is classified as 'possibly contaminated – investigation required'.* *When the results of further soil and groundwater investigations are submitted to DEC, these will be reviewed, and the site may be re-classified.* *A memorial stating the site's classification has been placed on the certificate of title, and will notify any prospective owners of the contamination status of the site.* ***Action Required:*** *Further soil and groundwater investigations are required to adequately delineate and characterise the nature and extent of soil and groundwater contamination across the site. Investigations should meet the standards outlined in the DEC's Contaminated Sites Management Series of guidelines.* Aerial Photographs Prior to 1953, the site was mostly cleared and vacant land, with a building present on the western boundary of the site. During 1965, there was evidence of development of a railway corridor in and around the site. By 1974, it appeared that the building on the western boundary had been removed and replaced with a new building on the southern boundary during 1977. Growth of vegetation along the northern portion of the site was observed in 1979 and during 1985 that part of the site was used for storage. The site was cleared between 1995 and 2000. By 2006, a drain/bund area for surface water runoff was constructed, which appears to be lined with soil material (possibly clay) and is fenced off with the only entrance being on the northern fence via a locked gate. The site remained unchanged to present. Conclusions The DEC BSR listed this site as *"the site was used as a railway yard, which is a land use that has the potential to cause contamination as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004). DEC understands that the site is proposed for redevelopment and is currently vacant)."* The historical aerial photographs indicate that this site was utilised as a railway prior to1953 until its decommissioning during 1995 to 2000. The DEC list railways as a potentially contaminating activity, additionally a review of DEC BSR information and historic aerial photographs indicates that there appears to be potential for contamination at this site.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
14 Bennett Ave	2125 / 993		DEC BSR (DMO 3355) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1974, the site was vacant, cleared and appeared to be used for stock grazing. From 1981, the site became a part of the Bennett Avenue road reserve. Around May 1999, an electrical pad-mount TX transformer unit was constructed onsite. The site remained unchanged to present. Conclusions Western Power has indicated that oils used in their transformers have not contained polychlorinated biphenyls (PCBs) since 1980, when they were phased out on all Western Power equipment. As this unit appears to have been installed around 1999, it is unlikely that this transformer unit would contain PCBs. Due to the small size of the transformer there appears to be limited potential only for contamination at this site.
3 Darkan Ave	2186 / 665		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1981 the site was vacant and appeared to be covered by sparse coastal vegetation. In the 1981 aerial photograph the site appears to be used for stock grazing. The site appears to undergoing earthworks in the 1995 aerial photograph. Construction of a warehouse has commenced in the 2000 aerial photograph. This warehouse is evident in all subsequent aerial photographs. GHD understands this warehouse is currently used by Fremantle City Cold Stores. Conclusions Based on a review of DEC BSR information and historic aerial photographs there appears to be limited potential only for contamination at this site.
13 Rollinson Rd	2689 / 288		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1981, the site was vacant and appeared to be covered by sparse coastal vegetation. The site was cleared of vegetation in 1995. The site remains vacant to present, the only notable changes being that the vegetation has slowly grown sparse coastal vegetation, vehicular movements across the site (in the form of tracks) and minor illegal dumping onsite near the tracks. Conclusions Based on a review of DEC BSR information and historic aerial photographs there appears to be limited potential only for contamination at this site.
16 Garston Way	2689 / 289		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1974, the site was vacant and appeared to be covered by sparse coastal vegetation. The site appears to have been partially cleared for agricultural use in 1974, until 1995, where vegetation was completely cleared. During 1999, the site was aligned to Garston Way and Darkan Avenue, which were constructed and bitumised during this time. The site remains vacant to present, the only notable changes being that the vegetation has slowly grown sparse coastal vegetation and vehicular movements across the site (in the form of tracks). Conclusions Based on a review of DEC BSR information and historic aerial photographs there appears to be limited potential only for contamination at this site.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
43 Rollinson Rd (Lot 69 Rollinson Rd)	2689 / 286		DEC BSR (11/90/102) ***Classification:*** *16/07/2012 – Possibly contaminated – investigation required* ***Nature and Extent of Contamination:*** *Metals and hydrocarbons are present in soils and groundwater at various locations beneath the site.* ***Reason for Classification:*** *The site was reported to the DEC prior to the commencement of the Contaminated Sites Act 2003 and portions of it were reported again in May 2007, after the commencement of the Act. The classification is based on information submitted to DEC by May 2007.* *The site was used as a railway yard, which is a land use that has the potential to cause contamination as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004). DEC understands that the site is proposed for redevelopment and is currently vacant.* *The site was reported because contamination assessments carried out in the 1900s to 2007 found soil and groundwater were contaminated with metals and hydrocarbons from historical land uses at the site. Reports for investigations carried out up to 1998 have been submitted to DEC. DEC understands that additional desktop investigations were carried out in 2006 and 2007; and further site investigations are currently underway.* *Contaminated fill soils were reportedly imported to the site in the 1970s and 1980s. Soil investigations found that metals (arsenic, manganese, lead, zinc and copper) were present in soils at concentrations exceeding Health-based Investigation Levels for residential land use and exceeding Ecological Investigation Levels, as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment and Conservation, 2010). Lead was present in soils at concentrations exceeding Health-based Investigation Levels for commercial/industrial land use. Hydrocarbons (such as from fuel oil) are present in soils at concentrations potentially exceeding Health-based Investigation Levels for all land uses and exceeding Ecological Investigation Levels (DEC, 2010).* *Groundwater investigations carried out up to 1998 found copper, zinc and lead were present in groundwater at concentrations exceeding aquatic ecosystems – marine guidelines, as published in 'Assessment Levels for Soil, Sediment and Water' (DEC, 2010). Hydrocarbons (such as from petrol/diesel/oil) were also present in groundwater.* *DEC understands that some remedial works have been carried out at the site, such as capping contaminated soils onsite; however, evidence of the success of remedial works in a suitable validation report is yet to be submitted to DEC.* *As the site has only been partially investigated, a comment cannot be made on the suitability of the site as a whole for any land use.* *As there are grounds to indicate possible contamination of the site and soil and groundwater have not been fully investigated, and a risk assessment to determine the risk to human health, the environment, or any environmental value has not been carried out, the site is classified as 'possibly contaminated – investigation required'.* *When the results of further soil and groundwater investigations are submitted to DEC, these will be reviewed, and the site may be re-classified.* *A memorial stating the site's classification has been placed on the certificate of title, and will notify any prospective owners of the contamination status of the site.* ***Action Required:*** *Further soil and groundwater investigations are required to adequately delineate and characterise the nature and extent of soil and groundwater contamination across the site. Investigations should meet the standards outlined in the DEC's Contaminated Sites Management Series of guidelines.* Aerial Photographs In 1953, there majority of the site remains sparse coastal vegetation, with a building in the south-east corner of the site. In 1965, an additional building appears onsite in the north-west corner of the site. The site appears to be being utilised as a railway marshalling yard, with several railway tracks located across the site and a train with carriages is present near south-eastern building. There are also stock yards evident in the eastern portion of the site in this photograph. During 1974, the onsite building in the north-west corner appear to have been removed, with trains and carriages remaining stored or in use onsite. During 1981, there appears to be multiple train lines visible intersecting the site, with two small buildings south-eastern corner. By May 1999, all onsite railways appear to have been removed and the site has been cleared (with the main railway remaining to the west of the site). The site has remained cleared to present, with sparse coastal vegetation growing back. Conclusions The DEC BSR listed this site as *"the site was used as a railway yard, which is a land use that has the potential to cause contamination as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004). DEC understands that the site is proposed for redevelopment and is currently vacant)."* The historical aerial photographs indicate that this site was utilised as a railway prior to1953 until its decommissioning during 1995 to 2000. The DEC list railways as a potentially contaminating activity, additionally a review of DEC BSR information and historic aerial photographs indicates that there appears to be potential for contamination at this site.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
Lot 70 Bennett Ave (Lot 70 on plan 55128)	2689 / 287		DEC BSR (11/90/102) ***Classification:*** *16/07/2012 – Possibly contaminated – investigation required* ***Nature and Extent of Contamination:*** *Metals and hydrocarbons are present in soils and groundwater at various locations beneath the site.* ***Reason for Classification:*** *The site was reported to the DEC prior to the commencement of the Contaminated Sites Act 2003 and portions of it were reported again in May 2007, after the commencement of the Act. The classification is based on information submitted to DEC by May 2007.* *The site was used as a railway yard, which is a land use that has the potential to cause contamination as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004). DEC understands that the site is proposed for redevelopment and is currently vacant.* *The site was reported because contamination assessments carried out in the 1900s to 2007 found soil and groundwater were contaminated with metals and hydrocarbons from historical land uses at the site. Reports for investigations carried out up to 1998 have been submitted to DEC. DEC understands that additional desktop investigations were carried out in 2006 and 2007; and further site investigations are currently underway.* *Contaminated fill soils were reportedly imported to the site in the 1970s and 1980s. Soil investigations found that metals (arsenic, manganese, lead, zinc and copper) were present in soils at concentrations exceeding Health-based Investigation Levels for residential land use and exceeding Ecological Investigation Levels, as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment and Conservation, 2010). Lead was present in soils at concentrations exceeding Health-based Investigation Levels for commercial/industrial land use. Hydrocarbons (such as from fuel oil) are present in soils at concentrations potentially exceeding Health-based Investigation Levels for all land uses and exceeding Ecological Investigation Levels (DEC, 2010).* *Groundwater investigations carried out up to 1998 found copper, zinc and lead were present in groundwater at concentrations exceeding aquatic ecosystems – marine guidelines, as published in 'Assessment Levels for Soil, Sediment and Water' (DEC, 2010). Hydrocarbons (such as from petrol/diesel/oil) were also present in groundwater.* *DEC understands that some remedial works have been carried out at the site, such as capping contaminated soils onsite; however, evidence of the success of remedial works in a suitable validation report is yet to be submitted to DEC.* *As the site has only been partially investigated, a comment cannot be made on the suitability of the site as a whole for any land use.* *As there are grounds to indicate possible contamination of the site and soil and groundwater have not been fully investigated, and a risk assessment to determine the risk to human health, the environment, or any environmental value has not been carried out, the site is classified as 'possibly contaminated – investigation required'.* *When the results of further soil and groundwater investigations are submitted to DEC, these will be reviewed, and the site may be re-classified.* *A memorial stating the site's classification has been placed on the certificate of title, and will notify any prospective owners of the contamination status of the site.* ***Action Required:*** *Further soil and groundwater investigations are required to adequately delineate and characterise the nature and extent of soil and groundwater contamination across the site. Investigations should meet the standards outlined in the DEC's Contaminated Sites Management Series of guidelines.* Aerial Photographs Prior to 1953, the site was already utilised as a railway corridor in the central and eastern portions of the site, with the western portion remaining undeveloped and covered with sparse, coastal vegetation. During 1965, there was evidence of development of a railway corridor intersecting the site. Railway lines intersect the central portion of the site, whilst railway cars are visible on railway lines in the eastern portion of the site. There are also stock yards evident in the eastern portion of the site in this photograph. By 1974, it appeared that the majority of buildings surrounding the site have been removed and replaced with new buildings between 1974 and 1977. The site was utilised as a railway corridor for the next approximately 20 years, with minor changes to infrastructure. The railway was decommissioned and cleared between 1995 and 2000, and has remained vacant land to present. Conclusions The DEC BSR listed this site as *"the site was used as a railway yard, which is a land use that has the potential to cause contamination as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004). DEC understands that the site is proposed for redevelopment and is currently vacant)."* The historical aerial photographs indicate that this site was utilised as a railway prior to1953 until its decommissioning during 1995 to 2000. The DEC list railways as a potentially contaminating activity, additionally a review of DEC BSR information and historic aerial photographs indicates that there appears to be potential for contamination at this site.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
11 Garston Way	2689 / 290		DEC BSR (DEC4271) ***Classification:*** *08/02/2008 - Report not substantiated* ***Nature and Extent of Contamination:*** *Landfill comprising of seaweed and shells have been identified on the site's surface.* ***Reason for Classification:*** *The site was reported to the DEC as per reporting obligations under section 11 of the Contaminated Sites Act 2003. The classification is based on information submitted to DEC by 18 May 2007.* *The site has historically been used for cattle grazing.* *Soil and groundwater investigations have not been carried out and the quality of soil and groundwater beneath the site are unknown.* *As a risk assessment has not been carried out, DEC cannot comment on the suitability of the Site for the proposed residential use.* *A site inspection was performed by Golder Associates which reported the visual identification of landfill comprising seaweed and shells on the surface.* *Based on a preliminary site investigation, there is no evidence to suggest that soils or groundwater/surface water of the site are potentially contaminated.* *The report of a known or suspected contaminated site, in conjunction with DEC enquiries of the site, provides insufficient grounds to indicate that possible contamination of the site is present from the current or historical land use. As such, the site is classified as 'report not substantiated'.* Aerial Photographs The site appears to be used for agricultural purposes during the 1950s to the 1980s, with possible fencing and stock evident in some aerial photographs. The site has been disused since the mid-1990s. There is some evidence of vehicle movement (i.e. tracks) across the site in the 2004 to 2009 aerial photographs. There are no other notable features in any of the aerial photographs available for review. Conclusions Based on a review of the DEC BSR information and aerial photographs there appears to be limited potential only for contamination at this site.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
9 Garston Way	2689 / 291		DEC BSR (DEC4271) ***Classification:*** *08/02/2008 - Report not substantiated* ***Nature and Extent of Contamination:*** *Landfill comprising of seaweed and shells have been identified on the site's surface.* ***Reason for Classification:*** *The site was reported to the DEC as per reporting obligations under section 11 of the Contaminated Sites Act 2003. The classification is based on information submitted to DEC by 18 May 2007.* *The site has historically been used for cattle grazing.* *Soil and groundwater investigations have not been carried out and the quality of soil and groundwater beneath the site are unknown.* *As a risk assessment has not been carried out, DEC cannot comment on the suitability of the Site for the proposed residential use.* *A site inspection was performed by Golder Associates which reported the visual identification of landfill comprising seaweed and shells on the surface.* *Based on a preliminary site investigation, there is no evidence to suggest that soils or groundwater/surface water of the site are potentially contaminated.* *The report of a known or suspected contaminated site, in conjunction with DEC enquiries of the site, provides insufficient grounds to indicate that possible contamination of the site is present from the current or historical land use. As such, the site is classified as 'report not substantiated'.* Aerial Photographs The site appears to be used for agricultural purposes during the 1950s to the 1980s, with possible fencing and stock evident in some aerial photographs. The site has been disused since the mid-1990s. There is some evidence of vehicle movement (i.e. tracks) across the site in the 2004 to 2009 aerial photographs. There are no other notable features in any of the aerial photographs available for review. Conclusions Based on a review of the DEC BSR information and aerial photographs there appears to be limited potential only for contamination at this site.
2016 Cockburn Rd	LR3146 / 794		DEC BSR (DMO 1475) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1981 the site was vacant, cleared and appeared to be used for stock grazing. During 1985, there is evidence of soil disturbance and by 1995, it is appears that the site was being utilised as a drain/bund area for surface water runoff. It appears to have been lined with a soil material (possibly clay). The site remains unchanged to present, the only exception being the dense regrowth of coastal vegetation. Conclusions Based on a review of the DEC BSR information and aerial photographs there appears to be limited potential for contamination at this site.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
Lot 1957 on plan 205558 Lot 1818 on plan 205891 Lot 1759 on plan 240202	LR3139 / 029 LR3139 / 028 LR3139 / 027	ENV (2007) Initial Investigation of Point Catherine Dunes North Coogee. February 2007. ENV (2009) Part of WAPC Reserve 44945, North Coogee, WA: Detailed Site Investigation. June 2009. 360 Environmental Pty Ltd (2009) WAPC Reserve 44945, North Coogee, WA: Tier 2 Health Risk Assessment. October 2009. RPS (2020) Robb Road Soils Investigation. March 2010. RPS (2010) Robb Road Groundwater Reinjection Pipeline, North Coogee: Construction Phase. May 2010. RPS (2010) Groundwater Interception Drain 2009-21010 Monitoring Report: Port Coogee Project. October 2010. GHD (2011) Report for North Coogee: Preliminary Site Investigation. March 2011. GHD (2011) Report for North Coogee: Sampling and Analysis Plan. March 2011. GHD (2012) Report for 24787R McTaggart Cover and 2110L Bennett Avenue, North Coogee: Detailed Site Investigation. May 2012.	DEC BSR (DEC5859) Awaiting classification. Onsite Investigations GHD was commissioned by the City of Cockburn to undertake contaminated sites investigations to determine if the former use of these sites had resulted in contamination. These investigations have been subject to review by a DEC accredited contaminated sites auditor. This investigation identified the presence of isolated elevated lead concentrations within the surface and subsurface soils at the site. The elevated concentrations were generally associated with slag material associated with the former ANI Bradken Foundry. Asbestos Containing Material (ACM) fragments were also identified at the site. During onsite investigations, *E.coli* was identified within groundwater beneath the site, which may limit the use of groundwater. Based on the results of the onsite investigations, GHD recommended that a Site Management Plan (SMP) be prepared to address potential human health risks associated with contamination at the site and that groundwater use be managed to limit the exposure to *E.coli*.
2064 Robb Rd	LR3093 / 698	ENV (2007) Initial Investigation of Point Catherine Dunes North Coogee. February 2007. ENV (2009) Part of WAPC Reserve 44945, North Coogee, WA: Detailed Site Investigation. June 2009. 360 Environmental Pty Ltd (2009) WAPC Reserve 44945, North Coogee, WA: Tier 2 Health Risk Assessment. October 2009. RPS (2020) Robb Road Soils Investigation. March 2010. RPS (2010) Robb Road Groundwater Reinjection Pipeline, North Coogee: Construction Phase. May 2010. RPS (2010) Groundwater Interception Drain 2009-21010 Monitoring Report: Port Coogee Project. October 2010. GHD (2011) Report for North Coogee: Preliminary Site Investigation. March 2011. GHD (2011) Report for North Coogee: Sampling and Analysis Plan. March 2011. GHD (2012) Report for 24787R McTaggart Cover and 2110L Bennett Avenue, North Coogee: Detailed Site Investigation. May 2012.	DEC BSR (DMO 7241) Not reported to DEC as a known or suspected contaminated site. Onsite Investigations GHD was commissioned by the City of Cockburn to undertake contaminated sites investigations to determine if the former use of these sites had resulted in contamination. These investigations have been subject to review by a DEC accredited contaminated sites auditor. This investigation identified the presence of isolated elevated lead concentrations within the surface and subsurface soils at the site. The elevated concentrations were generally associated with slag material associated with the former ANI Bradken Foundry. Asbestos Containing Material (ACM) fragments were also identified at the site. During onsite investigations, *E.coli* was identified within groundwater beneath the site, which may limit the use of groundwater. Based on the results of the onsite investigations, GHD recommended that a Site Management Plan (SMP) be prepared to address potential human health risks associated with contamination at the site and that groundwater use be managed to limit the exposure to *E.coli*.

Lot ID	Certificate of Title (Volume / Folio)	Contaminated Sites Investigation	Previous/Known Information
Lot 2110 on plan 219369	2124 / 083	ENV (2007) Initial Investigation of Point Catherine Dunes North Coogee. February 2007. ENV (2009) Part of WAPC Reserve 44945, North Coogee, WA: Detailed Site Investigation. June 2009. 360 Environmental Pty Ltd (2009) WAPC Reserve 44945, North Coogee, WA: Tier 2 Health Risk Assessment. October 2009. RPS (2020) Robb Road Soils Investigation. March 2010. RPS (2010) Robb Road Groundwater Reinjection Pipeline, North Coogee: Construction Phase. May 2010. RPS (2010) Groundwater Interception Drain 2009-21010 Monitoring Report: Port Coogee Project. October 2010. GHD (2011) Report for North Coogee: Preliminary Site Investigation. March 2011. GHD (2011) Report for North Coogee: Sampling and Analysis Plan. March 2011. GHD (2012) Report for 24787R McTaggart Cover and 2110L Bennett Avenue, North Coogee: Detailed Site Investigation. May 2012.	<u>DEC BSR (11/90/110 and 2011/9783)</u> ***Classification:*** *09/09/2009 – Possibly contaminated – investigation required* ***Nature and Extent of Contamination:*** *Hydrocarbons including fuel oils, and heavy metals including cadmium, copper and zinc were identified in surface soils to the west of Robb Road, extending approximately 200 m north of McTaggart Cover. Heavy metals, including arsenic, chromium, copper, lead, manganese, nickel and zinc were also identified in soils north of Rollinson Road.* ***Reason for Classification:*** *The site was originally reported to the DEC prior to the commencement of the Contaminated Sites Act 2003. A portion of the site, north of Rollinson Road, was reported again on 26 March 2009. The site classification is based on information submitted to DEC by August 2009.* *The site comprises Lot 2106, a portion of railway reserve extending north from McTaggart Cover for approximately 1.2 km, as well as Lot 2110, which lies directly west of the railway reserve, and includes Robb Road.* *Part of the site was historically occupied by the Robb Jetty Marshalling Yards, and stormwater drainage from an abattoir further east was also discharged to the site. Railway yards and abattoirs are land uses that have the potential to cause contamination, as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004).* *The then Department of Commerce and Trade commissioned a soil investigation of the site in 1996 to provide information for its redevelopment for passive recreational purposes including a dual use pedestrian and cycle path, access road and car park. The soil investigation identified that hydrocarbons (such as fuel oils and combustion residues) were present in surface soils near the railway tracks at concentrations exceeding Ecological Investigation Levels (EILs) and Health-based Investigation Levels for parks and recreational land use (HIL-E), as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment, 2003). Hydrocarbons, cadmium, copper and zinc were also present in near surface soils at the former abattoir stormwater discharge and rail wagon washdown areas at concentrations exceeding EILs.* *DEC was informed in March 2009 that metals had been identified in soil in the northern portion of Lot 2110, north of Rollinson Road, at concentrations exceeding EILs and, in some cases, HIL-E. DEC understands that further soil investigations are underway in this area, and is awaiting submission of the relevant reports.* *Soil sampling undertaken within the railway reserve (Lot 2106) just north of Rollinson Road in August 2008 and March 2009 identified lead in soil exceeding EILs but below Health-based Investigation Levels for commercial/industrial land use (HIL-F).* *Groundwater investigations have not been carried out, and the quality of groundwater beneath the Site is unknown.* *The 1996 investigation report proposed that the identified impacted soils be excavated and sent for off-site disposal to an appropriately licenced landfill facility and that validation of the resultant excavations be carried out prior to backfilling. By the date of classification, DEC had not received a suitable validation report confirming that the proposed remedial actions had been successfully implemented.* *As there are grounds to indicate possible contamination of the site, and since further investigation of soil and groundwater and a risk assessment to determine the risk to human health, the environment, or any environmental value are required to determine the contamination status of the site, the site is classified as 'possibly contaminated – investigation required'.* *When the results of further soil and groundwater investigations are submitted to DEC, these will be reviewed, and the site may be re-classified.* <u>Onsite Investigations</u> GHD was commissioned by the City of Cockburn to undertake contaminated sites investigations to determine if the former use of these sites had resulted in contamination. These investigations have been subject to review by a DEC accredited contaminated sites auditor. This investigation identified the presence of isolated elevated lead concentrations within the surface and subsurface soils at the site. The elevated concentrations were generally associated with slag material associated with the former ANI Bradken Foundry. Asbestos Containing Material (ACM) fragments were also identified at the site. During onsite investigations, *E.coli* was identified within groundwater beneath the site, which may limit the use of groundwater. Based on the results of the onsite investigations, GHD recommended that a Site Management Plan (SMP) be prepared to address potential human health risks associated with contamination at the site and that groundwater use be managed to limit the exposure to *E.coli*.

Table 2 Hilltop and Emplacement Crescent

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
136 Cockburn Rd	1205 / 021		DEC BSR Awaiting results of BSR search. Aerial Photographs Prior to 1965, the site remains vacant and undeveloped, consisting of sparse coastal vegetation. By 1974, vehicular moment onsite are visible (car tracks). The site remains unchanged until 1995, where it appears that vegetation in the western portion of the site has been burnt. The site remains unchanged again until 2001, where it has been cleared of all vegetation. Construction is underway in 2002, with the concrete pads of building visible and movement of sand. In 2003, there appears to be three 'pits' in the western portion of the site, and two buildings onsite. A large industrial shed dominates the central portion of the site and a smaller, presumably administration building resides along the eastern boundary. There are at least two electrical towers located onsite. The entire site is bitumised and car parking bays are visible. A small red brick building appears in the north-western corner of the site in 2007 and the 'pits' become vegetated around the edges. By 2009, an extension has been constructed on the central shed, extending the shed to the northern boundary. The site remains unchanged to present. Quickstep Holdings Ltd and Quickstep Technology Pty Ltd are the current site occupiers, which is an accredited manufacturing facility for the production engineering, manufacture and testing of advanced composite components to aerospace and defence-quality standards. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be potential for contamination at this site. Further investigation would be required to determine level, if any, of contamination present at the site.
21 Cockburn Rd (142 Cockburn Rd)	1275 / 714		DEC BSR Awaiting results of BSR search. Aerial Photographs Prior to 1965, the site remains vacant and undeveloped, consisting of sparse coastal vegetation. By 1965, the site has been cleared of vegetation and there is evidence of excavations onsite. Minor infrastructure has been constructed on the western portion of the site in 1974, in addition to a bunded or retained area near the western boundary of the site. The 1977 aerial features an excavation in the eastern portion of the site. During 1981, the western portion of the site appears to have been used as a tip site, with dumped waste or materials dominating the western portion of the site. The majority of these materials have been removed by 1985, with only minor materials present around the infrastructure. The eastern portion of the site appears to have been covered in small sand piles, potentially to refill the excavated sand. The 1995 aerial reinforces this notion, as the eastern portion of the site appears to have been refilled to the surface level of the remainder of the site. The entire site appears to have been utilised for sparse, surficial dumping in 2000, however by 2001, the eastern portion of the site has been cleared and by 2003, the entire site has been cleared. During 2009, there was vehicular activity onsite (car parking). A building was constructed onsite during 2010, two buildings were constructed on the south-western boundary and one building was constructed near the north-western boundary (all with blue rooves). A small building was added to the west of the two buildings on the south-western boundary in late 2010. The current and historical land uses of the site are unknown. Conclusions Based on a review of the DEC BSR Information and aerial photographs, there appears to be potential for contamination at this site.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
146 Cockburn Rd (Lot 22 Cockburn Rd)	1277 / 291		DEC BSR (DEC5596) Awaiting classification. Aerial Photographs Prior to 1953, the site remains vacant and undeveloped, consisting of sparse coastal vegetation. By 1965, the western portion of the site is partially cleared and a building appears to have been constructed near Cockburn Road. By 1974, one large and two medium sized industrial buildings have been constructed onsite. An additional medium-sized building has been constructed to the east of the other buildings. During 1995, the site has been partially bitumised including car parking areas near Cockburn Road. Evidence of the site being used as a laydown area is visible during 2004. The site remains unchanged to present. SCHÜTZ DSL Group (Coogee Drums) are the current site occupiers, which are a leading international producer of high-quality packaging systems, offering a range of products for liquid and dry filling goods, such as intermediate bulk containers, stainless steel units and mild grease units, drums, small volume refillable containers and reconditioned steel drums. City of Cockburn Information Information provided by the City of Cockburn indicates that this site has been occupied by SCHÜTZ DSL Group for a number of years and is used for drum storage and cleaning. The use of this site may have resulted may have resulted in some chemical spillages. Conclusions The DEC list the current land use of chemical manufacturing, blending or mixing (plastics), drum or tank re-conditioning or recycling facility and steel works as potentially contaminating activities. Based on a review of the DEC BSR information and aerial photographs, there appears to be a moderate potential for contamination at this site, however GHD understands that the current site owners have commissioned WSP to undertake contaminated site investigations and remediation at this site.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
25 Cockburn Rd	1369 / 924		DEC BSR (DEC3281) ***Classification:*** *15/05/2012 – Possibly contaminated – investigation required* ***Nature and Extent of Contamination:*** *Soils at the site have been impacted with brine salts.* ***Reason for Classification:*** *The site was reported to the DEC as per reporting obligations under section 11 of the Contaminated Sites Act 2003. The classification is based on information submitted to DEC by May 2007.* *The site has historically been used as a tannery since the 1970s. This is a land use that has the potential to cause contamination, as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004).* *The site was reported because groundwater impacts were suspected to have originated from the evaporation pond that has been located on the eastern part of the site for more than 30 years. The report also cited visual indications that brine salts, such as are used in the tanning process, had impacted soil at the site.* *No soil or groundwater investigations have been carried out, and the quality of soil and groundwater beneath the site are unknown.* *A risk assessment has not been carried out to determine the potential risk posed by the substances of concern at the site to human health, the environment or any environmental value. As a risk assessment has not been carried out, DEC cannot comment on the suitability of the site for any use.* *As there are grounds to indicate possible contamination of the site, and since suitable investigation of soil and groundwater and a risk assessment to determine the risk to human health, the environment, or any environmental value has not been carried out, further works are required to determine the contamination status of the site and the site is therefore classified as 'possibly contaminated – investigation required'.* *When the results of soil and groundwater investigations are submitted to DEC, these will be reviewed, and the site may be re-classified.* Aerial Photographs Prior to 1953, the site remains vacant and undeveloped, consisting of sparse coastal vegetation. By 1965, the western portion of the site is partially cleared and an industrial building appears to have been constructed near Cockburn Road. By 1981, development of the industrial building is apparent, with a bitumised area now around the edge of the building. There appears to be a bunded area towards the central to eastern portion of the site. This bunded area appears to hold liquid and in the 1995 aerial, there appears to be a disturbance in the bunded liquid, potentially due to the addition of liquid or other soil materials. Additionally, there also appear to be trucks onsite. By 2005, this blue bunded water now appears to be brown whereas in 2009, it appears to be white before returning to blue in 2010. The site remains unchanged to present, apart from the bunded area being disturbed and changing colour. Perth Hide and Skin Exports are the current site occupiers, which consists of a tannery for cattle and sheep skins. City of Cockburn Information Information provided by the City of Cockburn indicates that this site has operated as a skin and hide processing business for a number of years. Conclusions The DEC list the current land use of a tannery as a potentially contaminating activity. Based on a review of the DEC BSR information and aerial photographs, there appears to be moderate potential for contamination at this site. Further investigation would be required to determine level, if any, of contamination present at the site.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
15 Cockburn Rd	357 / 75A		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1965, the site remains vacant and undeveloped, consisting of sparse coastal vegetation. By 1977, there is evidence of vehicular movement in the eastern portion of the site and in 1979, a large track is apparent near the western boundary of the site, running in a north to south orientation and by 1995, there are a few additional tracks intersecting the site. The site remains unchanged to present. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be limited potential only for contamination at this site.
29 Cockburn Rd	1220 / 271		DEC BSR (DEC1446) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, the site remains vacant and undeveloped, consisting of sparse coastal vegetation. By 1965, two large buildings have been constructed in the centre of the site and the western portion of the site has been subjected to clearing. The use of the buildings is unknown. In 1981, two smaller buildings have been constructed on either side of one of the existing buildings. It also appears that an area to the front of the western building has been cleared (presumably for car parking purposes). It appears that the buildings have been decommissioned and removed by 1995. The site remains unchanged to present. Conclusions Due to the relatively small scale of development indicated at this site the potential for contamination to be present may be limited in terms of potential scale and severity, however as the nature of use is not known, this is uncertain. Further investigation would be required to determine level, if any, of contamination present at the site.
17 Cockburn Rd	1203 / 190		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, the site remains vacant and undeveloped, consisting of sparse coastal vegetation. By 1965, the site has evidence of vehicular movement across the western portion. An industrial building has been constructed in the centre of the site, in a north to south orientation. GHD understands that this building was part of the former Kreglinger Tannery. During 1977, a car parking area in the western portion of the site has been constructed. Extensive clearing in the western portion of the site is noted in 1995. The site remains unchanged to present, with the exception of the regrowth of coastal vegetation in the eastern portion of the site. This site appears to be currently inside the same fence as the neighbouring property to the north, Inside Out Direct Pty Ltd, which manufacture non-upholstered wood household furniture. Potentially, this industrial building may be associated with this company, due to them sharing a fence and also due to the orientation of the building and its distance from Cockburn Rd. Conclusions Former use of the site includes a tannery. The DEC list the current land use of a tannery as a potentially contaminating activity. Based on a review of available information and aerial photographs, there appears to be moderate potential for contamination at this site. Further investigation would be required to determine level, if any, of contamination present at the site.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
Lot 18 on diagram 15317	1301 / 640		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1965, the site remains vacant and undeveloped, consisting of sparse coastal vegetation. By 1977, there is evidence of vehicular movement onsite and by 1995, the site has been partially cleared. The site remains unchanged to present. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be limited potential only for contamination at this site.
32 Cockburn Rd 31 Cockburn Rd	1272 / 721 1258 / 802	GHD (2004) North Coogee Master Plan Area, Groundwater Data Review. GHD (2006) Cockburn Coast Urban Redevelopment, Phase 1: Project Inception Report. October 2006. GHD (2007) Cockburn Coast Urban Redevelopment, Environmental Service Phase 2: Desk Based Review, Package 3 – Land East of Cockburn Road. September 2007. GHD (2010) Cockburn Coast Urban Redevelopment, Sampling and Analysis Plan. January 2010. GHD (2011) Report for Cockburn Coast Detailed Site Investigation, Package 3: Lot 126 Emplacement Crescent and Lots 31 and 32 Cockburn Road, North Coogee. October 2011.	DEC BSR (DEC3277) Awaiting classification. Onsite Investigations GHD was commissioned by LandCorp to undertake contaminated sites investigations to determine if the former use of the site had resulted in contamination that restricted the proposed development. These investigations have been subject to review by a DEC accredited contaminated sites auditor. The onsite investigation also identified the presence of localised Asbestos Containing Material (ACM) at 32 Cockburn Rd. GHD recommended that the known locations of ACM be removed as part of the Remediation and Validation Plan (to be developed) and that a Construction Environment Management Plan (CEMP) be developed to manage any future ACM that may be identified during the development works at 32 Cockburn Rd and 31 Cockburn Rd. As long as these issues are addressed these sites are considered suitable for the proposed development, which includes terraced house/detached, low density residential, medium to high density residential and road reserve.
30 Cockburn Rd	1267 / 155		DEC BSR (DEC1446) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1965, the site remains vacant and undeveloped, consisting of sparse coastal vegetation. By 1965, a building has been constructed in the centre of the site, with four small, vertical trenches appearing in the western portion of the site. With the exception of increased vehicular movement, there are no observable changes until 1995, where the buildings onsite appear to have been removed and the site becomes vacant. The site remains unchanged to present. Conclusions Due to the relatively small scale of development indicated at this site the potential for contamination to be present may be limited in terms of potential scale and severity, however as the nature of use is not known, this is uncertain. Further investigation would be required to determine level, if any, of contamination present at the site.
208 Cockburn Rd	1883 / 623		DEC BSR (DMO 4045) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1965, the site remains vacant and undeveloped, consisting of sparse coastal vegetation. By 1965, there is evidence of vehicular movement onsite, as well as some vehicles being parked onsite. With the exception of increased vehicular movement, there are no observable changes until 1985, where a track situated parallel and close to the northern boundary had been bitumised, leading to the industrial buildings to the north of the site. A small car parking area near the centre of the site has additionally been bitumised. During 1995, the western half of this site appears to have been burnt and the building to the north of this site has been removed. It is assumed that the bitumen onsite is now disused. The site remains unchanged to present. Conclusions Due to the relatively small scale of development indicated at this site the potential for contamination to be present may be limited in terms of potential scale and severity, however as the nature of use is not known, this is uncertain. Further investigation would be required to determine level, if any, of contamination present at the site.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
123 Cockburn Rd	2052 / 986		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs A building is present onsite in 1953, potentially associated with the adjacent railway reserve. By 1965, this building has been replaced with another building, consisting of four adjoining buildings (three orientated west to east and ne orientated north to south). GHD understands that this building was part of the former Kreglinger Tannery. The site has remained unchanged to present, with the exception of the eastern portion of the site being mostly cleared in 1995 and experiencing regrowth in subsequent years. This site is currently occupied by Inside Out Direct Pty Ltd, which manufacture non-upholstered wood household furniture. It is unknown how long they have been the site occupants. Potentially, Inside Out Direct Pty Ltd may be associated the building to the south of this site, due it being located inside the same fence as the neighbouring property and also due to the orientation of the of the neighbouring building and its distance from Cockburn Road. Conclusions Former use of the site includes a tannery. The DEC list the current land use of a tannery as a potentially contaminating activity. Based on a review of available information and aerial photographs, there appears to be moderate potential for contamination at this site. Further investigation would be required to determine level, if any, of contamination present at the site.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
Lot 2106 on plan 219339 (314 McTaggart Cove, North Coogee)	LR3037 / 854		DEC BSR (11/90/110) ***Classification:*** *09/09/2009 – Possibly contaminated – investigation required* ***Nature and Extent of Contamination:*** *Hydrocarbons including fuel oils were identified in surface soils within the railway reserve along the eastern edge of Robb Road, extending approximately 500 m north of McTaggart Cove. Lead was identified in surface soils within the railway reserve north of Rollinson Road and west of the railway line.* ***Reason for Classification:*** *The site was originally reported to the DEC prior to the commencement of the Contaminated Sites Act 2003. A portion of the site, north of Rollinson Road, was reported again on 26 March 2009. The site classification is based on information submitted to DEC by August 2009.* *The site comprises Lot 2106, a portion of railway reserve extending north from McTaggart Cover for approximately 1.2 km, as well as Lot 2110, which lies directly west of the railway reserve, and includes Robb Road.* *Part of the site was historically occupied by the Robb Jetty Marshalling Yards, and stormwater drainage from an abattoir further east was also discharged to the site. Railway yards and abattoirs are land uses that have the potential to cause contamination, as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004).* *The then Department of Commerce and Trade commissioned a soil investigation of the site in 1996 to provide information for its redevelopment for passive recreational purposes including a dual use pedestrian and cycle path, access road and car park. The soil investigation identified that hydrocarbons (such as fuel oils and combustion residues) were present in surface soils near the railway tracks at concentrations exceeding Ecological Investigation Levels (EILs) and Health-based Investigation Levels for parks and recreational land use (HIL-E), as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment, 2003). Hydrocarbons, cadmium, copper and zinc were also present in near surface soils at the former abattoir stormwater discharge and rail wagon washdown areas at concentrations exceeding EILs.* *DEC was informed in March 2009 that metals had been identified in soil in the northern portion of Lot 2110, north of Rollinson Road, at concentrations exceeding EILs and, in some cases, HIL-E. DEC understands that further soil investigations are underway in this area, and is awaiting submission of the relevant reports.* *Soil sampling undertaken within the railway reserve (Lot 2106) just north of Rollinson Road in August 2008 and March 2009 identified lead in soil exceeding EILs but below Health-based Investigation Levels for commercial/industrial land use (HIL-F).* *Groundwater investigations have not been carried out, and the quality of groundwater beneath the Site is unknown.* *The 1996 investigation report proposed that the identified impacted soils be excavated and sent for off-site disposal to an appropriately licenced landfill facility and that validation of the resultant excavations be carried out prior to backfilling. By the date of classification, DEC had not received a suitable validation report confirming that the proposed remedial actions had been successfully implemented.* *As there are grounds to indicate possible contamination of the site, and since further investigation of soil and groundwater and a risk assessment to determine the risk to human health, the environment, or any environmental value are required to determine the contamination status of the site, the site is classified as 'possibly contaminated – investigation required'.* *When the results of further soil and groundwater investigations are submitted to DEC, these will be reviewed, and the site may be re-classified.* Aerial Photographs The area to the east of the site was utilised as a railway prior to 1953. During 1965, there was a building built across the northern part of the site. The site has been cleared during 1974 and by 1977, a railway ran the entire length of the site. The site has remained unchanged to present.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
			Conclusions The DEC BSR indicated that part of the site was reported as being historically occupied by the Robb Jetty Marshalling Yards, and stormwater drainage from an abattoir further east was also discharged to the site, both land have the potential to cause contamination, as specified in the guideline *'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004).*The historical aerials confirm use of the site as a railway and railway reserve since 1953. Further investigation would be required to determine the current status of contamination.
221 Cockburn Rd	2155 / 380		DEC BSR (DEC9229) ***Classification:*** *03/10/2008 – Possibly contaminated – investigation required* ***Nature and Extent of Contamination:*** *No sampling results are currently available to confirm the presence or extent of any possible contamination.* ***Reason for Classification:*** *The site was reported to the DEC as per reporting obligations under section 11 of the Contaminated Sites Act 2003. The classification is based on information submitted to DEC by September 2008.* *The site was reported because it has historically and is currently being used as an animal skin processing plant, a land use that has the potential for cause contamination, as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004).* *A Preliminary Site Investigation (reported in January 2008) identified potential sources of contamination, including evidence of spills/losses. The report recommended soil investigations to determine the contamination status of soil at the site. DEC understands that limited groundwater monitoring has been undertaken at the site, however, the results have not been forwarded to DEC.* *As there are grounds to indicate possible contamination of the site, and since a suitable investigation of soil and/or groundwater and a risk assessment to determine the risk to human health, the environment, or any environmental value has not been carried out, further works are required to determine the contamination status of the site, and the site is therefore classified as 'possibly contaminated – investigation required'.* *When the results of soil and groundwater investigations are submitted to DEC, these will be reviewed, and the site may be re-classified.* Aerial Photographs Prior to 1953, the site remained undeveloped, covered by sparse coastal vegetation. By 1965, industrial development had commenced onsite, as a large industrial building with 'Waycop' written on the roof was constructed. This building consisted of five thin, horizontal buildings, orientated east to west. By 1995, four of the five sheds appear to have rusted rooves. In December 2011, these rooves appear to have been replaced or fixed. The site has remained unchanged to present. Conclusions This site was reported to the DEC as it was historically and is currently being used as an animal skin processing plant, a land use that has the potential for cause contamination (DoE, 2004). Based on a review of the DEC BSR information and aerial photographs, there appears to be potential for contamination at this site. Further investigation would be required to determine level, if any, of contamination present at the site.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
152 Cockburn Rd (Lots 221 and 222 Cockburn Rd)	2155 / 379		DEC BSR (DEC5596) Awaiting classification. Aerial Photographs Prior to 1953, the site remained undeveloped, covered by sparse coastal vegetation. By 1965, two small sheds have been constructed in the western portion of the site, with a laydown area present in the centre of the site and a small pond present just east of the laydown area. By 1974, the two small sheds in the western portion of the site have been replaced by one larger building and two small industrial buildings are now located in the north-eastern portion of the site. In 1981, it is possible to discern the area near the western boundary has been lowered (dug out), the laydown area in the centre of the site has been extended and there appears to be an evaporation pond or pit in the south-eastern corner. By 1995, the laydown area extends to the western boundary. The dug out area in the north-eastern portion of the site also appears to have been levelled. By 1999, there is an increase in laydown in the eastern portion of the site. In 2004, the laydown are appears to have been reorganised and reduced in size. Between 2006 and 2007, the laydown materials in the south-eastern corner have been removed and three bunded pits have been dug again. In April 2011, one of the ponds in the south-eastern corner appears to be filled with a liquid. The site has remained unchanged to present. This site is currently occupied by SCHÜTZ DSL Group (Coogee Drums), which are a leading international producer of high-quality packaging systems, offering a range of products for liquid and dry filling goods, such as intermediate bulk containers, stainless steel units and mild grease units, drums, small volume refillable containers an reconditioned steel drums. This site is assumed to be a part of 146 Cockburn Road, which is also occupied by SCHÜTZ DSL Group. City of Cockburn Information Information provided by the City of Cockburn indicates that this site has been occupied by SCHÜTZ DSL Group for a number of years and is used for drum storage and cleaning. The use of this site may have resulted may have resulted in some chemical spillages. Furthermore, it is understood that an evaporation pond is present at the site and that there is potential for leakages from this pond. Conclusions The DEC list the current land use of chemical manufacturing, blending or mixing (plastics), drum or tank re-conditioning or recycling facility and steel works as potentially contaminating activities. Based on a review of the DEC BSR information and aerial photographs, there appears to be a moderate potential for contamination at this site, however GHD understands that the current site owners have commissioned WSP to undertake contaminated site investigations and remediation at this site.
Lot 252 on plan 26401	2217 / 015		DEC BSR Not reported to DEC as a known or suspected contaminated site. Aerial Photographs From 1953 to present, the site appears to have been used as road for vehicles next to the railway reserve (scattered vegetation strip). The track became a bitumised road between 1995 and 2000. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a very limited potential only for contamination.
Lot 55 on plan 20584	2037 / 286		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs The site appears to be a road reserve. Prior to 1953, the site remained undeveloped, covered by sparse coastal vegetation. By 1979, the site has been cleared and in 1981, the site forms part of the Cockburn Road reserve. The site remains unchanged to present, with the exception of vegetation regrowth. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a very limited potential only for contamination.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
9906 Cockburn Rd	2622 / 391	GHD (2004) North Coogee Master Plan Area, Groundwater Data Review. GHD (2006) Cockburn Coast Urban Redevelopment, Phase 1: Project Inception Report. October 2006. GHD (2007) Cockburn Coast Urban Redevelopment, Environmental Service Phase 2: Desk Based Review, Package 4 – South Cockburn Area. September 2007. GHD (2008) Fisherman's Cooperative Sampling, Pre-Demolition Sampling Results. July 2008. GHD (2010) Cockburn Coast Urban Redevelopment, Sampling and Analysis Plan. January 2010. GHD (2012) Report for Cockburn Coast Detailed Site Investigation, Package 4: South Cockburn Area, North Coogee. March 2012.	DEC BSR (DEC12104) Awaiting classification. Onsite Investigations GHD was commissioned by LandCorp to undertake contaminated sites investigations to determine if the former use of the site had resulted in contamination that restricted the proposed development. These investigations have been subject to review by a DEC accredited contaminated sites auditor. The onsite investigation also identified the presence of localised Asbestos Containing Materials (ACM) associated with remnant service infrastructure at 9906 Cockburn Rd. GHD recommended that the known locations of ACM be removed as part of the Remediation and Validation Plan (to be developed) and that a CEMP be developed to manage any future ACM that may be identified during the development works at 9906 Cockburn Rd. As long as these issues are addressed this site is considered suitable for the proposed mixed land use development.
9907 Cockburn Rd	2622 / 392	GHD (2004) North Coogee Master Plan Area, Groundwater Data Review. GHD (2006) Cockburn Coast Urban Redevelopment, Phase 1: Project Inception Report. October 2006. GHD (2007) Cockburn Coast Urban Redevelopment, Environmental Service Phase 2: Desk Based Review, Package 4 – South Cockburn Area. September 2007. GHD (2010) Cockburn Coast Urban Redevelopment, Sampling and Analysis Plan. January 2010. GHD (2012) Report for Cockburn Coast Detailed Site Investigation, Package 4: South Cockburn Area, North Coogee. March 2012.	DEC BSR (DMO 7254) Not reported to DEC as a known or suspected contaminated site. Onsite Investigations GHD was commissioned by LandCorp to undertake contaminated sites investigations to determine if the former use of the site had resulted in contamination that restricted the proposed development. These investigations have been subject to review by a DEC accredited contaminated sites auditor. The onsite investigations identified an isolated hydrocarbon impact and the presence of localised ACM. Management measures will be implemented as part of the works commissioned by LandCorp to render the site suitable for the proposed development. GHD recommended that hydrocarbon impacted soils and known locations of ACM be removed as part of the Remediation and Validation Plan (to be developed) and that a CEMP be developed to manage any future ACM that may be identified during the development works. As long as these issues are addressed the site is considered suitable for the proposed mixed use development.
9908 Cockburn Rd 26 Cockburn Rd	2622 / 393 1382 / 584	GHD (2004) North Coogee Master Plan Area, Groundwater Data Review. GHD (2006) Cockburn Coast Urban Redevelopment, Phase 1: Project Inception Report. October 2006. GHD (2007) Cockburn Coast Urban Redevelopment, Environmental Service Phase 2: Desk Based Review, Package 4 – South Cockburn Area. September 2007. GHD (2010) Cockburn Coast Urban Redevelopment, Sampling and Analysis Plan. January 2010. GHD (2012) Report for Cockburn Coast Detailed Site Investigation, Package 4: South Cockburn Area, North Coogee. March 2012.	DEC BSR (DEC3280) Awaiting classification. Onsite Investigations GHD was commissioned by LandCorp to undertake contaminated sites investigations to determine if the former use of the site had resulted in contamination that restricted the proposed development. These investigations have been subject to review by a DEC accredited contaminated sites auditor. The onsite investigation also identified the presence of localised ACM associated with fly-tipping. GHD recommended that the known locations of ACM be removed as part of the Remediation and Validation Plan (to be developed) and that a CEMP be developed to manage any future ACM that may be identified during the development works. As long as these issues are addressed these sites are considered suitable for the proposed mixed use development.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
Lot 9909 on plan 47039	LR3156 / 937		DEC BSR (11/90/522 and DEC11225) ***Classification:*** *12/11/2009 – Decontaminated* ***Nature and Extent of Contamination:*** *Following remediation, no contamination remains at the Site.* ***Reason for Classification:*** *Background:* *The site was reported to the DEC as part of the approvals process for residential subdivision of the site. The site classification is based on information submitted to DEC by November 2009.* *The site forms part of the Port Coogee Development Area, Cockburn Road, North Coogee WA 6163.* *The site was historically used for industrial and commercial purposes including animal carcass processing works and tanneries. These are land uses that have the potential to cause contamination as per the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004).* *Soil Investigations:* *The site was subject to soil and groundwater investigations and remediation works between 2005 and 2008. Soil investigations identified the presence of heavy metals, organochlorine pesticides, hydrocarbons (i.e. from petrol or diesel) and asbestos contamination within near surface soils across the site. The contaminant concentrations exceeded Health Investigation Levels for residential land uses (as published in guideline 'Assessment Levels for Soil, Sediment and Water', Department of Environment, 2003).* *Soil contamination was remediated by excavation and off-site disposal and validated following the completion of the remediation works. Soil remediation and validation works concluded in May 2007.* *Groundwater Investigations:* *An initial groundwater investigation identified the widespread presence of nutrient contamination at concentrations exceeding Marine Water Ecosystems assessment criteria as published in guideline 'Assessment Levels for Soil, Sediment and Water' (Department of Environment, 2003), within the superficial aquifer underlying the site.* *A risk assessment demonstrated that the presence of elevated nutrients within shallow groundwater represented a risk to the quality of the water within the proposed marina developments to the west of the site, which would give rise to eutrophication and algal blooms.* *Groundwater monitoring data accompanied by a Mandatory Auditor's Report prepared by an accredited Contaminated Sites Auditor, was submitted to DEC in 2008, following two years of groundwater monitoring across the site.* *The groundwater investigation was carried out in accordance with the standards set out in DEC's 'Contaminated Sites Management Series' of guidelines. The investigation identified the presence of heavy metals, organochlorine pesticides and nutrients exceeding ANZECC 2000 Marine Water Ecosystems Criteria as set out in the guideline 'Assessment Levels for Soil, Sediment and Water' (Department of Environment, 2003).* *On 17 August 2009 DEC received information confirming the extent of the groundwater plume and identifying the cadastral lots impacted by groundwater contamination. The extent of the groundwater contamination plume was further refined in new information presented to the DEC on 4 November 2009.* *The site's remediation management program requires the design and operation of a Groundwater Interception Drain (GID) to intercept and depress groundwater levels to minimise the recharge of contaminated groundwater entering the proposed marina development. The ongoing management of abstraction from the GID is subject to a 5C Licence to Abstract Water issued and regulated by the Department of Water.* *Conclusions:* *A screening risk assessment has demonstrated that after successful completion of soil remediation works, the site is suitable for the proposed residential, public open space and the commercial uses and groundwater is suitable for domestic garden irrigation uses. The operation and management of the GID will minimise the risk to the marina environment.* *As the site was known to be contaminated but has been subject to remediation works and risk assessment that has shown that the site is suitable for the proposed residential, public open space and the commercial land uses, the site has been classified as 'decontaminated'.*

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
			In accordance with Department of Health advice if groundwater is being, or is proposed to be, abstracted DEC recommends that analytical testing should be carried out to determine whether the groundwater is suitable for its intended use. Aerial Photographs Prior to 1953, the site appears to have been used for cleared agriculture/stock grazing. In 1965, there is evidence of vehicular movement (car tracks) across a small portion of the site. There were no significant changes onsite until 1981, where the central portion of the site appears to have undergone excavation activities. In 1985, it appears that there is a pond in the excavation area. By 1995, the excavation area has been levelled and is covered by sparse coastal vegetation. Between January and July 2008, Spearwood Avenue is constructed onsite and intersects the site in an east-west orientation. The site remains unchanged to present. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a very low potential for contamination following the remediation of the site and the site appears suitable for the proposed mixed use.
51 Cockburn Rd	1117 / 087		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, the site appears to have been mostly cleared, with a completely cleared square area in the centre of the site and the remainder covered by sparse coastal vegetation. There is evidence of vehicular movement in 1974 across the centre of the site. There are no noticeable changes until 1981, where the site appears to have received illegal dumping of waste in the centre of the site. By 1985, there is increased, sparse dumping of materials onsite. In 1995, the western portion of the site is completely cleared. By 2000, the vegetation onsite has regrown, the potentially burnt vegetation in the eastern portion of the site. In 2001, the vegetation has regrown to form low lying grasses and bushes, with evidence of vehicular movement around the perimeter of the site. The site has remained unchanged to present. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a very limited potential only for contamination at this site.
980 Cockburn Rd	1117 / 087		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, the site appears to have been covered by sparse coastal vegetation. There is evidence of vehicular movement in 1974 across the south-western corner of the site. There are no noticeable changes until 1981, where the site appears to have increased vehicular activity. By 1985, there is a major track running in a north-south orientation interesting the centre of the site. By 2000, there is evidence of potentially burnt vegetation in the western portion of the site. In 2001, the vegetation has regrown to form low lying grasses and bushes, with evidence of vehicular movement across the centre of the site. The site has remained unchanged to present. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a very limited potential for contamination at this site.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
52 Cockburn Rd	1117 / 087		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, the site appears to have been mostly cleared, with the remainder covered by sparse coastal vegetation. There are no noticeable changes until 1981, where the site appears to have increased vehicular activity and clearing. By 1985 placement of materials on the site to the north is encroaching on this site, however this appears to be very minor. In 1995, the western portion of the site is completely cleared. By 2000, the vegetation onsite has regrown, the potentially burnt vegetation in the eastern portion of the site. In 2001, the vegetation has regrown to form low lying grasses and bushes, with evidence of vehicular movement around the perimeter of the site. The site has remained unchanged to present. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a limited potential only for contamination on this site.
Lot 4197 on plan 20584	LR3038 / 208		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs During 1953, the northern portion of the site is covered by sparse coastal vegetation, the central portion of the site comprises excavations (possibly quarrying activities) and the southern portion of the site comprises dense vegetation. By 1977, there are tracks present throughout all sections of the site. By 1981, there appears to be vegetation growth throughout the site, in particular, the central part of the site where the excavations were. During 1995, the majority of the site and surrounds have been completely cleared, with limited vegetation remaining in the central and southern portions of the site. By 2000, vegetation has regrown in the central portion of the site. Tracks are visible throughout the site. The site has remained relatively unchanged to present. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be generally limited potential only for contamination on this site, with the possible exception of former excavation locations (possible localised quarry/backfill activities which have potential to contain contamination, albeit localised).
25 Emplacement Cr	2037 / 273		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1965, the majority of the site was covered by dense vegetation. By 1974, there is a track onsite, located in an east to west orientation, in the northern portion of the site. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2000, a building is located on the western portion of the site, with associated car parking located north of the building. The eastern portion of the site remains vacant land. A second industrial building has been constructed to the east of the original building in 2008, and the car parking area has been extended to the eastern boundary. This area to the east is being used as a storage area for boats. The site has remained relatively unchanged to present. Currently, the site operates as: • Unit 1: Lazco Engineering; and • Unit 2: formerly All Marine Services (now vacant and available for lease). Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a limited potential only for contamination on this site (e.g leaks/spills/ washing down activities causing substances to enter drains) due to extensive site coverage with a building and sealed surfacing.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
4199 Cockburn Rd	LR3106 / 264		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, the site was covered by sparse coastal vegetation. The site remained unchanged until 1981, where is has been partially cleared. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2008, vegetation has regrown onsite and there is evidence of vehicular movements. The site has remained relatively unchanged to present. Currently, this lot resides as vacant land surrounded by a limestone retaining wall. There appears to be illegal dumping/ vehicular movement onsite (eg. cars). Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a limited potential only for contamination on this site, most likely to be related to illegal surface dumping.
4195 Cockburn Rd	LR3106 / 260		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953 to 1981, the site comprised cleared and vacant land. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2008, vegetation has regrown onsite. The site has remained relatively unchanged to present. Currently, this lot resides as vacant land surrounded by a limestone retaining wall. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a very limited potential only for contamination on this site most likely to be related to illegal surface dumping.
15 Emplacement Cr (1/15 Emplacement Cr) (2/15 Emplacement Cr) (3/15 Emplacement Cr)	2142 / 066 2142 / 067 2142 / 068		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, the site was covered by sparse coastal vegetation, with a building bordering the site to the north and a dark shadow indicative of a quarry face , bordering the site to the south. By 1965, the building bordering the site to the south appears to have been removed and the probable quarry activity extended to the south-east of the site. By 1974, a small track is apparent intersecting the site across the north-western corner and vegetation onsite has regrown. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2000, a building is located in the centre of the site, with associated car parking located west of the building and a laydown/storage area located east of the building. Apart from vehicular movements and an increase in use of the laydown area, the site has remained relatively unchanged to present. Currently, this lot resides as three different businesses, being • Gymnastics Western Australia - Hamilton Hill (formerly located here) • E Bauwerk Werkstatt- potentially BAUWERK Paint • Livestock Express • Cotech Conclusions Based on a review of the DEC BSR information and aerial photographs, there is potential for contamination to be present at the site associated with quarry/infill activity prior to construction of the current form of development.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
7 Emplacement Cr	2037 / 265		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1965, the site was mostly cleared, with the remainder covered by sparse coastal vegetation. By 1974, a track is present onsite, running from north-west corner and passing through the centre of the southern boundary of the site. The site has been cleared in the centre during 1981, leaving a large circle of what appears to be gravel surfacing, leading to a small track intersecting the southern boundary of the site. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2000, a building is located on the south-eastern corner of the site, with associated car parking located north and west of the building. The site has been demolished in 2012 following a fire at the site , with just the concrete pad and bitumised surface remaining. The site has remained relatively unchanged to present. Currently, the site resides as FSL Systems (Fremantle Steam Laundry), which are a supplier of work wear and linen hire, including services in uniform rental, dust control mats, continuous towels, recycling of protective clothing and rag supply. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a potential for contamination on this site based on chemicals likely to have been used at the site and destruction of the main building by fire. However, given the protection afforded by sealed surfacing at the site and potential for dilution/ limited persistence the potential for contamination by be limited. Further investigation would be required to determine level, if any, of contamination present at the site.,
5 Emplacement Cr (1/5 Emplacement Cr) (2/5 Emplacement Cr) (3/5 Emplacement Cr) (4/5 Emplacement Cr) (5/5 Emplacement Cr)	2101 / 437 2101 / 438 2101 / 439 2101 / 440 2101 / 441		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953 until 1979, the site was covered by sparse coastal vegetation, becoming denser in subsequent years. During 1981, a track was constructed onsite, running in a north to south orientation thought the centre of the site. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2000, a building is located in the centre of the site, with associated car parking located south, west and east of the building. In 2008, there appears to be small red brick buildings attached to the main building and an extension of the main building towards the northern boundary. Apart from vehicular movements and an increase in use of the laydown area, the site has remained relatively unchanged to present. • Units 2, 3, 4 and 5 are all vacant and available for lease. • Currently, the site is occupied by Rags to Riches Op Shop and formerly by Aqua Dearborn (water treatment). Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a limited potential only for contamination on this site.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
1 Emplacement Cr	2037 / 263		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, the site was partly cleared, with the remainder covered by sparse coastal vegetation. By 1965, a track is present running north to south near the western boundary of the site. The City of Cockburn also identified the presence of military infrastructure at this site, however GHD understands that this military infrastructure was never operational and therefore is not considered to pose a risk of contamination. By 1977, dense vegetation has regrown in the eastern portion of the site. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2000, a building is located in the centre of the site, with associated car parking located south, west and east of the building. There appears to be an extension of the main building along the northern boundary in 2008. Apart from vehicular movements and an increase in use of the laydown area, the site has remained relatively unchanged to present. The site is currently occupied by: • Tradelink- bathroom products and service • Stepping Stones Wellness Clinic- pain relief system • Inside Out Health Lounge- natural health practitioner Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a very limited potential only for contamination on this site, based on the above land uses.
23 Emplacement Cr	2037 / 272		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, the majority of the site was covered by dense vegetation, with a small portion in the north-eastern corner comprising cleared land. During 1965, the site has undergone clearing and comprises sparse, coastal vegetation. By 1974, most of the vegetation onsite appears to have regrown. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2000, a building is located on the southern portion of the site, with associated car parking located north of the building. The site has remained relatively unchanged to present. This site is currently occupied by PK Print, an environmentally certified printing company. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a very limited potential only for contamination on this site, based on the above land use.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
21 Emplacement Cr	2037 / 271		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, the site was covered by sparse coastal vegetation, with partially cleared land in the north portion of the site. The site has undergone clearing in 1965, with the majority of the site now free of vegetation. By 1974, vegetation has regrown along the northern and southern boundaries and a track is present in the centre of the site, located in an east to west orientation. In 1977, there is a second track visible onsite, located parallel and north of the original track. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2000, a building is located in the centre portion of the site, with associated car parking located west of the building and a laydown/storage area located east of the building. In 2008, there is potentially the addition of a few small sheds or trucks onsite. Apart from vehicular movements and an increase in use of the laydown area, the site has remained relatively unchanged to present. The site is currently occupied by Metro Ice, manufacturers of tube, flake, bulk and block ice. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a very limited potential only for contamination on this site, based on the above land use.
19 Emplacement Cr (1/19 Emplacement Cr) (2/19 Emplacement Cr) (3/19 Emplacement Cr)	2099 / 924 2099 / 925 2099 / 926		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1965, the site was covered by sparse coastal vegetation, with partially cleared land in the north portion of the site. By 1974, vegetation has regrown over the majority of the site, and a track is visible running from the centre of the southern boundary to the north-western corner of the site. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2000, a building is located on the eastern portion of the site, with associated car parking located west and south of the building. During 2008, the main building has been extended to the eastern boundary. Two small red rooves have been added to the front of the main building in 2012. Apart from vehicular movements and an increase in use of the laydown area, the site has remained relatively unchanged to present. Currently, the site is occupied by: • Dale and Waters- online plus size clothing • Bella Furniture • CABA Australia – life support system engineers Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a limited potential only for contamination on this site.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
17 Emplacement Cr	2037 / 269		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, the south-eastern portion of the site was cleared, there was a possible quarry located near the northern boundary of the site and what appears to be a building in the north-western corner of the site. The remainder of the site was covered by sparse coastal vegetation. By 1965, the quarry near the northern boundary of the site has moved offsite to the east. In 1974, the quarry appears to be partially onsite in the north-eastern corner. The building in the north-western corner remains present onsite, as does the sparse coastal vegetation for the remainder of the site. By 1977, there appears to be potentially piles of disturbed sand or light coloured vegetation in the centre of the site. The quarry appears to be getting larger in size by 1981. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2000, a building is located on the eastern portion of the site, with associated car parking located west of the building. Apart from vehicular movements and an increase in use of the laydown area, the site has remained relatively unchanged to present. Currently, the site is occupied by Flowserve, which is a manufacturer and aftermarket service provider of flow control products and services. Conclusions Based on a review of the DEC BSR information and aerial photographs, there is potential for contamination to be present at the site associated with quarry/infill activity prior to construction of the current form of development.
13 Emplacement Cr	2037 / 267		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, the site was covered by sparse coastal vegetation, with a track intersecting the site in a north-east to south-westerly orientation and a building present on the southern boundary of the site. By 1965, the building on the southern boundary has been removed. In 1974, a second track is present onsite, branching off from the original track in a north-eastern orientation. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2000, a building is located on the eastern portion of the site, with associated car parking located west of the building. Apart from vehicular movements and an increase in use of the laydown area, the site has remained relatively unchanged to present. Currently, the site is occupied by: • Eco Max- wastewater treatment services • -Reodrain- leach drain for disposal of wastewater via infiltration and evaporation Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a limited potential only for contamination on this site restricted to use prior to the current form of development.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
11 Emplacement Cr	2037 / 266		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1965, the site was covered by sparse coastal vegetation. By 1974, a track is present intersecting the site in a north to south orientation through the centre of the site and the vegetation has regrown. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2000, a building is located on the eastern portion of the site, with associated car parking located west of the building. Apart from vehicular movements and an increase in use of the laydown area, the site has remained relatively unchanged to present. Currently, the site is occupied by: • Marlin Marine Solutions- provide a full range of vessel and marina docking products, designed to simplify mooring • Canna- producer of nutrients and growing mediums for the cultivation of fast growing plants Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a limited potential only for contamination on this site restricted to use prior to the current form of development.
16 Emplacement Cr	2037 / 276		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, the site was covered by sparse coastal vegetation, with a track intersecting the site in a north-east to south-westerly orientation. By 1965, the site appears to have been cleared of the majority of vegetation onsite. During 1974, a major track is visible in the south-western corner, in addition to the original track. There appears to be a disturbance in the centre of the site during 1981. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2000, a building is located on the south-western corner of the site, with associated car parking located north, south and west of the building. The rest of the site remains vacant land until 2008, where it has been bitumised and used as a laydown/storage area. Apart from vehicular movements and an increase in use of the laydown area, the site has remained relatively unchanged to present. Currently, the site is occupied by Southern Trading Australia, which supply specialised seafood products. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a limited potential only for contamination on this site, based on the above land use.
12 Emplacement Cr	2037 / 278		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1965, there was evidence of small infrastructure, such as a building, shed or water tank, present on cleared land located near the centre of the site. There is a track present running east to west near the southern boundary of the site and the remainder of the site is covered by sparse coastal vegetation. The onsite infrastructure has been removed by 1974 and by 1977, the site appears to be a thoroughfare for vehicles, as there are multiple tracks intersecting the site. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2000, there appears to be a trench onsite from the southern boundary to the centre of the site. There also appear to be a concrete pad near the northern boundary. The building is present in 2008 along the northern boundary, with associated car parking along the eastern boundary. Apart from vehicular movements and an increase in use of the laydown area, the site has remained relatively unchanged to present. Currently, the site is occupied by Early Bird Seafood and Bait. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a limited potential only for contamination on this site, based on the above land use.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
8 Emplacement Cr (1/8 Emplacement Cr) (2/8 Emplacement Cr) (3/8 Emplacement Cr) (4/8 Emplacement Cr) (5/8 Emplacement Cr) (6/8 Emplacement Cr)	2733 / 822 2733 / 823 2733 / 824 2733 / 825 2733 / 826 2733 / 827		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1965, the site comprises cleared land in the centre of the site, with evidence of small infrastructure, such as a building, shed or water tank, located on cleared land near the western boundary of the site. The remainder of the site is covered by sparse coastal vegetation. The small infrastructure on the western boundary of the site has been removed by 1974. Two tracks, forking to form a 'Y' shape, are present onsite during 1981. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2008, a building has been constructed in the south-western corner of the site and associated car parking is coated to the north and east of the building. The entire site has been bitumised. Apart from vehicular movements and an increase in use of the laydown area, the site has remained relatively unchanged to present. Currently, the site is occupied by: • So Cal Limos- car hire services • Stazo Marine Accessories Australia- manufacturing and distributing marine equipment Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a limited potential only for contamination on this site, based on the above land uses.
2 Emplacement Cr	2037 / 282		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, the site was covered by sparse coastal vegetation. By 1965, there is a track intersecting the site in a north-south orientation located near the western boundary. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2000, a building is located on the eastern portion of the site, with associated car parking located north and west of the building and a laydown/storage area located south of the building. Apart from vehicular movements and an increase in use of the laydown area, the site has remained relatively unchanged to present. The site is currently in use by Alba Oils (a refiner of high quality vegetable oils and fats). Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a limited potential only for contamination on this site most likely to be restricted to minor leaks/spills from non-vegetable oil/fat related ancillary processes/equipment (if present).
6 Emplacement Cr (Lot 119 Emplacement Cr)	2037 / 281		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1965, the site was covered by sparse coastal vegetation, with evidence of small infrastructure, such as a building, shed or water tank, located on cleared land on the eastern boundary of the site. Information provided by the City of Cockburn indicates that this infrastructure may have been associated with military operations within the area. GHD understands that this military infrastructure was never operational and therefore is not considered to pose a risk of contamination. This infrastructure was removed between 1965 and 1974. Regrowth of vegetation is visible by 1977. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. There is evidence of vehicular movements onsite during 2008 and by 2012, the entire site has been bitumised and a small building is located in the north-western corner. The site has remained relatively unchanged to present. The current land use is vacant land. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a very limited potential only for contamination on this site.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
4196 Emplacement Cr (City of Cockburn Reserve 43945R)	LR3038 / 206		DEC BSR (1103/05) Awaiting classification. Aerial Photographs Prior to 1953, there was evidence of small infrastructure onsite. This is listed by the City of Cockburn Local Government Inventory as *South Beach Battery (remains) is evidence of the importance of defending the Western Australian coastline, and in particular Fremantle Harbour and Cockburn Sound (Mitchell, 2009).* This infrastructure was installed in 1944 and housed land based, single barrel versions of a dual purpose gun mounted in twin turrets in Royal Navy Anti Aircraft cruisers, intended to provided high level anti aircraft and coast artillery cover for Fremantle Harbour and the Sound (Mitchell, 2009). The Battery at South Beach was never finished and never became operational and therefore is not considered to pose a risk to contamination at the site. The entire installation was destroyed except for the excavated remains now visible (Mitchell, 2009). The site now operates as an unsealed park, vested in the City of Cockburn. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a limited potential only for contamination on this site.
14 Emplacement Cr (Lot 115 Emplacement Cr)	2037 / 277		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, there was evidence of small infrastructure, such as a building, shed or water tank, located on cleared land was located near the near the centre of the site. Information provided by the City of Cockburn indicates that this infrastructure may have been associated with military operations within the area. GHD understands that this military infrastructure was never operational and therefore is not considered to pose a risk of contamination. A track intersected the site in an east to west orientation and the remainder of the site was covered by sparse to dense coastal vegetation. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2000, a building is in the process of being constructed on the southern portion of the site. The building is present onsite during 2008 and associated car parking located to the south and west of the building. The entire site has been bitumised. Apart from vehicular movements and an increase in use of the laydown area, the site has remained relatively unchanged to present. Currently, the site is utilised by Ricciardi Seafoods and Cold stores as a Seafood Processing Facility. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a limited potential only for contamination on this site.
31 Emplacement Cr	2172 / 918		DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Aerial Photographs Prior to 1953, the site was covered by sparse coastal vegetation, with dense vegetation in the north-eastern corner and a track intersecting the site in a north-east to south-easterly orientation. By 1965, there is an additional track onsite orientated in a north-west to south-east direction, which becomes more pronounced in 1974. Another track is located nearby the original north-east to south-west track. The site remained unchanged until 1995, where it has been completely cleared of all vegetation. By 2000, a building is located in the centre of the site, with associated car parking located all around the building, with a section of concrete pad extending to the eastern boundary. Apart from vehicular movements, the site has remained relatively unchanged to present. Currently, the site is occupied by Far West Scallops Industries, which is a scallop food processing facility. Conclusions Based on a review of the DEC BSR information and aerial photographs, there appears to be a limited potential only for contamination on this site.

Lot ID	Certificate of Title (Volume / Folio)	CS Investigation	Previous/Known Information
27 Emplacement Cr	2712 / 919	GHD (2004) North Coogee Master Plan Area, Groundwater Data Review. GHD (2006) Cockburn Coast Urban Redevelopment, Phase 1: Project Inception Report. October 2006. GHD (2007) Cockburn Coast Urban Redevelopment, Environmental Service Phase 2: Desk Based Review, Package 3 – Land East of Cockburn Road. September 2007. GHD (2010) Cockburn Coast Urban Redevelopment, Sampling and Analysis Plan. January 2010. GHD (2011) Report for Cockburn Coast Detailed Site Investigation, Package 3: Lot 126 Emplacement Crescent and Lots 31 and 32 Cockburn Road, North Coogee. October 2011.	DEC BSR (DMO 1476) Not reported to DEC as a known or suspected contaminated site. Onsite Investigations GHD was commissioned by LandCorp to undertake contaminated sites investigations to determine if the former use of the site had resulted in contamination that restricted the proposed development. These investigations have been subject to review by a DEC accredited contaminated sites auditor. The onsite investigation also identified the presence of localised Asbestos Containing Material (ACM) at 27 Emplacement Cr. GHD recommended that the known locations of ACM be removed as part of the Remediation and Validation Plan (to be developed) and that a CEMP be developed to manage any future ACM that may be identified during the development works. As long as these issues are addressed these sites are considered suitable for proposed mixed use development.





COCKBURN COAST

PUBLIC ART STRATEGY

March **2012**

PLACE PARTNERS
Place Making Consultancy
in association with **brecknock**consulting

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INTRODUCTION

This Public Art Strategy for Cockburn Coast has been developed in response to the requirement of the City of Cockburn that:

a) *The proponent shall submit to the Local Government a Public Art Strategy for approval as an additional detail of the Local Structure Plan(s)*
b) *The Pubic Art Strategy shall set out the framework to enhance precinct through the appropriate integration of public art within the Development Area by detailing the following:*
   (i) *Influences for public art and possible public art themes for each precinct;*
   (ii) *Indicative locations for artworks where they will enhance the amenity and the interpretation of the public realm, contribute to way-finding, and enhance the sense of place;*
   (iii) *Management arrangements and responsibilities for public art*

The Strategy is an integrated part of the Place Making Strategy developed for Landcorp by Place Partners. The Public Art Strategy thus seeks to fulfil the vision of the Place Making Strategy and deliver artworks which play a vital role in place making at Cockburn Coast. The Place Making Strategy has provided a rich qualitative analysis of Cockburn Coast, past and present, envisioning its future character and value in social, environmental, economic and cultural terms. The Public Art Strategy also aims to address and deliver identified benefits according to all Social, Environmental, Economic and Cultural [SEEC] principles.

The Public Art Strategy has been developed principally through adoption of the four Place Drivers, Intensity, Honesty, Legacy, and Duality; the Cultural Place Making Principle and the described Future Place Character of Cockburn Coast as a whole and for the three component precincts. The Place Making Strategy identifies the place drivers and place character as follows:
Place Driver *- describes the focus that is driving the future place character. It provides the foundation for the vision and place making principles.*
Place Character *–defines the personality of character of the place.*

From this integrated structural approach, the Public Art Strategy then provides a further layer of vision, interpretation and appreciation. This is articulated as a Conceptual Framework and is an over-arching rationale as a whole-of-area understanding for commissioning Public Art, Cultural Interpretation and potentially wider creative endeavour at Cockburn Coast. As heritage themes and concerns form a core part of Cockburn Coast's character, the Strategy seeks to integrate with cultural interpretation at many levels and work in a holistic approach to place. The identified artwork opportunities all sit within both the larger Place Making Strategy and the Public Art & Cultural Interpretation Strategy's Conceptual Framework as outcomes of both analytic and creative consideration.

COCKBURN COAST'S FUTURE PLACE CHARACTER

The Public Art Strategy can respond and contribute to the identified Place Character as follows:

EXPERIENCING DIFFENCE

Through investing in site research and adopting site-specific approaches, artists can develop artworks for Cockburn Coast which augment and extend its existing distinctive character, a different place. Artworks, in both form and content, can become part of a local vernacular. Moreover a diverse range of artworks can foster a rich and multi-layered appreciation of place, expressing a character which is open to re-interpretation and meaningful to a diverse and inclusive community, a place of difference.

EMBRACING CHANGE

Artists, through process-centred exploration and experimentation, will express the creative dimensions of change. Artists, through undertaking social engagement and inviting community participation, can act as change agents, catalysing community. Artists and artworks can assist community to embrace change through creative involvement and expression.

EVOLVING TOGETHER

Artworks commissioned for Cockburn Coast can make meaningful references to site histories and stories of the past in the layered language of contemporary art for present and future communities. Artwork incorporating layered interpretations, connecting past, present and future, can be integrated within public spaces of gathering and recreation to express an evolving place character.

COCKBURN COAST'S PLACE DRIVERS

The Public Art Strategy can respond and contribute to the identified Place Drivers as follows:

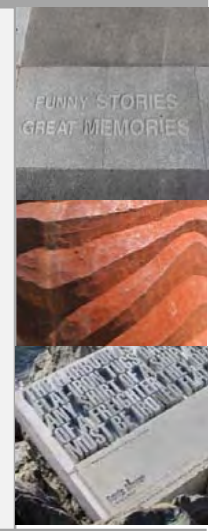
INTENSITY

Artworks within Cockburn Coast should seek to balance the intensity of planned future urban development with the intensity of the coastal landscape and a sometimes dramatic past. Where artworks within built areas can humanise, adding warmth and intimacy, artworks within landscape, former industrial or more remote sites can enhance inherent drama and express imaginative intensity. Artworks, temporary and permanent, can promote social gathering, interaction and engagement for day and evening.



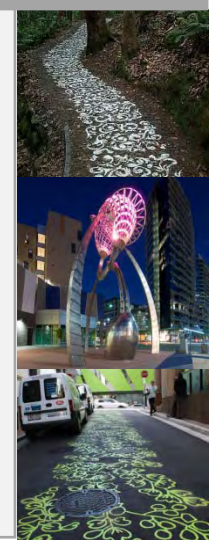
HONESTY

Artists can create honest and authentic artworks through investing in site research and community consultation. It can also involve a brave, bold and thoughtful approach to form and materials – avoiding the decorative and the superficial. The 'raw' palette of Cockburn Coast should be respected and celebrated. It should be thoughtfully understood and responded to rather than ignored, disguised, or superseded.



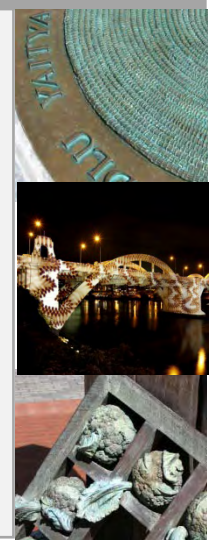
DUALITY

The dramatic juxtapositions within Cockburn Coast are core to its character and artworks need to be strategically conceived to strengthen rather than dilute this character. Artworks can express a dialogue with their environment, from creating points of dramatic contrast as iconic gateways and landmarks, to providing more subtle expressions, enhancing transition experiences as integrated forms. Artworks can explore the concept of duality within their own forms, forging creative tensions between the functional and non-functional, raw and refined, high and low technologies. Artists will work to balance media and materials, site, scale and experience.



LEGACY

Artworks integrated within or inspired by existing heritage provide a direct means of re-valuing the past and creating a new sense of connection to place with contemporary significance. Artworks are a means of imaginatively re-interpreting the past, assisting communities to evolve and experience change in meaningful ways. Artworks themselves can become part of a future legacy and thus seek to embody and express sustainable design principles and processes. Artworks within Cockburn Coast can express enduring local themes to create an abiding sense of place.



PUBLIC ART PRACTICE

Public art plays a vital role in achieving an authentic and abiding sense of place. This contribution occurs at many levels and through multiple aspects of the public art process.

First and foremost, artworks are intrinsically unique – the original work of a creative individual. While this may seem an obvious and common understanding, when placed with the public realm, the quality of originality is outstanding – whether or not the artwork itself is grand or subtle. Intuitively we sense that this item is different to the standardised environments and the commercialised objects and features which surround us. Artworks are special and their placement in the public realm can be felt as a demonstration of civic care, a special touch that fosters civic pride.

Secondly, artists are creative thinkers, story-tellers and symbol makers. Through the process of public art, artists can be invited to think about and engage with a specific place, site, history, issue and community. The resulting public artwork can communicate not just an individual's private response but reflect wider significance, meanings held in common, and thereby enter into public discourse as well as physical public space. Successful public art generates community attachment and social value, which may be as simple as a nickname for a quirky art object and as profound as a gathering at a memorial, as fun as a photo-opportunity and as serious as a name.

Finally, public art involves practices of creativity and innovation in an environmental context. Creativity and innovation are also central to the notion of sustainability. For a place to be sustainable, it must be both resilient and flexible, having a deep sense of purpose in its design and robust in its construction, while being open to interpretation for a range of evolving uses and engagements. Sustainability is an ongoing 'cycle of success' which has social, cultural, economic and environmental dimensions. The cycle of success involves processes of creativity and innovation where ways of ways and means of doing things are re-examined, renewed and improved. Public art, like sustainability itself, has key relational value, connecting people and place. Artworks within the public realm can function as an in-between layer, a type of connective tissue, generating awareness of our interdependence with the environment, the community and the available resources.

Public art can thereby inform place character through the primary effect of providing unique interpretations, through the secondary effects of social engagement, and through the tertiary effects of sustainable development generated through this special creative endeavour.

POTENTIAL PUBLIC ART APPROACHES

In identifying opportunities for this strategy a wide range of contemporary public art practices have been explored. These cover a broad range of options for artists to interact with the built and natural environment across the Cockburn Coast development.

This includes options for the integration of artworks into the fabric of buildings and urban infrastructure of all types. Developing integrated options for artworks for building facades, streetscape elements and road infrastructure can provide a cost effective option with the artwork funds value adding to the capital works budget. Integrated artworks will, in many cases, result from collaboration between artist and architect, urban designer or landscape architect.

The approach to stand alone projects has a strong focus on the quality of the artist's concept and sense of place. Such works as sculptural features and landmarks can provide significant focal points and precinct identifiers.

In addition to the direct interpretation of a place and its history through interpretive signage and commemorative features, there is a role for artworks that creatively explore a place's past and the stories of a community. Artists can be commissioned to create works that, while not addressing history in a didactic form, explore themes of relevance to local histories.

Increasingly artists are seeking opportunities to intervene in public spaces through temporary public art projects that might be in a place for a few days or months depending on the nature of place and project. In many cases these temporary projects will result from an artist initiating the idea rather than it being directly commissioned by the client.

INTEGRATED



COMMISSIONED ARTWORKS THAT ARE AN INTEGRAL PART OF A STREETSCAPE OR BUILDING PROJECT AND INVOLVE A COLLABORATIVE PROCESS

STAND ALONE



COMMISSIONED SITE SPECIFIC SCULPTURAL WORKS THAT ARE NOT DIRECTLY INTEGRATED INTO BUILDINGS OR STREETSCAPE PROJECTS

TEMPORARY/EPHEMERAL



ARTWORKS EITHER COMMISSIONED OR ARTIST INITIATED THAT ARE OF A SHORT TERM NATURE THAT INTERACT WITH OR ACTIVATE A PLACE

INTERPRETIVE



COMMISSIONED ARTWORKS THAT CONCEPTUALLY ALLUDE TO OR DIRECTLY REFERENCE PAST EVENTS OR STORIES ASSOCIATED WITH PLACE

PART A



CONCEPTUAL FRAMEWORK

Cockburn Coast may be considered as a palette of raw materials on a dramatic coastline. Within its landscape are inscribed the evidence of an industrial past and working-class histories. Where Freemantle to the north and Coogee to the south were once working areas but have now become established middle class areas, Cockburn Coast currently offers a different experience. Its beach is very much a 'working' beach – for horse-riding, dog-walking, fishing, and exercising on coastal walking and cycling trails. The deep dunal heathland allows the coastline to extend inland, magnifying the presence of nature and providing immersive and unmediated experiences. The remnants of industrial heritage, including the Power Station, the original Robb Jetty, the James and Diana ship wreck remains, are testament to past eras of human interaction and the powerful natural forces of weathering and erosion.

The raw or unrefined character of this place presents both challenges and opportunities for the commissioning and integration of artwork. This raw palette will be transformed over coming decades into new places and spaces, new zones of use and experience. Rather than simply aligning with areas of development and creating association with 'the new', there is real opportunity for artworks to make connection with existing sites of past and present significance and help to enable Cockburn Coast to tell its own story and evolve its future over time. This is a commitment to both honesty and intensity as drivers of place.

Alchemy is a philosophical tradition that stretches back to antiquity, spanning some four millennia and three continents. In addition to Western alchemy which can be traced back to Greco-Roman Egypt, there are non-western traditions in Chinese and Indian cultures. In general alchemists believe in a natural and symbolic unity of humanity with the cosmos. Alchemy is a system of knowledge and practice which is both exoteric and esoteric. Exoteric practices included practical applications for science, medicine and industry. Esoteric beliefs involved spiritual and mythological understandings. Alchemy aimed to prove alignment between these realms. For example, the transmutation of lead into gold is understood as an analogy for personal transmutation, the quest for perfection and the purification of the soul.

Alchemy is thus an experimental and speculative practice and process, grappling with big philosophical questions, searches for meaning and personal understanding. In this broad sense, it may be similar to the creative practice of contemporary art. While this framework in no way seeks to revive the antiquated practice of alchemy and its arcane beliefs in a literal sense, it does seek to draw upon a broader appreciation of alchemy as a rich and exciting metaphor for the potential significance of artwork at Cockburn Coast. Applying the notion of alchemy, artworks may interact with the environment of Cockburn Coast as base elements in an experimental process or 'chemical' reaction. They may actively draw upon the stories and aesthetic language of industry and working histories, the forces of weather and cycles of nature, and the histories and mythologies of the past (including Indigenous stories, ship wrecks, exploration and defence) and relates them to human experience and personal significance. Artists, as modern alchemists, can work with these base elements in experimental processes and new combinations to generate audience engagement and reaction. The framework of Alchemy is intended to encourage a creative relationship to the site and its histories. Rather than literal interpretations, public artworks may be surprising interventions, curious and quirky discoveries, strange attractors and inspiring enigmas. Like alchemy they may seek to answer bigger questions, offering promises of gold and secrets of eternity, for the speculation of future generations. This is a commitment to legacy as a driver of place.

While establishing commercial and residential centres at Cockburn Coast will undoubtedly promote transition to more middle class and service-centred communities, and a move away from an industrial past, there is opportunity to consider a new significance of 'industry' as potential future creative industries. The Power Station, as an industrial shell, has become a living gallery of stencil and spray-can artworks and a hub of youth subculture. A new story, a new sense of ownership and process of habitation has commenced which is at once creative and transformative. It points to the potential for this site to nurture other creative practices, across artforms and possibly even across disciplines (performance, music, film, media, technologies, sciences). Alchemical artworks, as both esoteric and exoteric, may explore the processes of science and industry to harness natural energies such as wind or tidal currents, recycle waste materials, rehabilitate natural landscapes or integrate with built design. Art, like alchemy, seeks to balance idea and object, inspiration and perspiration, method and madness, magic and hard work. This is a commitment to duality as a driver of place.

Alchemy is an ancient tradition, the primary objective of which was the creation of the mythical "philosopher's stone," which was said to be capable of turning base metals into gold or silver, and also act as an elixir of life that would confer youth and immortality upon its user. Alchemy can be viewed as a protoscience, a precursor to modern chemistry, having provided procedures, equipment, and terminology that are still in use. However, alchemy also included various non-scientific mythological, religious, and spiritual concepts, theories and practices. It is a popular belief that Alchemists made contributions to the "chemical" industries of the day—ore testing and refining, metalworking, production of gunpowder, ink, dyes, paints, cosmetics, leather tanning, ceramics, glass manufacture, preparation of extracts, liquors, and so on (it seems that the preparation of aqua vitae, the "water of life", was a fairly popular "experiment" among European alchemists). Alchemists contributed distillation to Western Europe. The attempts of alchemists to arrange information on substances, so as to clarify and anticipate the products of their chemical reactions, resulted in early conceptions of chemical elements and the first rudimentary periodic tables. They learned how to extract metals from ores, and how to compose many types of inorganic acids and bases.

COCKBURN COAST'S CHARACTER STATEMENT - defines the personality or character of the place	**COCKBURN COAST** EXPERIENCING DIFFERENCE EMBRACING CHANGE EVOLVING TOGETHER

PLACE DRIVERS - describes the focus that is driving the future place character. It provides a foundation for the vision and the place making principles.	**INTENSITY**	**HONESTY**	**DUALITY**	**LEGACY**

CONCEPTUAL FRAMEWORK
- defines the overall conceptual approach to public art themes across the site & individual precincts.

"ALCHEMY"

RATIONALE - defines the conceptual approach to either the whole of site or each precinct as a sub-set of the overall conceptual framework.	**ART OPPORTUNITY THEMES** - describes the themes associated with each of the proposed art opportunities identified for the whole of site and within each of the precincts.
WHOLE OF SITE ***Chain Reactions***	**OPPORTUNITY 1:** *Formulations* **OPPORTUNITY 2:** *Periodic Table of Place* **OPPORTUNITY 3:** *Habitus*
ROBB JETTY ***The Elements***	**OPPORTUNITY 1:** *Adaptations* **OPPORTUNITY 2:** *Cast Away* **OPPORTUNITY 3:** *On the Wild Side*
EMPLACEMENT ***Signs & Symbols***	**OPPORTUNITY 1:** *Divining* **OPPORTUNITY 2:** *Seeing the Sea*
POWER STATION ***Transmutations***	**OPPORTUNITY 1:** *Elixir* **OPPORTUNITY 2:** *Creative Laboratory* **OPPORTUNITY 3:** *Live Wires* **OPPORTUNITY 4:** *Into the Sea* **OPPORTUNITY 5:** *Imagineering*

PRECINCT PUBLIC ART LOCATIONS

CAST AWAY

Cockburn Sound / C Y O'connor Beach - Robb Jetty Interpretation

It is proposed to construct a bold and iconic work of contemporary art within the ocean coastal waters. Rather than a literal interpretation of the former jetty and past site significance, the artwork should seek to transcend historical allusion and offer a contemporary and open-ended expression.

C Y O'connor Statue

The CY O'Connor statue has become an iconic feature of the Cockburn Coast and should be retained in its current position if possible. It is important that the artwork is not compromised by new development along the foreshore and in the dunal area or compromised conceptually by new artwork in the proximity.

ELIXIR

Power Station Building - A Creative Lighting/Projection Scheme For The Power Station

A creative lighting and/or projection design for the building will create a virtual second skin as an evening experience and act as a signifier of new life and purpose in this precinct. This sophisticated evening effect will be complementary to the current day-time artwork 'skin' of graffiti and stencil designs which currently occupy the site.

CREATIVE LABORATORY

Artist studios at the Power Station Building

To foster and support local arts and creative practice it is proposed to provide low rent studios spaces within the Power Station precinct. The studios may be available for visual artists, dancers, performance groups, writers, designers, craftspeople, musicians and bands.

LIVE WIRES

Temporal art & activation strategy for Power Station Building

As the power station will remain a derelict site for some years, it provides a fertile environment for staging temporary public artworks, ephemeral interventions, and performance events. An event-based program is considered an effective means of activating the site and 'sparking' community interest and involvement.

INTO THE SEA

Power Station Foreshore & Cockburn Sound - An artwork installation between land and sea

A world class artwork that creatively captures and expresses the timeless dialogue between land and sea. The work would take the form of a sculptural installation which would occupy sites both on the land and in the sea

COCKBURN COAST PUBLIC ART LOCATIONS



ON THE WILD SIDE

South Beach Horse Exercise Area, Including Catherine Point

The work can seek to creatively capture the abiding relationship between people and horses and the sense of energy and freedom associated with the experience of horse riding. The artwork will act as a gateway to an art & heritage coastal trail which commences at Catherine Point, working its way through the coastal parklands to the C Y O'Connor Reserve.

ADAPTATIONS

Robb Jetty Main Street - Integrated Artworks within the Streetscape

Artworks may be integrated within awnings and shade shelters, seating and planter beds, paving, drinking fountains and lighting schemes. It is envisaged that the works will have a contemporary aesthetic, and will be human-scaled, providing a level of fine grain detail in the urban environment. Adaptations could be extended to include the playground located in the Memorial Square.

DIVINING

Emplacement Park - A Gateway Icon

The artworks will landmark the horizon, capturing views from the coastline, foreshore and Robb Jetty Precinct. There is further opportunity to incorporate wind- activation within this artwork, expressing the dynamic flow of natural energies and seasonal change.

SEEING THE SEA

Central Green Spine Termination - An Artwork Lookout

The artwork should be integrated within the central ridge park as part of a gathering space and viewing look-out. The artwork can explore integration with both built and natural form and materials, working to contain space and creating a sense of intimacy while also framing the expansive and dramatic views.

IMAGINEERING

Adjacent Cooling Pond & Groins - An Artist Designed Interactive Water-Based Playground

There is opportunity to create a major children's play area within this environment which can act as a regional draw-card for broad visitation. An artist-led design for such a playground will ensure a unique outcome and feature of distinction for the precinct.

WHOLE OF SITE

RATIONALE: *Chain Reactions*

APPROACH: Artwork Interventions

Cockburn Coast is a place in transition with an emerging sense of community. Its unique environment and rich histories will inform this process of evolution. Artworks can play a vital role in expressing and activating the relationship between people and place. Alchemy provides a rich metaphor for understanding creative process and artworks as active interventions within the public realm. While artworks are predominantly understood and appreciated as material objects, the commissioning of public art provides opportunity to explore the creative process of artmaking. Artworks, as interventions, can explore methods of creative content collecting, of collaboration and interdisciplinary exchange, and of social participation.

Chemistry describes the building blocks of matter in a variety of states. Substances are formed as chemical compounds and can be broken down into constituent elements and radically re-formed. Environmental changes, temperature, pressure and so on, can also cause radical changes to matter over time. These processes of change can be described through chemistry as reactions. Chain reactions create products or by-products which lead to additional reactions taking place. The early alchemists were fascinated by this relationship between matter and energy, stability and flux.

Artworks as interventions can explore the changing form and face of community at Cockburn Coast, helping to map this evolution over time and seeking to enrich the conversation between people and place, driven by honesty and legacy as active social processes. Artworks, temporary and permanent, can actively contribute to the built environment, creatively integrated into the social and built fabric as intriguing sites of intensity and duality.

The following pages provide detail on opportunities to integrate public art and a creative culture across the whole Cockburn Coast site,

These opportunities are:

1. *Formulations* - architecturally integrated artwork gateways
2. *Periodic Table of Place* – a strategy for ongoing community involvement
3. *Habitus*- a temporal art and place making strategy

COCKBURN COAST

EXPERIENCING DIFFERENCE
EMBRACING CHANGE
EVOLVING TOGETHER

TRANSITION

INTENSITY | HONESTY | DUALITY | LEGACY

public art principle 1.

social participation/ temporal interventions



public art principle 2.

creative collaborations/ interdisciplinary exchange



WHOLE OF SITE

CREATIVE INVOLVEMENT

The conceptual framework of alchemy enables Cockburn Coast to incorporate the notion of transformation into its central character. Artist alchemists, as change provocateurs, can play a proactive role in connecting new and old communities, people and places, icons of the past with new and future significance.

Artists, as modern alchemists, can explore the interface between matter and energy, creating artworks which express transformation and change.

In order to provide opportunities for creative chemistry to happen it is proposed that there should be a range of different approaches to involving artists in projects associated with place making, community development, heritage interpretation and physical infrastructure provision.

The rich diversity of identified opportunities also presents opportunities to involve artists through not only traditional commissioning processes but also through residencies, design collaborations and artist initiated interventions.

ARTIST RESIDENCIES

Throughout the development period there will be opportunities for artists to undertake residencies on site to either create temporary works or to create works on site that will become permanent once completed.

COMMUNITY ENGAGEMENT

In developing artwork projects there will be many opportunities for the artists to engage with the community during the concept development phase. The whole of **site opportunities include a long term community** engagement project that can evolve over the development's lifetime.

CREATIVE INTERVENTIONS

As the development evolves there should be opportunities to encourage artists to propose activities that are not prescribed in this strategy. The Power Station has long been a site for artist interventions and should continue to host temporal activities.

DESIGN COLLABORATIONS

Throughout the development there will be opportunities for collaborations between artists and architects on individual building projects and with landscape architects on open space or streetscape projects.



OPPORTUNITY 1: *Formulations*

APPROACH: Architecturally integrated artwork gateways

Within the proposed street network at Cockburn Coast, there are several key main road intersections which form precinct entrances and key points of transition within the urban design scheme. Such sites are key locations for built form address and these corner-site buildings will have landmark significance.

Artwork, integrated within building facades, can enhance the built form address and assist with landmarking and way-finding within the urban street network. Artists, working closely within an architectural design team, can achieve integrated artworks which explore and express the intersections of art and design, of the building, the artwork and the environment.

There is opportunity for artists to creatively intervene within the built form design, as a formula for provocative expression. Such interventions can result in extensions and extrusions of the built form or indeed in radical subtractions and incisions. They can also take the form of more subtle and integrated outcomes such as lighting or projection works which enhance an evening presence.

There is opportunity to creatively explore a local climatic response to the coastal environment, developing a vernacular of form and materials and employing principles of environmentally sustainable design. As integrated design responses, these artworks express inventive and hybrid formulations emerging from the urban coastal environment.

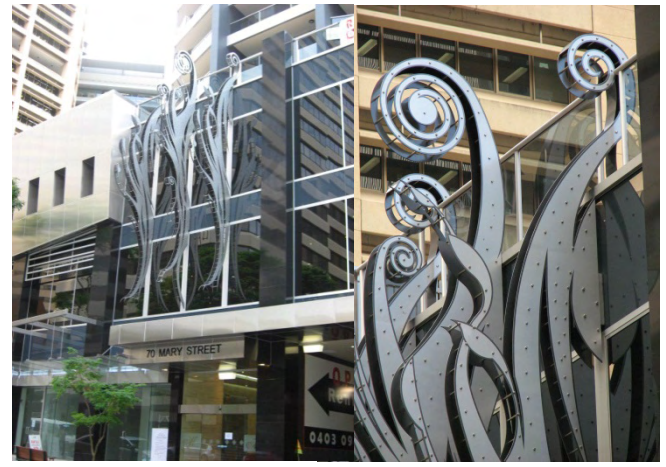
RESPONSE TO PLACE MAKING PRINCIPLES:

Social *– enhanced way-marking and legibility within urban design*

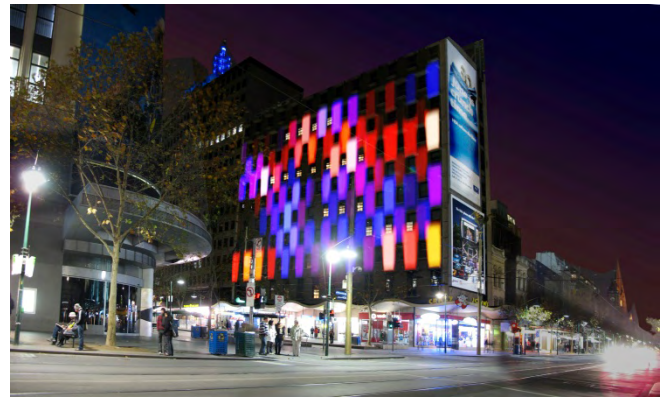
Environmental *– creative response to climatic design and ESD principles*

Economic *– value-adding to built form; skill and capacity building for local artists*

Cultural *– fostering an interdisciplinary dialogue between art and architecture*







WHOLE OF SITE

OPPORTUNITY 2: *Periodic Table of Place*

APPROACH: A strategy for ongoing community involvement

It is proposed to create a community archive of place histories as a cultural resource for the Cockburn Coast community. The material in this archive can be built up gradually over time and can be used as a tool for site research, interpretation and creative inspiration.

The archive may take a virtual form as an on-line resource, including photo-documentation of objects and memorabilia. Members can submit their own stories via the website for inclusion in the archive. Membership can be given through on-line registration which can create a community mailing list for the archive.

The archive may also take a physical form of a reading room, display or pavilion within a local library or other appropriate community facility. It may house and display objects and memorabilia as well as texts and photographs. The room may be used as a venue for community meetings of various kinds, encouraging broad community support and involvement.

The archive should be eclectic and quirky, incorporating a broad range of material from the personal and subjective to the officially recorded. A graphic interface can be designed, based on the format of the periodic table, to visually enliven the material, generate a sense of play and explore 'alchemical' reactions.

The archive can be developed through the submissions of local institutions such as libraries, schools, tertiary institutions and community groups. It can also receive direct submissions from community members. Content can also be generated through creative engagements with local community as part of artwork commission projects.

It is proposed that artists be invited to creatively develop and work with the *Periodic Table of Place* as part of an artwork concept development process. Artists may use the archive as a resource for creative interpretation. Resulting artworks can form part of a coastal art & heritage trail, as permanent interpretive features integrated within the environment – as part of *On the Wild Side* opportunity. Alternatively, artists may use the *Periodic Table of Place* as a tool for community engagement, adding to the archive and creating temporary artworks as community conversation pieces within developing built environment areas – as part of the *Habitus* opportunity.

OPPORTUNITY 3: *Habitus*

APPROACH: A temporal art and place making strategy

The development of new coastal communities, natural and built environments, and public amenities at Cockburn Coast provides opportunity for artists to creatively explore the experience of social gathering, encouraging community conversations and encounters. Artists can be invited to develop temporary installation environments in public places. As hybrid works bridging art and design, these sites may incorporate seating, lighting, planting, and playthings as sites for people to gather, relax, drink coffee or read books. The spaces may have in-built activities to invite community participation such as letter-writing, photo-booths, peep-show galleries, sound recordings, and so on.

The temporary *Habitus* environments can be located in emerging commercial and boutique retail areas to foster site activation and community interest. Local businesses may express interest in sponsoring this program.











ROBB JETTY

RATIONALE: *The Elements*

APPROACH: Opportunities for a range of artworks composed of related elements in key locations across the Robb Jetty Precinct.

The Robb Jetty Precinct comprises a variety of public places, primarily serving local residents, schools and businesses. It contains the local commercial centre which will operate as a destination hub for locals and visitors. The precinct also contains the length of shoreline and dunal heathland which stretches to Catherine Point in the north and includes the C Y O'Connor Reserve with the existing C Y O'Connor statue and Human Race artwork by Tony Jones and the heritage listed South Beach Horse Exercise Area. This coastline is bounded by the freight train line, imparting a secluded character. The experience of walking within the whole Robb Jetty Precinct, within the local village, the open spaces, parkland and along the shore, has key significance.

Artworks within this precinct can enhance both the journey and destination experience and help to build a sense of connectivity between and within places. They can express local stories of place, utilising local materials and a design vernacular.

Within the metaphor of alchemy, these artworks may be understood as the base elements, the simple raw ingredients of the natural world, immediate and open to interpretation. Within this precinct emphasis can be placed on nature as a force of change. Artworks can be made up of a series of elements which together create a relational journey, scheme or story thread. Artworks may be open-ended, even seemingly unfinished and incomplete, evocative of other times and place stories, and revealing of the processes of their making.

As a related series of individual elements, these artworks can provide discovery experiences, as clues and fragments which continue to engage and intrigue over time. They may be integrated within landform or built form as emergent and connected to larger stories of place or the natural environment. The honesty of these artworks lies in their ability to reveal, their legacy in the ability to generate lasting wonder.

This strategy recommends three key opportunities for artworks in the Robb Jetty precinct.

1. *Adaptations* - integrated artworks within the streetscape
2. *Cast Away* - Robb Jetty interpretation and landmark works
3. *On the Wild Side* - Art and heritage coastal trail



COCKBURN COAST

EXPERIENCING DIFFERENCE
EMBRACING CHANGE
EVOLVING TOGETHER

LOCAL – SEAMLESS – BALCONED - INTIMATE

INTENSITY | HONESTY | DUALITY | LEGACY

public art principle 1.

experiential relations/ gathering together



public art principle 2.

experiential transitions/ unfolding journeys



ROBB JETTY

OPPORTUNITY 1: *Adaptations*

APPROACH: Integrated artworks within the streetscape

The Robb Jetty main street and its link to the foreshore is a focal experience for local and visitor communities and is an active commercial hub, including outdoor cafes and dining for day and evening. As the heart of a walkable village this is a pedestrian friendly environment containing a diverse range of informal gathering spaces within a high quality public realm.

There is opportunity for the integration of artwork within the streetscape to further enhance and express qualities of intimacy, shelter and seamlessness. There is further opportunity to explore and develop a local design vernacular which is climate responsive and complementary to the streetscape design and architecture. Works can explore a dialogue between internal and external spaces, between city and sea, generating light and shadow play and the effects of reflection and refraction. Artworks may be integrated within awnings and shade shelters, seating and planter beds, paving, drinking fountains and lighting schemes. It is envisaged that the works will have a contemporary aesthetic and will be human-scaled, providing a level of fine grain detail in the urban environment.

As integrated design, *Adaptations* could be extended to include the playground located in the Memorial Square.

RESPONSE TO PLACE MAKING PRINCIPLES:

Social - *enhancing intimacy and enclosure, fostering gathering experiences*

Environmental - *climate responsive, a creative dialogue between light & shadow, internal & external*

Economic - *a local vernacular of materials, forms and artist designs, attractive to a visitor experience*

Cultural - *artists integrated in design teams, creating a unique streetscape experience*







OPPORTUNITY 2: *Cast Away*

APPROACH: Robb Jetty interpretation and landmark works

As a gesture of tribute to the former Robb Jetty, it is proposed to construct a bold and iconic work of contemporary art within the ocean coastal waters. A precinct landmark, this work will act as a destination attractor for the commercial centre.

Rather than a literal interpretation of the former jetty and past site significance, the artwork should seek to transcend historical allusion and offer a contemporary and open-ended expression. Rather than referencing the jetty itself, the concept of *Cast Away* speaks about the jetty's absence, when there is no longer a place for mooring, and being adrift at sea. The work may thus explore a creative dialogue in its form about the relationship between people and the sea, between the sea and the sky, between built and natural forces and forms, above and below the shifting waterline. The artwork may incorporate tidal movement and/or other natural forces and energies. In developing this concept it will be vitally important that the existing C Y O'Connor statue, located in the sea approximately 30m from the original jetty, is carefully considered to ensure there is no negative impact on the work or the integrity of the artist's concept.

As part of this commission and as an extension of the artwork, a partnering form will be developed and located at the end of Main Street. This feature element will capture approach views along Main Street, terminating the vista, and landmarking the transition onto the coastal foreshore. It is envisaged that a vertical, sculptural element will provide an iconic signifier and attractor for the major artwork which lies beyond. Furthering the concept of *Cast Away* and the incorporation of dialogue, this element can express a relationship between city and sea.

RESPONSE TO PLACE MAKING PRINCIPLES:

Social - *place activation, celebrating the relationship between people and the sea*

Environmental - *dialogue between land and sea, built form and natural force*

Economic - *a destination landmark and regional attractor*

Cultural - *identity, interpretation, and the contemporary imaginary*







ROBB JETTY

OPPORTUNITY 3: *On the Wild Side*

APPROACH: Art and heritage coastal trail

As part of park construction and improvement works to Catherine Point, artwork can be commissioned which reflects upon the practices of horse racing and training which has occurred at Cockburn Coast since the early stages of settlement and continues to the present day. It is envisaged that the artwork can be integrated within the new pathway design. The work can seek to creatively capture the abiding relationship between people and horses and the sense of energy and freedom associated with the experience of horse riding.

The artwork can also act as a gateway to a longer-term project for an art & heritage coastal trail which commences at Catherine Point, working its way through the coastal parklands and eventually reaching the artworks at the southern end of the C Y O'Connor Reserve, namely the C Y O'Connor statue in the ocean and the *Human Race* artwork in the parkland east of Robb Jetty, both by local artist Tony Jones. These two artworks reference significant stories of place.

Drawing upon local historic research an art and heritage coastal trail, consisting of a number of individual works commissioned over a long term period, will create a powerful memory schema for Cockburn Coast, meaningful to both local residents and visitors. Artworks should aim to be evocative of time and place and may incorporate landform integration, processes of weathering or the use of recycled materials.

Each artwork along the trail can reference a significant coastal story including:

- Geological history and ancient Aboriginal creation stories
- Robb Jetty Camp sites & their significance for the Aboriginal community
- European exploration and industry
- Military uses including the 10th Light Horse Regiment during WW1
- Environmental stories of the dunal health and coastal landscape









RESPONSE TO PLACE MAKING PRINCIPLES:

Social - *providing access and education to stories of local site significance*

Environmental - *site-specific approach, landform integration, environmental story-telling*

Economic - *a local vernacular of materials, forms and artist designs, attractive to a visitor experience*

Cultural - *referencing stories of the past, renewed with contemporary significance*

EMPLACEMENT

RATIONALE: *Signs & Symbols*

APPROACH: *Artworks as symbolic language*

The Emplacement Precinct, located on the elevated ridge line, is an established industrial area which will become a residential neighbourhood framing and containing Cockburn Coast. The land rises and falls in sections to the east of Cockburn Road which is the main arterial road linking Cockburn Coast to the north and south.

Artworks within this precinct can integrate with landform as a creative response to this distinctive topography. Iconic artworks can capture long range views from many directions, creating landmark and gateway experiences. Artworks may celebrate the views and vistas afforded by this precinct location, creatively framing and staging viewing experiences.

Within the metaphor of alchemy, these artworks may be understood as the higher order language of science and symbols. The cryptic codes of alchemy referenced both real world information and the philosophies and mythologies of mystical beliefs. This secret and evolving symbolic language held real power for the alchemists and was key to their practice, setting them apart as a separate order.

Within this precinct emphasis can be placed on human endeavour a force of change. Artworks which create symbolic significance are sophisticated and singular forms which utilise abstraction and metaphor to generate layers of meaning and wide interpretation. These works, situated strategically, will have a large-scale form and iconic presence. Greater than human-scale, they will point to a bigger picture and a higher scheme of relations. As points of intensity on a new horizon, these iconic artworks will express duality as a tension between site and scale, form and space, looking at and looking through, the material and the symbolic.

This strategy recommends two key opportunities for artworks in the Emplacement Precinct:

1. *Divining* – a gateway icon
2. *Seeing the Sea* - an artwork look-out

Note: he southernmost *Seeing the Sea* location is included in this section it is not within Emplacement precinct, rather part of the Power Station precinct.



COCKBURN COAST

EXPERIENCING DIFFERENCE
EMBRACING CHANGE
EVOLVING TOGETHER

INTEGRATED LANDSCAPE – A NEW TOPOGRAPHY

INTENSITY | HONESTY | DUALITY | LEGACY

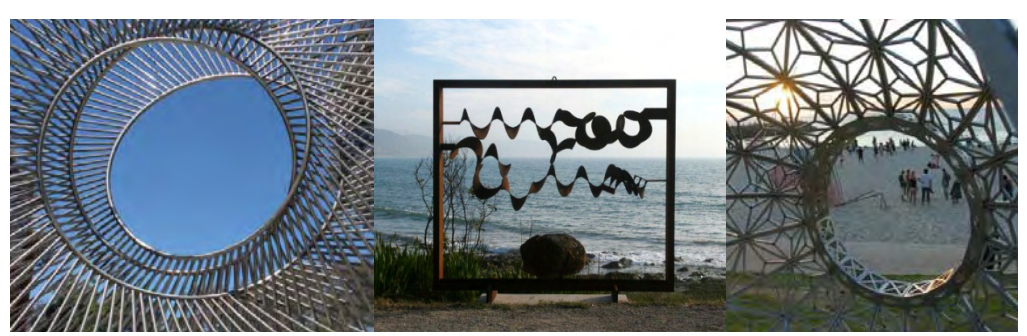
public art principle 1.

forms against the sky



public art principle 2.

framing vistas & views



EMPLACEMENT

OPPORTUNITY 1: *Divining*

APPROACH: A gateway icon

There is opportunity to locate an artwork of iconic significance at one of the high points of the ridgeline close to Emplacement Park. Such an artwork will act as a northern gateway and landmark for the precinct along Cockburn Road. It will also landmark the horizon, capturing views from the coastline, foreshore and Robb Jetty Precinct.

There is further opportunity to incorporate wind-activation within this artwork, expressing the dynamic flow of natural energies and seasonal change. In this way the work will take on local significance, indicating the strength of the Fremantle Doctor or south-westerly wind which is strongest during afternoons of the summer months, achieving broad appeal and potentially becoming a part of everyday life.

The concept of *Divining* is intended as a loose metaphor for the seeking of guidance and inspiration – be it in the pursuit of spiritual enlightenment, the effort to predict future events, or the sourcing of fresh underground water and other natural resources. This artwork may creatively express the notion of sustainability, the balance of nature, and our duty of care to the natural environment.

RESPONSE TO PLACE MAKING PRINCIPLES:

Social - *an iconic landmark, expressing social cohesion and collective aspiration*

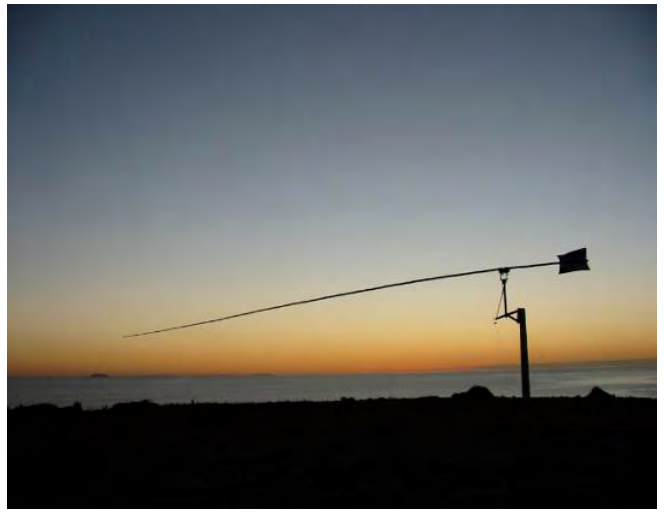
Environmental - *a wind-activated work, expressing renewable energy & environmental awareness*

Economic - *a strategic gateway, attractive to a visitor experience*

Cultural - *a sophisticated symbolic form of enduring significance*







OPPORTUNITY 2: *Seeing the Sea*

APPROACH: An artwork look-out

Within Cockburn Coast, there are three main linear parklands which run east west, creating environmental and habitat corridors. These green spines lead up to the Emplacement Precinct, providing common open spaces for residential neighbourhoods. There is opportunity for artwork to be integrated within the central ridge park as part of a gathering space and viewing look-out.

The artwork can explore integration with both built and natural form and materials, working to contain space and creating a sense of intimacy while also framing the expansive and dramatic views. The artwork will thus function as an attractor and as a reward for reaching the top of the ridge, exploring a creative dynamic between experiences of looking at and looking through.

The concept of *Seeing the Sea* is intended to evoke the experience of children visiting the beach, evoking excitement and wonder. Its simplicity is also intended as a meditation for reflection on the beauty of the natural world and our profound connection to a living planet.

RESPONSE TO PLACE MAKING PRINCIPLES:

Social - *a special gathering space for both locals and visitors*

Environmental - *a calm and meditative work encouraging environmental appreciation and awareness*

Economic - *promoting and value-adding to the unique residential lifestyle and natural amenity*

Cultural - *a timeless work incorporating form, function and site-specific integration*







POWER STATION

RATIONALE: *Transmutations*

APPROACH: A*rtworks as change agents*

The Power Station is the ultimate landmark and identity feature of Cockburn Coast. Reclaiming this disused industrial shell into a destination precinct is a long term project which can evolve over time. In its current form it already offers a unique and dramatic environment and experience for the general public. It has the potential to become a landmark attractor for national and international visitors.

The Power Station is itself an iconic form with dramatic, sculptural qualities and inscribed stories of past industry, contemporary graffiti and stencil art. Artworks within this environment can be provocative and challenging, utilising this unique architectural canvas and stage in surreal and surprising ways.

This precinct is ideal for temporal works - multimedia installations in lighting, sound or projection, large-scale graphic murals, sculptural interventions, artwork events, performance, live art, circus and physical theatre. A changing and evolving program of works will give expression to the latent energy of the Power Station building and surrounding precinct and be an integral part of a long term transformation process. Permanent installations can also be commissioned to initiate and sustain a creative engagement with this iconic site.

Within the metaphor of alchemy, these artworks may be understood as expressing the concept of transmutation – the combination of elements into new substances, including the ultimate goal of the creation of gold. The alchemists sought to release the energy contained within all matter in order that it could recombine to form new substances. They linked the inorganic chemical processes of metals and a search for creating gold, with organic life processes and a search for creating an elixir of life, with spiritual processes of purification, and a search for perfection and enlightenment. All these processes were linked to the concept of transmutation and the understanding that all things are made up of both matter and energy. The Power Station can indeed become a contemporary crucible for creative transformation and change.

Within this precinct emphasis can be placed on industry and creative energy as forces of change. Artworks which inhabit the Power Station, can act as catalysts for wider social and cultural change and transmutation. The degree to which artworks resonate with both site and audience will be indication of their honesty and their intensity. The long term evolution of a sustainable creative engagement with the Power Station will be an ongoing testament to duality and legacy.



the Power Station Precinct:

1. *Elixir* – a creative lighting/projection scheme
2. *Creative Laboratory* – artist studios at the Power Station
3. *Live Wires* – temporal art & activation strategy
4. *Into the Sea* - an artwork installation between land and sea
5. *Imagineering* - **a**rtist designed interactive water-based playground

COCKBURN COAST

EXPERIENCING DIFFERENCE
EMBRACING CHANGE
EVOLVING TOGETHER

DYNAMIC – CONTRAST – ENERGY - CREATIVE

INTENSITY	HONESTY	DUALITY	LEGACY

public art principle 1.

transforming the power station



public art principle 2.

activating the power station



POWER STATION

OPPORTUNITY 1: *Elixir*

APPROACH: A creative lighting/projection scheme

The Power Station building is a landmark icon for Cockburn Coast. As a disused industrial shell it signifies a former industrial period and a working class heritage, while also powerfully testifying to the natural forces of coastal weathering and the social forces of change. While many may perceive the Power Station as a derelict and neglected site and potential symbol for social disaffection, the building has a stark beauty and inherent drama which excites the imagination, arouses curiosity and invites exploration. It is a site open to creative interpretation. The long term proposal to rehabilitate this Precinct for contemporary use and recreation, should aim to foster broad community support, involvement and interests, while also preserving aspects of the building's unique raw character, confronting address, and its interpretable and flexible form.

There is opportunity to commission a creative lighting and/or projection design for the building. This integrated artwork will create a virtual second skin as an evening experience and act as a signifier of new life and purpose in this precinct. The evening effects will be complementary to the current day-time artwork 'skin' of graffiti and stencil designs which currently occupy the site, while also taking such artwork intervention to new levels of sophistication.

The lighting treatment can be achieved through energy efficient LED technology which has programmable capacities. Thus the lighting scheme can morph and change over time, in either subtle or dramatic ways to ensure ongoing viewing engagement and express notions of creative transformation, change and the re-interpretation of the past. Similarly projection-based work can cast images and designs across the built form surfaces in bold graphic format and site-specific design. Projection and lighting can be used in combination to dynamic effect. The notion of elixir, refers to the elixirs of life which were pursued by the alchemists as the key to achieving eternal life or eternal youth. As a metaphor for this artwork commission, a creative lighting scheme can effect change and transformation, keeping the Power Station building and precinct forever young. The alchemy of this artwork lies in its ability not to veil or disguise, but to reveal an original 'eternal' state.

RESPONSE TO PLACE MAKING PRINCIPLES:

SOCIAL- *a sign of rejuvenation and new life in this precinct*

ENVIRONMENTAL - *an integrated approach, 'recycling' the building for new sustainable communities*

ECONOMIC - *assisting the building to transition to new community use and function*

CULTURAL - *an homage to the past and a re-valuing for contemporary significance*







OPPORTUNITY 2: *Creative Laboratory*

APPROACH: Artist studios at the Power Station

To foster and support local arts and creative practice it is proposed to provide low rent studios spaces within the Power Station precinct. The studios may be available for visual artists, dancers, performance groups, writers, designers, craftspeople, musicians and bands. Through accommodating a range of creative practices, intermedia dialogue, artistic collaboration and experimentation can be encouraged. A large common area may be utilised as a flexible exhibition / performance space for informal programming. Open studio events can be held to encourage public access and engagement.

Artist tenants should include both established and emerging artists. It is proposed that consideration is also given to a studio with accommodation for one or two artists which can be used for regional, interstate and international residencies. A resident studio facility will provide a key asset for attracting project funds and international engagement, serving to build the profile of the Power Station precinct at Cockburn Coast. It is also a means for supporting professional mentorships and skill-building within the local community.

Most of the studio facilities can be very basic though special requirements for some disciplines (eg sound-proofing for bands, ventilation for painters, etc) should be taken into consideration. Kitchen / bathroom facilities can be provided as common areas. Studios should be lockable.

The *Creative Laboratory* strategy is intended as an open-ended and flexible means of organically fostering local creative practice. Over time, particular artistic areas / practices may become a focal strength which in turn may lead to the development of more permanent, professional facilities within the precinct such as theatres, galleries or multimedia facilities.

RESPONSE TO PLACE MAKING PRINCIPLES:

SOCIAL- fostering a local creative community

ENVIRONMENTAL - provision of shared amenity for sustainable creative endeavour

ECONOMIC - creative skills and capacity building

CULTURAL - fostering local arts and cross-artform practices





POWER STATION

OPPORTUNITY 3: *Live Wires*

APPROACH: Temporal art & activation strategy

As the Power Station will remain a derelict site for some years, it provides a fertile environment for staging temporary public artworks, ephemeral interventions, and performance events.

An event-based program is considered an effective means of activating the site and 'sparking' community interest and involvement. Initially conceived as a series of occasional one-off events, over time the activities may develop into a large program or festival event for more sustained audience engagement. The events may evolve out of the studio program and, in early phases, may be low-key, informal events partnering the open-studio days such as music jam sessions, theatre improvisations or video screenings. Fostering skill and capacity building, over time the events can become a more formal public program.

A hybrid mix of event-based works from performance (including theatre, dance, stand-up comedy, and circus), to multimedia film and sound events, and interactive installations can be staged to provocative and dramatic effect within the Power Station – generating energy of a different kind for a new urban coastal community. Experimental artworks can explore audience engagement strategies, pursing a creative dialogue between producers and consumers in live art scenarios.

RESPONSE TO PLACE MAKING PRINCIPLES:

SOCIAL- fostering local audience interest and ongoing community engagement

ENVIRONMENTAL - provision of a program and platform for sustainable audience development

ECONOMIC - generating a public profile for local arts activity for growth and development

CULTURAL - fostering a local and diverse culture for the live arts





OPPORTUNITY 4: *Into the Sea*

APPROACH: An artwork installation between land and sea

For all the power of its visible presence within the coastal landscape, the Power Station precinct also offers a wealth of invisible wonder submerged beneath the ocean. The desire to experience and explore the dramatic built form of the Power Stations and its remnant surrounds, is matched by an equally enticing invitation to experience the sea - for water recreation, fishing and boating within Cockburn Sound. Central to the magnetism of this site is the dialogue between land and sea, built and natural forms and the experiential stories, past, present and future that this dialogue generates. There is a singular opportunity for a world-class artwork commission to creatively capture and express the dialogue between land and sea at the dramatic Power Station site at Cockburn Coast. It is envisaged that the work would take the form of a sculptural installation. It may comprise a series of elements which occupy both land and sea, in a journey or serial form, or it may be a singular form which is semi-submerged, possibly fully revealed at low tide. The work may incorporate lighting within its form through the use of solar cells. It may be responsive to tidal movement, wind or ocean currents.

The concept of *Into the Sea* refers to the ocean as a place of eternal return, a mythical place of primal belonging and the source and sustenance of life on Earth. This notion relates to an Aboriginal belief, common to the people of the western coast, *that when the body dies the spirit goes away westward through the sea to some country far away, and that there the spirit lives in much the same manner as it has lived when in the flesh …* [Daisy Bates, AIC Report] It is also understood that souls of the dead sometimes wait in caves before being called out to sea by the being there. [TPG, Cockburn Coast, Cultural Heritage Strategy, p.50] There may be potential for the selected artist to consult and work with the local Indigenous community as part of the artwork commission process to explore a means of appropriately referencing this ancient Indigenous understanding. The dialogue between land and sea can indeed be understood a symbolic a dialogue between the real and the imaginary, the body and the spirit, solid and liquid, thoughts and emotions – a conversation which is embodied within the human condition.

RESPONSE TO PLACE MAKING PRINCIPLES:

Social - *a place identifier and precinct marker, fostering conversation & imaginative interpretation*

Environmental - *a creative expression of the dynamic dialogue between land and sea*

Economic - *building an international profile*

Cultural - *a site-specific world class artwork with intercultural significance by a leading artist*







POWER STATION

OPPORTUNITY 5: *Imagineering*

APPROACH: Artist designed interactive water-based playground

The sheltered foreshore areas around the Power Station provide opportunities for calm wading pools, as part of the Stations cooling ponds and groins, suitable for families with young children. There is opportunity to create a major children's play area within this environment which can act as a regional draw-card for broad visitation. An artist-led design for such a playground will ensure a unique outcome and feature of distinction for the precinct.

The playground can be designed as an interactive environment focussed on water and sand play. Children will be encouraged to channel water through various pipes, canals, and sand streams through interaction with pumps, pulleys, buckets, hoses and weir-like devices. Their management of a water resource can be used to create damns and pools, flowing streams, above and underground pipes, water-falls, rapids, gorges and gullies. Play is intended to be both functional and abstract, to provide reward for effort, and to be open to interpretation and re-design. The playground will feature a scheme of fixed equipment with the ability of children to also use their own items such as buckets and spades, boats, balls and floating toys.

While emphasis is given to the children's interactive play and their effective impact, the playground should also feature an automated aspect of its own – such as a jet of water which spurts up from below or a shower that falls from above at periodic intervals to enhance the play environment and encourage interaction. There may be opportunity to reward effort and collective endeavour – for example, when enough water is pumped into an overhead bucket, it tips onto everyone gathered below. There may be further potential for the incorporation of other types of interaction such as sound effects and musical play instruments utilising the pipe and water systems and linking real channels with channels of communication. The environment should also consider the provision of shade, shelter and parental supervision / adjacent seating as part of the creative design and artwork concept in an integrated approach to the site.







RESPONSE TO PLACE MAKING PRINCIPLES:

Social - *a creative, interactive environment for children, fostering cooperation and exchange*

Environmental - *demonstrating human impact, management and labour on natural resources*

Economic - *supporting and encouraging families and children to engage with the precinct*

Cultural - *fostering a culture of active participation and community involvement*

INTERPRETATION

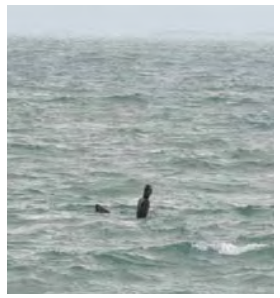
INTRODUCTION

As heritage themes and concerns form a core part of Cockburn Coast's character, the Strategy seeks to integrate with cultural interpretation at many levels and work in a holistic approach to place. The identified artwork opportunities all lie within the Public Art & Cultural Interpretation Strategy's scheme as outcomes of both analytic and creative consideration.

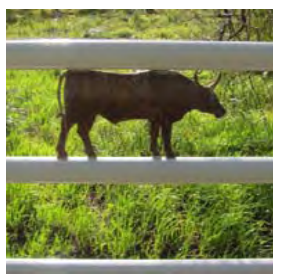
Interpretive information provides a valuable dimension of the visitor and viewer experience, distinct from the appreciation and experience of contemporary art. Some of the identified artwork opportunities have no significant relationship to site heritage and interpretation and are focussed on contemporary culture and future aspirations. Similarly, there are sites of historical significance at Cockburn Coast which have not been identified as artwork opportunities but which should be considered for heritage interpretation. Nevertheless many of the identified artwork opportunities bear significant relationship to site histories. The following descriptions describe this significance and outline a potential relationship to interpretive information which is complementary and holistic.

These descriptions seek to support rather than supersede the *Cockburn Coast: Cultural Heritage Strategy* produced by TPG.











EXISTING ARTWORK & CULTURAL SIGNIFICANCE

The Robb Jetty area currently features a group of artworks by Western Australian artist Tony Jones. The artworks are of cultural heritage significance as they are interpreting important memories of Cockburn Coast's past.

'CY O'Connor statue'
The bronze statue by Jones is located in the Indian Ocean approximately 20 - 30 metres off the south beach. The work depicts local identity CY O'Connor on the occasion of his suicide on 10 March 1902 at south beach, when he rode his horse into the sea and killed himself. The bronze sculpture is a dynamic feature of the coast as it is hidden and revealed with the tidal movements.

'Human race'
The second artwork installation by Jones is located in the dunes leading to site of the old Robb Jetty. The artwork is in the form of metal fencing, gates and wind vanes and follows part of the line of the original race that ran from Robb Jetty to the slaughter yards. The installation is sited to encourage visitors to walk to the beach along the race in memory of the thousands of animals who were disembarked along the jetty.

ARTWORK MANAGEMENT ISSUES

The Cultural Heritage Strategy recommends that the works be retained and conserved and included in any overall interpretation strategy.
[Ref: Cultural heritage Strategy]

The CY O'Connor statue has become an iconic feature of the Cockburn Coast and should be retained in its current position if possible. It is important that the artwork is not compromised by new development along the foreshore and in the dunal area or compromised conceptually by new artwork in the proximity.

Human Race is an excellent cultural heritage interpretive element telling the story of the area and is worth retaining for its storytelling values. However it is unclear if the work can be retained in the current location in the future due to development in the Robb Jetty precinct. Should it not be possible then consultation with the artist will be required to establish if there are options for relocation to a site where the significance would still be intact. Should this not be possible then the work may need to be removed and a new interpretive artwork should be created to tell the story in a different configuration.

In the event that the artwork is to be retained in its current position a condition report should be undertaken by a qualified Art Conservator to establish the work's current condition and rectify any corrosion of surface coating problems.

CULTURAL INTERPRETATION

ROBB JETTY

Opportunity 1: *Adaptations*
This artwork commission has a contemporary focus and is separate to heritage interpretation. Heritage interpretation may be considered for the chimney, as a remnant of the former Robb Jetty abbatoir.

Opportunity 2: *Cast Away*
Interpretive information on the original Robb Jetty should be provided in an appropriate location for the jetty remains and considered separately to the artwork. Consideration can be given to the inclusion of interpretive information with the *Human Race* artwork by Tony Jones which references the cattle journey from the jetty to the slaughter yards.

Opportunity 3: *On the Wild Side*
Interpretive information on heritage significance and historical narratives can be in close relationship with artworks and considered an integral aspect of a single commission process. Some stories and sites may lend themselves to a depth of historical information and documentation, and artwork may take a more secondary role. Conversely other sites may be better suited to artwork and creative allusion rather than detailed interpretation. The co-location of artwork and interpretive information should aim to be seamless and integrated in one presentation scheme.

EMPLACEMENT

Opportunity 1: *Divining*
This artwork commission has a contemporary focus and is separate to heritage interpretation. Heritage interpretation can be considered for the former Gun Emplacement, also referred to as the South Beach Battery (remains), and its significance to military history and the defence of the Western Australian coastline.

Opportunity 2: *Seeing the Sea*
This artwork commission has a contemporary focus and is separate to heritage interpretation. The former Gun Emplacement is the only site of heritage significance in the Emplacement Precinct.

POWER STATION

Opportunity 1: E*lixir*
This artwork commission takes an integrated approach, making the built form of the Power Station the focal subject though seeking to express contemporary significance. Cultural Heritage interpretation should thus be considered as a complementary part of this commission process – offering interpretive information on the Power Station as a day-time experience, complementary to the evening effects of this artwork. Another aspect complementary to this commission is the required development of a strategy for preserving the high quality urban artworks throughout the Power Station building. This may be undertaken as part of a wider community youth engagement strategy within the City of Cockburn. The artist/s engaged to undertake the creative lighting/projection scheme can be invited to incorporate a youth mentoring aspect into the commission process.

Opportunity 2: *Creative Laboratory*
The proposed creative studios have a contemporary focus and are separate to heritage interpretation. However names for the studio facilities may be drawn from the original architecture and component functions of the Power Station as a site-specific bridging metaphor for old and new energy generation.

Opportunity 3: *Live Wires*
The proposed live art program has a contemporary focus and is separate to heritage interpretation.

Opportunity 4: I*nto the Sea*
This artwork commission takes a poetic approach to Cockburn Sound. Cultural Heritage interpretation should be considered as a complementary part of this commission process – offering interpretive information on the James and Diana ship wrecks, histories of exploration and other aspects of maritime heritage.

Opportunity 5: *Imagineering*
This artwork commission has a contemporary focus and is separate to heritage interpretation. It may be possible to creatively incorporate information regarding power generation, industrial engines and/or ships engines into the environment as an appeal to older children and adults.

INTERPRETATION

HERITAGE MARKERS

The Cockburn Coast, from sea to the limestone ridge and behind are brimming with Indigenous and European stories and heritage. The tales of the formation of Cockburn Sound, shipwrecks, battlers, racehorses, industry and old traditions are the foundations of the spirit of the place and what makes this area unique and essentially different from other development sites..

The remains of significant buildings and structures lie as monuments to a bygone industrial era with the most visually prominent being the South Fremantle power station and the Robb Jetty Abattoir Chimney. Landscape plantings, sculptures, shipwrecks and sites of mythological and archeological importance are dispersed throughout the landscape creating layers of intrigue and interest.



N.B. Indigenous Heritage
The site is home to a number of areas of indigenous importance. It is essential that ongoing engagement with the local Aboriginal Reference Group occur and opportunities for integration of indigenous culture taken where possible e.g. planting, naming and signage.

N.B. Settlement Dates
Settlement dates associated with the Cockburn Coast will need to be carefully defined to prevent confusion with historic locations south of the Cockburn Coast development.

Image: Existing heritage marker at Coogee Beach.

HORSE EXERCISE LEGACY
The South Beach Horse Exercise Area is the portion of South Beach extending south past Catherine Point to McTaggart Cove. The Beach has been used for exercise and training of horses for recreation, sport and World War I service since the early 1830s and continues in the present.

FORESHORE NATURE
This foreshore has a rich history of human use. Some uses include indigenous camping areas, horse training, public recreation, abattoirs and marshalling yards, power generation and industrial uses constructed in close proximity to the shoreline. The Catherine Point Reserve and C.Y. O'Connor Reserve includes approximately 29 hectares of coastal dune and immediate hinterland along the Cockburn coast foreshore. Vegetation communities represented within the foreshore reserve, particularly at Point Catherine, are dune coastal heath.

INDIGENOUS CAMP
The sandhills along the foreshore and most particularly close to Robb Jetty were used as a camp area for aboriginal people and were still in use by aboriginal people from outside the metropolitan area at least until 1985. Like other long established fringe camps, the area is likely to have been a traditional camping area. It is thought that the camps continued in this locality due to the opportunities for work that was available associated with the shipping and slaughtering of cattle from the Kimberley.

ROBB JETTY INTERPRETATION
The original jetty was the focal point of the settlement of the northern Cockburn coast and its long association with the meat trade. The Jetty was used for the unloading of cattle from the state's north-west to the abattoirs situated here that operated between 1890s–1960s. Today all that remains of the jetty are submerged piles.

COAL YARD/INDUSTRY
Up until 1960, coal had been the main source of power for the generators that operated the turbines of the power station. Collie Coal was delivered to the South Fremantle power station by railway and stored in a large yard on the eastern side of the building. The yard was capable of holding 25,000 tones of coal. Coal was then delivered to the tops of boilers by a conveyor system between the coal stockpile and the power station. Due to the relative cheapness of oil coal burners were replaced with oil burners in 1960. However, the oil crisis saw the conversion of the Station back to coal in 1974.

POWER STATION & COOLING PONDS
The South Fremantle power station remains as a prominent element on the shoreline in the coastal sand dunes south of Fremantle. An important step in the development of power generation in the State, as the second largest thermal power station in Western Australia, construction on the facility commenced in January 1946. The distinctive cooling ponds were constructed behind stone groynes to utilise sea water for use in the boilers and for cooling the turbines The power station closed in 1985 because power generation in the site was uneconomic and had been superseded by other power plants in the grid.



NATIONAL ANIMAL MEMORIAL
Animals have been a part of the history of the area and this monument will acknowledge and pay tribute to them. In the late nineteenth century cattle from the state north-west arrived by boat and met their fate at the nearby abattoirs. The Beach has been used for exercise and training of horses for since the early 1830s. The 10th Light Horse Regiment trained on the beach prior to embarking from Fremantle during World War 1.

EMPLACEMENT/MILITARY
The former gun emplacement was one of two batteries commissioned by the Commonwealth of Australia in 1940 to cover Fremantle Harbour and Cockburn Sound. Only the Battery at Leighton became operational and was used from 1947 – 1963. The Battery at South Beach was never finished and did not become operational.

BEELIAR RESERVE/NATURE
Comprising two chains of wetlands, Beeliar Regional Park runs parallel to the coast through Melville, Cockburn and Kwinana. Beeliar Regional Park's 19 lakes and numerous shallower wetlands are home to abundant wildlife. A large portion of the Manning Park Reserve forms part of the Beeliar Regional Park.

CHIMNEY/ABATTOIR
The Robb Jetty chimney stands as the only remnant of the former Robb Jetty abattoir. The abattoir primarily received stock from the pastoral stations of Western Australia. Stock was shipped down the coast and herded into various holding pens situated on the beach and in the grounds of the abattoir. The abattoir was closed in 1993 after being in operation for nearly one hundred years.

FIGS/PIONEERS
These Moreton bay Fig trees are around fifty years of age. It is understood that the trees were once part of the Robb Jetty abattoir complex. The Cockburn Coast is associated with the earliest settlement of the Swan River Colony with the first settlers anchoring off shore and taking up land grants in 1830. The coastal strip steadily grew as an industrial area from the late nineteenth century with the introduction of the rail line between Fremantle Port and Robb Jetty in 1898.

SHIPWRECKS
After Perth was founded in 1829, many ships were wrecked along the coastline and around Fremantle. Islands, reefs and unchartered rocks, and poor navigational aids all played their part in the fate of many ships of the colonial period. There are two shipwrecks, the Diana and James, located in the beach area south of the power station, concealed beneath the sand. The Diana was shipwrecked on 16 July 1878 in a severe storm drove. The James was shipwrecked on 21 May 1830 after being blown ashore.

PART B



PUBLIC ART MANAGEMENT

POLICY CONTEXT

The City of Cockburn has addressed Public Art through both a Position Statement that was first adopted in 2003 and reviewed in 2009, and a Public Artworks Strategy 2009.

Position Statement
The Position Statement sets out Council's position on commissioning public art and references the City's Corporate Strategic Plan in relation to the following key areas:

1. *"To foster a sense of community spirit within the district generally and neighbourhoods in particular."*
2. *"To conserve the character and historic va*lue of the human and built environment."

The Position Statement states that public art should assist the city to achieve the following:

- *Develop and enhance a sense of place, pride and ownership of public spaces.*
- *Improve the quality and design of public spaces*
- *Contribute towards the development of Cultural tourism opportunities*
- *Give added meaning to Cockburn's unique environment, history and multicultural community*

The statement and its propositions are to be applied to public art projects associated with *City of Cockburn funded projects, externally funded projects, joint collaborations, and those initiated by development within the City.*

Public Artworks Strategy 2009
The City of Cockburn's Public Artworks Strategy

Goal 1: *Develop a collection of distinct and diverse public artworks*
Goal 2: *Position Cockburn as a leader in innovative public art practice*
Goal 3:*Achieve an integrated approach to public art*
Goal 4: *Increase awareness of public art as a significant cultural asset*

The strategy also outlines Council's position on the "purpose of Public Artworks" and "types of public artworks".

In addition the strategy sets out implementation strategies associated with:

- *Locations for Artwork*
- *Themes and Scale*
- *Project Management*
- *Selection Procedures*
- *Monitoring, Maintenance and Conservation*
- *Copyright*

In relation to the Cockburn Coast development Council has stated a requirement that:

a) *The proponent shall submit to the Local Government a Public Art Strategy for approval as an additional detail of the Local Structure Plan(s).*

b) *The Public Art Strategy shall set out the framework to enhance each precinct through the appropriate integration of public art within the Development Area by detailing the following:*
   i) *Influences for public art and possible public art themes for each precinct;*
   ii) *Indicative locations for artworks where they will enhance the amenity and the interpretation of the public realm, contribute to way-finding, and enhance the sense of place;*
   iii) *Management arrangements and responsibilities for public art.*

The Cockburn Coast Public Art Strategy delivers on the requirements as identified above and aligns with the principles, goals and processes outlined in both Council's Position Statement and the Public Artworks Strategy.

FUNDING STRUCTURE

The public art opportunities for Cockburn Coast development will be funded through a 1% for art levy on all buildings over the life of the development.

The percent for art funds should be collected and pooled in a Public Art Trust Fund and then as sufficient funds become available they are allocated to commissioning works for relevant art opportunities in precincts under development.

Depending on the staging of the development rollout the Public Art Trust Fund may require time to accumulate sufficient funds to invest in the projects identified in this Public Art & Cultural Interpretation Strategy. Therefore priorities will need to be identified for each stage as the program for each precinct has been established.

In some circumstances Landcorp/City of Cockburn may wish to partner with a developer who is delivering a key landmark building in order that the percent for art funding can be spent directly on that building. This option relates especially to those projects as identified in the Whole of Site Opportunity 1 *Formulations* and Robb Jetty Opportunity 1 *Adaptations*.

GOVERNANCE

Note: At the time of preparing this Strategy there was no clear decision on the best option for the governance of the public art program and therefore three options are included below.

Option 1:
The City of Cockburn should establish a Public Art Trust Fund to receive the percent for art contributions, and to provide funds to selected art opportunities as identified in parallel with the development rollout.

Option 2:
Landcorp should establish a Public Art Trust Fund to receive the percent for art contributions, and to provide funds to selected art opportunities as identified in parallel with the development rollout.

Option 3:
Landcorp should engage a Public Art Consultant to oversee the long term implementation of the Public Art Strategy. The consultant would work with the developers to ensure and the projects are delivered and the Strategy is complied with.

Decision Making
A Public Art Advisory Group [PAAG] should be established to oversee the delivery of the Cockburn Coast Public Art & Cultural Interpretation Strategy. The PAAG should review and provide advice on all public art projects funded from the Public Art Trust Fund.

The PAAG should have a membership made up of representatives from:

- The City of Cockburn
- Landcorp
- Council's Cultural Reference Group
- Relevant Western Australian State Government agencies
- Art advisors [academic or professional advisors]

In addition where a project under review is of significance to a specific community the PAAG should be augmented with:

- Local community representatives from the relevant precinct
- Local cultural representatives from the relevant group particularly the Indigenous community

Decisions on appropriate artists and the approval of artist's concepts can be made by the PAAG or the PAAG can make recommendations to the final authority for ratification.

It may also be important that the preferred artists' concepts are reviewed by Council officers for comment on any safety, risk or potential maintenance issues before the artist is commissioned to proceed to fabrication.

Management
It is recommended that artwork commissions are curated and managed by professional consultants. Such consultants can be engaged to work within Project Teams to prepare artwork briefs and artist shortlist, commission contracts and facilitate the commissioning phases.

Ownership
At the point of transferring ownership of public space from the developer to Council any integrated artworks within that space will also become the property and responsibility of Council.

Council then becomes the asset owner and as such assumes the ongoing maintenance responsibility. It is best practice for detailed maintenance manuals to be prepared at the completion of all public artworks. The maintenance manual and any required asset data can be provided to Council when the artwork transfers from the ownership of the developer to Council.

ARTIST ENGAGEMENT MODELS

There are two generally accepted commissioning models of relevance to the range of Art Opportunities identified in this Public Art & Cultural Interpretation Strategy. The first approach is to engage three or more artists in a limited competition to develop concepts from which one artist is selected to proceed to design development. The second approach is to engage one artist through a direct engagement approach to develop concepts.

Option 1: Limited Competition
The limited competition model is principally used where the artwork is a stand alone piece that does not require a high level of collaboration with a building or landscape design team. The advantage of this model is that the PAAG has three options to review and select from. Once a preferred concept has been selected then only that artist moves into the design development phase.

In a limited competition model all the artists are contracted and paid a concept fee to develop their concepts for presentation to the PAAG.

Option 2: Direct Engagement
In the situation where an art opportunity is integral to a building, landscape or urban design project then it is appropriate to undertake a direct engagement process where a single artist is selected and engaged to develop concepts in association with the design team. The advantage of this model is that it is less formal than the limited completion and therefore the artist is able to be in regular dialogue with the design team and develop their concept through an iterative process rather than working in isolation and then presenting a concept as in a competitive process.

DEFINITIONS

CULTURE

It is generally accepted today in Local Government policy terms that the word 'culture' relates to an overarching concept of beliefs and values that underpin the lives of individuals and communities.

The United Nations Educational, Scientific and Cultural Organisation [UNESCO] states that:

Culture consists of all distinctive, spiritual & material, intellectual & emotional features which characterise a society or social group.

Culture therefore underpins everything we do as individuals and as a society including the social ways of behaving and interacting with others. It also includes our understanding of history, the artefacts we make and the stories we tell.

CULTURAL HERITAGE

Cultural heritage can be considered as both immovable and movable heritage items. Historic buildings, examples of important architecture and places of cultural significance are among the immovable cultural heritage assets of a place and its people. Places of cultural significance might include sacred Indigenous sites and sites relating to significant local people or historic events that have meaning for the community. It is important to remember that immovable cultural heritage preservation and protection is in many cases covered by a legislative framework including classifications which provide legal protection to certain sites, monuments, statues and sculptures.

Movable cultural heritage refers to those tangible and intangible traces, stories and the recorded evidence of people's way of life that constitute a community's heritage and history. This may include: the physical collection and display of cultural objects in museums and galleries; the collecting of people's stories through oral history programs; research into local history for education and publishing activities; and the integration of interpretive signage or artworks in public spaces.

ART

The unique personal cultural expressions categorised as 'Art' includes a wide range of visual, audio and sensory communication. Art can be seen as an expression of a culture, one of the ways in which an individual or a group of individuals reflect or challenge the values contained within the community's culture. It is generally acknowledged today that the arts include, but are not limited to: the visual arts such as painting, sculpture, digital art; the performing arts such as dance, music and theatre; and the literary arts such as writing and storytelling.

ARTIST

The term 'Artist' can be associated with those individuals who, as Donald Richardson states in his book *"What Art is – and isn't"*, "transform material by manipulation for an aesthetic end". Richardson argues that as art is conceptual and not functional, then designers such as architects or industrial designers who deal with functional objects are not artists when practising in their professional capacity. The title 'Artist' has also become widely used when referring to creative practitioners such as craftspeople and artisans.

Unlike the design professions such as architecture there is no form of educational or professional institute membership required to qualify as an artist, therefore artists are often judged on the basis of the quality of their artwork, recognition of their peers and success through their practice.

PUBLIC ART

Public Art is art created and located outside of a typical gallery context, in locations such as streets, parks, forecourts of public buildings, integrated into the building fabric or any space accessible to people. Public art can adopt many forms and approaches from community cultural development, place making projects, stand alone public artworks, to art "built in" or integrated with buildings, landscape or urban developments.

Public Art can reflect a diverse range of styles and practices from traditional to contemporary art. It can include and/or incorporate memorials, monuments, sculptures, or murals and also functional objects such as fountains, street furniture, lighting and paving. It may be both permanent and/or temporary, including installations and performances, billboard art, sound installations, video or laser projections, text, advertising, aerosol art and street banners. The works may be commissioned by either the public or private sectors and may therefore be located on either public or privately owned land.

PUBLIC REALM

Truly public space is a space that is owned by a public authority, such as a local Council or state government agency, and is totally accessible to the public. This includes streets, plazas and open space such as parks, foreshores and beaches. In our modern cities there are many spaces that might be perceived as being in the public realm, although they are in fact private spaces that allow public access under certain terms and conditions. For example, a shopping mall may present itself as publicly accessible while employing security guards to ensure that people behave in a way acceptable to the owners of the space.

For the purpose of this strategy, the term public space refers to those spaces owned and managed by Council, over which Council can legally make decisions and provide for community needs.

COMMUNITY ENGAGEMENT

Across Australia, Councils have recognised that Community Cultural Development [CCD] and Community Art has been both a powerful community engagement and development tool and a wonderful way for community members to contribute to shaping their physical environment.

While there are many different approaches to the community art process, perhaps the most recognised is where an artist with community development skills works, with the community on developing the conceptual content and then either creates the final artwork or supervises the creation of the work. Either way the community benefits from skills development and increased sense of ownership of place.

Professional artists can also engage in gathering stories and community values as a source of inspiration from which to draw upon in the creation of their public art practice. For example, an oral history project may form the initial stage of a public art commission from which a contemporary artist develops her/his final artwork. In this way the outcome, while being a significant work resulting from that artist's practice, is grounded in the local context of community and place.

In the case of artists or public art consultants consulting with regard to Aboriginal heritage it is important that the Cockburn City Council Aboriginal Reference Group is consulted as part of the process.

INTEGRATED ART

There is considerable value in working with artists on integrated artworks as part of the landscape, buildings or civic spaces. Options might include building fabric such as facades, glazing, architectural detailing and public space, street furniture, paving, retaining walls or interpretive signage.

The advantages of involving artists in integrated artworks can be the development of unique detailing or furniture that has a strong sense of place and uniqueness. The other advantage is that maximum benefit can be gained through using art budgets to add value to existing expenditure. In addition, there are great benefits from including an artist on the design team to work alongside the architects and landscape architects to bring a deeper conceptual approach to the project.

STAND ALONE ART

In addition to artworks that are commissioned as part of major infrastructure work there are always key locations in a city or landscape that may benefit from the addition of a stand-alone sculpture, landmark or icon artwork.

While there is a tendency to think of icons as being major 'landmark' works, traditionally the term "icon" was used to describe a sacred object, it has also become a description of something that is unique and special to a place, therefore an "iconic" stand alone artwork should not be judged by its size but by its power, uniqueness and strong sense of place.

PLATFORMS FOR TEMPORARY/EPHEMERAL ART

Every city and town has a range of public spaces that can be utilised for art events and temporary installations, they may be: parks, plazas, streets or the entry to a civic building. Temporary projects especially provided opportunities for young and emerging artists and opportunities for artists whose practice is focused on ephemeral art forms.

An effective mechanism for introducing an element of change into the built environment can be through providing art spaces or 'platforms' for temporary artworks. For example, there are a number of successfully curated 'billboards' in Australia. In these situations the artists utilise traditional billboard technology to create their artwork.

An alternate approach is to use digital technology for screen based artworks, including digital screens that can be used for new media art as well as for event programming and special broadcasts. The advantage of the digital space is that it introduces almost unlimited potential for changing visual stimulation.

INTERVENTIONS

As an alternative to the concept of distinct platforms, where one can expect to find a changing program of artworks, the concept of 'Interventions' is about encountering the unexpected within the city. It is about an artist challenging perceptions about place and forcing a rethink about how we perceive particular spaces in our city. Interventions are traditionally the initiative of an artist who chooses the location and subject matter for the work and then seeks permission from Council to implement the proposal, with or without financial support from the City.

COMMISSIONING PROCESS

PHASE 1: ART OPPORTUNITIES

1.1 Confirm art opportunities and secure approvals
1.2 Prepare artwork briefing material

The Public Art Strategy provides an overall conceptual framework for thinking about future art opportunities, however over time it will be necessary to undertake a review as each new opportunity presents itself over the course of the development process. Once each specific art opportunity has been reviewed and approvals given it will be necessary to prepare a detailed Artwork Brief.

The Artwork Brief should include:

- Relevant Conceptual Framework information
- Site context and project intent
- Technical requirements
- Timelines and budget requirements
- Assessment criteria

PHASE 2: ARTIST SELECTION & CONCEPTS

2.1 Artist selection process
2.2 Commission Artists Concepts
2.3 Concept Development
2.4 Concept Presentation
2.5 Concept Approvals

Depending on the nature of the proposed artwork artists might be selected through a range of approaches, including:

- the curator identifies a shortlist of potential artists for consideration by the client
- public calls for expressions of interest from which a shortlist is prepared
- for collaborations between artist and architect/urban designer a direct engagement process might be preferred

Once selected, the artist/s will be contracted for a fixed fee to develop a concept proposal in response to the approved Artwork Brief.

Artist/s should be asked to develop a concept proposal in response to the Artwork Brief from both the perspective of the conceptual and technical requirements. The artist/s should also be briefed on what form the concept proposal should take. For a sculptural work a three dimensional model would be most appropriate and a computer graphic best for a wall treatment. All artists engaged to develop concepts should be paid a fee appropriate to the scale of work required.

PHASE 3: DESIGN DEVELOPMENT

3.1 Confirm art opportunities and secure approvals
3.2 Prepare artwork briefing material

Preferred concepts should proceed to a Design Development [DD] stage where all aesthetic and technical issues can be fully resolved before committing to a final commission contract.

In the case of limited competitions only the selected concept will proceed to the DD stage.

Sufficient allowance should be made in the DD budget for the artist to secure structural engineering advice and specifications.

PHASE 4: FABRICATION & INSTALLATION

4.1 Commission Contract
4.2 Fabrication Process
4.3 Fabrication progress Reviews
4.4 Practical Completion – Defects Review
4.5 Installation
4.6 Final Defects Review
4.7Handover to Commissioner

Once final Design Development approvals have been secured a commission contract should be prepared that outlines:

1. The scope of work
2. Agreed fee
3. Fabrication and Installation schedule
4. Progress payment stages
5. Progress review stages
6. Warranty Period
7. Copyright and reproduction rights

During the fabrication phase progress reviews should be undertaken to ensure that the work is of a high professional standard and that mile stones are achieved in order that progress payments can be processed. Where possible a defects review should be undertaken prior to the work being installed. Following the installation of the artwork a final defects review should be undertaken to ensure that all defects have been identified. The artist should then rectify any identified defects before a final handover is undertaken. Once all final defects have been rectified then the work should be handed over to the commissioner. At this point the commissioner accepts responsibility and liability for the work.

APPROVAL PROCESS

At each Phase there are a range of approvals required by the Commissioner, these include:

1. Confirming the specific art opportunity, its location, theme, typology and budget against the conceptual framework and requirements of the Cockburn Coast Public Art & Cultural Interpretation Strategy

2. Reviewing and approving the preferred Artist or Artists from the proposed Artist shortlist provided by the Curator. Following approval the Artist or Artists would be contracted to prepare concept proposals either as a direct engagement or limited competition.

3. Reviewing and approving the preferred concept or concepts, either through a direct engagement or limited competition process. Following the selection of a preferred concept then the Artist would be contracted to undertake the Design Development phase.

4. The final Design Development package including engineering and detailed costing would then be reviewed and approved for the commissioning of the fabrication and installation

5. Final acceptance of completed and installed artwork would be approved once any defects have been rectified and the Project Manager has certified that the work complies with the contract.

PAAG REVIEW AND APPROVALS

The key decision making points requiring PAAG involvement are at a minimum:

1. Identification of Art Opportunity, location, timing and budget

2. Review and approval of proposed artist or artists to be engaged to develop a concept for the approved Art Opportunity

3. Review and approval of preferred concept proposal

4. Review and approval of the artist's final Design Development proposal

TECHNICAL REVIEWS

Technical reviews should be undertaken by Council risk and asset managers to assess the artwork proposals' suitability for the public realm. The review points would be:

1. Following the PAAG identifying a preferred concept design

2. On completion of the design development proposal

3. Prior to the handover of the final installed artwork

PROCESS	RESPONSIBILITY			
STAGE/TASK	COMMISSIONER	PAAG	CURATOR/PROJECT MANAGER	ARTIST/S
STAGE 1: PROJECT INITIATION				
1: IDENTIFY OPPORTUNITY			X	
2. APPROVE OPPORTUNITY	X	X		
3. PREPARE BRIEF			X	
4. PREPARE SHORTLIST OF ARTISTS			X	
5. SELECT & APPROVE ARTIST SELECTION	X	X		
STAGE 2: CONCEPT PHASE				
1. PREPARE CONCEPT CONTRACT			X	
2. APPROVE CONTRACT	X			
3. CONCEPT BRIEFING			X	X
4. CONCEPT DEVELOPMENT PHASE				X
5. CONCEPT PRESENTATIONS				X
6. CONCEPT SELECTION/APPROVAL	X	X		
STAGE 3: DESIGN DEVELOPMENT (DD) PHASE				
1. PREPARE DD CONTRACT			X	
2 APPROVE DD CONTRACT	X			
3. DD BRIEFING			X	X
4. DD PHASE				X
5. DD PRESENTATION				X
6. REVIEW & APPROVE	X	X		
STAGE 4: FABRICATION & INSTALLATION PHASE				
1. PREPARE FABRICATION & INSTALLATION CONTRACT			X	
2. FABRICATION PHASE				X
3. UNDERTAKE PROGRESS INSPECTIONS			X	
4. INSTALLATION				X
5. DEFECT INSPECTIONS			X	
6. DEFECT RECTIFICATION				X
7. PROCESS COMPLIANCE & HAND OVER			X	
8. OWNERSHIP	X			

BUDGET

The following matrix has been provided as a basis for establishing the likely cost involved in commissioning the program of works.

Notes:

- Budget allocations based on a program over a 20 year period, no staging has been applied to the matrix
- No allowance has been made for cost escalation and CPI increases over the 20 year period
- No allowance has been made in this matrix to cover implementation costs such as consulting advice or costs associated with approval processes and advisory committees

PRECINCT	OPPORTUNITY	ARTWORK/PROJECT #	INDICATIVE PROJECT VALUE	PRECINCT TOTAL ALLOCATION
WHOLE OF SITE	1: *Formulations*	3	$100,000	$300,000
	2: *Periodic Table of Place*		$5,000 (per yr)	$100,000
	3: *Inhabit*	2 per yr	$30,000 (per yr)	$600,000
			SUB-TOTAL	**$1,000,000**
ROBB JETTY	1: *Adaptations*	1	$150,000	$150,000
	2: *Cast Away*	1	$400,000	$400,000
	3: *On the Wild Side*	6	$60,000	$360,000
			SUB-TOTAL	**$910,000**
EMPLACEMENT	1: *Divining*	1	$250,000	$250,000
	2: *Seeing the Sea*	1	$150,000	$150,000
			SUB-TOTAL	**$400,000**
POWER STATION	1: *Elixir*	1	$200,000	$200,000
	2: *Creative Laboratory*		N/A	
	3: *Live Wires*	1 x every 2nd yr	$100,000	$1,000,000
	4: *Into the Sea*	1 (multiple elements)	$1,000,000	$1,000,000
	5: *Imagineering*	1	$300,000	$300,000
			SUB-TOTAL	**$2,500,000**
			TOTAL	**$4,810,000**

MAINTENANCE

INTRODUCTION

The ongoing maintenance of public art and cultural heritage elements in the public realm is important from a range of perspectives, such as cultural value, civic pride, custodianship, public risk and continuing asset value. Therefore, during the commissioning process, it is important that issues associated with the proposed lifespan of the artwork be considered from the perspective of the suitability of proposed materials and fabrication techniques. Ideally conservation advice should be sought at the concept, final design development and final defects stage to ensure future maintenance issues have been addressed.

Ultimately the City of Cockburn will assume ownership of all public art located in the public realm across the Cockburn Coast development area, and as such will become responsible for the long term maintenance and management of the works. The City of Cockburn's Public Art Strategy 2009 outlines Council's strategies with regard to "Monitoring, Maintenance and Conservation". The management and maintenance strategies highlighted in this document are in line with Council's stated position and provide additional detail and supporting processes to enable future Asset Management planning to take place.

MAINTENANCE RECORDS

A condition of the final sign off and acceptance of a completed artwork should be the provision of a detailed Maintenance Manual by the artist to the commissioner.

This manual should include:

- Commission Details – Artist, Commissioner, title of work, fabricator, installer, location etc
- Artwork Construction – materials used, finishes, fixings, foundations, lifting points, weight etc
- Maintenance Procedures – cleaning, recoating/painting, patina treatments, graffiti removal etc
- Supporting Material – construction photographs, manufacturer's guarantees, technical data sheets etc

ASSET REGISTER REQUIREMENTS

In addition to the Maintenance Manual the artwork should be listed on Council's Asset Register and included in the ongoing annual maintenance schedule of works. Ensuring that artworks are regularly cleaned and reviewed will assist in maintaining the work in good condition and avoid expensive conservation work in the future.

RELOCATION, REPAIR & REMOVAL

The final step of the process is consideration of the options for future actions such as the allocation of funds and contracting conservation or maintenance work. The plan has provided five options or actions that might be realistically undertaken.

To Monitor – relates to a situation where there is some evidence of potential problems with the condition of the artwork but no actual work is required, therefore a monitoring of the work on a six monthly basis is recommended to ensure that any rapid deterioration of the artwork's condition is identified in a timely manner.

To Maintain – relates to maintaining an artwork in the condition that currently exists, therefore no remediation work is proposed and only work that ensures the condition remains stable.

To Repair – relates to those artworks that have either suffered damage through accident or vandalism or there has been material or coating failure. In this case conservation work is required to reinstate the artwork to acceptable condition relevant to its age and value.

To Remove – relates to those artworks that are in a condition where repair cannot be justified due to cost or difficulty of making good without impacting on the integrity of the artist's concept. This option also relates to the situation where the condition of an artwork poses a public risk that cannot be rectified without a disproportionate financial commitment.

To Replace – relates to artworks that are beyond repair and must be removed. However, where an artwork is of significant cultural value or community value, providing it is financially viable to do, it should be replaced by the artist in its original form. Alternately a decision might be made to replace an existing artwork with an entirely new concept for the same budget as would be required in replacing the original.

To Relocate – relates to a situation where an artwork may need to be removed from its current location and relocated to another site. This may occur where the original site has changed or is about to be changed significantly and the artwork is no longer relevant to the site. The process of identifying a relevant site for relocation should include discussion with the artist.

MAINTENANCE CONSIDERATIONS

Repairs - In the event that repair work is required it is critical that the artist's Maintenance Manual be consulted to ensure that the appropriate materials are used and for the contractor or conservator to understand the artist's intent. Where the repairs are significant and go beyond the level of detail provided by the artist then Council should make every effort to discuss the work with the artist and where relevant offer the artist the opportunity to undertake the repair work.

Removal - As the owner of an artwork, Council has the legal right to remove it from the original site, especially in the circumstances that the work has either deteriorated significantly or poses a public risk. However Council has a moral obligation to notify the artist of its intent to remove the work and either place it in storage or to destroy the work.

MAINTENANCE RECORDS



- MATERIAL SELECTION
- FABRICATION TECHNIQUES
- ENGINEERING SPECIFICATIONS
- MAINTENANCE REQUIREMENTS

REPAIR/REPLACE



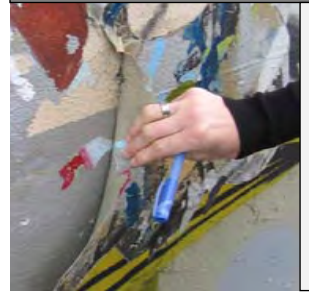
- CONDITION AUDITING
- WORK SKILLS REQUIREMENTS
- WORK PROGRAMS/BUDGETS
- ARTIST ADVICE/INVOLVEMENT

RELOCATION



- CHANGED SITE CONDITIONS
- CHANGE OF OWNERSHIP
- ARTIST ADVICE/INVOLVEMENT
- MORAL RIGHTS REVIEW

REMOVE/ DEACCESSIONING



- POTENTIAL PUBLIC RISK
- CONDITION BEYOND REPAIR
- ARTIST ADVICE/INVOLVEMENT
- MORAL RIGHTS REVIEW

MORAL RIGHTS & COPYRIGHT

INTRODUCTION

In addition to the physical outcome of a public art commission there are also a number of intellectual property considerations associated with copyright and moral rights. The federal Moral Rights Act 2000 provides an important outline of the rights of the artist and the commissioner/owner regarding the integrity of the artist's work and reputation. It is also important to remember that the commissioner who has the original contract with the artist may not be the long term owner of the work and therefore contractual obligations may need to be clearly defined at the time of commissioning.

MORAL RIGHTS AND PUBLIC ART

Public art like all the areas of the arts and creative endeavours is covered by the Moral Rights Act 2000. Moral rights are individual rights associated with the act of creating a work such as a work of art and the creator's reputation. The Act covers those rights that remain with the creator even though he or she may have transferred copyright in the work concerned to another person. They are non-economic rights, as they do not directly confer a financial return to the creator nor can they be traded, sold or bequeathed in a will, although when the creator dies the rights may be exercised by his or her legal personal representatives.

There are essentially three moral rights that are separate and distinct from the economic rights in an artistic work.

They are:

1. the **right of attribution** of authorship — the right of an artist to be named in connection with his or her artwork
2. the **right against false attribution** of authorship – the right of an artist to not have his or her artwork falsely attributed to another artist, and
3. the **right of integrity** of authorship — the right of an artist to object to treatment of an artwork that demeans his or her reputation.

Right of Attribution
The Moral Rights Act states that:

> *If the work is an artistic work, the **attributable acts** are the following:*
> *(a) to reproduce the work in a material form;*
> *(b) to publish the work;*
> *(c) to exhibit the work to the public;*
> *(d) to transmit the work.*

The implications for public art projects are that the contracts should acknowledge the Commissioner's obligation to: provide a permanent attribution plaque that attributes the work to the Artist, and accurately attributes the artwork in any published feature in which the artwork is prominently displayed.

Right Against False Attribution
The Moral Rights Act states that:

> ***Author's right not to have authorship falsely attributed***
> *(1) The author of a work has a right not to have authorship of the work falsely attributed.*
> *(2) The author's right is the right not to have a person (the **attributor**) do, in respect of the work, any of the acts (the **acts of false attribution**) mentioned in the following provisions of this Division.*

The likelihood of False Attribution on public art projects is remote as the Author/Artist is in most instances fully involved in the creation of the project. It is however important to require that the artist guarantees the Commissioner that he or she is the author of the work and that the work does not infringe the moral rights of another party.

Right of Integrity
The Moral Rights Act states that:

> ***Author's right of integrity of authorship***
> *(1) The author of a work has a right of integrity of authorship in respect of the work.*
> *(2) The author's right is the right not to have the work subjected to derogatory treatment.*

This right is the most relevant to the issue of asset maintenance as it relates to the right of integrity which is primarily directed against mutilation or distortion of a work that may be in some way prejudicial to the creator's reputation. In the case of public art works, the right also covers the destruction of the artwork and or the public exhibition of the artwork in a way that might be prejudicial to the artist's reputation.

In the situation where a work of art has been changed in some form from the original which the Artist considers to have altered the work and destroyed its integrity, the Artist would be entitled to request that the work should no longer be attributed to them. In this case the attribution plaque would be removed and no further reference would be made to the Artist as the author.

Any creator may give consent to a specified act or omission which would otherwise be an infringement of moral rights. In the event that there are potential changes likely in the future then it is important to identify the specified act or acts in the commission contract. The Moral Rights Act recognises that moral rights present special difficulties for buildings and for artworks associated with them or sited in public places. It makes detailed provision for the architect or artist to be consulted before any change to, or demolition of, a building or removal of a public site specific artwork, without impinging on the right of the owner to deal with their property.

For example where an artwork is integral to the building fabric or situated in a public space and changes are made to the building or space this may result in the inevitable destruction of the work.

> *(1) The destruction of a moveable artistic work is not an infringement of the author's right of integrity of authorship in respect of the work if the person who destroyed the work gave the author, or a person representing the author, a reasonable opportunity to remove the work from the place where it was situated.*

In this situation the Act does ask that an effort is made to notify the artist.

> *.. in accordance with the regulations and before the change, relocation, demolition or destruction is carried out, given the author or a person representing the author a written notice stating the owner's intention to carry out the change, relocation, demolition or destruction; and (b) the notice stated that the person to whom the notice was given may, within 3 weeks from the date of the notice, seek to have access to the work for either or both of the following purposes:*
>
> *(i) making a record of the work;*
>
> *(ii) consulting in good faith with the owner about the change, relocation, demolition or destruction; and*
>
> *(c) the notice contained such other information and particulars as are prescribed; and*
>
> *(d) where the person to whom the notice was given notifies the owner within the period of 3 weeks referred to in paragraph (b) that the person wishes to have access to the work for either or both of the purposes mentioned in that paragraph—the owner has given the person a reasonable opportunity within a further period of 3 weeks to have such access; and*
>
> *(e) where, in the case of a change or relocation, the person to whom the notice was given notifies the owner that the person requires the removal from the work of the author's identification as the author of the work—the owner has complied with the requirement.*

This last clause requiring a reasonable effort to be made to notify the artist of intended removal and or destruction of an artwork is particularly relevant to artworks in public places and should be an essential step whenever Council considers the removal, relocation or destruction of a public artwork owned by it.

COPYRIGHT

Copyright, unlike Moral Rights, is a transferable commodity and as such there are situations in which a commissioner requires an artist or designer to transfer the copyright as a condition of the commission contract. It is however, national best practice that the artist should retain copyright in a public art concept proposal.

Commission Contracts should detail:

- That the artist will retain the copyright or that the copyright will be transferred to the commissioner
- That the artist should be acknowledged as the author of the work both with regard to a permanent plaque on or near the artwork and in any feature of the work
- A licence agreement that provides the commissioner with the right to reproduce images of the artwork for non commercial marketing and promotional purposes
- That the commissioner will not produce any reproductions of the work for commercial purposes without entering into an agreement with the artist that ensures the artist's copyright is not infringed
- That the artist will not reproduce the same artwork for another commissioner

ARTIST ACKNOWLEDGMENT

Artists listed left to right/top to bottom.

Page 5:
Intensity - Sebastian Di Mauro, Mark Stoner, Nicole Voevodin-Cash
Honesty - Anton Hart, Robert Bridgewater, Catherine Griffiths
Duality - Elizabeth Woods, Geoff Bartlett, Elizabeth Woods
Legacy - Karen Genoff, Ian de Gruchy, Karen Genoff

Page 6:
Integrated – Jenifer Marchant
Stand Alone – Ann Neil
Temporary/Ephemeral – Philip Brophy & Martine Corompt
Interpretive – Tony Jones

Page 11:
Nicole Voevodin-Cash, unknown, Rebar
Jenifer Marchant, Peter Alwast, Alexander Knox

Page 12:
Simeon Nelson, Peter Alwast, Alexander Knox

Page 13:
Nicole Voevodin-Cash, John Tonkin, Rebar, Duke Albada

Page 14:
Glenn Romanis, Bruce Armstrong, Irene Barberis
John Tonkin, David Murphy, John Woods

Page 15:
Glenn Romanis, unknown, Bronwyn Oliver, Bruce Armstrong,
Francois Davin, Robyn Backen

Page 16:
Marijana Tadic, David Murphy, Stephen Newton, Stephanie Outridge-Field

Page 17:
Cameron Robbins, Phil Price, Phil Price, Matthew Harding, Peter Blizzard, Stuart Green

Page 18:
Brook Andrew, Anton James, Cameron Robbins, Stuart Green,
Matthew Harding, unknown

Page 19:
Ian de Gruchy

Page 20:
Ian de Gruchy, Cindi Drennan

Page 21:
Strange Fruit, Jason deCaires Taylor, Anthony Gromley

Page 22:
Unknown, unknown, Gerry Wedd

Appendix J
Emplacement Local Water Management Strategy

J

LandCorp

Hilltop / Emplacement Crescent Local Water Management Strategy

Volume 1

12 November 2012

Executive summary

This report is subject to, and must be read in conjunction with, the limitations set out in section 0 and the assumptions and qualifications contained throughout the Report.

GHD Pty Ltd was commissioned by LandCorp to prepare a Local Water Management Strategy for the Hilltop / Emplacement Crescent precinct of the Cockburn Coast urban redevelopment. LandCorp is proposing to sustainably develop the land for residential use.

The development located approximately 24 km south west of Perth and approximately 4 km south of Fremantle, within the City of Cockburn.

The Hilltop / Emplacement Crescent precinct area is approximately 20 ha in size and comprising the north eastern part of the Cockburn Coast structure plan area. The current zoning of the site supports the proposed subdivision development.

Water use

To reduce the annual water consumption in the development, in particular potable scheme water consumption, it will be necessary to be efficient in the use of water, and to use water that is fit-for purpose and appropriately sourced. Efficient water use will be up kept by following recommendations outlined in the water sustainability principle and Cockburn Sound Green Infrastructure recommendations. Fit-for-purpose water sources to be adopted will be scheme water, groundwater, and wastewater reuse.

Stormwater management

In accordance with the principals and objectives of this LWMS, the proposed development will need to maintain the pre-development stormwater discharge rates, and be protected from flooding in the 100-year ARI event. To this extent, the following stormwater management strategy is proposed:

1 year ARI event

- Runoff will be retained as close to source as possible within raingardens and bioretention areas;
- Runoff will be capture within rainwater tanks where possible, excess will be disposed of onsite via soakwells or other infiltration facilities;
- The use of permeable paving will be maximised to provide opportunities for infiltration at source.

5 year ARI event

- Runoff will be conveyed in underground pipe system designed to maximise infiltration utilizing bottomless pits and permeable joints to low point infiltration areas.

100 year ARI event

- Public open space will be designed to cater for surface overflow with habitable floors at least 300 millimetres above 100 year ARI flood levels.

Groundwater management

Groundwater quality and quantity will be at least maintained at a minimum and improved where possible for the entire Hilltop / Emplacement Crescent development site, in accordance with the principals and objectives of this LWMS. To meet these requirements the following groundwater strategy will is proposed:

- Soil amendment (where the tested phosphorous retention index is less than 10) within all stormwater infiltration areas and public open space;
- Infiltration will not be promoted in areas of known soil contamination;
- Xeriscaping to avoid the use of fertilisers; and
- Recommending a maintenance plan for the upkeep of the stormwater management system.

Next stage

The next phase of planning is the development of the Urban Water Management plan that will need to address the following:

- Additional information about irrigation, landscaping and POS, including water requirements, water sources, soil amendments;
- Additional information about geotechnical aspects of the site including phosphorus retention index testing;
- Flow rates and water levels at critical locations for the 100-year ARI event;
- Location, level and dimensions of drainage structures such as underground pipe system, low points for infiltration and soakwells;
- Imported wastewater program and necessary infrastructure upgrades;
- Management of subdivision works;
- Post-development monitoring program and a contingency action plan;
- Implementation plan, including roles and responsibilities;
- Guidelines for the irrigation and soil improvement for public open space are to be included within the urban water management plan.

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Appendix B Landscape master plan

Appendix C Integrated Water Management Assessment

Appendix D Modelling

Appendix E Better Urban Water Management LWMS checklist

Purpose of this report

To provide management strategies for stormwater, groundwater and water conservation within the Hilltop/Emplacement Crescent Local Structure Plan area.

Scope and limitations

This report: has been prepared by GHD for LandCorp and *may only be used and relied on by LandCorp for the purpose agreed between GHD and the LandCorp as set out in section 1 of this report.*

GHD otherwise disclaims responsibility to any person other than LandCorp arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer sections 5, 6, 7 and Appendix D of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by LandCorp and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

GHD has not been involved in the preparation of the Hilltop/Emplacement Crescent Local Structure Plan and has had no contribution to, or review of the Outline Development Plan *other than Hilltop/Emplacement Crescent Local Water Management Strategy. GHD shall not be liable to any person for any error in, omission from, or false or misleading statement in, any other part of the Hilltop/Emplacement Crescent* Local Structure Plan and Outline Development Plan*.*

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

1. Introduction

GHD Pty Ltd (GHD) was commissioned by LandCorp to prepare a Local Water Management Strategy (LWMS) for the Hilltop / Emplacement Crescent Local Structure Plan (LSP) of the Cockburn Coast urban redevelopment. The Hilltop / Emplacement Crescent LSP is one of three LSPs that define the Cockburn Coast urban redevelopment area.

The Cockburn Coast urban redevelopment is a 331 hectare (ha) site, with its centre located approximately 24 kilometres (km) south west of Perth and approximately 4 km south of Fremantle, within the City of Cockburn.

The Hilltop / Emplacement Crescent LSP area is an approximate 20 ha parcel of land situated within the north eastern section of the Cockburn Coast District Structure Plan (DSP). The proposed land use for the Hilltop/Emplacement Crescent LSP is residential, mixed use and local activity note, which is in line with the current zoning of the area.

1.1 Planning background

This LWMS has been prepared in accordance with the responsibilities for State Planning Policy 2.9: Water Resources (WAPC, 2004). The planning framework for land and water planning is illustrated in Figure 1.

The strategies presented in this LWMS are consistent with the following documents:

- City of Cockburn town planning scheme no. 3;
- City of Cockburn local planning strategy; and
- City of Cockburn guideline and standards for the design, construction and handover of subdivision within the municipality

1.2 Previous studies

Previously a number of studies have been conducted in support of the Cockburn Coast redevelopment including the Cockburn Coast District Water Management Strategy (GHD 2010c) and the Cockburn Coast Integrated Water Management Assessment (GHD, 2012b).

The aim of this local water management strategy is to combine present information and deliver design criteria and precinct water management strategies.

1.3 Principles and objectives

Local water management is a key component to water cycle management and should consider the integration of water supply, sewerage and stormwater while considering water-sensitive urban design principles.

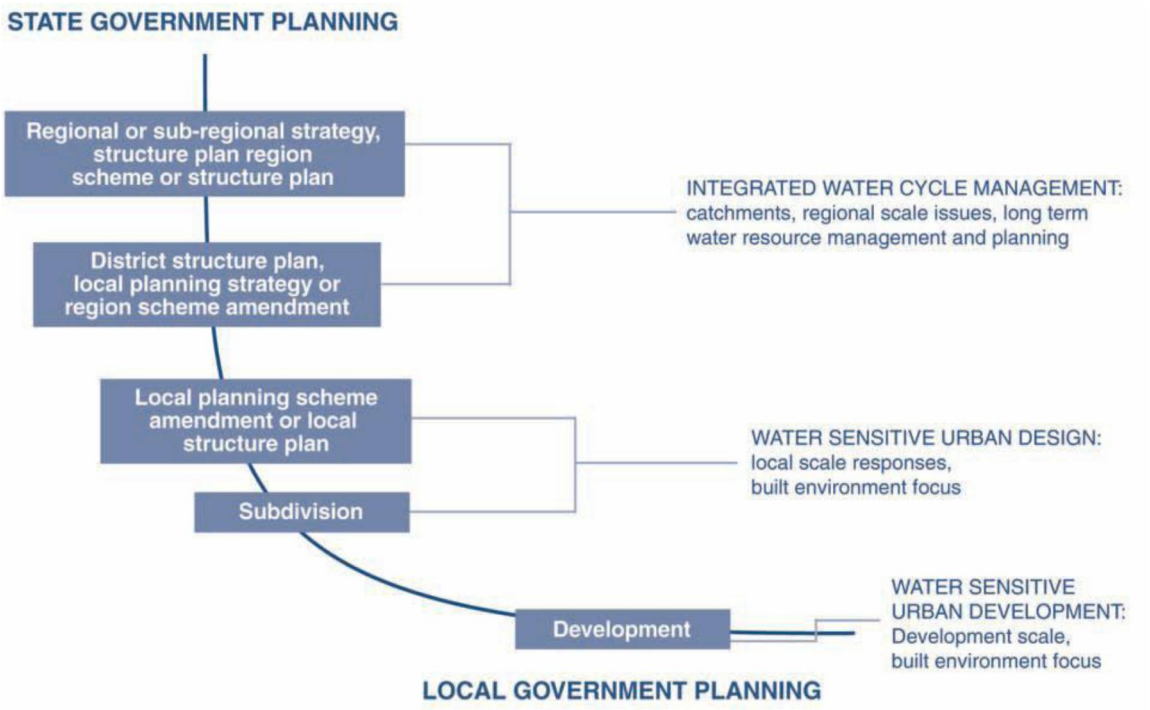

Figure 1 Planning framework for integrating the drainage planning with land planning

Source: Better Urban Water Management (WAPC 2008)

2. Proposed development

The proposed development is designed following the Cockburn Coast District Structure Plan 2009 prepared by the Western Australian Planning Commission (WAPC), detailing the planned land use and future development of the Cockburn Coast. The Hilltop / Emplacement Crescent development area is one of three phases in the Cockburn Coast Urban Redevelopment.

2.1 Land uses

The planned new land uses will complement existing local infrastructure to allow growth of new communities, economies, and activities beneficial to future residents and the wider community. The proposed development will be dominated by the following land uses: high and low rise residential, mixed use, and a road reserve. Less notable land uses will include public open space, medium rise residential, and terrace homes. The proposed land use and associated area in hectares, is summarised in Table 1.

The current land use is predominantly industrial and commercial, with some native bushland.

2.2 Public open space / landscaping

The Local Structure Plan for Hilltop/Emplacement Crescent provides large regions of Public Open Space (POS). As illustrated in Appendix B, the POS includes approximately 1.79 ha of Neighbourhood Park and Local Parks. Key features to these POSs is their east to west trending nature, which corrals stormwater drainage, and the presence of downstream infiltration basins abutting the street front to Cockburn Avenue. These designs aim to minimise stormwater runoff from crossing Cockburn Avenue.

Table 1 Hilltop / Emplacement Crescent land use

Land use	Area (ha)
Low density	0.403
High Density	10.957
Mixed use	4.77
Road reserve	2.18
Open Space	1.79
TOTAL	**20.1**



LEGEND

Local Structure Plan Boundaries

- Hilltop Emplacement LSP Area
- Power Station LSP Area
- Robb Jetty LSP Area

1:25,000 (at A4)

0 100 200 400 600 800 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

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LandCorp
Hilltop / Emplacement Crescent

Locality Plan

Job Number	61-27019
Revision	0
Date	13 Sep 2012

Figure 2

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3. Design criteria

Key objectives for the water management within the Hillside/Emplacement Crescent development area are detailed within the Cockburn Coast District Water Management Strategy (GHD 2009). The design criteria defined herein are adapted from those objectives, with consideration for recent investigation and obtainable targets.

3.1 Water conservation

Principle

To ensure management of the water within the development is wholly sustainable across all aspects of water and use is efficient.

The following criteria will be applied to support the intent of this principle:

- Consumption target for water of 80 kilolitres per person per year (kL/person/yr), including no more than 40 kL/person/yr scheme water;
- Potable water used outside of homes and buildings is to be minimised;
- All new fixtures and fittings are to be a minimum of 4 stars Water Efficiency Labelling and Standard Scheme (WELS) rated;
- The use of native plants is to be promoted, with native species constituting a minimum of 30-35% of total POS area.

3.2 Water quantity management

Principle

Maintain water discharge volumes and peak flows post-development, relative to pre-development conditions, unless otherwise established through determination of ecological water requirements for sensitive environments.

The following criteria will be applied to support the intent of this principle:

- Retaining all catchment runoff up to and including the 100-Annual Recurrence Index (ARI) events within the development area.

3.3 Water quality management

Principle

Quality will be maintained at pre-development levels (winter concentrations) and if possible, improve the quality of water leaving the development area to maintain and restore ecological systems.

To achieve the principle the following criteria will be applied:

- All surface and groundwater contained in the drainage infrastructure network will receive treatment prior to discharge to receiving environment consistent with the Stormwater Management Manual (DoW 2007).

3.4 Disease vector and nuisance insect management

To reduce health risks from mosquitoes, retention and detention treatments should be designed such that detained immobile stormwater is fully infiltrated in a time period not exceeding 96

hours, in accordance with the Department of Water (DoW) requirements, between the months of November and May.

Permanent water bodies are discouraged, but where accepted by DoW, should be designed to maximise predation of mosquito larvae by native fauna to the satisfaction of the local government on advice of DoW and the Department of Health (DoH).

3.5 Commitment to best management practices

In order to meet design criteria, a best practice hierarchy of principles will be implemented as follows:

- Place controls at or near the sources to prevent pollutants entering the drainage conveyance network and/or treat stormwater.
- Install in-transit measures to treat stormwater and mitigate pollutants that have entered the conveyance system.
- Install end-of-pipe controls to treat stormwater, mitigating any remnant pollutants prior to discharging to receiving environments.
- Utilise current discrete best practice water sensitive urban design measures for residential and commercial lot scales, and street scale.

Key design measures for each of these scales, include but may not be limited to, the following:

Residential lot scale:

  - Onsite retention;
  - Water and nutrient-wise landscaping;
  - Porous pavements;
  - Amended topsoils;
  - Rainwater tanks; and
  - Rain gardens and vegetated soakwells.

Commercial lot scale:

  - Landscaped infiltration structures; and
  - Hydrocarbon management and sediment traps.

Street Scale:

  - Landscaped infiltration structures;
  - Hydrocarbon management and sediment traps; and
  - Conveyance biofilter systems.

4. Pre-development environment

4.1 Study area

The Hilltop / Emplacement Crescent LSP area is located 0.5 km east of Cockburn coastline, approximately 24 km south west of Perth. The LSP area is bounded by Cockburn Road to the west, Rollinson Road to the north and Manning Reserve to the east. The site consists primarily of industrial and commercial use.

4.2 Climate

Cockburn Coast area has a Mediterranean climate with hot, dry summers and cold, wet winters. The average annual rainfall is 765 millimetres per year (mm/yr), of which 80% falls between the months of May and September. Local climate data is summarised below (BOM 2011):

- Mean Daily Maximum Temperature: 24.4 °C
- Mean Daily Minimum Temperature: 11.3 °C
- Annual Rainfall: 765 mm/yr
- Mean Annual Rain Days: 84.1

4.3 Topography

The Hilltop / Emplacement Crescent site is located on the western side of the Spearwood Ridge. Elevations range from 15 metres Australian Height Datum (mAHD) at the western border of the site to 40 mAHD at the eastern border, based on Light Detection and Ranging (LIDAR) measurements (Figure 3). The Spearwood Ridge peaks at approximately 50 mAHD just east of the site and is a key feature of the region. A small valley running north east to south west dissects the Hilltop / Emplacement Crescent site.

4.4 Geology and soils

Mapping by the Geological Survey of Western Australia indicates that the superficial geology at the Hilltop / Emplacement Crescent site is dominated by Tamala limestone, with Safety Bay calcareous sands present along the eastern boundary (Figure 4).

The Tamala limestone is characterised as a variably-cemented calcareous eolianite. The unit is generally karstic and often contains wide channels that increase the rate of water movement through the soil. Hydraulic conductivity is extremely high and is estimated between 100 m/day and 1000 m/day. The unit extends to a depth of -25 mAHD to -35 mAHD.

The Safety Bay calcareous sands present along the eastern part of the site are underlain by Tamala limestone, and consist of well sorted medium grained quartz and shell debris of eolian origin. Hydraulic conductivity of medium grained quartz is high and has been estimated at 8 m/day (Davidson 1995).

4.5 Acid sulfate soils

Mapping by the Department of Environment and Conservation (DEC) indicates that there is one area approximately 0.5 km east of the proposed development where there is a moderate to high risk of acid sulfate soils occurring within 3 m of the ground surface. This area is associated with Manning Lake in Beeliar Regional Park. There is no known risk of acid sulfate soils throughout the remainder of the Hilltop / Emplacement Crescent area.



LEGEND

Contours (5m)

Cadastre

Local Structure Plan Boundaries

Hilltop Emplacement LSP Area

Power Station LSP Area

Robb Jetty LSP Area

1:7,500 (at A4)

0 37.5 75 150 225 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

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Hilltop / Emplacement Crescent

Topography

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Revision	0
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Figure 3

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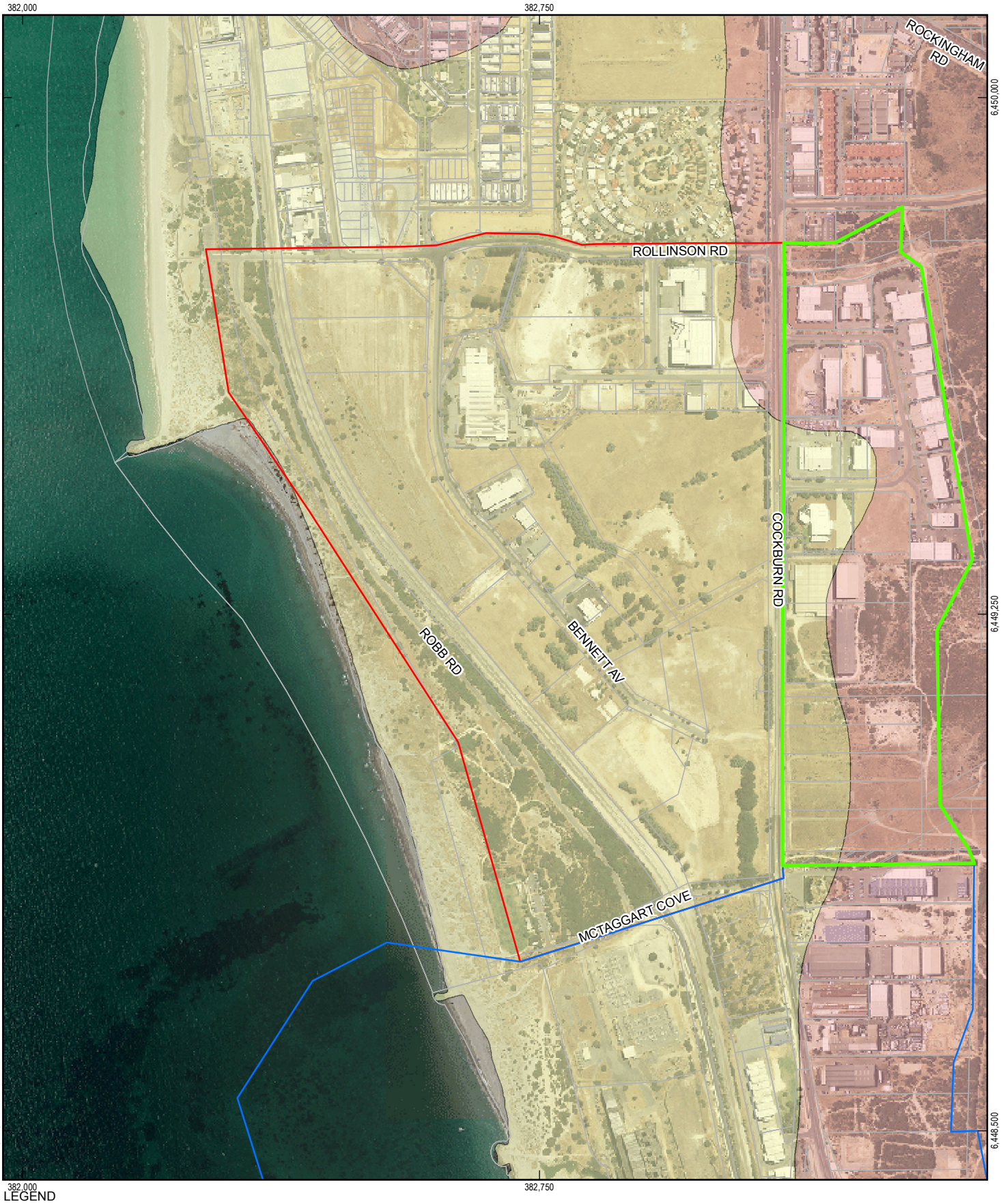
Created by: jrutherford, cagilbert



LEGEND

Cadastre

Local Structure Plan Boundaries

- Hilltop Emplacement LSP Area
- Power Station LSP Area
- Robb Jetty LSP Area

Geology

- LS1 - LIMESTONE - pale yellowish brown, fine to coarse-grained, sub-angular to well rounded, quartz, trace of feldspar, shell debris, variably lithified, surface kankar, of eolian origin
- S13 - CALCAREOUS SAND - white, medium-grained, rounded quartz and shell debris, well sorted, of eolian origin
- S7 - SAND - pale yellowish brown, medium to coarse-grained sub-angular quartz, trace of feldspar, moderately sorted, of residual origin
- Sm2 - SILTY SAND - greyish brown, medium to coarse-grained, quartz, variable silt content

1:7,500 (at A4)

0 37.5 75 150 225 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

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Hilltop / Emplacement Crescent

Job Number	61-27019
Revision	0
Date	13 Sep 2012

Geology and Soils

Figure 4

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4.6 Aboriginal heritage

Preliminary assessment has revealed aboriginal heritage sites in and around the Hilltop / Emplacement Crescent site (Figure 5). A narrow path across the southern boundary of the Hilltop / Emplacement Crescent area is part of a much larger heritage area to the south east of the site.

Archaeological and ethnographic evidence suggest the Cockburn coastal area was utilised as a route and favoured camping ground, linking wetland and other sources throughout the Perth metropolitan area. Signs of artefacts were absent; however, this may be attributed to the dynamic nature of the sand dunes of the site.

4.7 Environmental assets

The Hilltop / Emplacement Crescent area is located adjacent to Bush Forever Site No. 247 (Manning Lake and adjacent bushland, Hamilton Hill/Spearwood) which covers 50.6 ha and is part of Beeliar Regional Park. The bulk of Beeliar Regional Park lies south east of the Hilltop / Emplacement precinct and is defined as a significant Environmentally Sensitive Area. GHD carried out a site survey and produced an ecological assessment report for the Hilltop / Emplacement Crescent area (GHD, 2012c).

4.7.1 Flora

The site is largely degraded, developed for industry and dominated by weeds (GHD 2012c). However a 2.96 ha patch of native vegetation in good condition is present where the site is adjacent to a corridor of bushland connected to Manning Park.

One vegetation type identified on the limestone ridge on the eastern side of the site has similarities to a DEC listed threatened ecological community (TEC). A vegetation survey in spring (when annual species are present) would be required to confirm whether the area is a TEC.

The site contains no plant taxa labelled as Endangered or Vulnerable. One weed species was identified at the site; Bridal Creeper (*Asparagus asparagoides*) (GHD 2012c). The Bridal Creeper is listed as a Priority 1 declared plant by the Agriculture Protection Board. Weed management during the construction phase will be required to prevent the spread of these plants.

4.7.2 Fauna

Carnaby's Black Cockatoos were observed at the site within the 2.96 ha area of native vegetation (GHD 2012c). Carnaby's Black Cockatoos are classed as Schedule 1 priority fauna by the DEC. This classification applies to fauna which are rare or likely to become extinct, and are in need of special protection. Since the patch of native vegetation is connected to a much larger bushland corridor it is unlikely that the foraging habitat is critical to the survival of the Black Cockatoos, however, it is recommended that clearing is minimised or avoided where possible (GHD 2012c).



LEGEND

Local Structure Plan Boundaries

- Hilltop Emplacement LSP Area
- Power Station LSP Area
- Robb Jetty LSP Area

- Environmentally Sensitive Areas
- Bush Forever Sites
- Heritage Council Sites

- Cadastre
- Black Cockatoo Habitat

1:7,500 (at A4)

0 37.5 75 150 225 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

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Hilltop / Emplacement Crescent

Heritage Sites and Environmental Assets

Job Number 61-27019
Revision 0
Date 13 Sep 2012

Figure 5

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Data source: Landgate - Metro West Mosaic 2010 - 20110706, Roads - LGATE - 012 - 20110704, Cadastre - LGATE-082 - 20110530; GHD: Local Structure Plan Boundaries - 20110221, Black Cockatoo HabitatTree - 20120528; DOP: Heritage Council Sites - DOP-003 - 20110530, Bush Forever Sites - 20120530; DEC: Environmentall Sensitive Areas - 20110530; Created by: jrutherford, cagilbert

4.8 Surface water

There are no surface water bodies within the Hilltop / Emplacement Crescent area. Surface water flows across the area towards the coast as a result of topography.

Runoff in the currently developed area is generally infiltrated on individual lots via soakwells or collected in the local piped drainage systems and infiltrated in drainage sumps at an individual street or collection of streets scale.

4.9 Groundwater

The study area is located within the Cockburn Groundwater Area (CGA), which is a 157 square kilometer (km^2) area located 30 km south of Perth and covers a coastal strip of 22 km. The CGA was proclaimed on 29 July 1988 under the provisions of the *Rights in Water and Irrigation Act 1914* (RIWI Act) in order to protect the long term viability of this resource.

4.9.1 Superficial Aquifer

Data from three GHD bores in the Hilltop / Emplacement Crescent area indicate groundwater elevation ranges between 0.6 mAHD and 0.7 mAHD (Table 2).

The Superficial Aquifer is recharged by direct infiltration of rainfall. Groundwater flows in an east-west direction, again with some localised variation.

Table 2 Groundwater levels of GHD bores (monitored June 2010)

Well ID	Depth to groundwater (mBGL)	Ground elevation (mAHD)	Groundwater elevation (mAHD)
MW3-1	16.319	16.987	0.668
MW3-2	20.839	21.495	0.656
MW3-3	10.536	11.173	0.637

Groundwater quality monitoring of the three GHD bores was conducted by GHD in April / May 2010, as part of the DSP area investigations (GHD 2010b). Laboratory results indicated that the analysed groundwater samples exhibited naturally elevated salinity and nutrient levels, most likely a result of the historic agricultural practices (Table 3). Groundwater samples collected from two bores in the Hilltop / Emplacement Crescent area reported of total nitrogen, total phosphorous and oxides of nitrogen at concentrations above Australia and New Zealand Environment and Conservation Council (ANZECC) (2000) inline water resource guideline values and long term irrigation water guidelines (DEC 2010) (GHD 2010b). Reported analysis of groundwater samples collected from all three bores indicated that zinc concentrations were present at levels that marginally exceed ANZECC (2000) inland waters guideline values.

The Department of Environment and Conservation's *Contaminated Site Series: Assessment levels for soils, sediments and water* (DEC 2010), specifies that for open space and domestic irrigation, the required assessment guidelines are the DEC Domestic Non Potable groundwater use. None of the bores in the Hilltop Emplacement LSP exceeded the DEC Domestic Non Potable groundwater use guidelines.

Table 3 Summary of available groundwater data

Parameter	Concentration
Total nitrogen	12 - 14 mg/L
Total phosphorous	0.04 – 0.06 mg/L
Electrical conductivity	940 – 1140 microsiemens per centimetre (µS/cm)
pH	7.4 – 7.5

4.9.2 Leederville Aquifer

The Leederville Aquifer exists between 100 m below ground level (BGL) and 150 mBGL. The aquifer is confined by the Kardinya Shale and Henley Sandstone members of the Osborne formation and is generally brackish to saline with total dissolved solids (TDS) ranging between 500 mg/L to 2000 mg/L in the upper strata and 3000 mg/L in the unit. The DOW reports that recharge to the Leederville Aquifer does not occur in the Cockburn region due to the Kardinya shale confining layer (DoW 2007).

4.9.3 Yarragadee Aquifer

Similar to the Leederville Aquifer, the Yarragadee Aquifer is confined by South Perth Shale at depths of approximately 450 mBGL to 500 mBGL and receives no recharge due to the confining Kardinya shale.

4.9.4 Groundwater allocations

The Leederville and Yarragadee Aquifers are entirely allocated within the CGA, making the Superficial Aquifer the only ground water source available for abstraction. An estimated 1.1 gigalitres per year (GL/yr) is available from this source in the Cockburn Coast Urban Redevelopment area on request.

4.10 Existing water and wastewater infrastructure

An active wastewater pumping station is located within the adjacent Robb Jetty LSP area. The pumping station conveys wastewater to the Woodman Point Wastewater Treatment Plant (WWTP).

The Water Corporation has advised that wastewater and potable water requirements of development will be met with minimal upgrades to existing infrastructure (Wood and Grieve, 2010). Potable water will be sourced from the Water Corporation's Integrated Water Supply Scheme from existing water sources and wastewater will continue to be treated at Woodman Point WWTP.

4.11 Historic land use and contamination

The Hilltop / Emplacement Crescent site has historically been used for agricultural purposes, and more recently for industry and commercial uses. Therefore, there is a risk of residual soil and groundwater contamination.

Although there are no registered DEC Contaminated Sites present in the Hilltop / Emplacement Crescent area, there are several situated to the northwest (Figure 6). A hydrocarbon plume of bunker oil has been identified within the superficial aquifer in the adjacent Robb Jetty LSP area.



LEGEND

- Groundwater Well Location
- Water Level (mAHD) (as at 13:16h on 09/07/2010)
- Cadastre
- Contaminated Site
- **Bunker oil plume**
  - Groundwater Impacted Area
  - Provisional 70m Exclusion Zone
- **Local Structure Plan Boundaries**
  - Hilltop Emplacement LSP Area
  - Power Station LSP Area
  - Robb Jetty LSP Area

1:7,500 (at A4)

0 37.5 75 150 225 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

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Hilltop / Emplacement Crescent

Groundwater Bores and Contaminated Sites

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Figure 6

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Data source: Landgate - Metro West Mosaic 2010 - 20110706, Roads - LGATE - 012 - 20110704, Cadastre - LGATE-082 - 20110530; DEC: Contaminated Site - 20110708; GHD: Local Structure Plan Boundaries - 20110221, Groundwater Well Location - 20100621, Bunker Oil Plumes - 20110712. Created by: jrutherford, cagilbert

5. Water use sustainability initiatives

5.1 Water conservation and efficiency

Principle

Achieve the sustainable management of all aspects of the water cycle within the development area to promote the most efficient use of potable water.

To achieve the above principle the following criteria will be applied:

- Consumption target for water of 80 kL/person/yr, including not more than 40 kL/person/yr scheme water;
- Potable water used outside of homes and buildings is to be minimised;
- All new fixtures and fittings are to be a minimum of 4 stars WELS rated; and
- The use of native plants is to be promoted, with native species constituting a minimum of 30-35% of total POS area.

Water efficiency is part of the "Business as Usual" approach from the Building Code of Australia (BCA) guidelines and is implemented through the use of technology and changing behaviour towards water use.

The Waterwise Display Village concept has been developed by the Water Corporation with the intent of initiating a water saving and efficiency process towards Waterwise developments. The Waterwise Display Village Criteria (Criteria), which has been expanded to include developments, aims to support the implementation of appropriate action to achieve best management water outcomes. The Criteria for designated Waterwise homes requires the installation of water efficient appliances with a minimum four star WELS rating.

The standards for in-house water use appliances to be adopted in Cockburn Coast are in line with the Waterwise Display Village concept which includes:

- All tap fittings must have at minimum a 4 stars WELS rating;
- All showerheads must have at minimum a 4 stars WELS rating;
- All sanitary flushing systems must have at minimum a 4 stars WELS rating dual flush; and
- Hot water heaters to be located within 5 m of major hot water using points.

5.1.1 Irrigation

The irrigation of POS must comply with the City of Cockburn's irrigation specifications and hydro-zoning of irrigation systems will be implemented. Soil amendment will be required in areas of POS with the exception of areas dedicated for drainage and infiltration purposes. In areas for drainage and infiltration, the phosphorus retention index is to be greater than 10. Design guidelines for the irrigation and soil improvement for POS are to be developed and then implemented in the development. The design guidelines for POS are to address:

- Soil amendment;
- Park design / plant selection;
- Water efficient irrigation systems and use patterns (e.g. hydro-zoning);
- Metering and reporting;

- Improvement to soil structure areas to reduce water percolation and assist in plant development; and
- Weather Stations linked to irrigation systems.

5.1 Water demands

GHD conducted an Integrated Water Management (IWM) assessment for the greater Cockburn Coast redevelopment (GHD 2012b) which identified the estimated water demands for the LSPs in the Cockburn Coast DSP as well as the potential fit-for-purpose water sources (discussed further in Section 5.4). The IWM assessment has been included as Appendix C to provide the assumptions and unit demands associated with the water demand assessment.

From the IWM assessment, the potable and non potable water demands for the Hilltop/Emplacement Crescent LSP were estimated and the results from this assessment are presented in Table 4 below.

Table 4 Hilltop/Emplacement Crescent estimated water demands (ML/year)

Land use	Potable	Non potable (in house)	Irrigation	TOTAL
Residential*	113.02	63.20	13.61	189.83
Commercial	3.89	2.27	0.32	6.48
TOTAL	**116.90**	**65.47**	**13.94**	**196.31**

* inclusive of residential components in the mixed use land use.

The estimated POS and road verge irrigation demands have been refined from the IWM assessment to reflect the proposed landscaping strategy for the Hilltop/Emplacement Crescent LSP. The revised estimated POS and road verge irrigation demands are presented in Table 5. These demands have been determined based on the following assumptions:

- Irrigation application rate of 7,500 kilolitres per hectare per year;
- Open space areas as presented in Appendix B;
- 60% of the total area local parks and neighbourhood parks will be irrigated;
- 10% of the road reserve will be irrigated verges; and
- 1734 dwellings with an expected occupancy rate of 2.0.

Table 5 Open space irrigation demands

POS Type	Total Area (ha)	Irrigation Area (ha)	Irrigation demand (kL/year)
Open Space^	1.79	1.07	8,058
Road Reserve	2.18	0.22	1,635
TOTAL	**3.97**	**1.29**	**9,693**

^ includes Local and Neighbourhood Parks and assumes 40% of the open space area will be irrigated

The estimated total water use assuming a waterwise development for the Hilltop/Emplacement Crescent LSP area is estimated as 206 ML/yr. Based on the estimated population for the Hilltop/Emplacement Crescent LSP, the per capita water demands will be in the order of 59 kL/person/yr.

5.2 Potable water

The potable water supply for Cockburn Coast will be provided from the Water Corporation's Integrated Water Supply Scheme from existing water sources with minor upgrades to existing infrastructure.

5.3 Fit-for-purpose

The potential fit-for-purpose water sources identified in GHD's IWM assessment for the greater Cockburn Coast redevelopment (GHD 2012b) are discussed in greater detail in the following subsections.

5.3.1 Rainwater

Collection and reuse of rainwater at a lot scale is constrained by storage requirements within a high density urban development. However, there are opportunities for rainwater tanks to be installed in lower density parts of the Hilltop / Emplacement Crescent LSP area, and for small scale rainwater storage and distribution systems to be used for multi-residential dwellings.

The use of this water is generally limited to domestic fit-for-purpose demand (e.g., toilets and washing machines) because rainfall does not occur during the irrigation season. On an annual basis, a 2 kL tank could supply approximately 36% of domestic non-potable water requirements.

It is recommended that the use of rainwater tanks is optional for the Hilltop / Emplacement Crescent LSP area.

5.3.2 Stormwater

Stormwater harvesting is limited by storage requirements and use is dictated by the seasonality of irrigation demands. The most efficient and effective option for managing and reusing stormwater within the Hilltop / Emplacement Crescent LSP area is infiltration of stormwater to the Superficial Aquifer at (or close to) source.

The calcareous sands prevalent in the Hilltop / Emplacement Crescent area are ideally suited to the promotion of infiltration at (or close to) source. This has the advantages of maintaining recharge into the Superficial Aquifer as well as minimising the need for drainage infrastructure.

Collection and storage of stormwater for reuse other than by aquifer storage is regarded as inefficient due to the need to construct large storages and water collection infrastructure.

5.3.3 Groundwater

The availability of groundwater reserves for licensed abstraction has been discussed in Section 4.9.4. There is approximately 1.2 GL/year available within the Superficial Aquifer for use by the Hillside/Emplacement Crescent LSP area. The greater Cockburn Coast redevelopment is likely to gain access to a limited proportion of this available resource (potentially only up to 10% or 120 ML/year). It is estimated that the irrigation demand for the Hilltop Emplacement LSP area will be approximately 10 ML/year and the total fit-for-purpose demand (ie open space irrigation, domestic irrigation and non-potable water uses) is estimated to be 89 ML/year. Therefore, the groundwater resource will be unable to meet the fit-for- purpose water demand, although it can support the open space irrigation demands for this structure plan area.

The estimated open space irrigation demand for the adjacent Robb Jetty LSP area is 41 ML/year. Combined with the Hilltop/ Emplacement Crescent open space demands of 10 ML/year, the total irrigation demand for the two local structure plans is estimated to be 51 ML/year. The Superficial Aquifer currently has sufficient available allocation to support both LSP areas.

5.3.4 Imported groundwater

Groundwater may be imported from the groundwater interception trench at the nearby Port Coogee development. This source could contribute 2.4 ML/day to the greater Cockburn Coast development during summer (GHD 2012b). Preliminary information indicates that the quality of this resource is adequate for irrigation. Further investigation will be required to establish in more detail the quality and quantity of water available from this source.

5.3.5 Wastewater

The Bennett Ave Main Pumping Station collects and conveys wastewater generated within the greater Cockburn Coast district structure plan area to the Woodman Point Wastewater Treatment Plant (WWTP).

Although the pumping station conveys a substantial quantity of wastewater, the cost of building infrastructure to extract, treat, store and distribute treated wastewater is prohibitive to implementing a local wastewater harvesting scheme.

5.3.6 Imported wastewater

Long term planning indicates the Water Corporation's aim to recycle 20% of treated wastewater from Woodman Point WWTP by 2030. Therefore the Hilltop / Emplacement Crescent development will contribute to this regional scale wastewater recycling plan.

5.4 Water source recommendations

The preferred option for irrigation water supply for the Hilltop/ Emplacement Crescent LSP is groundwater, sourced locally with the potential of sourcing from Port Coogee in the longer term. The estimated irrigation is approximately 10 ML/year and currently the superficial groundwater aquifer has an available allocation of 1090 ML/year.

Further discussions are to be held with the Port Coogee development to determine the possible arrangements for using the water from groundwater inception trench.

6. Stormwater management strategy

6.1 Hydrology

The Hilltop/ Emplacement Crescent LSP has been divided into 3 hydrologic catchments, with delineation primarily based on the grades of the natural surface and proposed roads as illustrated in Figure 7. The Hilltop/Emplacement Crescent LSP was analysed in conjunction with the full Cockburn Coast LSP project area comprising of 17 catchments.

Information was sourced from the Bureau of Meteorology to generate the Intensity Frequency Duration (IFD) curves and temporal patterns for the Cockburn coast area.

Developed 1-, 5-, 10- and 100-year ARI storm events were simulated for each catchment of the study area using the Storm Water Management Model (SWMM) hydrologic model within the InfoWorks CS hydraulic package. Adopted hydrologic and hydraulic parameters, along with a description of the InfoWorks model are listed in Appendix D.

Hydrographs and total runoff rates and volume were calculated to determine the limiting infiltration area for post development runoff. A Rational Method calculation in accordance with Australian Rainfall and Runoff (2001) was used to verify the peak discharge rates and volumes. The 10- and 100-year ARI pre-development peak flow rates for each catchment within the Hilltop/Emplacement Crescent LSP is presented in Table 6. Full details of Cockburn Coast project area catchment 10- and 100-year ARI flows are presented in Table 7. Catchment hydrographs for the 5-, 10- and 100-year ARI flows are also provided in Appendix D.

Table 6 Hilltop/Emplacement Crescent Development Peak Flows

Catchment	Catchment Area (ha)	5- Year ARI Flow Rate (m^3/s)	10- Year ARI Flow Rate (m^3/s)	100- Year ARI Flow Rate (m^3/s)
3	9.4	0.17	0.28	0.67
5	10.9	0.17	0.28	0.73
5a	7.3	0.14	0.23	0.56

Table 7 Cockburn Coast Development Peak Flows

Catchment	Catchment Area (ha)	5- Year ARI Flow Rate (m^3/s)	100- Year ARI Flow Rate (m^3/s)
1	13.2	0.23	0.69
1a	8.1	0.10	0.28
2	7.4	0.16	0.57
2a	8.9	0.19	0.70
2b	10.9	0.26	0.86
2c	4.5	0.15	0.42
3	9.4	0.17	0.67

Catchment	Catchment Area (ha)	5- Year ARI Flow Rate (m^3/s)	100- Year ARI Flow Rate (m^3/s)
4	14.1	0.32	0.95
4a	8.3	0.23	0.74
5	10.9	0.17	0.73
5a	7.3	0.14	0.56
6	7.9	0.17	0.56
7	7.5	0.20	0.66
7a	4.4	0.13	0.37
8	10.4	0.20	0.67
8a	7.0	0.14	0.51
External	30.4	0.14	0.50

6.2 Surface water quantity management

Development of existing brown field areas into commercial and high density residential typically results in a minor increase in the amount of impervious surfaces. The additional impervious surfaces however will limit the quantity of stormwater that can infiltrate into groundwater, and will cause a quicker hydrologic response to rainfall events.

The higher flow rates and larger runoff volumes have the potential to affect properties and the environment surrounding the subdivision. Therefore, measures need to be taken to counteract the effects of the additional impervious surfaces.

6.2.1 Principle

The greater Cockburn Coast development stormwater management principles to mitigate the effects of increase development are outlined below:

- Infiltrate all remaining catchment runoff up to the 1-year ARI event at source;
- Retain all residential lot runoff up to and including the 20 year ARI on site; and
- Retain all catchment runoff up to and including the 100-year ARI event within the development area.

The hydrological modelling of the Local Structure Plan was completed using the program InfoWorks and the runoff routing method of the Storm Water Management Model (SWMM). The modelling was conducted for the existing and proposed development scenarios to quantify peak stormwater runoff for the 1, 5, 10 and 100 year ARIs and a range of rainfall durations (10 minutes to 12 hours).

Results from the hydrological assessment were checked using the Rational Method to compare derived flows and runoff volumes.

6.2.2 Strategy

In accordance with the principals and objectives of this LWMS, the proposed development will need to infiltrate all catchment runoff and to protect infrastructure from flooding in the 100- year ARI event.

The stormwater system has been design for the residential lots retaining the 20 year ARI event and commercial land uses providing on-site retention and infiltration for all events up to and including the 24 hour 100 year ARI event.

On site storage should be sized in accordance with the following formula:

$$\text{Storage Volume } (m^3) = \text{Rainfall (mm)}/1000 \times \text{EIA}$$

Where EIA = Equivalent Impervious Area and Rainfall = Millimetres of rainfall Intensity for design storm (1 in 20 year for Res and 1 in 100 year for Commercial and Mixed use)

On-site infiltration is promoted due to the regions sandy permeable soil (8 m/day as reported in Section 4.4) and depth to groundwater (10 m BGL as reported in Section 4.9). Examples of onsite infiltration are:

- Combination with a rainwater tank, where the top section of the tank is reserved for detention, with a high-level outlet or bypass for flows exceeding the capacity of the tank;
- Above ground storage in gardens or courtyards, draining to a infiltration pit with a high-level outlet or bypass for flows exceeding the capacity of the garden or courtyard;
- Above ground storage tanks in driveways or car parks, draining to infiltration pit(s) with an with a high-level outlet or bypass for flows exceeding the capacity of the driveway or car park;
- Underground detention tanks located under driveways and car parks with a high-level outlet or bypass for flows exceeding the capacity of the tank.

As well as lots, the Cockburn Coast Hilltop / Emplacement precinct development area includes road reserve, rail corridor and open space. Runoff from these surfaces up to the 1-year ARI event will be infiltrated at or close to source via tree pits and other infiltration devices as approved by the City of Cockburn. Runoff from these surfaces exceeding the 1-year ARI event up to and including the 100-year ARI event will be conveyed via piped infrastructure to drainage basins located in POS regions within the structure plan area as shown in Figure 7.

Basin N3 will serve the northern third of the Hilltop / Emplacement Crescent LSP, basin N5 the central third and basin N5a the southern third. These basins are to be located within POS and will receive stormwater from the surrounding developed area including runoff from major roads.

The typically sandy soil types prevalent in the Cockburn Coast structure plan area are ideally suited to the promotion of infiltration at, or close to source. This has the advantage of maintaining recharge into the superficial aquifer, minimising the need for drainage infrastructure and maximising water quality.

The drainage structures including the detail for the basins (N3, N5 and N5a) are yet to be configured, however storage requirements are provided in Table 8 based upon infiltration rate of 1 m/day (42 mm/hour) with indicative basin sizing and top water level assuming rectangular shape provided Table 9.

Table 8 Storage volume required for 1, 5, 10 and 100 year ARI storm

Drainage Basin	Catchment Area (ha)	1 yr ARI (m^3)	5 yr ARI (m^3)	10 yr ARI (m^3)	100 yr ARI (m^3)
N3	9.5	55	500	800	2,350
N5a	7.3	65	470	500	1,500
N5	10.9	100	310	750	2,050

Note: 1 yr ARI volume represents a volume sized at 2% of the catchments connected impervious for water quality treatment to be located as close to source as possible.

Table 9 Basin Dimension

Drainage Basin	Side slopes	Maximum Depth (m) 5 year ARI	Maximum Depth (m) 10 year ARI	Maximum Depth (m) 100 year ARI	5 year ARI TWL Area (m^2)	10 year ARI TWL Area (m^2)	100 year ARI TWL Area (m^2)
N3	1:6	0.2	0.4	1.0	2,000	2,450	2,900
N5a	1:6	0.2	0.4	1.0	1,300	1,600	1,900
N5	1:6	0.2	0.4	1.0	1,900	2,200	2,500

Note: Top Water Level (TWL)

Area provided is indicative assuming a rectangular 1:6 side slopes basin and may be modified through landscape design

6.2.3 1 year ARI event

Runoff from all (residential and commercial) lots during the 1-year ARI event will be captured within rainwater tanks where possible, with the excess disposed of onsite via the use of soakwells or other infiltration facilities as approved by the City of Cockburn.

Road runoff from events up to the 1-year ARI event will be retained as close to source as possible within rain gardens and bioretention areas integrated into the urban form. The bioretention areas are to be sized at a minimum of 2 % of the connected impervious area for water quality purposes.

The use of permeable paving should be maximised to provide opportunities for infiltration at source.

6.2.4 5 year ARI event

Runoff from all (residential and commercial) lots during the 5-year ARI event will be captured within rainwater tanks where possible, with the excess disposed of onsite via the use of soakwells or other infiltration facilities as approved by the City of Cockburn.

Road runoff from events greater than 1-year ARI and up to 5-year ARI exceeding the capacity of the 1 –year ARI bioretention areas will be conveyed in an underground pipe system. The piped system should be designed to maximise infiltration through the use of bottomless pits and permeable joints. The piped system will discharge to infiltration basins integrated into public open space areas.

The basins will infiltrate within 1.5 days of the 5-year ARI storm event

6.2.5 10 year ARI event

Runoff from all (residential and commercial) lots during the 10-year ARI event will be captured within and disposed of onsite via the use of soakwells or other infiltration facilities as approved by the City of Cockburn.

Road runoff from events greater than 5-year ARI and up to 10-year ARI will exceed the capacity of the 1-year ARI bioretention areas and will be conveyed in an underground pipe system. The piped system should be designed to maximise infiltration through the use of bottomless pits and permeable joints. The piped system will discharge to infiltration basins integrated into public open space areas.

The basins will infiltrate within 2 days of the 10-year ARI storm event.

6.2.6 100 year ARI event

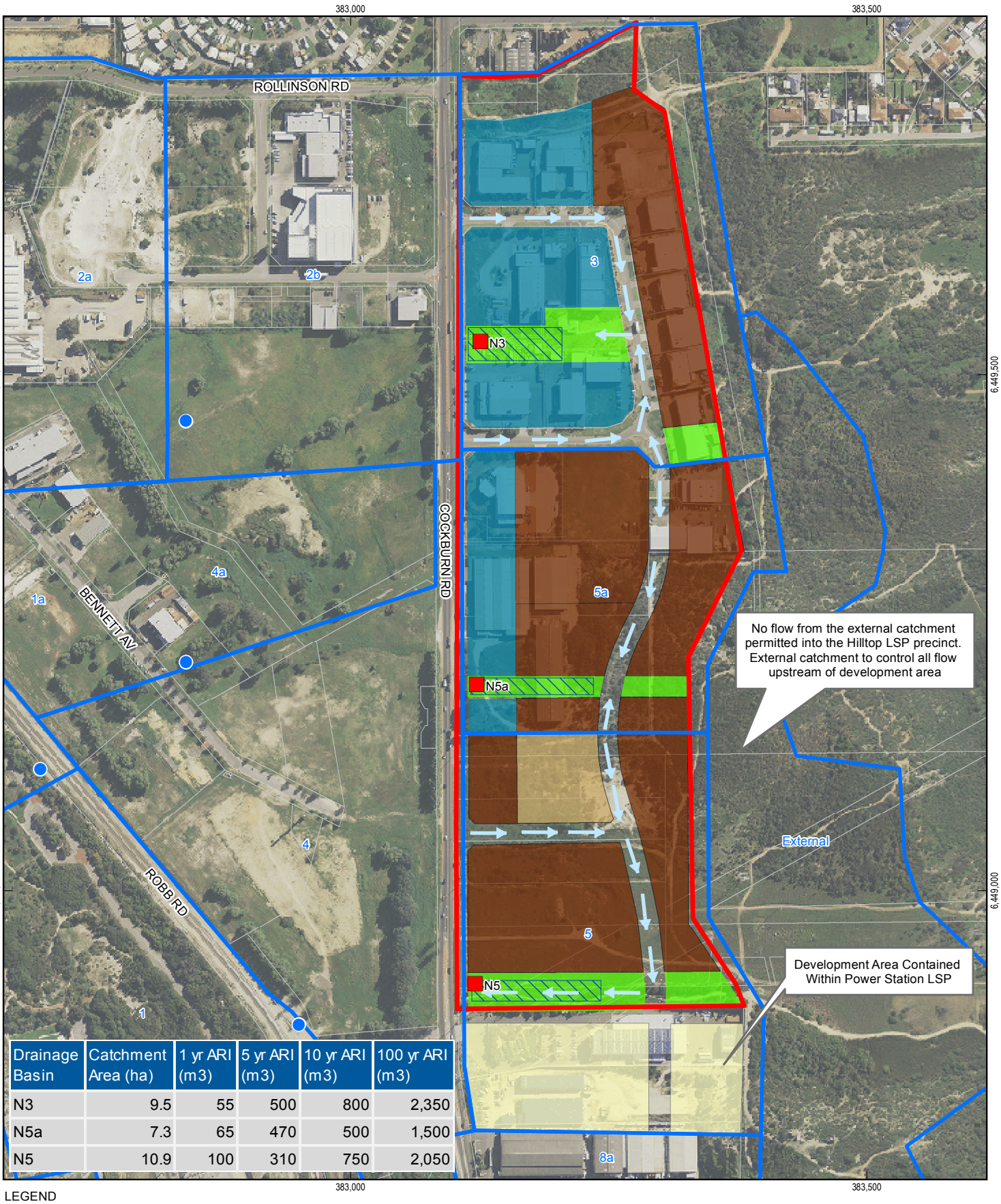
Runoff from all Commercial lots up to the 100-year ARI event will be captured within rainwater tanks where possible, with the excess disposed of onsite via the use of soakwells or other infiltration facilities.

For high density commercial lots where retention and infiltration within the boundary of the lot is not possible, retention and infiltration areas may be located underground within local public open space areas as close to source as possible in accordance with City of Cockburn development conditions.

Runoff from residential lots exceeding the capacity of the onsite detention system will overflow into the road reserves to be conveyed to the nearest infiltration basin or public open space which has been sized to accepted this volume of stormwater. Habitable floors will be set at least 500 mm above the 100-year ARI flood level at any basin location and 300 mm above road level.

Roads and public open spaces will be designed to cater for the surface overflow for more severe storms. Flow exceeding the capacity of the piped drainage system will flow within road reserves to the nearest infiltration basin or public open space.

The basins will infiltrate within three days of the 100 year ARI storm event.



Drainage Basin	Catchment Area (ha)	1 yr ARI (m3)	5 yr ARI (m3)	10 yr ARI (m3)	100 yr ARI (m3)
N3	9.5	55	500	800	2,350
N5a	7.3	65	470	500	1,500
N5	10.9	100	310	750	2,050

LEGEND

- Modelling Node
- Indicative Basin Location
- 100yr Flow Path
- Cadastre

Landuse

- Residential - power station LSP area
- Mixed use - residential/ commercial
- Public open space
- Residential - high density
- Residential - low density
- Indicative 100 Year Inundation Area
- Sub - Catchment

Local Structure Plan Boundaries

- Hilltop Emplacement LSP Area

1:5,000 (at A4)

0 25 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

LandCorp
Hilltop / Emplacement Crescent

Job Number 61-27019
Revision 3
Date 12 Nov 2012

Stormwater Management Strategy

Figure 7

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Data source: Landgate - Metro West Mosaic 2010 - 20110706, Roads - LGATE - 012 - 20110704, Cadastre - LGATE-082 - 20110530; GHD: Local Structure Plan Boundaries - 20110221, Modelling Node - 20120725, Indicative Basin Location - 20120725, 100yr Flow Path - 20121030 - 20120725, Landuse - 20121030, Sub - Catchment - 20120730, Indicative 100 Year Inundation Area - 20121112; Created by: jrutherford, cagilbert, erice, mczekaj

6.3 Surface water quality management

6.3.1 Principle

Maintain water quality at pre-development levels (winter concentrations) and if possible, improve the quality of water leaving the development area to maintain and restore ecological systems.

It is proposed to adopt Water Sensitive Urban Design (WSUD) and Best Management Practices (BMPs) promoting retention, infiltration and treatment of events up to the 1 -year ARI events, in accordance with the Stormwater Management Manual for Western Australia (DoW, 2004-2007).

This will be achieved by ensuring that the 1 year 1 hour storm will be infiltrated at or close to source. Pollutant discharge is to be reduced through adopting a treatment train approach including:

- Non-structural measures to reduce applied nutrient loads;
- On-site retention of frequent rainfall events; and
- Bioretention structures/systems sized for treatment.

It is estimated that the stormwater treatment areas will need a footprint of at least 2% of the constructed impervious area.

6.3.2 Structural Measures

The choice of structural treatment measures varies across the study area to suit streetscape and POS landscapes.

The proposed drainage plans uses multiple soak wells, bio retention areas and basins to infiltrate the 1 year 1 hour ARI. The process of infiltration effectively filters the stormwater and is effective in the removal of particulate nutrients. To increase the potential of the infiltration device treatment media, such as Laterite is to be employed.

A bioretention system, which represents 2% of the total impervious area, will result in performance at the maximum possible reductions. The key WSUD structural measures to be incorporated into the design are:

- Biofiltration pockets: Wherever practical, these small biofiltration and infiltration systems will be incorporated into non-frontage verges (where they will not obstruct driveway crossovers) and road nibs.
- Vegetated basins: Biofiltration and infiltration systems in the form of vegetated basins will be incorporated into public open space areas.

6.3.3 Non Structural Measures

Non-structural measures to control and reduce discharge of contaminants are based on source control of stormwater. Non-structural source control can include:

- Actions that aim to change behaviour such as public awareness campaigns and community education;
- Strata management operations and maintenance activities such as street sweeping, waste management;
- Landscape maintenance and fertiliser use;
- Land use and management measures, such as sediment and erosion control during construction and permeable pavements;

- Develop landscaping guidelines for the proposed development area that recommend the use of appropriate native species in landscaping and provide advice on the responsible use of fertilisers and herbicides;
- Provide an effective waste-management plan for the area to ensure that litter and other waste does not collect in the drainage systems, including street sweeping; and
- Require all development construction projects, including road and infrastructure construction, to implement sediment and erosion control measures.

Non-structural measures have been shown to be cost-effective long-term methods of improving water quality and reducing contamination.

6.3.4 Best Management Practices

Table 10 outlines the WSUD Best Management Practices (BMP) for maintaining a high level of surface water quality.

Table 10 Best Management Practices

Best Management Practices	Definition of Recommended Action
Residential fertiliser	Use low water soluble fertiliser applied to sandy textured soils, applied sparingly to gardens and turf.
	Minimise lawn areas or plant an alternative lawn.
	Fertilise only when symptoms of nutrient deficiency occur (e.g. Yellowing).
	Use a complete lawn fertiliser containing nitrogen, phosphorus and potassium, if fertiliser is required.
	Apply fertiliser at the maximum individual application rate, which is 25 grams per square metre (g/m2) for couch grass and 12 g/m2 for kikuyu and buffalo grass.
	If fertiliser is required apply in spring or early autumn (September, October, November, March and April).
	Do not fertilise during summer or winter months.
	Do not over-water.
Full sewerage connection	Connect all new urban developments to sewerage. Build into approvals conditions by decision-making authorities for all new subdivisions and new homes to be connected to reticulated sewerage.
Soil remediation	Ensure all new urban developments in areas with sandy soils undergo soil remediation at the estate scale.
	At the lot scale blend or apply a layer of higher Phosphorous Retention Index (PRI) soil from grade to 50 cm beneath the finished ground level to provide increased phosphorus retention.

Best Management Practices	Definition of Recommended Action
	Use soil amendment materials such as yellow Spearwood sands, Karrakatta soils or brown loams.
	Take care to maintain soil permeability.
Water and nutrient sensitive principles	Decision-making authorities should take a lead planning role in incorporating best management practices including water-sensitive urban design principles, criteria and outcomes in its strategic land use planning, policies structure plans and subdivision conditions.
Water-sensitive urban design	Comply with environmental quality criteria should be incorporated in local planning policy.
	Ensure design complies with stormwater management policies.
	Apply water-sensitive urban design treatment trains.
	Prepare water management strategies.
	Undertake soil amendment.
	Ensure total phosphorus and total nitrogen import and export criteria are met.
	Meet the minimum percentage area of deep-rooted perennial vegetation.
	Impose building and landscaping covenants.
	Ensure sound construction and building site management.
Drainage reform	Modify drainage management practices to reduce in-channel sediment movement as opportunities arise.
	Manage drainage as part of the total water cycle with the dual objectives of optimising stormwater runoff and reducing nutrient flows into the rivers and streams.

6.4 Disease vector management

No permanent water bodies are currently planned for the Hilltop/Emplacement Crescent development area; therefore no disease vector management plan is required.

7. Groundwater management strategy

7.1 Glossary of Terms

Controlled groundwater level (CGL)

Controlled groundwater level is a groundwater level endorsed by DoW. Subsurface drainage may not be installed below the controlled groundwater level.

The actual level selected will vary according to availability of data and/or modeling results. Commonly, when a modeling approach is used, the rainfall record for a year with close to average rainfall for the current climate is run and the winter maximum groundwater level for this scenario becomes the controlled groundwater level.

Alternatively, where a historical groundwater record is available, the average of recorded maxima for a selected period of records that is representative of the current climate may be chosen.

Maximum groundwater level (MGL)

Maximum groundwater level is a groundwater level endorsed by the DoW. The actual level selected will vary according to availability of data and/or modelling results, but is commonly the maximum recorded groundwater level for a high rainfall condition.

Developments will be required to make the development surface level 1.2 m above the maximum groundwater level, if subsurface drainage is not installed.

Phreatic line

The phreatic line is the modified (post development) maximum groundwater level following the installation of subsurface drainage and is in fact an arc in between subsurface drainage lines. When subsurface drainage is installed the phreatic line becomes the level from which building floor level clearance to groundwater is measured termed Design Groundwater Level.

7.2 Groundwater Quantity Management

To protect housing from flooding and damage from groundwater, the building finished floor levels must maintain at least 1.2 m clearance from the predicted MGL.

Local investigations have determined the groundwater level to range from 3.0 to 12.9 mBGL (GHD 2010b). In light of this, adequate clearance to groundwater level is possible through with existing site levels. Areas of the site where the groundwater level is within 5 m of the surface are limited to the foreshore public open space.

CGL through a groundwater drainage system and the importation of fill for groundwater separation purposes are not proposed at this time. Groundwater is not considered a risk to property or infrastructure within the development and no specific groundwater management strategy is proposed.

7.3 Groundwater Quality Management

7.3.1 Principle

The environmental values of groundwater within, and surrounding, the Hilltop / Emplacement structure plan must be upheld. The objective is to maintain water quality at pre-development levels (winter concentrations) and if possible, improve the quality of water leaving the development area to maintain and restore ecological systems.

To achieve the above principle the following criteria will be applied:

- Ensure that all surface and groundwater contained in the drainage infrastructure network receives treatment prior to discharge to a receiving environment consistent with the Stormwater Management Manual (DoW 2007).

To ensure that the existing groundwater quality is maintained, the quality of the stormwater infiltration to groundwater will be maximised through:

- Adopting a treatment train approach to runoff, through the use of WSUD and BMPs such as permeable pavements, buffer strips, bioretention swales, rain gardens, biofiltration pockets, median swales, gross pollutant traps, and infiltration basins;
- Xeriscaping to avoid the use of fertilisers;
- Soil amendment (where the tested phosphorous retention index (PRI) is less than 10) within all stormwater infiltration areas and public open space;
- Infiltration will not be promoted in areas of known soil contamination;
- Recommending a maintenance plan for the upkeep of the treatment train; and
- Recommending a monitoring program is implemented during construction and post development to ensure that the management measures for stormwater quality are meeting the design objectives. Urban runoff is a significant source of nutrients and other contaminants that are discharged to the shallow aquifer. Runoff water quality from roads and other paved surfaces can be variable and is dependent on local soil types, land use and climate.

The quality of the stormwater infiltration will be maximised through:

- Soil amendment (where the tested phosphorous retention index (PRI) is less than 10) within all stormwater infiltration areas and public open space;
- Infiltration will not be promoted in areas of known soil contamination;
- Xeriscaping to avoid the use of fertilisers; and
- Recommending a maintenance plan for the upkeep of the stormwater management system.

Based on the above it is expected that there will be no additional inputs of nutrients and other pollutant into the groundwater as they should be contained in the upper soil layers of the swale and basins.

7.3.2 Nutrients

Past Land Uses

The previous land use of the proposed development was as industrial land. There is little information on the amount and type of fertilisers potentially used within the site, however, groundwater monitoring showing elevated nutrient levels in samples collected for laboratory analysis suggesting possible past application or spills.

Post Development Conditions

The areas of the proposed development which are impervious will be roads, car parks, foot paths, driveways and paving areas within each private lot, and roofs. For roadside bioretention swales and detention basins, native species planting without fertiliser inputs is recommended.

Vegetated, soil based biofilters have the potential to reduce:

- 95% of Total Suspended Solids (TSS);
- 85% of Total Phosphorus (TP); and
- 50% of Total Nitrogen (TN).

7.3.3 Other Pollutants

Past Land Uses

The previous land use of the proposed development was as industrial land. A plume of bunker oil has been identified within the superficial aquifer in the adjacent Robb Jetty area. The bunker oil is a dense viscous material and the plume is generally stable in nature and is not expanding or moving towards the ocean (GHD 2012a).

Post Development Conditions

It is suspected that development of the residential area will produce the following types of pollutants:

- Heavy metals, due to traffic activity in the residential area; and
- Hydrocarbons, also due to traffic activity in the residential area.

Road reserve runoff from residential developments contains heavy metals and hydrocarbons. Runoff from roads will be directed to the roadside bioretention swales for treatment.

The study, “The Impact of Stormwater Infiltration Basins on Groundwater Quality, Perth Metropolitan Region” (1993) by Appleyard on drainage sumps found that heavy metals and hydrocarbons were contained in the first 2 cm to 3 cm of the bottom of the sumps in this sandy catchment.

It can thus be said that sand is a good filter material for heavy metals and hydrocarbons from leaching into the groundwater, after being suspended in the bio retention areas.

Without further application of fertilisers and the ability of the swales system to retain heavy metals and hydrocarbons, it is expected that the proposed drainage strategy will reduce nutrients loads from the catchment and mitigate the risk of pollutants export from the development.

7.4 Impact on water dependent ecosystems

The only identified groundwater dependent ecosystem within the nearby vicinity is Manning Lake which is upstream of the Cockburn Coast development area and will therefore not be impacted.

8. Implementation framework

8.1 Monitoring

8.1.1 Pre-development monitoring program

Baseline groundwater levels and quality have been determined from existing data.

The site is sandy and within the area to be developed there is greater than 5 m depth to groundwater as determined from site investigations and regional bore records. The area where potential exists for groundwater to be within 5 m of the surface is limited to the coastal boundary outside of the Hilltop / Emplacement Crescent LSP area.

The existing site is currently industrial in nature and stormwater runoff receives no water quality treatment before direct infiltration to groundwater. The development will involve substantial improvements to stormwater management on the site by following water sensitive urban design principles and therefore is considered highly likely to improve groundwater quality.

Since it is predicted that the development will cause an improvement in surface and groundwater quality, groundwater is more than 5 m deep in the area and monitoring to address contaminated sites has been conducted, no additional pre-development monitoring is proposed.

8.1.2 Post-development monitoring

As there will be minimal impact on surface or groundwater from the development, and the depth to groundwater is greater than 5 m, no post development monitoring is proposed.

8.1.3 Contingency action plan

As there is no recommended monitoring program, no contingency action plan is proposed.

8.2 Next steps

The next stage of subdivision planning will require the development of an Urban Water Management Plan. This will include progressing conceptual designs to detailed designs, specifically the following issues will need to be addressed within the urban water management plan:

- Demonstration that the urban water management plan will meet the objectives and criteria stated in the local water management strategy;
- Demonstration of compliance with regulatory requirements, including required licences and approvals;
- Determining the infrastructure requirements and land required to fit the infrastructure for detailed design, including drainage and development requirements for stormwater and shallow groundwater management;
- Soil permeability and phosphorous retention testing to confirm soil amendment requirements;
- Detailed designs for the major/minor stormwater management system, including best management practices to achieve the water quality and quantity objectives given in this local water management strategy;
- Identifying finished floor level heights; and
- Operational and maintenance responsibilities and liabilities.

8.3 Roles and responsibilities

The efficacy of the proposed water management system will rely on its regular maintenance. The following operation and maintenance program is proposed:

- Removal of debris to prevent blockages from the stormwater system;
- Maintenance of the infiltration basins;
- Street sweeping; and
- Application of slow release/ low phosphorus fertiliser.

Table 11 sets out the roles and responsibilities for the actions outlined in the LWMS for the LandCorp development.

Table 11 Roles and Responsibilities

Role	Responsibility	Requirement
Construction and Building Site Management Plan	Contractor	Sediment and erosion control during construction.
Fit-for-purpose: Public awareness campaigns	Developer	Information packs, including educational information and operational timeframes for fit-for-purpose water relating to the use of groundwater and recycled water to be provided at settlement.
Non-Structural Controls: Public awareness campaigns	Developer	Sustainability information packs, including educational information regarding non-structural control measures, such as fertiliser application, native gardens, herbicide use, weed control and waste management, to be provided at settlement.
Design and Construction of Drainage System	Developer	Hand over to City of Cockburn at practical completion.
Structural Control Compliance: Drainage	City of Cockburn after Practical Completion	Too ensure lots meet requirements relating to onsite stormwater disposal. Drainage structures to be cleared biannually for a period of three years from practical completion and monitored to ensure functionality.

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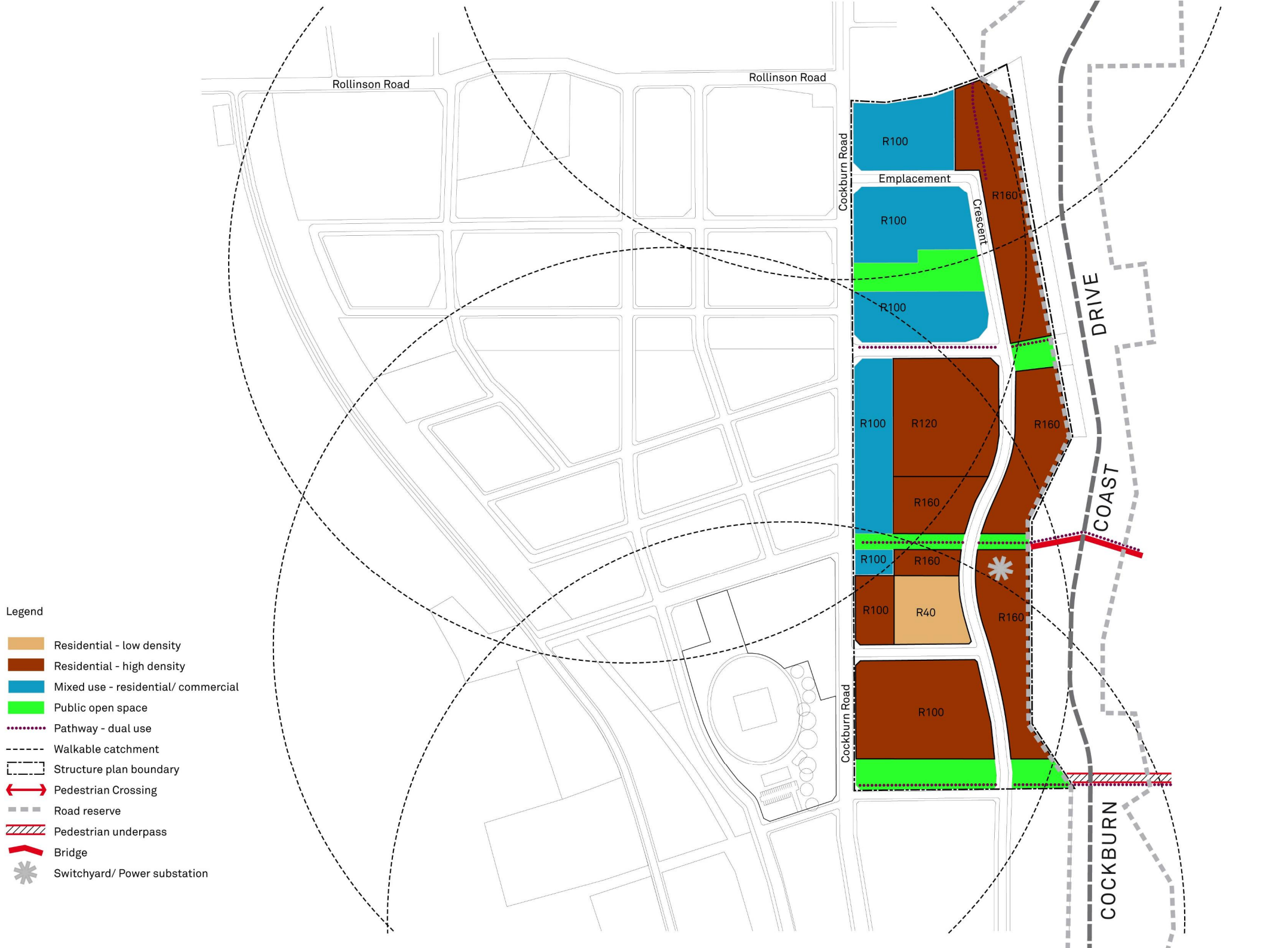
Appendices

Appendix A Local structure plan


Rollinson Road
Rollinson Road
Cockburn Road
Emplacement
Crescent
Cockburn Road
R100
R160
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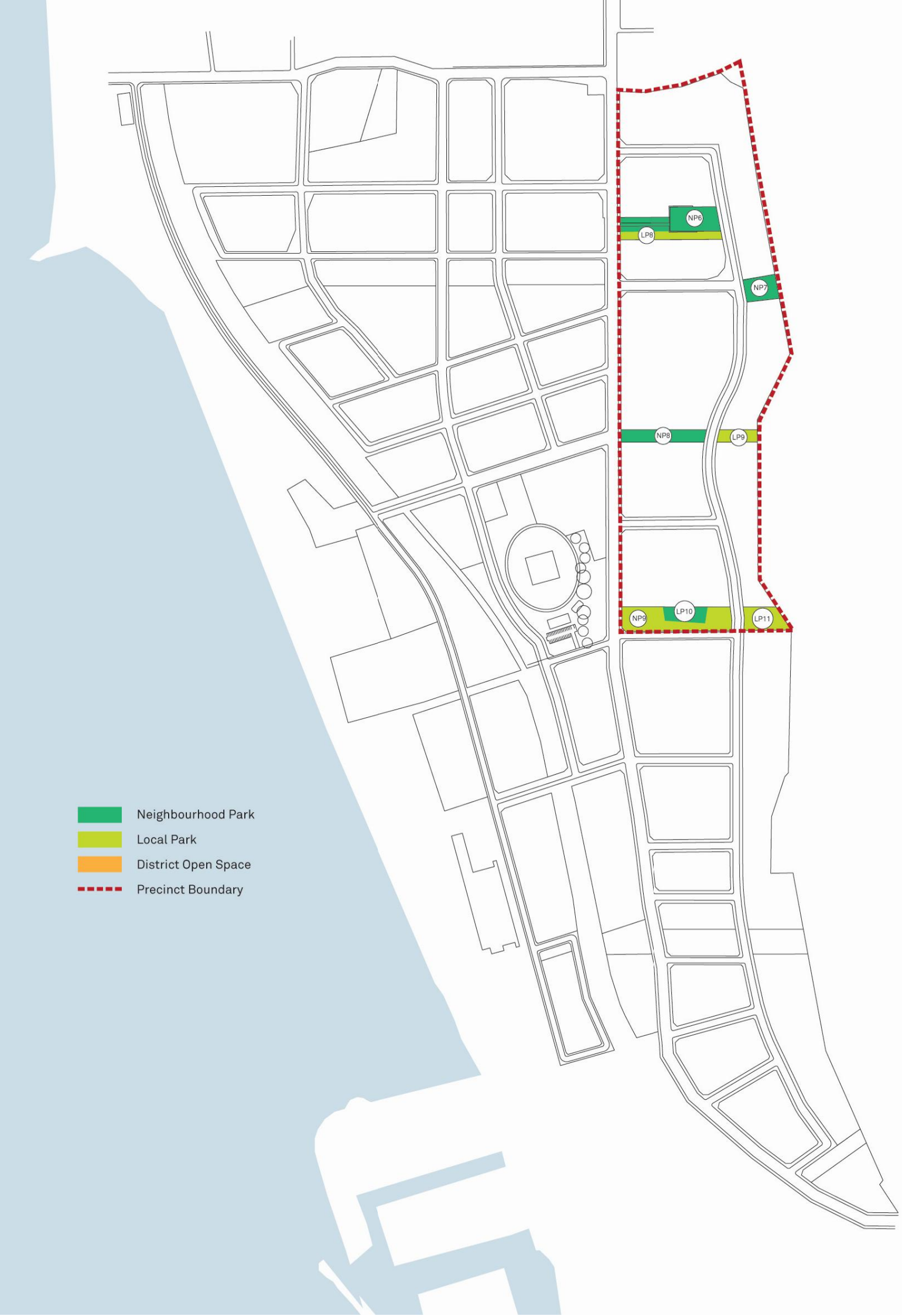
R120
R160
R160
R100
R160
R100
R40
R160
R100
DRIVE
COAST
COCKBURN
Legend
Residential - low density
Residential - high density
Mixed use - residential/ commercial
Public open space
Pathway - dual use
Walkable catchment
Structure plan boundary
Pedestrian Crossing
Road reserve
Pedestrian underpass
Bridge
Switchyard/ Power substation

Appendix B Landscape master plan


NP6
LP8
NP7
NP8
LP9
NP9
LP10
LP11
Neighbourhood Park
Local Park
District Open Space
Precinct Boundary

Appendix C Integrated Water Management Assessment

LandCorp

Report for Cockburn Coast Redevelopment

Integrated Water Management Assessment

February 2012

This Cockburn Coast Integrated Water Management Investigation *("Report"):*

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- *did not include GHD undertaking any site visits or testing at the site.*

The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking services and preparing the Report ("Assumptions"), including (but not limited to):

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A Water Corporation consumption parameters

1. Introduction

1.1 Project setup

GHD were engaged by LandCorp to undertake an Integrated Water Management assessment (IWM) of the Cockburn Coast redevelopment (Cockburn). This IWM assessment is linked to the Cockburn Coast District Water Management Strategy (DWMS) (GHD, 2010) prepared for the Cockburn Coast district structure plan and this IWM report will present a detailed extension of the preliminary water balance provided within the DWMS.

1.2 What is IWM?

IWM is a strategy that brings together all facets of the water cycle (water supply, sewage management, water treatment and stormwater management) to achieve strong triple bottom line benefits.

Urban landscapes significantly alter the hydrological water cycle. IWM addresses this and works towards managing the urban water cycle with the hydrological water cycle to facilitate water efficiency.

1.3 Objective

Maximising water management in Cockburn represents a challenge to firstly ensure water efficiency and secondly to identify practical and accessible water sources to reduce total demand on scheme water. It is the objective of this exercise to:

- Quantify the pre- and post-development hydrological cycle;
- Identify water sources including alternative water harvesting options;
- Present a range of scenarios that quantify the water balance for Cockburn; and
- Recommend the urban water cycle configuration.

2. Cockburn Coast Redevelopment

2.1 Study area overview

The Cockburn Coast redevelopment (Figure 1) covers an area of approximately 130 ha and is located adjacent to the coast, extending north towards Rollinson Road, east to Manning Reserve and south to Port Coogee. The area has been divided into the following three local structure plan areas (Figure 1):

1. Robb Jetty;
2. Hilltop Emplacement; and
3. Power Station.

This IWM assessment has also been based on the three local structure plan areas and each area has been described in more detail in Section 5 to Section 7.

2.2 Land uses

The land use framework facilitates a diversity of residential, commercial and community oriented uses that complement the existing activities in surrounding areas, whilst bringing additional opportunities that may not currently be available.

The range of land uses and landforms that can be established through the concept plan will allow new communities, economies and activities to be developed to the benefit of existing and future residents and landowners, and the wider community. Proposed land use areas for the Masteplan are shown in Table 1.

Table 1 Cockburn coast project land use areas

Land Use	Area (ha)
Activity Centre	13.24
Commercial	0.13
Low rise residential	21.11
Medium rise residential	7.61
High rise residential	10.30
Terrace residential	2.23
Mixed Business	2.46
Mixed use	10.19
Public open space	17.48
Public purpose	1.50
Road reserve	45.45

2.3 Sustainability targets

As part of the district structure plan, a series of sustainability targets were developed and adopted, including a total water consumption and potable water consumption target of:

- 80 kL/person/year total water consumption with not more than 40 kL/person/year of potable water.

To meet the potable water consumption target, an alternative water source and servicing strategy should to be considered. The following table (Table 2) outlines three possible alternative water source servicing options ranging from the 'business as usual' option to a non drinking water system supplying all NDW uses including internal NDW uses. The development's potable consumption will depend on the servicing option implemented.

Table 2 Alternative water source servicing options

	Potable	In-house non potable uses	Domestic irrigation	POS irrigation
Business as Usual	IWSS	IWSS	IWSS	LB
Irrigation only NDW	IWSS	IWSS	NDW	NDW
Full NDW use	IWSS	NDW	NDW	NDW

IWSS = Integrated Water Supply Scheme (Water Corporation);

LB = Local groundwater bores;

NDW = A non-drinking water supply eg groundwater, treated wastewater, greywater through a third pipe

This IWM assessment will quantify the estimated water consumption for the Cockburn Coast redevelopment (for the ultimate scenario) and will determine if the sustainability target is to be met. The results of per capita consumption will be discussed in Section 0 and the potable consumption will be presented for each of the servicing options presented above.

Figure 1 Cockburn Coast concept plan

3. Environmental Characteristics

In undertaking an IWM assessment, it is necessary to understand the environment of the site as this has direct impact on the hydrological cycle. The following environmental characteristics are of particular importance and require detailed understanding to aid the IWM assessment:

- Climate / Topography;
- Soils / Geology; and
- Hydrogeology.

3.1 Climate and topography

The climate at Cockburn is described as Mediterranean. The average annual rainfall at nearby Fremantle is 765 mm, of which 80% falls between May and September. The rainfall characteristics will influence the timing and availability of both surface and groundwater at the site.

The topography varies within the study area. Located on the coast, Cockburn has both primary and secondary dune formations. Elevation of the land surface ranges from approximately 5 mAHD – 50 mAHD.

3.2 Soils and geology

The Cockburn Coast redevelopment area is characterised by Tamala Limestone of Quaternary age which outcrops inland on a ridge that runs north-south through the development area. This layer is highly permeable with hydraulic conductivities ranging from 100 m/d – 1000 m/d (Davidson 1995). The Tamala Limestone is overlain by Safety Bay Sand, which is fine to medium grained and has hydraulic conductivities of about 8 m/d (Davidson 1995). The hydraulic conductivities of surface soils within Cockburn limits surface water runoff and promotes infiltration of almost all water that falls on open areas.

An analysis of stratigraphic bore logs taken from registered groundwater bores located was undertaken. The analysis identified the Cockburn Coast area supports the prominence of Tamala Limestone and Safety Bay Sand as the main geological unit and the investigation also identified some potentially impermeable layers at depth which may act as a separation to the superficial groundwater aquifer.

The regional geology of the Cockburn Coast redevelopment area outlines the stratigraphic sequence that defines the various groundwater aquifers. The stratigraphy is summarised below in order of increasing depth:

Table 3 Cockburn geological stratigraphy

Stratigraphy	Max Thickness (m)	Lithology	GW Aquifer
Safety Bay Sand	24	Sand and shelly fragments	Superficial aquifer
Becher Sand	20	Sand, silt, clay and shell fragments	Superficial aquifer
Tamala Limestone	110	Sand, limestone, minor clay	Superficial aquifer
Bassendean Sand	80	Sand and minor silt and clay	Superficial aquifer
Rockingham Sand	70	Sand, silt and minor clay	Rockingham aquifer
Kardinya Shale Member	140	Shale, limestone, minor sandstone	Confining layer
Henley Sandstone Member	100	Sandstone and minor siltstone	Leederville aquifer
Leederville Formation	600	Sandstone, siltstone and shale	Leederville aquifer
Pinjar Member	150	Sandstone, siltstone and shale	Leederville aquifer
Wanneroo Member	450	Sandstone, siltstone and shale	Leederville aquifer
Mariginiup Member	250	Sandstone, siltstone and shale	Leederville aquifer
South Perth Shale	300	Shale, siltstone, minor sandstone	Confining bed
Gage Formation	350	Sandstone, siltstone and shale	Yarragadee aquifer
Yarragadee Formation	>2,000	Sandstone, siltstone and shale	Yarragadee aquifer
Cattamarra Coal Measures	>500	Sandstone, siltstone and shale	Yarragadee aquifer

3.3 Hydrogeology

The study area is located within the Cockburn Groundwater Area (CGA), which is a 157 km^2 area located 30 km south of Perth and covers a coastal strip of 22 km, extending approximately 7 km inland. The CGA was proclaimed on 29 July 1988 under the provisions of the *Rights in Water and Irrigation Act 1914* in order to protect the long term viability of this resource. The study area is located within the Kogalup Groundwater Subarea, which covers 5,065 ha. A summary of the groundwater aquifer characteristics beneath the Cockburn Coast development is provided below:

Superficial Aquifer

The Superficial Aquifer is an unconfined aquifer extending throughout the coastal plain with the water table typically close to the surface at topographic low points creating numerous wetlands. The Superficial Aquifer is recharged by direct infiltration of rainfall and is often expressed in coastal wetlands such as Manning Lake. The Superficial Aquifer has been measured at between 0 and 1 mAHD throughout the area, which corresponds to depths ranging between 3 m and 39 m below ground level (Perth Groundwater Atlas 2004). This thickness of the superficial aquifer can be calculated using the Ghyben-Herzberg relationship:

$$z = 40h$$

Where z = thickness of fresh groundwater below sea level; and
h = height of the water table above sea level

Assuming the end of summer groundwater level to be approximately 0.23 mAHD as indicated by Rockwater (2000) and the maximum recorded level was 1 mAHD, then it is estimated the thickness of the Superficial Aquifer will range from approximately 12 m – 40 m, with an average thickness of 30 m according to DoW (2007).

An analysis of the up-coning effect of saline water at a location 150 m inland of the coast was modeled by Rockwater (2000). Results indicated groundwater abstraction of 11,847 m^3/d could occur without up-coning of saline groundwater. These results indicate that there is potential for injection of fresh stormwater through Managed Aquifer Recharge (MAR) without the risk of mixing with saline water, provided this occurs at a safe distance from the coast.

Groundwater quality in the Superficial Aquifer is variable and ranges from < 130 mg/L to > 12,000 mg/L TDS, however this is commonly less than 1000 mg/L.

Leederville Aquifer

The Leederville Aquifer is confined beneath the Kardinya Shale and Henley Sandstone members of the Osborne Formation and occurs at depths of approximately 100 m – 150 m below ground surface with a thickness of around 200 m – 250 m (DoW 2007). Groundwater quality trends from 500 – 2000 mg/L TDS in the upper Leederville and deteriorates at depth to below 3000 mg/L (DoW 2007). Recharge in the Leederville Aquifer typically occurs from leakage from the Superficial Aquifer, with no direct connection to surface water features, however no recharge is reported to occur within the CGA due to the presence of the confining Kardinya Shale Member (DoW 2007).

Yarragadee Aquifer

The Yarragadee Aquifer is confined by the South Perth Shale at depths of approximately 450 m – 550 m below ground surface. Recharge occurs outside the CGA at the eastern edges of the Swan Coastal Plain in the absence of the South Perth Shale. Salinity levels typically range between 200 mg/L and 1000 mg/L (DoW 2007).

Groundwater Allocations

The three groundwater aquifers located within the Cockburn Coast study area are either at near of full capacity. These details were provided from DoW as recorded in July 2011 and are presented below:

Table 4 Groundwater allocations

GW Subarea	Aquifer Name	Allocation Limit (kL/yr)	Licenced + committed Allocation (kL/yr)	Groundwater Available (kL/yr)
Cockburn Confined	Perth – Leederville	1,350,000	1,500,000	0
	Perth Yarragadee North	5,150,000	5,555,689	0
Kogalup	Perth – Superficial Swan	11,460,000	10,488,084	810,711

The groundwater allocations are discussed further as a potential alternative water source in Section 10.

4. Water balance methodology

4.1 Overview

There are difficulties associated with the accurate quantification of water demands and water supply options when assessing total water balance for a given site. Usually the investigation of matching water demands with water supply options is conducted with a single catchment model. Rather than relying upon only one catchment scale model to calculate water demands and investigate how to match supply options, this study constructed catchment scale water balances by employing different catchment models according to site specifics within the study area.

4.2 Methods and Assumptions

In order to construct the development water balances, five separate models were used to determine the water demands, the soil-water mechanics of the study site (e.g. runoff, groundwater infiltration, evaporation, etc) and the quantity of the water supply sources used for the local structure plan area.

The five models employed were:

- Water Corporation's alternative water supply consumption tool (Consumption Tool);
- the Australian Water Balance Model (AWBM);
- the MUSIC stormwater model; and
- GHD's spreadsheet urban water demands model.

A brief description of the purpose of each model is provided in Table 5.

Table 5 Model summary

Model	Purpose
Water Corporation's alternative water supply consumption tool (Consumption Tool)	In house water demands Ex house water demands POS irrigation rates Verge irrigation rates
AWBM	Runoff from pervious areas
MUSIC	Runoff from impervious areas
GHD's spreadsheet urban water demands model	Integration of the models

Each of the land uses within the development area were divided into the following four categories for the purposes of estimating the runoff, infiltration or estimate demand for each area:

- Irrigation area;
- Pervious and un-irrigated area;
- Impervious (excluding residential roofs) area; and
- Residential roof area.

The runoff from the study area's impervious areas was determined for the pre-development (ie existing) scenario and the post-development (ie ultimate) scenario. The difference in pre and post development runoff volumes was assumed to be potentially available for possible stormwater harvesting options. For the pre-development scenario, an estimate of the developed area was determined using aerial photography and of this developed area, it was assumed from the aerial photos that 80% of the area was impervious.

In the post development scenario, the impervious and pervious areas were calculated by applying the coefficients outlined in Table 6:

Table 6 Model summary

Land use	Pervious coefficient	Impervious coefficient
Residential	0.6	0.4
Commercial / Mixed Use etc	0.2	0.8
Road	0.4	0.6

As aforementioned, the development water balance for each option was calculated by combining the outputs of four models. A summary of these models are given in the following sections.

Water Demands Model

A water demands spreadsheet model was developed by GHD to determine the water usage in the following categories:

- Residential;
- Schools;
- Commercial and Industrial;
- Public Open Spaces; and
- Roads

The model was based on the unit consumption rates published in the Water Corporation's Consumption tool and the unit demands adopted have been presented in Appendix A. The Consumption tool also provides specified unit consumption rates for differing land uses including commercial and office buildings. . For the purpose of this water balance, the commercial, mixed use, activity centre and mixed business land uses were assigned a corresponding land use category from the Water Corporation's Consumption Tool. An occupancy rate of 2.2 people per dwelling was adopted across the site to provide consistency with the district structure plan.

The estimated water consumption rates are provided in Table 7.

Table 7 Water balance assumptions

Land use	Adopted WC parameter	Occupancy	Water consumption estimate
Terrace homes	Traditional	2.2	-
Low rise residential	Cottage	2.2	-
Medium rise residential	Terraced	2.2	-
High rise residential	Apartment	2.2	-
Commercial	Shopping centre	N/A	1.08 kL/m^2 GLA/year
Mixed Business	Office building	N/A	0.80 kL/m^2 GLA/year
Mixed use	Office building	N/A	0.80 kL/m^2 GLA/year
Public open space	Passive and active	N/A	-
Road reserve	Verges	N/A	0.64 kL/m^2/year

The areas allowed for irrigation of the residential land uses were:

- 15% of the lot area for terrace houses; and
- 10% of the lot area for low rise, medium and high rise land uses for communal landscaping.

It was assumed that 2% of the total road area will be irrigated to allow for verge and streetscape irrigation. For the public open space, the areas were adopted based on the proposed landscape plan for the Master Plan area and from this, it was assumed that 1/3 of the area would be considered active open space (ie playing fields and turfed areas), 1/3 of the public open space area would be considered as passive open space (ie shrubs etc) and 1/3 of the open space would not be irrigated.

It is to be noted that the water consumption demands have only been calculated for the post-development (i.e. ultimate) scenario.

The water demands assessment assumed in-house water wise fittings were adopted to maximise water use efficiency. These are summarised below.

- All tap fittings and dishwashers must be minimum 4 stars WELS rated;
- Washing machines are to be a minimum of 4.5 stars WELS rated;
- All showerheads must be minimum 4 stars WELS rated;
- All sanitary flushing systems must be a minimum 4 stars WELS rated dual flush (6/3 or 4½/3); and
- Hot water heaters to be located within 5 m of major hot water using points.

AWBM

A spreadsheet version of the Australian Water Balance Model (AWBM) was used to model surface runoff and groundwater infiltration from the pervious, un-irrigated area of the proposed development. The AWBM is a catchment water balance model that relates runoff to rainfall and calculates losses from rainfall. The model uses a maximum of three (3) surface stores to reflect different soil types within a catchment. The water balance of each surface store is calculated independently of the others. When

runoff occurs from any store, part of the runoff becomes recharge of the base flow store if there is base flow in the stream flow. The surface runoff can be routed through a store if required to simulate the delay of surface runoff reaching the outlet of a medium to large catchment.

The study site was spatially analysed to determine geomorphological characteristics that influence drainage flow paths. Three catchments were delineated from the study area based on the local structure plan areas. AWBM was applied for the individual characteristics of each of these three catchments and the results were combined to gain an understanding of the entire study site. The runoff characteristics for the site were determined for the pre-development (ie existing) scenario and the post-development (ie ultimate) scenario.

MUSIC

The Model for Urban Stormwater Improvement Conceptualisation (MUSIC) was developed by the CRC for Catchment Hydrology. MUSIC provides the ability to simulate both quantity and quality of runoff from catchments ranging from a single house block up to many square kilometres, and the effect of a wide range of treatment facilities on the quantity and quality of runoff downstream.

Whilst MUSIC is designed for both pervious and impervious areas, it was only used to analyse stormwater generated from impervious areas only. The AWBM model was used in place of MUSIC for modeling pervious areas as it was deemed to have a higher level of accuracy given ability to model more than one soil type.

4.3 Approach

To allow easy integration into future planning processes, a water balance model was constructed for each local structure plan area. Each model was developed using the site specific geology and preliminary land use plans to provide runoff estimates, groundwater recharge estimates and required demands to determine the appropriate water use strategy for each structure plan area.

Total water demand outcomes are presented relevant to each local structure plan within Sections 5 - 7. A summary of each outcome is subsequently presented in Section 0, with reference to the three water source servicing options presented in Table 2.

5. Robb Jetty LSP

5.1 Site description

The Robb Jetty local structure plan area covers approximately 62 ha and bounded by Cockburn Road to the west, Rollinson Road to the north and sits north of the existing power station (Figure 1). Using the expected occupancy rates, the estimated population is 4,391.

The proposed ultimate land use within the structure plan area is described in Table 8.

Table 8 Robb Jetty LSP land use

Land use	Area (ha)
Activity Centre	4.11
Commercial	0.13
Low rise residential	13.94
Medium rise residential	1.52
Terrace homes	1.43
Mixed Business	2.46
Mixed use	2.55
Public open space	12.03
Public purpose	1.50
Road reserve	21.69
TOTAL	**61.36**

To determine the run off from the pervious areas using AWBM, the Robb Jetty LSP was assumed to be made up of 97% sand and 3% limestone.

There is a known bunker oil contamination source at the location of the existing historic chimney within the boundary of the proposed school. The contamination originates from a loss of bunker oil from a former underground storage tank at the boiler house of the abattoir which was formerly present at the Site. There have been several investigations undertaken around this area including:

- Report for Cockburn Coast Redevelopment Detailed Site Investigation, Package 2 Former Abattoir Area, North Coogee (GHD, November 2010); and

Report for Cockburn Coast Detailed Site Investigation, Historic Bunker Oil Impact: Investigation and Risk Assessment (GHD, September 2011)

Investigations of the bunker oil impact have identified that:

- Bunker oil contamination has impacted soil and groundwater from a depth of approximately 6.2 below ground level over a limited area (broadly circular to egg shaped area approximately 80m in diameter at the location of the historic chimney)

- The bunker oil impact is generally stable in nature and is not expanding or moving towards the Indian Ocean.
- Risks to relevant receptors are insignificant or can be addressed with relatively simple management measures

The recommended outcome of the site investigations have been to leave the area of bunker oil impact in situ and adopt appropriate management measures for development in the vicinity. These included measures to prevent disturbance within potential influencing distance of the bunker oil impact as summarised below:

- Groundwater abstraction (or recharge) within the interpreted extent of bunker oil impact (GHD September 2011) should be prevented.
- A provisional exclusion distance of 70 m radius for abstraction or recharge of groundwater should be applied beyond the interpreted extent of bunker oil impact (GHD, September 2011) for the protection of receptors and to minimise risk of mobilisation of impacted groundwater.
- The exclusion distance of 70 m radius is provisional as the influence that a groundwater abstraction bore may have on impact stability/migration potential depends on circumstances specific to the abstraction or recharge such as volume of groundwater to be abstracted, proximity, targeted strata and characteristics. Therefore any proposal to abstract or recharge groundwater at surrounding Lots 101, 102, 109, 110, 2109 and the southern half of Lot 2103 should specifically assess the potential for influence upon the bunker oil impact and the validity of the provisional exclusion zone to ensure plume stability is not compromised.

5.2 Water balance results

The table below presents the results from the pervious and impervious areas runoff in the pre- and post-development scenarios.

Table 9 Robb Jetty LSP Estimated runoff (ML/year)

		Runoff (ML/year)
Pre development	Pervious	6.75
	Impervious	51.69
Total pre development		**58.44**
Pre development	Pervious	2.31
	Impervious	242.65
Total post development		**244.96**
Total increase in runoff		**186.52**

The estimated water demands for the Robb Jetty LSP area are presented in Table 10.

Table 10 Robb Jetty LSP estimated water demands (ML/year)

Land use	Potable	Non potable (in house)	Irrigation	TOTAL
Residential*	140.39	79.69	7.57	227.65
School	2.61	1.74	5.80	10.15
Commercial	35.15	20.50	2.93	58.58
Public open space	-	-	76.99	76.99
Road reserve	-	-	2.78	2.78
TOTAL	**178.15**	**101.93**	**96.07**	**376.15**

* inclusive of residential components in the mixed use land use.

The estimated total water use assuming waterwise development the local structure plan area is estimated as 376 ML/yr. The per capita consumption rates have not been presented for the individual structure plan areas, rather the consumption rates are presented for the whole development in Section 0.

6. Hilltop Emplacement LSP

6.1 Site description

The Hilltop Emplacement local structure plan area covers approximately 22 ha and is bounded by Cockburn Road to the west, Rollinson Road to the north, and Manning Reserve to the east (Figure 1). Using the approximate occupancy rates, the estimated population is 2,068. The land use within the structure plan area is described in Table 11:

Table 11 Hilltop Emplacement LSP land use

Land use	Area (ha)
Low rise residential	4.90
Medium rise residential	1.10
High rise residential	4.53
Terrace homes	0.80
Mixed use	4.78
Public open space	1.22
Road reserve	4.14
TOTAL	**21.47**

To determine the run off from the pervious areas using AWBM, the Hilltop Emplacement LSP was assumed to be made up of 27% sand and 73% limestone.

6.2 Water balance results

The table below presents the results from the pervious and impervious areas runoff in the pre- and post-development scenarios.

Table 12 Hilltop Emplacement LSP Estimated runoff

		Runoff (ML/year)
Pre development	Pervious	1.41
	Impervious	51.83
Total pre development		**53.24**
Pre development	Pervious	0.41
	Impervious	105.70
Total post development		**106.11**
Total increase in runoff		**52.87**

The estimated water demands for the Hilltop Emplacement LSP area have been presented in Table 13.

Table 13 Hilltop Emplacement LSP estimated water demands (ML/year)

Land use	Potable	Non potable (in house)	Irrigation	TOTAL
Residential*	66.23	37.53	2.95	106.71
Commercial	15.94	9.30	1.33	26.57
Public open space	-	-	7.81	7.81
Road reserve	-	-	0.83	0.83
TOTAL	**82.17**	**46.83**	**12.91**	**141.91**

* inclusive of residential components in the mixed use land use.

The estimated total water use assuming waterwise development the local structure plan area is estimated as 142 ML/yr. As with the Robb Jetty precinct, the per capita consumption rates are presented for the overall redevelopment in Section 8.

7. Power Station LSP

7.1 Site description

The Hilltop Emplacement local structure plan area covers approximately 49 ha and bounded by ocean to the west, east of Manning Reserve and south of the Robb Jetty and the Hilltop/Emplacement structure plan areas (Figure 1). Using the approximate occupancy rates, the estimated population is 5,931. The land use within the structure plan area is described in Table 14.

Table 14 Power Station LSP land use

Land use	Area (ha)
Activity Centre	9.13
Low rise residential	2.27
Medium rise residential	4.99
High rise residential	5.77
Mixed use	2.86
Public open space	4.23
Road reserve	19.62
TOTAL	**48.87**

To determine the run off from the pervious areas using AWBM, the Power Station LSP was assumed to be made up of 54% sand and 46% limestone.

7.2 Water balance results

The table below presents the results from the pervious and impervious areas runoff in the pre- and post-development scenarios.

Table 15 Power Station LSP Estimated runoff

		Runoff (ML/year)
Pre development	Pervious	4.42
	Impervious	68.62
Total pre development		**73.04**
Pre development	Pervious	1.37
	Impervious	223.26
Total post development		**224.63**
Total increase in runoff		**151.59**

The estimated water demands for the Hilltop Emplacement LSP area are presented in Table 16.

Table 16 Power Station LSP estimated water demands (ML/year)

Land use	Potable	Non potable (in house)	Irrigation	TOTAL
Residential*	189.16	107.64	4.03	300.83
Commercial	66.31	38.68	5.53	110.52
Public open space	-	-	27.07	27.07
Road reserve	-	-	2.51	2.51
TOTAL	**255.47**	**146.32**	**39.14**	**440.93**

* inclusive of residential components in the mixed use land use.

The estimated total water use assuming waterwise development the local structure plan area is estimated as 441 ML/yr. The per capita consumption rates have been presented for the overall development in Section 8.

8. Overall development

To determine if the sustainability targets identified in Section 2.3 are likely to be met within the Cockburn Coast redevelopment, the total water consumption per capita for the development requires determination. The sustainability targets are:

- 80 kL/person/year total water consumption with not more than 40 kL/person/year of potable water.

In order to assess whether these targets can be met, the total water demands for the ultimate development must firstly be addressed and these are summarised below in Table 17.

Table 17 Cockburn Coast estimated water demands (ML/year)

Land use	Potable	Non potable (in house)	Irrigation	TOTAL
Residential*	395.77	224.86	14.56	635.18
Schools	2.61	1.74	5.80	10.15
Commercial	117.40	68.48	9.78	195.66
Public open space	-	-	111.87	111.87
Road reserve	-	-	6.11	6.11
TOTAL	**515.78**	**295.08**	**148.12**	**958.99**

The consumption per capita (2.2 people per dwelling) assessment is presented in Table 18 and is presented assuming the three NDW servicing options presented in Section 2.3.

From this table, it can be seen that the total consumption meets the sustainability target of 80 kL/person/year. However the potable consumption target of 40 kL/person/year will not be met in any of the non-drinking water servicing options. The best potable water consumption achieved will be approximately 42 kL/person/year if a full non drinking water scheme is implemented.

Suggested measures and strategies for minimising potable consumption further have been suggested as part of Section 9.

Table 18 Cockburn Coast water consumption summary

Total Water (kL/person/year)	Potable water in Business as usual (kL/person/year)	Potable use with an irrigation only NDW supply (kL/person/year)	Potable Water (with a full NDW supply) kL/person/year)
77.40	67.41	65.44	41.63

9. Water Conservation

The Cockburn Coast redevelopment has an objective to achieve the sustainable management of all aspects of the water cycle within the development and ensure that the use of potable water is as efficient as possible. The water consumption from the water efficient fittings and fixtures listed above has been taken into consideration during the preparation of the water balance.

A total water consumption target of 80 kL/person/yr, including not more than 40 kL/person/yr scheme water has been set in the DWMS. The development will be able to meet the total water consumption target, however is just over the potable consumption target if a full non drinking water scheme is implemented. The following sections outline possible measures which may be able to improve the potable water consumption per capita.

9.1 Water conservation and efficiency of use

Water efficiency is a critical element of the water management approach and is enabled through the use of technology and by changing behaviour to use less water. The Western Australian Government has introduced a range of measures to ensure that new houses built in Western Australia meet minimum standards for energy and water efficiency. The 5 Star Plus building standards introduced in September 2007 are now an addition under the Western Australian Appendix to the Building Code of Australia[1] (BCA).

The Waterwise Display Village concept has been developed by the Water Corporation to engage with developers to drive waterwise development. The Waterwise Display Village Criteria, which has been expanded to include whole developments, aims to ensure appropriate action is taken to achieve best management water outcomes. In addition to water use efficiency requirements outlined in the BCA, the Waterwise Display Village Criteria requires the installation of water efficient appliances and other water conservation strategies including for irrigation.

9.2 Waterwise In-building Practices

The developments within the Cockburn Coast Master Plan area will be required to adopt the following criteria (based on the Waterwise Display Village Criteria) in addition to the 5 Star Plus building standards. The waterwise requirements are:

- All tap fittings and dishwashers must be minimum 4 stars WELS rated;
- Washing machines are to be a minimum of 4.5 stars WELS rated;
- All showerheads must be minimum 4 stars WELS rated;
- All sanitary flushing systems must be a minimum 4 stars WELS rated dual flush (6/3 or 4½/3); and
- Hot water heaters to be located within 5 m of major hot water using points.

Estimates of demand for residential water consumption have assumed residential lots would meet these requirements. Although the water efficiency program is focussed on all customers including households,

[1] http://www.buildingcommission.wa.gov.au/bid/5StarPlus.aspx

industry and commerce, savings in water use have only been estimated in this study for residential demand. Predicting demand for commercial properties is much less certain.

Design criteria outlining these practices will need to be developed and implemented to ensure adoption.

9.3 Waterwise Irrigation Practices

Irrigation demands, both domestic irrigation and POS irrigation are the largest non-drinking water uses within the Cockburn Coast area. It is recommended that the developments within each of the local structure plans adopt the following criteria (based on the Waterwise Display Village Criteria). The Waterwise requirements related to garden design, soil improvement and irrigation.

The minimum required soil improvements within the study area will be the

- Use of a soil conditioner certified to AS4454 to a minimum depth of 150 mm for lawns and 300 mm for gardens;
- Mulching of gardens beds to 50 mm – 75 mm using mulch certified to AS4454.

Design guidelines for residential irrigation controllers are to be developed and included within the urban water management plan and the Waterwise Display Village Criteria should be referenced as a guide.

The irrigation of public open space must comply with any irrigation specifications that the City of Cockburn's irrigation specifications may have and hydrozoning of irrigation systems is recommended. Soil amendment is also recommended in areas of public open space with the exception of areas dedicated for drainage and infiltration purposes. In areas for drainage and infiltration, the phosphorus retention index will need to be greater than 10. Design guidelines for the irrigation and soil improvement for public open space are to be included within the future urban water management plans for subdivisions. The design guidelines should include areas of soil amendment, the use of water efficient irrigation systems and use patterns and park design and plant selection. The use of native plants is to be promoted, with native species constituting a minimum of 30-35% of total public open space area.

9.4 Recommendations

It is recommended that a Waterwise display village is developed as part of the Cockburn Coast redevelopment which encompasses all the required and desirable waterwise measures for the site. Design guidelines are also to be prepared and implemented for:

- The internal and external waterwise and water conservation initiatives; and
- Public open space design.

Engagement with prospective and new residents by the landowners, developers and the City of Cockburn is recommended which focuses on water efficiency within the Cockburn Coast redevelopment. It is further recommended that an ongoing program of education and feedback on irrigation water use as well as internal water use is established in conjunction with all stakeholders including the Water Corporation.

10. Water source options

There are several potential fit for purpose water source options available within the Cockburn Coast redevelopment area which are summarised below.

10.1 Rainwater

Collection and reuse of rainwater at a lot scale within rainwater tank systems can be constrained by storage requirements within a high density urban development. However, there are opportunities for rainwater tanks to be installed in terrace house/detached and low rise residential areas outlined in the concept plan. There are also opportunities for small scale rainwater storage and distribution systems to be used for multi-residential dwellings. The use of this water is generally limited to in-house fit-for-purpose demand (ie toilets and washing machines) because rainfall does not occur during the irrigation season and tank sizes to retain sufficient water for year round irrigation demands are likely to be excessive.

Prior to the enforcement of rainwater tanks, the implementation mechanisms will need to be determined. The *Cockburn Coast Green Infrastructure Study* (PB, April 2011) determined that the implementation of rainwater tanks across the developed was an order of magnitude higher in costs than the cost for recycling wastewater and stormwater. As such, rainwater tanks are not recommended for mandatory installation across the Cockburn Coast development and it will be up to the individual household to install these as desired.

10.2 Stormwater

Harvesting of stormwater from drainage infrastructure is similarly constrained by storage requirements and again its use may be limited by the seasonality of irrigation demands.

There is some scope to investigate the potential for stormwater harvesting for Aquifer Storage and Recovery (also known as Managed Aquifer Recharge, MAR). This involves injection of treated stormwater into a suitable groundwater aquifer to be later re-abstracted and used locally or distributed to the wider development area for use as a year round fit-for-purpose water source. Storage and treatment requirements for this type of scheme can vary significantly according to the quality and suitability of the receiving aquifer as well as the quality and availability of stormwater for harvesting. This process is regulated in Western Australia under the Department of Water's *Operational policy 1.01 - Managed aquifer recharge in Western Australia* (DoW, 2011). Under this policy, changes in land use that result in additional runoff and would typically increase the groundwater recharge are not considered MAR. In order to gain additional abstractable water it would be necessary to demonstrate that an excess exists and cannot be infiltrated at source.

At this site there is an increase in stormwater runoff in the order of 390 ML/year. As there is an increase in runoff from the development in the ultimate scenario which will need to be managed, the possible options for capturing this stormwater are though:

- Storage areas (eg lined basins or tanks) during the winter months for reuse in the summer months; or
- Infiltration of the additional runoff at source.

The typically sandy soil types which are prevalent in the Cockburn Coast district structure plan area are ideally suited to the promotion of infiltration at, or close to source. This has the advantage of maintaining recharge into the superficial aquifer as well as minimising the need for drainage infrastructure. The existing drainage systems in place within the study area are therefore limited to onsite soakage devices, small scale collection systems and traditional drainage sumps. As such there is little to be gained through aquifer storage and recovery and it is not recommended that this considered further at this time.

The storage of the additional stormwater runoff will require large areas set aside for the additional infrastructure. The storage tanks will require maintenance as will ensuring the quality of the stormwater is maintained at a fit for purpose level.

The most appropriate management of stormwater is infiltration at source or as close to source as practicable.

10.3 Groundwater

The availability of groundwater reserves for licensed abstraction has been discussed in Section 3.3 and there is approximately 811 ML/year available within the superficial aquifer in the Kogalup groundwater sub area. The Cockburn Coast redevelopment is likely to gain access to a limited proportion of this available resource. It is estimated that the fit-for-purpose (non potable) water demand for the structure plan area will be approximately:

- 295 ML/year non potable in house use;
- 24.4 ML/year irrigation (residential and commercial);
- 124 ML/year for POS irrigation (inclusive of school ovals and verge irrigation); and
- **443.4 ML/year in total.**

As such, while there is currently sufficient groundwater allocation available to cover these demands, it is unlikely an allocation will be granted for the total NDW water use. Department of Water typically only issue groundwater allocations for a five year period based on the estimated development's requirements (ie groundwater for construction or public open space irrigation) and after this period, the licence can be renewed or additional allocation sought.

The location of abstraction bores (or recharge) within the Robb Jetty LSP area will need to be carefully evaluated. As referred to in Section 5.1, there is a known bunker oil contamination source at the location of the existing historic chimney within the boundary of the proposed school (Figure 1).

Groundwater abstraction (or recharge) within the interpreted extent of bunker oil impact (GHD September 2011) should be prevented. A provisional exclusion distance of 70 m radius for abstraction or recharge of groundwater should be applied beyond the interpreted extent of bunker oil impact (GHD, September 2011) for the protection of receptors and to minimise risk of mobilisation of impacted groundwater.

The exclusion distance of 70 m radius is however provisional as the influence that a groundwater abstraction (or recharge) bore may have on impact stability/migration potential depends on circumstances specific to the abstraction. Therefore any proposal to abstract (or reinject) groundwater at surrounding Lots 101, 102, 109, 110, 2109 and the southern half of Lot 2103 should specifically assess the potential for influence upon the bunker oil impact and the validity of the provisional exclusion distance to ensure plume stability is not compromised.

As such, the location any bore proposed for the irrigation of the school oval will require consultation with a hydrogeologist to determine what the cone of depression from abstraction will be and if this has any potential to impact upon the plume. Possible alternatives for bore placement include but are not limited to:

- Construction in the far south east corner of the school site (however the potential impacts on the bunker oil plume from abstraction will need to be assessed by a hydrogeologist);
- Piping the water from bores located in open space areas adjacent to the site on the opposite side of Cockburn Rd in the Hilltop Emplacement LSP or north of the school site; or
- Irrigating the school oval through a reticulated third pipe scheme.

The irrigation of the school oval will need to be determined as part of the local structure planning process and any potential impacts on the bunker oil plume mitigated or eliminated.

10.4 Imported groundwater

Additional groundwater reserves imported from the groundwater interception trench at Port Coogee may be able to contribute 2.4 ML/day during the summer to help meet the irrigation demands of the district structure plan. Preliminary information indicates that the quality of this resource is sufficiently good to enable its use for irrigation. Further investigation will be required to establish in more detail the quality and quantity of water available from this source.

The City of Cockburn is also proposing to use some of this available water and there may be other potential users. To assess the further viability of using the imported groundwater further, the following will need to be undertaken:

- Establish the long term viability and operation length f the groundwater interception trench at Port Coogee;
- Identify the approximate quantity of water required using the project staging information and if any additional groundwater allocations are available;
- Discuss and agree the options of acquiring a portion of the water with the owners of the water; and
- Establish the required regulatory requirements (e.g. groundwater trading approval or groundwater allocation application may be required).

10.5 Wastewater

There is a substantial wastewater pumping station, Bennett Avenue pump station (Bennett Ave PS) within the study area which collects and conveys wastewater to the Woodman Point Wastewater Treatment Plant. This provides an opportunity for onsite wastewater harvesting for local distribution.

The current average daily inflow through the Bennett Ave Main PS is in the order of 7 ML/day (approximately 3 GL/year). Advice received from the Water Corporation suggests that the pump station will ultimately be upgraded to a 350 L/s capacity (approximately 30 ML/day or 11 GL/year). There is a substantial quantity of wastewater available from this pump station, however the cost of building infrastructure to extract, treat, store and distribute treated wastewater needs to be examined in detail and costed and a suitable service provider secured.

The current buffer around the Bennett Ave Main PS is 50 m, however it is indicated that this may need to be increased to 150 m (WGE, 2010). There is the possibility that any upgrade works required at the Bennett Ave Main PS to allow for distributed treated wastewater may be able to be accommodated within the increased buffer area. The feasibility of upgrading the Bennett Ave Main PS should be investigated further to establish the cost of upgrading and the potential recovery volumes.

The second option for recycling treated wastewater is from the Woodman Point wastewater treatment plant (WWTP). The Water Corporation's long term planning indicates an aim to recycle 20% of treated wastewater from the Woodman Point WWTP by 2030. The total volumes of treated wastewater from the Woodman Point WWTP are currently 44 GL/year (approximately 120 ML/day) with projected flows in 2030 of 74 GL/year (approximately 200 ML/day). It may therefore be preferable for the Cockburn Coast redevelopment to continue contributing its wastewater into this larger, regional scale recycling plan.

The final alternative for wastewater recycling is on site wastewater treatment and distribution. This would involve the construction of a site specific wastewater treatment facility that is independent of the Bennett Ave PS and would treat, store and distribute wastewater generated within the development only.

To determine the availability of treated wastewater to reuse on site, a simple monthly demand is presented in Figure 2 where the wastewater is reused for all irrigation purposes only and where the wastewater is reused for all fit for purpose use. This figure assumes that of the wastewater generated on site, 75% of the wastewater will be available for reuse.

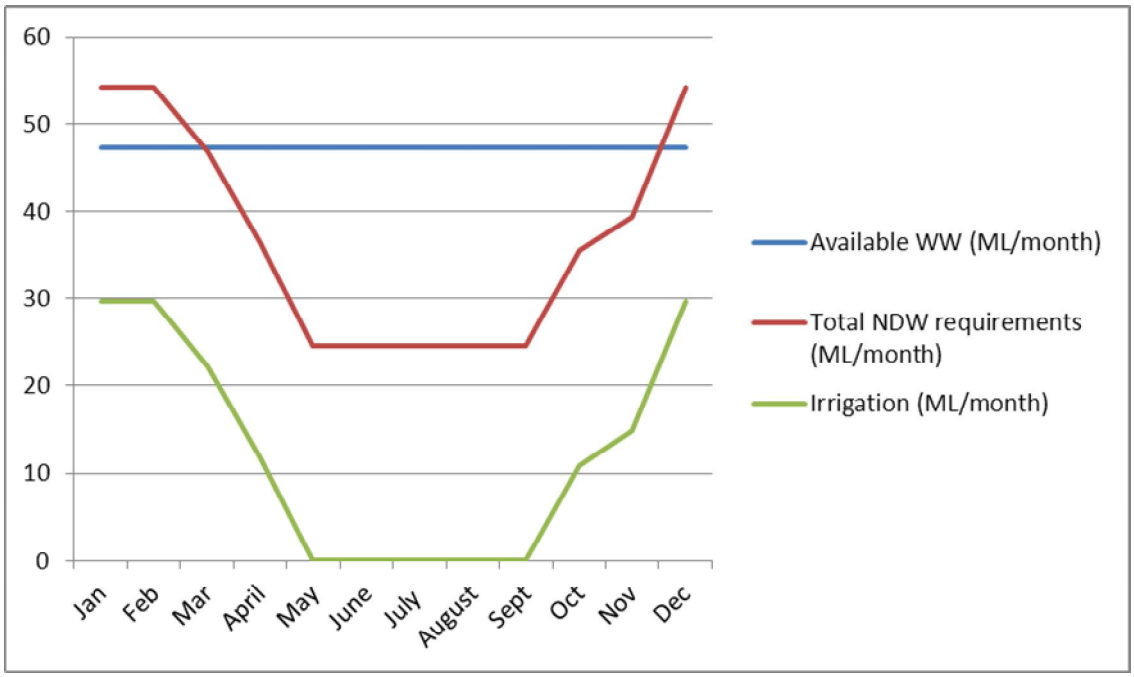


Figure 2 Wastewater availability

From Figure 2, it can be seen that there will be a surplus of wastewater during the winter months, regardless of which wastewater reuse servicing option is adopted. This excess would require either storage or disposal. If all non-drinking water uses were supplied by the treated wastewater, there will be a deficit of treated wastewater during the summer months. This deficit could be supplemented by storing some of the excess wastewater generated during the winter months or from an alternative water source.

At this stage of the development, the possibility of sewer mining and treatment at the Bennett Ave PS for local re-use is an option worth exploring further once more details are available regarding the timing of the upgrades.

10.6 Greywater

At the household scale, treated greywater is suitable for garden irrigation or infiltration in accordance with the Code of Practice for the Reuse of Greywater in Western Australia. Greywater can typically only be stored for up to 24 hours after which time there are significant impacts to water quality and subsequent risks to public health.

If greywater were to be used for domestic irrigation, the supply would be greater than the demand during the winter months. Alternative uses or disposal to the sewerage network would be required due to the reasons as described above.

Individuals may choose to install a greywater system for household irrigation and they will be responsible for adhering to the Code of Practice for Greywater Reuse in Western Australia. In this case the responsibility and costs for operation and maintenance are with the householder.

It is not recommended that greywater systems are mandated in the Cockburn Coast redevelopment area and it will be up to the individual householder to install the systems at their own discretion.

10.7 Water source recommendations

The following staged approach to implementing an alternative water source is recommended such that the development program is not impeded:

- Apply for groundwater allocation to allow for POS irrigation (and also construction) of the first stages;
- Commence discussions with groundwater inception trench owners to use part of this allocation;
- Allow flexibility in the local structure planning process to accommodate a reticulated NDW system; and
- Continue to investigate the possibility of wastewater recycling in the future based on upgrades to the Woodman Point WWTP.

11. Way forward

11.1 Summary

The integrated water management assessment has undertaken a high level water balance and demand assessment and found the following:

- A large amount (approximately 390 ML/year) of additional stormwater runoff will be generated in the ultimate scenario. While this is a possible water source, the recommended approach for managing this additional stormwater is to infiltrate into the groundwater using water sensitive urban design practices;
- The total water consumption for the site will be 960 ML/year, which equates to 77.40 kL/person/year. This per capita consumption meets the total water consumption sustainability target of 80 kL/person/year determined in the district structure plan; and
- The total potable consumption for the development ranges from 41.63 kL/person/year to 67.41 kL/person/year depending on which non drinking water servicing option is implemented. None of the calculated potable consumption rates will meet the potable sustainability consumption target of 40 kL/person/year outlined in the district structure plan.

11.2 Way forward and next steps

It is recommended that a staged approach is applied to taking forward the implementation of an alternative water source at the Cockburn Coast redevelopment. In the interim, the following is recommended:

- Apply for a groundwater allocation to allow for construction and establishment of the initial stages of development while an alternative water source is confirmed;
- Commence discussions with developers of Port Coogee for an allocation of groundwater from the groundwater inception trench. The Department of Water may also need to be involved to determine if an allocation is required for the use of this water; and
- Allow flexibility in the local structure planning process to accommodate a reticulated NDW system.

With respect to the localised bunker oil impact at depth in the vicinity of the historic chimney:

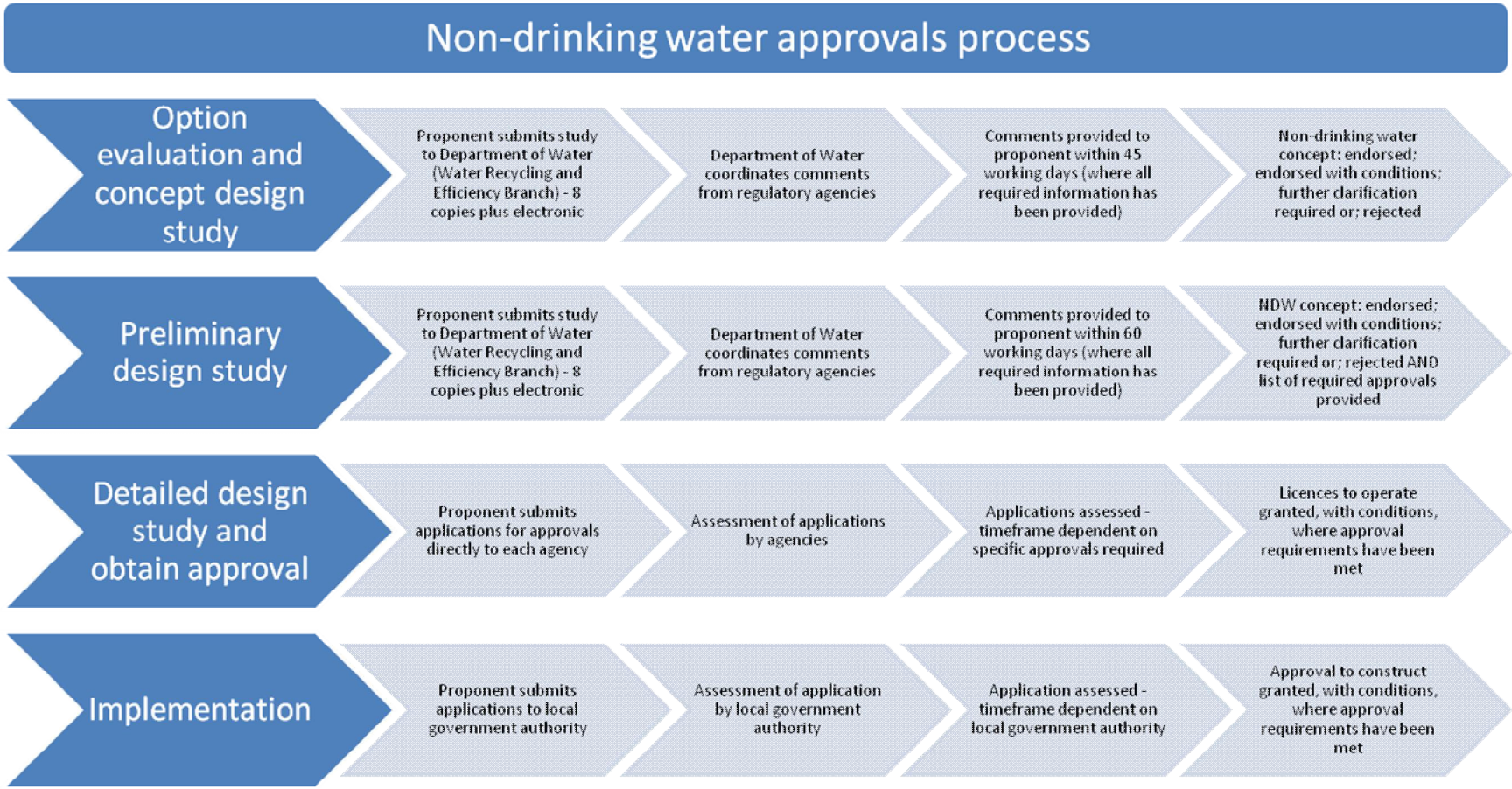
- No groundwater abstraction (or recharge) should be permitted within the interpreted extent of bunker oil impact in the vicinity of the historic chimney;
- No groundwater abstraction (or recharge) should be permitted within the provisional exclusion distance of 70m beyond the interpreted extent of the bunker oil impact (GHD September 2011);
- The exclusion distance of 70 m is provisional as the influence that a groundwater abstraction bore may have on impact stability/migration potential depends on circumstances specific to the abstraction or recharge such as volume of groundwater to be abstracted, proximity, targeted strata and characteristics. Therefore any proposal to abstract or reinject groundwater at surrounding Lots 101, 102, 109, 110, 2109 and the southern half of Lot 2103 should specifically assess the potential for influence upon the bunker oil impact and the validity of the provisional exclusion distance to ensure plume stability is not compromised.

- Prior to the construction of any groundwater bores within the exclusion distance surrounding the bunker oil impact in the Robb Jetty precinct, discussions are therefore to be held with a hydrogeologist to determine if the plume will be impacted.

For the longer term assessment of an alternative water source at Cockburn Coast, the following items should be considered:

- Undertake further discussions with the Water Corporation to determine the long term possibility of a regional wastewater recycling option;
- Assess and determine which non drinking water servicing option is most appropriate for the Cockburn Coast development;
- Undertake a cost benefit analysis for the preferred alternative water source and servicing strategy;
- Determine if a service provider is required and if so, assess potential service providers;
- Incorporate a waterwise display village into the initial stages of development to showcase the desirable water conservation initiatives; and
- Prepare design guidelines for the waterwise and water conservation initiatives and the public open space design.

Depending on the preferred alternative water source and servicing strategy, approval for the scheme may be required under the *Draft approvals framework for the use of non drinking water in WA* (DoW 2011). A summary of the approvals framework is provided as Figure 3. It is recommended that once a preferred water source has been established that discussions with the Department of Water are held to determine if the *Draft approvals framework for the use of non drinking water in WA* is applicable for the Cockburn Coast redevelopment.



Source: Department of Water, 2011

Figure 3 Draft non drinking water approvals framework

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Appendix A

Water Corporation consumption parameters

WATER USAGE

1. Residential

1.1 Household Use	Estimate	Units	Source	Water Source	In-house/Ex-house	Notes
Garden Irrigation	0.002	kL/m^2/day	Water Corporation	Non-Potable (Irrigatio	Ex-house	10mm*9apps*8months/365.25days
Shower	0.050	kL/person/day	Diversity Australia	Potable (Drinking)	In-house	
Kitchen sink	0.008	kL/person/day	Diversity Australia	Potable (Drinking)	In-house	
Bathroom basin	0.006	kL/person/day	Diversity Australia	Potable (Drinking)	In-house	
Dishwasher	0.003	kL/person/day	Diversity Australia	Potable (Drinking)	In-house	
Bath	0.001	kL/person/day	Diversity Australia	Potable (Drinking)	In-house	
Laundry trough	0.004	kL/person/day	Diversity Australia	Potable (Drinking)	In-house	
Leaks	0.029	kL/household/day	Diversity Australia	Potable (Drinking)	Ex-house	
Pool	0.020	kL/household/day	Diversity Australia	Potable (Drinking)	Ex-house	
Spa	0.002	kL/household/day	Diversity Australia	Potable (Drinking)	Ex-house	
Car washing	0.002	kL/household/day	Diversity Australia	Potable (Drinking)	Ex-house	
Evaporative cooling	0.006	kL/household/day	Diversity Australia	Potable (Drinking)	In-house	
Other	0.004	kL/household/day	Diversity Australia	Potable (Drinking)	Ex-house	
Toilet	0.033	kL/person/day	Diversity Australia	Potable/Non-Potable (	In-house	
Washing machine	0.042	kL/person/day	Diversity Australia	Potable/Non-Potable (	In-house	

1.2 Household Type	Estimate	Units	Source	Notes
Traditional	2.736	Average # of Residents	2006 ABS Census	
Terraced	1.765	Average # of Residents	2006 ABS Census	
Cottage	1.814	Average # of Residents	2006 ABS Census	
Apartment	1.552	Average # of Residents	2006 ABS Census	
Lifestyle/Semi Rural	2.736	Average # of Residents	2006 ABS Census	

1.3 Irrigation Area	Estimate	Units	Source	Notes
Traditional	25	%	Water Corporation	
Terraced	25	%	Water Corporation	
Cottage	25	%	Water Corporation	
Apartment	22	%	Water Corporation	
Lifestyle/Semi Rural	12	%	Water Corporation	

2. Schools

2.1 School Size	Estimate	Units	Source	Notes
<100 Students	31.070	kL/Student/year	Water Corporation	
100 to 500 Students	8.710	kL/Student/year	Water Corporation	
501 to 1000 Students	7.060	kL/Student/year	Water Corporation	
>1000 Students	10.140	kL/Student/year	Water Corporation	
Irrigation	0.960	kL/m2/year		This is the midpoint between Active and Passive POS irrigation requirements.

2.2 School Non-Irrigation Water Usage Percentage

Parameter	Estimate	Units	Source	Notes
Drinking	60	%	Diversity Australia	Specify Drinking proportion and non-drinking is automatically calculated
Non-Drinking	40	%	Diversity Australia	
Potable Water Supply/Total Water Supply For Schools	100	%	Estimate	

2.3 Irrigation Area	Estimate	Units	Source	Notes
School	40	%	Water Corporation	

3. Commercial and Industrial

3.1 Entity Type	Constraint	Estimate	Units	Source	Notes
Shopping Centre	N/A	1.080	kL/m^2 GLA/year	Water Corporation	
Office Building	N/A	0.800	kL/m^2 GLA/year	Water Corporation	
Light Industrial	N/A	0.940	kL/m^2 GLA/year	Estimate	Mid point between Shopping Centres and Office Buildings
Hospital	≤300 Beds	185.820	kL/bed/year	Water Corporation	
Hospital	>300 Beds	269.350	kL/bed/year	Water Corporation	
Nursing Home	≤60 Beds	144.490	kL/bed/year	Water Corporation	
Nursing Home	>60 Beds	109.390	kL/bed/year	Water Corporation	
Hotel	≤250 Rooms	104.530	kL/room/year	Water Corporation	
Hotel	>250 Rooms	192.010	kL/room/year	Water Corporation	
Commercial Laundry	N/A	44834.400	kL/entity/year	Water Corporation	
Aquatic Centre	N/A	14600.000	kL/entity/year	Water Corporation	
Hospitality	N/A	570.180	kL/entity/year	Water Corporation	
Manufacturing	N/A	438.340	kL/entity/year	Water Corporation	
Other Sporting Facility	N/A	14600.000	kL/entity/year	Water Corporation	

3.2 Commercial Laundries	
Assumed kgs/week for Commercial Laundries	60,000
L/kg/week	14

3.3 Aquatic Centres	
Assumed visitors/day	500
L/visitor/day	80

3.4 Water Usage Percentage Entity Type	Irrigation	Drinking Water	Non-Drinking Water
Shopping Centre	5%	60%	35%
Office Building	5%	60%	35%
Light Industrial	5%	60%	35%
Hospital	5%	60%	35%
Nursing Home	5%	60%	35%
Hotel	5%	60%	40%
Commercial Laundry	0%	5%	95%
Aquatic Centre	5%	80%	15%
Hospitality	5%	80%	15%
Manufacturing	5%	80%	15%
Other Sporting Facility	5%	80%	15%

3.5 Potable Water Supply/Total Water Supply for Entity Type Entity Type	Percentage
Shopping Centre	100%
Office Building	100%
Light Industrial	100%
Hospital	100%
Nursing Home	100%
Hotel	100%
Commercial Laundry	100%
Aquatic Centre	100%
Hospitality	100%
Manufacturing	100%
Other Sporting Facility	100%

4. Public Open Spaces

4.1 Public Open Space	Estimate	Units	Source	Water Use
Public Open Space - Active	1.280	kL/m^2/year	Water Corporation	Irrigation
Public Open Space - Passive	0.640	kL/m^2/year	Water Corporation	Irrigation
Public Open Space - Amenity Drinking/Non-drinking ratio	0.50	%	Estimate	Drinking

4.2 Verges and Street Scaping	Estimate	Units	Source	Water Use
Verges	0.640	kL/m^2/year	Water Corporation	Irrigation
Street Scaping	0.640	kL/m^2/year	Water Corporation	Irrigation

WATER SUPPLY

1. Rainwater

1.1 Rainfall Collection	Estimate	Units	Source	Notes
Average Annual Rainfall	700	mm/year	Estimate	Metro area only
Rain correction	24	mm/year	http://enhealth.nphp.gov.au	For evaporation, roof wetting, etc
Efficiency factor	80%	%	Estimate	Conversion of rainfall to rain capture

1.2 Percentage of lot that is roofing	Estimate	Units	Source	Notes
Traditional	50	%	Estimate	
Terraced	50	%	Estimate	
Cottage	50	%	Estimate	
Apartment	50	%	Estimate	
Lifestyle/Semi Rural	25	%	Estimate	
Schools	10	%	Estimate	
Commercial & Industrial	25	%	Estimate	
Public Open Spaces, Roads & Verges	5	%	Estimate	

1.3 Percentage of roofing used for collection	Estimate	Units	Source	Notes
Traditional	100	%	Estimate	
Terraced	100	%	Estimate	
Cottage	100	%	Estimate	
Apartment	100	%	Estimate	
Lifestyle/Semi Rural	100	%	Estimate	
Schools	100	%	Estimate	
Commercial & Industrial	100	%	Estimate	
Public Open Spaces, Roads & Verges	100	%	Estimate	

TARGETS

Target	Target Level	Units	Source	Notes
Metropolitan Residential Average 07/08	105.4	kL/person/annum		
Development Estate Average	90	kL/person/annum		
Department of Water Irrigation Allowance	7500	kL/ha/annum		
Local Authority	7500	kL/ha/annum	Local Authority	
Infrastructure Planning Estimate (Water)	TBD		IPB	
Infrastructure Planning Estimate (Wastewater)	TBD		IPB	

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Appendix D Modelling

Modelling Discussion

GHD built an InfoWorks CS hydrologic and one-dimensional hydraulic model of the existing and proposed development, and simulated the model for a range of design storms. InfoWorks CS is a computer program for simulating catchment hydrology and one-dimensional flows in conduits and open channels. Data is input via GIS files, tables and a graphical user interface, and results are produced graphically and in GIS and tabular format.

The hydrology was simulated using the SWMM model, based on the parameters listed in Table 12, Table 13 and Table 14. These parameters are consistent with regional storm water modeling for the Serpentine area.

Modelling assumptions

- Catchment infiltration modelled at a constant rate of 6 mm/hour
- Basin infiltration modeled at a constant rate of 4 mm/hour
- All roads connected to bio retention system sized for the 1 year 1 hour storm (16 mm)

Modelling parameters

Table 12 InfoWorks model runoff surface properties

Runoff surface	Surface roughness (Manning's n)	Initial loss (mm)	Infiltration loss (mm/hour)	Fixed runoff coefficient
Developed Impervious	0.015	16	6	1
Pervious	0.03	10	6	1
Lot (Commercial)	0.015	1.5	6	0
Lot (Res)	0.015	16	6	1

Table 13 IFD data

Input	Value
2 yr ARI intensity	
1 hr	21.04
12 hr	4.25
72 hr	1.26
50 yr ARI intensity	
1 hr	35.96

12 hr	6.71
72 hr	2.19
Geographical factors	
F2	4.86
F50	17.18
Location skewness	
Zone	8

Table 14 InfoWorks model catchment properties for pre development scenario

Sub-catchment ID	Area (ha)	Vector slope (m/m)	Catchment dimension (m)	Impervious (%)	Pervious (%)	Soakage (%)
1	13.184	0.01	204.9	9.976	2.971	87.053
1a	3.498	0.007	105.5	24.08	75.92	0
2	7.361	0.01	153.1	13.669	8.882	77.449
2a	8.927	0.01	168.6	13.834	12.372	73.794
2b	10.923	0.01	186.5	19.713	7.474	72.813
2c	4.525	0.01	120	24.08	75.92	0
3	9.449	0.01	173.4	5.21	4.157	90.633
4	14.085	0.01	211.7	18.548	23.544	57.908
4a	8.327	0.01	162.8	25.686	0	74.314
5	10.857	0.01	185.9	8.096	9.035	82.869
5a	7.327	0.01	152.7	7.325	8.953	83.722
6	7.932	0.01	158.9	9.32	0.896	89.784
7	7.513	0.01	154.6	26.295	4.356	69.349
7a	4.434	0.01	118.8	23.454	6.321	70.224
8	10.381	0.01	181.8	11.059	7.699	81.243
8a	6.97	0.01	149	15.406	0	84.594
external	30.381	0.03	400	0	100	0

Appendix E Better Urban Water Management LWMS checklist

Checklist for integrated water cycle management assessment of local structure plan or local planning scheme amendment

1. Tick the status column for items for which information is provided.
2. Enter N/A in the status column if the item is not appropriate and enter the reason in the comments column.
3. Provide brief comments on any relevant issues.
4. Provide brief description of any proposed best management practices, eg. multi-use corridors, community based-social marketing, water re-use proposals.

Local water management strategy item	Deliverable	☑	Comments
Executive summary			
Summary of the development design strategy, outlining how the design objectives are proposed to be met	Table 1: Design elements & requirements for BMPs and critical control points	☑	Executive Summary
Introduction			
Total water cycle management – principles & objectives Planning background Previous studies		☑	Section 1
Proposed development			
Structure plan, zoning and land use. Key landscape features Previous land use	Site context plan Structure plan	☑ ☑	Section 2.1
Landscape - proposed POS areas, POS credits, water source, bore(s), lake details (if applicable), irrigation areas	Landscape Plan	☑	Section 2.2
Design criteria			
Agreed design objectives and source of objective		☑	Section 3
Pre-development environment			
Existing information and more detailed assessments (monitoring). How do the site characteristics affect the design?		☐	
Site Conditions - existing topography/ contours, aerial photo underlay, major physical features	Site condition plan	☑	Section 4.1 to 4.3
Geotechnical - topography, soils including acid sulfate soils and infiltration capacity, test pit locations	Geotechnical plan	☑	Section 4.4 and 4.5
Environmental - areas of significant flora and fauna, wetlands and buffers, waterways and buffers, contaminated sites	Environmental Plan plus supporting data where appropriate	☑	Section 4.7
Surface Water – topography, 100 year floodways and flood fringe areas, water quality of flows entering and leaving (if applicable)	Surface Water Plan	☑	Section 4.8
Groundwater – topography, pre development groundwater levels and water quality, test bore locations	Groundwater Plan plus details of groundwater monitoring and testing	☑	Section 4.9
Water use sustainability initiatives			
Water efficiency measures – private and public open spaces including method of enforcement		☑	Section 5.1
Water supply (fit-for-purpose strategy), agreed actions and implementation. If non-potable supply, support with water balance		☑	Section 5.4
Wastewater management		☑	Section 5.4
Stormwater management strategy			
Flood protection - peak flow rates, volumes and top water levels at control points,100 year flow paths and 100 year detentions storage areas	100yr event Plan Long section of critical points	☑ ☐	Section 6.2
Manage serviceability - storage and retention required for the critical 5 year ARI storm events Minor roads should be passable in the 5 year ARI event	5yr event Plan	☑	Section 6.2

Local water management strategy item	Deliverable	☑	Comments
Protect ecology – detention areas for the 1 yr 1 hr ARI event, areas for water quality treatment and types of (including indicative locations for) agreed structural and non-structural best management practices and treatment trains. Protection of waterways, wetlands (and their buffers), remnant vegetation and ecological linkages	1yr event plan Typical cross sections	☑ ☐	Section 6.2 Section 6.3
Groundwater management strategy			
Post development groundwater levels, fill requirements (including existing and likely final surface levels), outlet controls, and subsoils areas/exclusion zones	Groundwater/subsoil Plan	☑	Section 7.2
Actions to address acid sulfate soils or contamination		☑	Section 7.3
The next stage – subdivision and urban water management plans			
Content and coverage of future urban water management plans to be completed at subdivision. Include areas where further investigations are required prior to detailed design.		☑	Section 8
Monitoring			
Recommended future monitoring plan including timing, frequency, locations and parameters, together with arrangements for ongoing actions		☑	Section 8.1
Implementation			
Developer commitments		☑	Section 8.3
Roles, responsibilities, funding for implementation		☑	Section 8.3
Review		☑	Section 8.3

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COCKBURN COAST
PLACE MAKING STRATEGY

FINAL REPORT 16 MARCH 2012

PLACE PARTNERS
Place Making Consultancy

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INTRODUCTION

Place Partners has been engaged by Landcorp to co-ordinate and deliver a Place Making Strategy for the Cockburn Coast Project. The Place Making Strategy provides the directions for the 'soft infrastructure' of Cockburn Coast; how people use the place, community development and public art.

This document dated 13 September is the first iteration of a developing strategy (Stage 1 of the commissioned works) and provides:

- Part A. Context - Influences on the Emerging Character of Cockburn Coast
- Part B. Place Framework
- Part C. Place Making Overlays

Appendices: Community Development Plan Framework & Public Art Strategy Framework.

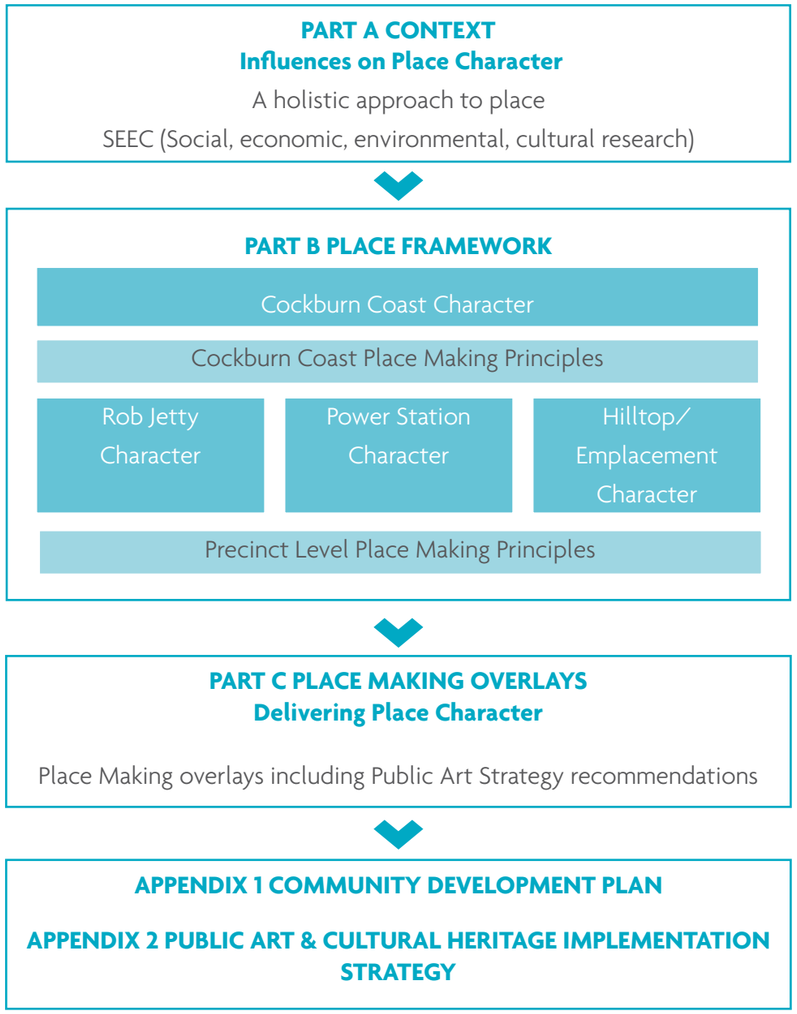
The place making services are being conducted concurrently with the Local Structure Plans for three precincts within the Cockburn Coast Masterplan area; the Rob Jetty Precinct, the Hilltop/ Emplacement Precinct and the Power Station Precinct. This Place Framework and the subsequent Place Making Overlay (Stage 2) will ensure that place making principles concerning; public amenity, accessibility, people focussed planning, local identity, community attractions and uses, management and other considerations, are incorporated into the up front planning and design of the project.

The objectives of the place making process are to:

- guide the planning and delivery of a dynamic coastal development that offers the existing and future community a unique place with a mix of business, lifestyle and civic activities
- provide a framework for the creation (over time) of a built environment and local identity that incorporates the historical, cultural, social and natural characteristics of the area
- support the delivery of the Cockburn Coast Project Vision: 'To develop Cockburn Coast as an integrated and high amenity beachside residential and mixed use area highly accessible by public transport'
- align with, and inform, LSP processes and outcomes to create an integrated plan for the future Cockburn Coast

The place making process is iterative in that it relies on a variety of inputs over time. Like an organically created place, a new place and its development framework should allow for flexibility and the evolution of planning directions to reflect the changing needs of pioneer residents, external forces or any other new information that comes to hand.

The following diagram illustrates the place making process for the Cockburn Coast Project:



REPORT STRUCTURE

The final Place Making Strategy will be divided into 4 sections:

- **Part A. Context - Influences on Cockburn Coast's Place Character**

Part A provides an overview of the Cockburn Coast site and its regional context including a review of the proposed Masterplan and DSP objectives to set the context for the research. It then goes on to describe the Place Partners approach to SEEC (Social, Economic, Environment and Cultural) influences on the Cockburn Coast Place Character. The key outcomes of this research are provided in the form of questions moving forward to be addressed by the Place Framework in Part B.

- **Part B. The Place Framework**

Part B describes a Place Framework that will align the DSP and Masterplan vision and objectives with Place Drivers for the Cockburn Coast as informed by the outcomes of Part B. It will include the Cockburn Coast Place Character statement and Place Making Principles that will guide the delivery of place at Cockburn Coast. The framework will provide both the strategy and specific directions for the delivery of the 3 precincts; Rob Jetty, Power Station and Hilltop/Emplacement.

- **Part C. Place Making Overlays**

Part C of the Cockburn Coast Place Making Strategy is known as Place Making Overlays. This document provides a series of conceptual illustrations of place making recommendations for key locations across the Cockburn Coast. Each illustration aims to demonstrate the elements required in the future place in order to ensure self-sustaining activity and the development of authentic local place character. Illustrations provide a conceptual diagram of these elements overlayed on the current masterplan. Detailed design work should consider the Overlays as a briefing tool not a prescription.

- **Appendices**

The appendices contain the Public Art and Cultural Heritage Strategy and the Community Development Plan 2011 - 2041. The Recommendations contained in these documents have been integrated into the Place Framework and Place Making Overlays, where appropriate.

ABOUT PLACE MAKING

Place making is the process of creating places that people inherently understand, participate in and feel ownership of. These places respond to the unique 'essence' or character of their location and build authentic and meaningful relationships between people, and between people and their environments.

Place Partners contends that a successful people place is a living system of relationships where each element plays an important role in the making of the whole - a civic ecosystem. It is difficult to know how the removal of even one element might impact the whole. Like a game of pick-up sticks, the infrastructure of the place (soft and hard) could hold together with any number of its elements removed, or fall apart if a single relationship is altered.

There are many definitions of place making. Perhaps the most commonly held is that regarding the activation of a place. Place making is much more than this; it is the creation of meaningful environments that reflect the values and aspirations of the people who will use the place, as well as the layers of narrative that contribute to the essence of that place - its 'genius loci'.

PLACE
Place is defined as a location that has meaning for the people who use it, has a unique character that reflects the needs and aspirations of the community and the narrative of the site's history.

PLACE MAKING
The aim of place making is the creation of meaningful environments that respect the unique qualities of each different location.

PLACE MAKING MUST:

- Respond to the essential character of the place
- Be meaningful to people; emotionally and spiritually
- Involve people in the place's production
- Be attractive to people; physically and intellectually
- Provide a choice of experiences
- Be sustainable economically and environmentally

PLACE MAKING OBJECTIVES:
A place making approach has a number of key objectives:

- Being appropriate for each unique place and its people through the facilitation of meaningful experiences.
- Putting people first by prioritising the experience of the pedestrian over all other modes of movement.
- Prioritising the 'every day' through an understanding that the greatest attractor of people is other people. Everyday uses attract every day users (and can still cater for special events) which leads to organic/natural activation that is sustainable and low cost.
- Building relationships between people and places to create an inter-dependent network of businesses, public spaces and users.

PLACE MANAGEMENT
Place Management describes the governance, maintenance, enhancement and protection of public places in our cities. It is not only concerned with the physical aspects of a place but more the 'life' of a place; a holistic system that has a single aim - to attract and retain diverse human activity and build their relationship to their place.

PLACE ACTIVATION
Place activation is defined as planning for diverse human activity in a place. When planning new places, the focus of place activation is on ensuring that the needs of all potential users are met. This will provide for the natural, organic and sustainable use of places by people as part of their daily life. In turn having a place full of people will attract more people.

PLACE DRIVER
The 'place driver' describes the core focus and mind set that is driving the vision and the future place character. It provides the foundation for the vision and the place principles.

PLACE VISION AND CHARACTER
Building the character of a place is not an intuitive by-product of the design process. It is a series of explicit and discrete actions that focus the decision making process. The Place Vision and Character clearly articulates the future we aim to achieve for this place and allows for alignment of project teams and stakeholders. It is development from an understanding of influences on place identity and stakeholder values and aspirations.

PRINCIPLES OF SUCCESSFUL PUBLIC PLACES

There are three broad dimensions of the public realm - rights, needs and meanings. "Successful public places are ones that are responsive to the needs of their users; are democratic in their accessibility; and are meaningful for the larger community and society" (Francis 2003).

RIGHTS
The Cockburn Coast has long been seen by the wider community of the City of Cockburn as 'our beach'. Historically stretching along 7kms of accessible coastline, the community has seen it reduced over many years to the remaining 2kms of public beach we see today. The Power Station, whilst strongly in the public's eye, has been somewhat out of reach (in terms of legal access) since its closure. Re-opening and redevelopment of the Cockburn Coast site needs to be both inviting and welcoming to the community of the LGA as a whole.

The Cockburn Coast site needs to ensure that in substance over gesture it provides:

- for the public good
- a welcome to all members of the community
- accessibility to all members of the community
- for participation in the process by members of the community

NEEDS
Meeting user needs is the simplest method of guaranteeing a place that attracts people, yet is often the primary cause of a place's failure. Identifying primary users of a place, providing them basic amenity in the form of comfortable seating, play areas, meeting places, toilets etc and supporting this with appropriate services whether coffee shops, banks, nightclub or library will attract people, who in turn will attract more people.

MEANING
New places have to work twice as hard to be meaningful for their users than older places with their own embedded histories. For the creation of new places place making requires the integration of cultural and social narratives, association and ritual in order to create connection with the community and importantly, to provide the cues that will enhance their ability to read or understand the place

THE MOVE BACK TO PLACE

While historically place making was the responsibility of all people in a community, there has been a discernible move away from the creation of place over the last two centuries; philosophically, economically and socially. Interestingly it is the last, the social, that has given rise to the current trend that is seeing the rise in value of place as a measurable commodity. Places that attract people have economic value in a competitive market and as such are increasingly being seen as an objective of the development of urban public spaces. Today's development market is responding to worldwide concern for the loss of places that the community values, the loss of cultural diversity and local autonomy that is occurring in the face of globalisation. In capital cities where 'city image' or place brand is the key to sustainable tourism this is particularly important.

PLACE MAKING SUPPORTS:

- Competitive and marketable destinations
- Leisure and recreation society
- Community demand for better urban experiences
- Community wellbeing

METHODOLOGY

Place making relies on a thorough understanding of the unique attributes and characteristics of each place. For the purpose of developing this and subsequent documents Place Partners carried out the following research.

DESKTOP REVIEW

A wide variety of data sources and documents were reviewed as part of Place Partners' approach to this Place Making Strategy. They were extremely valuable in contributing to the legislative, social, economic, environmental and cultural context for the findings in this report. Some of the most notable documents and data sources were:

- Cockburn Coast District Structure Plan (Western Australian Planning Commission 2009)
- Cockburn Coast Master Plan (Landcorp 2011)
- Cockburn Coast Integrated Transport Plan (Parsons Brinckerhoff 2011)
- Cockburn Coast Vision Workshop Outcomes (Hassell 2010)
- Analysis of Three Development Scenarios: Floorspace requirements (Pracsys 2010)
- Infrastructure Servicing Report for the proposed Cockburn Coast development (Wood & Grieve Engineers 2011)
- State Planning Policy 4.2- Active Centres for Perth and Peel (Western Australian Government 2010)
- Various stakeholder and community engagement findings reports

Other notable documents and data sources are mentioned below and a full list of sources considered in developing this report is attached as an appendix.

SCALES OF INTEREST

This report has considered the Cockburn Coast site from the perspective of 5 different scales; from the metropolitan to the micro, that is the defined site. The aim of this method has been to provide an understanding of the factors that may influence the development of the site both internally and externally, to consider Cockburn Coast as one place within a greater network of places.

Metropolitan Study Area

The Perth Metropolitan area has a population of 1.6 million and is growing rapidly. The Cockburn Coast, located in the Southern Suburbs of Perth, will be shaped by the current and future planning decisions, market forces and general character that play out at the Metropolitan Scale.

Key Stakeholders:

- Western Australian Government
- WA Department of Planning and Infrastructure
- Department of Immigration and Citizenship

Key documents and data sources:

- ABS data including 2006 Census Data and 2010 National Regional Profiles data
- Climate Change Climate Change Risk Management and Adaptation Action plan for the Southern Metropolitan Councils (GHD 2009)
- Crime statistics (Western Australian Police 2011, http://www.police.wa.gov.au/ABOUTUS/Statistics/CrimeStatistics/tabid/1219/Default.aspx)
- Love it or leave it? (Down under out west 2011, http://downunderoutwest.wordpress.com/2011/01/23/love-it-or-leave-it/)
- Publications, Research, Statistics and Historical Resources (Department of Immigration and Citizenship 2011, http://www.immi.gov.au/media/publications.htm)
- Social Trends (Department of Sport and Recreation, Government of Western Australia 2005)

Regional Scale

The regional context of the Cockburn Coast site has been considered at a scale of approximately 10km around the site. This region considers the trends and characteristics of the Local Government Area (LGA) of Cockburn in which the site is located, and adjoining LGAs including Fremantle, Melville, Canning, Armadale and Kwinana. Consideration of the site within the context of this regional scale is partially important because of localised migration trends from the northern side of the region down to Cockburn and Kwinana.

Key Stakeholders:

- Southern Metropolitan Councils
- WA Department of Transport
- WA Department of Health

Key documents and data sources:

- ABS data including 2006 Census Data and 2010 National Regional Profiles data
- The Changing Cockburn Coast: European Heritage (WA Department of Planning and Infrastructure 2008)
- The Changing Cockburn Coast: Indigenous Heritage (WA Department of Planning and Infrastructure 2008)
- The Changing Cockburn Coast: Socio-economic Analysis (WA Department of Planning and Infrastructure 2008)
- City of Cockburn Local TravelSmart Guide West (WA Department of Transport & Department of Health 2010)
- Cockburn Crime Prevention Plan 2011-2014 (City of Cockburn 2011)
- Drivers of Activity Centre Development in the Fremantle CBD: Fremantle's position in the metropolitan hierarchy (Urbis 2011)
- A forgotten Strip (Vanessa De Groot 2010, Australian Property Investor January 2010)

Local Government Study Area

The Cockburn Coast site is located in the north western corner of the City of Cockburn LGA. The northern boundary of the site adjoins the southern boundary of the City of Fremantle LGA. A study of both LGAs is critical to understand the role this area plays for the site in terms of employment and servicing the proposed community. The Cockburn LGA is one of the fastest growing areas of Perth with the Cockburn Coast projected to provide accommodation for around 10,000 residents in the years to come.

Key Stakeholders:

- City of Cockburn
- City of Fremantle

Key documents and data sources:

- City of Cockburn (www.cockburn.wa.gov.au)
- City of Cockburn 2005 State of the Environment Report (Ecologia Environment 2005)
- City of Cockburn Community Development Service Unit: Summary of Community Organisation Interviews (City of Cockburn 2009)
- City of Cockburn Community Development Service Unit: Summary of Officer Interviews (City of Cockburn 2009)
- City of Cockburn Community Profile (National Growth Areas Alliance 2010)
- City of Cockburn A Great Place for Business: Presentation to MCCC (City of Cockburn 2010)
- City of Cockburn Sustainability Strategy (City of Cockburn 2006)
- City of Fremantle (www.fremantle.wa.gov.au)
- Cockburn Coast District Structure Plan Frequently Asked Questions (WA Department of Planning 2009)
- Cockburn Community Development Strategy: Art of Enterprise Sustainability in practice (City of Cockburn 2007)
- Cockburn Community Development Strategy: Cockburn Community Development Strategy Guide (City of Cockburn 2007)

Suburban Study Area

The western half of the site is located within the suburb of North Coogee and represents a large proportion of the total area of this suburb. Eastern portions of the site are located in the suburbs of Hamilton Hill in the north and Spearwood in the South. A study of these suburbs contributes to a greater understanding of the site and the predominant influences upon its future development. A study of North Coogee is considered to be useful as the local population, housing types and density along the coast is most consistent with the anticipated Cockburn Coast development.

Key stakeholders:

- Local residents
- Local business operators

Key documents and data sources:

- Population and Household Forecast: Coogee- North Coogee (City of Cockburn 2010)
- Port Coogee Marina Village Masterplan (Australand Holdings Limited 2008)

The Cockburn Coast Site

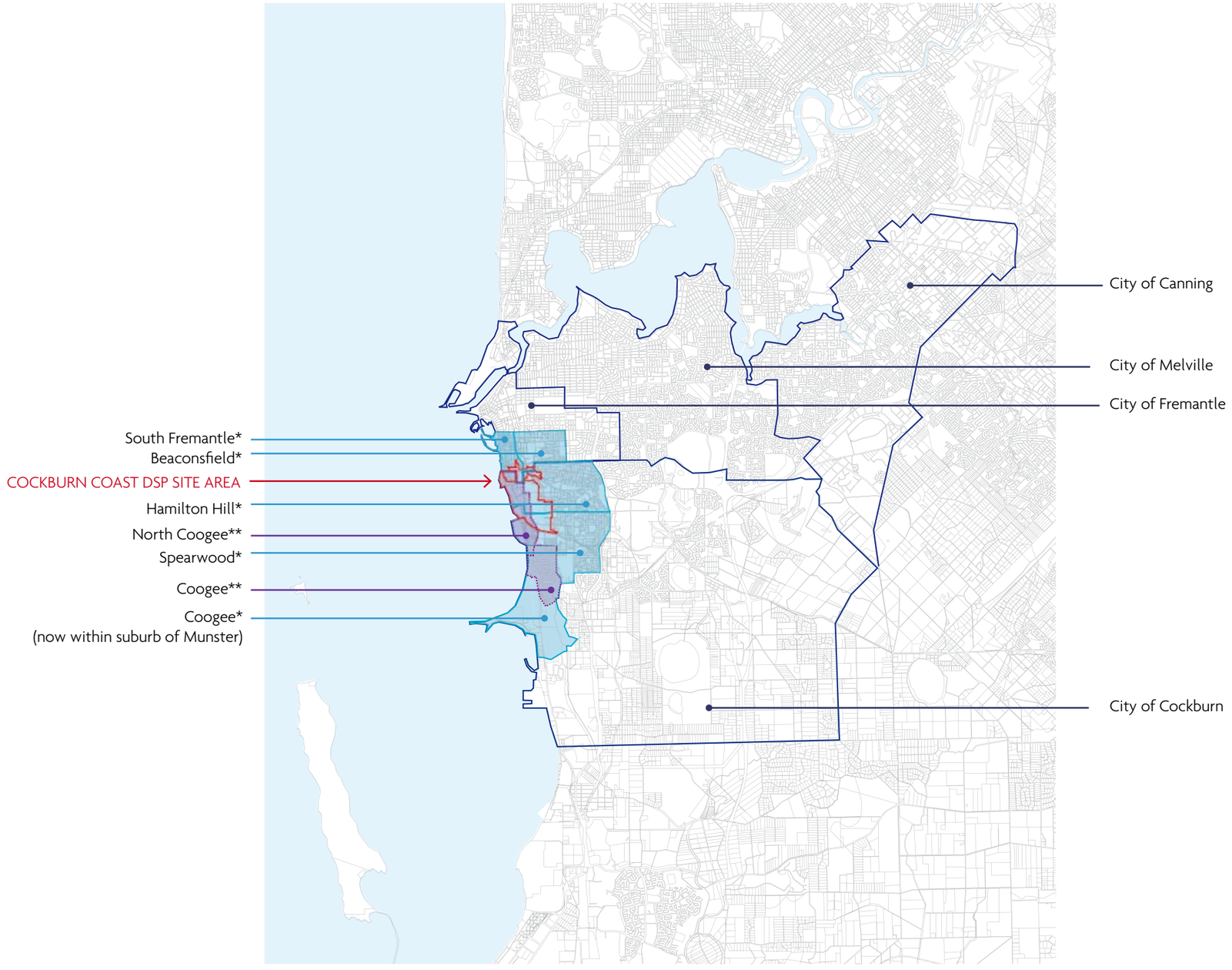
Although highly unutilised, the Cockburn Coast site has a distinct character and a strong identity. Physically, the site runs parallel to the coast and has an expansive dunal system long its entire western edge, a moderate slope from a ridgeline to the east and heritage items that complement a valuable narrative history.

Key stakeholders:

- Local residents
- Local business operators
- Regular and potential visitors

Key documents and data sources:

- Cockburn Coast Master Plan (Landcorp 2011)
- Opportunity Lost, Freo Tribe (Jon Strachan 2011)



* Suburban area 2006 ABS
** Current suburban areas as per City of Cockburn definition of subruban boundaries

SITE INVESTIGATIONS

The Place Partners team spent 3.5 days visiting the site and the region to understand the local context, regional competition and current public realm uses and users.

Local Context

Place Partners spent time on the ground in the local centres of Spearwood, Hamilton Hill, South Fremantle and North Coogee to observe how these communities currently use the public realm through behaviour mapping and place audits.

Regional context

Place Partners visited the regional centres of Fremantle, Cottesloe, Mosman, Ellenbrook, Rockingham and Cockburn Central to gain insight into the diversity of competitors in the region to the Cockburn Coast.

TEAM ALIGNMENT

Place Partners has ensured alignment with the LSP team through ongoing communications during the project duration. This has been achieved through:

- Phone conversations
- One to one meetings
- Team Place Making Workshop

The Place Making Workshop was held in Perth on Wednesday 3rd August. Participants from the following organisations were in attendance:

- Landcorp
- Department of Planning
- City of Cockburn
- BlocUrban
- Brand Agency
- Brecknock Consulting
- Culture Play
- Hassell
- Parsons Brinkerhoff
- Pracsys
- Yeates Heritage
- Place Partners

In addition, Place Partners attended a workshop held by Culture Play, the organisation commissioned to deliver the Place Brand for the Cockburn Coast, in order to ensure alignment moving forward.

EXECUTIVE SUMMARY

This Place Making Strategy provides strategic directions and detailed recommendations for the development of a unique place character for Cockburn Coast and its precincts. It synthesises the key findings from primary and secondary research and identifies influences and drivers on the emerging character of the Cockburn Coast. The Strategy builds upon this research to define place character and provides detailed recommendations for its delivery in the form of Place Making Overlays.

The following pages provides a summary of the Place Making Strategy which is divided into three parts

- Part A: Context
- Part B: Place Framework
- Part C: Place Making Overlays

SUMMARY OF PART A: CONTEXT

PROJECT VISION AND OBJECTIVES

The District Structure Plan (DSP) vision and objectives form the basis of the Masterplan, this Place Framework and future Place Making Overlays. The DSP vision and objectives will also provide the foundation for the ongoing development of local structure plans for the three precincts withing Cockburn Coast. The Place Framework supports the development for the LSPs by providing a response to the place and its unique nature. It aims to illustrate opportunities for the project to deliver the over arching vision and do so in a way that creates a place that meets and exceeds community expectations for place making in coastal developments.

The project vision is to create:

"A vibrant, landmark destination that is connected, integrated, diverse and accessible"



The Cockburn Coast Masterplan

DSP & MASTERPLAN OBJECTIVES

The following objectives outlined in the DSP & Masterplan set the high level aspirations for the project to date.

The project objectives are:

- Responsive to the context – regionally and the immediate environment
- Establish a sustainability framework for future detailed planning and design
- Transit orientated development with appropriate density
- Inclusive / participatory planning and consultation process
- Create a place with a mix of people, housing, uses, experience and lifestyle
- Establish an urban development framework that provides guidance for implementation

PLACE MAKING OBJECTIVES

The following place making objectives are a synthesis of the priorities shared by workshop participants at the Place Making Workshop August 2011. They have been further developed to respond to the Masterplan Objectives and aim to provide the next iteration for their delivery.

- Leverage existing assets; natural and heritage, with creative and innovative opportunities for re-interpretation and use
- Establish a point of difference or 'wow factor' that will set this place apart from others creating a locational advantage that is complimentary to surrounding centres and their roles (locally & regionally)
- Concentrate activity around key places and connect destinations with quality pedestrian experiences and public transport
- Identify existing and new markets and build place-based relationships that will evolve and strengthen over time; locally and regionally as part of a network of centres and community infrastructure
- Identify a range of community uses and infrastructure that will generate social sustainability and social cohesion
- Develop a staged approach to manage the transition of landmark uses such as the power station

PLACE DRIVERS & PLACE THEMES

Place character is influenced by a wide range of factors; these drivers of place can be historic, cultural, local, political, and/or global. By understanding the factors that have contributed to the current character of the Cockburn Coast we can incorporate the 'essence' of the place in shaping its future. These place drivers/themes provide the basis for the development of a unique place character statement for the Cockburn Coast and should be utilised as themes in themselves to be interpreted on site in the delivery of place.

INTENSITY

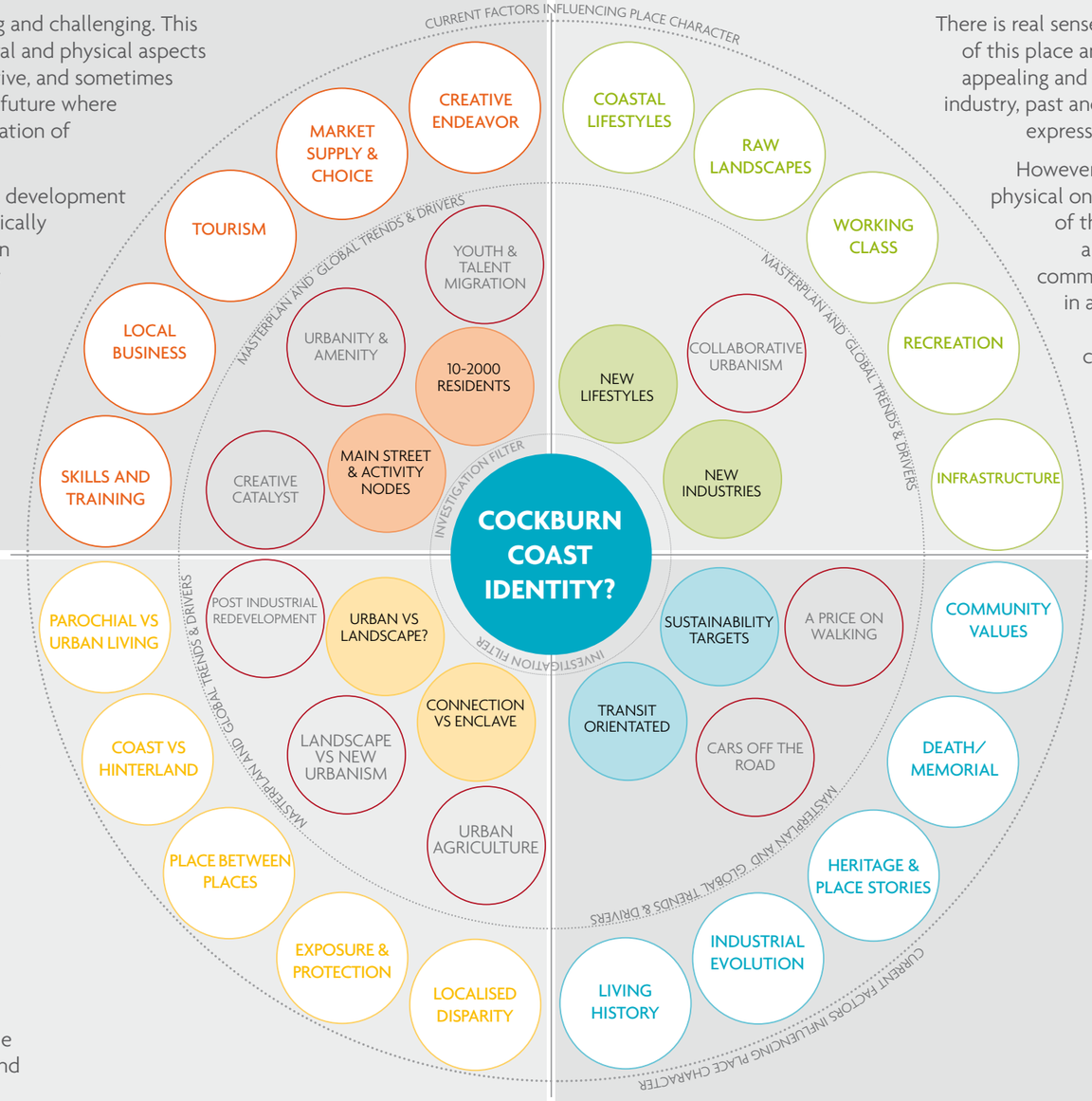
Intensity can be both exciting and challenging. This driver describes social, cultural and physical aspects of the place from its productive, and sometimes dramatic past, to its planned future where intensity refers to a concentration of activity and amenity.

The intensification of coastal development can be received unenthusiastically as there is a perceived tension between nature and the built environment. But with intensity of amenity comes a number of environmental benefits. It involves the centralisation people, buildings, gathering spaces and infrastructure to realise the greatest potential from a more compact city form.

HONESTY

There is real sense of the 'down to earth' nature of this place and its people, a rawness that is appealing and essentially honest. Textures of industry, past and present combine in a sincere expression of hard work and integrity.

However, this driver is deeper than the physical only, it involves sharing the story of the place, its planned evolution and listening and responding to community needs by involving them in a transparent and participatory process. In attracting a community who will help build the culture of the place we need to ensure that they understand their role in the development of the place they want.



DUALITY

This driver reflects the contrasts inherent on and around the site. Internally it is a place of dualities; from beach to dune, to bush to road, from industry to nature. Each contrast provides an opportunity for an authentic set of experiences that are unique to the site.

There is an opportunity to explore and enhance these place based experiences to provide a diversity of transitions that reflect the larger regional context and the shift between the suburban and the semi-urban.

LEGACY

This driver is an important aspect of the place, reflecting both tangible and intangible place based assets of the current site that are valuable to the local community and the history of Perth's development.

Its also suggests a need for leadership and responsibility in the future planning of the place, a long term view that considers infrastructure as a communal asset and investment. Sustainability, in all its forms is critical in our ability to pass on a positive contribution to future generations.

SUMMARY OF PART B: PLACE FRAMEWORK

COCKBURN COAST'S FUTURE PLACE CHARACTER

Building the character of a place is not an intuitive by-product of the design process. It is a series of explicit and discrete actions that focus the decision making process to consider all aspects that contribute to the personality or experience of a place.

Place Making aims to build on the strengths of a place and its community to ensure the future place reflects their culture, stories and aspirations. The following articulates the future story for the Cockburn Coast.

The over arching place character of 'Experiencing Difference, Embracing Change and Evolving Together' can be defined most simply by the term 'transition'. The idea of transition is particularly valid at Cockburn Coast because of its already rich history of change and the planned future evolution, but also because of the range of experiences that the place already offers a visitor. The idea of transition is 'of the place' it reflects what Cockburn Coast 'is' and what 'it wants to be'.

Transition reflects the ongoing and organic change that occurs at all places an in all communities. It can be considered strategically, spatially as well as through time. Transition questions the notion that a drawing can determine all aspects of the future needs of a place, especially one with such a long development horizon. Transition also considers that at the completion of the thirty year development time line the place will continue to change. Flexibility and responsiveness are key to building in resilience in both the place and its people.

The delivery mechanisms for Cockburn Coast need to consider how new information can be responded to and how the essence of transition with all its myriad possibilities can be ingrained into the environment and experience offered. Cockburn Coast needs and over arching story of change that can itself evolve to engage with current and future residents and visitors to an area that will need many hands to see its vision realised

INTENSITY | HONESTY | DUALITY | LEGACY



COCKBURN COAST

EXPERIENCING DIFFERENCE
EMBRACING CHANGE
EVOLVING TOGETHER

Cockburn Coast is a place that explores the essence of transition. From the beach to the bush, the local to the regional, the suburban to the semi urban, the intimate to the grand, Cockburn Coast delivers real diversity - of experience, offer and lifestyle.

It is not only different from its neighbours, it is a place that offers choice and variation within. From seamless movement between beach and main street to bold contrasts between new and old, Cockburn Coast plays with the idea of transition as a means of offering meaningful experiences that connect people to the place.

Cockburn Coast celebrates its dynamic evolution and collaborates with its community to make a place that reflects both local needs and regional expectations.

REGIONAL TOURISM/ RECREATION DESTINATION	CO-LOCATED DIVERSITY OF HOUSING PRODUCT	ACCESS TO AMENITY	RANGE OF EXPERIENCES
Power Station	Terrace	Public Transport	Intense Activity
Beach	Work/Live	Main Street	Quiet & Intimate
Beeliar Reserve	Family-Singles	Fremantle	Open & Public
	Rent/Buy	Public Realm	Comforting
			Challenging

PLACE MAKING PRINCIPLES FOR COCKBURN COAST

The Place Making Principles guide the high level delivery of the place character and provide a measurement tool to assess the successful delivery of the character and experience of the place we aim to create at Cockburn Coast . Whilst each of the Principles sits most strongly within the social, economic, physical environment or cultural realm, the Principles should be considered as applying across all aspects of the place.

social

PRIORITISE DIVERSITY AS A KEY DRIVER OF CULTURAL CHANGE

To succeed as a great people place Cockburn Coast needs to focus on providing a greater diversity of housing options, price points and recreational spaces. Providing choices extends people's stay and localises resident activity.

environmental

EXPLORE TRANSITION BETWEEN EXPERIENCES & PLACES, ACTIVE AND PASSIVE SPACES, LOCAL AND REGIONAL DESTINATIONS

Providing a variety of experiences will keep residents and visitors engaged with their place, provide options for walking paths and choices based on how an individual feels on a particular day.

economic

IDENTIFY SERVICE AND SUPPORT ROLES FOR LOCAL AND REGIONAL NETWORKS

At the centre of a triangle of key economic centres including Fremantle, Murdoch and Henderson, the local economy in Cockburn Coast needs to transition from the existing heavy industries to service and support businesses.

cultural

BUILD A CULTURE OF CHANGE CAPACITY THAT CELEBRATES INNOVATION & PARTICIPATION

Culture is the beliefs, values, behaviours and expressions of a group of people, it covers the arts but also local rituals and how an area is governed. The Cockburn Coast will encourage ideas, education, and entrepreneurship while responding to community values and civic pride.

THE PRECINCTS

The Cockburn Coast Masterplan nominates 3 precincts Robb Jetty, Emplacement and Power Station. Each of these precincts will be subject to further design refinement through the development of a Local Structure Plan for each. The precinct based place framework is intended to inform this process.

Cockburn Coast as a whole should have a universally understood character, however, within each precinct there will be variations in how that character is delivered. By providing the precincts with their own identities it is possible to:

- respond to specific land uses in the precinct
- reflect expected market values and place aspirations
- build a base for marketing efforts
- to align the team around opportunities for diversity
- to provide the framework for detailed decision making over time; i.e which precinct should a certain activity or land use be located in? Will it contribute or lessen the local character development?

The three precincts all vary in identity but share common themes that will allow them to be considered independently but also have a natural fit with one another. It is important that this occurs both in terms of the character of each area as well as through physical connectivity.

Residents in Emplacement will feel connected as they watch over Robb Jetty and visit to grab daily essentials, go to the beach and for coffee. While Robb Jetty will interact with Emplacement as its own backdrop, and a passage to Manning Reserve. Power Station will be the regional draw card, the primary access point for visitors to the Coast.

The following provides a summary of the key place making directions and illustrates how the precincts relate to one another and are also different.

PLACE MAKING KEY ELEMENTS

ROBB JETTY

PLACE CHARACTER

LOCAL - SEAMLESS - BALANCED - INTIMATE

PLACE THEMES

HONESTY | **LEGACY**

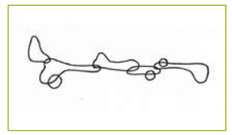
PUBLIC ART

Story telling
Local meaning



PUBLIC REALM

Seamless
Soft
Intimate



BUILT FORM

Protective
Fine grain & tactile
Comfortable



ACTIVITY

Healthy lifestyle
Self sustaining
Communal



EMPLACEMENT

PLACE CHARACTER

INTEGRATED LANDSCAPE - NEW TOPOGRAPHY

PLACE THEMES

INTENSITY | **DUALITY**

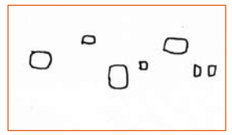
PUBLIC ART

Landscape art
Integrated
Landmark



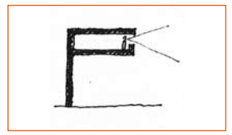
PUBLIC REALM

Contained
Shared



BUILT FORM

Responsive to landscape
Private but expansive



ACTIVITY

Common interest
Neighbourhood



POWER STATION

PLACE CHARACTER

DYNAMIC - CONTRAST - ENERGY - CREATIVE

PLACE THEMES

INTENSITY | **HONESTY**

DUALITY | **LEGACY**

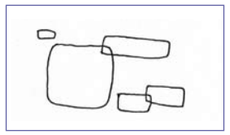
PUBLIC ART

Challenging
Temporary
Dramatic



PUBLIC REALM

Flexible
Destinational
Diverse



BUILT FORM

Awe
Juxtaposition
Inspiration



ACTIVITY

Festival
Celebration
Recreation



SUMMARY OF PART C: PLACE MAKING OVERLAYS

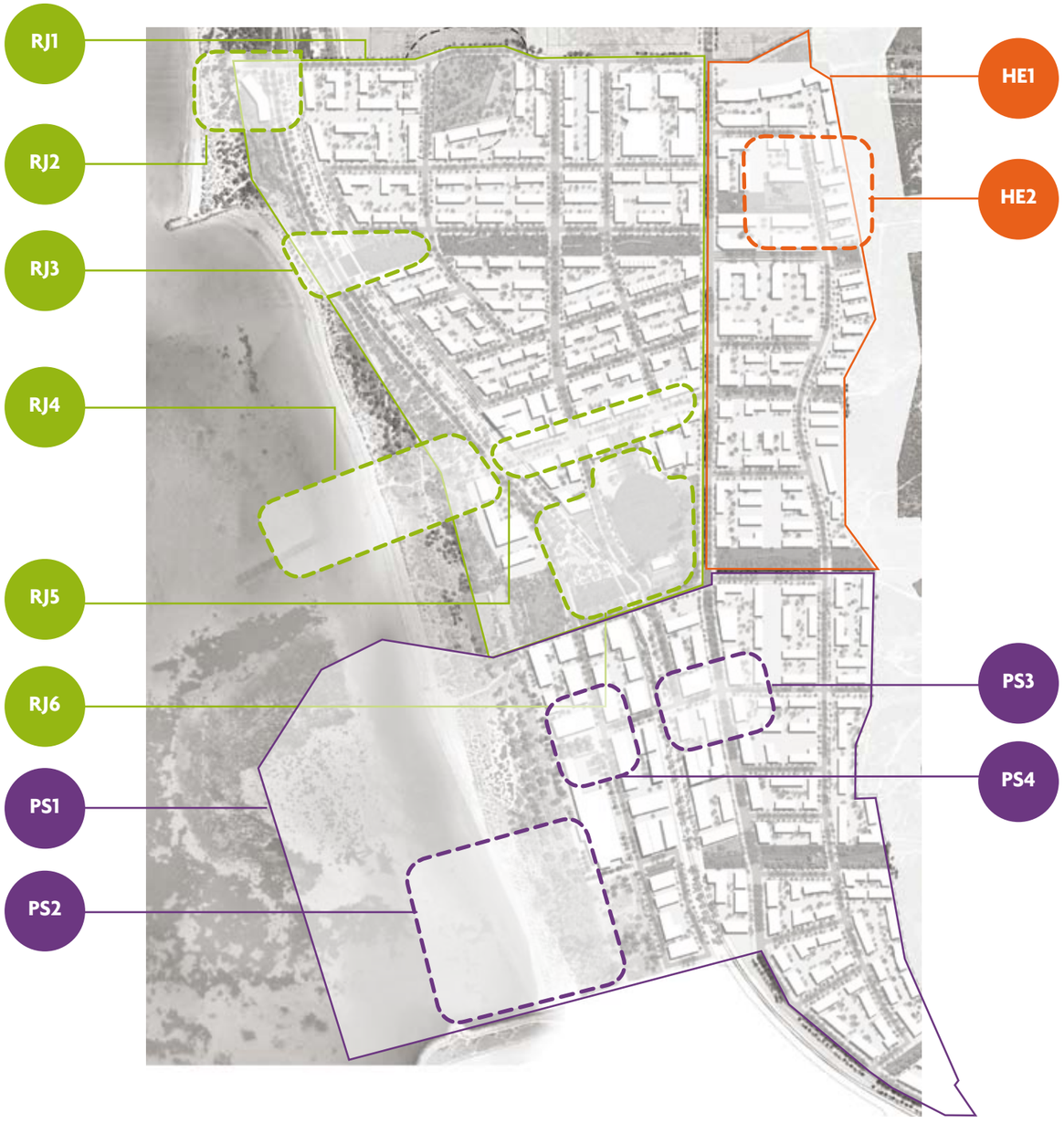
The following pages provide recommendations for the development of 'places' across the Cockburn Coast project area. These sites have been selected as nodes of community and or public activity and are considered critical to the success of the project becoming a place that attracts self sustaining human activity.

The recommendations are provided as Place Making Overlays. Each Overlay can be considered as both a review and a set of recommendations that define the elements that each place should incorporate to make it both meaningful and attractive to future users. Illustrations provide a conceptual diagram of these elements overlayed on the current masterplan. Detailed design work should consider the Overlays as a briefing tool not a prescription.

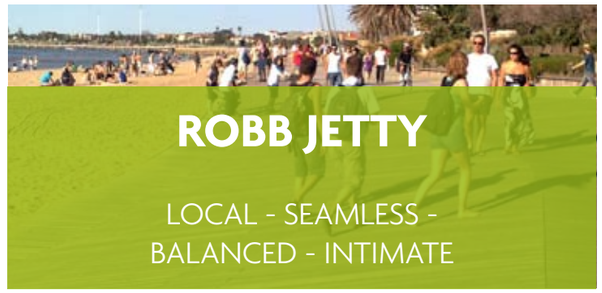
The following map locates the 3 key precinct areas for structural and staging recommendations and overlay locations within them. Each overlay has been allocated an acronym to ease with reading this report i.e. Robb Jetty Overlay 1 = RJ1, Emplacement 2 = HE2, Power Station Overlay 3 = PS3.

The facing page provides and overview of the key character statements for each precinct as described in Part B Place Making Framework, and the role and function of each overlay within it.

COCKBURN COAST PLACE MAKING OVERLAY LOCATIONS



SUMMARY OF ROBB JETTY OVERLAYS



Robb Jetty is primarily a place for local residents and businesses, a walkable village that is intimate in scale and 'soft' in character. In Robb Jetty the beach comes to the main street, locals walk barefoot and the stories of the past and its people are part of everyday life.

A variety of small but connected public places offer a range of experiences from the quiet to the communal, the sheltered to the open, the organic to the formal.

Robb Jetty is a place to build meaningful and lasting relationships; to share a chat on the bus, to know the local news agent, to have your favourite seat in the park.

RJ1 ROBB JETTY PLACE STRUCTURE
The Robb Jetty central shopping and activity zone, and its future success as a walkable community hub, is key to the attractiveness of the area as a local neighbourhood that can compete with the perceived amenity of the suburbs. The area needs to take advantage of its natural assets, and the opportunity of a new build, to create a comfortable outdoor environment that encourages social interactions in a relaxed and intimate environment.

RJ2 CATHERINE POINT
Catherine Point is the transition point between south beach and the Cockburn Coast. A relatively unchanged experience, it provides for animal and passive beach enjoyment with the addition of modest development for community use. It is a seamless experience that is well integrated with the natural environment.

RJ3 FORESHORE PARK
Foreshore Park is the laid back, informal 'backyard' for Robb Jetty residents. A place for casual community gathering and play, it is a commercial free space that transitions from natural dunal vegetation to a more formal landscape of outdoor 'rooms'. Low scale and modest it is a comfortable and soft place for all ages.

RJ4 ROBB JETTY FORESHORE
Robb Jetty Foreshore is a modest and organic beachside recreation area; connected to its past and providing a range of spaces and activities that reflect the needs of all members of the community. It is an integral part of the broader cultural and exercise trails and the local residents' focus for communal recreation.

RJ5 ROBB JETTY MAINSTREET
Robb Jetty Mainstreet provides a convenient and inviting local shopping experience. It concentrates street trading and active retail in its western block creating a vibrant community hub. Its diverse and contiguous streetscape continues to the east where civic and business services support active retail ensuring sustainable business mix.

RJ6 OVAL AND PARK
Oval and Park is the traditional village green, the focus of active recreation at Cockburn Coast. It feels established and balanced, this is a place that is shared harmoniously by many user groups. It embodies a sense of pride in the sporting and community legacy it will lay for future generations.

SUMMARY OF POWER STATION OVERLAYS



The power station is an iconic landmark, its physical dominance should translate into the area's primacy as the key regional destination for the Coast. The centre of recreation and leisure activity Power Station is the place were community celebrations are held and tourists enjoy multiple experiences that vary with each visit.

New and old are juxtaposed, events showcase the innovative and challenging. Creative entrepreneurship is encouraged across multiple fields from energy production, to arts, culture, experiential tourism and business.

Self sustainability for this precinct is key - activity has to be self generating and infrastructure flexible and attractive to a range of users on weekdays, evenings and weekends in summer and winter.

PS1 POWER STATION PLACE STRUCTURE
Power Station is the leisure, entertainment and recreational destination of the Cockburn Coast. As a regional attraction, consideration of appropriate staging of development will be essential to ensuring its short and long term success as a tourism and recreation destination. It should take advantage of the iconic nature of the power station architecture and create summer and winter spaces for year round activation.

PS2 POWER STATION FORESHORE OPTION 1
A Power Station Foreshore with a Marina will feel intense, active and inviting. It balances the private and the public by providing clear invitation for visitor activity form kids to elders, big spenders to picnicers. The area embodies a unique industrial maritime aesthetic that is sophisticated but honest.

PS2 POWER STATION FORESHORE OPTION 2
An organic edge to the Power Station Foreshore will retain the current rugged and casual atmosphere. A waterfront experience anchored by play and recreation areas for all ages. The relaxed atmosphere contrasts with the boldness of the power station and formally programmed Civic Square.

PS3 POWER STATION CIVIC SQUARE
Civic Square is the dynamic and highly programmed heart of activity in the Power Station precinct. A highly diverse and urban experience, the Square is enjoyable full or empty, in summer or winter, on a week day or during a regional event.

PS4 POWER STATION ENTRY
A balance of the bold and the intimate, Power Station Entry talks to both drivers and pedestrians. A gateway to a regional recreation, residential and commercial district, the Power Station Entry is a bold landmark on Cockburn Coast Road as well as a welcoming and comfortable pedestrian access point.

SUMMARY OF EMPLACEMENT OVERLAYS



Emplacement is a place in the early stages of transition, an established industrial area, its future is residential. Located along the ridge line separating the coast from the bush, Emplacement will be the new high point, a manufactured horizon line that offers the opportunity for a new architectural topography, an integrated landscape of nature and built form.

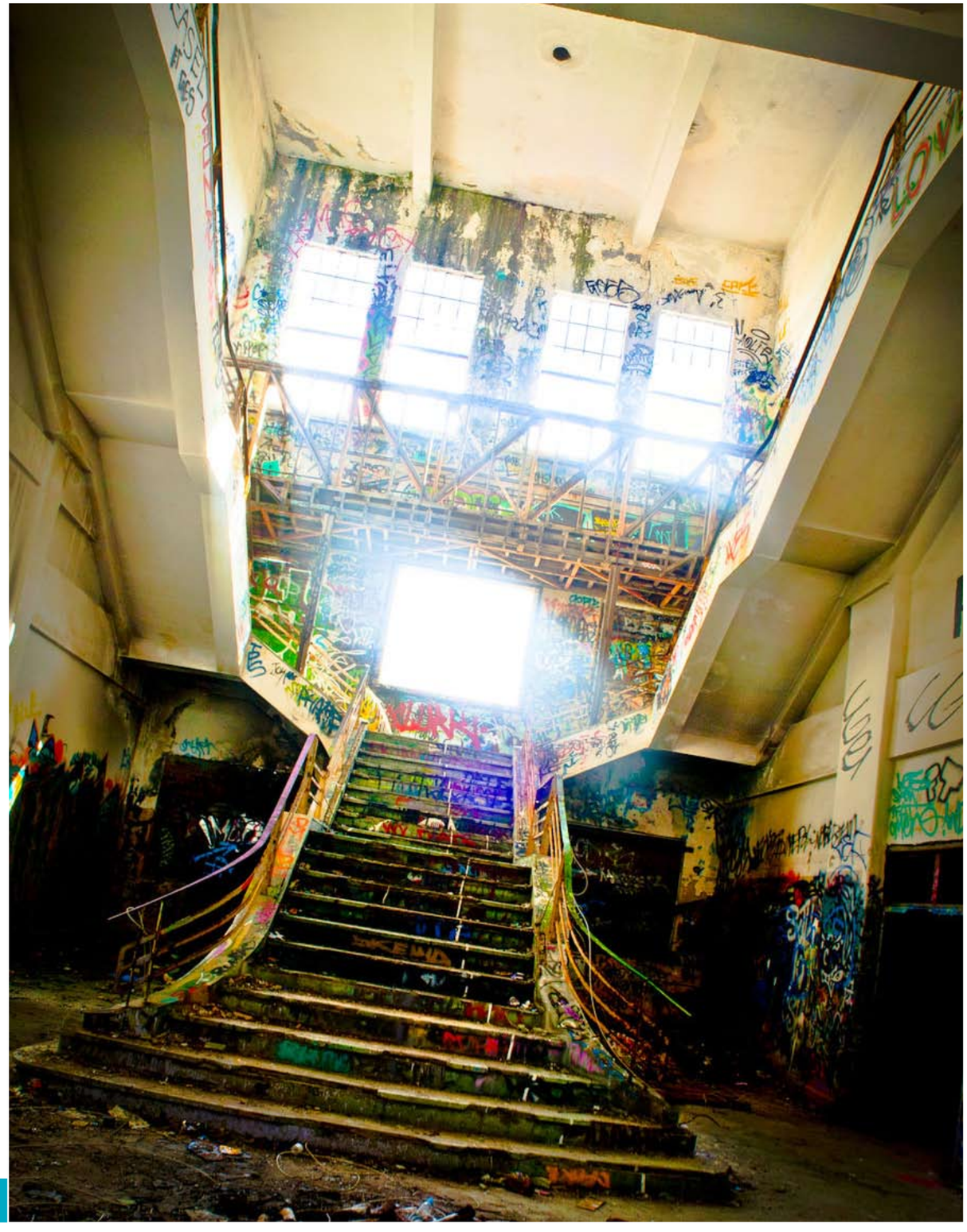
Residents enjoy the expansive views but also the sense of containment and groundedness. Facades and balconies host vertical parklands that shade and veil occupants. Ground level public realm is internalised and focussed on the residential community's common interests.

HS1 EMPLACEMENT PLACE STRUCTURE
Residential development at Emplacement will create a new topography upon the existing undulating landscape. High and low places should be emphasised by the scale of built form surrounding them. Links to Beelier Park add value to the residential offer. Pocket parks and integrated greenery with built form create a calming, natural feel throughout the precinct, despite the intensity of development.

HS2 EMPLACEMENT PARK
Emplacement Park is a traditional, formal memorial to Cockburn Coast's brush with war time defence. It is a quiet contemplative place, for reflection and appreciation of views to the islands of Cockburn Sound and other emplacement sites. A destination for heotage visitors and a pocket park for local residents.

PART A
CONTEXT

Influences on the emerging character of Cockburn Coast



A1
ABOUT COCKBURN COAST

The proposal to develop the Cockburn Coast area was tabled in 2005 by the Western Australian Government at a forum that aimed to seek the opinions of the community in designing a future vision for the area. This dialogue provided the foundation for the development of the Cockburn Coast District Structure Plan (DSP), setting out the vision for transforming the site into a mixed use urban community.

The Cockburn Coast District Structure Plan was prepared by the Department of Planning, on behalf of the Western Australian Planning Commission.

Guided by a Steering Committee, comprising of State and local government representation, the plan was prepared with the input of the Cockburn Coast reference group, including landowners, local community members and stakeholders.

In May 2011 the Cockburn Coast Masterplan, a further iteration of the DSP, was delivered. The Masterplan is a comprehensive plan for the site and details how the vision will be delivered. A further three regulatory documents, Local Structure Plans, will be developed to provide more detail for three precincts within the Masterplan area.

THE SITE

The Cockburn Coast site is located on the Indian Ocean approximately 18km south of Perth and 4km south of Fremantle. The majority of the site is within the City of Cockburn Local Government Area (LGA) but its northern end, including the Fremantle Village Caravan Park is located in the City of Fremantle. The City of Cockburn covers an area of 167.5 square kilometres, has a population of 74,472 (2006) that is expected to grow to 127,885 by 2031.

The Cockburn Coast site falls within the boundaries of four different suburbs. The Western half is in North Coogee, the eastern side is part of Hamilton Hill, the very northern part is located in South Fremantle and the south-eastern corner is in the suburb of Spearwood.

There are a total of 446 landholdings contained within the Cockburn Coast site boundary and 182 of these are owned by private landowners.

A concentration of residential properties located on site are concentrated to the north east, both to the north and south of Rockingham Road. Residential development, south of Rockingham Road, largely consists of apartments and town house developments, while to the north many properties remain single dwellings.

A dominant feature of the site is the dunal landscape that spans the entire western side of the site. The site has a moderate slope to a ridge line, which runs along the eastern side of the site parallel to the coast. The topography of the area means that the majority of the site is orientated like a grandstand looking out to the ocean and the setting sun. Other dominant features of the site include the abandoned Fremantle Power Station, operational switchyard, freight rail line, Robb Jetty and proximity to Beelier Regional Nature Reserve.

The site has traditionally accommodated industrial operations with isolated pockets of residential development. An abattoir and power station once operated on site, but both operations have since closed. Today the site consists of a number of light industrial businesses.

An audit of local businesses was undertaken to identify the range of industries currently operating on site. While specific businesses have been identified in the table to the right, other businesses at the site include engineering/drafting services, insulation services and water management services and were not captured due to lack of company identification signage The table to the right (organises these businesses according to Local Structure Plan area (refer to page 15) and does not include businesses outside the Masterplan study area.



EMPLACEMENT

- Perth Hide & Skin Exports
- Schutz DSL Australia
- Far West Scallops Industries
- Metro Ice
- Endeavour Foods
- PK Print
- Flowserve Australia
- Livestock Express
- Ricciardi Seafoods and Coldstores
- Alba Edible Oils
- Early Bird Seafood and Bait
- Southern Trading Australia Pty Ltd
- Freo Octopus
- Inside Out Direct Garden Wholesale
- Stazo Marine Equipment
- Aqua Care
- Wellness Clinic
- Tradelink
- LAZCO Engineering
- The Ashronia Community Services

ROBB JETTY

- Fremantle Cold Stores and Grando Processing
- Plantagenet Pork
- Hempel Marine Paints
- ERS Equipment
- Tank and Vessel Engineers
- Viento p/s
- Ball Noodle Manufacturing
- Don Vica Pty Ltd (Gourmet Olives)

POWER STATION

- BETA Spuds
- Potato Marketing Corporation of Western Australia
- WA Salt Supply
- Western Salt Refinery

TOP: SITE CONTEXT
BOTTOM: BUSINESS AUDIT TABLE

THE DEVELOPMENT

The Masterplan developable area (right) consists of approximately 300 hectares of post industrial land. The DSP and Masterplan propose a mixed use development to house between 10-12,000 people in a medium density, transport oriented development. Two primary retail/commercial centres are proposed, one at the power station and another at Robb Jetty. Other retail will be spread across the site and existing land uses are expected to continue in the north-west of the site. The employment objective is c.3000 jobs for local and neighbouring residents.

Opportunities and Challenges

The site area presents a number of unique opportunities and challenges.

Opportunities include:

- Predominantly government land ownership
- Minimal existing residential, and
- Access to numerous natural assets including the Beach and reserves

Challenges include:

- Adaptive reuse of heritage Infrastructure
- Post industrial land decontamination
- Potential conflicts in current and future land uses, and
- Freight rail line

Local Structure Plans

In addition to providing a macro level design for the entire Cockburn study area, the Masterplan has defined three Local Structure Plan Areas (LSP Areas) in accordance with the City of Cockburn's Development Zone. These LSP Areas comprise of:

- Robb Jetty LSP Area
- Hill Top/Emplacement LSP Area
- Power Station LSP Area

The LSPs aim to provide a greater level of design considerations on a precinct scale, and aid in the implementation of this design, while being directed by the District Structure Plan and Masterplan.



ABOVE: Cockburn Coast Masterplan and LSP Areas
Masterplan as updated September 2011

STRATEGIC PLANNING CONTEXT

The following strategic and regulatory documents have played a significant role in the development of the DSP and Masterplan. Their influence will continue to be considered through the Local Structure Planning process and the delivery of the Place Making Strategy.

METROPOLITAN REGIONAL SCHEME (MRS)

The MRS defines the future use of land, dividing it into broad zones and reservations. It requires local government town planning schemes to provide detailed plans for their part of the region.

IMPROVEMENT PLAN NO. 33 (IP 33)

IP 33 was prepared under the provisions of Part 8 of the Planning and Development Act 2005. It came into effect in June 2006 and was designed to prevent inappropriate development within Cockburn Coast while the DSP was being prepared. IP33 was intended as an interim statutory mechanism to allow the district structure planning to occur and is likely to be rescined at the end of the planning process.

DIRECTIONS 2031: DRAFT SPATIAL POLICY FOR PERTH & PEEL

Directions 2031 is a framework for steering detailed planning and delivery to provide the housing, infrastructure and services that will be needed for future population growth in the Perth and Peel metropolitan region.

STATE PLANNING POLICY 4.2 ACTIVITY CENTRES (SPP 4.2)

SPP 4.2 provides broad planning requirements for the planning and development of new and existing active centres. The policy is applicable to Cockburn Coast because it was named as a District Centre under Directions 2031.

STATE PLANNING POLICY 2.6- COASTAL PLANNING POLICY

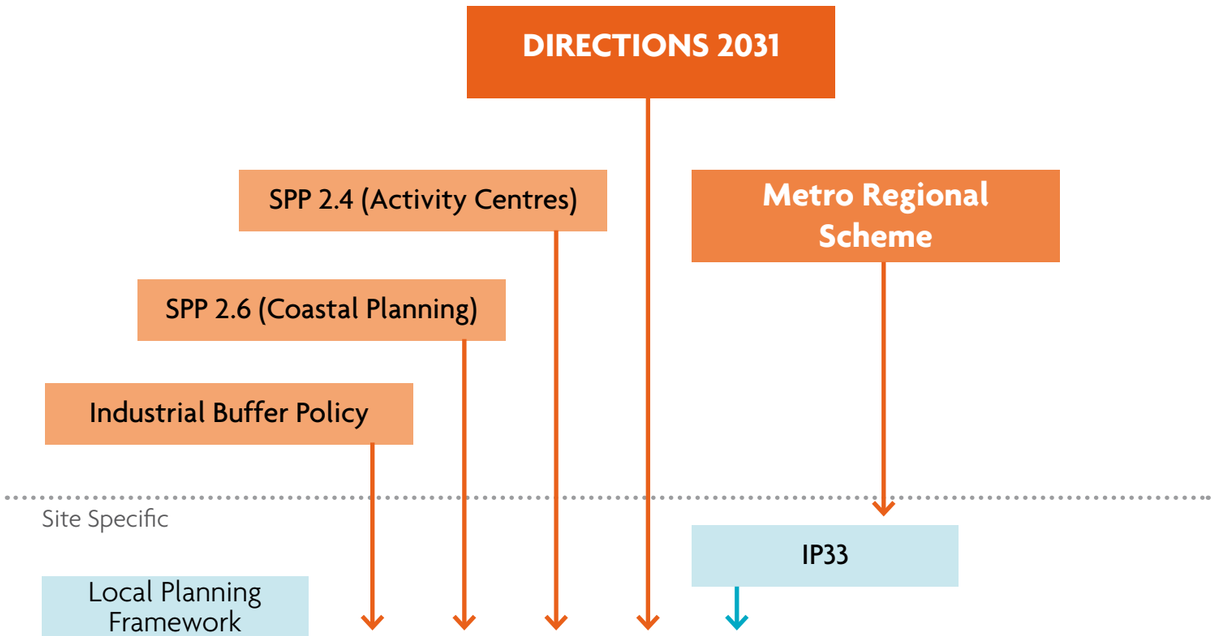
SPP 2.6 applies to development along the entire coastline of Western Australia it provides guidance relating to development and land use along the beach including building setbacks and height limits.

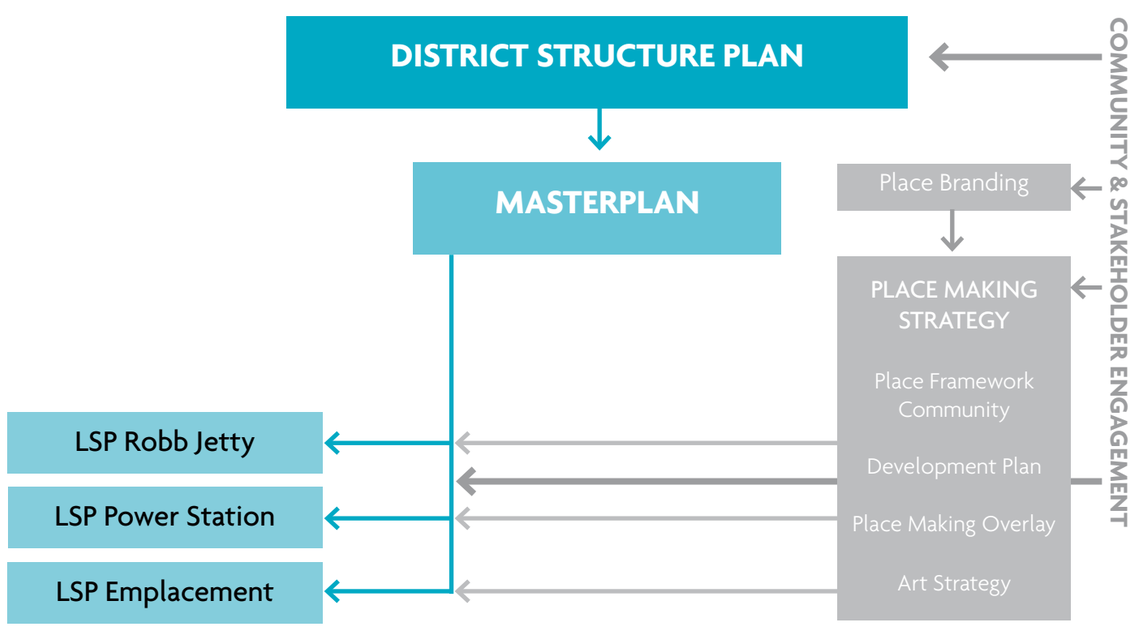
STATE INDUSTRIAL BUFFER STATEMENT OF PLANNING POLICY 4.1

The Industrial Buffer Policy potentially applies to a number of existing industrial uses including the Fremantle Cold Stores and Water Corporation Pumping Station.

LOCAL PLANNING FRAMEWORK

The City of Cockburn Town Planning Scheme No.3 is the key document in the approval process. However, IPN 33 means that it is not a statutory document with regard to Cockburn Coast. However the project should aim to be consistent with its vision and objectives.





PROJECT VISION & OBJECTIVES

The table on the following page summarises the key directions and objectives of each document. The purpose of this summation is to provide a foundation for the development of place making principles that reflect and deliver the Masterplan vision and objectives.

The Cockburn Coast Dialogue Report
insert overview of doc here (to be completed post feedback)

District Structure Plan
insert (to be completed post feedback)

Masterplan
insert (to be completed post feedback)

	COCKBURN COAST DIALOGUE REPORT	DISTRICT STRUCTURE PLAN	MASTERPLAN
VISION		**› To create a vibrant, landmark destination that is connected, integrated, diverse and accessible.**	**› To create a vibrant, landmark destination that is connected, integrated, diverse and accessible.**
		› To create a coastal settlement of beauty, charm and vibrancy that exhibits world leadership in architecture and building design, landscape and water design, and social and cultural sustainability. › To create a place that offers new and exciting living, employment and recreation opportunities, whilst also providing an appropriate level of compatibility and support for existing residents and enterprises in the area.	
PUBLIC REALM	› Mainly green open recreational space, as natural as possible, preserved from development, with no high rise except the	› The Structure Plan seeks to create a distinct urban public domain that complements the existing natural and urban areas within and surrounding the project area, and diversifies the opportunities for people to enjoy a vibrant outdoor city life.	› Link between quality of the green infrastructure and social cohesion.
	› Limited development and plenty of access to beach for general public.	› Establish a sense of place through interesting and interactive streetscapes and built form that reflecting the history and coastal influences of the site.	› Focus green infrastructure on the waterfront to maximise exposure and appeal.
	› A vibrant community area that is family friendly, with clean and plentiful public facilities, which is a destination for locals and	› Create strong legibility and enhancement of the project area's entries, focal points, movement networks, open spaces and activity nodes.	› Infuse a strong green infrastructure identity as a 'marketing brand' to appeal to a wider market to accelerate growth.
		› Ensuring attractive, interactive and interesting street environments for pedestrians and cyclists. › Ensuring safety in the public realm, particularly at night.	› Creating real links to the beach through walkways and environmental conservation trails.
		› The old South Fremantle Power Station brought back to life as a dynamic new waterfront centre which, combined with the new Port Coogee marina development, will create a regionally significant coastal node for Perth's southern suburbs.	
		› It will be a collection of great streets and inspiring public places in which to explore and enjoy the Cockburn Coast's past.	
		› Integrating and optimizing civic land uses. › Providing a network of open spaces.	› Creating a connected series of 'internally orientated' parks, streets and built up areas that embody the character of this coastal location.
ENVIRONMENT		› New sustainable performance criteria, as outlined in the Regional Framework, will be implemented and are based upon environmentally sustainable design principles, while an integrated urban water design will have a focus on collecting, storing and recycling water.	› Respecting the unique and fragile condition of the coast through careful consideration as to where and how the coast is developed.
		› A focus on environmental considerations in landscape design and management.	› Establish a sustainability framework for future detailed planning and design.
		› A green design focus for buildings, which collectively provide a demonstration of best practice sustainable development.	› Land value capture – long-term strategic land investment. High building standards (reflect Aust. climate). Local energy generation (WA min. demand on SWIS).
LIVEABILITY	› A vibrant beach culture, with access for young and old to cafes, restaurants, housing, active and passive recreation.	› Creation of an integrated mix of land uses - a place to live, work and play, where people have a choice of activities throughout the day and night	› Create a place with a mix of people, housing, uses, experience and lifestyle.
		› The use of the natural landform, different character and roles of individual streets to create varied land use and built form character precincts.	› Attracting the wider community- establish a district hub or Main Street.
		› A range of residential types that promote a mixed population.	› Overcome physical barriers (railway line/ roads) in key locations and create real links to the beach through walkways and environmental conservation trails and creating East-West links that connect people in this community to the coast.
		› Create a beach lifestyle. A sense of shared ownership of open space and recreation opportunities.	
BUILT FORM	› Medium to high density housing developments to ensure sufficient population for a viable community and to support a comprehensive public transport system.	› Creation of a variety of building types, with a key focus on sustainable design	› Respecting the unique and fragile condition of the coast through careful consideration as to where and how the coast is developed (explore opportunities to create 'finger' development).
	› South Fremantle Power Station redeveloped as an icon, with mixed use.	› Local activity/retail nodes, an active main street focus on Cockburn Road, and a significant destination opportunity with the Power Station special development area.	› Integrating a rejuvenated South Fremantle Power Station as a significant building and place making centrepiece that becomes a "world class" commercial and tourist destination.
		› Promoting traditional 'main street' forms of building design within commercial areas.	
		› Focusing on public realm and built form outcomes – not strict land use regulations. Providing housing density and diversity, embracing an integrated mix of uses where people have a choice of activities throughout the day and night. Maintenance of the integrity of the existing land uses where appropriate and desired.	
		› Stipulating adaptable mixed use buildings in appropriate locations. Facilitating development of commercial and mixed use buildings to the street edges. Encouraging active building edges fronting the public realm, particularly at the ground floor level.	

REGIONAL REVIEW

Place Partners conducted a regional review to consider opportunities for Cockburn Coast's point of difference and its contribution to the regional offer. The following pages consider each of the centres reviewed and outlines the key strengths and weaknesses of each.

A point of difference is established when a gap in the market is realised. The Cockburn Coast has the potential to respond to market gaps through a review of new developments, tourist destinations, major economic centres, recreational spaces and established and local shopping centres.

The major economic centres reviewed provide a variety of employment opportunities that range between blue and white collar jobs. Improved connections to Henderson, Murdoch, Perth CBD and Fremantle, will attract commuters and a greater social mix within the development. The Cockburn Coast should market itself in attracting both blue and white collar residents based on location, unique place character and affordable lifestyle.

Tourist destinations reviewed at Whiteman Park, Rockingham, Hillary's Harbour and the North Coast are a significant distance from the Perth CBD and promote themselves as the ideal 'day trip'. The Cockburn Coast's proximity to Perth CBD presents an opportunity to capitalise upon convenience but will also need to provide a significant tourist offer that differs from its competitors.

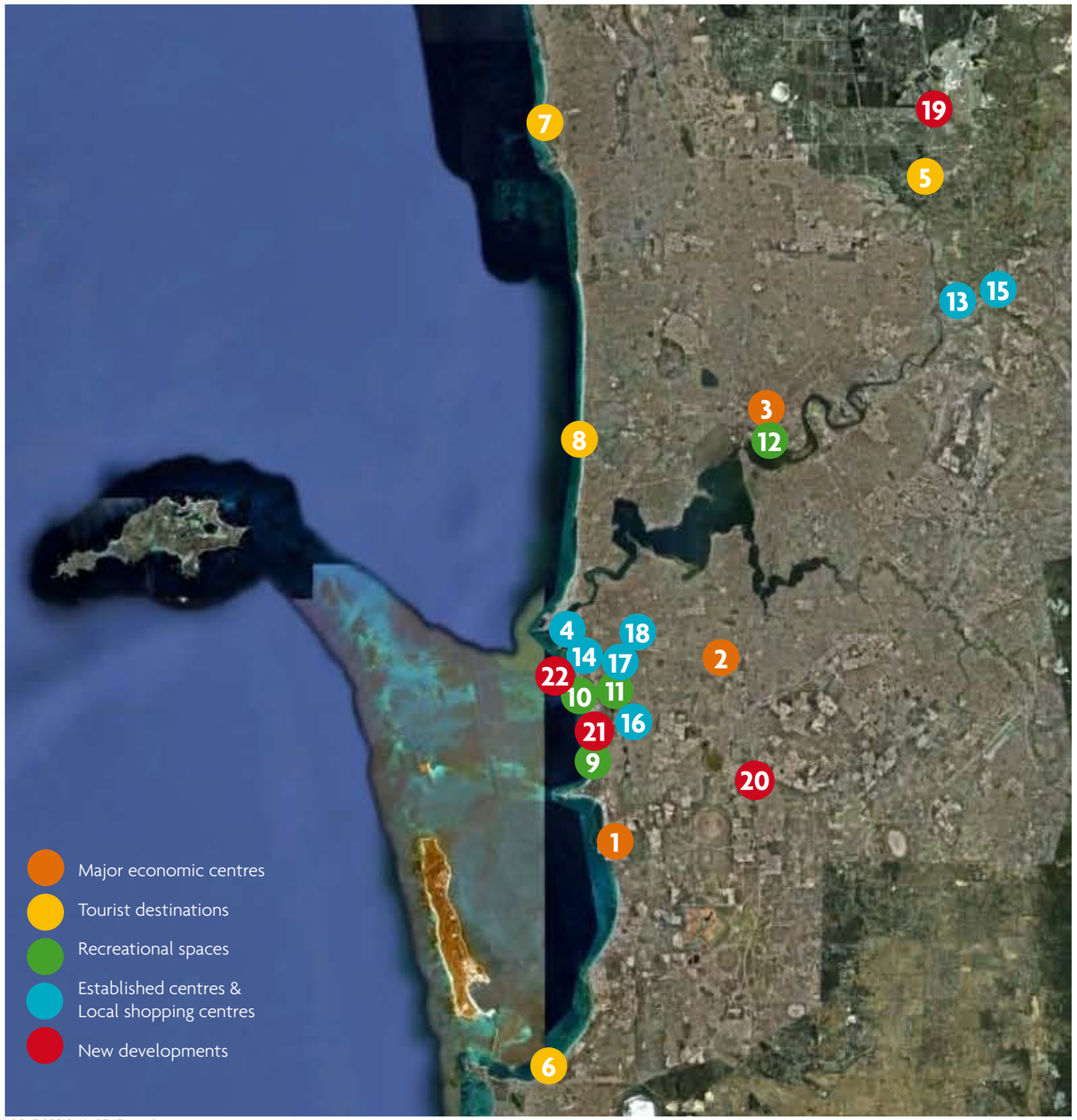
The recreational spaces of Coogee Beach, C Y O'Connor Beach, Manning Park and Alf Curlewis Gardens, are diverse in user groups and activities, providing a variety of different experiences. The strongest contrast is the experience between the coastal and inland recreational spaces, from the beach to the green sheltered spaces of Manning Park.

There is a general lack of quality public realm within the town centres reviewed. The role of many of these spaces are more like paths between destinations rather than destinations in their own right. The public realm often fails to convey a sense of comfort, but also to provide a point of interest or some form of self sustaining activity.

All new developments reviewed focussed on providing well maintained and green public open space as part if their offer. In pursuit of this aim, much of the open space was either too big to be actively used by surrounding residential development, too small or some even felt like an extension of an adjacent residential house.

WHAT WE LEARNT

- The major economic centres of Henderson, Murdoch, Perth CBD and Fremantle provide the Cockburn Coast with an opportunity to provide accommodation for blue and white collar residents and support industries
- Hillary's Harbour is the primary competitor for the Perth city tourist market but distance to the CBD creates an opportunity for the Cockburn Coast to provide Perth with a 'Hillary's of the south'
- Throughout the Perth metropolitan area, recreational spaces are over managed with restrictions and regulations common. An opportunity exists for the Cockburn Coast to develop a point of difference based on its openness to diversity of activity
- Migrants provide entrepreneurship and sense of vitality to established centres
- Local shopping centres are car dependent with no existing public realm
- New developments have focussed on the delivery of open space resulting in an over supply and have disconnected town centres
- The suburbs north of the Cockburn Coast, such as Fremantle, are ideal case studies for amenity and urbanity within the metropolitan area
- Overall the metropolitan area has a poor level of public transport and is largely car dependant
- 50% of centres reviewed have poor or no public transport connections
- The primary users of rapid bus transport were school children and workers, who parked close to the station, and commuted to their place of employment
- The Northern beaches are different to the Southern beaches. They are more dramatic than the South and in the past have attracted national events and carnivals. The Southern beaches attract a wider range of uses and have a greater sense of local ownership
- Generally, tourist attractions within the region are disconnected and attract specific audiences on day visits



ABOVE: REGIONAL REVIEW MAP

MAJOR ECONOMIC CENTRES

1 HENDERSON

Henderson is a major industrial hub, located 8km south of the Cockburn Coast. As public transport to the area is poor, private vehicle commuting exacerbates peak hour traffic in the region. The Cockburn Coast is ideally located to provide housing for these workers and office accommodation for support businesses.

STRENGTHS	WEAKNESSES
› Employment hub (blue and white collar)	› Travel to work distances › Not serviced by public transport

Characteristics

- Large industrial precinct
- Predominantly new buildings (with most built past 10 years)
- Beeliar Park acts as a buffer between residential and industrial areas
- Developed coastal edge (industrial use)
- Maritime businesses/industries
- Large warehouses and construction yards
- Boat harbour and wharf
- Car dependent
- No formal public parking areas with cars parked either on site or on curb
- Motorcycle club and international raceway

2 MURDOCH

Murdoch is a health and education activity hub based on campus style development, located 8km north east of the Cockburn Coast. Centralisation of education and health services makes it difficult for the Cockburn Coast to compete, but distance and lack of connectivity may leave a gap for local services in the area.

STRENGTHS	WEAKNESSES
› Open space › Employment hub (white collar) › Student population › Train station	› Car friendly design with large carparks separating buildings › Campus development

Characteristics

- Education and health activity centre
- St John of God Hospital
- Fiona Stanley Hospital (under construction)
- St Ives Large retirement village constructed past 5 years
- Murdoch University
- University affiliated uses including residential colleges
- Train station and bus interchange
- Car dependent
- Large parkland reserve and open spaces

3 PERTH

Perth CBD, located 18km north east of the Cockburn Coast, attracts a large number of daily commuters but is home to few residents. As such the CBD becomes lifeless outside work hours. With the Cockburn Coast a short distance from the Perth CBD, the area could provide affordable housing and lifestyle options for urban professionals attracting youth and talent as key audiences.

STRENGTHS	WEAKNESSES
› Public transport › Employment hub (white collar) › Major tourist attraction	› Lack of activity on weekend › Lack of late night trading

Characteristics

- Swan River waterfront
- Convention Centre
- Urban laneways
- Hay Street pedestrian mall
- Public transport (Train, Bus, Ferry)
- Bike paths and walking trails
- Disconnect between CBD and Northgate
- Recreational spaces (formal and informal)
- High density

4 FREMANTLE

Fremantle, located 4km north of the Cockburn Coast, is characterised by an active and diverse street life that makes the most of its unique heritage buildings, continuous street heights and range in street widths. Fremantle provides a local case study of good design outcomes and possibilities for any urban development along the Cockburn Coast. The Cockburn Coast could learn from Fremantle's urban offer without trying to replace it.

STRENGTHS	WEAKNESSES
› People sitting out on street › Shelter and awnings › Paving treatment, highly pedestrianised › Train station	› Lack of street vegetation

Characteristics

- People going to work primary audience
- School and university students secondary audience
- Place to get coffee
- Mix of demographic groups
- Morning trade is busier on weekends than during the week
- Café culture
- Heritage buildings
- Gino coffee is an anchor but other tenants seem quieter
- Train station









TOURIST DESTINATIONS

5 WHITEMAN PARK

Whiteman Park, located 34km north east of the Cockburn Coast, is an inland tourist destination attracting a local, regional and international tourist market. Learning from Whiteman Park, the Cockburn Coast could consider a wide range of uses to activate the public realm at various times of the day and night and provide a niche offer for particular audience groups.

STRENGTHS	WEAKNESSES
› Variety and diversity of offer, formal or informal › Parking	› Poor wayfinding › No public transport connections

Offer and Attractions

- Birds of prey flying display
- Caversham Wildlife Park (features over 200 species) family owned
- Children's forest and amusements
- Natural product and therapy shop
- Village art gallery
- Pottery centre
- Handcraft centre
- Western Australia's only land transport heritage centre
- Tractor Museum of WA
- Motor Museum of WA
- Train and tram rides

6 ROCKINGHAM

As a key Southern destination, Rockingham, located 21km south of the Cockburn Coast, represents strong regional competition for holiday makers and tourists. While Rockingham attracts large numbers of tourists and family groups during the summer months, the BBQ areas remain dormant during the winter months. The Cockburn Coast could activate the dunal landscape of C Y O'Connor during the winter months by encouraging dog based activities and wind/kite surfing.

STRENGTHS	WEAKNESSES
› Park and recreational offer	› Car dependent › Dramatic density variations

Offer and Attractions

- Beach restaurants (higher price point) attract white collar local business workers and tourist grey nomads
- Local wealthy retirees
- Shopping centre big box 5min inland
- Shopping strip – takeaway (cheap) vs dining (higher price point)
- High density residential/hotel apartments (10 storeys) vs 1 storey retail
- Recreational beach, family beach, no surfing
- Park buffer between high density development and ocean/beach
- Exposed to wind
- Public art
- Apartment hotel

7 HILLARY'S HARBOUR

Hillary's Harbour is currently Perth's major coastal tourist node for day trippers and visitors. Located 30km north of the Cockburn Coast it provides a weather protected shopping and eating experience. As Hillary's Harbour is 'one of a kind' in the Perth metropolitan area, an opportunity exists to establish a Hillary's Harbour of the South at Cockburn Coast.

STRENGTHS	WEAKNESSES
› Undercover and protected › Variety of commercial mix	› Outdated public realm materials and appearance

Offer and Attractions

- Multigenerational
- Local, regional and international visitors
- Main meal price point $25 - $47
- Children friendly safe beach and recreational area including water slide and play equipment
- Everyday services and demand for locals (i.e. hairdressers)
- Weekend activity centre for tourists
- Predominantly souvenir and tourist orientated businesses
- Sit down meals in cafes/restaurants facing the water but with very little outdoor seating unless protected from the wind
- Big family Sunday lunch
- Aquarium of WA
- Family groups and young teenagers watching surfers
- Expansive car parking

8 NORTH COAST

The North coast, including the Cottlesoe, Scarborough and North Beach centres, is more dramatic than the South with the landscape changing frequently from beach paradise to cliff face. The softer edge of the Cockburn Coast and relatively untamed beach landscape establishes a point of difference.

STRENGTHS	WEAKNESSES
› Active and well used recreational spaces › Iconic beach landscapes	› Environmental conditions

Offer and Attractions

- Dramatic edge condition
- Coastal drive separates residential from recreational
- Large detached 2 - 3 storey new housing development
- Scattered pockets of 1 - 2 beach shacks
- Scarboro SLSC located at Scarborough Beach has attracted national surf life saving competitions
- Popular swimming beach at Cottesloe and its historic and iconic club
- Active walk/bike paths regardless of weather conditions
- Dispersed centres along the coastline with surf life saving clubs anchoring businesses
- The public realm takes the full strength of the Perth winds









RECREATIONAL SPACES

9 COOGEE BEACH

A stand alone cafe and surf life saving club service Coogee Beach, located 3km south of the Cockburn Coast. A large well maintained open space adds another recreational element to the beach. The dunal landscape that separates the beach from the green space provides protection from the wind. Coogee Beach is family friendly and primarily attracts residents from the City of Cockburn. A jetty provides a romantic setting to a sunset backdrop. As a point of difference, the Cockburn Coast should maintain its wild appearance while meeting the needs of an increased number of beach users.

STRENGTHS	WEAKNESSES
› Popular local beach › Surf Life Saving Club › Large recreational spaces protected by dune	› Disconnect between residential development and beach

Users and activities

- Family
- Empty nesters, business meeting, tradies
- Higher price point café
- Facilities: bbq, seating, grass and play equipment
- Parking
- Heritage markers

10 C Y O'CONNOR BEACH

The users of C Y O'Connor Beach, located on site, travel to the area to walk their dogs, train horses from the Randwick Stables or participate in recreational activity; running, walking and cycling. There are no businesses located along C Y O'Connor Beach and the overgrown vegetation provides a sense of enclosure and restrict views to the ocean. It is important to maintain current uses of the beach.

STRENGTHS	WEAKNESSES
› Local character › Off leash dog areas	› No existing businesses, cafes, services, or Surf Life Saving Club

Users and activities

- Dog walkers primary audience
- Young Asian background university students with spray cans
- "You could see the ocean before the Council started planting trees and moving sand. I've been bringing my dogs here for years but Council has reduced the number of off leash dog areas so I drive 15min to come here to let my dogs have a run" - Local Resident, Woman, Mid 60s
- People drive to park here to visit the Power Station for graffiti, art, photography and exploration

11 MANNING PARK

Across the ridgeline of Manning Reserve, to the east of the Cockburn Coast site, Manning Park is a natural sanctuary catering for numerous recreational uses. The Park is protected from strong winds and includes views and access to the lake while being surrounded by remnant bushland. While not being a part of the Cockburn Coast site, the Manning Park is an important natural asset to consider in any planning, particularly maintaining access and connections.

STRENGTHS	WEAKNESSES
› Clean, › Well maintained grass › Quiet escape › Picturesque › Activated	› Car dependant

Users and activities

- Dog walkers primary audience
- Cyclists secondary audience
- Older people, mother's groups and community groups
- Large open space surrounding a lake
- Established trees
- Views to Manning Lake
- Well used children's playground
- Azelia Ley Homestead

12 ALF CURLEWIS GARDENS

The Alf Curlewis Gardens is an active recreational space in the heart of Perth CBD. The park balances formal and informal uses and is well used during weekdays responding to the needs of local workers. The Cockburn Coast should consider everyday users in the design of public open space.

STRENGTHS	WEAKNESSES
› Large open space used for ball sports › Responds to user groups needs and wants	› Lack of weekend activation

Users and activities

- Large open space
- Well used during the week, especially between 12pm and 3pm
- Lower usage rates on the weekends and at night
- Group and individual exercise
- Activities include ball game sports such as soccer
- Cafe/restaurant
- Adjacent to CBD
- Used for live entertainment
- Well maintained
- Toilet facilities
- Connected to wider parklands network









ESTABLISHED CENTRES

13 GUILDFORD

Guildford, located 28km North of the Cockburn Coast presents a sense of local pride, unique heritage and community to the visitor. The past and present merge in Guildford, with residents claiming ownership of their place and supporting the preservation of important community buildings such as the historic Guildford Hotel.

STRENGTHS	WEAKNESSES
› Train station › Community involvement/ interest › Sense of place › Established community › Heritage village	› No concentration of activity or centralised high street

Characteristics

- Community activism – "Save the Guildford Hotel"
- Museum of Natural History
- City of Swan Library
- Guildford Grammar School, approximately $16,000/year tuition fees, with boarding an additional $14,000/year, Anglican tradition
- Boutique cafes
- Boutique antique stores
- Train station
- The Rose and Crown Hotel is the oldest pubs in Perth

14 SOUTH FREMANTLE

South Fremantle, located 2km North of the Cockburn Coast, has a similar built form to Fremantle but attracts more creatives and artists. A number of formal and informal relationships could be developed between the artists of South Fremantle and future uses and businesses of the Cockburn Coast. However, because this vibrant centre is established with an identifiable place identity, it is important the Cockburn Coast does not compete directly, but rather complements the creative industries of South Fremantle.

STRENGTHS	WEAKNESSES
› Identity › Niche market › Creative › Variety and diversity	› High price point

Characteristics

- Variety of street widths
- Pedestrian friendly – wide footpaths, seating, planter boxes, street art
- Businesses: Artists, massage, whole foods, healthy living, gourmet, yoga, and pub

15 MIDLAND

The multiculturalism present in Midland, located 30km north east of the Cockburn Coast, is represented through its business mix. The fresh local produce and low price point attracts a regional catchment and tourists on route to the Swan Valley. As there is demand and a gap for fresh and cheap produce within the southern suburbs, an opportunity exists for the Cockburn Coast to activate spaces early on by encouraging markets. Migrants are also important facet of any community, providing entrepreneurship and creativity. A point of difference that could be realised at the Cockburn Coast would be to attract the settlement of migrants into the area.

STRENGTHS	WEAKNESSES
› Fresh local produce and low price point › Multicultural feel › Public transport	› Vacancies and degraded streetscape

Characteristics

- Train station
- Weekend farmers markets (every Sunday)
- Fresh produce
- Library
- Small businesses including the Filipino oriental store and the happy herb shop
- Street based developments with a low price point
- Shop top housing
- Adaptive reuse - "The workshops, an urban revolution" – redevelopment of the heritage listed railway workshops at Midland - Midland Redevelopment Authority
- Vacant shops
- Service/support businesses such as Anglicare







TOP: The Rose and Crown Hotel in Guildford
MIDDLE: Creative industries at South Fremantle
BOTTOM: Weekend farmers Markets at Midland

LOCAL SHOPPING CENTRES

16 SPEARWOOD (& PHEONIX SHOPPING CENTRE)

Spearwood, just under 2km East the site, which includes the Pheonix Shopping Centre and Council Chambers, favours vehicle access and convenience over the comfort of the pedestrian. As a point of difference Cockburn Road should consider connectivity between precincts and pedestrian comfort.

STRENGTHS	WEAKNESSES
› Services and facilities (i.e. Banks and medical services)	› No places for people or self sustaining activity

Key Findings

- Big box shopping centre (Pheonix Shopping Centre)
- Takeaway and fast food restaurants promote the area as strictly a drive through shopping strip
- Banks located within shopping centre but also adjacent to takeaway restaurants along the shopping strip
- Local area medical centre located on the western side of Rockingham Road
- Large street advertising signage
- No public realm with residents gathering inside the Pheonix Shopping Centre to socialise
- Rubbish and dumping in residential streets
- Predominantly detached one storey housing (circa 1970s)
- Pedestrian unfriendly with poor connectivity and urban design responding to the needs of the private vehicle
- Council Chambers at southern end of shopping strip

17 HAMILTON HILL SHOPPING PLAZA

The Hamilton Hill Shopping Plaza, located 500m East of the site on Rockingham Road, provides a local shopping catchment with quick and convenient everyday needs. The Cockburn Coast should aim to promote a similar mix of businesses and services that work together in attracting the consumer. If only restructured to provide a greater public realm experience, the businesses and services at Hamilton Hill Shopping Plaza would represent a close to perfect mix.

STRENGTHS	WEAKNESSES
› Vibrant (no vacant businesses) local shopping plaza	› No gathering spaces › No family restaurants dining out

Key Findings

- Local shopping centre
- Diverse range of businesses that sell bicycles, motorbikes, African products, pizza, property, groceries, and general gifts
- Diverse range of services such as a pharmacy, child care and gym
- Function Centre
- Peak time after school, collecting everyday items/needs
- Competitively priced for lower price point
- Set back from the road with internalised focus on parking area
- Parking is busy but appears sufficient

18 HAMILTON HILL SHOPPING CENTRE

The Hamilton Hill Shopping Centre, just under 2km North East of the site, is primarily food based, with fresh bakers and butchers complementing the larger supermarket. The diversity of food offer lends Hamilton Hill to an enclosed box shopping centre concept but it promotes itself as a casual and relaxed shopping experience with high street tendencies. People gather out the front of the small independent shops and there is a short distance between shops on either side. However, the Cockburn Coast will find its point of difference to Hamilton Hill in providing formal and informal, intimate and exposed public realm spaces that activate the senses.

STRENGTHS	WEAKNESSES
› Slow traffic › Busy › No vacant shops	› No place to sit and relax

Key Findings

- Local shopping centre at the back of a takeaway strip
- Businesses: IGA, pharmacy, bakers delight, Chinese restaurant
- IGA open 7 days
- Walkable with slow traffic movements and pedestrian dominance







TOP: Spearwood and Pheonix Shopping Centre
MIDDLE: Hamilton Hill Shopping Plaza
BOTTOM: Hamilton Hill Shopping Centre

NEW DEVELOPMENTS

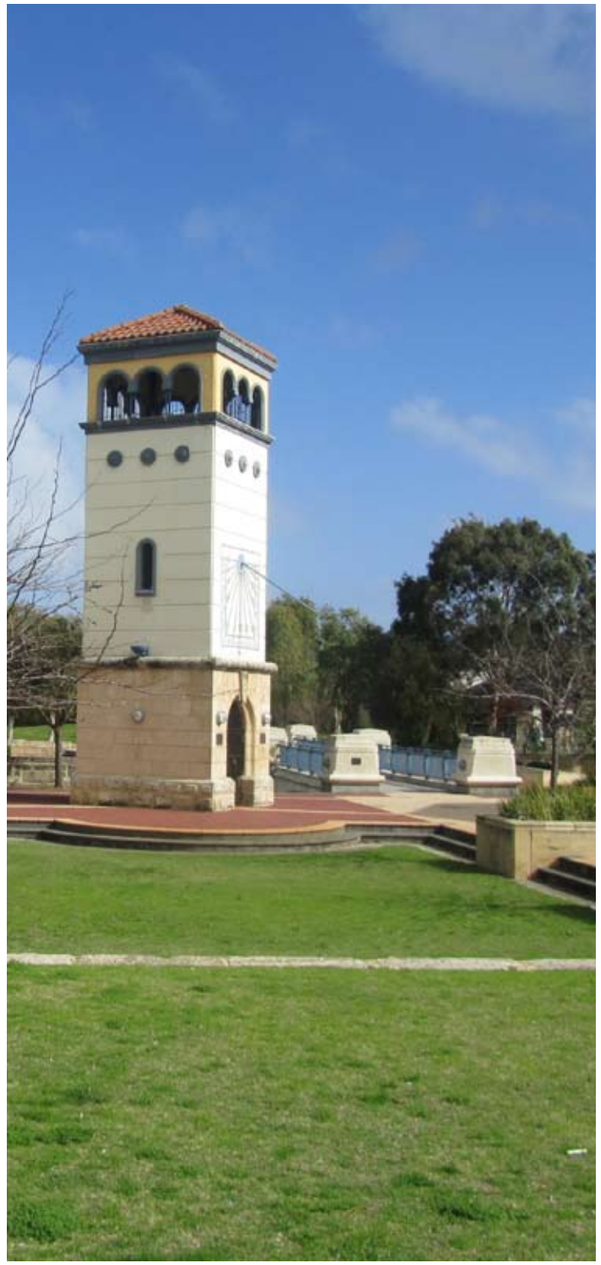
19 ELLENBROOK

Ellenbrook, located 40km north east of the Cockburn Coast, is based on new urbanist principles of open space and activity centre surrounded by smaller villages. The commercial space allocated to the villages remains vacant and the over supply of open space and separation of civic and community uses further deactivates the place. Planning for the incoming 'real' population while considering future needs will help the Cockburn Coast provide open space and centralised activity on a scale appropriate for the community.

STRENGTHS	WEAKNESSES
› Open space and preservation of pine trees/ landscape	› Over supply of open space › Disconnect between large box shopping centre and high street › Disconnect between shopping precinct and civic precinct and library › Businesses closed for weekend trading

Characteristics

- › WA's largest display village
- › Strong italian theme throughout residential
- › High proportion of vacant businesses within residential areas
- › Private and public schools
- › Medium density residential (dense detached residential and attached townhouses)
- › Library
- › Shared pedestrian/vehicle zones throughout the high street
- › Cheap offer along the high street (i.e. Dominos, Fish and Chips)
- › Large box shopping mall closed Sunday
- › Green room where residents bring their waste to be recycled
- › Aged care



20 COCKBURN CENTRAL (& GATEWAY SHOPPING CENTRE)

Cockburn Central is the key centre for the local region, located 10km east of the Cockburn Coast. Cockburn Central is characterised by high density development and poor activity levels in the public realm. The transport interchange at Cockburn Central is currently serving school children, not workers, as its primary audience. While the intention to provide a Transit Orientated Development is good, the poor delivery of the public realm for local residents and visitors has created empty spaces and uncomfortable micro climates between buildings.

STRENGTHS	WEAKNESSES
› Transit orientated Development (T.O.D)	› Disconnected youth centre › Disconnected shopping centre from T.O.D › High car usage

Characteristics

- › School children primary audience and workers as the secondary audience
- › The family group drives to the Gateway Shopping Centre
- › Contrasting T.O.D with vehicle dominated suburban habits – driving between sides of the shopping centre
- › Youth Centre separated from T.O.D and retail
- › Lack of public space in shopping centre precinct and therefore lack of opportunities for interaction
- › Public space at the entrance of T.O.D seating, public art and play equipment
- › No retail/activated edges at T.O.D
- › Surrounded and dissected by freeway and high traffic roads



21 PORT COOGEE

Port Coogee is a marina and residential estate development by Australand and is the Cockburn Coast's immediate neighbour to the South. Significant marina infrastructure and terracing of the landscaping have created a series of perceived barriers between the regional community and the water's edge. Future medium density and retail on the water's edge may alleviate this problem.

The Cockburn Coast should promote itself as an extension of the existing community and build upon existing links with locals. A respect for the existing built and natural environment and the inclusion of a traditional main street within the Cockburn Coast will the biggest point of difference. The South Fremantle Power Station will become an important buffer between the two developments and will need to be managed to mitigate any potential conflicting activities or uses at the border.

STRENGTHS	WEAKNESSES
› Children's beach	› Lack of activity › Sense of privately owned public spaces

Characteristics

- No people/residents only builders
- Detached 2-3 storey residential development
- Beach front land
- Marina
- Walls and raised platforms, that create terraces for the development
- Some public realm could be perceived as 'private' despite public access



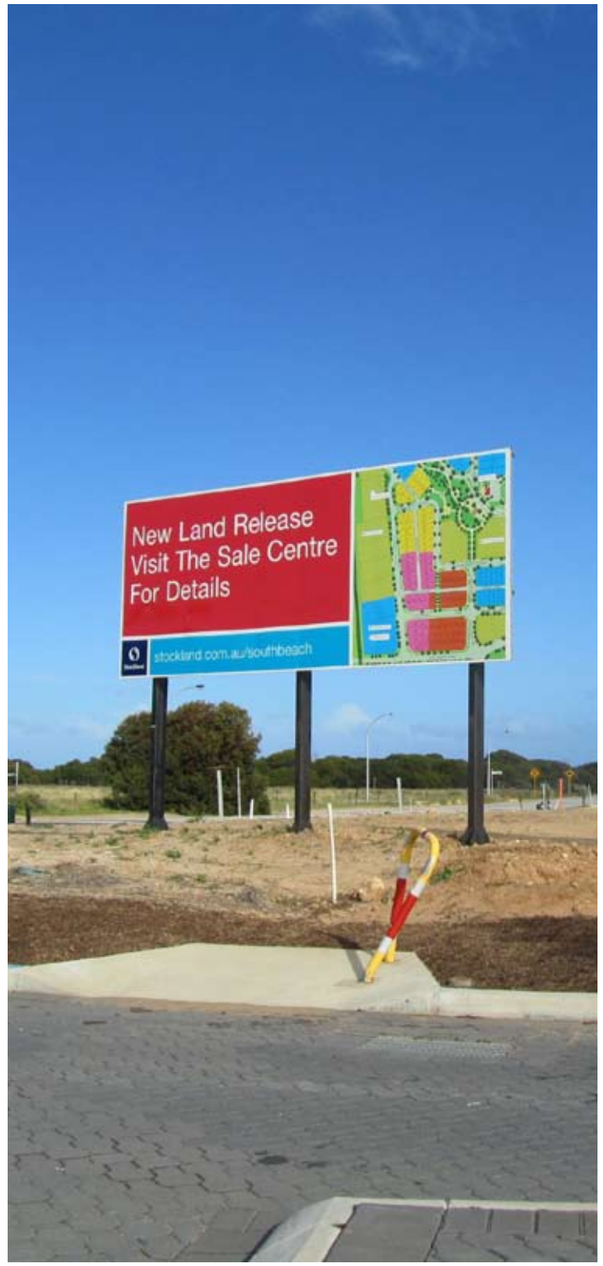
22 SOUTH BEACH

South Beach, to the immediate North of the Cockburn Coast site, links Fremantle and provides the Cockburn Coast with the opportunity for integration and a seamless coastal transition. The Cockburn Coast should consider how South Beach has incorporated the railway line within its development. A combination of built form and open space either disguises the infrastructure or displays it as a component of the landscaping.

STRENGTHS	WEAKNESSES
› Welcoming and attractive	› Beach is disconnected › Corporate feel

Characteristics

- Exercisers and dog walkers primary audience
- Local residents checking beach conditions secondary audience
- Friendly and informal interaction
- Good sense of community
- Railway is a barrier to the beach but well managed through landscaping
- Exposed to elements
- Dog walkers on beach in proximity to residential
- Kids play in park area
- Beach attracts a mix of people
- Concern from some, especially older residents, about erosion
- Younger people job and cycle
- BBQs don't cook well but are still used
- Price Point - $950,000 house and land package



A2
A HOLISTIC APPROACH TO PLACE

Place Partners utilises a quadruple top line approach to place making. That is we consider the social, economic, environmental (natural & man made) and cultural (SEEC) aspects of place. We see a successful people place as a living system of relationships where each element plays an important role in the making of the whole. It is difficult to know how the removal of even one element might impact the whole. Like a game of pick-up sticks, the infrastructure of the place (soft and hard) could hold together with any number of its elements removed, or fall apart if a single relationship is altered.

Considering a place according to SEEC provides a holistic framework for the assessment, making and maintaining of places that balances their social, environmental, economic and cultural aspects. A SEEC approach reflects the theory of holism with its emphasis on the whole and connections between parts. 'Transferred to cities it has made us see connections between the different domains: the environmental, social, economic and, at last, also the fourth pillar of sustainability, the cultural' (Landry 2006,).



THE EVOLVING CHARACTER OF COCKBURN

The diagram on the facing page illustrates some of the most significant factors that have influenced how people have perceived the Cockburn Coast over the years. Some of these narratives are still relevant while others have slipped away. Some stories have been overshadowed and need to be brought back to light.

Three significant narratives include the landscape, lifestyle and work ethos of the area:

The Dunal Landscape and the Ocean Edge
Indigenous stories tell of Carnac & Garden Islands once forming part of the coast "the ground split under great noise and sea rushed between". This dunal landscape creates distinct character qualities, view lines and separation between ocean and inland vegetation. Both protected and degraded landscapes are present within the site area. Significant natural reserve and parkland lies to the east of the site, contrasting with degraded industrial areas.

Coastal Lifestyle
A place between places, the Cockburn Coast was used as a camp between destinations by indigenous people. Active beach life has been part of the sites history dating back to horse racing in the 1830s and lifesaving in the early 1900s. A strong boating culture is present, both for trade and for recreation. The Cockburn Coast was part of the 1987 Amercia's Cup race.

Today O'Connor beach remains a popular dog walking and fishing destination.

Powerful Working Class Town
Traditionally a blue collar working class area associated with meat production and the Power Station, the Newmarket Hotel became the focal point and watering hole for industry and racing fraternities.

Not just a power producer, the site was home to a powerful monopoly on meat production and the working class often banded together to make improvements to their districts.

There has been a shift from production to processing in recent years, with and increase in manufacturing and food processing focus.

SOCIAL

A place between places - the Cockburn Coast was used as a camp between destinations by indigenous people.

Pioneering - early white settlers saw themselves as pioneers in this relatively uninhabited area

Mining migration - workers moving through the site to mining camps and also bring materials to the ports for distribution.

Blue collar - area associated with meat production and the Power Station, the Newmarket Hotel became the focal point and watering hole for industry.

ECONOMIC

Hunting & Gathering/ At one with the land - indigenous peoples worked in harmony with the land and its produce.

Farming/Living off the Land - white settlers struggled to succeed in taming the land.

Food & Power - not just a power producer, the site was home to a powerful monopoly on meat production and the working class often banded together to make improvements to their districts.

Blue to white collar - more recently the area has attracted increasing numbers of professionals and managers attracted to the coastal lifestyle

ENVIRONMENTAL

The Coast - the most enduring physical characteristic of the area, a series of transitions from water to beach, to dune, to ridge and to the eastern suburbs.

Exploitation - previous generations have not always cared for the land as they should, there are implications of long term industrial uses.

Homestead, military, suburban sprawl - the area has had a wide variety of dominant land uses, each with different impacts on the ideantity of the area.

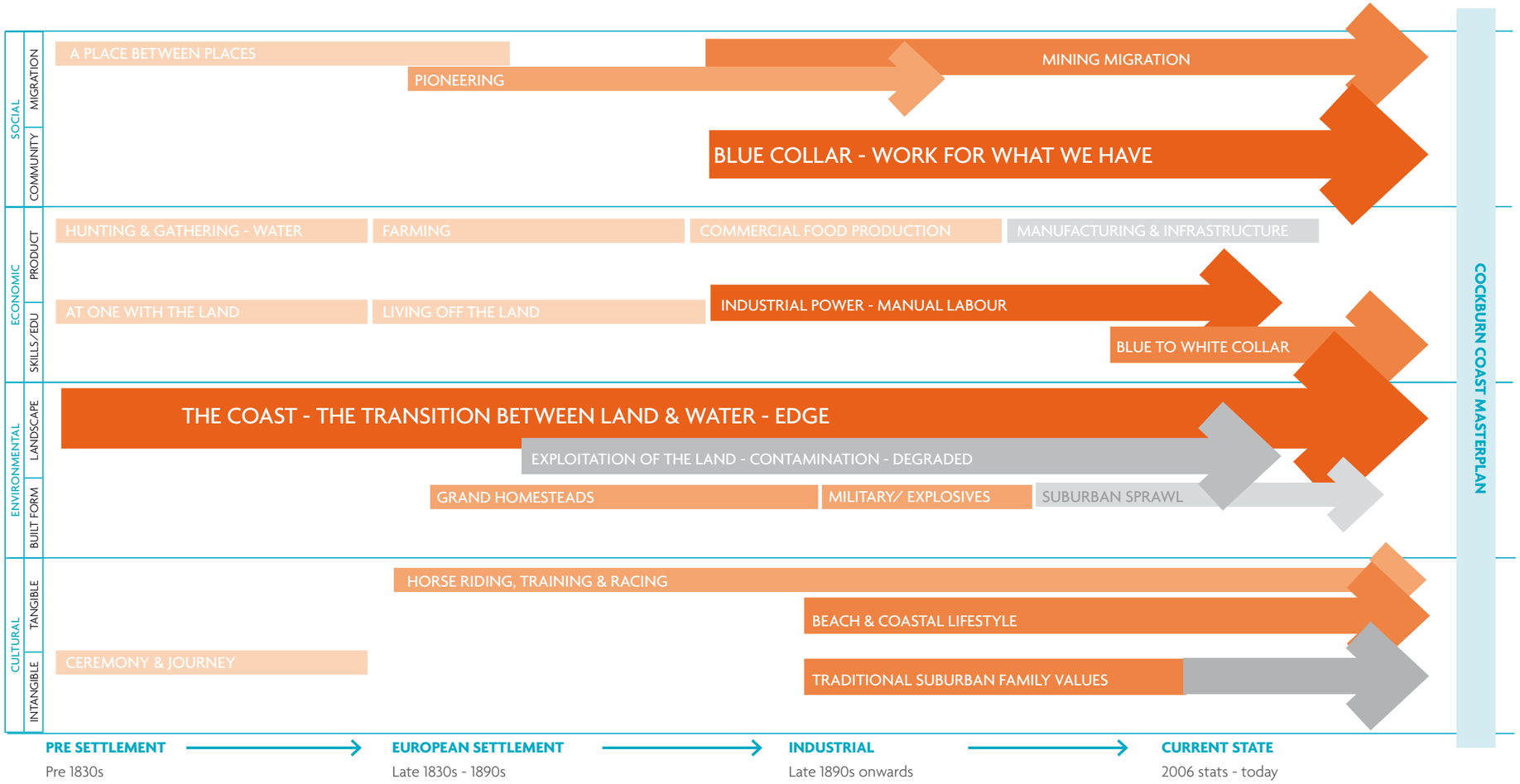
CULTURAL

Ceremony & journey - indigenous stories tell of Carnac & Garden Islands once forming part of the coast "the ground split under great noise and sea rushed between".

Horse riding and training - the longest continuous use of the site since white settlement.

Beach & coastal lifestyle - Aastrong boating culture is present, both for trade and for recreation and O'Connor beach remains a popular dog walking and fishing destination.

Traditional suburbia - no longer a sustainable lifestyle choice, however, supporting the values of the community is essential.



SUMMARY OF FINDINGS

The following pages provide an overview of key factors influencing the development of the Cockburn Coast across social, environmental, economic and cultural aspects of place. The key findings presented here are primarily based on desktop research but are also supported by place based observations in the field.

SOCIAL

The people of a place, its community, whether permanent or temporary, play a significant role in determining its place character. In the first instance they are the ones who 'read' it, they interpret the local narratives and give them meaning through their personal relationship with them. Secondly, the people themselves contribute to the overall character of a place, by being 'of it', or part of the narrative and experience. At the Cockburn Coast, a strategic decision making process is required to ensure the future population attracts adequate diversity and skills to meet the cultural and economic aims of the DSP, particularly younger audiences to service new industries. The Cockburn Coast must also consider its integration with its neighbours, and how the north/south gentrification process can be utilised as a positive force and avoid the exclusion of its potentially less affluent neighbours.

KEY FINDINGS

- Gentrification is occurring from north to south along the coast
- There are local disparities in affluence in the areas surrounding the Cockburn Coast site. The most culturally diverse suburbs are Hamilton Hill and Spearwood, and these are the least affluent
- Future forecasts for the LGA predict a shift in dominant household type from couple family with dependants to those without
- Those moving from northern suburbs are more likely to be managers and professionals than those from the LGA
- Residents tend to be older, more affluent and smaller in household size the closer they are to the coast (and conversely younger and less affluent the further they are inland)
- The largest group of people moving into the LGA are those coming from overseas with an anglo saxon cultural dominance is likely to be reinforced as the largest immigrant groups come from the UK and Ireland
- The LGA has more in common with the demographic characteristics of metropolitan Perth than its neighbour Fremantle
- Employment is very high compared to the national average
- Defining the future population will be a significant challenge and is likely to be linked with the viability of new industries

ENVIRONMENT

The environment of a place, both its man-made and natural physical elements, have an immediate influence on how a place is perceived. Our physical environment represents the culture and story of a place. What buildings look like, their materiality, the quality and diversity of the public realm and even the type of vegetation planted, all give us clues as to who the place is for and how we are expected to behave. Cockburn Coast's strong coastal edge and dunal landscape contrast with the historical industrial infrastructure and provide both opportunities and challenges for the next evolution of the area.

KEY FINDINGS

- The site runs parallel with the Indian Ocean and is edged by public beaches and a dunal landscape
- 330ha site, the largest single redevelopment project in the region
- The Fremantle Doctor (south-westerly wind) is strongest during afternoons of the summer months. Whilst refreshing can make the public realm unpleasant when at its peak
- Hot dry summers and cool wet winters (Mediterranean climate)
- Industrial buildings and infrastructure are situated across the site
- A freight rail line runs through the site dissecting it along the north south axis. C..44 train movement occur along this line each week, this is likely to increase to 56
- Currently there is only a single bus service through the structure plan area. This is a low-frequency service linking Fremantle and Rockingham.
- Cockburn Sound is the most intensively used marine embayment in Western Australia. The sheltered waters of the Sound are popular for fishing and more than 12,000 recreational boating trips are recorded annually
- The area enjoys views to Carnac, Garden and Rottnest Islands
- No threatened flora and fauna has been found on site
- The Cockburn Coast beach, known as the C Y O'Connor beach, is designated as a dog friendly beach (including charity dog beach parties), and is great for fishing

ECONOMY

The economy of a place, what it produces and contributes, influences how it is perceived both by the residents and workers who know it, as well as by those who are looking in. The types of businesses and what they sell, whether product or service, will contribute to the development of the place character, and also the people who will be attracted to the place, as workers, residents and visitors. The Cockburn Coast aims to provide for a gap in existing employment sectors in the LGA which has little or no base for high-end jobs at present. The challenge will be aligning this employment with the skills and training occurring locally to ensure levels of self sufficiency can be achieved.

KEY FINDINGS

- The dominant field of education of Cockburn residents remains engineering and related technologies (29%) and management and commerce (18%)
- Top 3 employment industries in the LGA (2006) are manufacturing (29.8%), retail trade (13.5%) and construction (9.3%)
- In 2006, 40% of people working in the Cockburn LGA lived there
- Employees within the Cockburn LGA typically drive to work (78.3%, only 1.8% take public transport)
- Employees within the Cockburn LGA typically have no formal qualification (45.5%) or certificate level qualification (28.8%)
- Local businesses are dominated by business services and retail trade
- Largest increase in the employment sector was in manufacturing between 2001 and 2006
- Many workers travel into the LGA from the east and southern surrounds
- Little or no economic base for high-end jobs at present

CULTURE

The culture of a place describes the physical or behavioural representation of a community's beliefs, values and creativity. It is not just about ethnicity but perhaps more importantly, how we encourage, manage and govern a community's ability to express itself. How people behave, the way they live, work and play impacts on the character of the place. For Cockburn Coast the challenge will be in changing the dominant culture of the region from suburban private lives to urban communal living. Alternatively there is a need to attract people with different cultural behaviours - those that are already attached to a denser lifestyle, the amenity and sense of community it can deliver.

KEY FINDINGS

- There is not a high level of cultural/ethnic diversity in the local population
- Migration to the area has relied on the attraction to affordable housing for young families and those pushed further south out of the city (gentrification)
- Predominantly Anglo Saxon ethnicity
- The indigenous peoples of the area used the Coast as a transitory camping ground
- Early white settlement was sporadic and varied; from agriculture to horse farming, abattoirs to infrastructure
- Horse racing and training is the most enduring historic theme of the Cockburn Coast
- There appears to be limited local creative or communal activity
- Local recreation focuses on active outdoor pursuits
- There is a cultural divide between current resident lifestyles and the desired behaviours of the future residents of the Cockburn Coast



KEY QUESTIONS MOVING FORWARD

The below questions represent larger considerations and gaps found in the research, where it is either unclear or not specified as to their solution or answer. They provide the ideal starting point for discussion on how the Cockburn Coast is to achieve its ideal place character.

SOCIAL

- What does 10-12,000 residents look like at the Cockburn Coast?
- How do we provide day time activation if our demographic shifts to predominately couples without dependants?
- What do we have to offer a new audience?
- How can we ensure a diversity of population in a somewhat culturally homogenous context?

ECONOMIC

- How do we attract the skilled workers for the desired industries?
- How do we support local business start ups and entrepreneurship?
- What types of businesses do we want to attract?
- How can we support youth education into gap employment sectors?
- How does the leverage off the major employment opportunities of Kwinana and the Western Trade Coast further south fit with employment at the Cockburn Coast?

ENVIRONMENTAL

- How will the edges and crossing of the freight line be managed?
- How do we manage the south westerly winds into the public space?
- How do we enhance the view corridors to the water?
- What is the commitment for the adaptive re-use of the heritage buildings and other infrastructure on site?
- How do we activate the public space outlined in the Masterplan?
- What is the primary activity zone - can 2 zones be supported by this population?

CULTURAL

- What cultural themes will resonate with the new community?
- How do we make past heritage themes relevant today?
- What if the people who move here value the old culture not the new? (i.e. cars & privacy)
- How do we ensure the sustainability of local cultural practices such as the traditional use of the beach by horses and dogs?
- How do we support the first residents of the Cockburn Coast, the incoming pioneers?

Social Aspects Influencing Place Character

The people of a place, its community, whether permanent or temporary, play a significant role in determining its place character. In the first instance they are the ones who 'read' it, they interpret the local narratives and give them meaning through their personal relationship with them. Secondly, the people themselves contribute to the overall character of a place, by being 'of it', or part of the narrative and experience. At the Cockburn Coast, a strategic decision making process is required to ensure the future population attracts adequate diversity and skills to meet the cultural and economic aims of the DSP, particularly younger audiences to service new industries. The Cockburn Coast must also consider its integration with its neighbours, and how the north/south gentrification process can be utilised as a positive force and avoid the exclusion of its potentially less affluent neighbours.

FAST FACTS FROM THE SOCIAL RESEARCH

The people that live, visit and work in a place are an intrinsic part of place character. The following provides a snapshot of the social findings with regard to the Cockburn Coast.

- Gentrification is occurring from the north to the south along the coast
- There are local disparities in affluence in the areas surrounding the Cockburn Coast site
- Future forecasts for the City of Cockburn predict a shift in dominant household type from couple family with dependants to those without
- Those moving from northern suburbs are more likely to be managers and professionals than those from the Cockburn Coast LGA
- Residents tend to be older, more affluent and smaller in household size the closer they are to the coast (and conversely younger and less affluent the further they are inland)
- The largest group of people moving into the LGA are those coming from overseas
- The LGA has more in common with the demographic characteristics of metropolitan Perth than its neighbour Fremantle
- Despite overseas migration, an anglo saxon cultural dominance is likely to be reinforced as the largest immigrant groups come from the UK and Ireland
- The most culturally diverse suburbs are Hamilton Hill and Spearwood, and these are the least affluent
- Employment is very high compared to the national average
- Defining the future population will be a significant challenge and is likely to be linked with the viability of new industries

COCKBURN LGA 2006	COCKBURN LGA 2031
74,472 POPULATION	127,885 POPULATION
35-39 yrs MOST POPULOUS AGE	35-39 yrs MOST POPULOUS AGE
2.65 PERSONS PER HOUSEHOLD	2.46 PERSONS PER HOUSEHOLD
Couple families with dependants DOMINANT HOUSEHOLD TYPE (35.8%))	Couple families without dependants DOMINANT HOUSEHOLD TYPE (31.9% 2031)
19.9% LONE HOUSEHOLDS	23.9% LONE HOUSEHOLDS
8,569 NET MIGRATION (2007-11)	-585 NET MIGRATION (2027-2031)

OPPORTUNITIES

The northern gentrifiers, high income, well educated creatives



National and international talent migration



Strategic approach to community development and attraction of new residents



CHALLENGES

Attracting adequate diversity in future population, particularly youth



'Us and them' challenges of integration with our less affluent inland neighbours



Less family households = fewer people to activate the public realm and retail during the day



PEOPLE IN THE CITY OF COCKBURN NOW

The City of Cockburn Coast is home to 91,448 people (forecast 2011) and is expected to grow to 127,885 by 2031. Much of this growth is to be accommodated by areas within the District Structure Plan of the Cockburn Coast. The following provides a summary of the key socioeconomic influences occurring at LGA level surrounding the Cockburn Coast.

IF IT WERE JUST BUSINESS AS USUAL

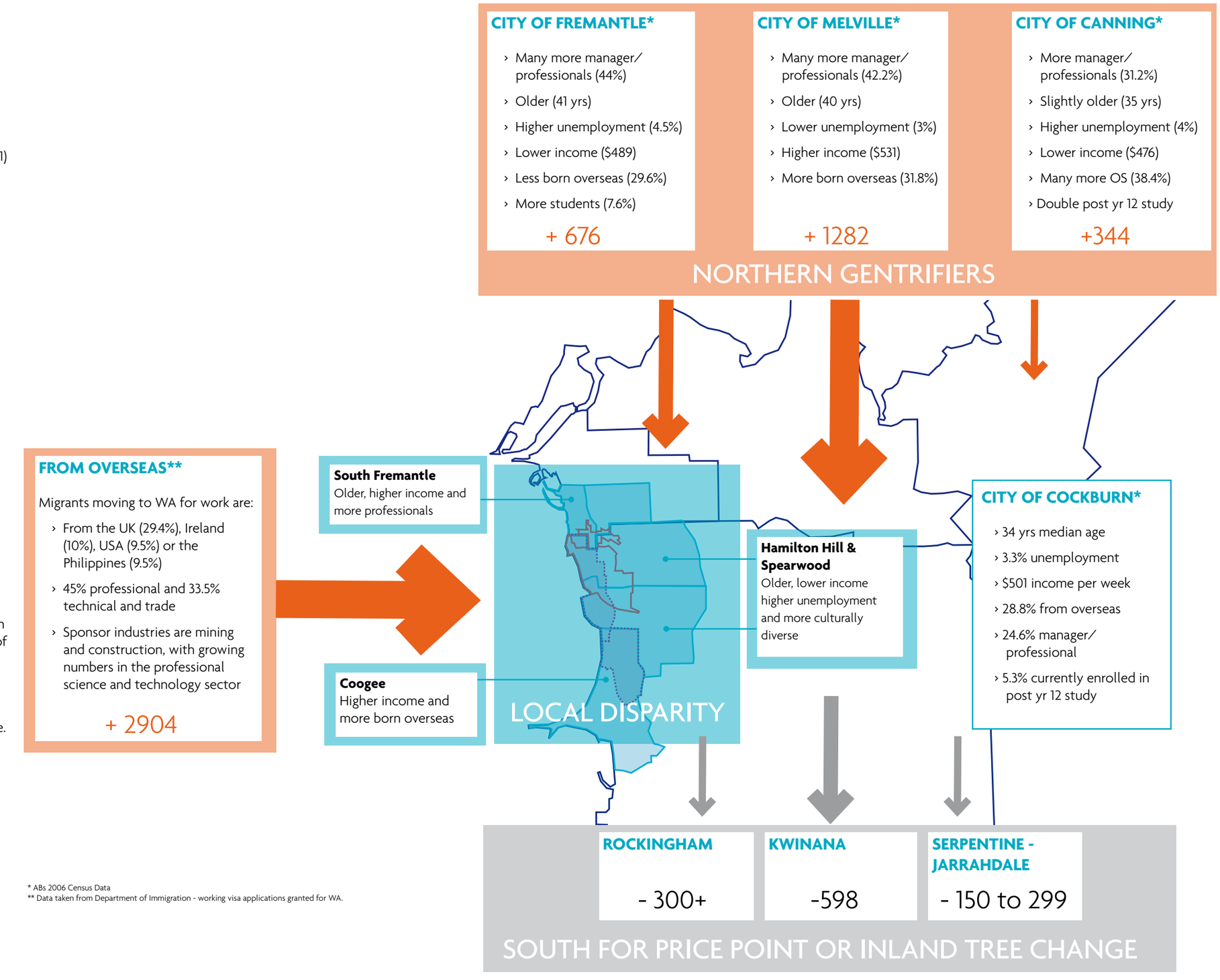
Traditionally a working class area, the City of Cockburn LGA is characterised by high levels of employment, a median age around the mid 30s and a larger proportion of young families than its northern neighbours. Across the LGA, incomes are relatively high and unemployment levels are lower than in any adjoining LGA at just 3.3%.

The LGA is experiencing a North to South migration of residents from the LGA's of Fremantle, Melville and Canning. Those moving out of the LGA are also moving south, to Rockingham, Kwinana and Serpentine-Jarrahdale, likely for cheaper housing. There is likely to be a significant shift in dominant household type from couple households with dependants to those without. The cities of Cockburn and Fremantle are both experiencing an ageing population with a decline in young children that is consistent with the metropolitan average.

The trend amongst coastal suburbs is a high proportional increase in 30-39 yr olds (compared to Perth average) which has been suggested indicates established households are purchasing in beach suburbs close to schools. This trend contrasts with the wider city of Cockburn trend which is experiencing a decrease in this age group.

A strategic decision will be required as to the type of people the Cockburn Coast wishes to attract, particularly with regard to the employment self-sufficiency the Cockburn Coast wishes to achieve.

The largest number of people moving to the Cockburn Coast LGA is from overseas. The dominate groups moving to WA to work are moving from the UK and Ireland. This suggests that overseas migration may reinforce the existing Anglo-Saxon demography. There is a percentage of working immigration from the Philippines, which is on the increase, which may provide for greater cultural diversity moving to WA in the future.



* ABs 2006 Census Data
** Data taken from Department of Immigration - working visa applications granted for WA.

COCKBURN COAST SOCIOECONOMICS

To the North, South, and East of the site, each suburban area has its own unique socioeconomic characteristics, with different needs and challenges. The Cockburn Coast will need to consider these audiences, our closest neighbours, to establish a level of integration with the existing community.

The current resident population within the DSP is predominantly isolated in the North of the DSP study area, with residents living higher densities than surrounding suburbs to the east. The Masterplan area does not include any residential development. It is estimated that the final population of the Cockburn Coast will be in the order of 10-12 000 new residents.

The DSP projects that the Cockburn Coast's future population is to be more similar to that of Cottesloe and Mosman Park than the LGA. The demographics of these town centres indicate the future demographic of the Cockburn Coast is likely to be:

- wealthier
- older
- with fewer children
- in professional service jobs or other higher income employment sectors

The City of Cockburn's greatest proportional age increase since 2006 is in the 20-29 year age group. This is in contrast to trends at Cottesloe and Mosman Park which have a decreasing proportion. A contributing factor to this increase may be as a result of young independents leaving home in the coastal suburbs and moving into more affordable suburbs such as those within Cockburn. As shown in the below table, the Cockburn Coast is expected to be home to larger percentages of couples without children than both the Fremantle or Cockburn LGAs

Cockburn Coast DSP 2009, Estimated Household Mix

Estimated household	Cockburn coast mix	Cities of Fremantle and Cockburn 2021
Couple with children	14-15%	33%
Couple without children	30%	23%
One parent family	10-11%	10%
Other family	2%	2%
Group households	5%	4%
Lone person households	38%- 40%	28%

LOCALISED DISPARITIES

At a suburban level, the local area surrounding the Cockburn Coast is characterised by disparity. The inland suburban areas of Hamilton Hill and Spearwood, to the East of the site, have an overall lower income and are home to larger percentages of people who speak a language other than English compared to the LGA average. The coastal suburbs of South Fremantle and Coogee are older and increasingly affluent. South Fremantle is home to a much higher proportion of the population enrolled in education studies, managers and professionals, with smaller household sizes. Home ownership purchases spike at 80% in Coogee consistent with significant new development with a very low percentage of current rentals. This is consistent with the most dominant household type in Coogee and North Coogee as 'couple families' with dependents, which accounted for 43.1% of all households.

ABOUT OUR NEIGHBOURS

The following provides a snapshot of key socio economic characteristics of the adjacent LGA's of Fremantle, Melville and Canning.

- Fremantle LGA

  Older and more professional but with a higher unemployment and lower income base than Cockburn.

- Melville LGA

  The highest income and lowest unemployment in the area with more professionals than Cockburn Melville is closer in age to Fremantle than Cockburn.

- Canning LGA

  The largest student base, twice that of Cockburn, Canning is younger than its western neighbours and contains a higher percentage of migrants than Cockburn.

COCKBURN COAST POPULATION SNAPSHOT

	Fremantle LGA	South Fremantle	Hamilton Hill	Spearwood	Coogee	Cockburn LGA	Perth
Total population	24,835	2,794	9,257	8,940	4,310	74,472	1,445,078
Median age	41	41	39	39	39	34	36
Unemployment	4.5%	4.6%	4.9%	4.1%	2.4%	3.3%	3.6%
Income (median individual per week)	$489	$537	$378	$411	$541	$501	$513
Total labour force	12,499	1,520	4,162	4,345	2,232	37,852	730,634
Managers and Professionals	44%	49.9%	23.3%	18.6%	28.3%	24.6%	31.8%
Born overseas	29.6%	33.6%	31.9%	33.0%	34.7%	28.8%	31.3%
Language other than English spoken at home	22.6%	16.6%	29.1%	33.6%	22.9%	22%	20.1%
Technical and tertiary education attendants	7.6%	7.6%	5.3%	4.2%	5.2%	5.3%	6.8%
Average household size	2.2	2.2	2.2	2.5	2.8	2.7	2.5
Dwellings owned/being purchased	56.7%	62.2%	58.0%	68.1%	80.9%	71.5%	67.2%
Rented	33.2%	31.7%	34.8%	23.4%	12.4%	21.3%	24.7%
Persons who volunteer	17.2%	18.3%	11.7%	9.8%	12.9%	12.2%	15.1%





LEFT: Vibrant cafe strip in Fremantle. Home of the northern gentrifiers
RIGHT: BBQ gathering in Kings Park of Perth locals. Likely indicative of the inland local dining/recreation approach of those living in Spearwood and Hamilton Hill.

WHAT WE ARE AIMING FOR

FORECAST CHANGES

The City of Cockburn had a population of 78,477 at the time of the 2006 Census and forecasts project an increase in population to 104,939 by 2016 and to 127,885 by 2031. This represents an average population change of 2% every year over the 25 year period. The suburbs of Coogee and North Coogee (as defined by Council) will host a great deal of this anticipated growth with an average rate of growth of 4.7% per annum between 2006 and 2031, growing from 4,294 to 9,244.

The speed at which this region will transform itself from a place of industry to primarily residential will provide challenges for the development of authentic place character. A flexible approach will be a required with regard to community development as the community evolves and changes.

LIFE IN COCKBURN

Healthy communities rely on a diversity of ages, household types and professions in order to develop a sustainable local economy and an active public realm. As such, a great place must provide for all stages of life, or we will leave to find them elsewhere. Imagine a life on the Cockburn Coast...

A parent with a young baby requires medical services, child care, parent's groups and easily accessible parks and playgrounds. Once this child reaches school age; schools, aftercare and part-time work opportunities become important. As a teenager, access to peers and public transport, active recreation, sports and cultural activities and the opportunity for part time low skilled work are required.

As a high school graduate, tertiary education looms, as does a higher skilled part time job and potentially apprenticeship or internship. He/she will need a place to celebrate their coming of age, an 18th or 21st birthday. Moving out of home requires affordable rental accommodation close to employment. Cafe and restaurant culture become key as they embark on a full time job in their associated industry of study.

Years later we meet this person again, to find they are now a parent with a child about to embark upon this whole process again. Their parents have retired to a cafe lifestyle and as they age they too need affordable housing alternatives and aged care to complete their life cycle in place.

Providing for this one individual and their family is a complex task. Add a layer of preferred experiences, diverse cultural backgrounds and behaviours and lifestyles and we complicated it further. Multiply this by a community of 10-12000, with little in the way of an existing resident community, the challenge ahead is clear.



ABOVE: Young people and tourists frequenting the Little Creatures brewery at Fremantle
BELOW: Local mothers group. Key to daily activation of the public realm.

KEY QUESTIONS MOVING FORWARD

What does 10-12,000 residents look like at the Cockburn Coast?

How do we provide day time activation if our demographic shifts to predominately couples without dependants?

What do we have to offer a new audience?

How can we ensure a diversity of population in a somewhat culturally homogenous context?

Economic Aspects Influencing Place Character

The economy of a place, what it produces and contributes, influences how it is perceived both by the residents and workers who know it, as well as by those who are looking in. The types of businesses and what they sell, whether product or service, will contribute to the development of the place character, and also the people who will be attracted to the place, as workers, residents and visitors. The Cockburn Coast aims to provide for a gap in existing employment sectors in the LGA which has little or no base for high-end jobs at present. The challenge will be aligning this employment with the skills and training occurring locally to ensure levels of self sufficiency can be achieved.

FAST FACTS FROM THE ECONOMIC RESEARCH

The economic health and vitality of a place is key to its place character. The visibility of industry and work places gives us a clue to what makes a community work when we experience it. The following provides a snapshot of the economic findings with regard to the Cockburn Coast.

- The dominant field of education of Cockburn residents remains engineering and related technologies (29%) and management and commerce (18%)
- Top 3 employment industries in the LGA (2006) are manufacturing (29.8%), retail trade (13.5%) and construction (9.3%)
- In 2006, 40% of people working in the Cockburn LGA lived there
- Employees within the Cockburn LGA typically drive to work (78.3%, only 1.8% take public transport)
- Employees within the Cockburn LGA typically have no formal qualification (45.5%) or certificate level qualification (28.8%)
- Local businesses are dominated by business services and retail trade
- Largest increase in the employment sector was in manufacturing between 2001 and 2006
- Many workers travel into the LGA from the east and southern surrounds
- Little or no economic base for high-end jobs at present

COCKBURN LGA NOW	PLANNED FOR COCKBURN COAST
31,566	3,175
EMPLOYMENT BASE (2010)	NEW JOBS (OF TOTAL 5000 AS PROPOSED IN MASTERPLAN)
6,447	?
REGISTERED BUSINESS (2009)	
Manufacturing (-348)	Shopping (31%)
Construction (+300)	Office (31%)
Retail trade (+530)	Health (12%)
TOP 3 EMPLOYMENT SECTORS 2011 AND THEIR CHANGE SINCE 2006	TOP 3 FUTURE EMPLOYMENT SECTORS (COCKBURN COAST MP)
49.1% no qualification	?
20% certificate level	?
11% bachelor/degree	?
EDUCATION LEVELS (2006)	
Business services & retail	Shopping & office/ business
PREDOMINANT LOCAL BUSINESS MIX	PREDOMINANT FUTURE BUSINESS MIX

OPPORTUNITIES

Heritage character drivers a tourism product



Local living and employment



New service and tourism industries



CHALLENGES

Industrial evolution or revolution, from production, to process, to services



Transition of skills and training for new industries



Self sustaining tourism sector



THE REGIONAL ECONOMY

The Cockburn LGA provides light and heavy industry, government and community services and retail sector jobs that can be found locally or regionally. The gap in the region, is in the professional occupations, where most travel into Perth.

The City of Cockburn has an employment self sufficiency of 68% (2001). However, if combined with Fremantle this increases to 106 %. Levels this high indicate there is strength to be built upon in terms of its economic development.

The Cockburn Coast has the opportunity to play a positive role in the regional context. Unlike South Beach and Port Coogee developments which lack employment lands, the Cockburn Coast aims to provide high levels of employment self sufficiency. Part of this role, may also provide an opportunity for commercial development linked with Fremantle, which has traditionally been ports, logistics and consumer services focused but constrained by heritage regulation.

The City of Cockburn can be economically characterised by the following:

- Sufficient local industrial land and substantial regional employment base in industrial estates
- A high proportion of manufacturing workers and jobs, and a low proportion of white-collar and tourism-related jobs
- Little or no economic base for high-end jobs at present
- Top 3 employment industries in the Cockburn LGA (2006) are manufacturing (29.8%), retail trade (13.5%) and construction (9.3%)

Heavy industry is shifting south to Kwinana and Henderson, which are focussing on export orientated heavy industrial. This may also support migration of those currently living in Cockburn south for the employment base. Overseas migration of workers focuses predominately on the professional and technical trades for minding and construction, however there has been a large increase in the those sponsored by professional, scientific and technical industry.

EMPLOYMENT TRENDS

In 2006, 40% of people working in the Cockburn LGA lived here. Neighbouring suburbs that travel into the LGA to work were from Rockingham (11.3%) and Melville (9.8%). The largest sector of employment is manufacturing. It has a comparatively low self sufficiency of around 30% with many of its employees travelling into the region for work.

Employees within the Cockburn LGA typically drive to work (78.3%, only 1.8% take public transport) and have no formal qualification (45.5%) or certificate level qualification (28.8%), only 12.1% have a bachelor or higher degrees.

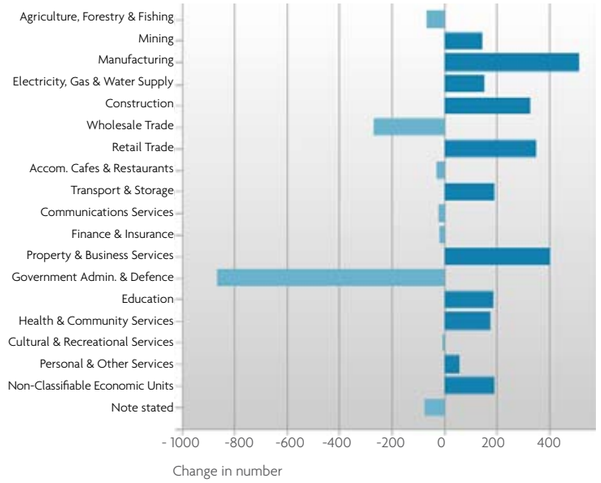
Changes in employment sector across the LGA show a significant decrease in government administration and defence jobs and a strong increase in manufacturing. Retail was also a growing employment sector, however culture, all recreation, accommodation, cafes and restaurants declined. Culture and recreation is also one of the smallest employment industries in the LGA (1.4%).

MARKET SUPPLY & CHOICE

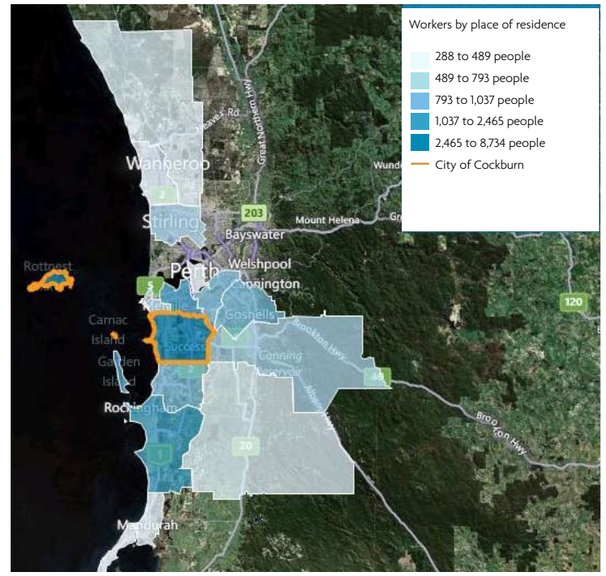
The housing market of the City of Cockburn has for a long time provided affordable opportunities for home ownership for families and prospective families from southern Perth. There has been a recent swing of some development towards a market of second and third home buyers, 'empty nesters' and retirees, particularly along the coast. Greenfield sites in the City of Cockburn are expected to be exhausted over the next twenty years which is likely to change population trends and push new development down the coast to Kwinana.

Within the Australian economic context, population growth is a key driver for economic development just as market supply and demand trends are for urban development. The majority of the current supply chain is polarised between freestanding 'suburban' houses and higher density, big block or tower developments. The demand is also split between those who desire the 'product'; a private house and garden no matter where, and those who seek amenity or experience, e.g. close to the city. Given its relative proximity to the CBD the Cockburn Coast has the opportunity to position itself within the existing market paradigm while exploiting opportunities to lead the future market.

Change in Employment by Industry Sector City of Cockburn 2001 to 2006



Areas of residence for workers in the City of Cockburn 2006



WA overseas workers (no. of applications 2010-2011)	Sponsor Industry	Occupation	Country of Origin
Major industries (2010-11)	› 23.3% mining › 26.6% construction	› 45% professional › 33.5% technical and trade	› 29.4% UK › 10% Ireland › 9.5% USA › 9.5% Phillipines
Biggest change in industries (since 2009-10)	› 365.7% professional, science & technology › 109% manufacturing	› 169.9% clerical and administration › 165.2% machinery operation and driving	› 185% Phillipines › 105% Ireland

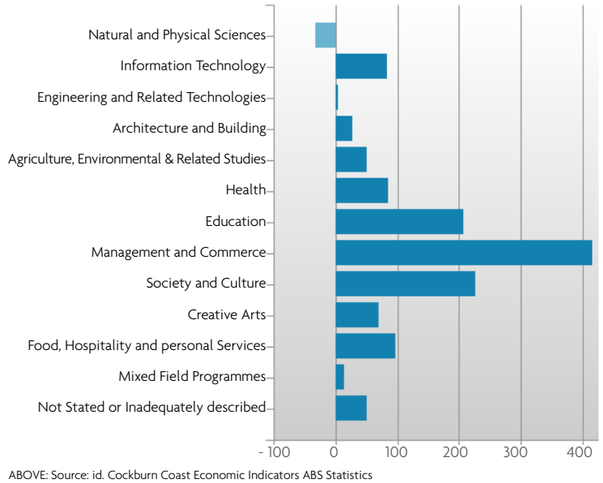
TOP LEFT: Source: id. Cockburn Coast Economic Indicators ABS Statistics
TOP RIGHT: Source: id. Cockburn Coast Economic Indicators ABS Statistics
BELOW: Number of working applications granted to immigrant workers moving to Western Australia. Source: Department of Immigration and Citizenship

EDUCATION

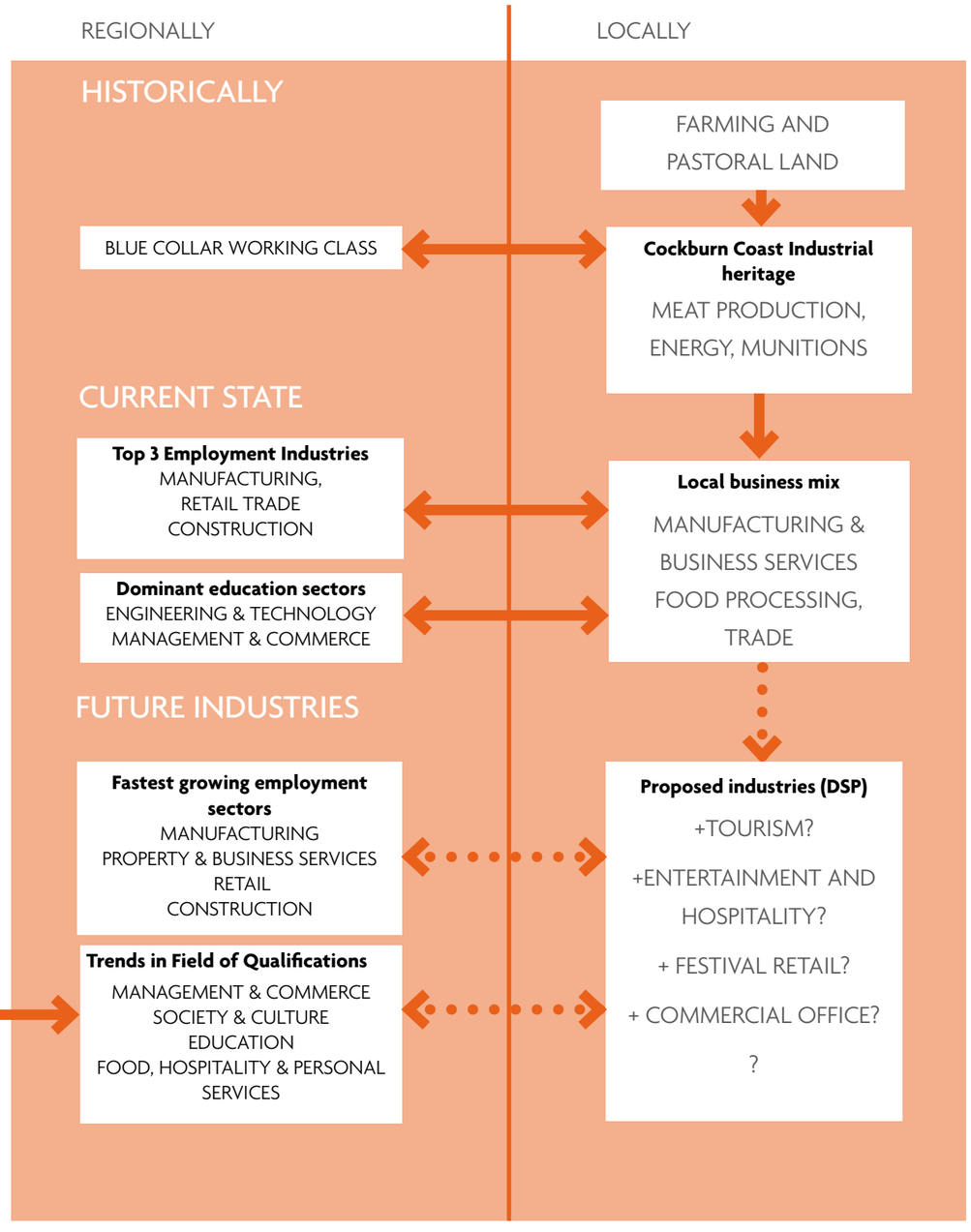
Planning for employment on the Cockburn Coast requires an understanding of who lives in the area now and what they are studying. Skills availability in the local area will be key to local employment self sufficiency.

Since 2011, changes in the training and education undertaken by those in the LGA were 5% more people choosing to study management and commerce, and 5% less in the engineering and technology sector. Food hospitality and personal services held steady at 8% and there was a decrease in employment in this sector in the LGA. This may indicate a potential gap in industry training and education for new hospitality and tourism sectors introduced to the Cockburn Coast.

Change in Field of Qualification of the Workforce (all industries)
City of Cockburn 2001 to 2006



ABOVE: Source: id. Cockburn Coast Economic Indicators ABS Statistics



LOCAL ECONOMY

The Cockburn Coast has traditionally played a strong role in the development of Perth as its industrial backbone. Originally farming and pastoral land, the site developed from primarily grazing to abattoir and meat production that monopolised the regional meat market.

The Fremantle Power station provides a formidable reminder of the sites past as a producer of energy as well as food. This industry has too evolved now focussing more on food processing and business servicing rather than producing.

The DSP notes that the Emplacement and Darkan precincts are home to businesses that will remain onsite that directly relate to the Fremantle economy (especially in seafood handling and marine services) and a range of other industries which provide vital services to the heavy industries in Kwinana and Henderson. The regional importance of local businesses at the Cockburn Coast reinforces its role as a supporter of the regional economy.

On a more local level, a number of services located in Emplacement Crescent lease flexible and affordable industrial units for community purposes, often used as a stepping stone for new start ups and innovation.

The Cockburn Coast is now facing its next stage of evolution, from servicing businesses, to becoming a home for business and servicing people and culture with a tourism products. The challenge will be balancing those industries onsite that are staying on, with a mixed use retail commercial future.

LOCAL BUSINESS

Most local business in the immediate areas of Spearwood and Hamilton Hill are predominately either property and business services, or retail trade. Both had a manufacturing presence in contrast to Coogee which is dominated by property and business services likely as it is during its development phase.

Spearwood has a much stronger hospitality focussed business mix than that of Hamilton Hill which appears to be more manufacturing focussed. Across the board there was few cultural and recreation services limited to sporting clubs.

TOURISM

The danger in focussing too much on this industry as a driver of place is its seasonal and weekender characteristics that during low season can result in high turn over of traders and resentment of tourism by local residents whose lifestyles peak season effects. The level of business and tourism activity envisaged by the DSP is relatively low and aims to complement the high levels of Fremantle.

Examples of regional tourism nodes at Cottesloe (38 rooms) and Fremantle (689 rooms) suggest Cockburn's proximity to Fremantle may allow for it to be positioned as a value add to the Fremantle experience.

Key assets that have the potential to attract the tourist market are:

- Historic Districts - authentic experience and stories, particularly those shared by locals
- Waterfronts/Beachfronts - the Cockburn Coast provides a beachfront experience, that is the closest to the CBD on the southern side of the river. However, Cottesloe is a similar distance away and is iconic as a tourism beach.
- High Quality Retail and Catering Facilities - often considered a secondary element to tourism, food is increasing a reason to travel in search of high quality produce and cuisine. Fremantle has traditionally been well positioned in the food tourism market for its seafood and Little Creatures Brewery. The challenge will be determining what will set Cockburn Coast apart from its neighbour.

Other attractors for tourism to be considered:

- Convention Centres and Exhibitions - attracting the corporate tourist market is a year round tourism offer.
- Festivals and Events - have the potential to reinforce a places identity as well as activate it during lower periods of visitation
- Special Visitor Districts - combination of visitor attractions such as cultural, entertainment or sports clustered in one location
- Edutainment - entertainment options that are also designed to educate i.e. discovery/environmental centres

Another challenge for local year round tourism is price point. The local disparity of income and advantage means a variety of prices points will be required to ensure there is offer to match or risk becoming a tourist only destination that locals cannot afford.

WHAT WE ARE AIMING FOR - ECONOMIC TARGETS

The Masterplan and DSP set out specific targets for both industries and employment base within the Cockburn Coast development. These targets will need to be considered in terms of their difference or alignment with the business as usual evolution of the place as an additional driver of place character.

INDUSTRIES

The DSP has proposed new industries on the Cockburn Coast including tourism, entertainment, hospitality, festival retail and commercial based on a current gap in the market that is reflected by the skills shortage in the area. These will employ up to 3,125 people (Cockburn Coast Masterplan) approximately 31% shopping and 31% office, a significant shift from the industrial base that exists today.

The Masterplan suggests it will leverage off the major employment opportunities of Kwinana and the Western Trade Coast further south, which are heavy industrial areas.

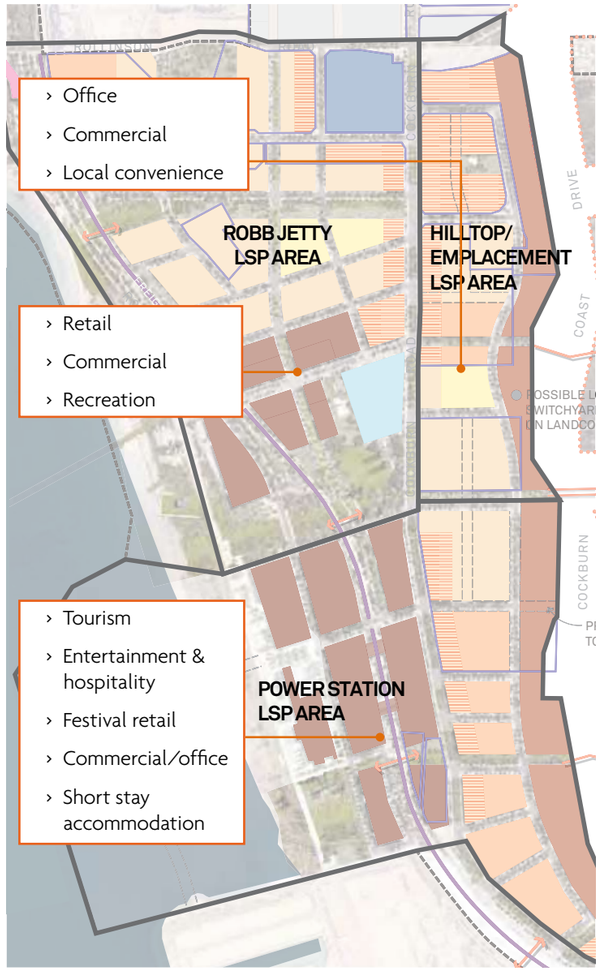
FUTURE EMPLOYMENT BY SECTOR

With a total expected labour force of 5000, the Masterplan proposes the following breakdown of the 3,125 new jobs to be created in the Masterplan area by industry:

- 31% shopping
- 31% office
- 11.8% health
- 5.7% manufacturing
- 5.7% storage
- 4.8% entertainment
- 4.2% retailing
- 3.9% service
- 2.9% utilities

OCCUPATIONS REQUIRED

With a focus on shopping (undefined) and office employment (undefined), two distinct levels of occupations will be required which are currently in small numbers in the LGA; both sales and clerical workers and professionals.



ABOVE: LSP areas as defined by the Hassell Cockburn Coast Masterplan in reference to employment bases proposed by the DSP.

KEY QUESTIONS MOVING FORWARD

How do we attract the skilled workers for the desired industries?

How do we support local business start ups and entrepreneurship?

What types of businesses do we want to attract?

How can we support youth education into gap employment sectors?

How does the leverage off the major employment opportunities of Kwinana and the Western Trade Coast further south fit with employment at the Cockburn Coast?

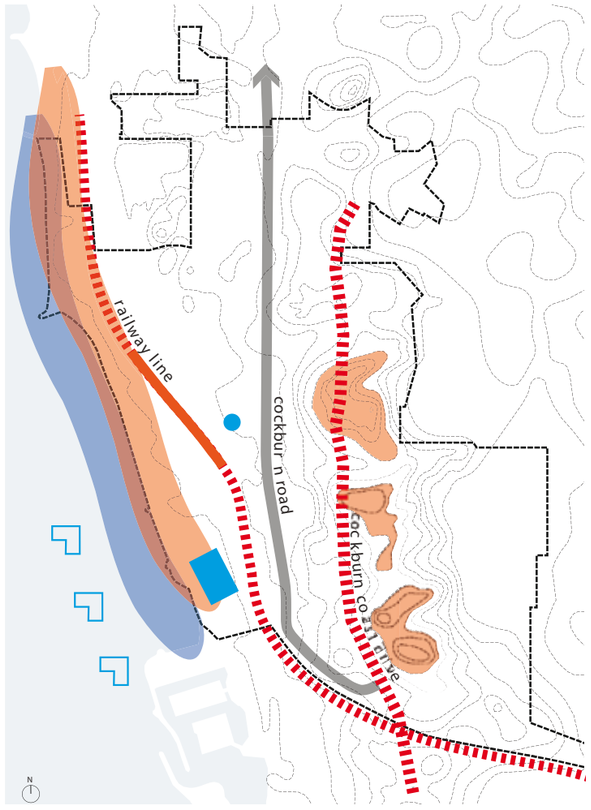
Environmental Aspects Influencing Place Character

The environment of a place, both its man-made and natural physical elements, have an immediate influence on how a place is perceived. Our physical environment represents the culture and story of a place. What buildings look like, their materiality, the quality and diversity of the public realm and even the type of vegetation planted, all give us clues as to who the place is for and how we are expected to behave. Cockburn Coast's strong coastal edge and dunal landscape contrast with the historical industrial infrastructure and provide both opportunities and challenges for the next evolution of the area.

KEY FINDINGS FROM THE ENVIRONMENTAL RESEARCH

The physical elements of a place are key markers of how an area is perceived, they provide visual cues to who is welcome and how to behave. The following list provides a summary of current environmental aspects influencing the place character of the Cockburn Coast:

- The site runs parallel with the Indian Ocean and is edged by public beaches and a dunal landscape
- 330ha site, the largest single redevelopment project in the region
- The Fremantle Doctor (south-westerly wind) is strongest during afternoons of the summer months and while refreshing can make the public realm unpleasant when at its peak
- Hot dry summers and cool wet winters (Mediterranean climate)
- Industrial buildings and infrastructure are situated across the site
- A freight rail line runs through the site dissecting it along the north south axis
- C..44 train movement occur along this line each week, this is likely to increase to 56
- Currently there is only a single bus service through the structure plan area. This is a low-frequency service linking Fremantle and Rockingham.
- Cockburn Sound is the most intensively used marine embayment in Western Australia. The sheltered waters of the Sound are popular for fishing and more than 12,000 recreational boating trips are recorded annually
- The area enjoys views to Carnac, Garden and Rottnest Islands
- No threatened flora and fauna has been found on site
- The Cockburn Coast beach, known as the C Y O'Connor beach, is designated as a dog friendly beach (including charity dog beach parties), and is great for fishing



Adapted from Barriers to access, Cockburn Coast Masterplan, Hassell 2011

OPPORTUNITIES

Industrial landscape integration



Continuous access to ocean along site



Coastal urban development



CHALLENGES

Freight line separating key destinations



Blocked views to beach & ocean



Wind directed into public places



The following provides a summary of the key thematic areas pertaining to environmental influences on place character:

LANDSCAPE

The site runs parallel to the Cockburn Sound and Indian Ocean to its west and from the eastern ridgeline, offers significant views to the coast. The Carnac, Garden and Rottnest Islands can be viewed from the shore and ridgeline providing a point of interest on the horizon.

The landscape of the Cockburn Coast has been significantly modified by past industrial use. Along the coast, six groynes, a seawall and jetty, and infrastructure associated with the development of the South Fremantle Power Station have all adversely impacted on the natural coastline

The Cockburn Coast is relatively flat, with a large dunal system the primary landscape to the west of Cockburn Road. The landscape between Cockburn Road and the freight rail line has been largely cleared of natural vegetation. A collection of established Norfolk Island Pines and other tree species (including Fig, Casuarina, Tamarisk and Melaleuca) that were planted in earlier settlement, form a grouping of cultural vegetation.

A more diverse range of species is found to the east of Cockburn Road at Manning Reserve, a disconnect between vegetation communities limits fauna movements. The Reserve contains Manning Lake and a low concentration of remnant bushland and high concentration of weed cover in the understorey.

DUNAL LANDSCAPE

An extensive dune system, covering 29ha of the Foreshore Reserve along with the ocean and beaches are the most significant features of the Cockburn Coast. The height of the dune and the dense covering of vegetation limit views to the ocean and islands beyond.

CLIMATE

The high and low gradients of the landscape mimic the dramatic variations in seasonal climate similar to that of a Mediterranean climate, with hot dry summers and cool wet winters. The 'Fremantle doctor', strongest from December to February, sends a cooling south westerly across the Cockburn Coast and is a welcome relief during the summer months. However the intensity and strength of this phenomenon has the potential to create an unpleasant public realm experience and discourage use of outdoor spaces.

BUILT FORM AND HERITAGE

The most significant built form on the site is the Power Station, switchyard and the freight rail line.

POWER STATION

The South Fremantle Power Station officially opened in 1951 to supply the South-West with electricity. It closed in 1985. The site has been registered as a prominent building with a strong functionalist structural industrial form. The building is currently abandoned and has been heavily vandalised. The power house building is listed on the State Register of Heritage Places.

FREIGHT RAIL

The western boundary of the site is dominated by a freight railway connecting to the Fremantle inner harbour. It currently services approximately 22 trains (44 movements) per week. Fremantle Ports has advised that future freight rail are likely to increase to 56 trains per week (112 movements) and are expected to be approximately 600m long. This increase in freight rail movements accords with key government policy to transfer freight movement from roads to rail, but presents a significant barrier for other transport and pedestrian movements throughout the site.

HERITAGE

Accompanying the Power Station on the State's heritage register is the Manning estate, which includes Azelia Homestead, Robb Jetty Chimney, Newmarket Hotel, Randwick Stables and the South Beach horse exercise area. Other culturally important sites of heritage significance have been identified as Owen Anchorage, the original Robb Jetty, Afghan camps at Davilak and World War 2 gun emplacements.

INDUSTRIAL

The existing industrial built form on site is predominantly 2 storey warehouses scattered throughout the precinct but concentrated along Cockburn Road. While built form along the Cockburn Coast is largely industrial, other development occurring in the urban zone to the north of Rollinson Road, includes the caravan park, town house or apartment style mix and some commercial.

INFRASTRUCTURE IN INDUSTRY

The Cockburn Coast supports a diverse but degraded landscape. As the traditional custodians of the land, the indigenous legacy shadows that of the post settlement, where the adverse impacts from industrial uses continues to the current day. The presence of historic industrial buildings, including the heritage listed South Fremantle Power Station and Robb Jetty Chimney, connect with the continued evolution of the site as an economic driver. The South Fremantle Power Station is the site's 'white elephant', visible from the coast and an iconic landmark of the Cockburn Coast site. A freight rail line that connects port Fremantle with the south divides the site. A planned intensification of this line in the future secures its strategic importance for the state.





WATER

The Cockburn Coast is located parallel to the Indian Ocean and is bordered by Manning Lake to the east. The C Y O'Conner beach, named after one of Western Australia's greatest engineers, is the site's local beach introducing the coast to the shore. The C Y O'Conner beach is not known for its 'family friendly' offer but is promoted as one of region's 'dog friendly' beaches and is frequently used as a horse training beach by Randwick Stables. The award winning Coogee beach to the south, offers a wide range of services and facilities, and is the City of Cockburn's primary recreational beach. South beach to the north of the site, maintains its equestrian heritage with horses, both recreational and commercial, a common sight. The remediation, protection and recreation of water bodies, in and around the site, represents a growing consciousness of Cockburn residents towards open space and reflects global attitudes to the environment.



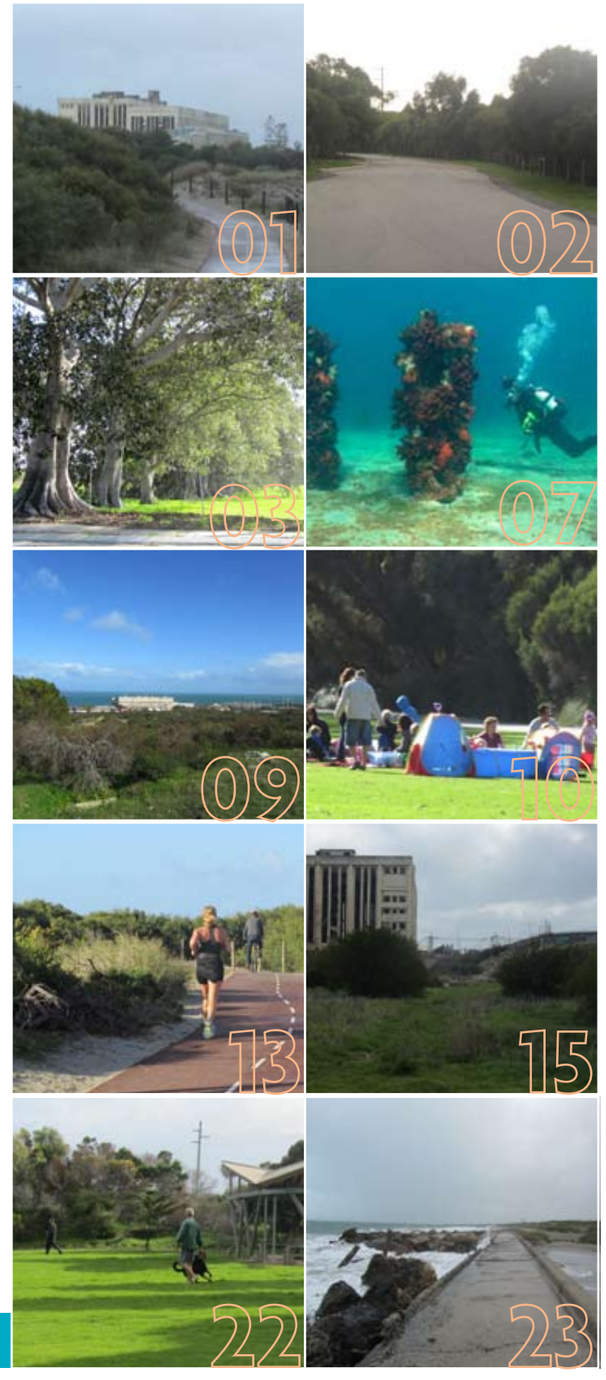


ASSET MAP

The facing map and images illustrate the physical elements within each precinct that contribute to the unique character of the site. These should be integrated into the detailed planning for the place providing a layer of authenticity and experience to the Masterplan.

1. Power Station - as landmark and creative outlet for graffiti artists and youth
2. Road access embedded in the landscape and framed by vegetation
3. Fig trees - heritage listed, shade and protection from Cockburn Coast Rd
4. Factory Chimney (check the name) - remnant of industrial past
5. View across to Power Station. Provides a sense of proximity.
6. Dunal landscape that allows for exposure or retreat
7. Rob Jetty remains - the original trade gateway
8. James and Diana ship wreck remains - potential diving attraction
9. Look outs atop Manning Parklands to the ocean across the site
10. Manning Lake - family friendly parkland attractor, home of heritage homestead and place to listen to frogs
11. Newmarket Hotel - the original drinking hole for working class and racing fraternity, currently in poor state of repair
12. View from the Emplacement Precinct across to the ocean
13. Coastal pathway connections - shade and exposure
14. Rugged dunal landscape and experience - intimate and held by the Switchyard
15. Varying heights and valleys in infrastructure surrounding the Power Station
16. CY O'Connor - icon and heritage, all the locals know his story
17. Norfolk Pines surrounding Sewer Pump Station
18. Emplacement, Darken and Hamilton Hill existing industry
19. Vegetated gateway entry from height with views to the water
20. Soccer Clubs
21. Horse and dog beach
22. Dog park and BBQ facilities
23. Out over the water on old Power Station Infrastructure





WHAT WE ARE AIMING FOR

The design vision of the DSP for the project area is to create a coastal settlement of beauty, charm and vibrancy that exhibits world leadership in architecture and building design, landscape and water design, and social and cultural sustainability.

"It will be a collection of great streets and inspiring public places in which to explore and enjoy the Cockburn coast's past."

The following list summarises considerations for the detailed planning of precincts during the Local Structure Planning Process:

- The Masterplan offers over 9.57 hectares of open space. This allows for 6.84 m2 for every person living and working in the area (c14,000).

  If 10% of people were outside at any one moment between 7am and 7pm then the average density would be 68m2 per person per hour.

  Consideration should be given to reducing the amount of open space offered and concentrating it in areas where people will naturally cross paths or are likely to come together.

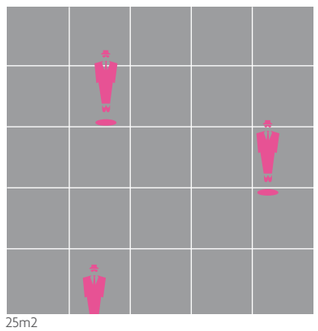
- The three key linear parks do not offer a great deal of variation in terms of scale or current detail. They are relatively narrow and variously bounded by cars on one side and private housing on the other with zig zagging paths further breaking up the spaces. There is limited variation in experience between the parks or within them and a mixed message as to what they are meant for - are they private or public? pathway or park?
- All of the primary public spaces are facing into the strong south westerly.
- East/west links don't connect to the east. Movement paths only work when they are between destinations.
- Splitting of activity zones.
- Scale of public space similar to Esplanade Park Fremantle, however does not have the same strengths in terms of transport and activity attractors





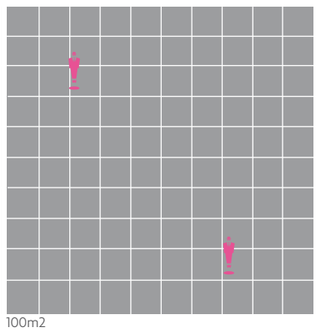






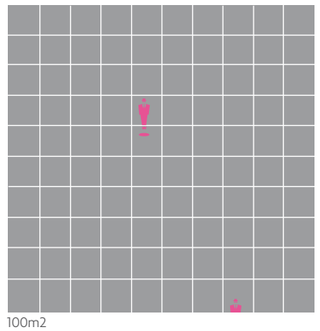
25m2

Surry Hills, Sydney has a population of 15,000 people. St Margarets Plaza has an average density of 11m2 per person per hour.



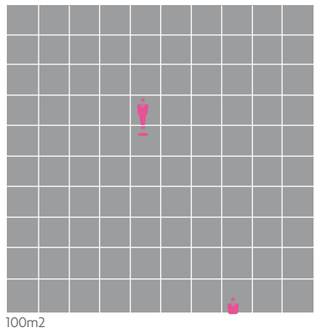
100m2

Paddington, Sydney has a local population of 12,000. The Paddington Reservoir Park has an average density of 44m2 per person per hour.



100m2

Inner Fremantle, Perth has a working/studying weekday population of 10,000. The Esplanade Park as an average density of 66m2 per person per hour.



100m2

The Cockburn Masterplan has 9.57ha of public open space - not including streets or the beaches. If we take an estimate of a daily weekend population of max 14,000 people and 10% of those were outside at any one time this would provide an average density of 68m2 per person per hour in the formal public open space.

KEY QUESTIONS MOVING FORWARD

How will the edges and crossing of the freight line be managed?

How do we manage the south westerly winds into the public space?

How do we enhance the view corridors to the water?

What is the commitment for the adaptive re-use of the heritage buildings and other infrastructure on site?

How do we activate the public space outlined in the Masterplan?

What is the primary activity zone - can 2 zones be supported by this population?

Cultural Aspects Influencing Place Character

The culture of a place describes the physical or behavioural representation of a community's beliefs, values and creativity. It is not just about ethnicity but perhaps more importantly, how we encourage, manage and govern a community's ability to express itself. How people behave, the way they live, work and play impacts on the character of the place. For Cockburn Coast the challenge wil be in changing the dominant culture of the region from suburban private lives to urban communal living. Alternatively there is a need to attract people with different cultural behaviours - those that are already attached to a denser lifestyle, the amenity and sense of community it can deliver.

FAST FACTS FROM CULTURAL RESEARCH

The culture of a place is both tangible and intangible, some is connected to place and other aspects of culture reside with the people who inhabit the place. The following list provides a summary of current cultural aspects influencing the place character of the Cockburn Coast:

- There is not a high level of cultural/ethnic diversity in the local population
- Migration to the area has relied on the attraction to affordable housing for young families and those pushed further south out of the city (gentrification)
- Predominantly Anglo Saxon ethnicity
- The indigenous peoples of the area used the Coast as a transitory camping ground
- Early white settlement was sporadic and varied; from agriculture to horse farming, abattoirs to infrastructure
- Horse racing and training is the most enduring historic theme of the Cockburn Coast
- There appears to be limited local creative or communal activity
- Local recreation focuses on active outdoor pursuits
- There is a cultural divide between current resident lifestyles and the desired behaviours of the future residents of the Cockburn Coast

The following provides a summary of the key thematic areas pertaining to cultural influences on place character:

CULTURAL & ETHNICITY

In 2001 the proportion of Western Australian's born overseas was the highest in the nation (28.5%) with people of more than 200 nationalities living, working and studying in the state. In 2006 the City of Cockburn followed this trend with 28.8% of the local population born overseas. However the majority of those born overseas come from an English speaking country. This trend appears to be continuing with nearly 50% of successful 2010 working visa applications for WA coming from the UK, Ireland and the USA. This is significantly higher than the national average. The next largest group is from the Philippines with 9.5% of the applications granted.

The challenge of a population with this demography is potentially their lack of experience with denser and more urban environments.

34% of the local population's religious affiliation is Catholic and this is on the rise while 64.1% consider themselves Christians, only slightly higher than the Australian average.

OPPORTUNITIES

Existing recreation attraction



Local & meaningful heritage themes



Urban community living



CHALLENGES

Relatively homogenous and traditional population



Retaining and expanding existing user base and aligning with new community



Community engagement with a new way of living



HERITAGE

Prior to European settlement, the Nyungar people used the area as a camping ground and travelling route. The Robb Jetty camp site, an important resting area near Catherine Point, was used for camping and hunting as part of the coastal 'pad' or travelling route. Clontarf Hill to the north of the site is regarded as an important ceremonial, mythological and artefact site, and as a hunting place and a natural feature for the Nyungar people. As traditional custodians of the land Aboriginal People share a sacred connection to land and their way of knowing, the dreamtime. The Nyungar people describe a time when the islands now known as Rottnest, Carnac and Garden formed part of mainland before a 'great noise' separated them from the mainland and the sea 'rused in between'. The Indian ocean carries important mythological significance for the Nyungar people.

The following information is sourced from TPG in association with Yates Heritage & Big Island Research.

INDIGENOUS

"There is strong evidence, both archaeological and ethnographic, for the Cockburn Coast area having been utilised in the past by Aboriginal people, as part of a particular 'chain' route of favoured camping grounds, linked by wetlands and other water sources throughout the Perth metropolitan area. The Cockburn Coast also has mythological significance – a matter interrelated with the importance of water sources in the Cockburn area much favoured in the past as camping areas by Aboriginal people traversing the coastal route that passes through the Cockburn Coast (north Coogee) area.

Archival research undertaken in the preliminary investigation of Aboriginal heritage for the Cockburn Coast draft District Structure Plan indicates that there are ethnographic sites recorded close to and in the project area. These confirm that there continues to be a strong spiritual significance attached to the Cockburn coast area, particularly in the form of Waugal beliefs, as evidenced in the area's mythological sites including the Indian Ocean, Cockburn Road, Clontarf Hill, Lake Coogee and Woodman Point.

EUROPEAN

The Cockburn Coast area has a rich European heritage dating back to early Colonial times, with some of the original practices and themes continuing today.

The 1830s saw the first white settlers coming to the area. The original Robb Jetty was the focal point of the settlement of the northern Cockburn coast and its long association with the meat trade. The jetty was the first obvious landmark in the area.

Robb Jetty Chimney (on the State Register) is the only remnant of the Robb Jetty abattoir, which was built in 1919 and closed in 1993. In the early days the abattoir at Robb Jetty literally fed the metropolitan area and Goldfields. The heritage-listed Moreton Bay Fig Trees were part of the Robb Jetty Abattoir complex and are located in the vicinity of the Robb Jetty chimney.

In 1902 C. Y. O'Connor tragically took his life at South Beach, believing that his Perth to Kalgoorlie pipeline project was a failure. The site of the tragedy has since been interpreted through a bronze statue of O'Connor on his horse.

The Newmarket Hotel (on the State Register) was built on the corner of Rockingham and Cockburn Roads (north of the study area), in 1912 and soon became a popular watering hole for the workers in the industrial areas. It later became a focal point for the Southern Metro racing fraternity. The building continues to be used for its original purpose.

Horse racing and training is the most enduring historic theme of the Cockburn Coast. The Cockburn foreshore has been used as a horse exercise area since 1833, when it was the site of the first official horse race in Western Australia, and still continues today."

CREATIVE & COMMUNITY ENDEAVOUR

The City of Cockburn Public Artworks Strategy 2009 aims to foster a sense of community spirit within the district generally and neighbourhoods in particular. However, the area does not appear to have a strong creative community. Only three local arts and cultural groups are noted on the Council website and two are collocated at the old Council Chambers at Hamilton Hill. The Council supports arts and culture through a program of events throughout the year with a focus on the Summer of Fun program with music events, festivals and community activities.

Predominant activities taking place in the LGA include:

- Children's and family activities
- Charity events eg Australia's Biggest Morning Tea
- Local community events eg School fund raising
- Environmental education
- Local sporting competition
- Beach activities and events

The Council website notes a number of community organisations in the LGA, these are predominantly residents groups and access to their websites through a community portal provided by Council suggest that many may not be very active. This correlates with Perth wide data that illustrates a generally low volunteering rate of only 12.3% of the population in 2006 compared to a national average of 17.9%.

RECREATION

The City of Cockburn's Sport & Recreation Strategic Plan focuses on active reserves, the facilities located on these reserves and the sporting clubs who use them. It does not provide an assessment of current recreational activity or needs across the LGA. Anecdotal reporting and evidence of existing recreational activity suggests that City of Cockburn residents enjoy simple pleasures such as walking, sports, family activities and visiting the beach. These are all activities that are available all along the Perth coastline. Interestingly a smaller percentage of those not born in Australia, than those born here, participate in sport or other physical activities. This could be caused by lack of knowledge of the sports played, communication barriers, family and cultural tradition and racism.

Longer working hours has led to recreation time being increasingly valued and competition for recreation dollars and activity will also continue to increase. In addition, the more diverse the population the wider range of amenity local public places need to supply to retain community activity.

A last consideration for Cockburn Coast is the duality presented by outdoor lifestyles. In one sense active sports have positive impacts on general wellbeing and team activities can help develop community cohesion. On the other hand increasing health concerns with the timing of outdoor activities with peak ultraviolet radiation times, means that sporting facilities and other outdoor focussed activity areas need to provide extensive shade areas and program events away from peak times. Water based recreation is highly valued on the coast and Cockburn Sound generates significant water born traffic, this is in addition to beach visitors and swimmers.

Most common facilities used for physical activity in Western Australia[133]

Level of activity	Proportion (%)
Local streets/paths	57
Home	50
Public paths and ovals	17
Cycle/walking paths	14
Gymnasiums	14

Note that survey respondents could report for more than one type of facility.

ABOVE: Social Trends, 2003 Source: Department of Sport & Recreation WA

RIGHT TOP: Family and local competitive sports are popular

RIGHT BOTTOM: The area accommodates predominant passive water based activities

CHANGING LIVES

Current demographic trends reveal the City of Cockburn's age structure is forecast to get progressively older with the highest proportional population growth in people aged 50 plus. In addition Cockburn's household structure will see a proportional decline in all household types except for lone person households which will increase by 3.3 per cent. Both trends that reflect global social & cultural changes.

However, one of the most significant cultural impacts on the Cockburn Coast development will be that which it brings with it. Denser environments support a culture of urban living, closer environments, less privacy but more sharing, less private ownership but more diverse amenity.

The current residents of the LGA are used to driving (73.2% use a private vehicle to get to work vs the national average of 65.3%) and very few walk (1.3% compared to 4.0%). 81.7% of the population live in a separate/single family house compared to the national average of only 67.5%.

Changing the way that people live their lives, their expectations as well as what they value is a key factor in the success of the Cockburn Coast Masterplan.





COMMUNITY VALUES

From the beginning of the process consultation with the community and stakeholders regarding the future of the Cockburn Coast has been considered. First in the development of the DSP and more recently regarding the development of a brand for the project.

KEY THEMES

The key themes to have come out of community and stakeholder engagement undertaken to date (25th July 2011) are summarised below.

Public Realm

- There is some uncertainty around the power station. People are unsure of its best use but its success is seen as important to the success of the whole development.
- High quality open space is important given the density of the development.
- Creation of a strong main street.
- A public marina should be provided- maybe connecting to Fremantle Power station

Environment

- Sustainable principles are very important- Transport orientated development, rainwater harvesting
- The coast offers a significant, perhaps even unique marine environment. Its ecological health must be balanced with coastal development and uses.
- The site should be an international benchmark for sustainable principles.
- Green links to Beeliar Park should be provided. • Clear carbon emission targets/benchmarks should be set.

Livability

- The experience of the coast must be carried inland.
- Private land barriers should be respected.
- There is some concern regarding safety and security, particular problems include vandalism and graffiti.
- Consider freight noise and dust impacts.
- Incorporate a sense of memorial that makes reference to the legacy of past custodians, workers and visitors who died on site.

Built Form

- High points offer views to the coast and such views must be protected.
- The development should have a high building quality and must not feel manufactured or fake.
- High density is considered appropriate, often even desirable for the benefits of transport orientated development.
- Don't want continuous high rise along the coast.

BEHAVIOUR OBSERVATIONS

Place Partners conducted Behaviour Observations at key locations on the site as well as nearby centres and public spaces. Behaviour Observations capture who is using public places and what they are doing there. It provides useful qualitative data for considering current activity and likely future use of new public spaces.

BEACH ACTIVITY

Noting that site visits were conducted during winter and during unusually high tide due to storm conditions, beach activity focused mainly around walking dogs, checking the ocean conditions and exercise such as walking, jogging or cycling along coastal paths. Specifically, South Beach residents spent time visiting the beach to see what condition the erosion was in post-storm weather.

MAIN STREET ACTIVITY

In South Fremantle, cafes were starting to open as early as 6.30am to service early morning exercises. However in Fremantle proper, a later start appear to occur. Early morning visitors consisted mainly of commuters and students getting a coffee/snack on the way to work. During the day, Fremantle mainstreet became a hive of activity, particularly around lunchtime. User groups appeared to come from both professional and tourism sectors. One of the few places in Perth with an active evening economy, the mainstreet is anecdotally known as a place to head out on weekends and evenings, supplemented by the Wharf seafood offer pitched towards the tourism sector.

PARK ACTIVITY

Parks were predominately utilised by mothers with young children, and older members of the community during the day. Some community organised events were observed at Manning Park which appeared to focus around a parents group. Dog walking and walking/jogging for exercise were also popular.

At Esplanade Park, sitting, reading, taking a phone call and using a laptop was a common activity likely due to the proximity of the university and Esplanade Hotel conference centre.

TOWN CENTRE ACTIVITY

Cockburn Central transit hub was populated largely by students utilising public transport services. Most were being picked up by private vehicle or departing by bus.

The Gateway Shopping Centre is largely a car dominated centre with siloed pockets of retail including a youth centre and pub. The Shopping Centre itself was well used by families, and parking was difficult despite large amounts provided. Few observations could be made around people in the public realm, as most used the private space of the shopping mall to gather for coffee/food social reasons as well as retail.

WATERFRONT ACTIVITY

Along the Perth coastline, waterfront activity is directly impacted by one single factor, the wind. Although temperatures vary between the seasons and wind is stronger during the summer when temperature differences between land and sea is at its greatest, the winter months provide little relief from the intensity of wind. Regardless of this constraint, the people of Perth embrace their coastal lifestyle.

Along the northern coastline of Perth, Hillary's Harbour is an active and undercover shopping centre, recreational area and marina. While Hillary's is promoted as a primary tourist node, it attracts a wide local customer base and bridges that weekend retail gap. Hillary's is a popular family destination and balances the needs and wants of locals with the interests of tourists. Hillary's includes a children's friendly beach, the Aquarium of WA and numerous cafes, restaurants and souvenir shops.

Also to the north, Cottlesloe and the northern beaches were observed on the weekend. Regardless of the poor weather conditions, the recreational areas that run along the coast were activated by people walking, jogging and cycling. The local surf life saving clubs and main streets are co-located providing a concentration of activity.

In contrast, the southern beaches of Rockingham and Coogee attract similar audience groups but are softer with established dunal landscapes. These beaches also differ from one another in terms of user catchment, where Rockingham attracts a more regional focus compared to Coogee which serves primarily a local base.

Due to weather conditions both spaces were underutilised at the time of observation.

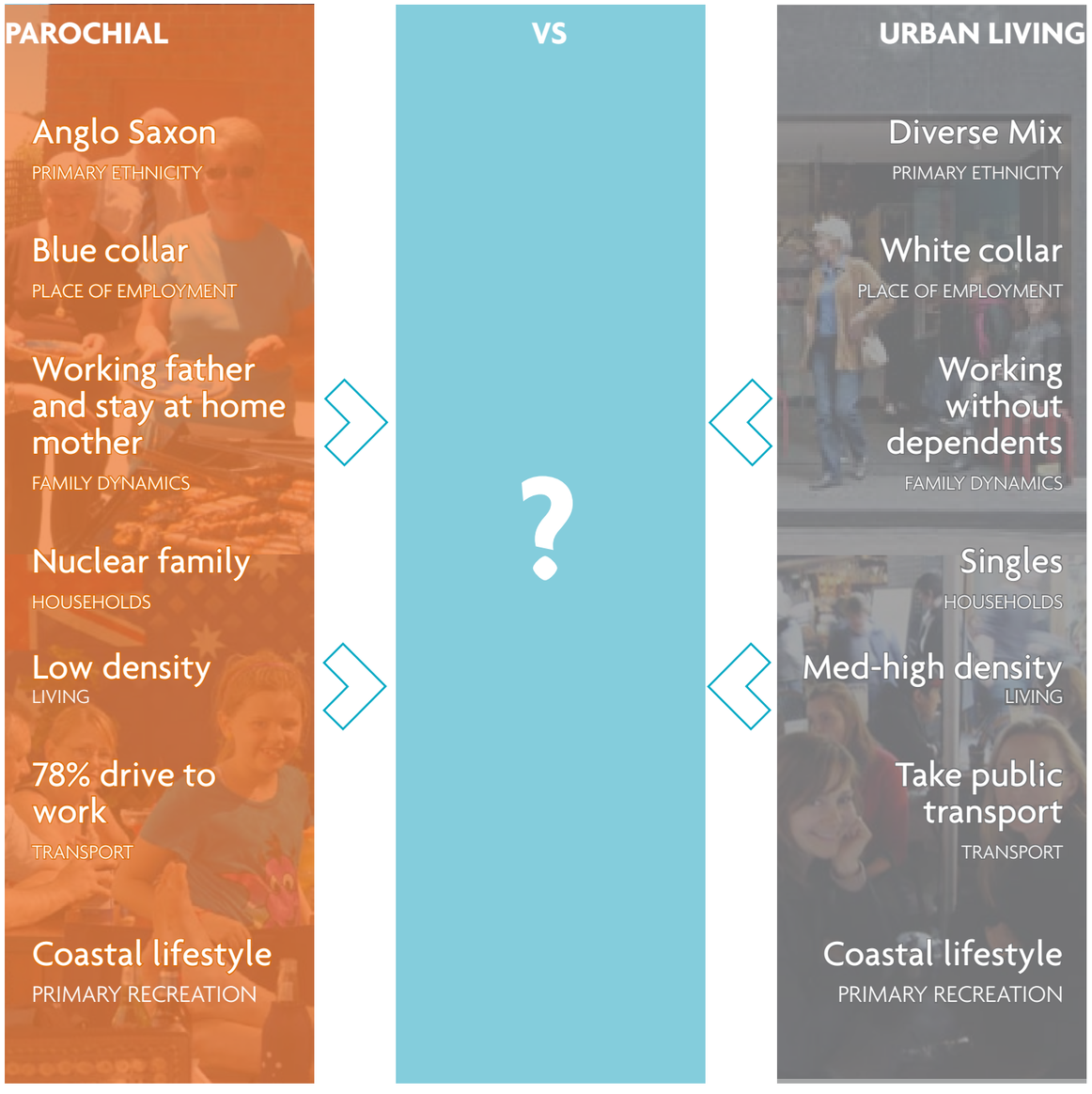
WHAT WE ARE AIMING FOR

The design vision of the DSP seeks to create a place that offers new and exciting living, employment and recreation opportunities, whilst also providing an appropriate level of compatibility and support for existing residents and enterprises in the area.

Naturally, the Masterplan with its focus on spatial planning does not delve too deeply into planning for community or cultural activity. However, the physical elements of a place contribute significantly to how people behave by providing visual clues that invite or discourage certain activities.

The following list summarises considerations for the detailed planning of precincts during the Local Structure Planning Process:

- Consideration should be given at the next stage of planning to the collocation of amenities and activities that support community activity and builds relationships. For instance, a defensible play area for young toddlers within visual distance of the front gate of the primary school and with supporting retail and hospitality such as chemist, cafe and kids clothing store.
- Local businesses attract regular local users. These businesses often need to be clustered with smaller floor areas, flexible leasing arrangements and will benefit from trading off an anchor such as a supermarket or community asset like a library.
- The location of large hospitality or tourist focussed retail should consider weekday and off season sustainability. The areas that naturally attract people - such as beach side should be for everyone and have a range of price points and activity options to generate a self sustaining movement economy
- Walkable neighbourhoods have to have high levels of local amenity clustered in and around housing



KEY QUESTIONS MOVING FORWARD

What themes will resonate with the new community?

How do we make past heritage themes relevant today?

What if the people who move here value the old culture not the new? (i.e cars & privacy)

How do we ensure the sustainability of local cultural practices such as the traditional use of the beach by horses and dogs?

How do we support the first residents of the Cockburn Coast, the incoming pioneers?

A3
EXTERNAL INFLUENCES ON THE CHARACTER OF THE COCKBURN COAST

The following pages provides an overview of key external factors influencing the development on the Cockburn Coast. From existing local social structures and expectations, to regional tourism and global trends, the scale of development planned for the Cockburn Coast requires the consideration of external factors that will help shape the community now and in the future.

SEEC

- Existing social structures
- Existing economic status
- Existing environmental assets and constraints
- Existing cultural behaviours

GLOBAL TRENDS

- Cars of the road
- Urban agriculture
- Landscape vs new urbanism
- Creative catalysts
- A price on walking
- Urbanity and amenity
- Post industrial development
- Youth and talent migration
- Collaborative consumption

REGIONAL INFLUENCES

- Regional tourism
- Mining industry focus

COCKBURN COAST CHARACTER FUTURE CHARACTER

?

GOVERNMENT POLICY & STRATEGY

- Directions 2031
- District Structure Plan
- Local Structure Plans
- Community development plan

THE MASTERPLAN

- Road and pedestrian pathway structure
- Size of lots and density of development
- Diversity of product
- Landscaping and size of public spaces
- Design for transit orientated development

BRANDING & MARKETING

- Brand themes
- Place Brand
- External communications

Global Trends & Forces

Development, particularly for large inner or semi urban sites, is often subjected to the unmanaged influence of the global trends and drivers of the time. These global influences could be as wide ranging and deterministic as following the tenets of new urbanism, striving for the ultimate eco development, or following the seduction of 'starchitecture'.

Alternatively, there are less direct impacts on decision making in all stages of the development process. The prioritisation of one direction over another, the beliefs and values of team members, or political appropriateness.

Place Partners has provided a brief summary of 9 key trends and global forces that are influencing development internationally as well as having the potential to impact decisions at the Cockburn Coast.

Cars off the road 01

If you design for cars you get cars
If you design for people you get people

Reducing private vehicle use is not just about providing alternate modes of transportation. Firstly the alternatives need to get you to the destination you want; your job, your local shops, school or the park. Secondly they have to be as easy as your car - if not easier, and preferably cheaper, quicker and more enjoyable. Cities around the world are being proactive about this and some are making some aggressive moves to change motorists behaviours. Please note that density and concentrated amenity is the basis for the success of these programs.

- In Murcia Spain, you can swap your car for a lifetime public transport pass
- In London, England the congestion tax reduced city traffic by 16%
- Cities across Europe continue to close large amounts of streets to any traffic
- German cities have set up 'environmental zones' where only low emission cars can enter
- City of Sydney continues to reduce on street parking by increasing car share spots and bike lanes

CITIES

Spanish city lets you trade in your car for a lifetime pass on public transit 1

BY SARAH LASKOW
13 JUL 2011 1:26 PM

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The Spanish city of Murcia offered its residents a lifetime of free trolley rides if they would only give up their cars.

Murcia, which is near Spain's southeastern coast, wanted to promote its trolley system and decrease the number of cars in the crowded city. So it proposed, through a series of ads and public stunts, that its citizens exchange a car — one paid off and in working order — for a trolley pass good for free rides for the rest of their lives.

The transit agency in charge of the campaign claims they had success with the program, and now they're going to dismantle the cars they're taking out of circulation bit by bit. Every time someone comments on the project, their engineers remove another part, supposedly. You can watch it here.

Urban agriculture 02

Urban agriculture is more than setting up local community gardens, it is about setting up flexible spaces and built form that allow for a diversity of food growth options that are close to the city. Urban agriculture contributes to food security and food safety in two ways: first, it increases the amount of food available to people living in cities, and, second, it allows fresh vegetables and fruits and meat products to be made available to urban consumers. The benefits include reducing environmental costs of transportation and refrigeration, diversifying local industry and making urban areas greener and more attractive.

- Havana Cuba led the way with its urban garden program that by 2002, included 35,000 acres of urban gardens producing 3.4 million tons of food - 90% of the city's fresh food needs
- In New York the One Acre Farms projects located on existing roof tops are producing 1000s of tons of food for commercial sales, providing local jobs, activation of unused land and improving the overall environmental conditions of the city.
- Brisbane is the first city in the world to include both urban agriculture and green roofs in an action plan to meet predicted global climate change challenges



Ten Acre Farm, New York'

Landscape vs new urbanism 03

The current debate in urban design is between the landscape urbanist and the new urbanists. Landscape urbanism is a theory of urbanism arguing that landscape, rather than architecture, is more capable of organizing the city and enhancing the urban experience. New urbanism promotes walkable neighbourhoods that contain a range of housing and job types.

Landscape Urbanism could be characterised as impressively large tracts of landscape (usually parks) sitting between small parcels of urbanism. The design language speaks of division rather than integration; an urbanism of the big green and the small grey. The formula seems to be, "Either have landscape or urbanism but not both in the same place". This is a both a counterpoint and an overlap with new urbanism which promotes village style enclaves but also integrates landscape.

The dialogue is continuing with a focus on the opportunities that an integrated urbanism would provide. A green city that respects natural systems as well as human ones.



2 Schools of Thought - Landscape Urbanism (top) and New Urbanism (bottom)

Creative catalyst

04

A lively arts and culture scene has often been seen as a marker of a place that is vibrant and interesting. It can reflect a diverse population in terms of age and socio-economics. Recently a number of differently scaled projects have been developed as a catalyst for economic and community development.

RENEW NEWCASTLE/RENEW AUSTRALIA

This community led initiative was founded in Newscastle where it has significantly contributed to the revitalisation of the degraded city centre. Empty shops are offered at a token rent to young entrepreneurs and creatives on the proviso that they move on when a paying tenant is found. The underlying premise is that these businesses will attract people and that these people will then attract viable businesses to serve them. The potential risk is that when these creatives are pushed out by rising rents, the very thing that attracted people there in the first place will be gone.

STARCHITECTURE

The Guggenheim Bilboa designed by 'starchitect' Frank Gehry certainly put this regional Spanish city on the global map. A dramatic piece of architecture sited by the river, the building received world wide acclaim and interest that triggered a significant tourism industry in a post industrial economy. The challenge has been the seeming disconnect between the building and its direct environment - it is not part of the city and pushes urban life away from its edges. In fact its considered one of the worst areas for crime in the city.

CONCENTRATING ARTS DISTRICTS

Some cities are know for the diversity of arts and culture on offer. It seems that every neighbourhood in New York has a gallery, theatre or writer's studio. An alternate approach has been taken in Dallas where a formal arts district is being delivered. The discrete area houses any number of trophy buildings yet does not offer the same vitality and life of cities like New York. There are no bookstores, few restaurants outside those in the museums, and not a lot of street life, at least when there are no performances going on. When the focus is on brand not actual experiences then the risk is that the place will not attract people. .

ADAPTIVE REUSE

Sometimes heritage buildings, often expensive to retrofit, are given over to artists as a practical use. This has both positive and negative outcomes. Firstly these buildings can often suit the needs and sensibilities of creatives, however, these same people are often lower income earners so costs can not be recovered and this leads to the requirement for ongoing government funding.

"798" is located in the Dashanzi area, to the northeast of central Beijing. It is the site of state-owned factories including Factory 798, which originally produced electronics. Beginning in 2002, artists and cultural organizations began to divide, rent out, and re-make the factory spaces, gradually developing them into galleries, art centres, artists' studios, design companies, restaurants, and bars.

It became a "Soho-esque" area of international character, replete with "loft living," attracting global attention. Bringing together contemporary art, architecture, and culture with a historically interesting location and an urban lifestyle, "798" has evolved into a cultural area that attracts a diverse population of visitors. Its strengths is the collocation of a large number of individuals and organisation, its challenge is to secure long term commercial sustainability.





Left: Dallas Art Precinct Sign
Right: Beijing's 798 artist precinct

A price on walking

05

Enhancing walkability is the latest catch cry in the development industry with a tendency to focus on the same issues that plague all movement systems in urban environments - they are still dependant on the organisational system produced by a planning system that draws roads before anything else. True walkability is only produced when paths connect destinations that people want to walk to - otherwise you end up with strips of concrete that are empty because they go nowhere and overall feeling of abandonment.

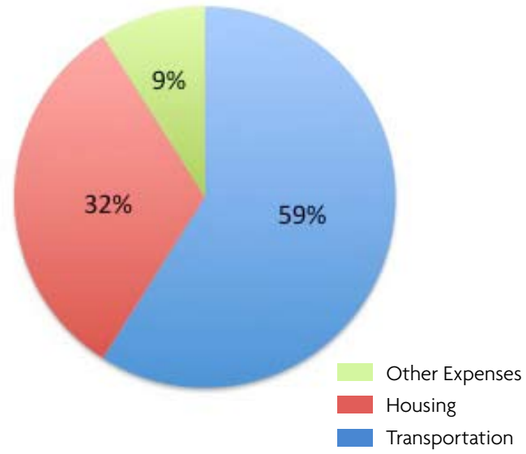
Walkable places have the following characteristics:

- They are dense with a diverse mix of uses including residential, small business, contiguous street fronts and a sense of enclosure created by the buildings around
- Pedestrians have the psychological priority if not the actual
- There are LOTS of different things to look at as you are walking at regular 5-10 metre intervals
- There is a range of paths you can take - the quick and direct way, the back alley way, the path by the post box or past the park or your favourite ice cream store
- They attract people who value the above

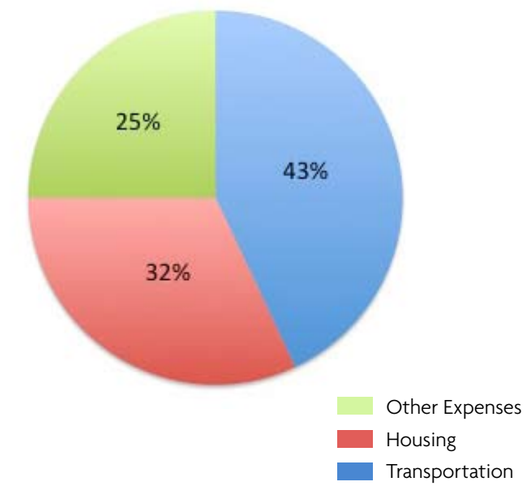
The Walk Score is an online tool that can provide a rating out of 100 for almost any place. The Walk Score considers proximity to a range of amenities. Although it does not consider relative location, attractiveness of area or other less tangible aspects of place, it is increasingly being utilised to support the valuation of residences in more walkable areas. It has been the most clicked on image on one Australian real estate website and has been added to over 85 million property listings in the US. In a typical US market, an additional one point increase in Walk Score was associated with between a $500 and $3,000 increase in home values.

	WalkScore		WalkScore
The Esplanade, Fremantle	95	Potts Point, Sydney	98
Cockburn Central	65	SOHO, New York	100
Claisebrook Cove East Perth	78	Ellenbrook, Perth	33

Mobility-Option Neighbourhood



Auto Dependant Neighbourhood



Urbanity and Amenity

06

More and more cities are positioning themselves as a preferred lifestyle choice. For their vitality and vibrance, their creativity and culture and accessibility. However, this is contingent on the quality of that urbanity. People are attracted to a sense of community and street life, not congestion.

Examining the characteristics of the urban neighbourhoods such as these begins to paint a picture that gives us clues as to how to recreate it. Generally contemporary developments do not have a legacy for quality of dense environments. Our best cities have evolved over hundreds of years and we are struggling to maintain their urbanity as they continue to sprawl, thinning out the labour pool and reducing innovation and productivity.

The predominate form of new density in Australian cities has been stand alone towers on podiums with open plaza surrounds. This does not lend itself to the contiguous street fronts, human scale and range of street widths exemplified in places such as Potts Point Sydney or Greenwich Village New York. Jan Gehl has focussed much of his career around defining quality urban environments and their characteristics. The adjacent table details the protection, comfort and delight elements of a quality people place.

In the US, it is the metropolitan areas where people and businesses cluster that are the engines of the economy. America's top 100 metropolitan areas cover about 12% of land but around 75% GDP.

That is not to say that GDP is the only indicator, as in some cases it has proven to be independent of wellbeing and liveability in cities. 'Gross National Happiness' index was coined by Bhutan as an instrument to measure the population's general level of wellbeing, a response to the culture and values of Buddhist spirituality. Based on the recognition that liveablilty and quality environments attract talent (see over page) we've seen a greater focus towards achieving this aim. World wide a greater value is being placed on urban environments as quality places to live, create and innovate.

The following example images clearly illustrate a number qualities in common and are described to the right.


Barcelona's Old City


Geenwich Village, New York


Paris street

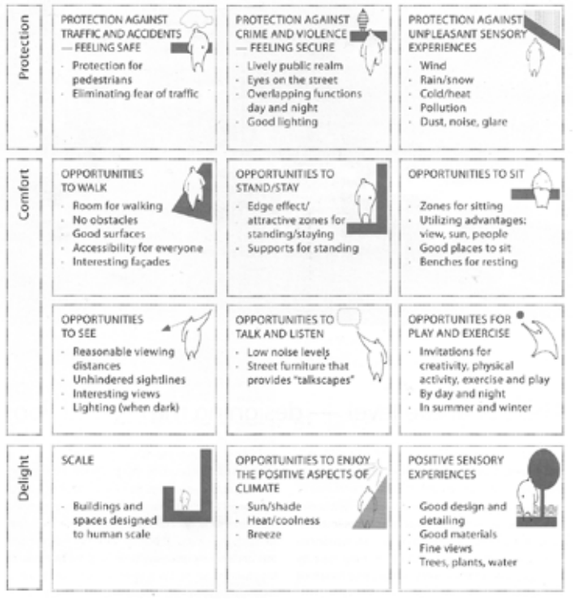

Potts Point, Sydney

"Sprawl thins out the labour pool, which reduces innovation & productivity"

1. Range of street widths
City forms that provide a range of street widths from narrow laneways to broader provide a variety of experiences and intimate spaces amongst high density building.

2. Contiguous street fronts with human scale shop widths and heights & detailing
High density streetscapes with contiguous street fronts provide human scale activity and a reason to continue walking. Tall buildings almost fall away into the background as the hive of activity on the ground floor dominates the senses at an intimate human scale.

3 Consistent building heights
Consistency of building heights provides a sense of enclosure to the street without feeling over surveilled aided by ground floor awnings and often parking that provide a threshold that protects pedestrians from traffic on the street.



Post Industrial Development

07

The reclamation and conservation of post-industrial landscapes constitutes an important cultural objective which is inherently sustainable in that it encourages the positive re-use of redundant buildings that are part of our industrial and commercial heritage.

The key driver for the remediation and adaptation of industrial sites within cities is to provide for expanding and increasingly urbanised populations. Treatment and redevelopment of former industrial sites range from total demolition and remediation through to integrated adaptive reuse of industrial infrastructure, each with varying levels of success. Industrial heritage if retained, can provide a point of difference, unique character and focal point to new development - that adds considerable value to the asset. However, these benefits can be over shadowed by extra cost, controversy and bureaucracy related to the treatment and value placed on specific heritage elements.

Former industrial sites are being redeveloped world wide for a range of uses including:

- Urban parklands/heritage parklands
- Museums of industrial heritage
- Residential and mixed use development (responding to pressure for land and housing in growing cities)
- Art gallery/cultural centres (such as the Tate Modern in London)
- Sports complex (new stadium or indoor recreation)
- Affordable housing locations with close proximity and access to services
- Nature conservation/biodiversity/environmental restoration
- Renewable energy production (such as solar power or wind turbines)

KEY APPROACHES TO DEVELOPMENT OF FORMER INDUSTRIAL SITES

1) Demolish and redevelop
Many former industrial sites consider remediation as demolish and removal of the toxic lands and equipment without regard for retaining industrial character or heritage. Large parts of Melbourne Docklands provide an example of industrial heritage and character removed to pave way for large scale residential and mixed use development that no longer speaks to the industrial heritage of the ports in a compelling way.

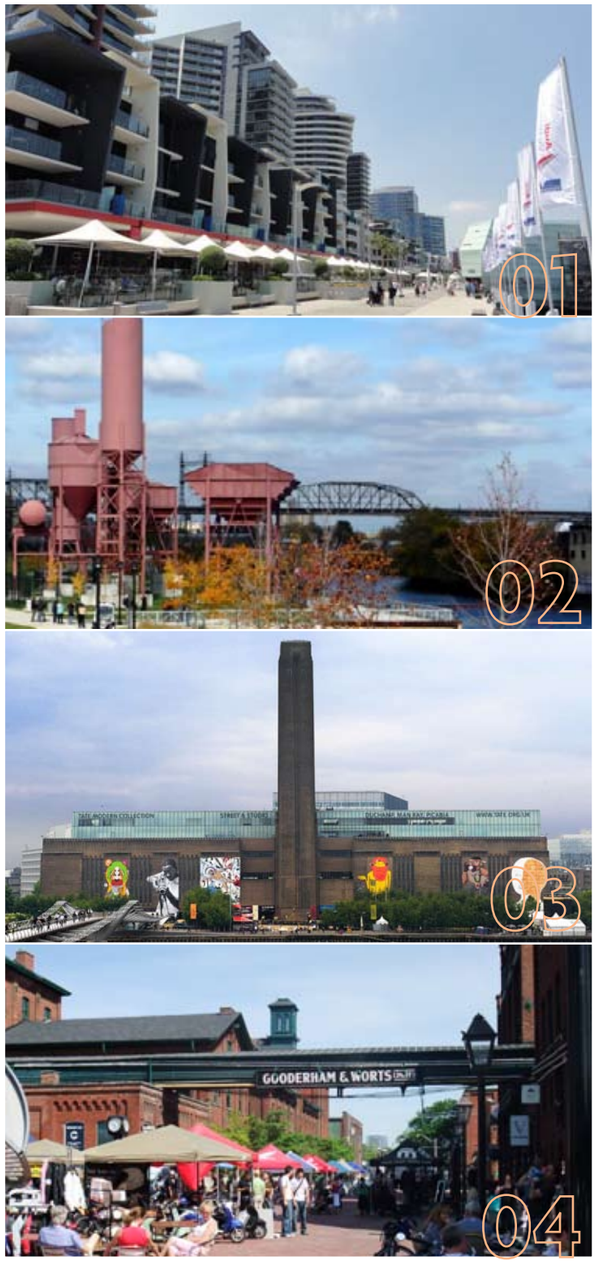
2) Restoration and parklands/memorialisation
A community led initiative, the revitalisation of a former concrete batch mix plant site now provides a new public amenity and renewed access to the Bronx River in New York. Concrete Plant Park is now home to re-established salt marshes, community festivals and its industrial heritage remains on display as a sculptural backdrop to the public realm.

3) Adaptive reuse as cultural/recreation centre
The Tate Modern is one of the best known former industrial sites. When the Tate Collection outgrew its existing premises, there was debate whether to build new or look for a conversion. After extensive consultations, particularly with artists, the search commenced for a convert site. Having found the distinguished and striking power station with huge turbine hall, the Tate Modern found its home. The power station has now become synonymous with the Tate Modern brand.

4) Adaptive reuse and redevelopment as mixed use/residential
In contrast, to the demolish and redevelopment model the Distillery District of Toronto contains the largest and best-preserved collection of Victorian industrial architecture in North America, is a national heritage site and a 'top pick' for Canadian travellers in National Geographic.

PUBLIC VS PRIVATE FUNDING

Of the examples provided, both the culturally and arts based projects (number 2 and 3) attracted government funding. Developer driver projects such as at Docklands Melbourne would likely have involved significant developer contributions to the public realm, whilst the Toronto example involved the private investment of a broad range of businesses in a more ground up than top down approach.



KEY APPROACHES WATERFRONT FORMER INDUSTRIAL SITES

Cities world wide have reclaimed their once undervalued waterfronts as places of culture and revitalisation. The following provides an overview of the key success factors that contributed to successful waterfront redevelopments around Australia.

South Bank, Brisbane
- Integrated Place Management combined with community connected event management
- City Beach – free of charge entry popular with families and school age children
- Riverside promenade – walking, sightseeing › City views – backdrop for sightseeing, picnics, weddings, photography
- Large number of public access points – dominance of pedestrian and public transport options
- Dining options: wide range of price points – open air picnics in parkland to fine dining in restaurant precinct
- Avoids development that is 100% residential to offset dominance of single stakeholder interests

Federation Square, Melbourne
- Integrated Place Management combined with community connected event management
- Big Screen -free of charge communal viewing of major events and celebrations
- City views
- Large number of public access points – proximity to public transport
- Ongoing targeted event management to activate all spaces
- Free seating at major transport interchange

Honeysuckle , Newcastle
- Public transport access in development
- Orchestrated events have been adopted by the community, "Livesites" Initiative
- Public feedback on the design of public spaces has been positive

Kingston, Canberra
- Quality building design - state of the art residential properties
- Popular weekend activities attracting large numbers of local people (market, arts and cultural venues/events)
- Project offers Canberrans a harbour for still water boating – sailing, kayaking, etc.

Darling Harbour, Sydney

› Extensive marketing and promotion budgets › Located on Sydney Harbour and in Australia's largest city - corporate leases and rentals substantial

› Slowly overcoming original design weaknesses of exclusive, inaccessible stand alone precinct with poor integration with city grid

› Large public domain sites allow for large celebration hosting

› Programming has assisted development of a family entertainment precinct identity

Circular Quay, Sydney

› Popular heritage destination with heavily marketed, free and low cost activities

› Significant budget

› Designated position "Place Manager" – role – plan, deliver and assess "place" events and engagement with event stakeholders and site specific partners





TOP: Federation Square, Melbourne. BOTTOM: Honeysuckle, Newcastle

REHABILITATED URBAN STRUCTURES

Inhabitat.com recently rated their top 6 rehabilitated urban structures. Below is an extract from their analysis.

"Over the past few years we've seen some very creative minds transform urban ruins into spectacular parks for us to enjoy. If you can brave an abandoned nuclear plant turned into an amusement park, head to Germany - or see how old train tracks can be transformed into beautiful and fun parks in New York City and Lima. Jump ahead for a peek at 6 of our favourite parks made from rehabilitated urban structures!

1. Cheonggyecheon River Project in Seoul

This stream used to be buried underneath the city of Seoul until it was uncovered and transformed into a lush green park as part of the Cheonggyecheon Restoration Project. Since 2003, the new park has been like a major life-force for the centre of the city, helping reduce temperatures and bridging the gap between the north and south of the metropolis. The 5.6 km park is encouraging new activity and recreation and is even home to an array of new insects, fish and other wildlife.

2. Ghost Train Park in Lima

Old train ruins in Lima, Peru have become the perfect playground for both kids and adults alike thanks to the work of Spanish group Basurama. The Ghost Train Park makes use of recycled materials to create horse-shaped tire swings, climbing structures, canopy lines, and swings. What was once a blight on the city is now a cheery and bright spot full of kids making use what would be otherwise useless concrete columns.

3. Paddington Reservoir Gardens in Sydney

Sydney also has an impressive adaptive reuse project to create a beautiful urban green space. The ruins of a public waterworks was magically transformed into the Paddington Reservoir Gardens with enough history to give you the feeling you're walking around the Acropolis. And since it used to be a waterworks, water efficiency is still a high priority. In fact, rainwater is collected on-site for landscape irrigation.

4. Abandoned Silo Climbing Gym in Amsterdam

Silos are huge pieces of infrastructure that would be a shame to tear down when no longer needed, so when two abandoned silos came up for grabs, Amsterdam hoped to transform them into something amazing for everyone. NL Architects proposed an adaptive reuse project that would transform the silos into an incredible climbing gym. If ever completed, the project would allow climbers to scale both the interior and exterior of the silos and rappel down - all in the name of fun.

5. High Line Park in New York City

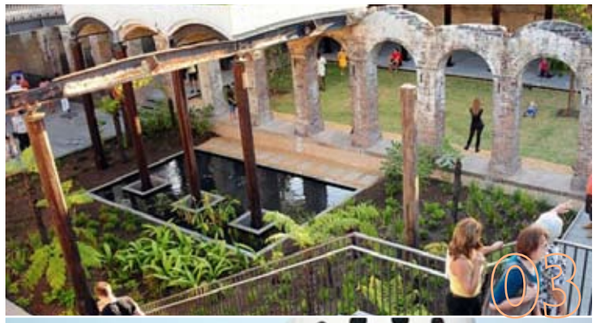
One of our favourite projects to open as of late has been the High Line Park in Manhattan. We still can't get over the inspired idea to transform an abandoned, elevated train line into a beautiful park in the heart of the city. Now that the second phase of the High Line is complete, there's even more space to stroll, hang out and take in the sites of greater Manhattan. The High Line is officially our favourite spot in NYC for ice cream because you can walk it off afterwards!

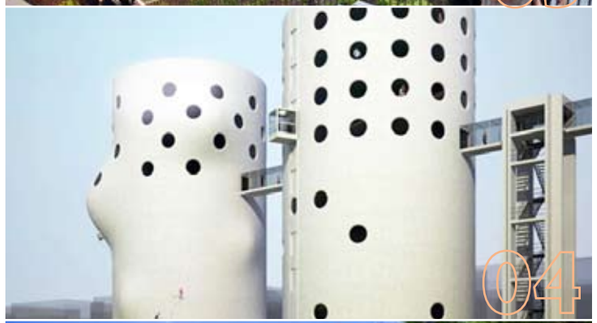
6. Wunderland Kalkar

Wunderland Kalkar in Germany If you're looking for a bit more excitement in your park, check out the Wunderland Kalkar in Germany - an abandoned nuclear plant that has been transformed into an amusement park. The plant was never actually in operation, so have no fear of radiation - but rather than tearing it down, they transformed it into a park that draws hundreds of thousands of people every year."













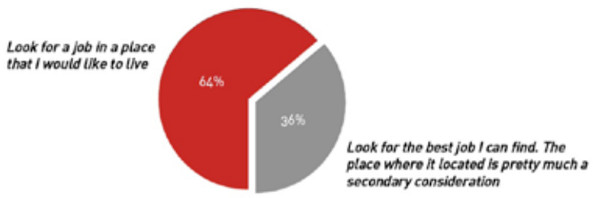
Youth and talent migration

08

Globally cities are becoming more competitive, as people move to places because of what they represent, or because they align with their personal values, that is, the place is more desirable than even the job. Cities are actively targeting youth and talent for their known benefits to local and regional economies and to the social and cultural life of cities.

What we are seeing now is a significant movement of young people into urban places with a recent study of 15-35 year olds finding that 88% of youth wanting to be in an urban setting (RCLCO). Even cities that are losing population are seeing an increase in 25-35 year olds in their urban centres. These younger people are being seen as a real resource. For example, detroit now has the same population as it did 100 years ago and in response has launched a program called 15/15 where they are actively pursuing 15,000 younger people to move to the city centre by 2015.

A recent survey of college graduates found that almost two-thirds of college-educated young people report that they will make the decision of where they live first, then look for a job within that area (CEOs for Cities). If the place meets their needs, wants and aspirations, youth and talent will recognise the unique place character and will ultimately consider settling in the area.



ABOVE: Graduates recognising importance of place. SOURCE: CEOs for Cities

WHAT DO YOUTH VALUE?

The McCann Worldgroup recently produced 'The Truth about Youth' to establish what motivates young people around the world today.

The three top motivations or values for youth were defined as:

- Commune: The need for connection, relationship and community
- Justice: the need for personal or social justice, to do what's right, to be an activist
- Authenticity: the need to see things as they are

According to Anna Rose, co-founder and chair of the Australian Youth Climate Coalition, youth want ownership and responsibility and will be motivated to participate in the community if; they are informed and feel it is worthwhile, know that time isn't being wasted and real action is a by product, and that there is an element of learning or personal growth that is enjoyable. Rose makes a note that motivating youth involves the identification of sub cultures and a realisation that just as youth are diverse, so too should be their urban environments.

WHAT DO TALENT VALUE?

When speaking of 'talent' we refer to urban professionals, often with careers in finance, business or scientific fields. This group are tech savvy and well educated, health and image conscious and often come from a multicultural background.

Talent value:

- Active and healthy lifestyle
- Inner city urban environment
- A safe and secure neighbourhood
- Sustainability and natural assets of a place

Attracting 'talent' to a place, contributes to the economic prosperity of the region in terms of intellectual benefits, but also with flow on effects from a higher disposable income and support for the arts and culture and local businesses that provide daily services. The attraction of talent to a place will self perpetuate once their needs are met, with more talent and college graduates attracted to the area as a result of its place identity and character.

"While young people may be a driving force in demanding vibrant urban environments, they aren't necessarily in the driver's seat when it comes to the important policy decisions that continue to shape metro areas, often at the expense of cities."

- Angie Schmitt, StreetsBlog

ACTIVATORS OF THE PUBLIC REALM

Providing facilities for youth activities and entertainment is vital in any well balanced community. As most youth cannot drive or visit licenced venues, they are frequent, and usually visible users of public open space. The provision of open space should be equitable, providing for all ages of the community, including youth.

While we are starting to design for these very mobile younger people, the 15-25 year olds, we are not really involving them practically or theoretically in planning the places they want to live. We are stuck in a paradigm of the 'skate park' and the opportunity to engage with young people on the spaces they inhabit could provide the next breakthrough in providing for this demographic.

THE VALUE OF CREATIVITY

Great places are socially and economically productive, and creativity is an increasingly valued commodity. Richard Florida addressed NU graduates with the statement 'our creativity is an infinitely renewable and sustainable resource' and this resource is being demanded globally.

When smart, skilled people start to gather in a place, the process becomes self-perpetuating. The more skilled people you attract, and the more they live in higher densities, the more you reduce transaction costs and increase "knowledge spillover," which leads to commerce and innovation, also known as social capital. Done right, density considered within the context of fostering social capital and attracting youth and talent, can be an engine of prosperity.

DIVERSE POPULATIONS MAKE HEALTHIER COMMUNITIES

A key factor relating to decreasing crime lies in the growing racial, ethnic and demographic diversity of our cities and metropolitan areas (Kaid Benfield, Director of Sustainable Community and Smart Growth at the Natural Resources Defence Council). More and more we are seeing cities and communities take a strategic approach to demographic and cultural diversity. Cities that attract youth and talent, provide a greater depth of social mix and an element of entrepreneurship that comes with the sharing of ideas and energy.

Group aims for 15,000 young professionals in Midtown area by 2015

By Sherri Begin Welch

Nathan Skid/Crain's Detroit Business



Midtown residents Zach and Morgan Stotz enjoy an outdoor lunch on Willis Street.

If **15 by 15**, a coordinated effort by the three anchor employers in Detroit's Midtown area to bring 15,000 young, educated people to greater downtown by 2015, is successful, it could become a national model.

The effort is the first nationally to put a stake in the ground and set some measurable markers around its goal to attract young people, and it is one of the first such efforts with anchor institutions working collaboratively, according to the Chicago-based nonprofit **CEOs for Cities**.

Wayne State University, **Henry Ford Health System** and the **Detroit Medical Center** in May began meeting to explore ways they could work together to spur more development in Midtown to make it a place young people find attractive.

Joining them at the table is the Detroit-based **Hudson-Webber Foundation**, the impetus for the effort and an investor in Midtown for more than 20 years.

The four are members of the Detroit affiliate of CEOs for Cities, a nonprofit network of business, nonprofits and mayors dedicated to building and sustaining the next generation of great American cities.

Collaborative Urbanism

09

Changes in the patterns of consumption and ownership are likely to increasingly impact the spatial arrangement of urban environments. The emergence of a new generation with 'online trust in sharing' has created new ways to exchange good and share resources. This has movement has been called 'collaborative consumption' and recently voted by Time Magazine as one of the 10 ideas to change the world.

Collaborative consumption works on the premise that people want the outcome not the object; the music not the CD, the hole not the drill, the mobility not the car. In urban environments this idea has historic roots from the idea of the common to English private parks and gardens shared by surrounding houses. Successful enterprises based on the collaborative consumption model do require a significant market and as such have a direct relationship with density in urban environments.

Collaborative Urbanism takes this concept one step further, transforming the way we interact with our communities and the places we live work and play in. This movement is changing how people living in cities.

On a governance level, collaborative urbanism has been linked to collaborative processes of engagement with communities. Many of the collaborative processes associated with Place Making are being considered collaborative urbanism. However, at its most powerful collaborative urbanism is catalysed by, and implemented by the community, bottom up not top down.

COLLABORATIVE CONSUMPTION AND ITS URBAN IMPLICATIONS

Car sharing is one service that has seen changes to development regulations and street parking access. Other areas ripe for sharing are water, power, laundries, hot water, waste management, tools, toys, food production, flexible spaces and communal facilities. A centralised 'share site' could be produced for the site as a whole.

POP UP URBANISM

Pop up urbanism, also known as tactical urbanism, whether driven by the community, developers or government policy, has recently been seen as a way of catalysing change through low cost interventions. The two directions of pop up urbanism, being the bottom up or top down approaches, have in essence been driven by the changing global market and in recent years were catalysed by the Global Financial Crisis. When involving the community pop up urbanism provides an opportunity for the community to build ownership and buy in to more significant long term projects.

Popup urbanism comes in many forms, from promotional, branding and marketing strategies by large transnational corporations, through to the physical manifestation of community led revitalisation efforts. These efforts provide a taste of what is possible, breaking with established norms to achieve untapped potential.

COMMUNITY LED REVITALISATION

Community led revitatlisation can take on a number of forms, from creative clusters, place based activism, urban agriculture to cultural clusters. The bringing together of like minded and committed citizens to improve their urban environment is the foundation of this movement.

Community led revitalisation is most often a local phenomenon, is rarely planned, rather there is generally a convergence of similar values, needs or aspirations that bring people together. Migrants are often attracted to place for its affordability or pre-existing community. In this way migrants have potential to transform spaces into places, defining the place character of the area and capitalising upon it.

"Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody"

-- Jane Jacobs



1. Parking Day
PARK(ing) Day is a annual open-source global event where citizens, artists and activists collaborate to temporarily transform metered parking spaces into "PARK(ing)" spaces: temporary public places. The project began in 2005 when Rebar, a San Francisco art and design studio, converted a single metered parking space into a temporary public park in downtown San Francisco. Since 2005, PARK(ing) Day has evolved into a global movement, with organizations and individuals (operating independently of Rebar but following an established set of guidelines) creating new forms of temporary public space in urban contexts around the world.

2. Temple Bar district
In the 1980s, the state-owned transport company Córas Iompair Éireann proposed to buy-up and demolish property in the area and build a bus terminus in its place. While this was in the planning stages, the purchased buildings were let out at low rents, which attracted small shops, artists and galleries to the area. Protests by residents and traders led to the cancellation of the bus station project, and the Taoiseach (Prime Minister) Charles Haughey was responsible for securing funding. In 1991, the government set up a not-for-profit company called Temple Bar Properties to oversee the regeneration of the area as Dublin's cultural quarter.

3. Pop Up Greenhouse Bar, was in Melbourne, now in Perth
Designed by Joost working exclusively with the discard of human activity he fashioned unique building system utilising straw bales set into a 100% recyclable steel framework used to construct the first 'Greenhouse by Joost', an exhibition and event space at Melbourne's Federation Square which was open from November 2008 to January 2009 and attracted 1,000 visitors per day, global media attention from major publications and over 2.5 million viewers on YouTube. A permanent Greenhouse by Joost is currently located on St George's Terrace in Perth and in 2010 received the Restaurant of the Year in Perth and attracts 800 to 1,000 visitors per day.

4. Better Block Project
For two days on April 10th and 11th, 2010, locals changed a car-centric thoroughfare to a people-friendly destination, complete with temporary businesses like a cafe, flower market, kid's art studio, and featuring historic lighting, cafe seating, live music and more. All with a budget of $1000! The event was such a success that members of city hall now want to make it permanent.

PART B
THE PLACE FRAMEWORK



B1
VISION & OBJECTIVES

The DSP vision and objectives form the basis of the Masterplan, this Place Framework and future Place Making Overlays. The DSP vision and objectives form the basis for the ongoing development of visionary local structure plans that respond to the place, speak of its unique nature and enable the unique opportunities of the project to be brought to fruition.



DSP & MASTERPLAN VISION

The following vision statements are taken from the DSP which aims to create and implement:

- A vibrant, landmark destination that is connected, integrated, diverse and accessible
- A coastal settlement of beauty, charm and vibrancy that exhibits world leadership in architecture and building design, landscape and water design, and social & cultural sustainability
- A place that offers new and exciting living, employment and recreation opportunities, whilst also providing an appropriate level of compatibility and support for existing residents and enterprises in the area
- A sustainable community that celebrates the area's past as well as taking on creative ideas, innovation and development
- A regionally significant coastal node for Perth's southern suburbs that combines the new Port Coogee Marina development with a dynamic new waterfront centre
- An easily accessible place, with an integrated transit system and offering lively cafes, restaurants, shops, residential and commercial precincts, tourism, cultural and recreation activities
- New sustainability criteria
- A collection of great streets and inspiring public places which will explore and enjoy the Cockburn Coast's past
- A place that unites the social, environmental and economic principles while maintaining and respecting the Cockburn coast's unique history and culture

The following vision statement is from the Masterplan:

- The Cockburn Coast is set to become the manifestation of contemporary urban sustainability; contemporary by expression of current knowledge and future aspiration; urban by design and by the intensity of development; and sustainable by restorative intervention.

MASTERPLAN OBJECTIVES

The following objectives outlined in the DSP & Masterplan set the high level aspirations for the project to date.

The project objectives are:

Responsive to the context – regionally and the immediate environment

Establish a sustainability framework for future detailed planning and design

Transit orientated development with appropriate density

Inclusive / participatory planning and consultation process

Create a place with a mix of people, housing, uses, experience and lifestyle

Establish an urban development framework that provides guidance for implementation

PLACE MAKING OBJECTIVES

The following place making objectives are a synthesis of the priorities shared by workshop participants at the Place Making Workshop August 2011. They have been further developed to respond to the Masterplan Objectives and aim to provide the next iteration for their delivery.

Leverage existing assets; natural and heritage, with creative and innovative opportunities for re-interpretation and use

Establish a point of difference or 'wow factor' that will set this place apart from others creating a locational advantage that is complimentary to surrounding centres and their roles (locally & regionally)

Concentrate activity around key places and connect destinations with quality pedestrian experiences and public transport

Identify existing and new markets and build place-based relationships that will evolve and strengthen over time, that will emerge as a network of centres and infrastructure for the long term.

Identify a range of community uses and infrastructure that will generate social sustainability and social cohesion

Develop a staged approach to manage the transition of landmark uses such as the power station

B2
PLACE DRIVERS

Place character is influenced by a wide range of factors; these drivers of place can be historic, cultural, local, political, and/or global. By understanding the factors that have contributed to the current character of the Cockburn Coast we can incorporate the 'essence' of the place in shaping its future. These place drivers provide the basis for the development of a unique place character statement for the Cockburn Coast and should be utilised as themes in themselves to be interpreted on site in the delivery of place.

The four place drivers for Cockburn Coast are:

- Intensity
- Duality
- Honesty
- Legacy

The following diagram describes the various factors that will combine to influence the future place character of the Cockburn Coast. The outer ring summarises key themes emerging from the Social, Economic, Environmental and Cultural (SEEC) research conducted by Place Partners and focuses on the existing character influences of the place today.

The middle ring refers to regional and global trends and drivers that are influencing urban development generally and place making specifically. The central ring summarises to the objectives of the District Structure Plan and Masterplan as they will influence the development of the Cockburn Coast in directive way.

The diagram is also divided into 4 quarters relating to the key themes that are emerging across all the research: Intensity, Duality, Honesty and Legacy.

INTENSITY

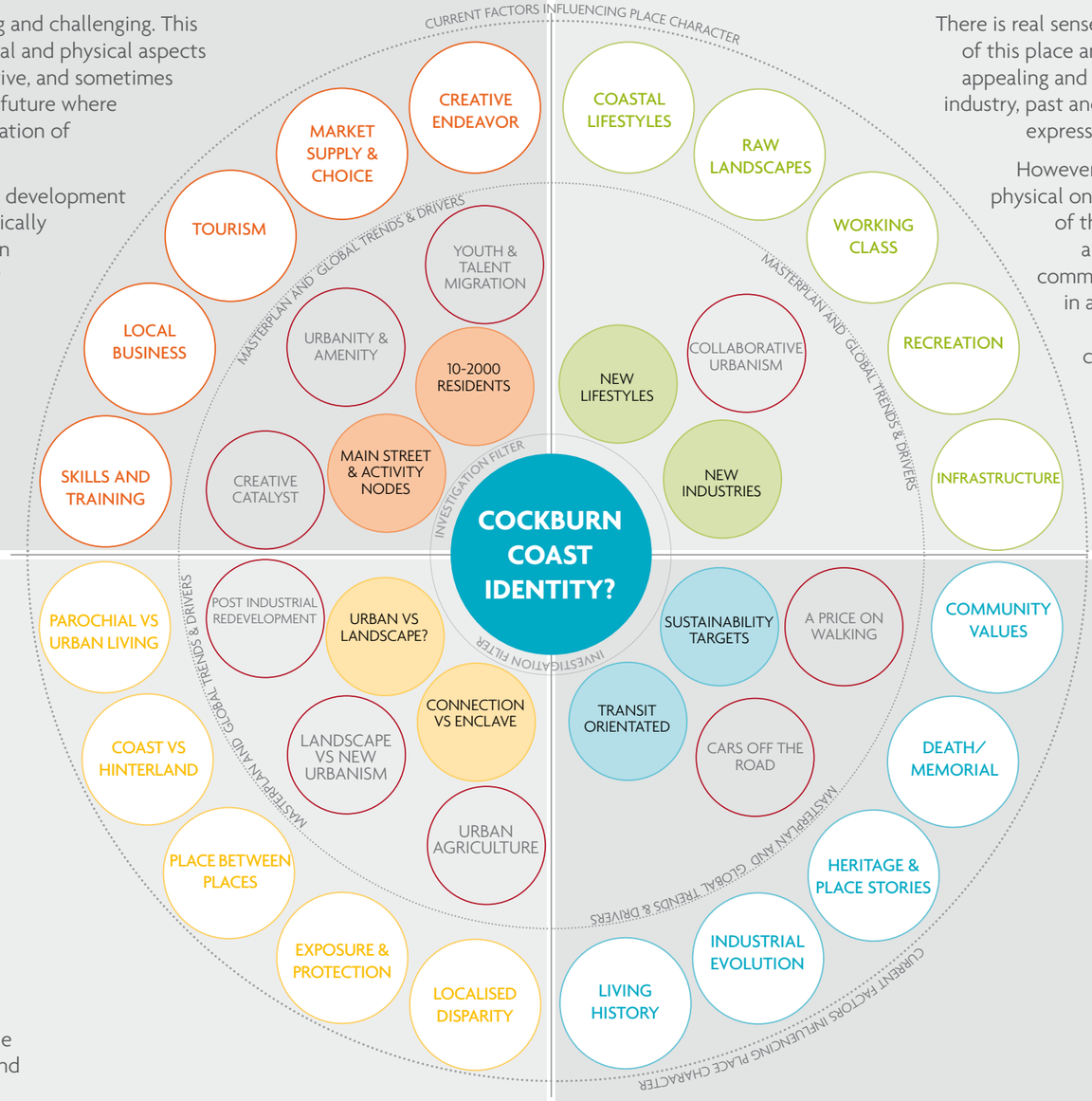
Intensity can be both exciting and challenging. This driver describes social, cultural and physical aspects of the place from its productive, and sometimes dramatic past, to its planned future where intensity refers to a concentration of activity and amenity.

The intensification of coastal development can be received unenthusiastically as there is a perceived tension between nature and the built environment. But with intensity of amenity comes a number of environmental benefits. It involves the centralisation people, buildings, gathering spaces and infrastructure to realise the greatest potential from a more compact city form.

HONESTY

There is real sense of the 'down to earth' nature of this place and its people, a rawness that is appealing and essentially honest. Textures of industry, past and present combine in a sincere expression of hard work and integrity.

However, this driver is deeper than the physical only, it involves sharing the story of the place, its planned evolution and listening and responding to community needs by involving them in a transparent and participatory process. In attracting a community who will help build the culture of the place we need to ensure that they understand their role in the development of the place they want.



DUALITY

This driver reflects the contrasts inherent on and around the site. Internally it is a place of dualities; from beach to dune, to bush to road, from industry to nature. Each contrast provides an opportunity for an authentic set of experiences that are unique to the site.

There is an opportunity to explore and enhance these place based experiences to provide a diversity of transitions that reflect the larger regional context and the shift between the suburban and the semi-urban.

LEGACY

This driver is an important aspect of the place, reflecting both tangible and intangible place based assets of the current site that are valuable to the local community and the history of Perth's development.

Its also suggests a need for leadership and responsibility in the future planning of the place, a long term view that considers infrastructure as a communal asset and investment. Sustainability, in all its forms is critical in our ability to pass on a positive contribution to future generations.

Place Drivers (Project Themes)

The significance of the place drivers is such that they not only inform the development of the place character but also define the key project themes that will be used as a tool to deliver that place character.

The Place Drivers/Project Themes inform key initiatives of the project including public art, heritage interpretations, and landscaping elements, even street naming and material selection.

The following table illustrates how the theme would direct responses to heritage, public art and social activity.

THEME	HERITAGE INPUT	
INTENSITY Intensity can be both exciting and challenging. This theme describes social, cultural and physical aspects of the place from its productive, and sometimes dramatic past, to its planned future where intensity refers to a concentration of activity and amenity.	The heritage aspects of the site that are incorporated into the theme of intensity include the South Fremantle Power Station, the Robb Jetty entry port, the CY O'Connor story, shipwrecks and the abattoirs. They all contribute a highly charged, emotional response to former activities and events on the site.	 
DUALITY This theme reflects the contrasts inherent on and around the site. Internally it is a place of dualities; from beach to dune, to bush to road, from industry to nature. Each contrast provides an opportunity for an authentic set of experiences that are unique to the site.	Duality plays out, in terms of heritage, in highlighting the differences and commonalities between the old and the new, the natural and the man made, and the tangible and intangible There is wide scope for considering both dramatic and seamless transitions between these, depending on where they are located	 
HONESTY There is real sense of the 'down to earth' nature of this place and its people, a rawness that is appealing and essentially honest. Textures of industry, past and present combine in a sincere expression of hard work and integrity.	There is a wide breadth of heritage elements that input into this theme, from the site's indigenous past, to the early settlers and rawness of the military and industry uses.	 
LEGACY This theme is an important aspect of the place, reflecting both tangible and intangible place based assets of the current site that are valuable to the local community and the history of Perth's development as well as investment in the area's future.	The legacy theme reflects the value of the current assets on site including the power station, the beach horse riding, landscape features even the dog walking. Consideration should be given to the creation of future heritage that does not diminish current assets.	 

PUBLIC ART

Public art can be influenced by the them of intensity by providing the opportunity for dramatic, forceful and challenging works that may in fact be short lived. Temporary interventions, provocative, experiential discoveries and lighting installations would all reflect this theme.



Public art can explore this theme through a response to the intimate and the grand, the hand made and the high tech, the architectural and the artistic. What is a piece of art and what is a creative landscape?



Art practices can be used to explore many ideas that may or may not be clearly legible to the viewer. The opportunity for art works exploring this theme is to work with the public in the creation or art, to use it as a means of communication and also education.



Public art is itself a legacy for the community, a communal benefit that reflect the values of a certain time and place. This theme should be considered for all permanent art works on site but can also consider how to engage with intangible aspects of place.



SOCIAL ACTIVITY

The intensity theme would apply to social activity in a similar vein to public art, large scale events and celebrations that reflect community passions.

In terms of social activity, the types of places that would fit this theme include flexible spaces that are planned for multiple uses and users and places that explore the edge between suburban and semi-urban activity. Programs could consider community elders mentoring youth or environmental education

Engaging with the honesty theme in planning for social activity will need to consider not ‘idealised behaviours’ but be based on a realistic appreciation of the day to day activities of local residents and visitors, their needs first and aspirations second.

One of the greatest legacies that this project can offer is in terms of cultural change from suburban living to semi-urban lifestyles and the associated walkability, use of public transport, local shopping and community cohesion. Investment in both culture change programs and public infrastructure to support these new behaviours is essential.

B3
COCKBURN COAST'S FUTURE PLACE CHARACTER

Building the character of a place is not an intuitive by-product of the design process. It is a series of explicit and discrete actions that focus the decision making process to consider all aspects that contribute to the personality or experience of a place.

Place Making aims to build on the strengths of a place and its community to ensure the future place reflects their culture, stories and aspirations. The following pages articulate the future story for the Cockburn Coast.

Place Driver - describes the focus that is driving the future place character. It provides the foundation for the vision and the place making principles.

Cockburn Coast's Place Character Statement - defines the personality or character of the place.

Cockburn Coast's Place Vision - articulates the future we aim to achieve for this place and allows for alignment of project teams and stakeholders. It is developed from an understanding of influences on place identity and stakeholder values and aspirations

INTENSITY | HONESTY | DUALITY | LEGACY



Cockburn Coast is a place that explores the essence of transition. From the beach to the bush, the local to the regional, the suburban to the semi urban, the intimate to the grand, Cockburn Coast delivers real diversity - of experience, offer and lifestyle.

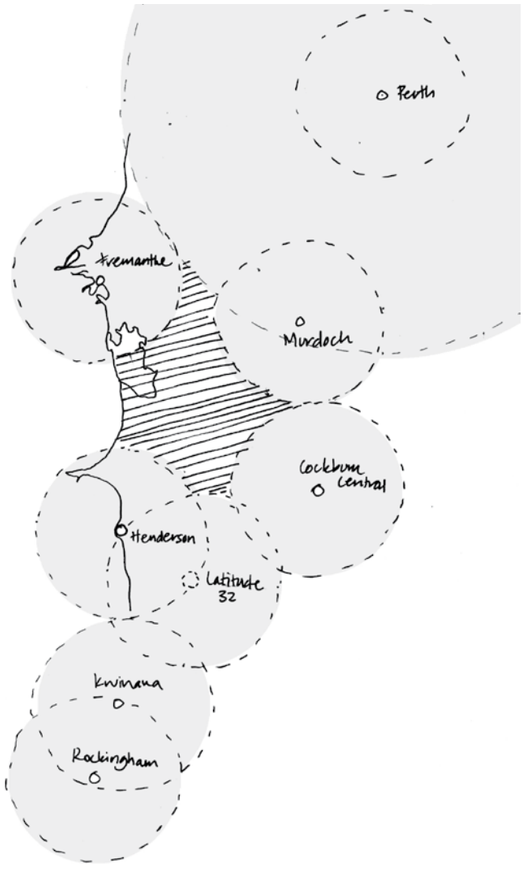
It is not only different from its neighbours, it is a place that offers choice and variation within. From seamless movement between beach and main street to bold contrasts between new and old, Cockburn Coast plays with the idea of transition as a means of offering meaningful experiences that connect people to the place.

Cockburn Coast celebrates its dynamic evolution and collaborates with its community to make a place that reflects both local needs and regional expectations.

Project Differentiation
Defines the qualities that set this place apart from others both in terms of product and experience.

REGIONAL TOURISM/ RECREATION DESTINATION	CO-LOCATED DIVERSITY OF HOUSING PRODUCT	ACCESS TO AMENITY	RANGE OF EXPERIENCES
Power Station	Terrace	Public Transport	Intense Activity
Beach	Work/Live	Main Street	Quiet & Intimate
Beeliar Reserve	Family-Singles	Fremantle	Open & Public
	Rent/Buy	Public Realm	Comforting
			Challenging

Cockburn Coast is a place between places. On the edge of a number of concentrated activity zones it needs to imagine itself as a self sufficient entity that can also build relationships with its neighbouring centres. For Perth it is a new type of place, a transition from town centre to semi-urban environment Cockburn Coast needs to balance current cultural values and suburban aspirations with the strategic vision for integrated and localised living.



PLACE BETWEEN PLACES

› Transitioning experience
The Cockburn Coast's transition from a soft and seamless to a dramatically contrasting place. considers the internal land uses but also the boundaries to neighbours

Active to passive
Complementing transition, the places within the Cockburn Coast will also range in diversity from passive to active entertainment and recreation spaces.



LOCAL & REGIONAL



TRANSITIONING TRANSITION

‹ Local and regional
The offer to regional audiences is more extensive than that provided to new residents. There will need to be a transition to shared local and regional ownership.

› Intense and calm
Activities within the Cockburn Coast will be specific to their location but will include a balance between intense and calm spaces. Precinct will not be limited to one part of the range but rather providing a variety of experiences locally for a wide spectrum of audiences.



ACTIVE TO PASSIVE



INTENSE & CALM

Delivering a sense of Transition at Cockburn Coast

Place making is an iterative process; the place drivers inform the place character and in turn determine the themes that will guide decision making and the delivery of the place character. This is not a prescriptive approach but rather one that aims to imbue a physical location with a personality, to a certain extent to humanise it and make it meaningful to people who live or visit there.

The overarching place character of 'Experiencing Difference, Embracing Change and Evolving Together' can be defined most simply by the term 'transition'. The idea of transition is particularly valid at Cockburn Coast because of its already rich history of change and the planned future evolution, but also because of the range of experiences that the place already offers a visitor. The idea of transition is 'of the place' it reflects what Cockburn Coast 'is' and what 'it wants to be'.

Transition reflects the ongoing and organic change that occurs at all places an in all communities. It can be considered strategically, spatially as well as through time. Transition questions the notion that a drawing can determine all aspects of the future needs of a place, especially one with such a long development horizon. Transition also considers that at the completion of the thirty year development timeline the place will continue to change. Flexibility and responsiveness are key to building in resilience in both the place and its people, (Port Coogee is an example of where this has not been the case).

The delivery mechanisms for Cockburn Coast need to consider how new information can be responded to and how the essence of transition with all its myriad possibilities can be ingrained into the environment and experience offered. Cockburn Coast needs and overarching story of change that can itself evolve to engage with current and future residents and visitors to an area that will need many hands to see its vision realised

COCKBURN COAST
EXPERIENCING DIFFERENCE
EMBRACING CHANGE
EVOLVING TOGETHER

TRANSITION

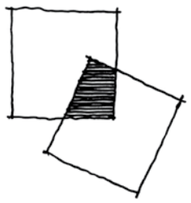
INTENSITY



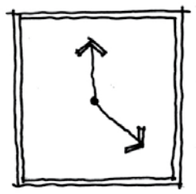
HONESTY



DUALITY



LEGACY



Open space
Open space within the Cockburn Coast should offer a range of experiences, from informal to formal, active to passive, large to small and everything in between.

Activity
The Cockburn Coast will provide an invitation to participate in a diversity of activities from a solo walk to intimate lunch, family gathering or community celebration. Different places in the precincts should build unique character that reflects the desired behaviours.

Lifecycle
The Cockburn Coast needs to provide a clear offer for people of all ages by providing services and facilities for the entire spectrum of human life, from child to elder. In doing so, a diversity of activities, range of recreational spaces and entertainment will be considered in addition to an emphasis on walkability, sittability and comfort.

Streets
A hierarchy of streets enhances legibility and distinguishes opportunities for different types of activity from street dining, to street fairs and laneway 'happenings'. Varying street widths offer varying sense of enclosure or speed or slowness that are further enhanced by ground level uses

Landscapes
The Cockburn Coast already offers a wide range of organically transitioning landscapes, these should be protected and enhanced then balanced with new types of landscape suitable to different areas.

















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Place Making Principles

The Place Making Principles guide the high level delivery of the place character and provide a measurement tool to assess the successful delivery of the character and experience of the place we aim to create at Cockburn Coast's . Whilst each of the principles sits most strongly within the social, economic, physical environment or cultural realm, the principles should be considered as applying across all aspects of the place.

social



PRIORITISE DIVERSITY AS A KEY DRIVER OF CULTURAL CHANGE

To succeed as a great people place Cockburn Coast needs to focus on providing a greater diversity of housing options, price points and recreational spaces. Providing choices extends people's stay and localises resident activity.

The Cockburn Coast needs to build on the urban amenity and lifestyles present in Fremantle and South Fremantle while responding to the needs and wants of the local/regional community. A variety of housing options will attract a range of family types and provide a socially balanced community.

A diversity of housing options will only achieve its desired outcome if it is accompanied by a diversity of experience and price point. Cafes and food outlets will be required to cater for a wide range of different users, from the university student to the high income professional. The move from car dependency to a walkable neighbourhood will complement this price point, creating an accessible and centralised place for all.

The diversity in entertainment and recreation activities should vary from active participation to passive people watching, from no cost to special occasion splurge. They are accommodated by a variety of outdoor spaces that provide for intimate quiet times as well as communal celebrations.

HOW DO WE DO THIS?

- Plan for diverse housing types, sizes, cost and tenure (rent vs purchase)
- Centralise diversity in activity zones and around public spaces
- Ensure a range of retail space sizes and costs
- Develop a strategy for attracting start ups and unique local traders, provide shorter leases
- Ensure a diversity of price points in the food, beverage and retail mix
- Support businesses that work with extended or unusual operating hours to attract a more diverse customer base

environmental



EXPLORE TRANSITION BETWEEN EXPERIENCES & PLACES, ACTIVE AND PASSIVE SPACES, LOCAL AND REGIONAL DESTINATIONS

Providing a variety of experiences will keep residents and visitors engaged with their place, provide options for walking paths and choices based on how an individual feels on a particular day.

A diversity of experiences can be achieved through the provision of a variety of places with different characters and look; intimate and open, active and passive, and green and paved. These places, and the spaces between them will realise the potential of the area in catering for a multitude of community needs and wants, providing sanctuaries, local communal spaces, grand gathering places and all the variations between.

HOW DO WE DO THIS?

- Identify a hierarchy of places and consider their character, roles and potential users e.g provide larger spaces for community gatherings celebrations and markets and smaller spaces for families and friends to gather and connect throughout the retail core
- Use the public realm as a visual marker for what activity is desired e.g tight spaces with busy built edges will move people quickly or providing a group of seats under shelter will invite people to gather
- Work with different user groups to define spaces that suit their needs such as youth space, student lounge, mothers groups etc
- Avoid the place for everyone – it ends up being for no-one
- Consider a range of materials and street furniture that reflect different character zones but still reflect the whole area's character
- Play with the transitions between places – some direct, others a journey and discovery
- Program activities that cater for different ages and cultural backgrounds and times
- Design spaces for their intended uses based upon community needs and feedback

economic



IDENTIFY SERVICE AND SUPPORT ROLES FOR LOCAL AND REGIONAL NETWORKS

At the centre of a triangle of key economic centres including Freemantle, Murdoch and Henderson, the local economy in Cockburn Coast needs to transition from the existing heavy industries to service and support businesses.

Current businesses on site tend to the 'dirty' including processing, storage, logistics and chemical. Many of these are unwilling to move at this time and consideration will have to be given to transitional arrangements that take into consideration land prices and increasing residential population. Current accommodation needs for professional consultancies, research, logistics, education and health are being met in the surrounding centres leaving little scope for the development of a cluster base in Cockburn Coast. As such tourism and hospitality for visitors, and resident services including daily shopping and local professional services, are likely to be the primary future industries. A careful balance needs to be managed between these two markets to ensure the self sustainability of the area in low season. Opportunities for the area include stand out and authentic offerings that are not found in the region, that meet a regional visitor price point and take advantage of the coastal position. In addition industries can be developed on site that reflect the site's unique features eg. clean energy production or water based industries that can co-located with tourism such as underwater engineering training.how do we do this?

HOW DO WE DO THIS?

› Provide incentives for businesses moving into the area - e.g discounted housing for owners & staff

› Produce an Economic Development Plan that identifies potential new businesses and actively target them as investors

› Provide formal support including marketing and incentives for early adopters - it is essential that the first businesses - particularly retail, do not fail

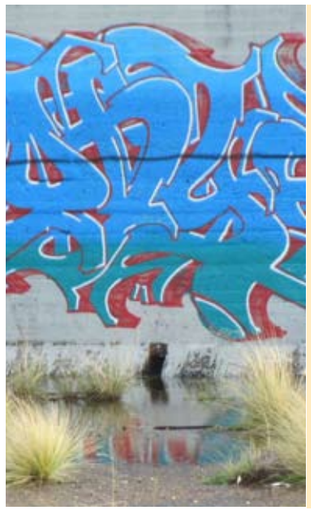
› Focus retail around known attractors such as Robb Jetty main street, the power station, Robb Jetty, C Y O'Connor beach and great public gathering spaces

› Investigate alternative energy generation possibilities

› Design adaptable spaces, large warehouse spaces, for conversion or multiple uses and to maximise developable interest

› Encourage and support pop up/vendor businesses to experiment with demand and activate spaces with few overheads

cultural



BUILD A CULTURE OF CHANGE CAPACITY THAT CELEBRATES INNOVATION & PARTICIPATION

Culture is the beliefs, values, behaviours and expressions of a group of people, it covers the arts but also local rituals and how an area is governed. The Cockburn Coast will encourage ideas, education, and entrepreneurship while responding to community values and civic pride.

While there is no residential community on site now, the area is considered a key asset of the wider regional community and is used as such. Recent developments on the coast have considerable lessened access to the water's edge. Cockburn Coast needs to provide a different model of development with a focus on communal asset investment rather than private development. A different approach from government will invite a different response from the community.

In the past Cockburn Coast was the gateway to Perth and now the project presents a new way of living. The opportunity is to create a sense of place that is open to new ideas, to entrepreneurs whether big or small business and to recent arrivals in the country

HOW DO WE DO THIS?

› Make visible the historic and planned evolution of the place and share the story of change

› Support suburban to semi-urban culture change through early community programs that encourage regional residents to see what in it for them

› Ensure that things that are different to the 'norm' are better than the norm

› Offer regional empty nesters the first opportunity to downsize but upscale their lifestyle

› Provide family rental accommodation for those waiting to have their house built inland – change their mind!

› Partner with local businesses seeking off shore employees to offer job/house packages

› Encourage the development of a business chamber and residents group using social media to keep the local community informed of promotions, developments and activities

B4
THE PRECINCTS

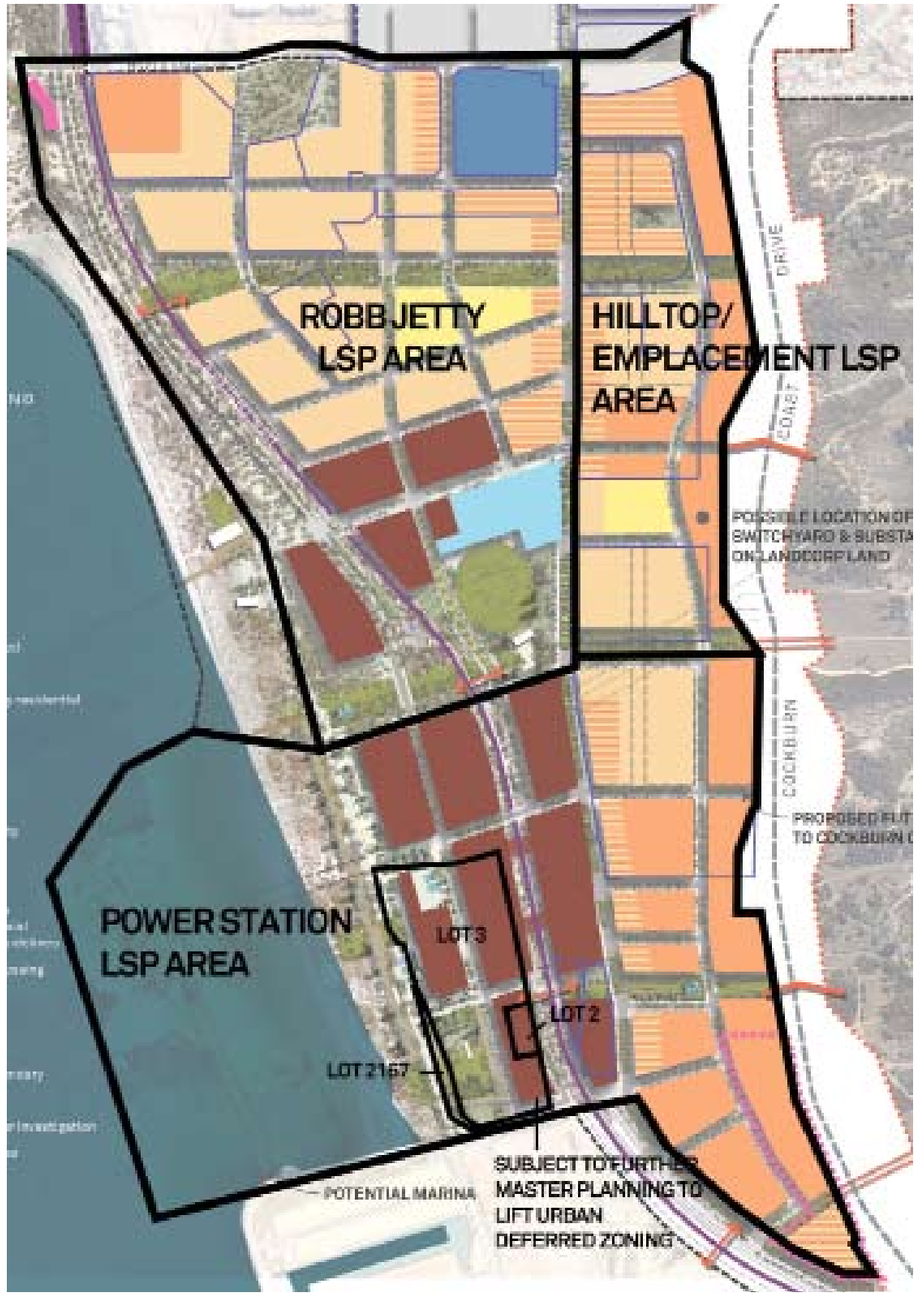
The Cockburn Coast Masterplan nominates 3 precincts Robb Jetty, Hilltop/ Emplacement and the Power Station. Each of these precincts will be subject to further design refinement through the development of a Local Structure Plan for each. The Precinct based place framework is intended to inform this process.

Cockburn Coast as a whole should have a universally understood character, however, within each precinct there will be variations in how that character is delivered. By providing the precincts with their own identities it is possible to:

- › respond to specific land uses in the precinct
- › reflect expected market values and place aspirations
- › build a base for marketing efforts
- › to align the team around opportunities for diversity
- › to provide the framework for detailed decision making over time; i.e which precinct should a certain activity or land use be located in? Will it contribute or lessen the local character development?

The three precincts all vary in identity but share common themes that will allow them to be considered independently but also have a natural fit with one another. It is important that this occurs both in terms of the character of each area as will as through physical connectivity.

Residents in Emplacement will feel connected to Robb Jetty having views over it and visiting it to grab daily essentials, go to the beach and for coffee. While Robb Jetty will interact with Emplacement as its own backdrop, and a passage to Manning Reserve. The Power Station will be the regional draw card, the primary access point for visitors to the Coast.



The facing page provides a summary of the key place making directions and illustrates how the precincts relate to one another and are also different.

PLACE MAKING KEY ELEMENTS

ROBB JETTY

PLACE CHARACTER

LOCAL - SEAMLESS - BALANCED - INTIMATE

PLACE THEMES

HONESTY | **LEGACY**

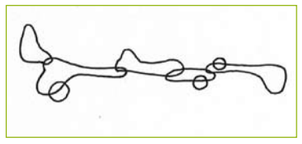
PUBLIC ART

Story telling
Local meaning



PUBLIC REALM

Seamless
Soft
Intimate



BUILT FORM

Protective
Fine grain & tactile
Comfortable



ACTIVITY

Healthy lifestyle
Self sustaining
Communal



EMPLACEMENT

PLACE CHARACTER

INTEGRATED LANDSCAPE - NEW TOPOGRAPHY

PLACE THEMES

INTENSITY | **DUALITY**

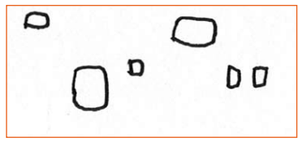
PUBLIC ART

Landscape art
Integrated
Landmark



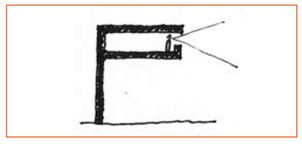
PUBLIC REALM

Contained
Shared



BUILT FORM

Responsive to landscape
Private but expansive



ACTIVITY

Common interest
Neighbourhood



POWER STATION

PLACE CHARACTER

DYNAMIC - CONTRAST - ENERGY - CREATIVE

PLACE THEMES

INTENSITY | **HONESTY**

DUALITY | **LEGACY**

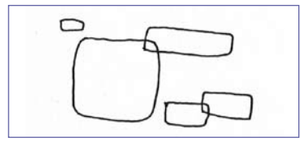
PUBLIC ART

Challenging
Temporary
Dramatic



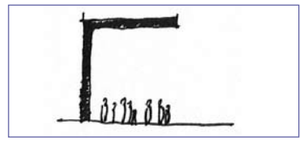
PUBLIC REALM

Flexible
Destinational
Diverse



BUILT FORM

Awe
Juxtaposition
Inspiration



ACTIVITY

Festival
Celebration
Recreation



Robb Jetty

The Robb Jetty Precinct forms the northwestern portion of the site and stretches from Rollinson Road in the north, Cockburn Road in the east and to the Parkland Corridor (one block north of the power station) in the south. The precinct stretches west of Robb Road but stops short of including the beach. The Robb Jetty Precinct is taken from the LSP area of the same name and is made up of precinct 3 (Robb Jetty) and precinct 5 (Darkan) as referred to in the DSP.

The Robb Jetty Precinct contains elements of mixed-use development potential along significant road links including Cockburn Road, but is otherwise predominantly set aside for medium to high-density residential development. The precinct also contains supporting community facilities in the form of the two storey urban primary school, the area's key active playing field, and a small commercial/community development opportunity at the Catherine Point foreshore activity node. A high amenity, coastal character is proposed for the precinct to complement the adjacent beach and foreshore, and the key areas of open space contained within it.

Buildings on Cockburn Road will have a maximum height of five storeys. The height of buildings on secondary streets throughout the precinct will generally have three to four levels.

The northeastern corner of the Robb Jetty Precinct contains the Fremantle Cold Stores operation. The development immediately facing the site is mixed use to provide a buffer to more sensitive land uses. Significant stands of trees and the heritage-listed Robb Jetty chimney will be preserved in the active open space area, and associated with the urban character two-storey primary school.

Robb Jettys Place Character Statement - defines the personality or character of the place.

Robb Jettys Place Vision - articulates the future we aim to achieve for this place and allows for alignment of project teams and stakeholders. It is developed from an understanding of influences on place identity and stakeholder values and aspirations

Robb Jettys Place Themes - sets out the key themes for precinct for integration into the place making overlays, public art strategy, community developmnet plan

COCKBURN COAST

EXPERIENCING DIFFERENCE
EMBRACING CHANGE
EVOLVING TOGETHER



ROBB JETTY

LOCAL - SEAMLESS - BALANCED - INTIMATE

Robb Jetty is primarily a place for local residents and businesses, a walkable village that is intimate in scale and 'soft' in character. In Robb Jetty the beach comes to the mainstreet, locals walk barefoot and the stories of the past and its people are part of everyday life.

A variety of small but connected public places offer a range of experiences from the quiet to the communal, the sheltered to the open, the organic to the formal.

Robb Jetty is a place to build meaningful and lasting relationships; to share a chat on the bus, to know the local news agent, to have your favourite seat in the park.

INTENSITY

HONESTY

Meeting daily needs

Working together to make the place

Modest, relaxed and welcoming

Evolving

DUALITY

LEGACY

Respecting & making history

Long life loose fit

Communal resources

Infrastructure investmnet

PLACE MAKING RESPONSE

Tell a meaningful local story.

PUBLIC ART

Public art at Robb Jetty should build a meaningful connection to place, its people and its heritage. An opportunity for community learning and cultural exchange, public art that integrates local stories can become a discussion point and connection between locals and with visitors. Consideration should be given to different voices in the community.

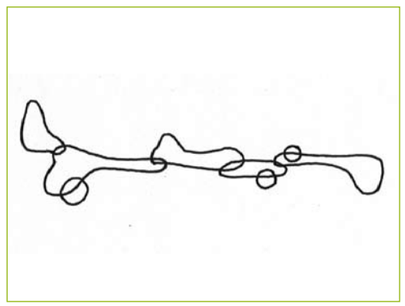




Transition with ease and honesty.

PUBLIC REALM

The public realm at Robb Jetty should explore the idea of seamless transitions between character or landscape zones. Honest landscaping that integrates the current diversity of vegetation can be balance by more formal places. Textured and a bit messy, sometimes raw, sometimes smooth, its a place where human comfort comes first.

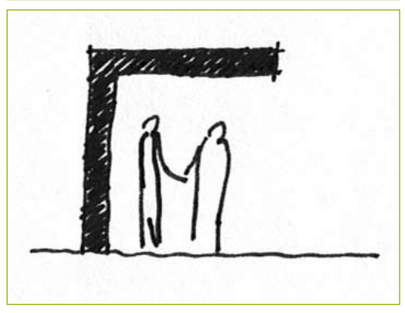


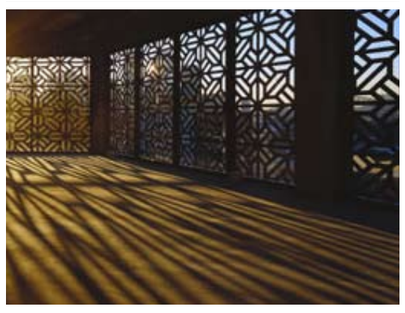


Use an intimate scale that makes you feel at home.

BUILT FORM

Many hands make light work - especially in creating place. Focus on providing micro -diversity at the ground level with narrow shops, front doors and alcove public space. Make walking interesting. Physical and psycological comfort are reflected in material detailing, scale, vehicle separation and a sense of enclosure.





Focus on healthy lifestyles and community connections.

ACTIVITY

Family focussed activities are centred around sheltered outdoor dining, defensible space for children and support infrastructure for beach use. Healthy lifestyles focus on walkability and the access to local services in the neighbourhood, owned and operated by local people. Activity is primarily focussed on self sustaining daily activity.





Emplacement

The Hilltop/Emplacement Precinct forms the north eastern portion of the site and stretches from the northern boundary of the Masterplan site to Cockburn Coast Drive in the east, Cockburn Road in the west and to the middle Parkland Corridor (between Robb Jetty and the power station) to its south. The Hilltop/ Emplacement Precinct is taken from the LSP area of the same name and is made up of precinct 4 (Emplacement) and precinct 2 (Hilltop) as referred to in the DSP.

The Hilltop/Emplacement Precinct is distinctive as a product of its topography and this landform influences how it shall be treated in future planning and development phases. The landform has steep gradients, especially to its south, sometimes above 25 per cent. The precinct contains the highest point of the Cockburn Coast. It is intended that development shall be responsive to the topography and shall aim to retain as much of the existing natural character of the site as possible.

The Hilltop/Emplacement Precinct is predominantly residential in its south and mixed use in its north and along Cockburn Road. It also contains part of the project area's central activity node, focused on the central transit stop, with some further mixed-use development sleeving this node. The precinct has the project area's two east-west linear parks, providing strong connections down the hill from Beeliar Park and through Robb Jetty Precinct to the coastal foreshore.

Buildings on Cockburn Road will be a maximum height of five storeys and the height of buildings on secondary streets throughout the south of the precinct area will be three to four storeys. Those buildings which will front the green corridor shall be five storeys, with significant breaks in development on the north side of the corridor. Selected sites on the steeper topography and ridgeline are permitted to be five levels in height, with nominated gateway and landmark sites to be seven levels and the height of buildings on Emplacement Crescent may be up to six storeys. Laneway development shall be a maximum three storeys.

Emplacement's Place Character Statement - defines the personality or character of the place.

Emplacement's Place Vision - articulates the future we aim to achieve for this place and allows for alignment of project teams and stakeholders. It is developed from an understanding of influences on place identity and stakeholder values and aspirations

Emplacement's Place Themes - sets out the key themes for precinct for integration into the place making overlays, public art strategy, community developmnet plan

COCKBURN COAST

EXPERIENCING DIFFERENCE
EMBRACING CHANGE
EVOLVING TOGETHER



EMPLACEMENT

INTEGRATED LANDSCAPE - A NEW TOPOGRAPHY

Emplacement is a place in the early stages of transition, an established industrial area, its future is residential. Located along the ridge line separating the coast from the bush, Emplacement will be the new high point, a manufactured horizon line that offers the opportunity for a new architectural topography, an integrated landscape of nature and built form.

Residents enjoy the expansive views but also the sense of containment and groundedness. Facades and balconies host vertical parklands that shade and veil occupants. Ground level public realm is internalised and focussed on the residential community's common interests.

INTENSITY

High point - expansive views out

Creating a new horizon line

HONESTY

DUALITY

Tension between nature and built form

The transition from industrial to residential

Expansive views and internalised lives

LEGACY

PLACE MAKING RESPONSE

Think far and wide.

PUBLIC ART

Contemplative and expansive, public art in Emplacement can reflect its high position and views out of itself. Look for opportunities to integrate art into buildings and landscapes that showcase natural assets - sea, sky and land. Create landmarks and frame vistas and gateways from beach to bush to enhance a sense of discovery and act as a guide.

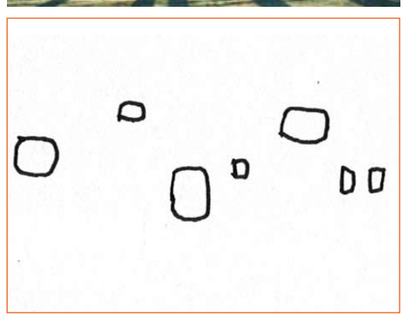
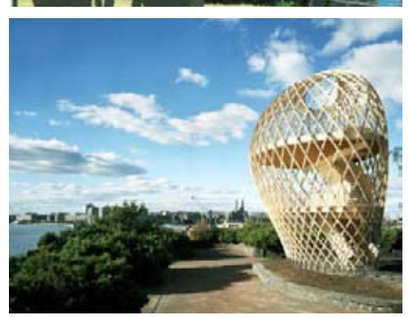




Pockets of public space that reflect local needs

PUBLIC REALM

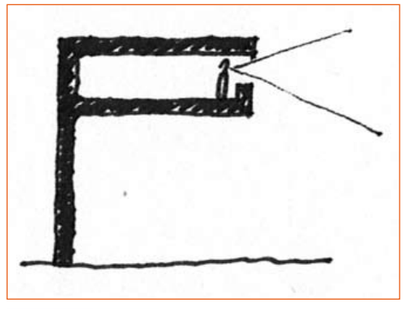
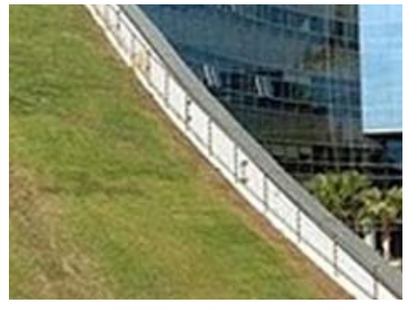
Emplacement should provide both private contained and intimate spaces, as well as moments exposed to the elements and dramatic views. Provide a reward for effort for reaching the top of the hill by maximising the expansive power of the hilltop experience along the ridge line - don't build out the lookouts


Architecture as landscape.

BUILT FORM

The development at Emplacement should offer a new green/public face to the coast. Encourage green walls and roofs to create a new topography that reflects the bushland to be discovered behind. The facades of these buildings are the backdrop to the public realm of the coast.


Community cohesion through common interest.

ACTIVITY

In higher density areas, shared spaces for common interests provide important opportunities for community building. Integrate pocket public spaces for activities such as a dog walking and community gardening. Keep the lookouts as communal space and destinations for hiking and community outings - authentic to the place. Retain place based businesses.





Power Station

The Power Station Precinct forms the southern portion of the site area including everything south of the southern most Parkland Corridor. It stretches east to the eastern boundary of Cockburn Coast and west to include the proposed marina off shore. It largely represents the area of precinct 1 (power station) as defined by the DSP with a few exceptions on the coastal side. The precinct is the southern gateway to the Cockburn coast area, and interfaces with the Port Coogee development to the south and Beeliar Park to the east. It also has a direct interface with the project area's southernmost east-west linear public open space linkage.

The precinct will be the activity hub of the Cockburn coast area, centred on the power station special development area with its local transit stop and associated mixed-use and activity node focus. The protected family beach will provide informal recreational activities to complement the intensity of commercial development and the tranquil feel of the marina.

Medium and high-density residential development on the hillside will provide a backdrop to this activity node, complete with a series of landmark and gateway buildings located at strategic sites along Cockburn Coast Drive. The key open space links to Beeliar Park and Port Coogee, and the relationship of the built form to the linear park and northern bridge crossing, will be significant elements forming the character of the Power Station precinct, providing an exciting contrast and complement to the post-industrial character of the built form.

Bulk and height shall be limited on buildings immediately adjacent to the power station, so that these surrounding buildings become secondary forms and ensure that the power station is the dominant element. The predominant height on Cockburn Road shall be five storeys, and within the activity node area the height shall increase to six storeys, with potential for a seventh level in the roof space, subject to a three metre setback being provided. Residential development in secondary streets shall be three to four levels in height, with opportunities for roof terraces and an additional loft level in the pitched roof space.

Robb Jettys Place Character Statement - defines the personality or character of the place.

Robb Jettys Place Vision - articulates the future we aim to achieve for this place and allows for alignment of project teams and stakeholders. It is developed from an understanding of influences on place identity and stakeholder values and aspirations

Robb Jettys Place Themes - sets out the key themes for precinct for integration into the place making overlays, public art strategy, community developmnet plan

COCKBURN COAST

EXPERIENCING DIFFERENCE
EMBRACING CHANGE
EVOLVING TOGETHER



POWER STATION

DYNAMIC - CONTRAST - ENERGY - CREATIVE

The Power Station is an iconic landmark, its physical dominance should translate into the area's primacy as the key regional destination for the Coast. The centre of recreation and leisure activity Power Station is the place were community celebrations are held and tourists enjoy multiple experiences that vary with each visit.

New and old are juxtaposed, events showcase the innovative and challenging. Creative entrepreneurship is encouraged across multiple fields from energy production, to arts, culture, experiential tourism and business.

Self sustainability for this precinct is key - activity has to be self generating and infrastructure flexible and attractive to a range of users on weekdays, evenings and weekends in summer and winter.

INTENSITY

Contrasting new and old, multiple scales, materials

Concentrated community recreation

HONESTY

Expression of raw industry and its materiality

Reflection of community recreation values

DUALITY

Balancing regional tourism peaks with local daily activity

Edges and extremes

LEGACY

Investment in community infrastructure

Building a new economy

R-evolutionary, challenging, surprising.

PUBLIC ART

The art at Power Station can afford to be dramatic, challenging and edgy. This is a place where art can be experimental, temporary, contemporary and innovative. The scale of the building provides a natural balance to works of any scale. Incorporating the current youth works will support the transition of uses.



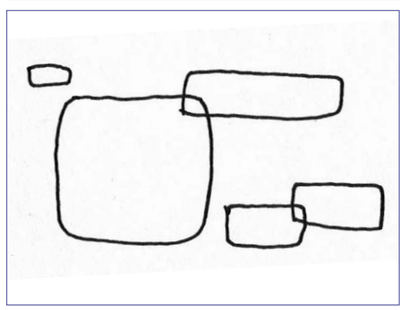




Provide for the region with places that engage at the micro & macro.

PUBLIC REALM

The public realm at Power Station will need to establish a quality that is fitting for a regional scale attractor of large groups and events. The public realm needs to be designed for all weather providing indoor and outdoor options. These dynamic places will need to engage at the micro and macro, for one off visits to those regulars aiming for rediscovery.



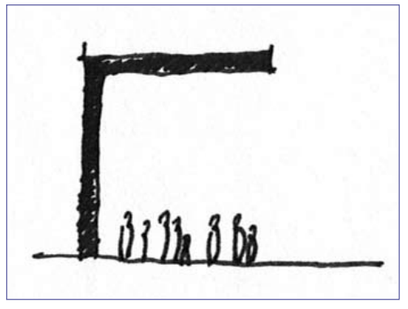




Enhance primacy through contrast.

BUILT FORM

The dominance but simplicity of the Power Station building provides a backdrop for contrasting built form that explores scale, materiality and colour. While other areas of Cockburn Coast aim to ease the transition from suburbia Power Station should revel in the extremes and clarify the benefits of urbanity and concentrated community investment.







Provide diversity that responds seasonally.

ACTIVITY

The Power Station has the potential to become a regional attractor, for visitors to Perth as well as the Perth community. A diversity of price point and free attractions will ensure it is accessible for the local community. A seasonal program fuelled by creative industries and water and energy innovation will attract visitors year round.







PART C
PLACE MAKING OVERLAYS



ABOUT PART C

The Place Making Overlays are place based recommendations for the delivery of the Place Making Strategy in specific locations across the site. Each overlay aims to deliver on the proposed place character identified in Part B. The Place Framework. In addition they provide detailed strategies across the social, environmental, economic and cultural sectors for the meaningful activation of public spaces across the Cockburn Coast Masterplan area.

Part C of the Cockburn Coast Place Making Strategy is known as Place Making Overlays. This document provides a series of conceptual illustrations of place making recommendations for key locations across the Cockburn Coast. Each illustration aims to demonstrate the elements required in the future place in order to ensure self-sustaining activity and the development of authentic local place character.

There are four sections in Part C:

C1 Cockburn Coast
Illustrates place making recommendations that are applicable to the whole Cockburn Coast Masterplan area, including trails pertaining to exercise, public art and heritage.

C2 Robb Jetty
Illustrates staging and structural recommendations across the Robb Jetty Precinct and 5 locations within the precinct.

C3 Power Station
Illustrates staging and structural recommendations across the Power Station Precinct and 3 locations within the precinct.

C4 Emplacement
Illustrates staging and structural recommendations across the Emplacement Precinct and 1 location within the precinct.

Each location is detailed with a place making overlay that includes recommendations in the form of:

- Place Making response to the masterplan
- Role and Character
- Audiences and Attractors
- Principles
- Social, Economic, Environmental, Cultural (SEEC)
- Public art
- Heritage
- Community Development



C1
COCKBURN COAST PUBLIC REALM

LANDMARKS AND GATEWAYS

Landmarks and Gateways are the highest level of a hierarchy of places in the physical environment that let people know they are moving from one area to another or have arrived at a destination.

Landmarks are essential elements that help us to read a place and let us know what place is important and often why it is significant - literally they 'mark' the land.

At the Cockburn Coast, existing landmarks such as the power station, the Robb Jetty, emplacement, and the abattoir chimney connect us to the history of the area but also provide physical markers that locate us as the surrounding environment changes.

New landmarks need to focus on making the environment more legible, not less. Buildings of public spaces should offer a natural hierarchy that reflect land uses that the community think valuable

Gateways should be developed or designed to highlight areas of transition from one place to another. They denote arrival and departure but can also provide the unique experience of being on a journey.

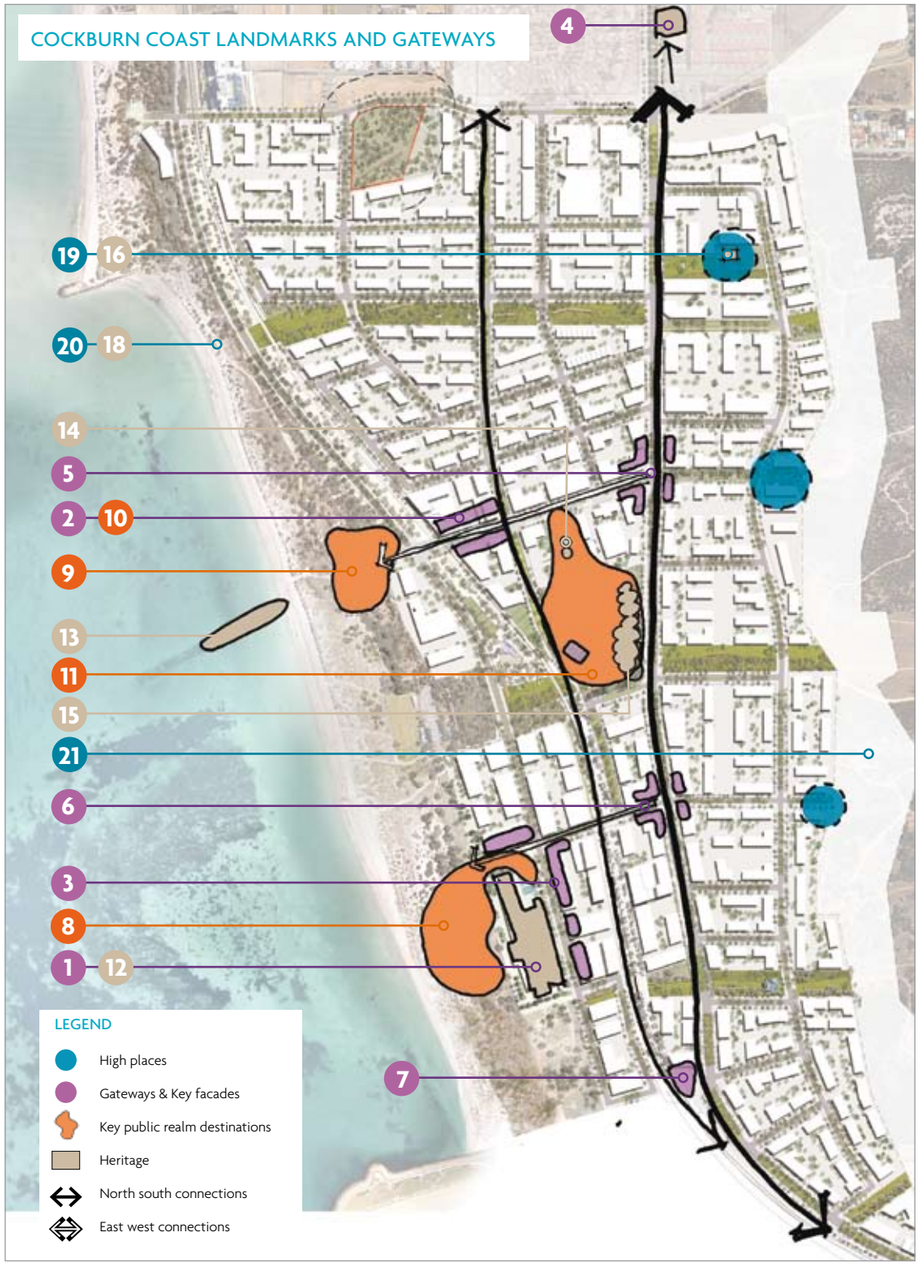
KEY PRINCIPLES:

Aid wayfinding by distinguishing pivotal places with significant built form or public realm.

Do not highlight places or buildings that are not significant to the community, this sends confusing messages and belittles those places of community importance that should read high in the hierarchy of places.

Create a network of landmarks that reflect local stories of the place

Consider how different types of landmarks; public spaces, heritage artefacts, and built form work together to provide authentic differentiation across the site.



Built form

1. The power station - Should be the primary landmark on site, its heritage and scale ensuring that no other building overshadows it.
2. West Main Street - Diverse and interactive facades should provide interest (c.5- 7m intervals on ground) as well as weather protection at a scale suitable (c 3-4 m high) for a local community retail centre.
3. Power Station Main Street - A series of modern commercial and residential buildings that complement and support the activation of the Power Station forecourt.
4. Rockingham Hotel (gateway) - An important entrance landmark, the restoration of this building's heritage should be prioritised as a marker to the community that change is occurring. Consider using this building as a sales centre in the short to medium term.
5. Main Street & Cockburn Rd (gateway) - A multi storey 'urban school' on the south-west corder at this junction highlight's the civic importance of Main Street as a community hub. The other 3 corners support this landmark with architecture indicative this civic and community focussed identity.
6. Power Station entry street (gateway)- A contemporary building facade complimentary to the 'industrial' scale and character of the power station. This gateway should speak of tourism destination.
7. Cockburn Coast Road/ RBT Junction - A distinctive wedge shaped building at the southern gateway to the site (complimentary 'bookend' to Rockingham Hotel).

Public realm

8. Power Station Foreshore - The primary regional public open space with high levels of amenity and choice of activity for a range of ages and interests. The design of this area can be bold and dramatic.
9. Robb Jetty Foreshore - A soft and organic recreation area for day to day community use associated with visits to the beach. The design of this landmark should focus on coastal integration and modesty.
10. Main Street - Informal and diverse streetscape achieved through a mix of materiality, traditional high street activity and natural vegetation.
11. The Oval - Programmed open space that will be used by regional sports people. It is a civic destination and key connector with external communities. The club house should be inviting and connected to other amenities.

Heritage

12. The power station - The building, its proximity to the water and subsequent uses including a youth centre of street art are all key elements to be retained.
13. Robb Jetty remains - These authentic structural items are a landmark in themselves connecting the future development with the area's past uses.
14. The Abattoir Chimney - A public plaza will reinforce the chimney's height and provide a connection between the main street, school and oval.
15. Heritage Fig Trees - Mature trees are unusual in new developments and as such they mark both the heritage of the area as well as providing and edge to the civic precinct of oval and school.
17. South Beach Battery - evidence of the Coasts military history and role in defence located in a high place.
18. South Beach Exercise Area - living heritage landmark.

Landscape

19. High places - Provide the opportunity to connect with the original landscape/ ridgeline and offer views both to the Sound and inland providing an important psychological connection.
20. The Foreshore - A regional asset and unique in its relatively organic and natural state, and proximity to Fremantle and Perth.
21. Beeliar Reserve - An indigenous landscape buffer separating the coast from inland but also an opportunity for alternative outdoor experiences and improved connectivity.

OPEN SPACE HIERARCHY - ROLE & FUNCTION

Just as there are landmarks that denote places of significance, each open space in the network has a role to play in terms of its place in the hierarchy. For Cockburn Coast the hierarchy defines local, district and regional public places based on scale, amenity and the audiences the place is likely to attract.

The purpose of providing a hierarchy is to guide the appropriate scale of a place, and match the level of activities and amenities provided to the number of people likely to use the place.

To maximise the benefit of open space for the Cockburn Coast and the City of Cockburn LGA it is necessary to consider how each open space in the network contributes to the overall offer to the community. Cockburn Coast is offering a substantial contribution to the LGA's network of open spaces, however, the master plan must also consider the long term sustainability of the space in terms of attractiveness (will the amenity continue to attract people) and long term maintenance.

For the purposes of this master plan the hierarchy outlined in the table below has been defined by how attractive the place will be in terms of its ability to attract people from a distance.

Hierarchy Level	Travel Time
Regional/District	20 + minute drive
District/ Local	10 to 20 minute walk/drive
Local/ Neighbourhood	0 to 10 minute walk

ARTWORK
LOOKOUT
HERITAGE MARKER
COMMUNITY FACILITY
PUBLIC TOILETS
HORSE RIDING
BIKE RACK
DOG FRIENDLY
DOGGY BAGS
BBQS AREA
SHELTERED SEATING
CAFE/KIOSK
FOOD & BEV
PICNIC TABLES
EXERCISE
SWIMMING
BOATING
PROJECTION
WAYFINDING
PLAY EQUIPMENT
WATER BUBBLER

COCKBURN COAST OPEN SPACE HIERARCHY



COCKBURN COAST AMENITY PLAN



REGIONAL/DISTRICT

1. Power Station
Regional destination that should provide amenity and will attract young to old, locals and visitors, male and female, all across a wide socio-economic range.

Audiences	Public Realm Amenity	
› Demographic range representative of LGA population	› Regional water playscape › Skateable landscape › Shipwreck heritage marker › Major artwork › Lighting projections	› Water access › Public toilets › Seating/shelters › Event space › Bike racks

2. The Oval
A regional community hub that attracts structured sporting associations from across the city and provides a space for improved social cohesion through communal recreation

Audiences	Public Realm Amenity	
› Sports participants › School children › Sport watchers	› Sports ground › Cricket nets › Fig tree heritage marker	› BBQ facility › Seating/shelters › Public toilets › Bike racks › Water bubbler

3. Robb Jetty Foreshore
Capturing residents from up to 20minutes away, the Robb Jetty Foreshore attracts and provides amenity for dog lovers, beach goers, and the equine community.

Audiences	Public Realm Amenity	
› Family groups › Equine community › Exercisers	› Lifesaving Club › Robb Jetty heritage marker › Major artwork › Public toilets	› Seating/shelters › BBQ facility › Bike racks › Water bubbler

4. Beeliar Park
Attracts bush walkers, regional visitors and local residents travelling from the Manning Reserve to enjoy nature and lookouts.

Audiences	Amenity	
› Nature enthusiasts Small exercise groups › Local residents	› Regional park access › Observation point › Viewing platforms	› Walking and cycling trails

DISTRICT/LOCAL

5. Foreshore Park
A space for informal community gatherings and family picnics, attracting local residents and occasional regional visitors.

Audiences	Public Realm Amenity	
› Family groups › Local residents › Regional visitors	› Pavilion › Picnic and BBQ facilities › Water access	› Water bubbler › Artwork › Exercise trail

6. Catherine Point
The community hall provides locals with the opportunity to hire the space for larger events, both public and private.

Audiences	Public Realm Amenity	
› Local community groups › Equine community	› Community hall › Horse exercise facilities › Dog friendly	› Interpretive art › Exercise trail › Heritage trail › Bike racks

7. Emplacement Park
A local destination that provides locals and historical tourists the opportunity to reflect, take in scenic views and reflect on the area's past through memorial.

Audiences	Public Realm Amenity	
› Historical tourists › Local and regional residents	› Observation point › Viewing platform › Artwork	› Heritage marker › Picnic tables

8. Playground Park
Attracting local families, this space provides an enclosed play landscape. There is the opportunity for the co-location of a neighbourhood shop adjacent tot he play ground.

Audiences	Amenity	
› Local families with young children aged 0-8 years old	› Playground › Coffee cart › Seating/shelters	› Public toilets › Water bubbler

9. Robb Jetty Mainstreet
Serving the local community, the mainstreet attracts local workers and residents, their families and friends.

Audiences	Public Realm Amenity	
› Local workers and residents › School children	› Retail mix › Memorial square › Integrated artwork	› Playground › Seating

10. Recreation Park
This unprogrammed and active space complements the Oval but attracts a more local audience.

Audiences	Public Realm Amenity	
› Youth aged 12-17 years old › Dog walkers › Exercisers	› Multi use courts › Exercise trail › Dog friendly › Seating/shelters	› Rubbish bins and doggy bags › Water bubbler

LOCAL/NEIGHBOURHOOD

11. Northern Finger Park
This space provides an important recreational corridor, connecting the Playground Park, Foreshore Park and Emplacement Park.

Audiences	Amenity	
› Local residents	› Regional park access › Walking and cycling trails	› Seating

12. Central Finger Park
Connects bush walkers from the Beeliar Park Reserve with the recreational precinct and main street.

Audiences	Amenity	
› Nature enthusiasts › Local residents	› Regional park access › Observation point › Seating/shelters	› Walking and cycling trails

13. Southern Finger Park
A passive open space that attracts local residents living nearby.

Audiences	Amenity	
› Local residents	› Observation point	› Seating/shelters

14. Pump Station Open Space
Odour management and the required 50m buffer mean that this space will have limited use. It is suggested that it become an all day off leash dog area.

Audiences	Amenity	
› Dog walkers	› Dog friendly › Rubbish bins and doggy bags	› Seating › Walking trails › Water bubbler

STREET HIERARCHY, CHARACTER & ROLES

Street hierarchy is one of the most important structural indicators for pedestrians and vehicles and how they behave in place. As a new place Cockburn Coast has the opportunity to create a language of street designs that indicate what mode of movement dominates as well as supporting legible way finding through distinct and different street character.

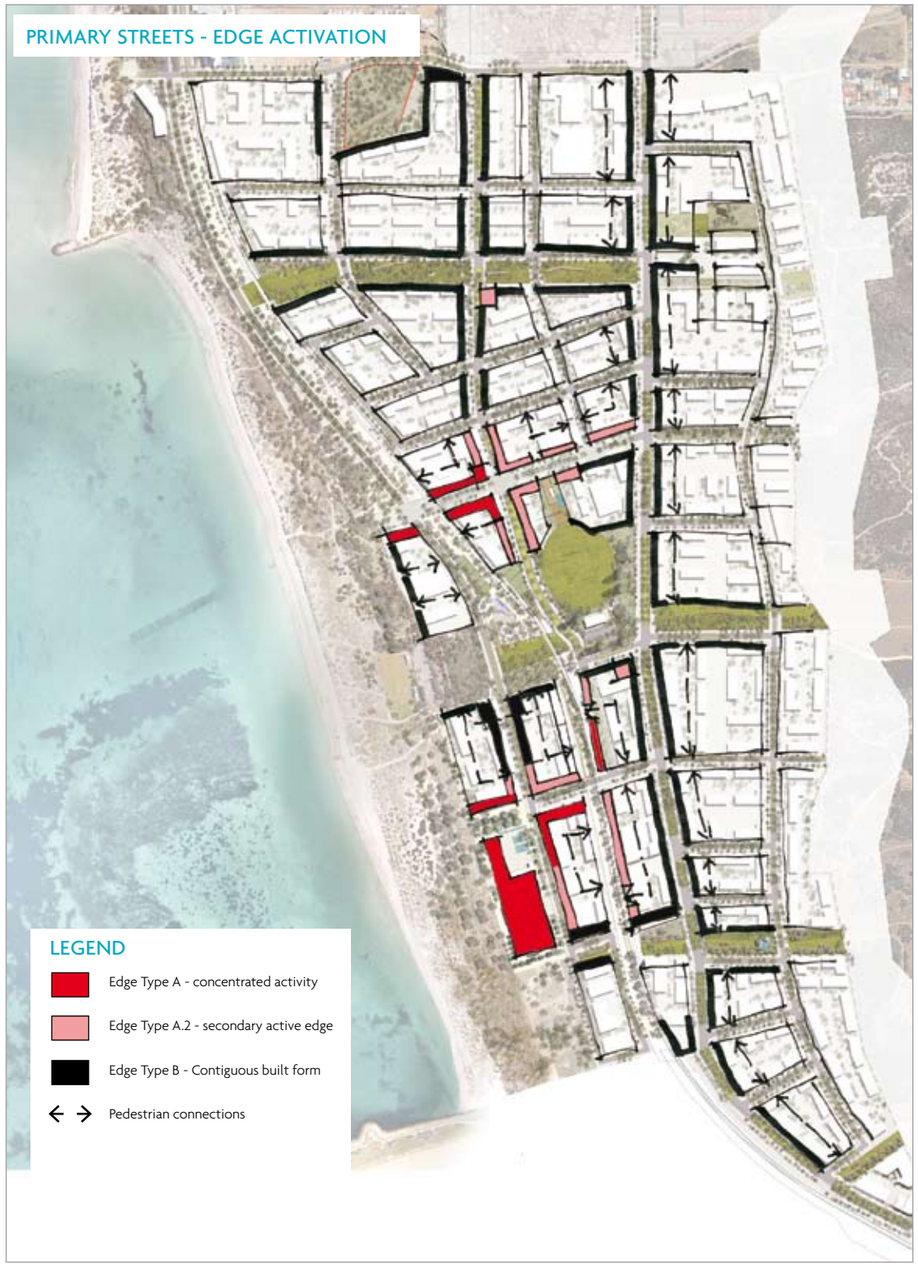
There are 5 primary wayfinding/character streets on site:

Street	Character	Priority mode
Cockburn Coast Rd	Streamlined for ease of movement and access	1. Private vehicles
Bus Rapid Transit St	Slow and crossable, a comfortable avenue connecting key destinations	1. BRT 2. Pedestrian 3. Cycle
Robb Road	Traditional coastal road alternatively sheltering and opening to the sea	1. Private vehicles
Robb Jetty Main St	Concentrated activity hub with a balanced mix of movement modes	1. Pedestrian 2. Private vehicle
Power Station Entry St	Grand and contemporary street with view corridor to water and Power Station	1. Pedestrian 2. Private vehicle

COCKBURN COAST STREET HIERARCHY & CHARACTER



PRIMARY STREETS - EDGE ACTIVATION



ROBB ROAD



Existing "rustic/coastal" road should be retained to provide authentic coastal experience. The organic green enclosure of the space reinforces the connection with past uses and the experience of being within the dunal coastal landscape. The retention and promotion of enclosure will ensure a dramatic contrast upon arrival at the Power Station precinct where buildings frame a formal central corridor of vegetation. The dunal vegetation to the north of the Power Station is an existing character generator, reduces noise from the railway line, benefitting residences in the vicinity and aims to concentrate pedestrian movements to coastal paths and the BRT Road ensuring a safer environment on these key pedestrian routes by increasing the numbers of eyes on the street rather than spreading pedestrians further throughout the site.

- Retain 12m width and existing vegetation
- Do not formalise pedestrian paths - encourage either beach walking or BRT pedestrian avenue

BRT/ TRANSIT STREET



The BRT Road should act as the primary north-south route for public transport, pedestrians and cyclists. A high quality pedestrian street shaded by contiguous, structured and consistent avenue plantings with transport nodes adjacent to key intersections.

- Provide avenue plantings over footpaths not central median
- Main cycle way
- Choose tree species with distinctive flower/ colour and high canopy for strong street visibility
- Provide transport stops with shelter clear of pedestrian site lines
- Discourage private vehicle 'short cutting'

COCKBURN COAST ROAD



The primary path of private vehicle along the south coast, the reality of this road will be heavy commuter traffic and goods transportation. This urban arterial road needs to prioritise this role while providing the most sheltered pedestrian experience possible. Attempts to create a boulevard or shared space are not recommended as this will trigger attempts to activate the ground floor where retail is not desired.

In the event that the future bypass comes about, ground floors should be designed on the principle of long life, loose fit and the nature of the whole street may change.

- Breakdown the length of the road in to segments by reinforcing rhythm of "green fingers" through clustered plantings at crossing points that reflect built form gateways.
- Reinforce separation of pedestrians and vehicles (particularly trucks) through ground level verge planting
- Provide awnings in favour of, or in addition to, avenue tree planting

ROBB JETTY MAIN STREET WEST



This section of the main street should be a casual and relaxed experience that supports pedestrians and provides strong delineation between the carriage way and kerb side activity.

- Reduce width to 26m building edge to building edge
- Allow for projection of upper level balconies into this space
- Deep awnings with potential verandah posts to reinforce the street edge as a series of outdoor rooms
- Optimise car parking within the street reserve including median/central parking.

ROB JETTY MAIN STREET EAST

The eastern section focuses on civic uses including the school, the war memorial, community playground and other associated community services. The street cross section remains consistent with the Masterplan design.

RECREATION PRECINCT CONNECTOR

The primary pedestrian route that connects the recreation precinct with the foreshore through a park like setting.

- Structured/ direct pedestrian links through a mix of formal and informal green spaces
- Structure local carparking around these key pedestrian links and a mixture of existing & new, and exotic and native canopy trees

POWER STATION ENTRY STREET

This street should be formal and structured with an emphasis on "grand" proportions that complement the power station.

- Defined by appropriate "architectural" trees (i.e. Norfolk pines)
- Primarily a "built" street with man made character reinforced by other street elements such as custom lighting, flags, smart poles
- Shading provided by structures rather than "finer grain" awnings

POWER STATION SOUTH

This street is primarily a landscape terminus for pedestrian and cycling links.

- Ensure areas of car parking are screened by lower level native coastal shrubs
- Contiguous hard surfaces suitable for cycling, prams, etc

LOCAL STREET NETWORK

The local streets will encourage local ownership of place and sense of local address:

- Reduce carriage way widths to a minimum with indented car parking (11m)
- Provide for mixed informal ground plantings, pedestrian movement and canopy trees

NORTHERN FINGER STREET

This slow street is edged by local parks and green corridor.

- Reduce pedestrian verge to park edge of street to promote walking through the green
- Indented car parking with regular planted pedestrian build outs to maximise kerb side parking while reducing pedestrian crossing

PRIMARY STREETS - ACTIVE EDGES

Considering the limited catchment, active retail edges need to be concentrated to where they will be most likely to succeed. The primary streets edge activation map (refer to page 14) locates three primary edge types for the Cockburn Coast.

Edge type A: primarily "retail" edge with high levels of ground floor interaction with the public e.g cafes, fashion, fresh food.

Edge type A.2: secondary commercial edges that support the retail core but have less active shopfronts e.g. travel agent, chemist, doctor's suite.

Edge type B: edges designed to create greater street level interface and higher quality/more structured relationship with the public realm e.g. through more contiguous building form, and multiple residential building entries and patios.

N.B Power Station edge activation will remain in principle the same regardless of detail design of buildings. Primary activated facades should face onto primary open spaces while secondary activation should connect destinations (i.e. bus stop and Power Station).

C1.1
Cockburn Coast Public Trails

The following pages demonstrate how public art works, heritage markers and exercise stations are connected by a public trail route through the Cockburn Coast Masterplan area.

Exercise, art and heritage coastal trails, consisting of a number of individual art works commissioned over a long term period, interpretive signage and exercise stations work together to enhance the experience of moving through and around the area.

EXERCISE & HORSE RIDING TRAILS

Exercise and walking trails are a strong generator of self sustaining activity in a place. This is due to their everyday use by locals during and after hours.

The Cockburn Coast exercise/walking trail is combined with the heritage and public art to provide opportunity for everyday reminders of place character and its stories in addition to becoming landmarks that can be used by runners/walkers to gauge the distance of their travels.

Exercise brings people together and adequate amenities mean the additional use of open spaces for group exercise, personal training and team training sessions.

Horse riding trails retain the heritage protected use for horse exercise at South Beach that are utilised before 8am in the morning along their traditional route. The horse trail connects to the existing path taken by horses and their trainers from the Randwick Stables as early as 5.50am. For those coming from further afield, trailer parking will allow for ease of access.

In addition, there may also be tourist rides considered during evenings or weekends that could take a shorter loop. This would also remind visitors of the equine use of the place which is rarely seen due to its early hours.

COCKBURN COAST HORSE & EXERCISE TRAILS



HERITAGE MARKERS

The Cockburn Coast, from sea to the limestone ridge and behind are brimming with Indigenous and European stories and heritage. The tales of the formation of Cockburn Sound, shipwrecks, battlers, racehorses, industry and old traditions are the foundations of the spirit of the place and what makes this area unique and essentially different from other development sites.

The remains of significant buildings and structures lie as monuments to a bygone industrial era with the most visually prominent being the South Fremantle power station and the Robb Jetty Abattoir Chimney. Landscape plantings, sculptures, shipwrecks and sites of mythological and archeological importance are dispersed throughout the landscape creating layers of intrigue and interest.

N.B. Indigenous Heritage
The site is home to a number of areas of indigenous importance. It is essential that ongoing engagement with the local Aboriginal Reference Group occur and opportunities for integration of indigenous culture taken where possible e.g. planting, naming and signage. For example, at the time of this report TPG had completed an interview with a member of the indigenous community with a long association with the Robb Jetty area, oral histories and anecdotal information would enrich the experience.

N.B. Settlement Dates
Settlement dates associated with the Cockburn Coast will need to be carefully defined to prevent confusion with historic locations south of the Cockburn Coast development.



Image: Existing heritage marker at Coogee Beach.

HORSE EXERCISE LEGACY
The South Beach Horse Exercise Area is the portion of South Beach extending south past Catherine Point to McTaggart Cove. The Beach has been used for exercise and training of horses for recreation, sport and World War I service since the early 1830s and continues in the present.

FORESHORE NATURE
This foreshore has a rich history of human use. Some uses include indigenous camping areas, horse training, public recreation, abattoirs and marshalling yards, power generation and industrial uses constructed in close proximity to the shoreline. The Catherine Point Reserve and C.Y. O'Connor Reserve includes approximately 29 hectares of coastal dune and immediate hinterland along the Cockburn coast foreshore. Vegetation communities represented within the foreshore reserve, particularly at Point Catherine, are dune coastal heath.

INDIGENOUS CAMP
The sandhills along the foreshore and most particularly close to Robb Jetty were used as a camp area for aboriginal people and were still in use by aboriginal people from outside the metropolitan area at least until 1985. Like other long established fringe camps, the area is likely to have been a traditional camping area. It is thought that the camps continued in this locality due to the opportunities for work that was available associated with the shipping and slaughtering of cattle from the Kimberley.

ROBB JETTY INTERPRETATION
The original jetty was the focal point of the settlement of the northern Cockburn coast and its long association with the meat trade. The Jetty was used for the unloading of cattle from the state's north-west to the abattoirs situated here that operated between 1890s–1960s. Today all that remains of the jetty are submerged piles.

COAL YARD/INDUSTRY
Up until 1960, coal had been the main source of power for the generators that operated the turbines of the power station. Collie Coal was delivered to the South Fremantle power station by railway and stored in a large yard on the eastern side of the building. The yard was capable of holding 25,000 tones of coal. Coal was then delivered to the tops of boilers by a conveyor system between the coal stockpile and the power station. Due to the relative cheapness of oil coal burners were replaced with oil burners in 1960. However, the oil crisis saw the conversion of the Station back to coal in 1974.

POWER STATION & COOLING PONDS
The South Fremantle power station remains as a prominent element on the shoreline in the coastal sand dunes south of Fremantle. An important step in the development of power generation in the State, as the second largest thermal power station in Western Australia, construction on the facility commenced in January 1946. The distinctive cooling ponds were constructed behind stone groynes to utilise sea water for use in the boilers and for cooling the turbines The power station closed in 1985 because power generation in the site was uneconomic and had been superseded by other power plants in the grid.



NATIONAL ANIMAL MEMORIAL
Animals have been a part of the history of the area and this monument will acknowledge and pay tribute to them. In the late nineteenth century cattle from the state north-west arrived by boat and met their fate at the nearby abattoirs. The Beach has been used for exercise and training of horses for since the early 1830s. The 10th Light Horse Regiment trained on the beach prior to embarking from Fremantle during World War 1.

EMPLACEMENT/MILITARY
The former gun emplacement was one of two batteries commissioned by the Commonwealth of Australia in 1940 to cover Fremantle Harbour and Cockburn Sound. Only the Battery at Leighton became operational and was used from 1947 – 1963. The Battery at South Beach was never finished and did not become operational.

BEELIAR RESERVE/NATURE
Comprising two chains of wetlands, Beeliar Regional Park runs parallel to the coast through Melville, Cockburn and Kwinana. Beeliar Regional Park's 19 lakes and numerous shallower wetlands are home to abundant wildlife. A large portion of the Manning Park Reserve forms part of the Beeliar Regional Park.

CHIMNEY/ABATTOIR
The Robb Jetty chimney stands as the only remnant of the former Robb Jetty abattoir. The abattoir primarily received stock from the pastoral stations of Western Australia. Stock was shipped down the coast and herded into various holding pens situated on the beach and in the grounds of the abattoir. The abattoir was closed in 1993 after being in operation for nearly one hundred years.

FIGS/PIONEERS
These Moreton bay Fig trees are around fifty years of age. It is understood that the trees were once part of the Robb Jetty abattoir complex. The Cockburn Coast is associated with the earliest settlement of the Swan River Colony with the first settlers anchoring off shore and taking up land grants in 1830. The coastal strip steadily grew as an industrial area from the late nineteenth century with the introduction of the rail line between Fremantle Port and Robb Jetty in 1898.

SHIPWRECKS
After Perth was founded in 1829, many ships were wrecked along the coastline and around Fremantle. Islands, reefs and unchartered rocks, and poor navigational aids all played their part in the fate of many ships of the colonial period. There are two shipwrecks, the Diana and James, located in the beach area south of the power station, concealed beneath the sand. The Diana was shipwrecked on 16 July 1878 in a severe storm drove. The James was shipwrecked on 21 May 1830 after being blown ashore.

PUBLIC ART INTERPRETATION TRAIL

Public art plays a vital role in achieving an authentic and abiding sense of place. This contribution occurs at many levels and through multiple aspects of the public art process.

First and foremost, artworks are intrinsically unique – the original work of a creative individual. While this may seem an obvious and common understanding, when placed with the public realm, the quality of originality is outstanding – whether or not the artwork itself is grand or subtle. Intuitively we sense that this item is different to the standardised environments and the commercialised objects and features which surround us. Artworks are special and their placement in the public realm can be felt as a demonstration of civic care, a special touch that fosters civic pride.

Secondly, artists are creative thinkers, storyÐtellers and symbol makers. Through the process of public art, artists can be invited to think about and engage with a specific place, site, history, issue and community. The resulting public artwork can communicate not just an individual's private response but reflect wider significance, meanings held in common, and thereby enter into public discourse as well as physical public space. Successful public art generates community attachment and social value, which may be as simple as a nickname for a quirky art object and as profound as a gathering at a memorial, as fun as a photoÐopportunity and as serious as a name.

Finally, public art involves practices of creativity and innovation in an environmental context. Creativity and innovation are also central to the notion of sustainability. For a place to be sustainable, it must be both resilient and flexible, having a deep sense of purpose in its design and robust in its construction, while being open to interpretation for a range of evolving uses and engagements. Sustainability is an ongoing 'cycle of success' which has social, cultural, economic and environmental dimensions. The cycle of success involves processes of creativity and innovation where ways of ways and means of doing things are reÐexamined, renewed and improved. Public art, like sustainability itself, has key relational value, connecting people and place. Artworks within the public realm can function as an inÐbetween layer, a type of connective tissue, generating awareness of our interdependence with the environment, the community and the available resources.

Public art can thereby inform place character through the primary effect of providing unique interpretations, through the secondary effects of social engagement, and through the tertiary effects of sustainable development generated through this special creative endeavour.

The Public Art Strategy has identified:

Whole of site opportunities (Alchemy)
- Architecturally integrated artwork gateways (Formulations)
- A strategy for ongoing community engagement (Periodic Table of Place)
- A temporal art and place making strategy (Habitus)

Robb Jetty Opportunities
- Precinct wide (The Elements)
- Robb Jetty Mainstreet (Adaptations)
- Cockburn Sound/CY O'Connor Beach (Cast Away)
- South Beach horse exercise area and Catherine Point (On the Wide Side)

Emplacement Opportunities
- Precinct wide (Signs and Symbols)
- Emplacement Park (Divining)
- Central green spine termination (Seeing the Sea)

Power Station Opportunities
- Precinct wide (Transmutations)
- Power Station Building (Elixir, Creative Laboratory & Live Wires,)
- Power Station Foreshore (Into the Sea)
- Cooling pond and groins (Imagineering)

Please refer to the Public Art Strategy for further detail with regard to the conceptual framework for public art across the Cockburn Coast.

WHOLE OF SITE PUBLIC ART

Periodic Table Of Place - A strategy for ongoing community engagement

It is proposed to create a community archive of place histories as a cultural resource for the Cockburn Coast community. The material in this archive can be built up gradually over time and can be used as a tool for site research, interpretation and creative inspiration.

The archive may take a virtual form as an onÐline resource, including photoÐdocumentation of objects and memorabilia. Members can submit their own stories via the website for inclusion in the archive. Membership can be given through onÐline registration which can create a community mailing list for the archive.

The archive may also take a physical form of a reading room, display or pavilion within a local library or other appropriate community facility. It may house and display objects and memorabilia as well as texts and photographs. The room may be used as a venue for community meetings of various kinds, encouraging broad community support and involvement.

The archive should be eclectic and quirky, incorporating a broad range of material from the personal and subjective to the officially recorded. A graphic interface can be designed, based on the format of the periodic table, to visually enliven the material, generate a sense of play and explore 'alchemical' reactions.

The archive can be developed through the submissions of local institutions such as libraries, schools, tertiary institutions and community groups. It can also receive direct submissions from community members. Content can also be generated through creative engagements with local community as part of artwork commission projects.

It is proposed that artists be invited to creatively develop and work with the Periodic Table of Place as part of an artwork concept development process. Artists may use the archive as a resource for creative interpretation. Resulting artworks can form part of a coastal art & heritage trail, as permanent interpretive features integrated within the environment – as part of On the Wild Side opportunity. Alternatively, artists may use the Periodic Table of Place as a tool for community engagement, adding to the archive and creating temporary artworks as community conversation pieces within developing built environment areas – as part of the Habitus opportunity.

Habitus - A Temporal Art and Place making Strategy

The development of new coastal communities, natural and built environments, and public amenities at Cockburn Coast provides opportunity for artists to creatively explore the experience of social gathering, encouraging community conversations and encounters. Artists can be invited to develop temporary installation environments in public places. As hybrid works bridging art and design, these sites may incorporate seating, lighting, planting, and playthings as sites for people to gather, relax, drink coffee or read books. The spaces may have inÐbuilt activities to invite community participation such as letterÐwriting, photoÐbooths, peepÐshow galleries, sound recordings, and so on.

The temporary Habitus environments can be located in emerging commercial and boutique retail areas to foster site activation and community interest. Local businesses may express interest in sponsoring this program.

Formulations - Architecturally Integrated Artwork Gateways

Within the proposed street network at Cockburn Coast, there are several key main road intersections which form precinct entrances and key points of transition within the urban design scheme. Such sites are key locations for built form address and these cornerÐsite buildings will have landmark significance.

Artwork, integrated within building facades, can enhance the built form address and assist with landmarking and wayÐfinding within the urban street network. Artists, working closely within an architectural design team, can achieve integrated artworks which explore and express the intersections of art and design, of the building, the artwork and the environment.

There is opportunity for artists to creatively intervene within the built form design, as a formula for provocative expression. Such interventions can result in extensions and extrusions of the built form or indeed in radical subtractions and incisions. They can also take the form of more subtle and integrated outcomes such as lighting or projection works which enhance an evening presence.

There is opportunity to creatively explore a local climatic response to the coastal environment, developing a vernacular of form and materials and employing principles of environmentally sustainable design. As integrated design responses, these artworks express inventive and hybrid formulations emerging from the urban coastal environment.

CAST AWAY

Cockburn Sound / C Y O'connor Beach - Robb Jetty Interpretation

It is proposed to construct a bold and iconic work of contemporary art within the ocean coastal waters. Rather than a literal interpretation of the former jetty and past site significance, the artwork should seek to transcend historical allusion and offer a contemporary and open-ended expression.

C Y O'Connor Statue

The CY O'Connor statue has become an iconic feature of the Cockburn Coast and should be retained in its current position if possible. It is important that the artwork is not compromised by new development along the foreshore and in the dunal area or compromised conceptually by new artwork in the proximity.

ELIXIR

Power Station Building - A Creative Lighting/Projection Scheme For The Power Station

A creative lighting and/or projection design for the building will create a virtual second skin as an evening experience and act as a signifier of new life and purpose in this precinct. This sophisticated evening effect will be complementary to the current day-time artwork 'skin' of graffiti and stencil designs which currently occupy the site.

CREATIVE LABORATORY

Artist studios at the Power Station Building

To foster and support local arts and creative practice it is proposed to provide low rent studios spaces within the Power Station precinct. The studios may be available for visual artists, dancers, performance groups, writers, designers, craftspeople, musicians and bands.

LIVE WIRES

Temporal art & activation strategy for Power Station Building

As the power station will remain a derelict site for some years, it provides a fertile environment for staging temporary public artworks, ephemeral interventions, and performance events. An event-based program is considered an effective means of activating the site and 'sparking' community interest and involvement.

INTO THE SEA

Power Station Foreshore & Cockburn Sound - An artwork installation between land and sea

A world class artwork that creatively captures and expresses the timeless dialogue between land and sea. The work would take the form of a sculptural installation which would occupy sites both on the land and in the sea

COCKBURN COAST PUBLIC ART LOCATIONS



ON THE WILD SIDE

South Beach Horse Exercise Area, Including Catherine Point

The work can seek to creatively capture the abiding relationship between people and horses and the sense of energy and freedom associated with the experience of horse riding. The artwork will act as a gateway to an art & heritage coastal trail which commences at Catherine Point, working its way through the coastal parklands to the C Y O'Connor Reserve.

ADAPTATIONS

Robb Jetty Main Street - Integrated Artworks within the Streetscape

Artworks may be integrated within awnings and shade shelters, seating and planter beds, paving, drinking fountains and lighting schemes. It is envisaged that the works will have a contemporary aesthetic, and will be human-scaled, providing a level of fine grain detail in the urban environment. Adaptations could be extended to include the playground located in the Memorial Square.

DIVINING

Emplacement Park - A Gateway Icon

The artworks will landmark the horizon, capturing views from the coastline, foreshore and Robb Jetty Precinct. There is further opportunity to incorporate wind- activation within this artwork, expressing the dynamic flow of natural energies and seasonal change.

SEEING THE SEA

Central Green Spine Termination - An Artwork Lookout

The artwork should be integrated within the central ridge park as part of a gathering space and viewing look-out. The artwork can explore integration with both built and natural form and materials, working to contain space and creating a sense of intimacy while also framing the expansive and dramatic views.

IMAGINEERING

Adjacent Cooling Pond & Groins - An Artist Designed Interactive Water-Based Playground

There is opportunity to create a major children's play area within this environment which can act as a regional draw-card for broad visitation. An artist-led design for such a playground will ensure a unique outcome and feature of distinction for the precinct.

C2
ROBB JETTY

Robb Jetty is primarily a place for local residents and businesses, a walkable village that is intimate in scale and 'soft' in character. In Robb Jetty the beach comes to the mainstreet, locals walk barefoot and the stories of the past and its people are part of everyday life.

A variety of small but connected public places offer a range of experiences from the quiet to the communal, the sheltered to the open, the organic to the formal.

Robb Jetty is a place to build meaningful and lasting relationships; to share a chat on the bus, to know the local news agent, to have your favourite seat in the park.

ROBB JETTY PLACE CHARACTERISTICS:

LOCAL	BALANCED
Legible, meaningful, communal	Easy, steady, calm
SEAMLESS	**INTIMATE**
Soft transitions & edges, indoor/outdoor,	Comfortable, sheltered

ROBB JETTY PLACE PRINCIPLES

PUBLIC ART	Tell a meaningful story.
PUBLIC REALM	Transition with ease and honesty.
BUILT FORM	Use an intimate scale that makes you feel at home.
ACTIVITY	Focus on healthy lifestyles and community connections.

EXTEND CURRENT PLACE QUALITIES

Robb Jetty's existing place qualities of raw dunal landscapes and soft edges should be reflected in the development of the precinct. This will create a level of authenticity as it will be reflective of the existing place character that is known by the community.





FUTURE BUILT FORM

Future built form should embody the feeling of seamless transition, from indoor to outdoor, from formal to informal, from exposed to protected. Respectful of nature, it should reflect the natural characteristics of the vegetation and landscape of Robb Jetty.

The scale and materiality of buildings should relate to the human and be warm, sheltering, comforting and tactile.







ABOVE: The reference image above is indicative of the type of atmosphere that could be achieved in the Robb Jetty precinct through seamless transitions between public and private, indoor and outdoor, urban and natural environments.

MAIN STREET CHARACTER

Robb Jetty Mainstreet has two distinct precincts, east and west. Mainstreet West should provide an intimate pedestrian environment with active edges for outdoor dining and trading out.

Mainstreet East is a civic precinct with school, memorial park and more commercial focussed retail such as sports therapy or business services. Mainstreet East is home to a secondary active edge supporting the intimacy of the western block.



COMMUNITY INFRASTRUCTURE

Community infrastructure at Robb Jetty should be coastal, local and integrated with the natural environment. It should provide a range of experiences from exposed to protected, and support a wide range of user groups at different times of the day, week and year.





THE ROBB JETTY OVERLAYS

The following pages provide place making recommendations in the form of Overlays for specific sites across Robb Jetty. These sites have been selected as nodes of community and or public activity that are considered critical to the success of the project becoming a place that attracts self sustaining human activity. While not every place has been considered these Overlays can be used as a guide for the treatment of places across the precinct.

The following map locates the Robb Jetty precinct and overlay locations within. Each overlay has been allocated an acronym to ease with reading this report i.e. Robb Jetty Overlay 1 = RJ1.

ROBB JETTY LSP STRUCTURE - accessible, local, community neighbourhood.
Audience: **Local residents**
Attractors: **Mainstreet, foreshore, school & oval**
RJ2

CATHERINE POINT - transition between South Beach and Cockburn Coast.
Audience: **Horse & nature lovers**
Attractor: **Lookout marker, horse trailer parking**
RJ2

FORESHORE PARK - laid back, informal 'backyard' for Robb Jetty residents.
Audience: **:Local residents**
Attractor: **Beach access, pavilion & picnic areas**
RJ3

ROBB JETTY FORESHORE - a modest and organic beachside recreation area.
Audience: **Local residents & regional visitors**
Attractor: **Beach access, Lifesaving Club, Jetty pontoon**
RJ4

ROBB JETTY MAINSTREET - a convenient and inviting local shopping experience.
Audience: **Local residents**
Attractor: **Mainstreet shopping experience, school, memorial square**
RJ5

OVAL & PARK - the traditional village green, the focus of active recreation.
Audience: **Senior AFL & Cricket, School children**
Attractor: **Oval, club rooms, multi use courts**
RJ6

ROBB JETTY OVERLAY LOCATIONS



RJ1 Robb Jetty Place Structure and Staging

The Robb Jetty central shopping and activity zone, and its future success as a walkable community hub, is key to the attractiveness of the area as a local neighbourhood that can compete with the perceived amenity of the suburbs. The area needs to take advantage of its natural assets, and the opportunity of a new build, to create a comfortable outdoor environment that encourages social interactions in a relaxed and intimate environment.

Please note, this section relating to staging is only suggestive and reflects early delivery of place character. A full delivery strategy for the project is still to be finalised.

RECOMMENDATIONS RE MASTERPLAN STRUCTURE

Roads

- Close the gap between Robb Road and the railway line to reduce the distance between the main st and the foreshore.
- Provide a laneway link through the northern buildings and across main street into the heritage chimney public space
- Minimise lane access onto main street to maximise street front active edges

Built Form

- Pull the foreshore buildings closer to main st to provide as much continuity as possible over the railway line and Robb Road
- Contiguous street fronts (no gaps) on the western block of main st

Public Realm

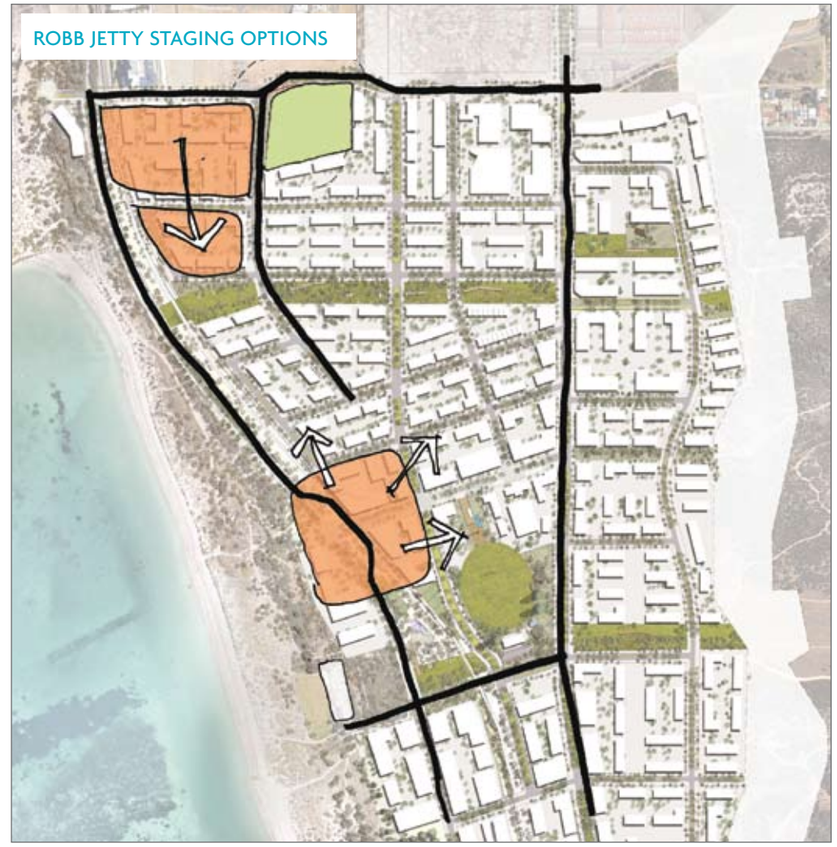
- Integrate a range of small, pocket spaces along main street with different materials, landscaping and orientation to provide diverse options for public seating and meeting, outdoor dining or small group activities.
- Create landmark public space in the foreshore at the end of main street with associated beach front facilities and amenity

ROBB JETTY RECOMMENDED STRUCTURAL CHANGES



NB No structural changes are suggested for elsewhere in the Robb Jetty Precinct so the diagram does not cover those areas.

ROBB JETTY STAGING OPTIONS



STAGE ONE

There are two possible Stage 1 scenarios for Robb Jetty development in terms of building the character of the place:

1. Extension - This would see the first sites being developed as an extension of the South Beach development. The advantages are that it would rely on existing infrastructure (i.e. no new roads), however, it is likely that the identity of this precinct would then be dominated by South Beach rather than forging the identity and character desired for the Cockburn Coast.

2. Catalyst - This would see the heart of the new community precinct - the main street - being developed first and would encourage a new type of development founded on the character and identity of Robb Jetty. The risks would include delivering the right retail mix with limited residents.

N.B. These staging recommendations are based on Place Making objectives only and have not been tested against economic feasibility nor land ownership etc.

RJ2 Catherine Point



LOCATION

Honesty
Intimate
Rugged
Transition

PLACE CHARACTER AND ROLE

Catherine Point is the transition point between south beach and the Cockburn Coast. A relatively unchanged experience, it provides for animal and passive beach enjoyment with the addition of modest development for community use. It is a seamless experience that is well integrated with the natural environment.

- Modest and low scale building forms
- Natural, soft surfaces
- Predominately dunal, organic, raw
- Animal and passive beach enjoyment
- Hall for hire/temporary vendors

MASTERPLAN DETAIL



PLACE MAKING RESPONSE TO MASTERPLAN

- Height of the dunes restricts visual access to the water from existing location of building
- Current building use suggestion - SLS Club suggested use is not practical due to isolation from beach users
- Existing quality infrastructure such as the car parking should be retained as they are public in nature, already used by local residents and in good condition
- Retain existing invitation to the beach via view corridor from the road down to the dunes/beach
- The public road is an important existing entry to the site and also should be retained

KEY PRINCIPLES

Reinforce the existing place character

A relatively unchanged experience. Modest development. Build on the existing characteristics and infrastructure already in place at Catherine Point. Create a laid back invitation to the beach through wayfinding heritage marker that also provides a look out to check the conditions in keeping with existing rituals of local residents of South Beach. Seamless low key and integrated with environment.

Modest development

Catherine Point plays a supporting role in the transition from South Beach development to that of the Cockburn Coast. Modest development will ensure that its character remains relatively unchanged, an evolutionary approach as opposed to catalyst.

PLACE MAKING REFERENCE IMAGES









IMAGE 01: Significant existing infrastructure that is used by the community and should be retained at Catherine Point.

IMAGE 02: Community building should be modest, natural materials and coastal in feel in keeping with the rugged character of Catherine Point.

IMAGE 03: Heritage markers in the form of public art interpretation or signage

IMAGE 04: A lookout/patrol tower could be positioned on the top of the dunes as a landmark to invite people travelling from Rollinson Rd into Catherine Point. This could become a sculptural piece that is also the heritage marker and starting point for heritage trails throughout the Cockburn Coast.

AUDIENCE

Catherine Point is first and foremost for the local residents of Robb Jetty, however will also attract a broader audience utilising its attractors. Priority should be given to satisfying the needs of daily users. The key audience groups include:

Daily users

- Local residents
- Exercisers
- Dog walkers

Occasional users

- Local community groups
- Equine community

ATTRACTORS

Catherine Point provides a local facilities and amenities that also attract some users from further afield. The following list represents the basic amenities and attractors required for self sustaining activity:

Primary attractors

- Horse trailer parking and exercise facilities
- Dog beach (before 8am, 7 days a week)
- Exercise trail
- Heritage trail
- Community hall for hire

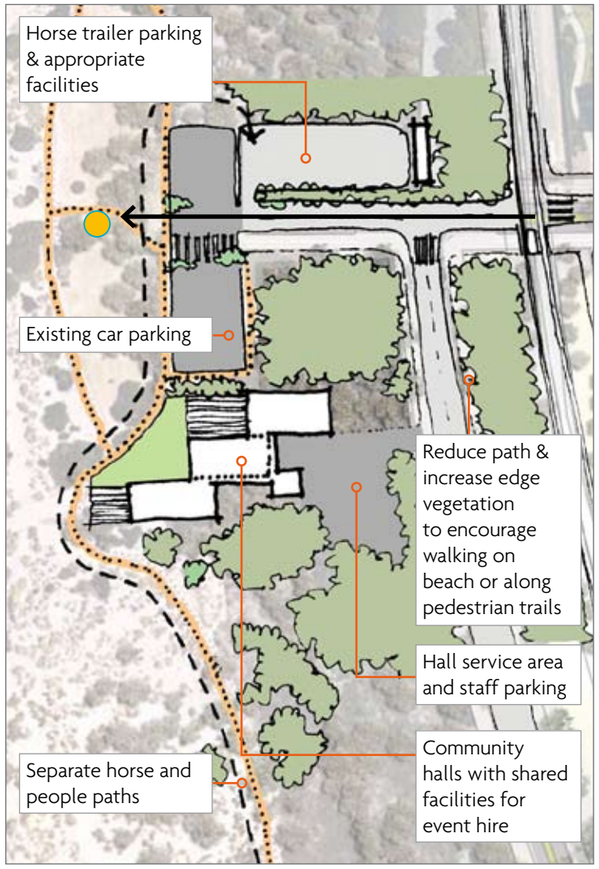
PLACE MAKING RECOMMENDATIONS

SOCIAL
Catherine Point provides for low key local activities such as checking the conditions at South Beach. In addition, it provides for both local and district horse and dog exercisers and will attract residents from the region who share these common interests. The Community Hall for hire provides opportunities for these groups to gather and connect with each other based on these shared interests.

ECONOMIC
There is significant existing car parking infrastructure which is currently working and should be retained. A community hall that is low maintenance and management for hire in conjunction with a small cafe or kiosk would serve the local population, every day users and visitors alike. Horse related facilities and associated businesses could be considered as an attractor for equine related audiences as the population grows and activity intensifies.

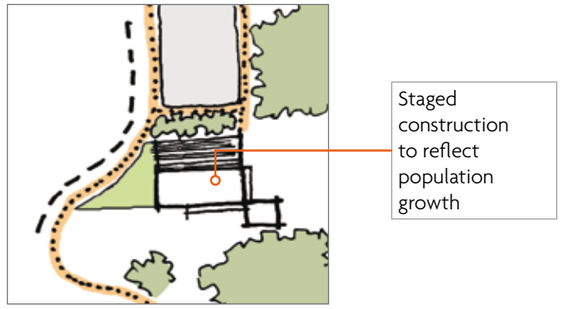
ENVIRONMENTAL
Ensure Catherine Point retains its 'rawness' by revegetating and protecting areas of coastal vegetation. Aim for a seamless transition from the natural and more rugged vegetation to selected more formal green space that will facilitate community use. Built form should be modest, low maintenance and respectful of the environment. Natural materiality and soft surfaces should dominate. The view corridor through the car park provides a clear invitation marked by a lookout art work beyond the carpark.

CULTURAL
Program the Community Hall with small scale community activities as well as hire for one off events and common interest community groups. Look for opportunities for events that would suit specific user groups attracted to this location such as horse riders and dog users. Pony rides could attract tourism diversifying the equine activity at Catherine Point. Heritage markers provide a starting point for history trails throughout the Cockburn Coast.



NOT TO SCALE

ARTWORK/ HERITAGE/ LOOKOUT
FORMAL GREEN SPACE
DUNAL VEGETATION
PEDESTRIAN PATHWAYS
CAR PARKING
ROADS



NOT TO SCALE

Proposed Stage 1

PUBLIC ART STRATEGY

Interpretive Art - Horse & Indigenous histories

As part of park construction and improvement works to Catherine Point, artwork can be commissioned which reflects upon the practices of horse racing and training which has occurred at Cockburn Coast since the early stages of settlement and continues to the present day. It is envisaged that the artwork can be integrated within the new pathway design. The work can seek to creatively capture the abiding relationship between people and horses and the sense of energy and freedom associated with the experience of horse riding.

The artwork can also act as a gateway to a longer-term project for an art & heritage coastal trail which commences at Catherine Point, working its way through the coastal parklands and eventually reaching the artworks at the southern end of the C Y O'Connor Reserve, namely the C Y O'Connor statue in the ocean and the Human Race artwork in the parkland east of Robb Jetty, both by local artist Tony Jones. These two artworks reference significant stories of place.

HERITAGE CONSIDERATIONS

South Beach Horse Exercise Area

South Beach should continue to be used for the horse training, a use with which it has had a long association. Any future conservation, management and/ or adaptation works to the place are to be undertaken in accordance with state and local policies and procedures. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community.

Heritage Trail Marker - Horse Exercise Legacy

The South Beach Horse Exercise Area is the portion of South Beach extending south past Catherine Point to McTaggart Cove. The Beach has been used for exercise and training of horses for recreation, sport and World War I service since the early 1830s and continues in the present.

COMMUNITY DEVELOPMENT PLAN

Proposed Community Infrastructure

- Community hall - multi-purpose facility
- Car parking
- Bike parking
- Kiosk/temporary vendors
- Toilet/shower
- Dog/horse cleaning facilities

RJ3 Foreshore Park



LOCATION

Legacy
Seamless
Communal
Formal

PLACE CHARACTER AND ROLE

Foreshore Park is the laid back, informal 'backyard' for Robb Jetty residents. A place for casual community gathering and play, it is a commercial free space that transitions from natural dunal vegetation to a more formal landscape of outdoor 'rooms'. Low scale and modest it is a comfortable and soft place for all ages.

	Low scale, modest shelters
	Transition dunal vegetation to european landscape
	Soft but formal. Minimum hard surfaces.
	Passive and informal active recreation such as kick to kick and bbq gatherings
	None Recommended

MASTERPLAN DETAIL



PLACE MAKING RESPONSE TO MASTERPLAN

- There is no explicit pedestrian connection across the road from park to beach - this is likely to be desired by park/beach users
- The green space lacks a focal point or explicit gathering areas for groups of people to gather
- There is potential for exposure to strong winds from the beach into the park
- Pedestrian crossings and paths do not currently reflect desire lines
- The rail crossing is not managed in a way that would allow children to safely play in the park unsupervised

KEY PRINCIPLES

Create outdoor rooms

Utilise the landscape and pedestrian pathways to create rooms within Foreshore Park to support various sizes of community gatherings from mothers groups to young couples.

Follow desire lines

Generally, people will take the shortest route from a to b, irrespective of what meandering pathways may have been provided for them. Ensure all pathways reflect pedestrian desire lines to support connectivity and encourage pedestrian access.

PLACE MAKING REFERENCE IMAGES









AUDIENCE

Foreshore Park is the backyard and gathering space for the local residents of Robb Jetty, priority should be given to satisfying the needs of these daily users. The key audience groups include:

Daily users
- Local residents

Occasional users
- Local community groups
- Regional residents

ATTRACTORS

Foreshore Park provides local facilities and amenities for community gathering. The following list represents the basic amenities and attractors required for self sustaining activity:

Primary Attractors
- Access to the beach
- BBQ facilities
- Pavilion
- Shelters and picnic tables
- Picnic areas

IMAGE 01: Foreshore Park should feel like an outdoor room, a place that is as comfortable as home but in the public realm

IMAGE 02: Pathways should reflect desire lines between facilities such as picnic and BBQ shelters. More formalised planting provides a 'backyard' feeling, that the place is cared for and someone is proud of it.

IMAGE 03: Screening for the railway crossing could form an artwork in itself - it should provide view lines that make you want to cross to see what is on the other side.

IMAGE 04: Picnic tables and shelters strategically located surrounded by planting to create 'rooms' for groups to gather

PLACE MAKING RECOMMENDATIONS

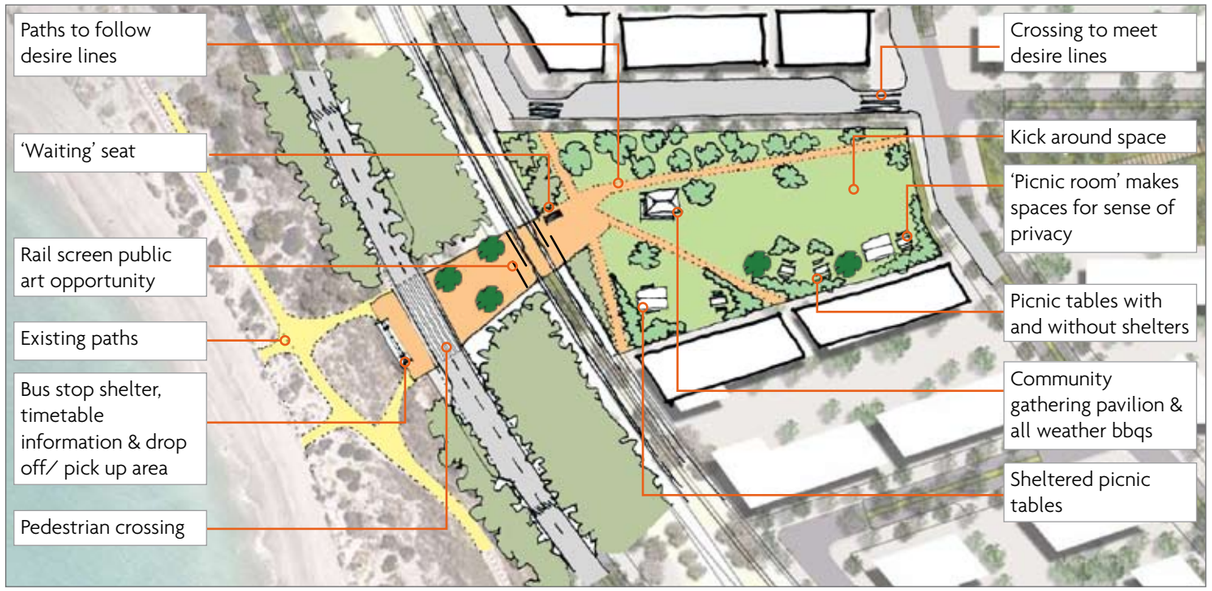
SOCIAL
Create a place for the local residential community by supporting group outdoor lifestyles and ritual visitors such as the 'train watchers', usually families with young children. Various outdoor rooms cater for a broad range of community groups and local residents, from young couples and the elderly to neighbourhood and family groups.

ECONOMIC
BBQ and pavilion hire will provide low cost spaces for community groups and family functions. Other shelters and tables as well as areas for picnicing on the grass provide a no cost alternative for family outings.

The pavilion can be hired through a community portal that like with share cars gives residents the opportunity to share local resources.

ENVIRONMENTAL
Open grassed areas with perimeter planting and shade trees will provide a kick about space as well as more private gathering spaces. Use gravel and shade trees to create informal paths along desire lines and across rail tracks protected from the heat of summer. Safety screens at the rail crossing should be designed to de-risk the area for children and could incorporate aspects of the local rail story.

CULTURAL
Groups of picnic tables and chairs (some sheltered) allow visitors to play, talk, meet picnic relax, in a group or as an individual or walk the dog on a lead. Screening of the rail crossing may provide opportunity for public art integration that would speak to local stories of the Robb Jetty precinct and/ or be playful and engaging to children who 'train watch'. Most activity occurs here with adjacent green spaces providing a passive retreat and link to the rest of the precinct.



NOT TO SCALE

FORMAL GREEN SPACE
DUNAL VEGETATION
INDIGENOUS PLANTING
EUROPEAN PLANTING
ROADS
COASTAL/RESERVE
PEDESTRIAN PATHWAYS

PUBLIC ART STRATEGY
None planned for this site.

HERITAGE CONSIDERATIONS
Robb Jetty Camp
Any future conservation, management and/ or adaptation works to the place are to be undertaken in accordance with state and local policies and procedures. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community. Record and preserve important aspects of a human experience that would otherwise go undocumented.

Heritage Trail Marker - Indigenous Campsite*
The sandhills along the foreshore and most particularly close to Robb Jetty were used as a camp area for aboriginal people and were still in use by aboriginal people from outside the metropolitan area at least until 1985. Like other long established fringe camps, the area is likely to have been a traditional camping area. It is thought that the camps continued in this locality due to the opportunities for work that was available associated with the shipping and slaughtering of cattle from the Kimberley.

* Please note. The City of Cockburn Aboriginal Reference group must be consulted as part of any process involving Aboriginal interpretations of the site.

COMMUNITY DEVELOPMENT PLAN
Amenity to support community gatherings
- BBQ facilities - hire and non-hire
- Public transport information and waiting space
- Pavilion for community gathering and hire
- Bus stop shelter and drop off area
- Pedestrian pathways
- Quality public lighting

RJ4 Robb Jetty Foreshore



LOCATION

MASTERPLAN DETAIL



Legacy

Balance

Modest

Organic

PLACE CHARACTER AND ROLE

Robb Jetty Foreshore is a modest and organic beachside recreation area; connected to its past and providing a range of spaces and activities that reflect the needs of all members of the community. It is an integral part of the broader cultural and exercise trails and the local residents' focus for communal recreation.

	Coastal architecture, indoor/outdoor transitions, wind and solar shading
	Transition beach to dunal vegetation to formal planting
	Natural materials, soft edges, focus on human comfort
	Beach access, swimming, walking, picnics. Pre-8am dog and horse exercise.
	Cafe and lifesaving club. Tourist pony rides. Beach equipment hire.

KEY PRINCIPLES

› Part of something bigger

Robb Jetty Foreshore is home to two of the most significant heritage elements in the Cockburn Coast, the remains of Robb Jetty and CY O'Connor Statue - both significant at a regional scale. The whole area needs to be welcoming to local residents and regional visitors.

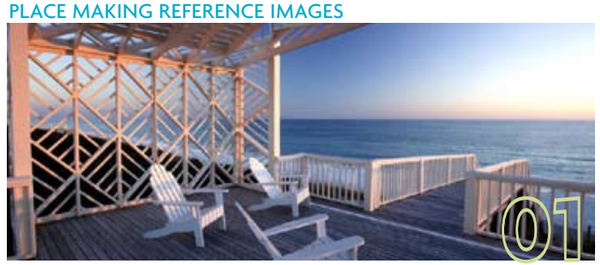
› Choice of experience

From intimate to exposed, from formal to raw and rugged, create a variety of gathering spaces, or active/passive 'rooms' that are connected by different paths and suit different user groups. Ensure human comfort is the focus with sunny and shady spaces as well as wind protected areas that reflect seasonal conditions.

PLACE MAKING RESPONSE TO MASTERPLAN

- The 200m (approximate) distance between the beach and the main street is too far to provide an easy & comfortable transition
- The large scale of the public plaza could be difficult to activate without establishing smaller 'rooms' within
- The pier element could interrupt the existing horse and dog exercise activities occurring on site
- Building forms do not provide summer and winter 'rooms' or 'decks' that are appropriate to different seasons
- Providing a variety of path ways to and from the plaza would add a level of discovery and intimacy
- Lack of shelter from sun or wind

PLACE MAKING REFERENCE IMAGES









AUDIENCE

Robb Jetty Foreshore is the key passive recreation space for Robb Jetty residents, priority should be given to satisfying the needs of these daily users. The key audience groups include:

Daily users
- Local residents
- Dog walkers
- Exercisers

Occasional users
- Local community groups
- Equine community
- Regional residents

ATTRACTORS

Robb Jetty Foreshore provides a range of amenities for enjoyment of the outdoors and the beach on a day to day basis. The following list represents the basic amenities and attractors required for self sustaining activity:

Primary Attractors
- Beach
- Beachside lawn
- Cafe
- Lifesaving club
- Coastal pathways
- Public bathrooms
- Robb Jetty pontoon

IMAGE 01: The 'deck' at Robb Jetty Foreshore should provide a feeling of intimacy but also a connection to the expansive nature of the water..

IMAGE 02: A mix of formal and more informal pathways such as these 'ant tracks' will help to retain the 'rawness' and choice of experience provided at Robb Jetty Foreshore.

IMAGE 03: As a gesture of tribute to the former Robb Jetty, it is proposed to construct a bold and iconic work of contemporary art within the ocean coastal waters. A precinct landmark, this work will act as a destination attractor for the commercial centre.

IMAGE 04: Example of Lifesaving Club patrol tower/equipment store, separate from the main club house utilised for training, kiosk and social events (Altona Lifesaving Club, Victoria).

PLACE MAKING RECOMMENDATIONS

SOCIAL

Provide a series of 'rooms' with different experiential qualities that will suite various user groups. Create sheltered meeting points with view lines up into the main street in proximity to the bus stop. Providing opportunity for existing user groups such as dog walkers will ensure the development does not disenfranchise existing users and the local resident population.

ECONOMIC

Quality public amenities and public transport will encourage visitation by a broader catchment than the local Cockburn Coast. Residents from other surrounding local areas are likely to frequent this location, supplementing the customer base for local retailers. Temporary vendors, micro business and market stalls support day trippers and regional visitation on summer weekends.

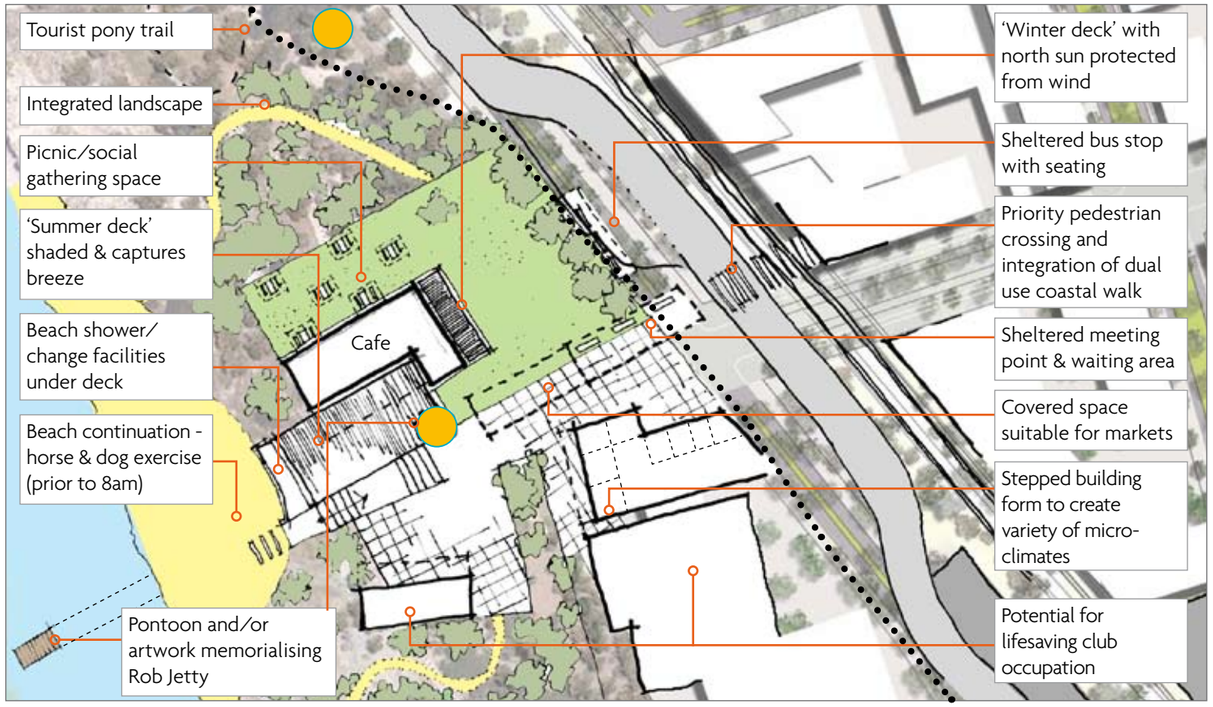
ENVIRONMENTAL

The 'Summer & Winter Decks' are an example of using micro-climates to provide comfortable spaces year round. The summer deck is a shaded area that captures cooler afternoon breezes, whilst the winter deck faces the north sun and is sheltered from strong westerly winds.

Providing a choice of pathways or journeys through the site, from the rugged to more formalised will provide for the variety of user groups that will frequent this location.

CULTURAL

Public art and integrated landscapes provide opportunities to tell the story of Robb Jetty, its history and the future stories of the community as the place evolves. Attractions such as the market stalls and pony rides (starting at Catherine Point) provide tourist activities for day trippers. The Robb Jetty pontoon provides for a future 'rite of passage', when one is old enough, confident enough or a strong enough swimmer to visit the pontoon.



NOT TO SCALE

ARTWORK · FORMAL GREEN SPACE · DUNAL VEGETATION · CAR PARKING · ROADS

HERITAGE · COASTAL/RESERVE · DUAL USE COAST TRACK

N.B. Robb Jetty Foreshore is home to a significant amount of existing assets including:

- Robb Jetty remains
- Shipwreck sites
- CY O'Connor Statue
- Human Race artwork

These assets need to be carefully surveyed and any future development or artwork installation should enhance, not detract from these assets. At the time of this report the exact locations of these assets could not be determined.

PUBLIC ART STRATEGY

Robb Jetty Landmark Artwork - Cast Away

Rather than a literal interpretation of the former jetty and past site significance, the artwork should seek to transcend historical allusion and offer a contemporary and open-ended expression. Rather than referencing the jetty itself, the concept of Cast Away speaks about the jetty's absence, when there is no longer a place for mooring, and being adrift at sea. The work may thus explore a creative dialogue in its form about the relationship between people and the sea, between the sea and the sky, between built and natural forces and forms, above and below the shifting waterline. The artwork may incorporate tidal movement and/or other natural forces and energies.

HERITAGE CONSIDERATIONS

Robb Jetty Interpretation

Remnants of Robb Jetty should be retained undisturbed. Any future conservation, management and/ or adaptation works to the place are to be undertaken in accordance with state and local policies and procedures. Consideration should be given to providing historic statutory heritage protection to Robb Jetty in its own right. Integrate interpretation of the site in the Cockburn Coast project to communicate the tangible and intangible values and history of the place to the community. Record and preserve important aspects of a human experience that would otherwise go undocumented.

Wyola and Barge Remains

Retain in situ and do not disturb. Interpret the story of the wreck and wreck event.

Public Art - CY O'Connor Statue & Human Race Artwork

Retain and conserve and include in any overall interpretation strategy.

COMMUNITY DEVELOPMENT PLAN

Proposed community infrastructure

- Cafe
- Community building/ lifesaving club - potential for club house/social spaces nearer to road access and patrol outpost closer to the water
- Showers and toilets
- Pontoon
- Picnic gathering space
- Car parking
- Market stalls
- Transport waiting area and information

RJ5 Robb Jetty Mainstreet



LOCATION

MASTERPLAN DETAIL



Honesty
Local
Informal
Inviting

PLACE CHARACTER AND ROLE

Robb Jetty Mainstreet provides a convenient and inviting local shopping experience. It concentrates street trading and active retail in its western block creating a vibrant community hub. Its diverse and contiguous streetscape continues to the east where civic and business services support active retail ensuring sustainable business mix.

	Intimate, contiguous, human scale shelter and articulation
	West block - low vegetation to allow views across street. East block - formal street trees
	Mix of natural, comfort and tactile materials
	Outdoor dining, shopping, playground, bus stop, workplace
	Supermarket, fresh food, cafes, local services, independent retailers

KEY PRINCIPLES

› Concentrate activity

Concentrate active retail activity to the western block of Robb Jetty Mainstreet to provide a truly active and vibrant retail and dining experience. Support retailers in the western block and encourage them to trade out and take advantage of sunny pedestrian focussed streetscapes.

› Put customers first

Robb Jetty Mainstreet should first and foremost provide an enjoyable, easy and inviting shopping experience for pedestrians. Keeping customers happy will ensure retail is sustainable and there is activity on the street - and build loyalty to local shopping convenience rather than car based destination centres.

PLACE MAKING RESPONSE TO MASTERPLAN

- There is little differentiation between street blocks and few clues as to which area is for people to linger and which for driving through
- The height of first floor street awnings/balconies is too high and narrow to provide comfortable protection from the elements or a sense of enclosure
- The median strip increases the width of the road but may not encourage pedestrians to cross its distance.
- Pedestrian footpaths may not provide adequate space for outdoor dining and trading out into the street, particularly on the sunny side of the road
- Car movement to and through the main street has to be easy to encourage local shopping

PLACE MAKING REFERENCE IMAGES







AUDIENCE

Robb Jetty Mainstreet is the neighbourhood retail heart for local residents of the Cockburn Coast, priority should be given to satisfying the needs of these daily users. Key audience groups include:

Daily users
- Local residents
- Local workers
- School age children and their carers
- Beach visitors

Occasional users
- Regional residents

ATTRACTORS

Robb Jetty Mainstreet provides a convenient, inviting day to day shopping experience for local residents. The following list represents the basic amenities and attractors required for self sustaining activity:

Mainstreet West (retail concentration)
- Supermarket
- Fresh food
- Mainstreet experience
- Outdoor cafes/restaurants
- Independent retailers

Mainstreet East (civic/commercial/business services)
- Memorial Square
- School
- Playground
- Major public transport stop (RBT)

IMAGE 01: Robb Jetty Mainstreet should feel intimate, protected and active on its edges.

IMAGE 02: The Animals in War Memorial, London is a good example of a park memorial that could be appropriate for the Cockburn Coast given the equine heritage of training horses for defence on the site.

IMAGE 03: Angelo Street, South Perth, provides a good example of rear access for vehicles as well as truck loading without impacting on the character of the mainstreet.

PLACE MAKING RECOMMENDATIONS

SOCIAL

On the south side of the street, sunny outdoor dining and public seating on outstands provide for incidental meetings with other community members and pause points for older people. They allow for local businesses to express themselves on the street and encourage social interaction.

ECONOMIC

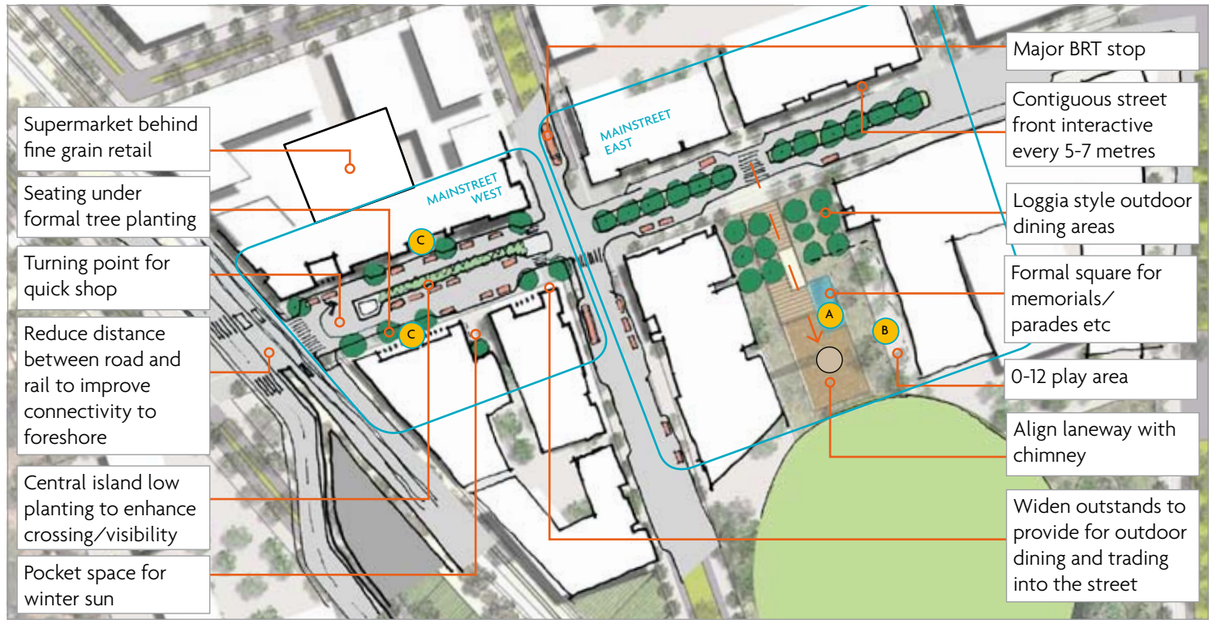
Concentrate active retail in the western block by widening the footpaths and providing outstands on the south side (sunny side) of the main street, the invitation to 'trade out' will encourage the activation of facades, attract pedestrians and support locally owned business. Providing convenience retail such as a supermarket on the north side will encourage people to cross the street. Locate civic and business support services such as health care to the east near the school, memorial park and oval.

ENVIRONMENTAL

Differentiating zones along the street will encourage movement along as people enjoy choice of experience. It is essential that the connection to the foreshore is easy, inviting and pleasant. This can be supported by reducing the distance and bringing the dunal landscape up into the main street. Narrowing the street of the western block will make it easier to cross the road, which will concentrate activity and movement. The character of the western area should be soft, intimate, human scale in plan and section and value human comfort as a priority.

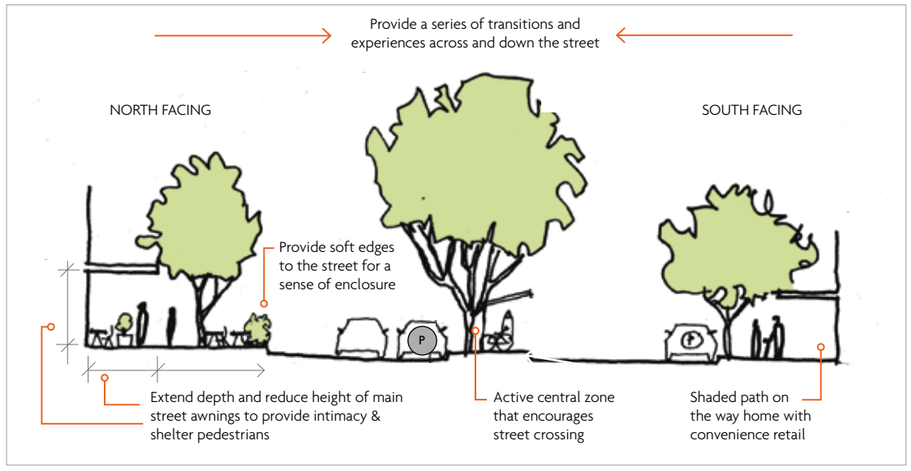
CULTURAL

As the heart of the community it is important that the culture of this place both in terms of behaviours and creativity reflect the place character. Relaxed and welcoming it needs to be comfortable for bare feet and for suits dropping by on the way to work. Community infrastructure such as bike stands, seats, planting and community notice boards are opportunities for local participation, production and a unique point of difference that will illustrate more clearly than anything else that this place is for local people.



NOT TO SCALE

ARTWORK · HERITAGE · FORMAL GREEN SPACE · INDIGENOUS PLANTING (LOW) · EUROPEAN PLANTING (FORMAL) · ROADS · P CAR PARKING



NOT TO SCALE

PUBLIC ART STRATEGY

Integrated artworks within the streetscape - Adaptations

The Robb Jetty main street and its link to the foreshore is a focal experience for local and visitor communities and is an active commercial hub, including outdoor cafes and dining for day and evening. As the heart of a walkable village this is a pedestrian friendly environment containing a diverse range of informal gathering spaces with a high quality public realm.

There is opportunity for the integration of artwork within the streetscape to further enhance and express qualities of intimacy, shelter and seamlessness. There is further opportunity to explore and develop a local design vernacular which is climate responsive and complementary to the streetscape design and architecture. Works can explore a dialogue between internal and external spaces, between city and sea, generating light and shadow play and the effects of reflection and refraction. Artworks may be integrated within awnings and shade shelters, seating and planter beds, paving, drinking fountains and lighting schemes. It is envisaged that the works will have a contemporary aesthetic, and will be humanÐscaled, providing a level of fine grain detail in the urban environment.

- A Memory/reflection garden (chimney)
- B Community built playground (artist collaboration)
- C Sensory building interaction (awning, paving, screens, lighting)

HERITAGE CONSIDERATIONS

Robb Jetty Chimney interpretation

Retain and conserve. Conduct periodic structural assessments to ensure the Chimney retains its structural integrity. Any new development adjacent to the Chimney should ensure it retains its landmark qualities. Interpret the former abattoir use of the site, its role in feeding the people of Perth and the goldfields, and its former connection to Robb Jetty.

National Animals in War Memorial

Australia does not currently have a memorial to the animals that lost their lives supporting war efforts. Cockburn Coast could capitalise on this opportunity given its history of training horses for defence on the site. This is an opportunity for a national tourism destination.

COMMUNITY DEVELOPMENT PLAN

Proposed community infrastructure:

- Central pedestrian island
- Car parking including car share
- Formal square for memorial
- Shaded seating
- Bicycle parking and hire
- Outstands for outdoor dining/ trading
- Public transport waiting shelters
- Quality street lighting
- Water features
- Tourism information
- Business enterprise services
- Visitor accommodation
- Accessibility for prams and scooters
- Dedicated parking for retailers from day one

RJ6 Oval and Park



LOCATION

MASTERPLAN DETAIL



Legacy

Balance

Active

Shared

PLACE CHARACTER AND ROLE

Oval and Park is the traditional village green, the focus of active recreation at Cockburn Coast. It feels established and balanced, this is a place that is shared harmoniously by many user groups. It embodies a sense of pride in the sporting and community legacy it will lay for future generations.

	Modern, contemporary sports and recreation infrastructure
	Contrasting landscapes to signify different uses, formal trees, to heritage fig trees, to dunal vegetation
	Contrast of natural and contemporary urban materiality
	Organised and informal sport and recreation, community gatherings, education
	Community sporting based

KEY PRINCIPLES

› Connectivity for a precinct approach

Consider the oval and adjacent green and recreation spaces as one precinct. It should be well connected internally for quality pedestrian access, as well as easily accessible as a destination by public transport, car or bike.

› Multiple uses and users

Ensure every amenity or facility provided around the oval and adjacent parks are utilised by more than one user group and for more than one use. Consider a whole of day and week cycle of activity e.g. sporting club house becomes public gym with associate memberships and function venue out of hours.

PLACE MAKING RESPONSE TO MASTERPLAN

- The orientation of the club rooms reduces interaction with the street and adjacent parklands and could be reorientated for improved wind protection
- Adequate parking and drop off areas for a district level amenity need to be considered
- Spaces for youth recreation are required, however the skate park could be better located away from more formalised sporting activity to make way for the co-location of a variety of active recreation and sporting facilities
- The space between the road and railway line is too large and results in wasted space
- There is very little circulation space around the edges of the oval
- Car parking to the rear of the sporting facilities creates blocks to pedestrian pathways and a visual barrier to the green open space

PLACE MAKING REFERENCE IMAGES









AUDIENCE

Oval and Park is a district level active recreation hub, home to senior AFL and Cricket clubs, utilised by the adjacent school and local residents, priority should be given to satisfying the needs of these daily users. Key audience groups include:

Daily users

- Regional AFL and cricket players
- Local primary school children
- Local youth and active residents

Occasional users

- Regional residents

ATTRACTORS

The Oval and Park precinct provides for a wide range of active recreation opportunities for multiple user groups. The following list represents the basic amenities and attractors required for self sustaining activity:

Oval

- AFL and Cricket club
- Oval

West Park

- Netball/basketball courts
- Cricket nets
- Half courts
- Dog walking
- Kick about space

South Park

- BBQ and picnic facilities
- Shelters

IMAGE 01: The heritage fig trees provide a stunning canopy and protection from the sun. Utilise these existing features as a character driver and for picnic and bbq spaces.

IMAGE 02: Example of a local oval with large trees that provide shaded picnic spaces and raised earthen area as an informal 'stand' for spectators.

IMAGE 03: Support sporting activities such as cricket nets for youth informal play and multi line courts for netball and basketball

IMAGE 04: High quality contemporary sporting facilities should be able to be utilised by various users for various uses.

PLACE MAKING RECOMMENDATIONS

SOCIAL
Collocating a variety of sporting facilities will cater to a broader range of family activities. As they age in place, brothers and sisters will be able to attend this sporting hub together. Integration with the school who will use the oval will support its activation. There is potential for use by seniors clubs, AFL and cricket, local residents, visitors as well as national memorial to the north of the site associated with the Robb Jetty Chimney.

ECONOMIC
Recreation hub for in dependant sporting and community clubs as well as a shared use with the school ensures that this is a well utilised community asset that will have the potential to raise revenue and reinvest in the community assets. It will help to concentrate pedestrian activity as users access the mainstreet and recreation facilities to the rear in consolidated carparking.

ENVIRONMENTAL
Fig trees provide a stunning backdrop to the sporting ground and create shade a micro-climates ideal for bbq and picnic use. Landscaping should encourage and retain connections through to the beach and to the primary school. Avoid fencing off areas where possible. The orientation of the club house should consider wind implications. Provide an earthen bund to create a viewing area for local games. Maximise the open space around the oval by centralising car parking to the east which will serve the beach, oval and shops.

CULTURAL
This place will allow for informal place (kick about) as well as formal play as children of all ages that engage in active recreation age in place. There is opportunity for a mix of recreation including basketball, netball, cricket etc. In addition, it can be a place of ceremony and memorial, for school fetes and carols associated with the school. As sporting clubs establish themselves, they will start to develop their legacy as an organisation building pride and making their mark on the evolution of the place.



NOT TO SCALE

HERITAGE · DUNAL VEGETATION · FORMAL GREEN SPACE · INDIGENOUS PLANTING · EUROPEAN PLANTING

PEDESTRIAN PATHWAYS · ROADS · P CAR PARKING

PUBLIC ART STRATEGY
None planned for this site.

HERITAGE CONSIDERATIONS
Retain and Conserve Morton Bay Fig Trees

An arboricultural assessment of the Morton Bay Fig trees should be undertaken to ensure the health and vigour of the trees is maintained. New development in the vicinity should not negatively impact on the trees. A tree replacement strategy should be prepared and implemented if and when required.

Heritage Trail Link - Fig Trees

These Moreton bay Fig trees are around fifty years of age. It is understood that the trees were once part of the Robb Jetty abattoir complex.

The Cockburn Coast is associated with the earliest settlement of the Swan River Colony with the first settlers anchoring off shore and taking up land grants in 1830. The coastal strip steadily grew as an industrial area from the late nineteenth century with the introduction of the rail line between Fremantle Port and Robb Jetty in 1898.

COMMUNITY DEVELOPMENT PLAN
Active Recreation Facilities

- AFL/cricket oval
- Multipurpose community facility (including public toilet)
- Senior AFL and Cricket Club rooms (as per Sports and Recreation Plan)
- Netball/basketball courts
- Cricket nets

Amenity

- BBQs
- Picnic tables
- Drinking fountains

C3 POWER STATION

The Power Station precinct is anchored by an iconic landmark, the historic power station's physical dominance should translate into the area's primacy as the key regional destination for the Coast. The centre of recreation and leisure activity, Power Station is the place were community celebrations are held and tourists enjoy multiple experiences that vary with each visit.

New and old are juxtaposed, events showcase the innovative and challenging. Creative entrepreneurship is encouraged across multiple fields from energy production, to arts, culture, experiential tourism and business.

Self sustainability for this precinct is key - activity has to be self generating and infrastructure flexible and attractive to a range of users on weekdays, evenings and weekends in summer and winter.

POWER STATION PLACE CHARACTER ELEMENTS

DYNAMIC	CONTRAST
Evolving, flexible, changing, active	Old/new, shade/light, soft/hard
ENERGY	**CREATIVE**
Bold, iconic, intense	Inspiring, edgy, artistic, experiential

POWER STATION PLACE PRINCIPLES

PUBLIC ART	R-evolutionary challenging, surprising.
PUBLIC REALM	Provide for the region with places that engage at the micro & macro.
BUILT FORM	Enhance primacy through contrast.
ACTIVITY	Provide diversity that responds seasonally.

SHOWCASE CURRENT PLACE QUALITIES

The scale of the Power Station architecture is unique and awe inspiring. It is a strong landmark for wayfinding and the primary character driver for future activity in the precinct. The current foreshore is raw and rugged allowing people to get close to the shore and experience the water, the weather and the landscape. It is important that the development of the site does not 'sterilise' the area. Integrate aspects of the raw industrial materiality, scale and internal volumes that make this place authentic and unique. Consider leaving some areas 'as is' including graffiti/street art' and worn wall surfaces.





FUTURE BUILT FORM

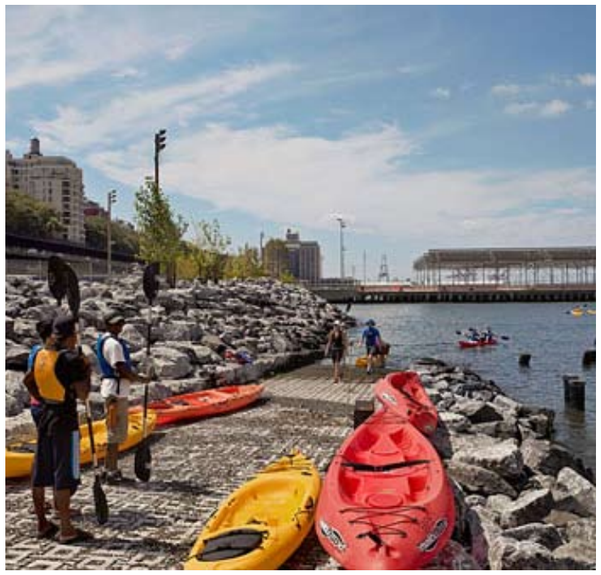
Modern contemporary architecture that has the strength and boldness of the power station. However, they must not compete with the landmark itself, but highlight it through contrast of heritage and the contemporary. Consider how scale, materials and detailing can 'talk to' rather than compete with the landmark.







ABOVE: The reference image above is indicative of the type of atmosphere that could be achieved in the Power Station precinct through dramatic architectural statements and the contrast between modernity and industrial heritage.



ABOVE: The reference image above is indicative of the type of atmosphere that could be achieved in the Power Station precinct by contrasting rough natural elements with the new urban environment.

FORESHORE CHARACTER

The foreshore should act as a public destination, large enough tot act as a gathering space and truly unique in its proximity to the water. It should feel fundamentally public and civic, and avoid any perception of privatisation. Existing place character elements including rugged exposure and aged infrastructure should be embedded in the public realm and mixed with new creative landscape design elements.



COMMUNITY INFRASTRUCTURE

Provide for coastal and waterbased recreation, both informal and formal including safe water play for a variety of ages. Power Station should provide for and support creative industries, pioneers and incubators for local businesses or entrepreneurs.

Infrastructure to support regional (and further) tourism should include information, food and beverage and public transport access in addition to general amenity for families and more localised visitation.





THE POWER STATION OVERLAYS

The following pages provide place making recommendations in the form of Overlays for specific sites across Power Station. These sites have been selected as nodes of community and or public activity that are considered critical to the success of the project becoming a place that attracts self sustaining human activity. While not every place has been considered these Overlays can be used as a guide for the treatment of places across the precinct.

The following map locates the Power Station precinct and overlay locations within. Each overlay has been allocated an acronym to ease with reading this report i.e. Power Station Overlay 1 = PS1.

POWER STATION STRUCTURE- leisure, entertainment and recreational destination.
Audience: **Local residents, regional tourists**
Attractor: **power station activity hub**
PS1

POWER STATION CIVIC SQUARE - dynamic & highly programmed heart of the precinct.
Audience: **Local residents, regional tourists**
Attractor: **Event space, lighting projection**
PS3

POWER STATION ENTRY - gateway to a regional recreation, residential and commercial district.
Audience: **Local residents, regional tourists**
Attractor: **Icon architecture**
PS4

POWER STATION FORESHORE 1 - a bold, active, tourism, boating and entertainment destination.
Audience: **Regional tourists, local residents, boating enthusiasts**
Attractor: **Marina, playground, food & bev**
PS2

POWER STATION FORESHORE 2 - a rugged & edgy waterfront experience anchored by recreation.
Audience: **Regional tourists, local residents**
Attractor: **Playground, water experience, food and bev**
PS2

POWER STATION OVERLAY LOCATIONS



PS1 Power Station Place Structure and Staging

Power Station is the leisure, entertainment and recreational destination of the Cockburn Coast. As a regional attraction, consideration of appropriate staging of development will be essential to ensuring its short and long term success as a tourism and recreation destination. It should take advantage of the iconic nature of the power station architecture and create summer and winter spaces for year round activation.

Please note, this section relating to staging is only suggestive and reflects early delivery of place character. A full delivery strategy for the project is still to be finalised.

PLACE MAKING RECOMMENDATIONS

- Power Station should be a place where anyone from Perth or beyond can feel comfortable visiting. The character needs to remain public and civic to avoid perceptions of privatisation.
- Open spaces should be used as a linking tool, not just as the paths themselves but a string of destinations along the paths
- Consider destinations e.g. bus stop and foreshore and how people will move between i.e what will they see, how will they cross roads, what retail will they pass?
- Some parking should be visible from Cockburn Road
- The entry road should be highly activated eg; articulated facades and active retail
- Ensure core public spaces particularly the foreshore, are activated by retail, food and beverage offer and public amenity to provides for all price points.
- Create activity zones based around play, food, performance/ entertainment and retail to ensure enough diverse activity for all day visitation.



STAGE ONE

As the key landmark on site it is important that early activation of the power station building occur; concurrently, early delivery of development of residential building sites will be required to support that activation.

1. Power Station Early Activation - As a coastal icon, the power station is an object of interest and curiosity. Providing a small public area with appropriate dining/ retail/ community facilities from early in the project will help build the psychological connection with this place as a new destination. Planting can screen the switch yard in the short to medium term.

2. Residential Development - The early delivery of housing sites to the south of the power station will support the funding of public realm works and can be achieved through an extension of minimal road infrastructure from Port Coogee.

N.B. These staging recommendations are based on Place Making objectives only and have not been tested against economic feasibility nor land ownership etc.



PS2 Power Station Foreshore - Option 1 with Marina



LOCATION

Intensity

Energy

Urbane

Entertaining

PLACE CHARACTER AND ROLE

A Power Station Foreshore with a Marina will feel intense, active and inviting. It balances the private and the public by providing clear invitation for visitor activity form kids to elders, big spenders to picnicers. The area embodies a unique industrial maritime aesthetic that is sophisticated but honest.

	Maritime industrial, public, bold, innovative, creative, contrasts
	Formal, european, urban with pockets of beach/ dunal landscape
	Industrial, weathered juxtaposed against sophisticated maritime - layered
	People watching, water play, programmed entertainment, boating, paddle boating, dining
$	Variety of price points, range of pleasure based retail, boating equipment, boat hire, boat repairs

MASTERPLAN DETAIL



PLACE MAKING RESPONSE TO MASTERPLAN

- Moving events platform expensive to program and not self sustaining
- Volume of car parking over water and on foreshore as dominant land use
- Groin structure to be seen as transition space not barrier
- Conflict between private housing and private marina pens with stated objective of precinct as regional tourism destination with associated large events etc
- Marina development may be seen by the community as another foreshore 'privatised' like that at Port Coogee

KEY PRINCIPLES

› Something for everyone

Consider how each potential user group will interact with the precinct and plan for activities or spaces that will respond to specific needs. A place could provide for a family with small children in the form of a playground or for someone who wants to read a book in the shade by the beach. Public spaces should also be programmed (informally or formally) to attract people at different times of the day.

› Places with purpose

Look for ways to differentiate precincts within the public realm to ensure they are activated with a purpose. Such as a food and beverage precinct, an active water recreation precinct, and children's play space. This will extend each visitor's stay as they explore different area to experience or take part in different activities.

PLACE MAKING REFERENCE IMAGES









IMAGE 01: Industrial infrastructure at Long Island City waterfront, NYC as backdrop for performance and public life.

IMAGE 02: St Kilda marina developing including lifesaving club, restaurants, boat repairs and sale, trailer and jetski storage is private without appearing overtly privatised.

IMAGE 03: Food and beverage offer with public seating by the waterfront at Sydney's fish markets.

IMAGE 04: Low skill watercraft for recreation/tourism boating in the safety of the Power Station foreshore marina.

AUDIENCE

Power Station Foreshore is a regional entertainment destination, visited by tourists and regional visitors, as well as on a day to day basis by local residents, boat owners and creatives. Priority should be given to satisfying the needs of these daily users. Key audience groups include:

Daily users

- Local residents
- Boat owners
- Employees
- Regional residents

Occasional users

- Local, national and international tourists

ATTRACTORS

Power Station provides a regional tourism destination and associated amenities serving locals and tourists alike. The following list represents the basic amenities and attractors required for self sustaining activity::

- Power Station mixed use offer on ground
- Water view dining and outdoor eating areas
- Choice of public space experiences
- Regional scale play ground
- Safe and clean swimming
- Marina access
- Paddle boats
- Safe waterplay/swimming area
- Performance stage and programmed events

PLACE MAKING RECOMMENDATIONS

SOCIAL

Power Station Foreshore should attract a full cross section of the regional community - from inland families looking for an inexpensive day out to Fremantle executives enjoying along lunch. As such it will need to provide safe places for young children and activities to engage youth; for active people access to water sports, boating and exercise tracks, for couples romantic dining and quiet picnic areas etc.

ECONOMIC

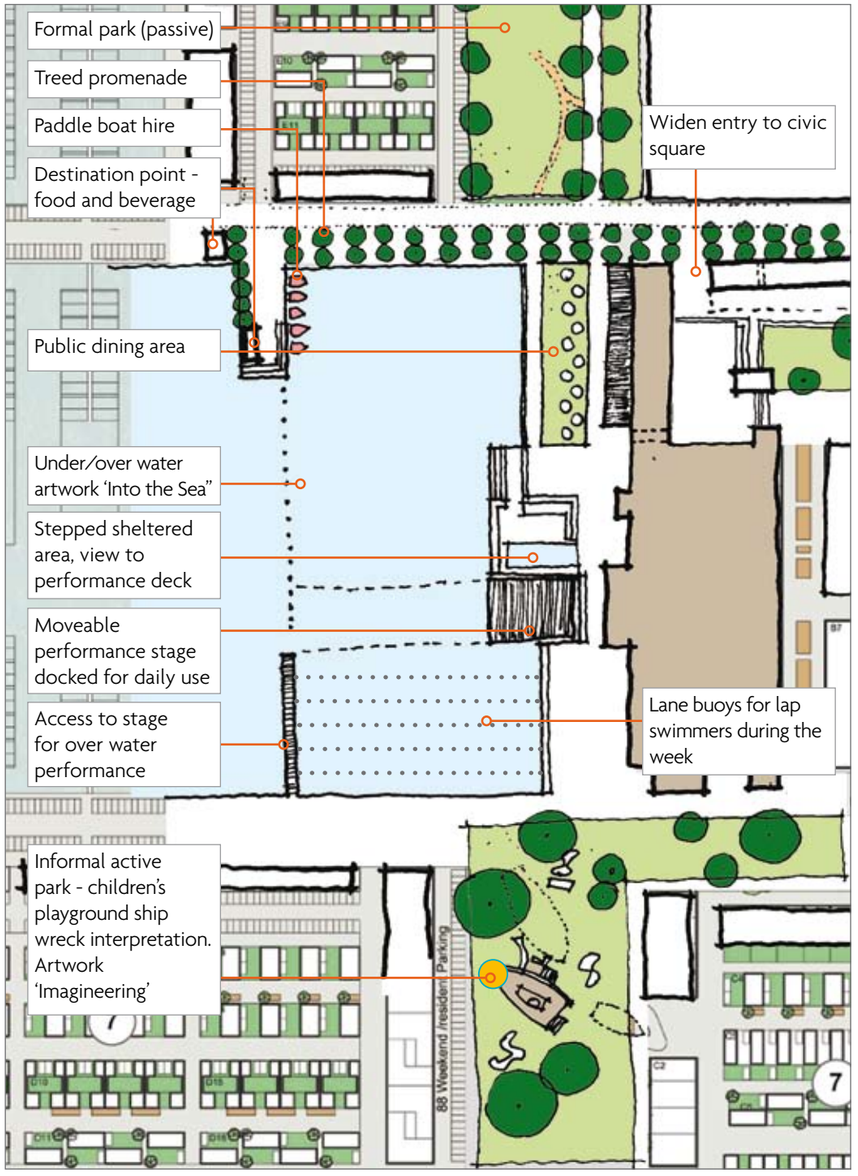
Accessibility is as much about price point as it is transport. The offer should vary from no cost (picnic and swim with the kids) to fine dining and is as important as the range of food styles and fitouts. Businesses that support activation of the public realm should be encouraged; learn to snorkel or sail school, bike hire, mobile vendors, swimming and surfing classes, outdoor cinemas - will all attract people to watch them. With the potential to become the 'Hillary's of the South' this very public marina is anchored by the iconic power station which is dominated by community uses.

ENVIRONMENTAL

The power station provides a dramatic backdrop to public life. The public space to the north should be articulated as a formal european park in contrast with the public open space to the informal active children's park to the south that reinterprets the hidden ship wrecks. Break down large amounts of public open space with level changes and surface treatments that can hold different scales of activity. The northern link into the marina should be formalised as a tree lined pedestrian link with a public destination that blocks the view into the car parking for the marina and yacht club.

CULTURAL

The physical dominance of the marina will establish the foreshore as a place for boating, fishing, corporate cruises and fine dining in the minds of most people. A balance of low status behaviours need to be encouraged; swimming, walking, playing. These should focus on low cost activities within the area to ensure long term sustainable activity on a day to day basis - not just for special occasions.



NOT TO SCALE

PUBLIC ART STRATEGY

An artwork installation between land and sea - Into the Sea

For all the power of its visible presence within the coastal landscape, the Power Station precinct also offers a wealth of invisible wonder submerged beneath the ocean. The desire to experience and explore the dramatic built form of the power station and its remnant surrounds, is matched by an equally enticing invitation to experience the sea - for water recreation, fishing and boating within Cockburn Sound. Central to the magnetism of this site is the dialogue between land and sea, built and natural forms and the experiential stories, past, present and future that this dialogue generates.

An artist designed interactive water-based playground - Imagineering

The sheltered foreshore areas around the power station provide opportunities for calm wading pools, as part of the Stations cooling ponds and groins, suitable for families with young children. There is opportunity to create a major children's play area within this environment which can act as a regional drawÐcard for broad visitation. An artistÐled design for such a playground will ensure a unique outcome and feature of distinction for the precinct.

HERITAGE CONSIDERATIONS

Power Station

Maintain the visual setting of, and interrelationship between, the significant contributory elements of the South Fremantle power station, including the open space and associated link between the main building and the Indian Ocean. Incorporate and/or interpret the cooling pond and groins in any future development.

Diana Shipwreck and the James Shipwreck Sites (Power Station Foreshore)

Retain in situ and do not disturb. Interpret the story of the wreck and the wreck event.

Indian Ocean

Interpret the mythological story regarding the separation of the islands from the mainland.

Heritage Trail Marker - Shipwrecks

After Perth was founded in 1829, many ships were wrecked along the coastline and around Fremantle. Islands, reefs and uncharted rocks, and poor navigational aids all played their part in the fate of many ships of the colonial period. There are two shipwrecks, the Diana and James, located in the beach area south of the power station, concealed beneath the sands. The Diana was shipwrecked on 16 July 1878 in a severe storm drove. The James was shipwrecked on 21 May 1830 after being blown ashore.

COMMUNITY DEVELOPMENT PLAN

Proposed community infrastructure:

- Safe swimming area
- Public waterfront dining area
- Performance space
- Public toilets
- Tourism information
- Bicycle hire
- Storage lockers
- Playground

PS2 Power Station Foreshore - Option 2 with Organic Edge



LOCATION

Intensity

Energy

Integrated

Fun & Raw

PLACE CHARACTER AND ROLE

An organic edge to the Power Station Foreshore will retain the current rugged and casual atmosphere. A waterfront experience anchored by play and recreation areas for all ages. The relaxed atmosphere contrasts with the boldness of the power station and formally programmed Civic Square.

	Human scale contrasted with large scale integrating industrial and innovative design
	Dunal and formal european in contrast
	Raw, edgy, rugged balanced with soft, tactile, comfortable
	Fishing, swimming, diving, playground, art works
	Active retail (trades out), creative boutiques, art studios, variety of food and beverage offer

MASTERPLAN DETAIL



PLACE MAKING RESPONSE TO MASTERPLAN

- Lack of useable open space on foreshore
- Linear public green spaces have the potential to feel privatised by surrounding residential - paths not places
- Void 'street' space to the north of Civic Square does not establish a clear entry to the power station and does not appear to have a purpose
- Lack of transition between Power Station Foreshore and dunal landscape

KEY PRINCIPLES

› Something for everyone

Consider how each potential user group will interact with the precinct and plan for activities or spaces that will respond to specific needs. A place could provide for a family with small children in the form of a playground or for someone who wants to read a book in the shade by the beach. Public spaces should also be programmed (informally or formally) to attract people at different times of the day.

› Places with purpose

Look for ways to differentiate precincts within the public realm to ensure they are activated with a purpose. Such as a food and beverage precinct, an active water recreation precinct, and children's play space. This will extend each visitor's stay as they explore different area to experience or take part in different activities.

PLACE MAKING REFERENCE IMAGES









IMAGE 01: Copenhagen Harbour swimming and diving platform at 'the deep end'.

IMAGE 02: Fisherman make use of a waterfront groin similar to that which could be provided at Power Station Foreshore.

IMAGE 03: Long Island Waterfront edge condition integrates soft and hard surfaces for an uneven edge condition reflective of its industrial character.

IMAGE 04: Children's playgrounds based on boats or ships could provide a tangible interpretation of the ship wrecks that could be actively used by the community.

AUDIENCE

Power Station Foreshore is a regional entertainment destination, visited by tourists and regional visitors, as well as on a day to day basis by local residents and creatives. Priority should be given to satisfying the needs of these daily users. Key audience groups include:

Daily users

- Local residents
- Employees
- Regional residents

Occasional users

- Local, national and international tourists

ATTRACTORS

Power Station provides a regional tourism destination and associated amenities serving locals and tourists alike. The following list represents the basic amenities and attractors required for self sustaining activity::

- Power station mixed use offer on ground
- Water view dining and outdoor eating areas
- Choice of public space experiences
- Regional scale play ground
- Diving platform
- Safe and clean swimming
- Safe waterplay/swimming area

PLACE MAKING RECOMMENDATIONS

SOCIAL

Power Station Foreshore should attract a full cross section of the regional community - from inland families looking for an inexpensive day out to Fremantle executives enjoying along lunch. As such it will need to provide safe places for young children and activities to engage youth; for active people access to water sports, boating and exercise tracks, for couples romantic dining and quiet picnic areas etc

ECONOMIC

Accessibility is as much about price point as it is transport. The offer should vary from no cost (picnic and swim with the kids) to fine dining and is as important as the range of food styles and fitouts. Businesses that support activation of the public realm should be encouraged; learn to snorkel or sail school, bike hire, mobile vendors, swimming and surfing classes, outdoor cinemas - will all attract people to watch them.

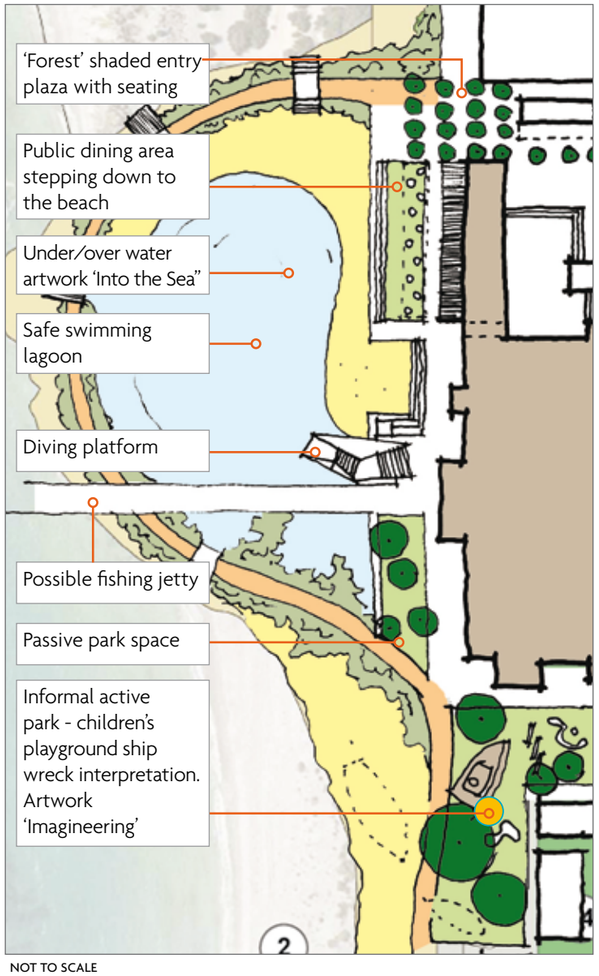
ENVIRONMENTAL

The organic edge option will need a different physical design response that is more intimate and smaller in scale while still balancing the dominance of the power station. Rough rocks need to be tempered with soft steps for sitting and sun baking, lawn areas for comfortable picnicing and modest built form to support smaller water based businesses. This approach is more about integration than strong contrasts (other than that already occurring)

CULTURAL

The foreshore will provide a new passive recreation space for local residents and safe swimming area for families. The new groin could become a potential departure point for active recreation for tourists such as sea kayaking or diving tours.

The organic edge option is more likely to support those low status behaviours such as walking, swimming and playing, that the current community is comfortable with.



NOT TO SCALE

PEDESTRIAN PATHWAYS · HERITAGE · ROADS · CAR PARKING · DUNAL VEGETATION · INDIGENOUS PLANTING · EUROPEAN PLANTING · FORMAL GREEN SPACE · ARTWORK

N.B. Power Station Options

At the time of this report Power Station options were in the process of further design development. The Option 2 with organic edge has since been reconsidered to reflect the form of the cooling ponds shown in the heritage images below.







PUBLIC ART STRATEGY

An artwork installation between land and sea - Into the Sea

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HERITAGE CONSIDERATIONS

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COMMUNITY DEVELOPMENT PLAN

Proposed community infrastructure:

- Safe swimming area
- Public waterfront dining area
- Performance space
- Public toilets
- Tourism information
- Bicycle hire
- Storage lockers
- Playground
- Beach equipment hire (umbrellas, seats, towels, sunscreen)

PS3 Power Station Civic Square



LOCATION

Intensity
Energy
Dynamic
Changing

PLACE CHARACTER AND ROLE

Civic Square is the dynamic and highly programmed heart of activity in the Power Station precinct. A highly diverse and urban experience, the Square is enjoyable full or empty, in summer or winter, on a week day or during a regional event.

	Bold, contrast, contemporary, diverse
	Formal european
	Edgy, urban, creative, comfortable
	Informal recreation, people watching, outdoor dining, markets,
	Mix of price points and offer suitable for locals, regional visitors and tourists; f&b, homewares, local produce, international brands

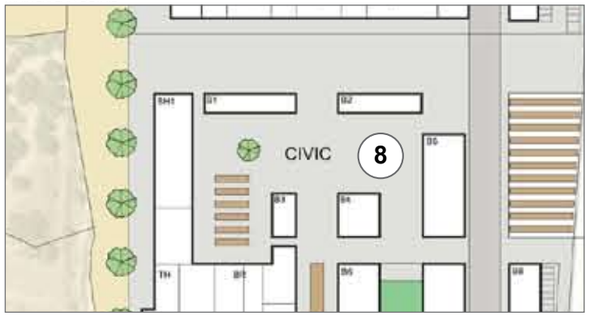
AUDIENCE

Power Station mainstreet corner is the invitation to a regional entertainment destination, visited by tourists and regional visitors, as well as on a day to day basis by local residents and creatives. Priority should be given to satisfying the needs of these daily users. Key audience groups include

Daily users
- Local residents
- Employees

Occasional users
- Regional residents
- Local, national and international tourists

MASTERPLAN DETAIL



KEY PRINCIPLES

› Active edges with quality retail, food and beverage

The success of Civic Square will be in the quality of its active edges. City Square in Melbourne struggled for activation for many years, much of its now established success was triggered by the right iconic retailer. Consider the entertainment and retail mix around civic square carefully to ensure maximum activation and attraction to visitors and locals, during the day and evening, week day and weekend.

› Something always happening

Civic Square is part of an entertainment destination and should be highly programmed as such. Irrespective of its scale, the space should have something happening, from a simple busker to full scale art installation events and performances.

ATTRACTORS

Power Station mainstreet corner provides a regional tourism destination and associated amenities serving locals and tourists alike. The following list represents the basic amenities and attractors required for self sustaining activity::

- Power station
- Sunny but wind protected destination
- Proximity to water
- Evening entertainment
- Markets and events
- Outdoor waterfront and Civic Square dining

PLACE MAKING RESPONSE TO MASTERPLAN

- Civic Square is separated from the public waterfront and primary paths from bus stops, car parks and foreshore
- Entries to Civic Square are tight
- Extensive ground floor to be activated
- Lacks connection to the foreshore
- Two sided retail to north difficult to manage/sustain - wants to face square but sun to north

Option 1 - with Marina

- Primary pedestrian path to marina is shared with vehicles
- Two large open spaces hard to activate

Option 2 - without Marina

- Three large open spaces (including path to north) hard to activate

PLACE MAKING REFERENCE IMAGES

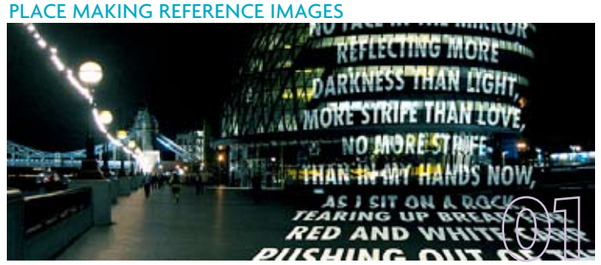








IMAGE 01: Projections onto buildings to activate at night providing a 24/7 experience.

IMAGE 02: Always something happening - no where does programming better than Federation Square, from small scale community events to large scale events such as the Opera Show.

IMAGE 03: The Guggenheim architectural folly and forecourt populated by large scale installation art work.

IMAGE 04: Southbank Melbourne arts precinct - outdoor dining integrated with permanent public art and active waterfront experience.

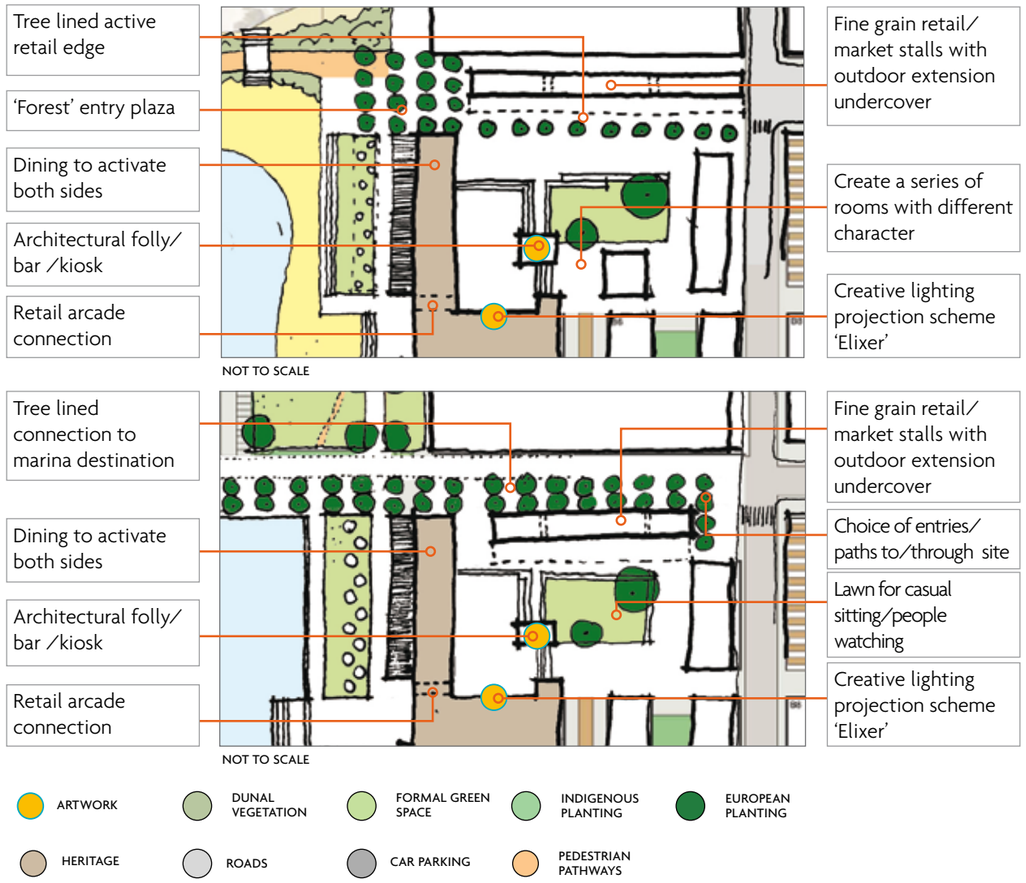
PLACE MAKING RECOMMENDATIONS

SOCIAL
Civic Square should become the meeting place for local, regional and international tourism at Power Station. Youth, students, arts communities and entrepreneurs will be attracted by the ongoing programming, creative edge and inspiration for new projects. Additionally, families having a day out with the kids will visit this space to pause and entertain the family without cost.

ECONOMIC
Civic Square should focus on entertainment and recreation supported by affordable dining trading into the square, and the opportunity for more fine dining options facing the waterfront views. Arcade connections between Civic Square and Waterfront should include tourism retail offer with a creative edge such as boutique/gallery homewares, jewellery, artwork that can be purchased as gifts by tourists or by locals wanting something uniquely Western Australian. This should be at minimum an 18/7 space with an active evening economy catalysed by bars, restaurants, family entertainment, plays and outdoor cinema.

ENVIRONMENTAL
Civic Square should be contemporary yet comfortable. The landscape should be skateable in some places for youth as well as comfort for seating/people watching. Shade and seating should be integrated into the urban fabric where possible. Use the spaces between buildings to create a series of rooms with different characters/experiences so that even when empty there are things to see. These rooms could be supported by temporary vendors that encourage the different experiences.

CULTURAL
The introduction to the power station, Civic Square provides an active and vibrant meeting place for visitors to get their bearings, enjoy installation art and do their souvenir shopping pre or post visiting the beach, dining out or attending other creative entertainment. It is a highly programmed space with opportunities for busking and street art. Street art builds on the existing culture within the power station of high quality graffiti art and edge creativity.



PUBLIC ART STRATEGY
A creative lighting/projection scheme for the power station - Elixir
The power station building is a landmark icon for Cockburn Coast. As a disused industrial shell it signifies a former industrial period and a working class heritage, while also powerfully testifying to the natural forces of coastal weathering and the social forces of change. While many may perceive the power station as a derelict and neglected site and potential symbol for social disaffection, the building has a stark beauty and inherent drama which excites the imagination, arouses curiosity and invites exploration. It is a site open to creative interpretation. The long term proposal to rehabilitate this Precinct for contemporary use and recreation, should aim to foster broad community support, involvement and interests, while also preserving aspects of the building's unique raw character, confronting address, and its interpretable and flexible form.

HERITAGE CONSIDERATIONS
Retain, conserve and adapt the South Fremantle power station for new uses, including the retention of
- The open thoroughfare on the eastern side of the building
- The open space of the entry forecourt between the northern side of the main building and the eastern side of the administration wing

COMMUNITY DEVELOPMENT PLAN
Proposed community infrastructure:
- Public toilets
- Seating
- Shade
- Tourism information
- Clear wayfinding
- Public art - permanent and installation based
- Performance space
- Bike hire

PS4 Power Station Entry



LOCATION

MASTERPLAN DETAIL



Intensity

Energy

Curiosity

Contrast

PLACE CHARACTER AND ROLE

A balance of the bold and the intimate, Power Station Entry talks to both drivers and pedestrians. A gateway to a regional recreation, residential and commercial district, the Power Station Entry is a bold landmark on Cockburn Coast Road as well as a welcoming and comfortable pedestrian access point.

	Gateway landmarks, sheltered walking paths and rest areas
	Shade trees, edge planting to rail track
	Urban, contemporary, tactile
	Bus stop and waiting areas, promenade to water
	Edge convenience retail and food offer

AUDIENCE

Power Station entry is the gateway to a regional entertainment precinct. Visited by tourists and regional visitors, as well as on a day to day basis by local residents and creatives. Priority should be given to satisfying the needs of these daily users. Key audience groups include

Daily users

- Local residents
- Employees
- Public transport users

Occasional users

- Regional residents
- Local, national and international tourists

KEY PRINCIPLES

A reason to stop

Create a pause point that alights curiosity to stop and explore the area. Visible landmarks need to highlight the entry point for drivers, bus users and pedestrians alike - at a scale suitable for each.

Invitation to explore

The area needs to be interesting in its own right with a variety of experiences, but also clearly connect to other choices and paths. Ease of connections and pedestrian paths with views to different looking places and activities will encourage movement deeper into the precinct.

ATTRACTORS

Power Station main street corner provides the gateway to a regional tourism destination and associated amenities serving locals and tourists alike. The following list represents the basic amenities and attractors required for self sustaining activity:

- Power Station
- Major bus stop
- Gateway building landmark architecture
- Convenience retail and food offer
- Safe rail crossing and waiting area

PLACE MAKING RESPONSE TO MASTERPLAN

- Lacks indication there is something to see or trigger to explore the Power Station Precinct
- North south link is stronger than the east west encouraging people to continue travelling
- Disconnection of bus users from path to Power Station
- Lack of open space for bus users

PLACE MAKING REFERENCE IMAGES









IMAGE 01: Iconic architecture by Frank Gehry creates a landmark.

IMAGE 02: Bus shelter as creative artwork.

IMAGE 03: Comfortable environments to sit on the street whilst waiting for friends or transport.

IMAGE 04: Bike hire for tourists and locals to set out and explore Power Station and the Cockburn Coast.

PLACE MAKING RECOMMENDATIONS

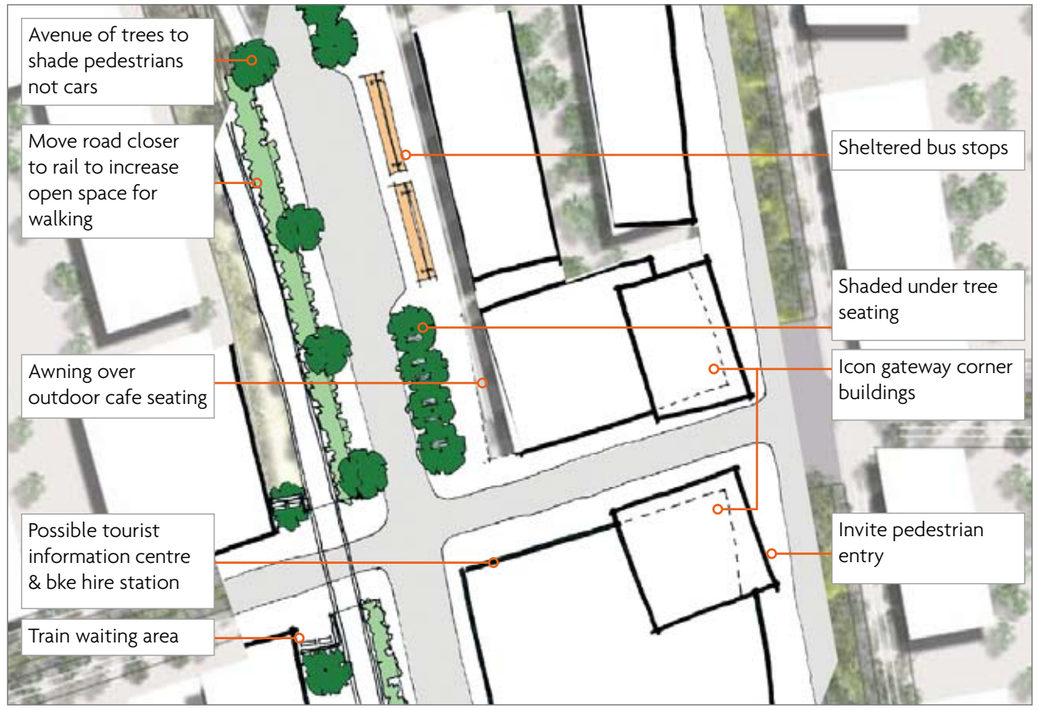
SOCIAL
As a regional destination and one of the few accessible by public transport, the area is likely to attract youth and older people. The bus stop and adjacent cafes with outdoor seating will become a natural meeting and waiting place.

ECONOMIC
The local economy of this area is likely to focus, at ground level, on convenience retail and lower costs food and beverage offer. 'Faster' food options such as milk bar/cafe with seating as well as juice bars or sandwich shops suit public transit users but also people visiting the foreshore or beach.

A tourist/community information booth could be located at this junction of private and public transportation.

ENVIRONMENTAL
This area needs to focus on multi-modal accessibility through clear and discrete paths but also the invitation afforded by landmark buildings on to Cockburn Road and welcoming pedestrian spaces on the RBT road.

CULTURAL
The whole area is a gateway and transition space leading into a key regional destination. It is the pause place to get your bearings, to rest a while, or meet with friends before moving on to the power station or home again.



NOT TO SCALE

DUNAL VEGETATION
FORMAL GREEN SPACE
INDIGENOUS PLANTING
EUROPEAN PLANTING
HERITAGE
PEDESTRIAN PATHWAYS
CAR PARKING
ROADS

PUBLIC ART STRATEGY
None planned for this site.

HERITAGE CONSIDERATIONS
No specific heritage considerations for this site.

COMMUNITY DEVELOPMENT PLAN
Proposed community infrastructure:
- Major RBT bus stop
- Outdoor dining
- Bicycle hire
- Waiting areas

C4 EMPLACEMENT

Emplacement is a place in the early stages of transition, an established industrial area, its future is residential. Located along the ridge line separating the coast from the bush, Emplacement will be the new high point, a manufactured horizon line that offers the opportunity for a new architectural topography, an integrated landscape of nature and built form.

Residents enjoy the expansive views but also the sense of containment and groundedness. Facades and balconies host vertical parklands that shade and veil occupants. Ground level public realm is internalised and focussed on the residential community's common interests.

EMPLACEMENT PLACE CHARACTER ELEMENTS

LANDSCAPE	DUALITY
Landscape and built form become one.	Contrast, high and low
A NEW TOPOGRAPHY	**INTEGRATED**
Utilise building forms to create a new topography that reinforces the natural.	Transition, exploration

EMPLACEMENT PLACE PRINCIPLES

PUBLIC ART	Think far and wide.
PUBLIC REALM	Pockets of public space that reflects local needs
BUILT FORM	Architecture as landscape.
ACTIVITY	Community cohesion through common interest.

TAKE CURRENT PLACE QUALITIES BEYOND

Take existing views to Cockburn Sound and Beeliar Reserve and maximise their impact in the public realm. These should be showcased as assets to place character. Contrast the high and low places by highlighting the scale of surrounding built form. Utilise public art to accentuate highpoints and frame view corridors.





FUTURE BUILT FORM

Built form should be designed to provide a living facade to the coast, a new topography that integrates landscape and built form. Facades should integrate greenery and planting wherever possible to create this new topography where landscape and built form become one. In addition this will provide privacy for residents and reduce wind to coast facing balconies.







ABOVE: The reference image above is indicative of the type of atmosphere that could be achieved in the Emplacement precinct through the integration of landscape, vegetation and natural materials that have the potential to create a new topography in built form enhances the existing landscape.

EMPLACEMENT PARK CHARACTER

A quiet and contemplative space for heritage trail followers, those interested in military history as well as a place for local residents to take time out. Emplacement Park should enhance its formal military use and contrast this with soft surfaces and comfort for quiet enjoyment of the natural environment and views to the coast.



COMMUNITY INFRASTRUCTURE

Emplacement should provide the amenity for passive recreation, reflection and quite enjoyment of the outdoors throughout small and varied public spaces. This includes comfortable surfaces to sit, seating, shelter from the sun, rain and wind. Individual public spaces should be designed in collaboration with future residents as these will be their dominant users.

Look outs and public art works will provide way finding landmarks for walkers and hikers into Beeliar Reserve.





THE EMPLACEMENT OVERLAYS

The following pages provide place making recommendations in the form of Overlays for specific sites across Emplacement. These sites have been selected as nodes of community and or public activity that are considered critical to the success of the project becoming a place that attracts self sustaining human activity. While not every place has been considered these Overlays can be used as a guide for the treatment of places across the precinct.

The following map locates the Emplacement precinct and overlay locations within. Each overlay has been allocated an acronym to ease with reading this report i.e. Emplacement Overlay 1 = HE1.

EMPLACEMENT LSP STRUCTURE- Maximising access to Beelier Park

Audience: **Local residents**
Attractor: **High points with views**

HE1

EMPLACEMENT PARK - formal traditional memorial for quite enjoyment and reflection.

Audience: **Local residents & heritage visitation**
Attractor: **Emplacement**

HE2

POWER STATION OVERLAY LOCATIONS



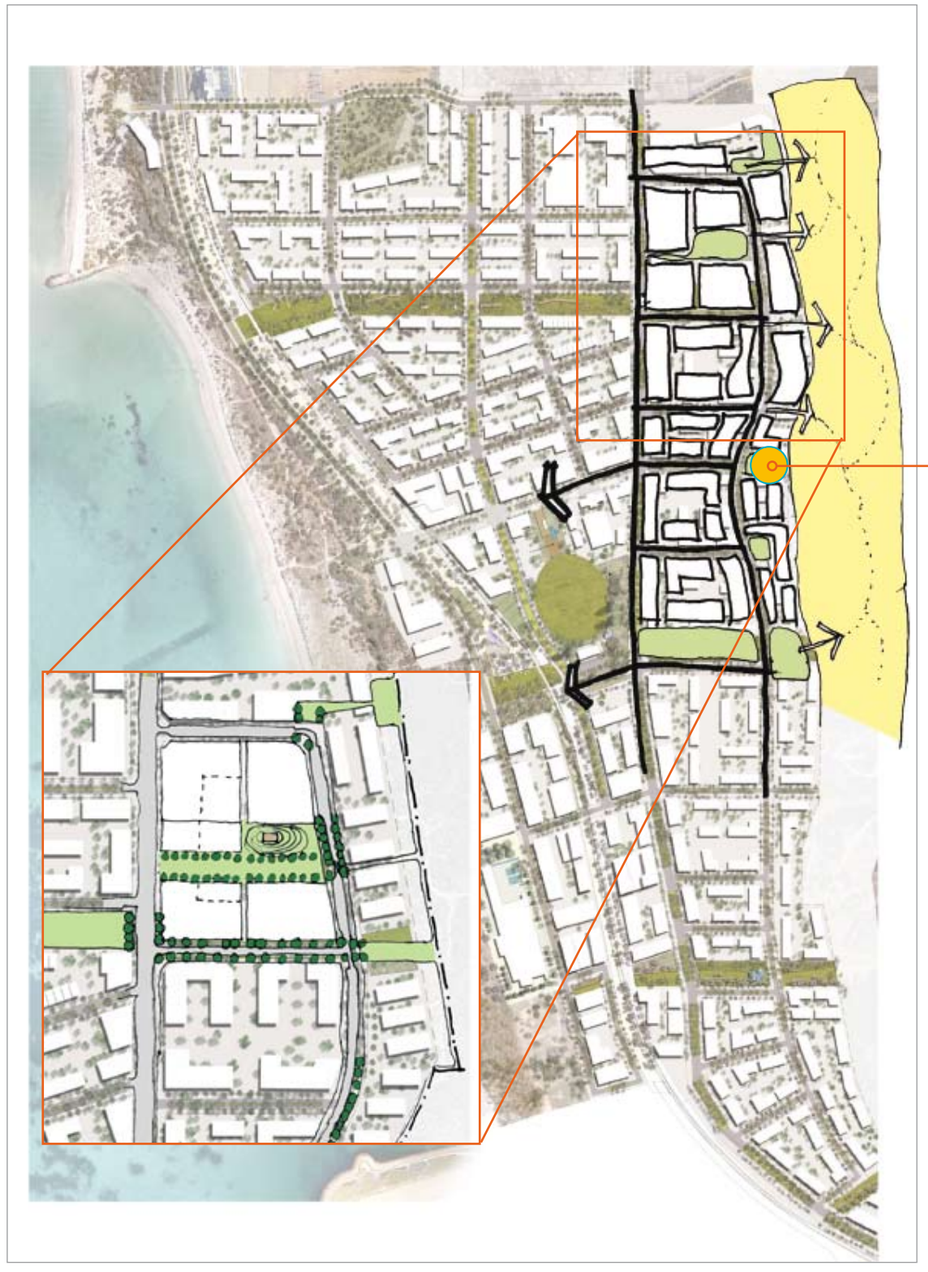
HE1 Emplacement Place Structure and Staging

Residential development at Emplacement will create a new topography upon the existing undulating landscape. High and low places should be emphasised by the contrasting scale of built form surrounding them. Links to Beelier Park add value to the residential offer. Pocket parks and integrated greenery with built form create a calming, natural feel throughout the precinct, despite the intensity of development.

Please note, this section relating to staging is only suggestive and reflects early delivery of place character. A full delivery strategy for the project is still to be finalised.

PLACE MAKING RECOMMENDATIONS

- Maximise links to Beelier Park to add value to residential development as the 'backyard' for Emplacement residents.
- The 'hilltop' nature of this site should be reinforced by maximising views wherever possible to both the coast and to Beelier Reserve and landscape behind the Cockburn Coast development site.
- The new topography at Emplacement should emphasis the existing undulating landscape to speak to the existing character of the place.
- Highly recommended that Robb Jetty Main Street continue across Cockburn Road as primary pedestrian and vehicular route between the precincts.



STAGE ONE

Emplacement currently houses a variety of heavy and light industrial buildings, many with no potential for redevelopment in the short/medium term. As such it is important to find pockets of developable land that are well linked to the area west of Cockburn Road.

The place making recommendations for early delivery of development at Emplacement would focus on creating an edge to the regional community facilities defined by the oval and primary school.

N.B. These staging recommendations are based on Place Making objectives only and have not been tested against economic feasibility, nor land ownership etc. In addition, there is a constraint posed by the 132kv switchyard power lines which traverse the southern area of Emplacement which will effect its staging.

HE2 Emplacement Park



LOCATION

Duality
Honest
Integrated
Landscape

PLACE CHARACTER AND ROLE

Emplacement Park is a traditional, formal memorial to Cockburn Coast's brush with war time defence. It is a quiet contemplative place, for reflection and appreciation of views to the islands of Cockburn Sound and other emplacement sites. A destination for heritage visitors and a pocket park for local residents.

	Enclosure to the north and south, retain views to the west.
	Formal planting - highlighting the direction of views
	Military and industrial materiality
	Lookout, heritage trail, reflection, quiet time
	Not applicable.

MASTERPLAN DETAIL



PLACE MAKING RESPONSE TO MASTERPLAN

- Challenge of integrating heritage and place making objectives with existing buildings and uses
- Isolated and disconnected from users
- No function or purpose, no heritage interpretation
- Lacks shelter
- Limits views from the park

KEY PRINCIPLES

Retain views to the islands and other emplacements

The value of Emplacement Park is its military heritage and views to the islands. These views should be retained, enhanced and showcased by future development of the Cockburn Coast.

Retain the passive, soft and quiet characteristics

Emplacement Park's existing characteristics as a soft, passive and quiet place should be retained and enhanced by the future development of the Cockburn Coast.

PLACE MAKING REFERENCE IMAGES









IMAGE 01: Shade structures that direct views (rather and obscuring them)

IMAGE 02: Paris open space directs users to face a particular direction by utilising a sloping ground plane.

IMAGE 03: Heritage plaques embedded in ground surfaces as part of the Heritage Trail as a marker, remembrance and potentially directional to key views or landmarks.

IMAGE 04: The Ballarat Avenue of Honour is an example for formal street planting that signifies a memorial to military events.

AUDIENCE

Emplacement Park is a traditional formal park for memorial visited occasionally by historical enthusiasts and on a day to day basis by local residents as a retreat from the urbane. Priority should be given to satisfying the needs of these daily users. Key audience groups for include:

Daily users
- Local residents
- Local employees

Occasional users
- Regional residents
- Historical tourists

ATTRACTORS

Emplacement Park provides a quiet space for reflection and memorial. The following list represents the basic amenities and attractors required for self sustaining activity:

- Heritage emplacement
- Views to islands and other emplacements
- Space to take time out/reflect
- Shaded seating

PLACE MAKING RECOMMENDATIONS

SOCIAL
Emplacement Park is a space for the passive reflection and quiet enjoyment of local residents. It is also a place for some visitation by heritage focussed tourists following heritage trails or with a specific interest in military heritage.

ECONOMIC
A commercial free space, Emplacement Park doesn't not have any economic drivers other than to add value to surrounding development as a public amenity for local residents.

ENVIRONMENTAL
Any built form or landscaping should improve connectivity to paths and open space and enhance views. Vegetation, seating and shelter should reflect the military aesthetic and be traditional and formal.

CULTURAL
Activity at Emplacement Park includes memorial, views to Cockburn Sound and islands, and the opportunity to participate in quiet reflection and appreciation of nature. Part of the art and historical trails, the journey to and through the space will be important to the cultural experience.



NOT TO SCALE

PUBLIC ART STRATEGY

A Gateway Icon - Divining
There is opportunity to locate an artwork of iconic significance at one of the high points of the ridgeline close to Emplacement Park. Such an artwork will act as a northern gateway and landmark for the precinct along Cockburn Road. It will also landmark the horizon, capturing views from the coastline, foreshore and Robb Jetty Precinct. There is further opportunity to incorporate wind-activation within this artwork, expressing the dynamic flow of natural energies and seasonal change. In this way the work will take on local significance, indicating the strength of the Fremantle Doctor or south-westerly wind which is strongest during afternoons of the summer months, achieving broad appeal and potentially becoming a part of everyday life.

Seeing The Sea - An Artwork Look-Out
Within Cockburn Coast, there are three main linear parklands which run east west, creating environmental and habitat corridors. These green spines lead up to the Emplacement Precinct, providing common open spaces for residential neighbourhoods. There is opportunity for artwork to be integrated within the central ridge park as part of a gathering space and viewing look-out. The artwork can explore integration with both built and natural form and materials, working to contain space and creating a sense of intimacy while also framing the expansive and dramatic views. The artwork will thus function as an attractor and as a reward for reaching the top of the ridge, exploring a creative dynamic between experiences of looking at and looking through.

HERITAGE CONSIDERATIONS

South Beach Battery (Remains)
Retain and conserve the remaining gun emplacement of the south beach battery
View lines from the south beach battery to the Indian ocean should be retained in future planning. Interpretation should include reference to:
(a) the two other gun emplacements that were constructed at the same time and in close vicinity
(b) the connection of the south beach battery to the defence network established along the coast during World War II
Consideration should be given to the partial reinstatement of earth embankments to allow for appreciation of its original function.

Heritage Trail Marker
The former gun emplacement was one of two batteries commissioned by the Commonwealth of Australia in 1940 to cover Fremantle Harbour and Cockburn Sound. Only the Battery at Leighton became operational and was used from 1947 – 1963. The Battery at South Beach was never finished and did not become operational.

COMMUNITY DEVELOPMENT PLAN

Proposed community infrastructure:
- Shelter
- Seating
- Heritage markers
- Access to views

i **Appendix L**
Community Development Plan





The Cockburn Coast Community Plan

FINAL DRAFT
December 2011

PLACE PARTNERS
Place Making Consultancy

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PLACE PARTNERS
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INTRODUCTION

The Cockburn Coast Community Plan provides the framework for the delivery of soft and hard community infrastructure for the future residents and visitors of the Cockburn Coast development. Its implementation will ensure people from a diverse range of cultures, income levels, ages, housing tenure, and ability have access to the community infrastructure, facilities, services and programs required to live fulfilling and enjoyable lives in their community.

The Cockburn Coast Community Plan (The Plan) relates directly to the Cockburn Coast Masterplan area and is linked to all other strategies and plans being developed to guide the implementation of the Cockburn Coast Masterplan. Together these strategies will guide the planning and delivery of the coastal development which, in the longer term, will become a thriving community of around 12,000 residents and people engaged in business, industry, service delivery, cultural, recreational and civic pursuits, within a built environment that is respectful of the historical and natural environment.

Importantly, The Plan has referenced current City of Cockburn plans and strategies as well as recognising those Western Australian State Government and Commonwealth of Australia plans, strategies and policies that are relevant to the development of the site.

DOCUMENT PURPOSE

PURPOSE

The City of Cockburn has requested the preparation of this community plan as a prerequisite for the design of Local Structure Plans at the Cockburn Coast site. In doing so, the purpose of The Plan is to provide a high level blueprint for the thirty year period of ongoing development at the Cockburn Coast. It includes identifying the contribution of infrastructure, community infrastructure, facilities, services and programs by relevant private and public sector stakeholders. The soft community infrastructure will be captured by Council's Development Contribution Plan 13 - Community Infrastructure (DCA 13) while smaller (hard infrastructure) items such as seating, showers and toilets, will be considered as Public Open Space (POS) enhancements under the proposed North Coogee DCP. These contributions will ensure the livability of the area and in turn support the growth of the community.

Perceptions of a location's livability are subjective. The decision taken by individuals, families and groups to live in a place is based on how well the location and the associated community meets the social needs of that person or persons. People will be drawn to an area initially for one or more of a range of factors; aesthetic, social, economic, environmental or cultural. As living circumstances change people will continue to live in an area while the majority of these social needs continue to be met.

The Plan aims to support the creation of a place that supports its community and all other aspects of life.

SCOPE

The Cockburn Coast is a new development within the existing City of Cockburn Local Government Area. The Plan will guide social aspects of the project from its historic agricultural to its current largely industrial usage into home, work place and recreation zones for around 12,000 people.

Landcorp, developers and the City of Cockburn will primarily share the responsibility of implementing the plan. However, developers will play an important role in the delivery of infrastructure as most infrastructure will be outside the scope of the City of Cockburn and Landcorp. The development of partnerships with all stakeholders including the State and Federal government and the private and non-government sectors, will be essential to achieving the long term outcome that is currently envisioned.

The Cockburn Coast Community Plan is limited by its preparation prior to the formation of a local community. The Scope of the Cockburn Coast Community Plan includes:

PART A: CONTEXT

- A community profile of current and projected demographics and population numbers
- A review of relevant historical and cultural contextual documents
- An assessment of existing community infrastructure, facilities, services and programs

PART B: STRATEGIC FRAMEWORK

- Overview of key areas of community capacity building
- Outline of hard and soft infrastructure requirements based on a gap analysis of existing facilities, services and programs
- Identification of lead and partner areas of responsibility

Not in the Scope of the Cockburn Coast Community Plan are the following:

- Information about the future demography of Cockburn Coast
- Specific details about proposed programs and services
- Information and costings for proposed infrastructure and facilities
- Final agreements about areas of responsibility
- Time lines for implementation

ENDORSEMENT

The Cockburn Coast Community Plan will be endorsed by:

- The City of Cockburn
- LandCorp

The Community Plan is intended as a living document to be reviewed and updated no less than annually for its lifetime to account for the changing nature of the community.

METHODOLOGY

This Community Plan for the Cockburn Coast was developed by the review and analysis of existing documentation and previous community engagement outcomes in consultation with the City of Cockburn. The research aim was to develop a community profile and gap analysis of existing and planned community facilities and services at the Cockburn Coast in context with the surrounding region.

PART A - CONTEXT

COMMUNITY PROFILE

The Community Profile was developed using the available quantitative data. That quantitative data included:

- Population data sourced directly from ABS sources and indirectly from City of Cockburn sources
- Information available in current City of Cockburn, WA State Government and Commonwealth of Australia planning and service delivery documents
- Previous community engagement outcomes

ENGAGEMENT WITH CITY OF COCKBURN

Place Partners met with the personnel from the CIty of Cockburn representing the following departments:

- Community Services
- Human Services
- Communications
- Cultural Development
- Community Development
- Strategic Planning

Two meetings were held. The first meeting focussed on establishing the policy context, all relevant documentation and testing a framework for the Cockburn Coast Community Plan with the City of Cockburn. The second meeting involved the presentation of draft strategic directions by Place Partners to gain feedback and input from the City of Cockburn for consideration in the finalisation of the Community Plan.

COMMUNITY FACILITIES REVIEW

An audit of community facilities located or planned for within the Cockburn Coast, within a 2-4km radius and regionally. These facilities were mapped on aerial images of the region. An assessment was made as to which services and facilities were provided within each of these catchments and therefore where there are gaps that could potentially be filled at the Cockburn Coast.

POLICY AND REGULATORY FRAMEWORK

All documents and policies relevant to the Community Plan were reviewed and the key recommendations tabulated against each community needs area to ensure both current facilities and planned infrastructure were considered by the Community Plan.

COMMUNITY NEEDS ASSESSMENT

An analysis of community needs was conducted by comparing the likely community profile with the existing and planned community facilities and services to be provided at the Cockburn Coast. This analysis formed the basis of the strategic directions in Part B.

PART B - STRATEGY

VISION AND OBJECTIVES

The vision for the Cockburn Coast Community Plan has been adopted from the Masterplan to ensure continuity across the project.

STRATEGIC DIRECTIONS

Each of the strategic directions builds on the community needs assessment in Part A to articulate the key challenges, opportunities and gaps in services and facilities for each. These provide the framework for future implementation of the Community Plan.

FURTHER CONSULTATION

The Community Plan is to be presented to the City of Cockburn for a 2 week review period, prior to finalisation for a public exhibition period.

REFERENCES

All documents sourced in preparation of the Cockburn Coast Community Plan are listed in the References.



PART A
Context









A.1 COCKBURN COAST OVERVIEW

The proposal to develop the Cockburn Coast area was tabled in 2005 by the Western Australian Government at a forum that aimed to seek the opinions of the community in designing a future vision for the area. This dialogue provided the foundation for the development of the Cockburn Coast District Structure Plan (DSP), setting out the vision for transforming the site into a mixed use urban community.



Above: Aerial of Cockburn Coast District Structure Plan (DSP) area. (Source: Hassell Cockburn Coast Masterplan).

The Cockburn Coast District Structure Plan was prepared by the Department of Planning, on behalf of the Western Australian Planning Commission.

Guided by a Steering Committee, comprised of State and local government representation, the plan was prepared with the input of the Cockburn Coast reference group, including landowners, local community members and stakeholders.

In May 2011 the Cockburn Coast Masterplan, a further iteration of the DSP, was delivered. The Masterplan is a comprehensive plan for the site and details how the vision will be delivered. A further three regulatory documents, Local Structure Plans, will be developed to provide more detail for three precincts within the Masterplan area.



Above: Cockburn Coast Masterplan area showing the 3 Local Structure Plan (LSP) Precincts, Power Station, Jobb Jetty and Hilltop/Emplacement. (Source: Hassell Cockburn Coast Masterplan).

THE SITE

The Cockburn Coast is a 330 hectare site located on the Indian Ocean approximately 18km south of Perth and 4km south of Fremantle. The majority of the site is within the City of Cockburn Local Government Area (LGA) but its northern end, including the Fremantle Village Caravan Park is located in the City of Fremantle. The City of Cockburn covers an area of 167.5 square kilometres, has a population of 74,472 (ABS 2006) that is expected to grow to 127,885 by 2031 (forecast.id 2009). The projected population at the Cockburn Coast is 10,000 to 12,000 residents.

The Cockburn Coast site falls within the boundaries of four different suburbs. The western half is in North Coogee, the eastern side is part of Hamilton Hill, the very northern part is located in South Fremantle and the south-eastern corner is in the suburb of Spearwood.

REGIONAL LOCAL GOVERNMENT AREAS SNAPSHOTS

An introduction to each of the five regional Local Government Areas (LGAs) adjacent to the Cockburn Coast is found below. This information provides a greater scope and context to the wider community of which the Cockburn Coast site is part.

CITY OF COCKBURN

The City of Cockburn LGA covers over 165 square kilometres on the Indian Ocean, 22km south of Perth CBD and 8km south of Fremantle. Cockburn has a chain of five lakes that run north to south through the centre of the LGA. City of Cockburn currently has a population of approximately 75,000 and this is expected to be more than 100,000 by 2016. Cockburn currently has about 27,000 dwellings and over 2,000 businesses. The agricultural and ship building industries are currently the largest employers. Given that Cockburn Coast is located within the City of Cockburn it is anticipated that the City of Cockburn will meet many of the needs of the residents of the new development at Cockburn Coast. Many of the closest schools and health centres are located within Cockburn LGA as well as childcare centres and recreational facilities.

CITY OF FREMANTLE

The City of Fremantle LGA adjoins the northern boundary of the City of Cockburn LGA and the Cockburn Coast site. The LGA covers an area of 19 square kilometres with the Indian Ocean at its west and the Swan River at its north. Fremantle has an approximate population of 28,000 and a total of 12,616 dwellings. The LGA contains Western Australia's major commercial port. It is also home to a 450-bed hospital, which accounts for the largest employment industry in Fremantle, which is health care and social assistance (17.5%). Fremantle has an unique character and is a popular tourist precinct for its architecture, music, art, retail, and cultural events.

CITY OF MELVILLE

Melville LGA covers an area of 53 square kilometres and adjoins the City of Cockburn to the south, and the Fremantle LGA to the west. The City of Melville LGA has an approximate population of 97,800 and a total of 39,260 dwellings. The city is anticipated to grow to 107,650 by 2016. The city has a total of 773 commercial properties, the regional commercial shopping centre in Garden City, 6 supporting district commercial centres and 29 local shopping centres.

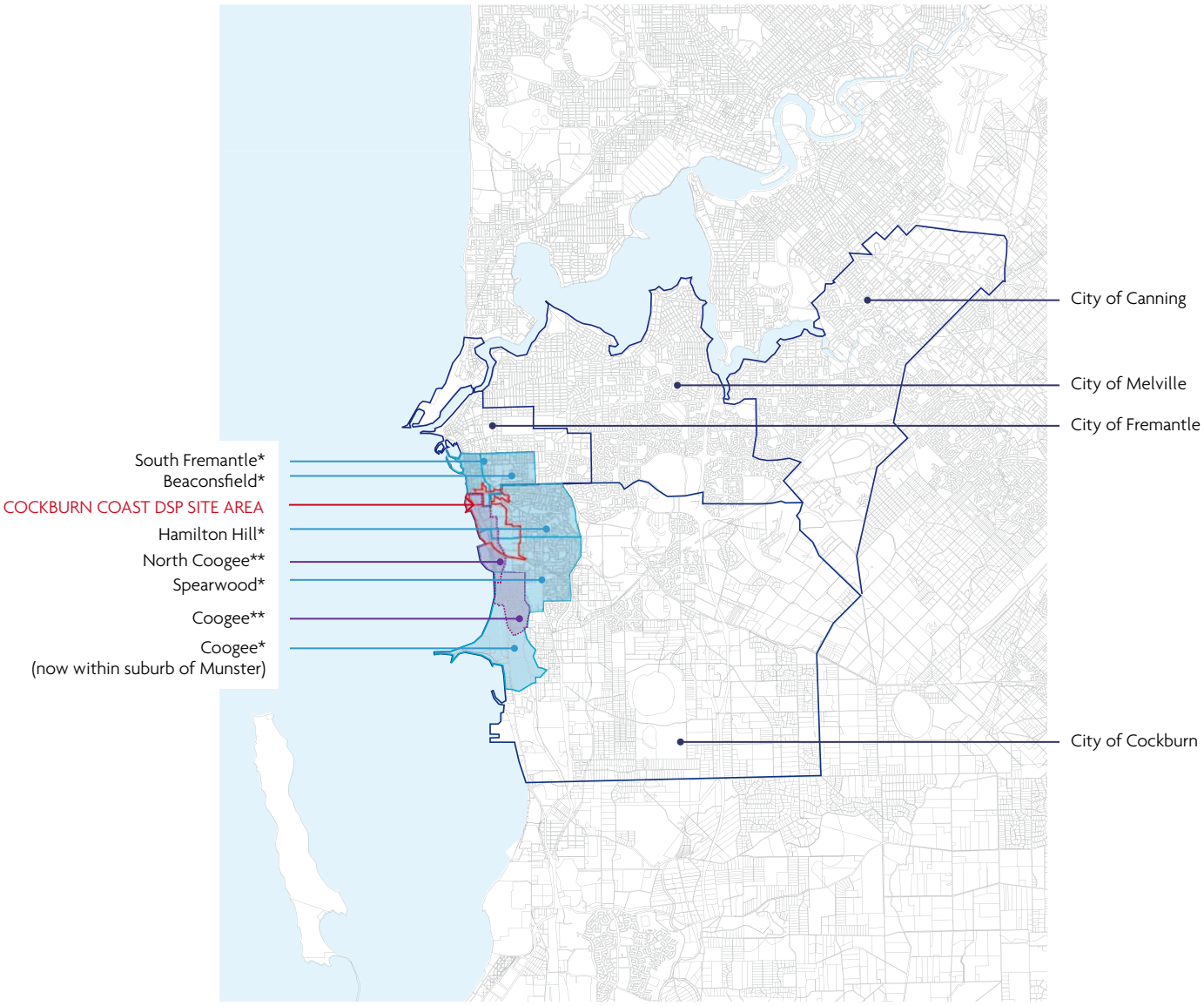
Melville has a total of 210 parks and reserves which collectively cover 900 hectares. It also contains 20 playing fields, 2 golf courses, 2 recreation centres, 13 youth centres, 32 community halls and 6 libraries. There are 9 maternal and child health centres, 5 aged persons' recreation facilities, 28 aged persons' housing facilities, a TAFE campus, Murdoch University, 23 preschools, 25 primary schools and 11 secondary schools within the LGA.

CITY OF CANNING

The City of Canning adjoins the northeast boundary of City of Cockburn and covers a total area of 65 square kilometres. The City of Canning LGA has an estimated population of 87,800 and a total of 27,390 dwellings. Canning is approximately 12km inland. Its northern border is defined by the Canning River with flows into the Swan River. The City of Canning contains 23 primary schools, 5 secondary schools, 1 private school, and 1 special school. The LGA also contains 1 hospital and 3 nursing homes. Recreational facilities in Canning include the Canning River Regional Park, extensive cycle and walk ways, the historic Woodloes Homestead and the Castledare Miniature Railway.

TOWN OF KWINANA

The Town of Kwinana adjoins the southern boundary of City of Cockburn and covers an area of 120 square kilometres. Kwinana has an approximate population of 25,000 but this is expected to double by 2020. In order to meet this demand the local government will release 1,000 new residential lots each year. The majority of this development will take place within the Eastern Residential Intensification Concept that is located from Anketell to Wellard. The existing Kwinana Industrial Area currently employs 4,800 people directly. Kwinana is also home to the Latitude 32 project, which will be a centre of 10,000 new jobs. The anticipated growth of Kwinana through a number of keynote projects will bring new educational opportunities, improved transportation and new community services.



* Suburban area 2006 ABS
** Current suburban areas as per City of Cockburn definition of suburban boundaries

A.2 COMMUNITY PROFILE

A Community Profile has been developed to inform the Cockburn Coast Community Plan. This profile is limited by the fact that the Cockburn Coast District Structure Plan area is home to little residential population (and no existing residents within the Masterplan area) and has a restricted capacity as a source of information specific to the area. This community profile has been developed using current ABS data (2006) for City of Cockburn, related suburbs and for the wider Perth region. The available information was used to gain an understanding of the demographic groups that are likely to be attracted to live in the Cockburn Coast thus providing some likely projections rather than hard statistics.

The Community Profile information has been organised under the six topics that have been identified to provide the broadest and most succinct coverage of human requirements to live. The topics cover basic needs such as food, shelter and care through to the higher order and creative needs like culture, leisure and recreation.







COCKBURN COAST POPULATION SNAPSHOT

The following table provides a summary of some basic demographic and social statistics for the City of Cockburn in comparison to the neighbouring suburbs, including the City of Fremantle, and Metropolitan Perth as a whole. A comparison of the statistics shows the City of Cockburn has a comparatively low median age, low unemployment rate and high average household size. The

City of Cockburn also has a relatively high rate of dwelling ownership compared to the Fremantle local government area and greater Perth.

Cockburn Coast DSP 2009, Estimated Household Mix

Estimated household	Cockburn coast mix	Cities of Fremantle and Cockburn 2021
Couple with children	14-15%	33%
Couple without children	30%	23%
One parent family	10-11%	10%
Other family	2%	2%
Group households	5%	4%
Lone person households	38%- 40%	28%

	Fremantle LGA	South Fremantle	Hamilton Hill	Spearwood	Coogee	Cockburn LGA	Perth
Total population	24,835	2,794	9,257	8,940	4,310	74,472	1,445,078
Median age	41	41	39	39	39	34	36
Unemployment	4.5%	4.6%	4.9%	4.1%	2.4%	3.3%	3.6%
Income (median individual per week)	$489	$537	$378	$411	$541	$501	$513
Total labour force	12,499	1,520	4,162	4,345	2,232	37,852	730,634
Managers and Professionals	44%	49.9%	23.3%	18.6%	28.3%	24.6%	31.8%
Born overseas	29.6%	33.6%	31.9%	33.0%	34.7%	28.8%	31.3%
Language other than English spoken at home	22.6%	16.6%	29.1%	33.6%	22.9%	22%	20.1%
Technical and tertiary education attendants	7.6%	7.6%	5.3%	4.2%	5.2%	5.3%	6.8%
Average household size	2.2	2.2	2.2	2.5	2.8	2.7	2.5
Dwellings owned/being purchased	56.7%	62.2%	58.0%	68.1%	80.9%	71.5%	67.2%
Rented	33.2%	31.7%	34.8%	23.4%	12.4%	21.3%	24.7%
Persons who volunteer	17.2%	18.3%	11.7%	9.8%	12.9%	12.2%	15.1%

Source: Cockburn Coast Place Making Strategy 2011

FUTURE COCKBURN COAST RESIDENTS

It is difficult to predict with any accuracy who will live and work in the area. The project intentions for diversity in the demography and current migration trends may influence a potential community make up. Potential demographic groups within the future population:

- Empty nesters
- Renters
- SINKS and DINKS
- Professionals and managers
- Skilled migrants

The DSP projects that the Cockburn Coast's future population is to be more similar to that of Cottesloe and Mosman Park than the LGA. The demographics of these town centres indicate the future demographic of the Cockburn Coast is likely to be:

- Wealthier
- Older
- With fewer children
- In professional service jobs or other higher income employment sectors

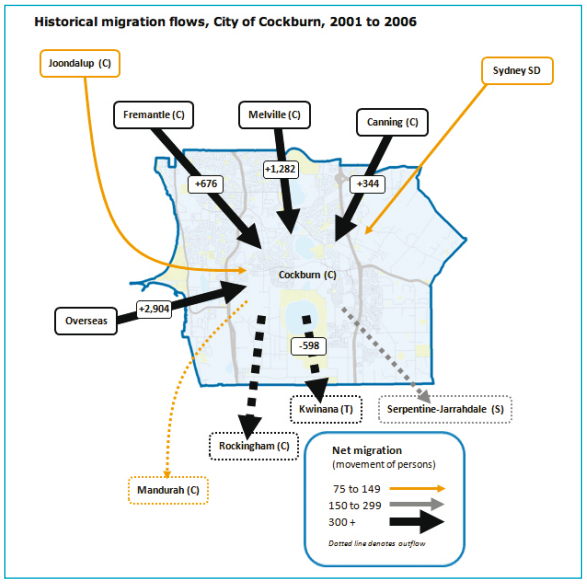
MIGRATION

The area around Cockburn Coast is currently experiencing rapid growth and this has brought some social change to the area. Understanding migration patterns is important for anticipating the most likely community demographics that will populate the Cockburn Coast.

The City of Cockburn had a population of 78,477 at the time of the 2006 Census and forecasts project an increase in population to 104,939 by 2016 and to 127,885 by 2031. This represents an average population change of 2% every year over the 25 year period. The suburbs of Coogee and North Coogee (as defined by Council) will host a great deal of this anticipated growth with an average rate of growth of 4.7% per annum between 2006 and 2031, growing from 4,294 to 9,244. The speed at which this region will transform itself from a place of industry to primarily residential will provide challenges for the development of authentic place character. A flexible approach will be a required with regard to community development as the community evolves and changes.

During the period 2001-2006 the majority of Cockburn's population growth was a product of international migration which represented 2,904 new residents. The other most significant places of origin were the City of Melville (1,282) and the City of Fremantle (676). Over the same 5 year period 598 Cockburn residents relocated south to Kwinana. In 2001 there were a total of 359 international immigrants to the City of Cockburn, this grew to 558 in 2003, peaked at 664 in 2005 and in 2006 there were a total of 553 arrivals. In recent years the majority of international migrants have come from the Philippines, the United Kingdom and China. Migration from the United Kingdom has been common for many years but until 2005 there were very few immigrants from China and The Philippines.

Internal migration is just a little higher than the national average for those who lived at a different address 1 year ago (16.3% to 15.5%) and those who lived at a different address 5 years ago (41.7% to 40.3%). The diagram above (right) illustrates these migration patterns.



Source: City of Cockburn





EDUCATION & EMPLOYMENT (UNPAID WORK)

Availability of education facilities and employment opportunities will be fundamental to the economic sustainability of the Cockburn Coast. It is also important to understand the numbers of people who are involved in unpaid caring roles. The plan to attract new demographic groups to the Cockburn Coast will change the education and employment profile of the area.

EDUCATION

The education levels of people currently living in City of Cockburn are lower than those for both Perth and the whole of Australia. Only 11% of people in Cockburn held Bachelor or higher degrees in 2006, while the figure for Perth was 16.4% and for Australia as a whole it was 15.6%. For diploma or advanced diploma the percentage for City of Cockburn was 7.2% compared to 8.0% for Perth but 7.1% for Australia.

City of Cockburn had higher levels of vocational qualifications (trade), 19.8% to Perth 16.8% and Australia 16.7%. Those holding no qualifications in City of Cockburn were 49.4% as opposed to 45.5% for Perth and 47.5% for Australia.

Since 2011, changes in the training and education undertaken by those in the LGA were 5% more people choosing to study management and commerce, and 5% less in the engineering and technology sector. Food hospitality and personal services held steady at 8% and there was a decrease in employment in this sector in the LGA. This may indicate a potential gap in industry training and education for new hospitality and tourism sectors introduced to the Cockburn Coast.

Post School Education in City of Cockburn (2006)

	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85 years+	Total
Postgraduate degree	9	188	230	217	108	24	8	5	789
Graduate diploma and graduate degree	31	152	185	143	59	15	3	3	591
Bachelor degree	491	1861	1289	851	373	127	49	11	5052
Advanced diploma and diploma	408	946	1126	944	479	157	65	19	4166
Certificate	1542	2815	2803	2265	1340	660	253	45	11723
Level of education not stated	82	177	226	186	144	59	33	9	916
Total	1103	957	1150	1044	756	757	584	209	6560
Total	3666	7096	7009	5650	3259	1821	995	301	29797

Highest Level of Qualification Achieved by Total Population Aged 15 Years+

	2006			2001		
	Cockburn	Metro Perth	Australia	Cockburn	Metro Perth	Australia
Bachelor or higher degree	11.0%	16.4%	15.6%	8.2%	13.7%	12.99%
Advanced diploma or diploma	7.2%	8.0%	7.1%	5.6%	6.9%	6.0%
Vocational	19.8%	16.8%	16.7%	19.3%	16.4%	15.8%
No qualifications	49.4%	45.5%	47.5%	57.3%	52.3%	53.8%

Source: ABS 2006 Census

EMPLOYMENT

In 2006 the three biggest employment areas for City of Cockburn were manufacturing 27.5%, construction 14.0% and retail 8.9%.

This compared to the Perth Metro area with retail trade 11.5%; health care and social assistance 10.6% and construction 9.9%.

Field of Occupation

Jobs	Cockburn (2010)	Metro Perth (2010)	Cockburn (2006)	Metro Perth (2006)
Agriculture, forestry and fishing	1.7%	1.1%	1.6%	1.1%
Mining	2.8%	3.4%	1.6%	2.4%
Manufacturing	23.1%	9.5%	27.5%	9.4%
Electricity, gas, water and waste services	4.7%	1.6%	3.4%	1.1%
Construction	13.3%	9.5%	14.0%	9.9%
Wholesale trade	5.3%	4.4%	5.3%	4.3%
Retail trade	9.5%	11.1%	8.9%	11.5%
Accommodation and food services	4.1%	5.8%	3.7%	5.8%
Transport, postal and warehousing	6.2%	5.2%	6.0%	4.5%
Information media and telecommunications	0.3%	1.4%	0.3%	1.9%
Financial and insurance services	0.6%	3.3%	0.6%	3.3%
Rental, hiring and real estate services	1.0%	1.8%	1.3%	2.1%
Professional, scientific and technical services	4.1%	7.7%	4.1%	8.5%
Administration and support services	4.4%	3.3%	3.4%	3.7%
Public administration and safety	2.9%	6.8%	3.1%	6.6%
Education and training	6.9%	7.8%	6.1%	7.5%
Health care and social assistance	5.0%	10.5%	4.1%	10.6%
Arts and recreation services	1.0%	1.6%	1.2%	1.6%
Other services	3.0%	4.0%	3.7%	4.4%

UNPAID CARING

The proportion of people involved in caring for others is comparable to the wider Australian community.

24.2% of people care for their own children without pay in City of Cockburn, slightly higher then 21.5% for Perth and 21.3% for Australia. 10.0% of people in City of Cockburn are providing care to family members.

Unpaid Work Undertaken (2006)

	City of Cockburn	Metropolitan Perth	Australia
Persons caring for own children without pay	24.2%	21.5%	21.3%
Persons caring for other children without pay	7.7%	7.8%	7.7%
Persons caring for own children or other children without pay	1.2%	1.2%	1.1%
Persons providing unpaid care, help or assistance to family members or others	10.0%	10.1%	11.2%

Source: ABS 2006 Census

HEALTH & ABILITY

An understanding of the health and ability of the people who are likely to settle in the Cockburn Coast will ensure provision of a living environment that sustains wellbeing. While the plan to attract different groups of people to settle in the area will have some impact on the health and ability profile of the area, there is an expectation that the general statistics are applicable.

HEALTH

The median age of the City of Cockburn at 34 is somewhat younger than that of Perth at 36 and the whole of Australia at 37. People in City of Cockburn have more children at a median of 2.0 while for Perth it is 1.9 and for the whole of Australia it is 1.9. While there is no localized City of Cockburn data on health issues, there would be some expectation that City of Cockburn would be approximately reflective of that for Western Australia as a whole which shows the top three health issues are arthritis at 14.2%, slightly lower than the figure for the whole of Australia of 15.2%; asthma at 9.7%, also slightly lower than the whole of Australia figure of 9.9% and back pain/problems higher for Western Australia at 16.1%, compared to 13.8% for Australia.

ABILITY

There is no localised data for those caring for a person with a disability, but the Western Australian figure for people with disabilities or health issues is 33.5% of the total population. As such it can be expected Cockburn Coast would reflect this statistic.



Selected Long-Term Conditions

Selected long-term conditions (2007-08)	Western Australia	Australia
Arthritis	14.2%	15.2%
Asthma	9.7%	9.9%
Back pain/problems	16.1%	13.8%
Deafness	9.8%	10.2%
Diabetes mellitus	3.5%	4.0%
Hayfever and allergic rhinitis	19.8%	15.1%
Heart, stroke and vascular disease	4.4%	5.2%
Hypertensive disease	7.6%	9.4%
Long sightedness	26.4%	25.6%
Malignant neoplasms (cancer)	1.7%	1.6%
Mental and behavioural problems	11.5%	11.2%
Osteoporosis	2.7%	3.4%
Short sightedness	22.7%	22.7%

Source: ABS Community profiles

Fertility and Death Rates

	City of Cockburn	Metro Perth	Australia
Median age (2006)	34	36	37
Total fertility rate (2008)	2.0	1.9	1.9
Standardised death rate (2008)	6.0	5.7	6.0

Source: ABS Community Profiles

Disability Status

Disability Status 2007-08	Western Australia	Australia
Has a profound or severe core activity limitation	4.9%	4.6%
Other disability or restrictive long term health condition	28.6%	31.5%
Has no disability or long term health condition	66.4%	64.0%

Source: ABS Census 2006

HOUSING

Cockburn Coast is a medium density residential development that will introduce a different form of housing to the City of Cockburn than is currently available. This is likely to attract the settlement of different people than those currently settling in City of Cockburn.

The majority of dwellings in Cockburn are detached houses (87.7%) that are fully owned (28.0%) or being purchased (43.5%). Cockburn has a higher proportion of detached houses than Metropolitan Perth where 78.1% of dwellings are detached houses, and Australia where 74.8% are detached dwellings. In Metropolitan Perth a higher proportion of homes are fully owned (29.6%) than Cockburn (28%). However, more homes are being purchased in Cockburn (43.5%) than Perth (37.6%) which may result in a more even level or higher proportion of comparative home ownership in the future.

Cockburn 72.7% of households are family households compared to 67.2% in Perth and 67.4% across Australia. It has a lower number of lone households at 19.8% than either Perth (23.6%) or Australia (22.9%). It also has a lower number of group households (2.8%) than Perth (3.6%) or Australia (3.7%).

Private Dwelling Types, Tenure Types and Household Compositions (2006)

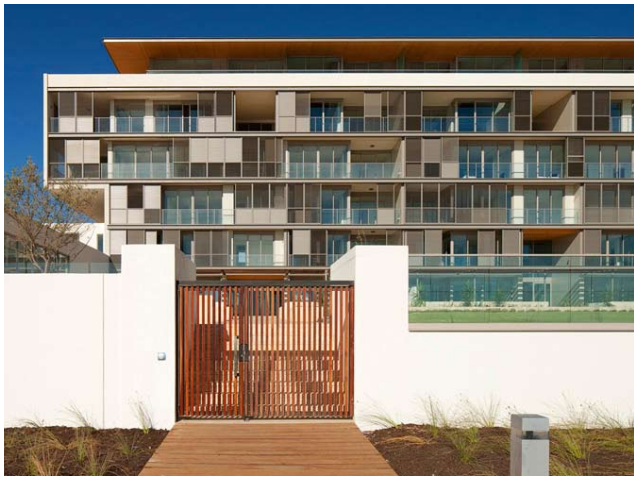
Dwelling type	Cockburn	Metro Perth	Australia
Detached house	87.7%	78.1%	74.8%
Semi-detached, row, terrace or townhouse	7.6%	11.9%	9.2%
Flat, unit or apartment	3.6%	9.4%	14.2%
Other dwellings	1.1%	0.6%	1.7%

Occupied private dwelling tenure	Cockburn	Metro Perth	Australia
Fully owned	28.0%	29.6%	32.6%
Being purchased	43.5%	37.6%	32.2%
Rented	21.3%	24.7%	27.2%
Other tenure type	0.6%	0.9%	0.9%

Household compositions	Cockburn	Metro Perth	Australia
Family household	72.7%	67.2%	67.4%
Lone household	19.8%	23.6%	22.9%
Group household	2.8%	3.6%	3.7%
Median household size	2.7	2.5	2.6

Source: ABS Census 2006





ACCESS (TRANSPORTATION AND AFFORDABILITY)

Access is not simply about transportation. Access can be limited by price point or by the identity of a place and its ability to make you feel 'welcome' despite your economic status. Cockburn Coast needs to provide a high quality transportation network, as well as an invitation to a broad range of user groups and new residents to avoid an 'us vs them' scenario.

TRANSPORTATION

The higher density living that is planned for the Cockburn Coast will require the provision of different forms of transport than is currently available in the City of Cockburn. There will be a need for improved pedestrian and bicycle networks as well as and public transport provision. A culture change from private vehicle dependency to other modes will be key.

The figures for method for travelling to work show in the City of Cockburn 66.15% drive a car, and a further 6.37% travel as a passenger in a car compared to 62.33% of people in Perth driving with 5.87% being passengers and 59.36% across Australia driving with 5.86% as passengers. Those who take the bus in City of Cockburn number 4.30% compared to 3.90% for Perth and 2.75% for Australia, while 2.65% walk from home in City of Cockburn compared to 3.53% for Perth and 4.68% for Australia.

AFFORDABILITY

The housing market of the City of Cockburn has for a long time provided affordable opportunities for home ownership for families and prospective families from southern Perth. There has been a recent swing of some development towards a market of second and third home buyers, 'empty nesters' and retirees, particularly along the coast. Greenfield sites in the City of Cockburn are expected to be exhausted over the next twenty years which is likely to change population trends and push new development down the coast to Kwinana. Given the coastal location of the Cockburn Coast project, prices are likely to be at the higher end of the market with a demographic mix similar to that of Cottesloe or Mosman Park. This provides a challenge in planning for a diverse of population and provision of access to those of lower socio-economic status.

Method of Travelling to Work (2006)

Travel method	Cockburn	Metro Perth	Australia
Train	0.19%	1.99%	3.35%
Bus	4.30%	3.90%	2.75%
Ferry	0.04%	0.03%	0.11%
Tram/light rail	None	0.01%	0.39%
Taxi	0.13%	0.19%	0.24%
Car, as driver	66.15%	62.33%	59.36%
Car, as passenger	6.37%	5.87%	5.86%
Truck	1.14%	1.07%	0.13%
Motorbike/scooter	0.52%	0.54%	0.67%
Bicycle	0.60%	0.96%	0.99%
Walk	1.46%	2.21%	4.03%
Work from home	2.65%	3.53%	4.68%

Source: ABS 2006 Census

Housing out of reach for many in Perth

Aleisha Orr
September 19, 2011

It takes more than seven times the average annual income to buy a home in Perth, community interest group Australians for Affordable Housing revealed.

AAH spokeswoman Sarah Toohey said a big proportion of the community were unable to buy property and the group wants governments to take action to make housing more affordable.

She said it took 7.1 times the average annual income to buy a home in Perth, which was about average compared to other capital cities, with Hobart being about six times and Sydney about eight times.

But Ms Toohey said taking into account Perth's higher average annual income meant it was costing more for people here to buy property.

Source: smh.domain.com.au

CULTURE (ETHNICITY, LEISURE, RECREATION)

Cockburn Coast aims to encourage a diverse community built upon the leisure and recreation activities associated with the natural coastal environment. However, the new higher density development and a more concentrated population will offer opportunity for the provision of new community facilities as well as improvements to current forms of leisure and recreation.

ETHNICITY

The Cockburn Coast development intends to attract a diverse community. Currently the City of Cockburn has a majority of residents born in Australian (64.4%) compared to Perth (61.5%) and Australia (70.9%). The biggest groups born overseas are those from England (7.4%) compared to 9.9% for Perth and 4.3% for Australia; Italy (2.3%) compared to 1.3% for Perth and 1.0% for Australia; and New Zealand (2.0%) compared to 2.4% for Perth and 2.0% for Australia. Those from English speaking backgrounds form the largest groups of immigrants to Cockburn. Those that speak a language other than English at home account for 22% of people.

LEISURE & RECREATION

The leisure involvement of the people living in the new development of Cockburn Coast will be guided by both the natural assets and the provision of new opportunities for the expression of culture and pursuit of leisure. These leisure activities can be expected to be reflective of the wider Australian community.

National leisure figures suggest that Australians spend most of their leisure time in the home; 10.8% of time each day is spent watching TV, 4.1% listening to the radio, 2.3% reading, 1.3% using audio or visual media, 1.2% hobbies, 0.6 watching DVD's and 0.3% listening to audio media. Of the activity time 0.3% is spent on religious activity and another 0.3% is spent visiting entertainment and cultural venues.

CREATIVE & COMMUNITY ENDEAVOUR

The City of Cockburn Public Artworks Strategy 2009 aims to foster a sense of community spirit within the district generally and neighbourhoods in particular. However, the area does not appear to have a strong creative community. Only three local arts and cultural groups are noted on the Council website and two are collocated at the old Council Chambers at Hamilton Hill. The Council supports arts and culture through a program of events throughout the year with a focus on the Summer of Fun program with music events, festivals and community activities.

Cultural Background of the City of Cockburn (2006)

	Cockburn	Metro Perth	Australia
Australian citizenship	85.0%	82.7%	86.1%
Persons born overseas	28.8%	31.3%	22.2%
LOTE spoken at home	22.0%	20.1%	21.5%
Catholic	33.8%	24.9%	25.8%
Anglican	17.2%	19.8%	18.7%
No religion	21.1%	22.2%	18.7%
Country of birth			
Australia	64.4%	61.5%	70.9%
England	7.4%	9.9%	4.3%
Italy	2.3%	1.3%	1.0%
New Zealand	2.0%	2.4%	2.0%
Croatia	1.7%	0.3%	0.3%
Portugal	1.5%	Unknown	0.1%

Source: ABS 2006 Census

Predominant activities taking place in the LGA include:

- Children's and family activities
- Charity events e.g. Australia's Biggest Morning Tea
- Local community events e.g. School fund raising
- Environmental education
- Local sporting competition
- Beach activities and events.

The Council website notes a number of community organisations in the LGA,. These are predominately residents groups, and access to their websites through a community portal provided by Council suggest that many may not be very active. This correlates with Perth wide data that illustrates a generally low volunteering rate of only 12.3% of the population in 2006 compared to a national average of 17.9%.

ENVIRONMENT

Australians nationally are becoming increasingly conscious of environmental issues and the quality of natural environments. This consciousness has lead to many people specifically choosing to live in a way that reduces their impact on the environment. Providing ways for communities to engage with the care of their environments can provide essential community building projects that benefit people and the natural systems they live within.

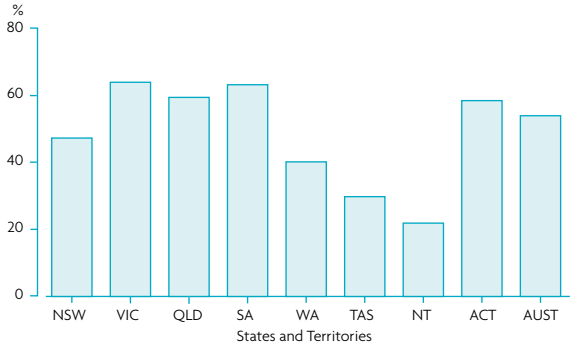
There are no localised figures for the City of Cockburn about the priority people place on the environment, however the figures for Western Australia suggest that somewhat less than 60% of people think the natural environment is declining, and 40% decreased their water use in 2007-8. It is likely those settling on the Cockburn Coast will be equally as concerned about environmental issues as the wider Western Australian community.

Proportion of Adults Who Reported the Natural Environment was Declining 2007- 08



Source: ABS 2007-08 Environmental views and behaviour study

Proportion of Adults who Decreased their Water Consumption 2007-08



Source: ABS 2007-08 Environmental views and behaviour study



A.3 COMMUNITY FACILITIES REVIEW

The Cockburn Coast is a new urban development site. Its heritage as a post industrial site, its disconnection from its inland surrounds by Beelier Park and new development to its north and south has resulted in limited opportunity or necessity for community facilities to date. It is expected a community with a population of 12,000 people will be living there in thirty years time. In terms of Community Facility provision, the Cockburn Coast site will become a focal point for population of the new development, but also, due to proximity, to the populations north and south of the new development site. The combination of these three groups will result in a population of approximately 18,000 using the facilities that are provided in the new site. This is comparative in terms of population to a medium sized town.







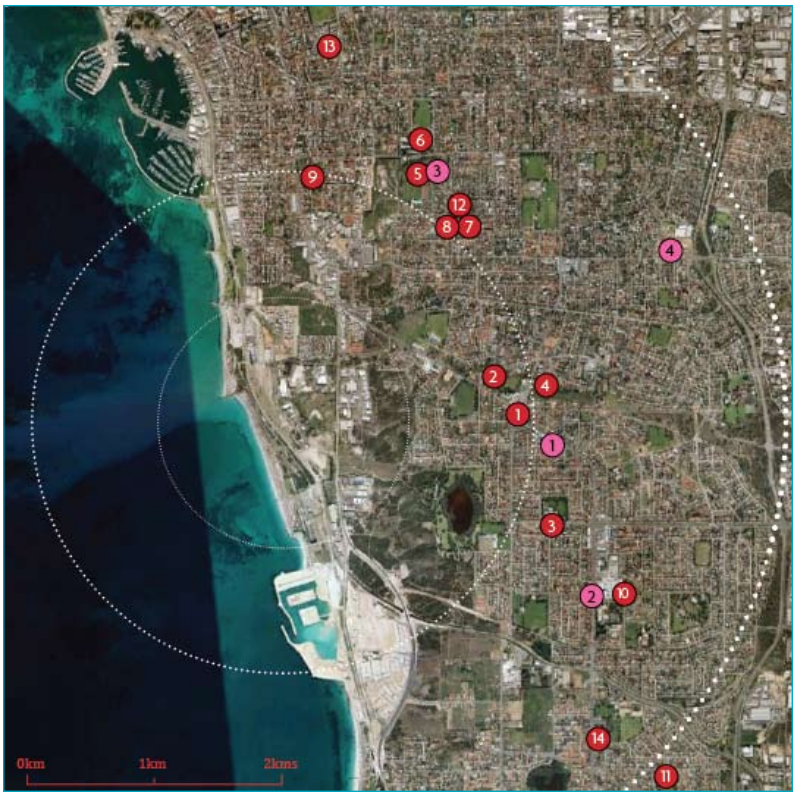
Responsibility for provision of each community facility will rest with the appropriate partner or another negotiated party. Providers of community facilities could include, but not be restricted to:

- LandCorp
- City of Cockburn
- WA State Government
- Federal Government
- Private sector
- Non-government sector

To understand the infrastructure and service delivery needs of the future population living on the Cockburn Coast, a review was undertaken of what is currently delivered on the Cockburn Coast, within a 2-4 kms distance of the Cockburn Coast and then, where appropriate, within the region.

EDUCATION AND CHILD CARE

Within the Cockburn Coast development area, the need for a primary school has been identified. The Cockburn Coast is serviced by secondary schools within a 2-4km radius and will be serviced by Murdoch University at the regional level.



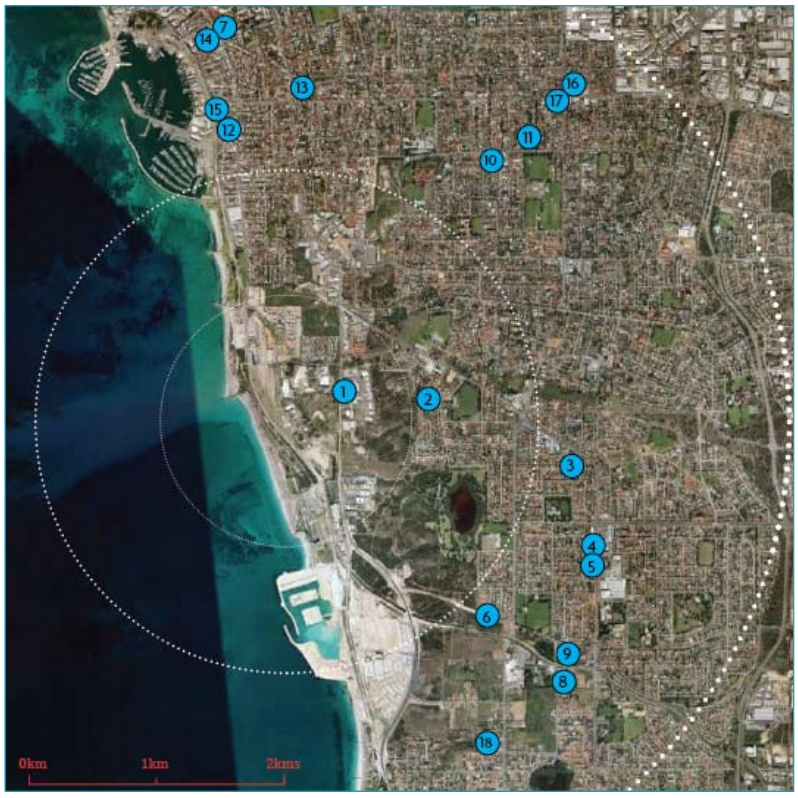
What does childcare and education delivery look like currently?

	Cockburn Coast	2-4kms	Regional
Childcare		✓	
Primary Schools	✓ (planned)		
High Schools		✓	
TAFE		✓	
Murdoch University			✓

Education establishments			
1	New Life Christian College	8	Southwell Primary School
2	Kerr Street Community School	9	Beaconsville Primary Intensive Language School
3	Pheonix Primary School	10	Jess Thomas Kindergarten
4	Port School (Secondary)	11	Newton Primary School
5	South Fremantle Senior High School	12	Winterfold Primary School
6	Challenger TAFE	13	Fremantle Primary School
7	Christ the King School	14	St Jerome's Primary
Child care			
1	Early Learning Centre, Hamilton Hill	3	Little Woodpeckers Child Care Centre
2	Lefroy Road Childcare Centre	4	Teddy Bear Corner

HOSPITALS & HEALTH CENTRES

There are a range of services within 2-4 kilometres of the site and a hospital currently serving the site in a regional capacity.



What does health service delivery look like currently?

	Local to Cockburn Coast	2-4kms	Regional
Hospital			✓
Medical		✓	
Dental		✓	
Allied Health		✓	
Complementary Health		✓	
Ambulance Services		✓	
Child Health Centres		✓	

Hospitals and Health Centres			
1	Colonics at Inside Out Health Lounge	10	Fremantle Family Doctors
2	Profession Counselling and Psychotherapy Services	11	Grove Physiotherapy
3	Spearwood Dental Clinic	12	South Fremantle Health and Counselling
4	Pheonix Medical Centre	13	Lifecare Fremantle Physiotherapy
5	Cockburn Chiropractic Centre	14	Wellbeing Chiropractic
6	Villa Dalmacia Aged Care Facility	15	Essence Physiotherapy
7	Fremantle Hospital and Health Service	16	Hilton Medical Centre
8	Elite Podiatry	17	Cadd Street Dental Surgery
9	Spearwood Physiotherapy Clinic	18	Coogee Chiropractic

PARKS, RECREATION, CULTURAL & TOURISM

Parks, recreation culture and tourism provide essential catalysts for community members to connect around common interests.

PARKS & RECREATION

The Cockburn Coast has an abundance of natural assets that form a basis for passive leisure and recreation, or provide the infrastructure for active recreation. This strength can be increased with additional community facilities and the enhancement of current facilities.

There are a broad range of recreational opportunities already existing on site including:

- Dog walking
- Jogging
- Sand play
- Horse riding
- Surfing
- Swimming
- Fishing

Key recreational facilities on site include:

- Beaches
- Dunes
- Manning Park
- Beeliar Regional Park
- Dog parks

Beyond the site, there are a broad range of recreation, parks, tourism and cultural facilities as shown in the map on the facing page.

CULTURE & TOURISM

There is currently a range of significant cultural sites for the Nyungar People on Cockburn Coast. There are also a number of early European settlement sites of heritage significance that are either currently attracting tourists or have the potential to attract tourists. Public art works also exist on site including the C Y O'Connor statue which is well known by the local community and tourists alike.

Nyungar People

- Indian Ocean – mythological significance
- Campsites – North Lake – City of Cockburn
- Campsites – Bibra Lake – City of Cockburn
- Campsite – Robb Jetty – Cockburn Coast
- Clontarf Hill – important ceremonial, mythological, & artefact site, hunting place and natural feature

European

Interim Listing on State Heritage Register

- South Fremantle Power Station
- Azelia Homestead
- Robb Jetty Chimney
- Newmarket Hotel
- Randwick Stables
- South Beach horse exercise area

Other sites

- Owen Anchorage
- Robb Jetty
- Afghan camps at Davilak
- WWII gum emplacements & groups of trees

Off shore

- 2 shipwrecks
- Bronze statue CY O'Connor

Recreational			
1	Wally Hagan Basketball Stadium	5	Cockburn Bowling and Recreational Club
2	Spearwood Dalmatinac Club	6	Fremantle United Soccer and Recreation Club
3	Cockburn City Soccer	7	Joe Cooper Recreation Centre
4	Cockburn Institute of Dance		

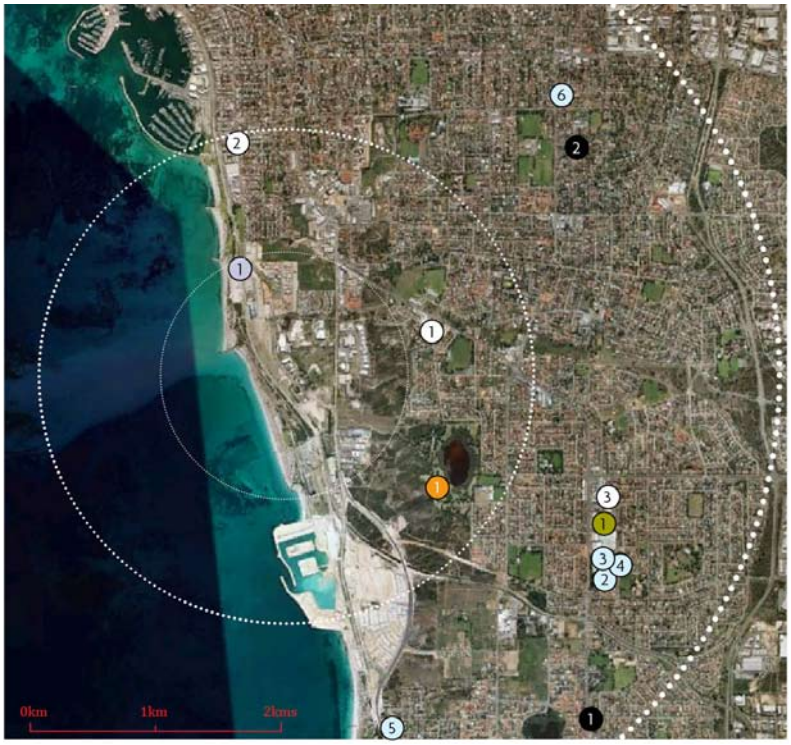


Marine Recreation	
1	South Beach
2	Coogee Marina
3	Fishing Boat Harbour
4	Success Harbour
5	Challenger Harbour
Waterways	
1	Manning Lake
2	The Coast
3	Market Garden Swamp
Tourism	
1	Fremantle Village Caravan Park
2	On Tap Watersports
3	Fishing
4	Coogee Beach Holiday Park
5	Fremantle Chocolate Factory
6	Little Creatures Brewery

Parks			
1	Wilson Park	16	Gerald Reserve
2	Hollis Park	17	Dubove Park
3	Dixon Park	18	Eliza Park
4	Davilak Reserve	19	Goodchild Park
5	CY O'Connor Reserve	20	Wheeler Street Reserve
6	Manning Park	21	Isted Reserve
7	Dalmatinac Park	22	Enright Reserve
8	Manning Lake Bushland	23	Hobbs Park
9	Beale Park	24	Baker Square
10	Peace Park	25	Parmelia Park
11	Olive Tree Park	26	Glen Jones Oval
12	Watson Reserve	27	Bruce Lee Oval
13	Edwardes park	28	Hilton Park
14	Interim Reserve	29	Stevens Reserve
15	Macfaull Park		

GENERAL COMMUNITY

There are currently no community facilities or service delivered on the Cockburn Coast. Within the 2-4 kilometre distance there is a limited provision of facilities currently available to provide services to the Cockburn Coast community. However, it is unclear what capacity the current facilities have, if any, to address increased demand as the Cockburn Coast development unfolds.



What is currently available?

Community Facilities	Local to Cockburn Coast	2-4kms	Regional
Centrelink		✓	
Library		✓	
Coogee Community Centre		✓	
Cockburn Seniors Centre		✓	
Police and Citizen's Youth Clubs		✓	
Ashronia Community Services		✓	

Emergency Services	Local to Cockburn Coast	2-4kms	Regional
Cockburn Police Station		✓	
Hilton Hill Police Station		✓	
City of Cockburn Services	✓		
Ambulance		✓	
Fire Services		✓	

Welfare and safety			
1	Spearwood Centrelink	1	Cockburn Police Station
		2	Hilton Police Station
Retail			
1	Hamilton Hill Shopping Plaza	3	Phoenix Shopping Centre
2	South Fremantle		
Community centres and libraries			
1	Ashronia Community Services	4	Cockburn City Council Chambers
2	Cockburn Seniors Centre	5	Coogee Community Hall
3	Spearwood Public Library	6	Police and Citizen's Youth Clubs

Art galleries and museums	
1	Azelia Ley Homestead Museum
Train station	
1	South beach (Closed)

A.4 REGULATORY & POLICY FRAMEWORK

In order to develop an understanding of the regulatory and policy context that surrounds the Cockburn Coast Community Plan, a review of currently available Western Australian State and City of Cockburn Local Government Planning documents was undertaken.

The following provides a brief summary of the key planning documents reviewed. Other documents reviewed include:

- City of Cockburn Community Consultation (City of Cockburn)
- Cockburn Strategic Plan 2006-2016 (City of Cockburn)
- Public Artwork Strategy 2009 (City of Cockburn)
- Greenhouse Gas Emission Reduction Strategy 2011-2020 (City of Cockburn
- WA Health (WA State)
- Sport Facility Plan (WA State)
- North Coogee Foreshore Management Plan (City of Cockburn)

STATE PLANNING POLICY 3.6 - DEVELOPMENT CONTRIBUTIONS FOR INFRASTRUCTURE (SPP 3.6)

The SPP 3.6 sets out the principles and considerations that apply to development contributions for the provision of infrastructure in new and established urban areas. It also outlines the form, content and process to be followed in considering such provisions.

STATE PLANNING FRAMEWORK POLICY

The State Planning Framework Policy sets out the key principles relating to environment, community, economy, infrastructure and regional development which should guide the way in which future planning decisions are made. It also provides a range of strategies and actions which support these principles generally and for each of the ten regions of the State.

DIRECTIONS 2031 AND BEYOND

Planning WA recently released Directions 2031, a new strategy for land use planning, for public comment. It takes up where the previous government's Network City left off. A pivotal moment in planning, the 2004 policy produced a range of aspirational ideas for the city's future. Directions 2031 moves into the area of more measurable goals, although it falls short on detail.

Directions 2031 and Beyond provides the highest level of strategic metropolitan planning to guide the development of more detailed polices, strategies and plans. Due to the complexity of strategic planning for the metropolitan area, sub-regional strategies are required to provide guidance at the local level. Sub-regional strategies address issues that extend beyond local government boundaries and that require a regional response, as well as commonly shared issues such as provision of housing choice and affordability. Medium and long-term infill and greenfield housing targets are set in Directions 2031 to ensure the city's connected growth beyond 2031. These targets include a 50% improvement on current infill residential development trends and a 50% increase in the current average residential density.

DRAFT OUTER METROPOLITAN PERTH AND PEEL SUB-REGIONAL STRATEGY

The Draft Outer Metropolitan Perth and Peel Sub-Regional Strategy forms an integral part of the Directions 2031 vision. It provides information about the levels of expected population growth by local government area and highlights development opportunities and increased densities in greenfield areas throughout the five outer sub-regions of north-west, north-east, south-east and south-west metropolitan Perth and Peel. Together with the draft Central Metropolitan Perth Sub-Regional Strategy, this strategy also promotes the achievement of the Directions 2031 housing targets.

CITY OF COCKBURN TOWN PLANNING SCHEME NO. 3 (TPS NO.3)

The TPS No.3 statutory legal framework for development within the City of Cockburn. It sets out the long term planning directions for the City, including zoning and other provisions, and also provides for general policies relating to matters relevant to the TPS No.3.

CITY OF COCKBURN DEVELOPMENT CONTRIBUTION PLAN 13 (DCA 13)

In accordance with SPP 3.6, the City of Cockburn introduced DCA 13 that applies to all land within the City to be subdivided or developed for residential, rural residential or resource zone purposes. The DCA 13 also identifies what community infrastructure qualifies for contribution and how much contribution is required.

NORTH COOGEE DCP

At the time of this report the North Coogee DCP was in final stages of assessment and as such was yet to be exhibited for public comment or approved as Council policy. As the development of the North Coogee DCP has been informed by the DCA 13, it is envisaged that the North Coogee DCP will contain all physical (hard) infrastructure and public open space directions for the Cockburn Coast.

DISTRICT STRUCTURE PLAN

The Cockburn Coast District Structure Plan (DSP) guides land use planning in the North Coogee area, and aims to provide for sustainable development, while protecting and enhancing the area's distinctive heritage and landscape. The plan is the first step in establishing a detailed land use framework for the Cockburn Coast area.

INTEGRATED TRANSPORT PLAN (ITP)

The Cockburn Coast Integrated Transport Plan (ITP) provides a benchmark in integrated land use and transport solutions and further refines the provision of transport infrastructure at the Cockburn Coast.

DISTRICT WATER MANAGEMENT STRATEGY

The District Water Management Strategy has been prepared for the DSP and includes the key design principles relating to the management of water quality, quantity and conservation.

A PLAN FOR THE DISTRICT 2010 - 2020

The Plan for the District identifies this 'needs' based infrastructure, as well as the growth in service programs that are required to support its provision throughout the Cockburn Coast LGA.

SPORT AND RECREATION STRATEGIC PLAN 2009

The Sport and Recreation Strategic Plan is a strategic approach to get more Western Australians physically active, to resource and equip sport and recreation providers; to support talent development and achievement in sport; to promote sound infrastructure planning and sustainable facility provision; and to provide affordable recreation camp experiences.

SUMMARY OF THE REVIEW OF PLANS

A review of all current Western Australian State and City of Cockburn plans and strategies, together with those prepared for the Cockburn Coast development, was undertaken to help in the identification of future social needs for the Cockburn Coast development.

A summary of findings that are applicable to the Cockburn Coast site is provided in the table below:

No.	Needs Area	Identified Requirement	Plan/Strategy	Constituency	Themed Objective
1.	Health	› A new Fiona Stanley Hospital › Upgrade of Fremantle Hospital to provide mental health, aged care and rehab services	WA Health	WA State	A Healthy Community
		› A GP Super Clinic	City of Cockburn Community Consultation	City of Cockburn	
2.	Education	› Expanded educational options › A well informed community	Cockburn Strategic Plan 2006-2016	City of Cockburn	A Learning Community
3.	Caring	› Cost effective community services › Support community in which people feel belong, connection and contribution	Cockburn Strategic Plan 2006-2016	City of Cockburn	A Caring Community
		› Embrace difference › Support the vulnerable › A community in which people can facilitate positive change in their lives and the lives of others	New Directions for Community Development Service Unit	City of Cockburn	
		› Social diversity/integration › Universal access design	District Structure Plan	City of Cockburn	
4.	Safety	› Maximise safety and well-being	District Structure Plan	City of Cockburn	A Safe Community
		› Use of Crime Prevention through Environmental Design Principles	Integrated Transport Plan	Cockburn Coast	
5.	Housing	› Site responsive design › High levels of connectivity › Diverse housing form/dwelling type › Range of housing affordability options	District Structure Plan	City of Cockburn	A Community with Innovative Housing

No.	Needs Area	Identified Requirement	Plan/Strategy	Constituency	Themed Objective
6.	Economic	› A strong financial position for City of Cockburn › Vibrant and diverse economy › High value employment	Cockburn Strategic Plan 2006-2016	City of Cockburn	A Financially Viable Community
		› Diversity of scale of employment base › Promote employment opportunities › Promote economic development › Best practice IT and telecommunications › Maximise public benefit from expenditure	District Structure Plan	City of Cockburn	
7.	Transport	› Comprehensive Transport Network	Cockburn Strategic Plan 2006-2016	City of Cockburn	An Accessible Community
		› High speed/frequent public transport › Access to public transport › Maximise alternate modes of transport	District Structure Plan	City of Cockburn	
			Integrated Transport Plan	City of Cockburn	
8.	Heritage, Culture and Leisure	› Recognition of cultural and historical precedents	Cockburn Strategic Plan 2006-2016	City of Cockburn	A Creative, Diverse Community
		› Public Art reflecting distinct neighbourhoods › Public art reflecting spirit and diversity › Public art celebrating built and natural environments	Public Artwork Strategy 2009	City of Cockburn	
		› Interpret sites of significance;	District Structure Plan	City of Cockburn	
		› Celebrate Diversity	New Directions for the Community Development Service Unit	City of Cockburn	
9.	Recreation & Open Space	› Surf Life Saving Club/Community Facility › Public 9 Hole Golf Course	A Plan for the District 2010-2020	City of Cockburn	An Active Community
		› Redevelopment of Coogee Surf Club	Sport & Regional Strategic Plan	WA State	
		› Sports Oval	Sport Facility Plan	WA State	
10.	Environment	› Minimal Environmental impacts from transport › Attractive landscape › Integrated environmental management › Effective remediation programs › Advanced waste recycling	Cockburn Strategic Plan 2006-2016	City of Cockburn	An Environmentally Sustainable Community
		› Sustainable Planning and Development › Efficient settlements › Efficient use of resources	Greenhouse Gas Emission Reduction Strategy 2011-2020	City of Cockburn	
		› Upgrade Cockburn Coast foreshores	North Coogee Foreshore Management Plan	City of Cockburn	
		› Maximise energy efficiency › Respond to climate change › Maintain biodiversity	District Structure Plan	City of Cockburn	
		› Maximise water efficiency	District Water Management Strategy	City of Cockburn	

A.5 COMMUNITY NEEDS ASSESSMENT

The following Community Needs Assessment analyses the data provided by the Community Profile and Facilities and Services Review to identify key gaps and needs for the future community of the Cockburn Coast. This analysis considers both existing assets, and those planned by the City of Cockburn through their Plan for the District 2010-20.

GAPS IN FACILITIES AND SERVICES PROVISION (2.4KM RADIUS)

GAPS CURRENTLY PLANNED FOR

- Sports Oval
- Primary School

OTHER GAPS

- University (but served regionally)
- Hospital (but served regionally)
- Public transport access to secondary schools and university

GAPS IN FACILITIES AND SERVICES ONSITE

- General community services and facilities i.e. local community centres, library, Centrelink and welfare services
- Lack of physical recreation infrastructure
- Lack of amenity i.e. water fountains, playgrounds, shelter

PLANNING FOR THE DISTRICT

REGIONAL, SUB-REGIONAL & LOCAL COMMUNITY AND CIVIC INFRASTRUCTURE

The following map locates the key community and civic infrastructure works identified by the Cockburn Plan for the District 2010-2020 in relation to the Cockburn Coast District Structure Plan site.

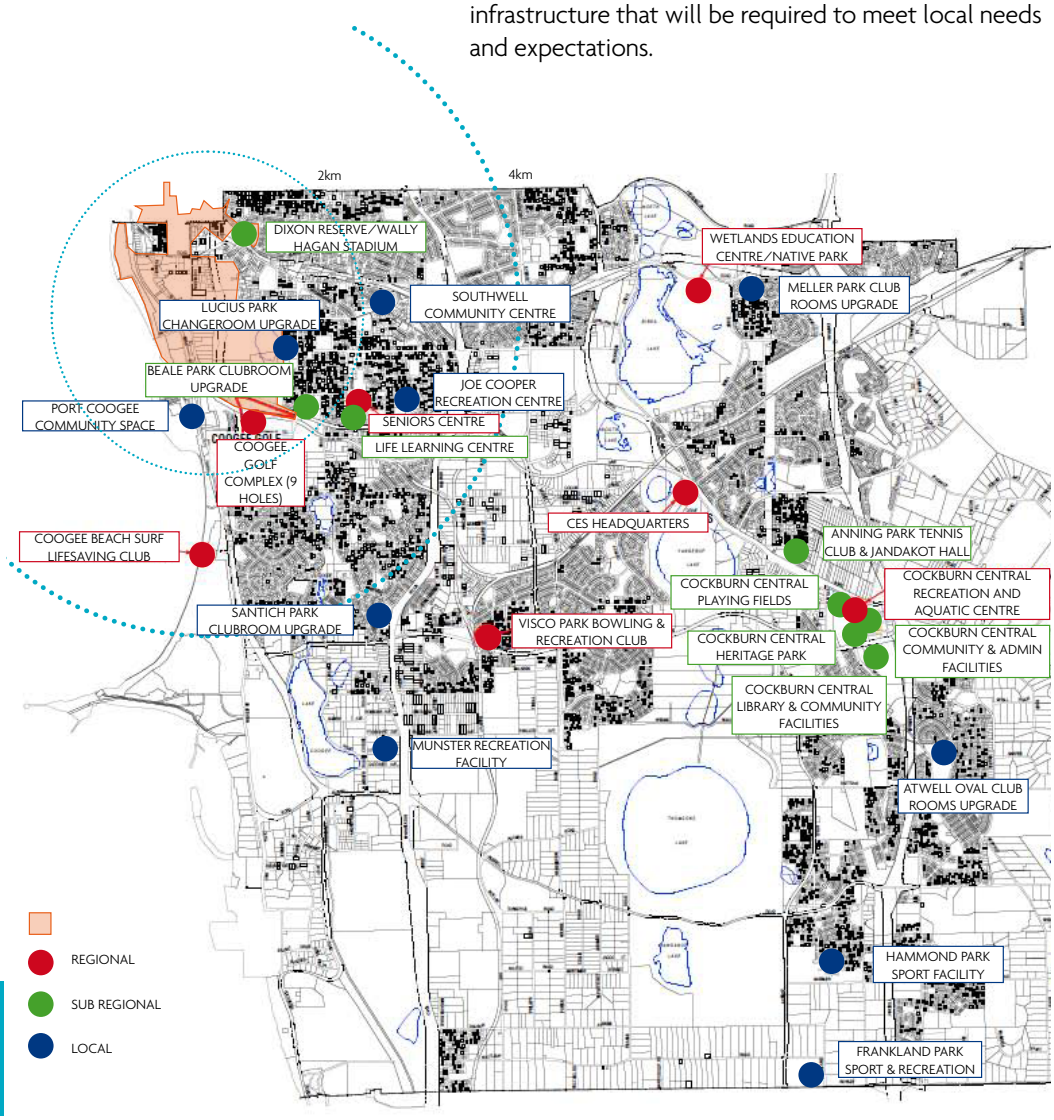
In determining community infrastructure required at the Cockburn Coast, we considered the development site catchment, and also the catchment of other facilities planned in the region. The Plan for the District 2010-20 only considers the next 10 years of service provision, whilst at Cockburn Coast we are planning for 2040. There is a need to be proactive and start the planning process early to ensure quality of life and wellbeing for the Cockburn Coast community as it evolves in the future.

CATCHMENTS FOR COMMUNITY INFRASTRUCTURE

Population thresholds for community infrastructure items are defined by the City of Cockburn in accordance with DCA 13.

The current City of Cockburn's 'Plan for the District' and 'Sports and Recreation Plan' took these thresholds into account for future development of the Cockburn Coast with a projected population of 10,000 - 12,000 people. The identified need was for one active playing field and associated club rooms.

At a local level it has been acknowledged that there will likely be a need for a community centre/ space for the Cockburn Coast in line with the local community space proposed for Port Coogee (1,000 sqm). This document considers additional community infrastructure that will be required to meet local needs and expectations.



ANALYSIS OF THE COMMUNITY PROFILE & FACILITIES REVIEW

The analysis of the Community Profile and Facilities Review has identified the following key social needs for the Cockburn Coast.

EDUCATION & CHILD CARE

While it is expected that the Cockburn Coast will attract single professionals, students, couples without dependants and retirees, it is important that provision be made for children to attend child care and school within the development site. There will undoubtedly be people with children who choose to settle in the area, and given the demographics being attracted to the area, in subsequent years there will be singles who marry and have children, and couples initially without children who also have a family.

Localised child care and school facilities are an expectation of families and also an attraction for a development. While it cannot be expected that a high school will be provided initially the proposed population for the area would suggest there may be a need for additional high school provision in the area in the longer term. Initially however, there will need to be adequate public transport linkages to accommodate high school students travelling to schools nearby. The plan to attract young people, retirees and couples without dependants to the Cockburn Coast also raises the need for the provision of facilities to allow for the provision of training, adult learning and life long learning opportunities for the area.

HEALTH & HOSPITALS

There are some facilities within driving distance of the Cockburn Coast and access to a hospital within the region. The expectation is that primary health care in the form of medical practices, together with dental services and allied health care, will be available within the local area. The urbanised nature of the Cockburn Coast development will be a further incentive to access these services in the immediate area, preferably within walking or public transport distance. Retirees and other older people are especially keen to have local access to health services. The other service which needs to be considered is the availability of an ambulance service to the site, to enhance access to the regional hospital.

PARKS, RECREATION, CULTURAL & TOURISM

The Cockburn Coast has many natural assets that encourage recreation and leisure activities. There are also many Nyungar and Early European heritage sites and attractions that will provide leisure experiences for people. There are also several key facilities that require major regeneration before they can be utilized to their full potential. These include Robb Jetty and the South Fremantle Power Station. To cater for the expected population increases there will need to be additional recreation facilities provided, including the planned Community facility at Catherine Point, a sports oval and club rooms, and the redevelopment of the Coogee Surf Club. These facilities will be provided through private arrangements.

The changing demographic of couples, singles, and retirees will also bring the opportunity for increased provision of cultural services such as performance arts, visual arts and historical displays, all of which will provide challenges in terms of provision of appropriate facilities. Longer-term goals should be set to ensure the Cockburn Coast has the facilities that support a diverse range of cultural activities for the diverse community it is hoping to attract.

GENERAL COMMUNITY

The provision of community centres/spaces at the Cockburn Coast will be important capacity building programs to ensure community cohesion. There will need to be some specific provision for youth and children in the community as well as seniors and others with special needs.

Fire and police services will be required on the Cockburn Coast and will need facilities out of which to operate. Other community requirements will include services and related facilities provided by State and Federal Government such as welfare, disability services, aged care and children's services.

ANALYSIS OF COMMUNITY NEEDS

A detailed analysis of the Community Needs of the Cockburn Coast indicates the following will be required to support a sustainable, cohesive and viable community in the new development site.

A Healthy & Active Community

An analysis of the community needs around health care provision has shown that there is a requirement to provide services and facilities to meet people's primary healthcare and acute health care needs. In addition it is recognised that provision of quality recreation and open space facilities and services will contribute to the health and well being of the local community members. This will encourage – A Healthy and Active Community.

A Learning Community

Education needs of the community have been articulated in terms of provision of schools and child care together with the transport linkages which will provide access to the high schools, TAFE and universities in the nearby regions. These, together with the provision of education and training opportunities for people of all ages, will create – A Learning Community.

A Caring and Safe Community

Caring for the vulnerable in terms of provision of facilities and services for people with disabilities, the aged, and children together with ensuring people feel protected in their community will lead to – A Safe and Caring Community

A Community with Innovative & Sustainable Homes

The Cockburn Coast will provide a higher density form of housing than that provided in surrounding areas. This will create an unique urban living experience but will also provide an opportunity to respond innovatively to the community housing needs. Environmentally friendly features, and accessible housing, both physically and in affordability terms will ensure – A Community with Innovative and Sustainable Housing

A Economically Sustainable Community

The higher density urban living spaces together with the natural and heritage resources of the Cockburn Coast will create an economic environment for new and exciting business opportunities that will provide employment locally for many more people than are currently employed on the Cockburn Coast. This will create – A Financially Viable Community.

An Accessible Community

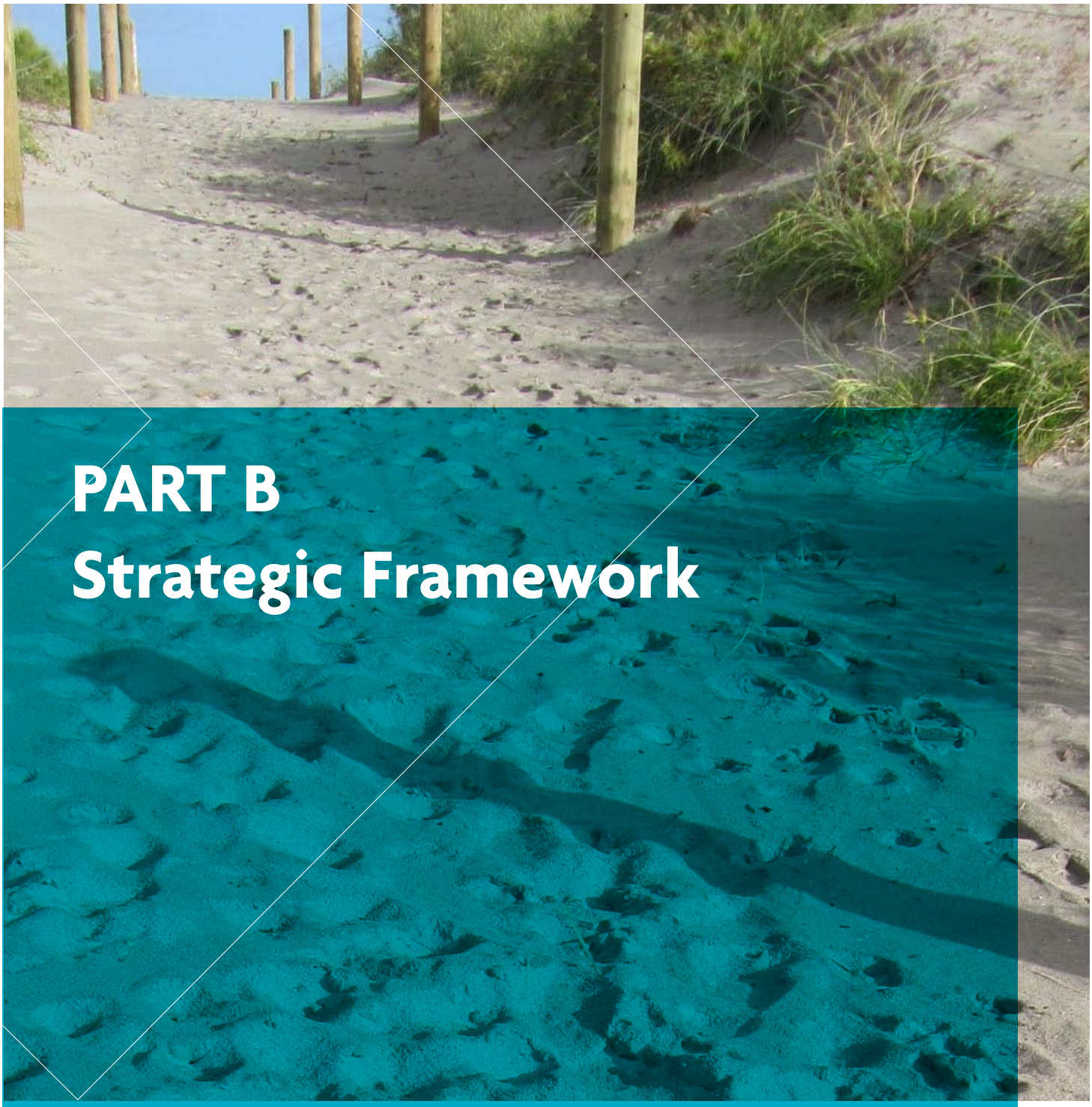
While the basic infrastructure is in place for a road network along the Cockburn Coast development there will still need to be future development of local roads to support the new development. In addition the urban density of the development lends itself to a range of pedestrian, bicycle and public transport options, including the possibility of light rail. The community feedback indicates people think this would be a benefit to the development area and would result in – An Accessible Community

A Diverse & Creative Community.

The heritage of the Cockburn Coast is clearly present and offers further opportunity for preservation; together with new public art installations, and other creative expression. The cultural diversity of the site will increase with the addition of 12,000 people over the life of the development. This will bring greater capacity for community creative engagement such that the Cockburn Coast will become – A Creative, Diverse Community.

An Environmentally Sustainable Community

The environment is an all-encompassing aspect of the Cockburn Coast which people want maintained and enhanced. Opportunities exist for the provision of state of the art waste management, water recycling, and energy efficiency. Work to upgrade the coastal areas and ensure development is environment friendly is important to the development of – An Environmentally Sustainable Community.



PART B
Strategic Framework

B.1 VISION & OBJECTIVES

The Vision for the Cockburn Coast Community Plan is:

"To create a vibrant landmark destination that is connected, integrated, diverse and accessible."

This vision has been adopted from the Cockburn Coast Masterplan to provide continuity of vision across the project.



OBJECTIVES

The objectives of the Cockburn Coast Community Plan are:

- Develop an understanding of the potential demographic profile of the future Cockburn Coast community
- Identify relevant stakeholder involvement and responsibilities in the delivery of this plan
- Identify required infrastructure, facilities, services and programs that meet the future community's future needs and aspirations for a full and happy life.

B.2 COMMUNITY PLANNING & PLACE MAKING PRINCIPLES

The Cockburn Coast Community Plan has been developed utilizing an underpinning set of community planning principles. In addition, Place Making Principles set out by the Place Making Framework for the Cockburn Coast have been considered in the development of the Community Plan.

PLACE MAKING PRINCIPLES FOR COCKBURN COAST

The Place Making Principles guide the high level delivery of the place character and provide a measurement tool to assess the successful delivery of the character and experience of the place we aim to create at Cockburn Coast . Whilst each of the Principles sits most strongly within the social, economic, physical environment or cultural realm, the Principles should be considered as applying across all aspects of the place, and as such should be considered by this Community Plan.

- Prioritise diversity as a key driver of cultural change.
- Explore transition between experiences & places, active and passive spaces, local and regional destinations.
- Build a culture of change capacity that celebrates innovation & participation.
- Identify service and support roles for local and regional networks.

COMMUNITY PLANNING PRINCIPLES

This Community Plan has been developed from the following principles:

- Support the development of a diverse community by working with a social justice focus
- Develop partnerships with and between the three levels of government, non-government sector, private enterprise and volunteers to deliver the plan
- Work in a collaborative, and coordinated way to ensure equity in service provision and program delivery across the community
- Encourage healthy lifestyles with a minimized ecological footprint
- Provide quality infrastructure and facilities for the community with visionary integrated long-term planning

B.3 STRATEGIC DIRECTIONS

The Strategic Directions for the Cockburn Coast Community Plan emerged from the analysis of the community needs for the Cockburn Coast area. This community needs analysis was undertaken using data from the Community Profile, community input from the Community Engagement undertaken with the stakeholders, and a review of all relevant State Government, City of Cockburn and Cockburn Coast plans and strategies.

A HEALTHY AND ACTIVE COMMUNITY

The Cockburn Coast needs to provide opportunities for healthy and active lifestyles amongst its community. Encourage healthy living by offering physically engaging local activities and providing access to local services that support health and holistic approaches to wellbeing.

A LEARNING COMMUNITY

The Cockburn Coast community needs to provide for the personal growth and education of its residents at every stage in life. Provide for educational, training and life-long learning experiences across the life-span of all local residents to support a culture of innovation and new approaches to sustainable living.

A CARING AND SAFE COMMUNITY

The Cockburn Coast must provide a feeling of comfort, care and safety to attract a diverse audience. This can be achieved through the use of appropriate urban design, place activation and the provision of quality services that support and encourage the physical and emotional wellbeing of the vulnerable, young, disabled and aged residents, and their carers.

A COMMUNITY WITH INNOVATIVE & SUSTAINABLE HOMES

The Cockburn Coast development needs to actively support the sustainable lifestyle choices made by its community. Building development should utiltise innovative design and meet environmentally sustainable standards, but should also consider its ability to change and respond flexibly to future community needs.

AN ECONOMICALLY SUSTAINABLE COMMUNITY

The Cockburn Coast community will be strengthened through the provision of local jobs for local people. Utilise economic development practices to establish a financially sustainable community that will become a thriving industrial, commercial and professional centre that supports tourism.

AN ACCESSIBLE COMMUNITY

The Cockburn Coast must be physically, financially and socially accessible. A range of pedestrian and wheeled vehicle transport options will complement the urbanized build environment and provide clear linkages both internally and to adjacent regions and will create a sense of welcome when combined with a range of price points to ensure affordability.

A DIVERSE & CREATIVE COMMUNITY

The Cockburn Coast needs to attract a diversity of people from a range of backgrounds and age groups to live in the area. This will contribute to the growth of a flourishing creative arts community as well as support an active public realm and a healthy economy served by people of varied ages, incomes and cultural backgrounds.

AN ENVIRONMENTALLY SUSTAINABLE COMMUNITY

In order to become an environmentally sustainable community, the Cockburn Coast must consider more than just the physical environment. A sympathetic built environment that responds to the landscape should be met with programs that encourage behaviour change, resource efficiency, productive landscapes, and meet local needs locally.

B.3a
A Healthy & Active Community

Plan for a healthy and active community for Cockburn Coast through the promotion of physical and emotional well being.

The Cockburn Coast Community Plan supports the development of a healthy and active community both in terms of physical and emotional wellbeing. The development of healthy and active lifestyles for residents, visitors and people working, living and learning in Cockburn Coast is a key goal for The Plan.

As a new place, with no existing community, the early delivery of key health services particularly for children and older people will be essential for attracting and retaining residents. The concentration of activity and amenities provided by higher density living will encourage walking, public transport use and shared experiences in the public realm. Programs to support community cohesion and development will build a sense of belonging.

CHALLENGES

- The relative isolation of the site and past industrial uses means that it is currently not serviced
- Linkages to regional health services will be required
- Timed rollout of services will be critical to liveability of the area
- Viability of local services will depend on population numbers
- Promotion to private and public health providers to provide localised services

OPPORTUNITIES

- Coastal location supports active outdoor lifestyles
- Concentration of local retail on main street to create community heart
- Development of a pedestrian culture due to higher density living
- Proximity to existing tertiary health services in the region
- Football oval will attract regional players and expand community boundary
- Existing culture of exercising with animals

FACILITIES AND SERVICES GAPS

Community Group	Facilities	Services
All	› Local health facilities › Beach side showers and change rooms › Beach equipment for hire - chairs, umbrellas, water craft › Diving/snorkelling platform › Horse parking, trails and appropriate facilities › Shared path (cycle/ped) linking to existing coastal walk › Exercise stations and distance markers for runners/walkers	› Local health services › Allied health services › Complementary health services
Children	› Ocean pool with lanes › Regional play area, interpretive water play	
Youth	› Active sports practice area; courts and cricket nets › Basketball and netball courts › Water sports club facility (surf, sailing etc) › Youth focussed skateable landscape	
SINKS/DINKS	› Beach games infrastructure – volleyball	› Low cost sports equipment hire
Families	› Local health facilities › Dual seasonal sports ground & sports club room	› Local health services
Elders	› Beach games infrastructure - boules, giant chess › Boat mooring facilities	› Age appropriate exercise program

B.3b A Learning Community

Plan for the Cockburn Coast to support a community encourages life-long learning through formal educative experiences and informal sharing of skills and knowledge.

The Cockburn Coast Community Plan identifies the need for a range of educational, training and life-long learning experiences for local residents to ensure aspirations for the delivery of a learning community are met.

Early delivery of high quality childcare and primary education facilities will attract families to consider alternatives to suburban living. Active learning and skills sharing programs such as LandCare provide informal education opportunities as well as community connection with place.

CHALLENGES

- Matching provision of facilities with requirements of residents in a timely manner
- Early provision of adequate transport linkages to regional educational services in adjacent suburbs
- Lack of local programs and services

OPPORTUNITIES

- Commitment to primary school on site
- Building an energy efficient, environmentally sustainable development that can be used as educational experience
- Partnerships for on site educational/learning service delivery

FACILITIES AND SERVICES GAPS

Community Group	Facilities	Services
All	› Robb Jetty reconstruction › Heritage trail with appropriate interpretation	› Community education › Historical services
Children	› Primary School › Preschool/child care centre	› Primary school education services › Early childhood education service
Youth	› Out of school hours centre › Environmental learning facility	› Out of school care service › Environmental education providers
SINKS/DINKS	› Vocational education › Adult education › TAFE/Training facility	› Vocational education
Families	› Private education provision	› Family edu-tainment (walking trails, free talks, workshops)
Elders	› Library/Adult life long learning facility	› Adult life long learning services › Library services

B.3c
A Caring and Safe Community

Plan for Cockburn Coast to be a caring and safe community that supports its individual members and takes responsibility for the greater good.

The Cockburn Coast Community Plan actively encourages the development of a community that ensures the most vulnerable; children, those with disabilities and the aged, have the care they require and their carers are supported.

Developing a community of 12,000 from zero provides the opportunity to build cohesion and shared responsibility from day one. Support, care, safety and personal security are basic rights of the individual that can only be realised by the many. The thirty-year development time frame also means that forty year olds moving into the area in the early stages of the development, will be seventy by the end and in need of age related services.

CHALLENGES

- Identifying common interests to seed early community development of pioneer purchasers
- Relative isolation of the area will require focused attention by service providers to deliver to the new community
- Timing roll out of services to ensure new residents in need are not left without services
- Attracting a range of ages and abilities
- Creating a cohesive community by encouraging people moving into the area to stay for the long term

OPPORTUNITIES

- To create a built environment that is usable, to the greatest extent possible, by everyone regardless of their age, ability, or status in life
- To provide co located housing opportunities that attract a diversity of people
- To provide opportunities for community interaction and local community governance and shared responsibility
- Expansion and extension of local government services

FACILITIES AND SERVICES GAPS

Community Group	Facilities	Services
All	› Catherine Point Community Facility › Beach front disability access › Public toilets › Water bubblers › Public spaces well lit at night › Police and Fire Station › Emergency Services facility	› Local Government capacity building programs › Local Government safety programs r › Welfare services › Police services › Fire services › Emergency services
Children		
Youth	› Youth centre	› Youth outreach/neighbourhood watch
SINKS/DINKS		› Community leaders, residents associations and local business chamber
Families	› Baby change/feeding rooms	› Baby and toddler care services › Services for carers
Elders	› Seniors centre › Aged & disabled service delivery facility	› Aged care services › Disability services

B.3d
A Community with Innovative & Sustainable Homes

Plan for Cockburn Coast to provide a range of residential types and tenures that are designed to minimize resource use and to adapt to the changing needs of residents.

The Cockburn Coast Community Plan supports the provision of diverse residential options in terms of size, affordability and tenure. Attracting a truly diverse demography to the area will depend on residential diversity.

New homes should be provided that attract a broad and diverse community of residents of different ages and relationship status, with and without children, and at different price points. Residences, whether purchased or rented should be flexible in design to allow for changes that reflect the requirements of ageing in place.

Proposed higher density living will require innovative solutions to address desirable suburban characteristics such as land ownership, private backyards, and perceptions of increased security.

CHALLENGES

- Attracting current single house residents to higher density living
- Providing housing options for purchase and renting
- Providing opportunities for individualization of residential units
- Providing useable private and shared outdoor spaces

OPPORTUNITIES

- Sharing the benefits of higher density living
- Provision of supported living for people with disabilities
- Design buildings where it is easier to walk than drive, that have shared facilities and on site resource minimisation systems

FACILITIES AND SERVICES GAPS

Community Group	Facilities	Services
All	› Affordable housing › Supported living facility for those with disabilities	› Tenancy services
Children	› Play areas for local children	
Youth		
SINKS/DINKS	› Designated off leash dog park with dog wash facility	
Families	› Shared communal facilities such as laundries and drying rooms	› Sustainable house education programs
Elders	› Aged care living	

B.3e
A Economically Sustainable Community

Plan for the Cockburn Coast to provide a range of jobs to local residents and support the development and sustainability of a local business community.

The Cockburn Coast Community Plan supports the need for an economically viable, financially sustainable community on the Cockburn Coast. This means ensuring the early delivery of the main-street precinct to allow for the establishment of businesses, commercial enterprises and professional offices that meet local needs locally. Employment opportunities for the local people will result.

A local economic development strategy should be developed that considers the viable lease terms, tenancy mix, tenancy sizes and business attraction to the area.

CHALLENGES

- Moving the economic base from the current industries to a services, commercial and retail base
- Timing roll out of local retail to ensure new residents in need are not left without and businesses have a chance to succeed
- Building the economic base in tandem with the housing development to provide jobs for people moving to the area

OPPORTUNITIES

- Creating a thriving main street economy so locals shop locally
- Build on the heritage narratives and environmental assets of the area to create a new tourism industry
- Identifying employment partners for professional and managerial roles

FACILITIES AND SERVICES GAPS

Community Group	Facilities	Services
All	› Robb Jetty Main Street; wide covered footpaths, seating, public art, landscaping › Power Station public plaza as recreation destination and anchor for edge retail › Redevelopment of the Power Station › Tourist Information Centre › Visitor accommodation	› Tourist and visitor marketing program › Job services › Business mentoring programs
Children		
Youth		
SINKS/DINKS	› Activate building edges on beach front with coffee shops, restaurants, bars etc › Creative incubator spaces; low cost and short lease	› Business enterprise services
Families	› Street vending	
Elders		

B.3f An Accessible Community

Plan for the Cockburn Coast to be physically and economically accessible, connected to the greater region and be welcoming to all.

The Cockburn Coast Community Plan supports increased walking, public transport use and cycling as alternatives to car use on site. In addition dedicated no/low cost car parking for regional visitors will need to be provided for access to recreation amenities.

The topography of the site, with its eastern ridgeline, creates a natural barrier to the rest of the City of Cockburn, and as such requires a focused approach to linking the Cockburn Coast to Cockburn Central as the local government headquarters so people can become part of the wider local government area and access services as required.

Accessibility is not limited to physical mobility, partnerships with existing regional service providers, and the price point of housing, hospitality and recreation as well as a sense of welcome and initiation are also all key.

CHALLENGES

- Physical isolation from eastern communities
- The dominant car culture of the region
- Commitment of government to early delivery of public transport

OPPORTUNITIES

- Concentration of amenity supports walkability
- Delivery of affordable public transport system
- Free access to beach and water activities
- Continued use of beach and foreshore for dog walking and horse riding
- Integrated car parking that can adapt to other uses in the future

FACILITIES AND SERVICES GAPS

Community Group	Facilities	Services
All	› Beach side parking areas › Pedestrian network that links destinations, is comfortable, safe and easy › Pedestrian crossings located on paths between key destination › Level crossings for pedestrians/cyclists across rail line (x3) › Cycle paths shared with cars and/or pedestrians where appropriate › Cycle parking along the foreshore, Power Station and Robb Jetty main street › Car parking at beach front › Foot/cycle path landscaping for comfort and pleasure › Bus rapid transit system › Bus stations and shelters › Taxi ranks	› Free local bus service › Bus rapid transit › Taxi service › Light rail service
Children		
Youth	› Skateboard storage facility	
SINKS/DINKS	› Car and bike share	› Car and bike rental service
Families	› Accessible pram ramps	
Elders	› Scooter parking/pathways	

B.3g A Diverse and Creative Community

Plan for Cockburn Coast to attract people of all ages, ethnicities and cultures to work together to develop a meaningful, creative and productive community.

The Cockburn Coast Community Plan supports the retention and enhancement of the area's tangible and intangible heritage, both Nyungar and European, and to build a meaningful relationship between this place and the community of the future.

Consideration should be given to the attraction of skilled migrants to the Cockburn Coast.

Creative activities to suit the aspirations of the planned community members will attract people from a range of cultural backgrounds and support a diversity of ideas and activities, and support creative cultural exchange through language, food and experience.

Public art and community art offer many benefits from wayfinding and land marking through to the communal expression of common values and beliefs. The invitation to participate in creative experiences builds place meaning and community cohesion and presents an opportunity for Cockburn Coast to lead the creative renaissance of the region.

CHALLENGES

- Immigration from overseas to Western Australia lacks cultural diversity (dominated by English speaking nations)
- Lack of performance, visual and creative arts infrastructure
- Building on and maintaining the underground creative culture at Fremantle Power Station

OPPORTUNITIES

- People from international backgrounds who are familiar with higher density living
- Young singles who are currently involved in work that means they travel regularly and may not have bought into the market before
- People from adjacent areas who are keen to live in a higher density area
- Down sizers, and retirees looking for a change of lifestyle
- Creative arts experiences not offered in other areas of City of Cockburn which will help to make Cockburn Coast a unique living experience

FACILITIES AND SERVICES GAPS

Community Group	Facilities	Services
All	› Robb Jetty Plaza community facilities focussed on multiple user needs › Robb Jetty Foreshore (public space) with mix of amenity for different users › Public art; ephemeral, functional, and both temporary and permanent › Event space with appropriate infrastructure › Nyungar cultural space › Heritage centre for Indigenous and early settler displays	› Services for the local Nyungar people › Creative performance services › Event program coordinator › Visual arts services › Creative performance services › Historical services
Children		
Youth	› Low cost/concession art studio spaces for rent	
SINKS/DINKS	› Community art studio spaces for rent	
Families	› BBQ areas, picnic tables and shelters	
Elders		› Arts mentoring program

B.3h An Environmentally Sustainable Community

Plan to support an environmentally sustainable community at Cockburn Coast primarily through cultural change, transport modal shifts and the reduction of resource use.

The Cockburn Coast Community Plan supports the planned environmental strategy and encourages environmental education and cultural change programs that illustrate the benefits of higher density living. Community facilities and residences should be built to the highest ESD standards and be upgradeable as new technologies become available.

The physical infrastructure should be developed sensitively and carefully to maintain and enhance natural assets, placing the built environment in sustainable co-existence with the natural environment. Programs such as LandCare can be activated early in the process to build responsibility for the natural environment. The primary school can also lead with communal gardens and an environmental education focus.

CHALLENGES

- Protecting sensitive and fragile natural assets while providing a high density urban living experience
- Commitment to the highest standard of environmentally sensitive development
- Localised resource management
- Cultural change of current population

OPPORTUNITIES

- Primary school environmental education focus
- Natural environmental assets
- Public transport
- Build community cohesion through the creation of a model environmentally sustainable community

FACILITIES AND SERVICES GAPS

Community Group	Facilities	Services
All	› Protect and enhance foreshore landscape › Water sensitive urban design › Waste management facility › Energy efficient development › Maintenance of Lakes environment › Maintenance of Bushland › Ensure access over ridgeline to east of Cockburn Coast › Design to ameliorate the impact of Fremantle Doctor › General environmental sustainability within urban development	› Water services › Waste services › Energy services › Bush regeneration services
Children	› Environmental learning facility	› Environmental education providers
Youth		
SINKS/DINKS		
Families		
Elders		› Environment conservation volunteer program

B.4 SUMMARY OF FACILITIES AND SERVICES GAPS

The tables outlined on the following pages are a summary of the required facilities and service gaps that have been identified by the Cockburn Coast Community Plan.

FACILITY AND SERVICE NEEDS BASED STATUS

The are listed under three headings; planned, recommended and desired.

a) **Planned** - Those items listed as "planned" are those facilities and services which are listed in a current local government or State plan or strategy.

b) **Recommended** – The items listed as "recommended" are those which are deemed as a required infrastructure or service for Cockburn Coast if the vision of liveability is to be achieved.

c) **Desired** – Those items listed as "desired" are those which, if provided, would increase the liveability and appeal of the development and encourage a diverse population to settle in the area.

RESPONSIBILITY FOR DELIVERY

The facilities and services identified in the following tables have been evaluated against the relevant policy documents and assigned to a stakeholder(s) who will deliver the infrastructure. The policy and delivery is explained below:

Policy

DCA 13	Community infrastructure, soft, LGA wide, informs the DCP North Coogee
DCP North Coogee	Physical infrastructure, hard, site specific, is informed by DCA 13

Delivery

Developer	Government or private developer contributions
Government	State and local government departments and divisions
Business	Private enterprise

A Healthy and Active Community

Facilities		DCA 13	DCP North Coogee	Developer	Government	Business
Planned	› Dual seasonal sports ground & sport club rooms					
	› Shared path (cycle/ped) linking to existing coastal walk					
Recommended	› Exercise stations					
	› Distance markers for runners/walkers					
	› Water sports club facility (surf, sailing etc)					
	› Beach side showers and change rooms					
	› Local health facilities					
	› Active sports practice area; courts and cricket nets					
	› Horse parking, trails and appropriate facilities					
	› Regional play area, interpretive water play					
	› Youth focussed skateable landscape					
Desired	› Boat mooring facilities					
	› Diving/ snorkelling platform					
	› Ocean pool with lanes					
	› Beach games infrastructure e.g. volleyball, boules, giant chess					
	› Beach equipment for hire; chairs, umbrellas, water craft					

Services		Developer	Council	Business
Recommended	› Local health services			
	› Allied health services			
	› Complementary health services			
Desired	› Low cost sports equipment hire			
	› Age appropriate exercise program			

A Learning Community

Facilities		DCA 13	DCP North Coogee	Developer	Government	Business
Planned	› Robb Jetty Reconstruction					
	› Primary school					
Recommended	› Heritage trail with appropriate interpretation					
	› Preschool/childcare centre					
	› Library/Adult life long learning facility					
Desired	› TAFE/Training Facility					
	› Out of school hours centre					
	› Private education provision					
	› Environmental learning facility					
	› Marine Park					

Services		Developer	Government	Business
Planned	None			
Recommended	› Early childhood education service			
	› Primary school education services			
	› Library services			
	› Family edu-tainment (walking trails, free talks, workshops)			
Desired	› Community education			
	› Adult life long learning services			
	› Vocational education			
	› Environmental education providers			

A Caring and Safe Community

Facilities		DCA 13	DCP North Coogee	Developer	Government	Business
Planned	› Catherine Point Community Facility					
	› Beach front disability access					
Recommended	› Public toilets and baby change/feeding rooms					
	› Water bubblers co-located with exercise stations, bus stops, community gathering areas					
	› Public spaces well lit at night to provide a clear line of sight and passive surveillance					
	› Shaded and weather protectes places for sitting at bus stops, railway crossings and along key pedestrian paths					
Desired	› Seniors centre					
	› Youth centre					

Services		Developer	Government	Business
Planned	None			
Recommended	› Community capacity building programs ; volunteering etc			
	› Community safety programs			
	› Baby and toddler care services			
	› Aged care services			
	› Disability services			
	› Services for carers			
	› Welfare services			
	› Police and Fire services			
	› Emergency services			
	› Youth outreach/neighbourhood watch			
	› Community leaders, residents associations and local business chamber			
Desired	None			

A Community with Innovative and Sustainable Housing

Facilities		DCA 13	DCP North Coogee	Developer	Government	Business
Planned	› Affordable housing options					
	› A mix of housing types, sizes and tenures					
	› Housing design that reduces operating costs/ resource use					
Recommended	› Waste management systems for household recycling, composting etc					
	› Play areas for local children					
	› Designated off leash dog park with dog wash facility					
	› Shared communal facilities such as laundries and drying rooms					
Desired	› Housing for ageing in place					
	› Supported living facility for those with disabilities					

Services		Developer	Government	Business
Planned	None			
Recommended	› Tenancy services			
	› Sustainable home education programs			
	› Neighbourhood 'share' systems - share car, tool library, toy library			
Desired	None			

An Economically Sustainable Community

Facilities		DCA 13	DCP North Coogee	Developer	Government	Business
Planned	› Robb Jetty Main Street; wide covered footpaths, seating, public art, landscaping					
	› Power Station public plaza as recreation destination and anchor for edge retail					
Recommended	› Redevelopment of the Power Station to incorporate community facilities/spaces					
	› Small area retail opportunities for local business ownership					
	› Visitor parking					
	› Tourist wayfinding signage etc					
	› Visitor accommodation					
Desired	› Street vending					
	› Creative incubator spaces; low cost and short lease					

Services		Developer	Government	Business
Planned	None			
Recommended	› Tourist and visitor marketing program			
	› Place management services			
Desired	› Business enterprise services			
	› Business mentoring program			
	› Job services			

An Accessible Community

Facilities		DCA 13	DCP North Coogee	Developer	Government	Business
Planned	› Beach side parking areas					
	› Pedestrian network that links destinations, is comfortable, safe and easy					
	› Level crossings for pedestrians/cyclists across rail line (x3)					
	› Cycle paths shared with cars and/or pedestrians where appropriate					
	› Cycle parking along the foreshore, Power Station and Robb Jetty main street					
	› Car parking at beach front					
	› Foot/cycle path landscaping for comfort and pleasure					
	› Pedestrian crossings located on paths between key destination					
	› Bus rapid transit system linked to Fremantle and other employment centres					
	› Bus stations and shelters co-located with other transport options and/or commercial or retail premises					
	› Taxi ranks					
	› Accessible pram/wheelchair ramps					
Recommended	› Car share hub					
	› Bike share/hire hub					
Desired	None					

Services		Developer	Government	Business
Planned	› Bus rapid transit			
Recommended	› Taxi service			
Desired	› Light rail service			
	› Car and bike rental service			
	› Free local bus service			

A Diverse and Creative Community

Facilities		DCA 13	DCP North Coogee	Developer	Government	Business
Planned	› Robb Jetty Plaza community facilities focussed on multiple user needs					
	› Robb Jetty Foreshore (public space) with mix of amenity for different users					
	› BBQ areas, picnic tables and shelters					
	› Public art; both temporary and permanent					
Recommended	› Nyungar cultural space					
	› Heritage interpretations thoughout site/ where appropriate					
	› Event space with appropriate infrastructure					
Desired	› Art and performance space					
	› Low cost/concession art studio spaces for rent					
	› Community art studio spaces for rent					

Services		Developer	Government	Business
Planned	None			
Recommended	› Community event program coordinator			
Desired	› Community creative arts/performance services			

An Environmentally Sustainable Community

Facilities		DCA 13	DCP North Coogee	Developer	Government	Business
Planned	› Protect and enhance foreshore landscape (Foreshore Management Plan)					
Recommended	› Waste management facility					
Desired	None					

Services		Developer	Government	Business
Planned	None			
Recommended	› Water services			
	› Waste services			
	› Energy services			
	› Bush regeneration services			
	› Environmental conservation volunteer program			
Desired	None			

B.5 CONCLUSION

The Cockburn Coast Community Plan has developed a local community profile, albeit with limitations due to the lack of a current community population in the area. Local sentiment about the future of Cockburn Coast was captured in the community engagement data that had been gathered over the duration of the Cockburn Coast planning period. In addition, current State and local government plans and strategies together with Cockburn Coast plans and strategies were reviewed. Following this a community needs analysis was undertaken to identify the infrastructure, facilities and service requirements of the Cockburn Coast in making it a liveable community.

The findings presented in the Cockburn Coast Community Plan include both the routine and the special requirements. The routine requirements for Cockburn Coast are the infrastructure, facilities and services which Australians expect to be available for any community in the country. The special requirements are those infrastructures, facilities and services that should be delivered in the Cockburn Coast to address its unique environment.

To ensure liveability in the Cockburn Coast, the Community Plan supports the delivery of all routine requirements for the community. In addition it supports the delivery of the special requirements identified for the community. First is the need for the higher density urban development to be placed in the fragile coastal landscape in an environmentally sensitive manner. Then there is a need to marry the current open space land and coastal recreation uses with the aesthetic creative leisure pursuits favoured by highly urbanised populations. Finally is the need to address accessibility for all age and ability groups when considering the topology, transportation and housing requirements of the area.

Success in delivering both the routine and special requirements identified in the Cockburn Coast Community Plan will ensure the Cockburn Coast becomes a highly liveable urban community into the future.

REFERENCES

In the development of the Cockburn Coast Community Plan reference was made to the following documents and sources:

- Australian Bureau of Statistics data including 2006 Census Data and 2010 National Regional Profiles data
- City of Cockburn; A Plan for the District 2010-2020
- City of Cockburn; Age-Friendly Strategic Plan 2008
- City of Cockburn; Business Plan 2010/11
- City of Cockburn; Children's Services Plan 2010-2015
- City of Cockburn; Greenhouse Gas Emission Reduction Strategy 2011-2020
- City of Cockburn; Land Management Strategy 2011-2016
- City of Cockburn; Library Strategic Plan 2007-2010
- City of Cockburn Local TravelSmart Guide West
- City of Cockburn; New Directions for Community Development Service Unit
- City of Cockburn; Population and Household Forecast: Coogee-North Coogee
- City of Cockburn; Public Artwork Strategy 2009
- City of Cockburn; Reconciliation Action Plan 2011-2013
- Climate Change Climate Change Risk Management and Adaptation Action plan for the Southern Metropolitan Councils
- Cockburn Coast Community Engagement Strategy
- Cockburn Coast District Structure Plan
- Cockburn Coast Integrated Transport Plan
- Cockburn Coast Masterplan
- Cockburn Crime Prevention Plan 2011-2014
- Cockburn Strategic Plan 2006-2016
- Directions 2031 and Beyond
- Draft Outer Metropolitan Perth and Peel Sub-regional Strategy
- Drivers of Activity Centre Development in the Fremantle CBD: Fremantle's position in the metropolitan hierarchy
- North Coogee Foreshore Management Plan
- Port Coogee Marina Village Masterplan
- Sport and Recreation Strategic Plan 2009
- The Changing Cockburn Coast; European Heritage
- The Changing Cockburn Coast; Indigenous Heritage
- The Changing Cockburn Coast; Socio-economic Analysis
- Western Australian Police Crime Statistics 2011

Appendix M
Hilltop/Emplacement
LSP Bushfire Hazard
Assessment

M

Hilltop / Emplacement LSP Bushfire Hazard Assessment

Prepared for
Hassell Ltd on behalf of LandCorp

14 May 2013









DOCUMENT TRACKING

ITEM	DETAIL
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Technical Review by	Rod Rose (Director)
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1 Introduction

Eco Logical Australia Pty Ltd (ELA) was engaged by Hassell Pty Ltd (Hassell) to undertake and prepare a bushfire hazard assessment and associated analysis of the Hilltop / Emplacement Local Structure Plan (LSP) in the City of Cockburn, Western Australia (WA).

1.1 PURPOSE AND AIM

The need for a bushfire hazard assessment was raised by Department of Planning (DoP) and Department of Environment and Conservation (DEC) in their submissions to City of Cockburn on the LSP. The assessment is required by the City of Cockburn to inform and support the LSP prior to submission to Western Australia Planning Commission (WAPC) for endorsement.

The aim of the assessment is assess the bushfire hazard and risk relevant to the LSP and provide bushfire protection recommendations that are acceptable under, or compliant with, the *Planning for Bushfire Protection Guidelines (Edition 2, 2010)* (herein referred to as PBP) developed by WAPC and the Fire and Emergency Services Authority (FESA).

1.2 METHODOLOGY

The methodology used in this assessment is detailed in Section 2; it is compliant with the PBP and involved:

- Identification and mapping of the bushfire hazard level
- Determining acceptable bushfire hazard controls appropriate to the hazard level
- Recommending bushfire hazard controls to be incorporated into the LSP

1.3 LOCATION

The LSP site is located in the City of Cockburn within the suburb of North Coogee, to the south of Fremantle (Figure 1).

The site is bound to the north by Bellion Drive, to the west by the Cockburn Coast Primary Regional Road Reserve, to the south by existing light industrial development marked by McTaggart Cove, and to the east by Cockburn Road (Figure 2).

The site itself supports existing light industrial development for approximately two-thirds of its area serviced primarily by Emplacement Crescent. The remaining area consists of cleared or highly disturbed, vacant lands.

1.4 HILLTOP / EMPLACEMENT LSP

The LSP proposes changes to land use replacing the existing industrial zone with residential and mixed business and commercial uses (Figure 3). This will involve the introduction of habitable development and an intensified use of the area.

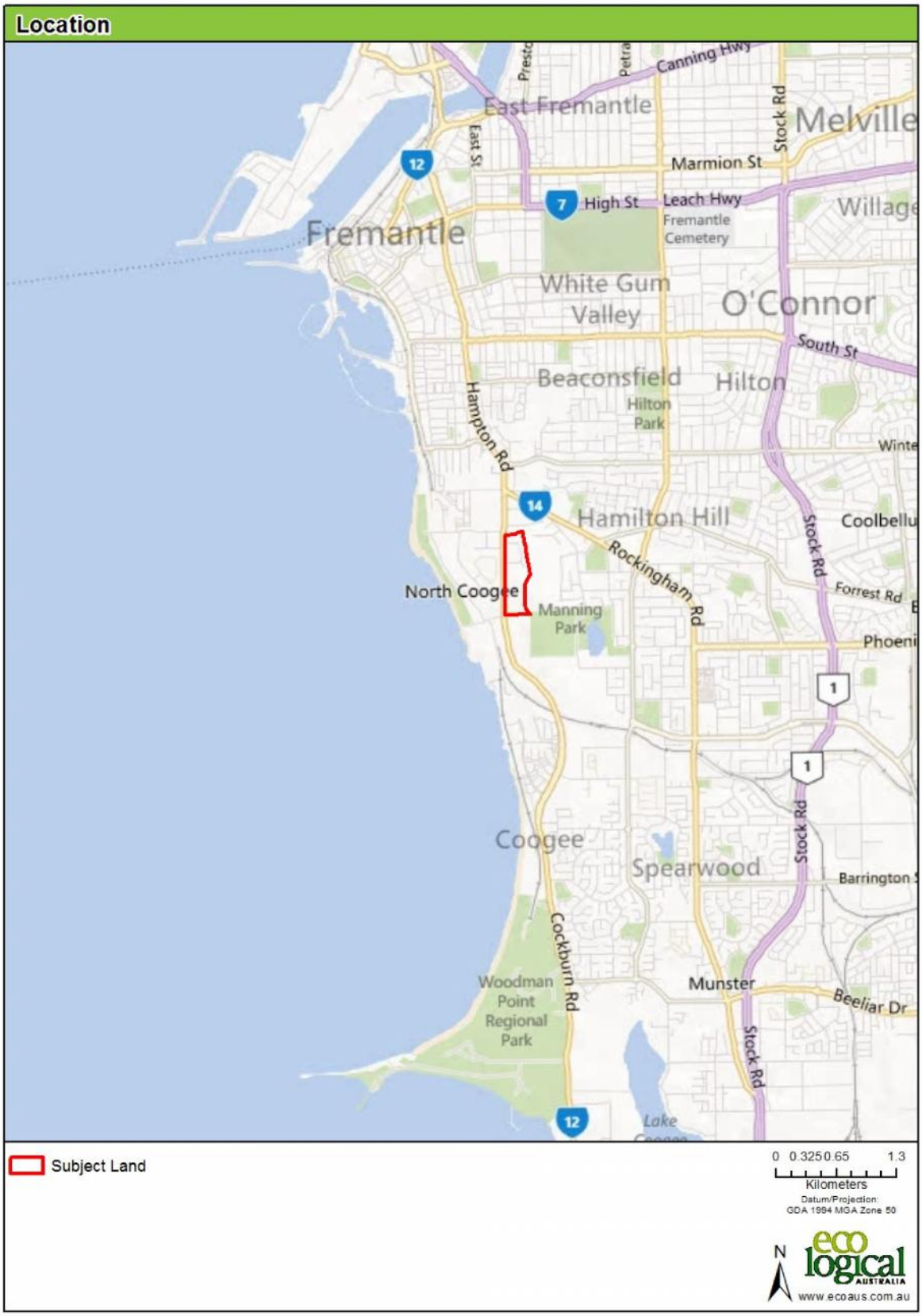

Figure 1: Location of Hilltop / Emplacement Local Structure Plan (LSP)

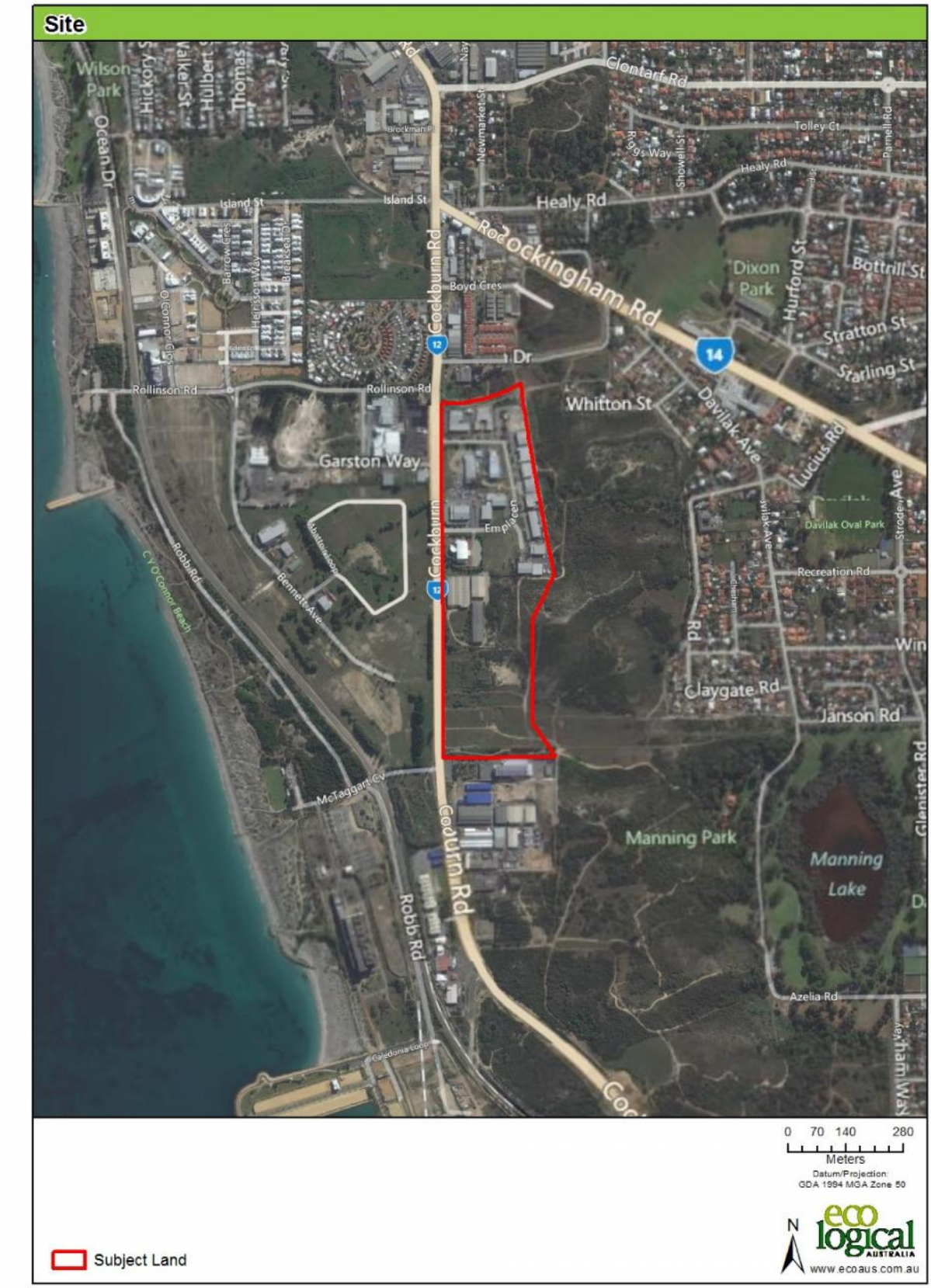

Figure 2: LSP site environs

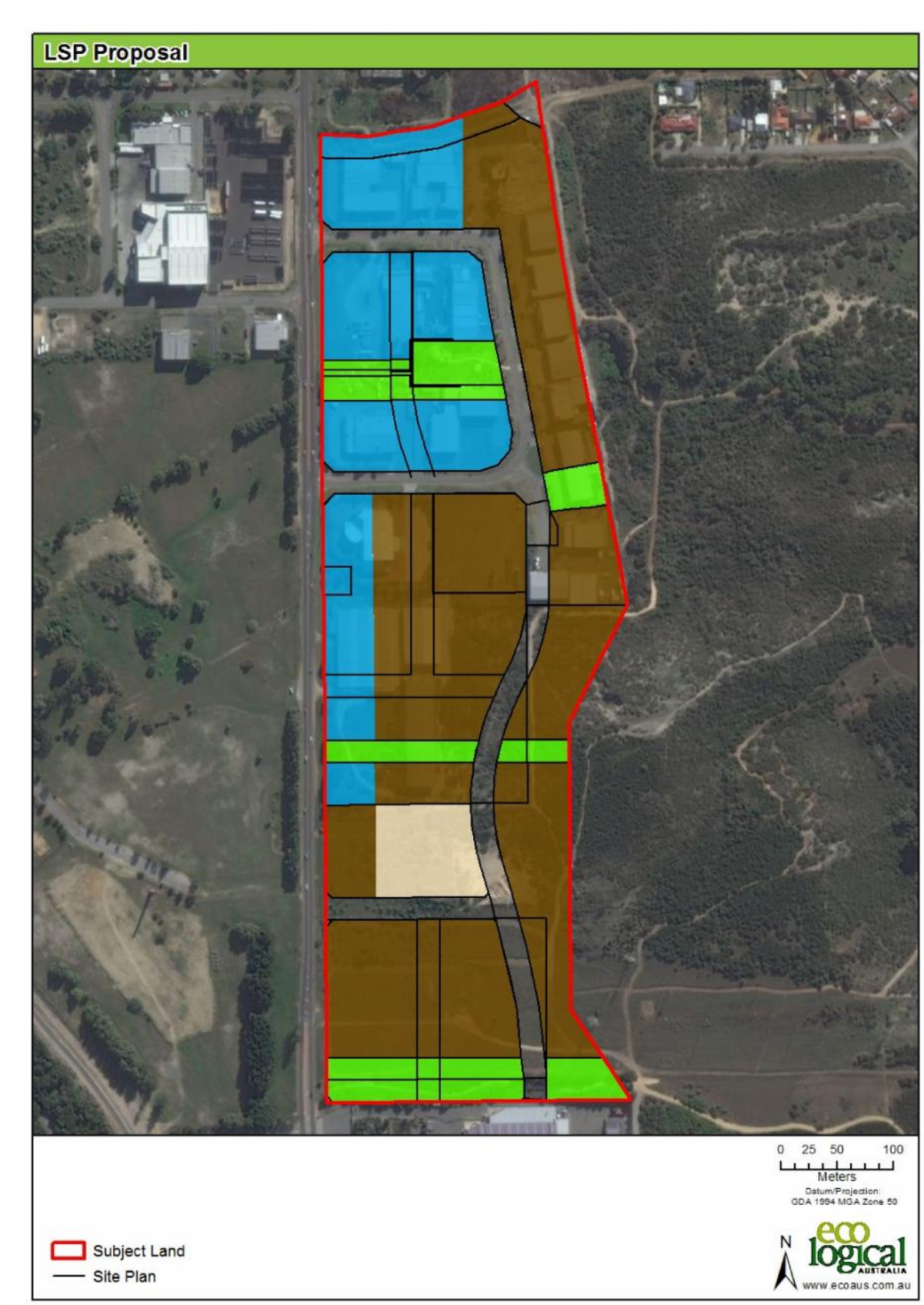

Figure 3: LSP land use proposal/layout

2 Assessment requirements

The PBP defines the approach required for mapping bushfire hazard, and lists the performance criteria and acceptable solutions for specific bushfire hazard controls or fire mitigation strategies required for development within a bushfire hazard area.

There are eight guidance statements (PBP Section 2.3) that apply to structure plans. These statements must be addressed to give effect to the objectives of PBP and an acceptable and compliant level of bushfire protection within a structure plan.

The performance criteria and acceptable solutions identified within PBP are designed to achieve the twelve guidance statements for subdivisions (PBP Section 2.4). Although it is not possible to assess the compliance of a structure plan against the detailed requirements of the performance criteria and acceptable solutions, they are referred to as a guide to inform future phases of the planning process including subdivision. Satisfying the guidance statements for the Structure Plan will ensure that the guidance statements for subdivision and related performance criteria and acceptable solutions can be achieved in the future.

The objectives, general principles and guidance statements for structure plans from PBP are listed in Appendix A and referred to throughout this bushfire hazard assessment. These can be found in Section 2.1, 2.2 and 2.3 of PBP, respectively.

3 Bushfire hazard

3.1 VEGETATION

The vegetation within and surrounding the LSP site has been inspected on site and mapped (Figure 4). The vegetation classes are in accordance with the PBP, which adopts the vegetation classification method within *AS 3959-2009 Construction of buildings in bushfire-prone areas* (AS 3959). The most recent version of AS 3959 has been used (AS 3959-2009 incorporating Amendment 3).

More than half of the LSP site is kept clear of vegetation and is considered 'managed land'. Managed lands predominate adjacent land to the north, west and south of the site.

The remainder of the site is mostly shrubland and grassland. This is typical of the land adjacent to the east of the site in the Coast Primary Regional Road Reserve and further afield into the Beeliar Regional Park. Here and within those parts of the site that remain vegetated the height and density (structure) of the shrubland varies greatly due to past disturbance including fire activity, clearing and weed invasion, and position on the undulating landscape , ranging from tall closed shrubland to low open shrubland. There are small pockets of low woodland within and adjacent to the site. Substantial areas of grassland exist in the southern part of the site and adjacent to the south-east corner of the site in the Road Reserve and Beeliar Regional Park.

3.2 BUSHFIRE HAZARD ASSESSMENT MAPPING

A bushfire hazard assessment map has been prepared following the methodology within PBP (Figure 5). The map displays areas of low, moderate and extreme hazard based upon the predominant vegetation (Figure 4) and the effective slope (see contours and slope labelling).

Of particular importance, the map identifies extreme hazard currently within the centre of the site and adjacent to the east within the Cockburn Coast Primary Regional Road Reserve and Beeliar Regional Park. The PBP does not expressly permit an intensification of development within areas of extreme hazard unless the hazard will be removed or managed, or the appropriate bushfire hazard management measures are put in place. For the purposes of this assessment, it is assumed that as a result of implementation of the LSP the vegetation representing an existing bushfire hazard within the site will be developed, removed or managed so that it constitutes a low hazard. In regards to the hazard represented by adjacent land, Section 4 discusses what bushfire hazard management is to occur to allow development adjacent to vegetation of extreme hazard, which will remain off-site to the east. The PBP also requires measures for development within and adjacent areas of moderate hazard. Areas of low hazard are considered to pose a threat not significant enough to warrant specific bushfire hazard management measures.

3.3 AS 3959 BUSHFIRE ATTACK LEVEL (BAL)

The Bushfire Attack Levels (BALs) for the site have been mapped and tabulated (Figure 6). A BAL is determined by the combination of predominant vegetation, effective slope and distance from the hazard. The determination of the BALs followed the acceptable solution Method 1 process within AS 3959. Each BAL is identified by the radiant heat flux measured in kW/m^2 that is expected within that zone. For example, a dwelling within BAL-12.5 zone is predicted to experience a maximum 12.5 kW/m^2 of radiant heat based upon a design-fire at the interface of the bushfire hazard.

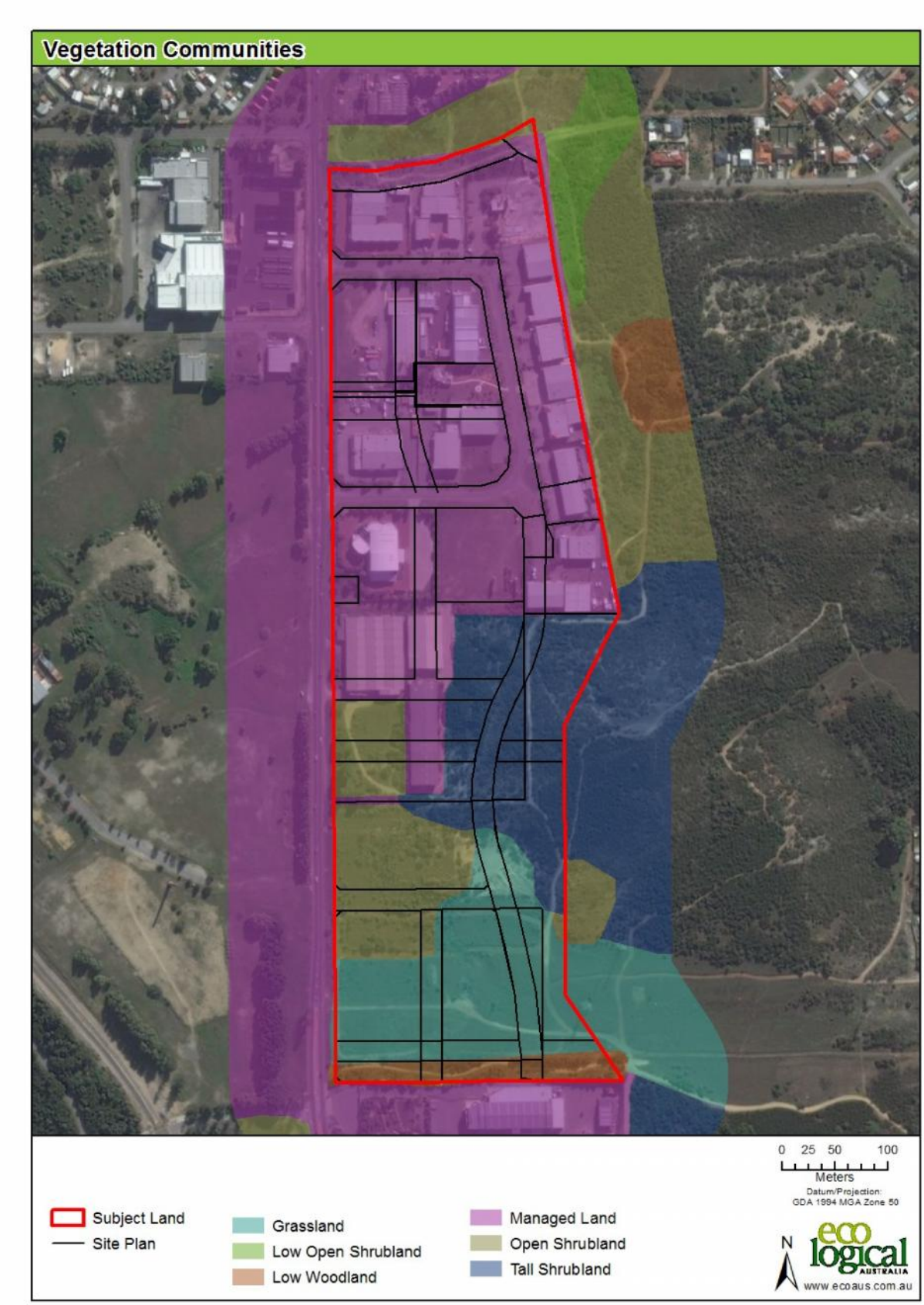

Figure 4: Vegetation communities



Figure 5: Bushfire hazard and slope

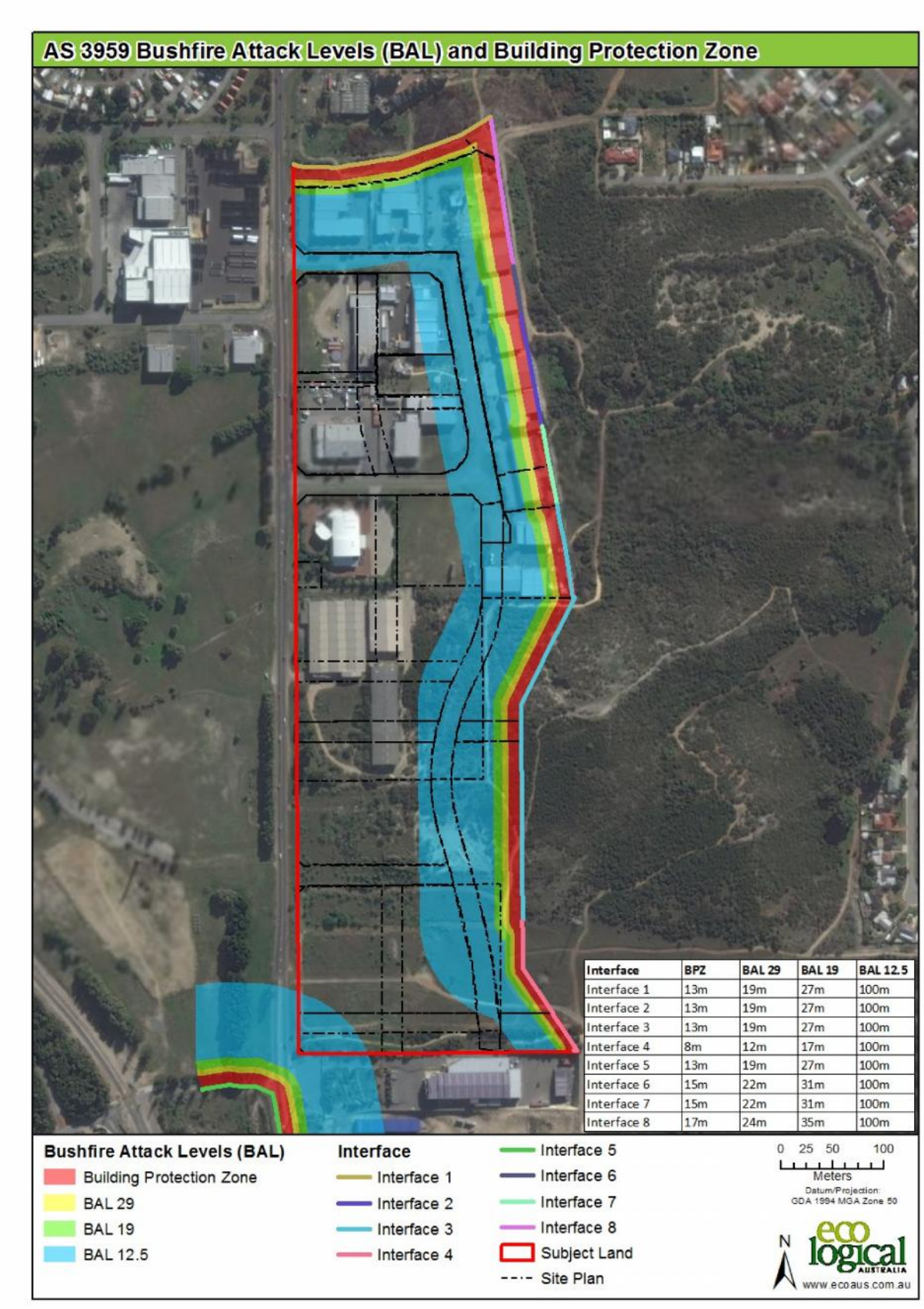

Figure 6: AS 3959 Bushfire Attack Levels (BAL) and Building Protection Zone

AS 3959 lists a set of construction requirements for each BAL that will prevent material ignition at the relevant radiant heat flux during a passing fire front. An overview of the BAL system is provided below:

- BAL-Low: The threat does not warrant application of construction standards. Developments with BAL-Low are generally not within bushfire prone land (greater than 100 m from bushland)
- BAL-12.5: Addresses background radiant heat at lower levels and ember attack
- BAL-19: Addresses mid-range radiant heat and ember attack
- BAL-29: Addresses high range radiant heat and ember attack
- BAL-40: Addresses extreme range of radiant heat and potential flame contact and ember attack. PBP does not recommend development within BAL-40
- BAL-FZ: Addresses construction within the flame zone. PBP does not recommend development within BAL-FZ

The BAL-FZ and BAL-40 zones in combination form the Building Protection Zone that provides the required setback from the bushfire hazard allowing dwelling and building construction at a maximum of BAL-29.

All the BALs in combination create a Bushfire Prone Area that requires all future dwellings and buildings to be constructed in accordance with the building construction measures linked to each BAL. Figure 7 indicates the Bushfire Prone Area.

Note, in determining the BALs for simplicity and as a precaution the vegetation was categorised as 'scrub' for all vegetation communities except 'grassland', which was categorised as 'grassland'. There are some vegetation communities present that pose a lesser threat than scrub (such as low open shrubland) however these cover a small percentage of the hazard area and may revert into the higher hazard class of scrub in the medium to long term. The low woodland community was disregarded due to its small size and distance from the site.

The amalgamation and upgrading of the communities into 'scrub' classification allows future subdivision to comply with the separation zone applied at the structure planning stage. A site specific assessment at the time of subdivision application may result in a slight reduction in the Building Protection Zone or the areas affected by each BALs.

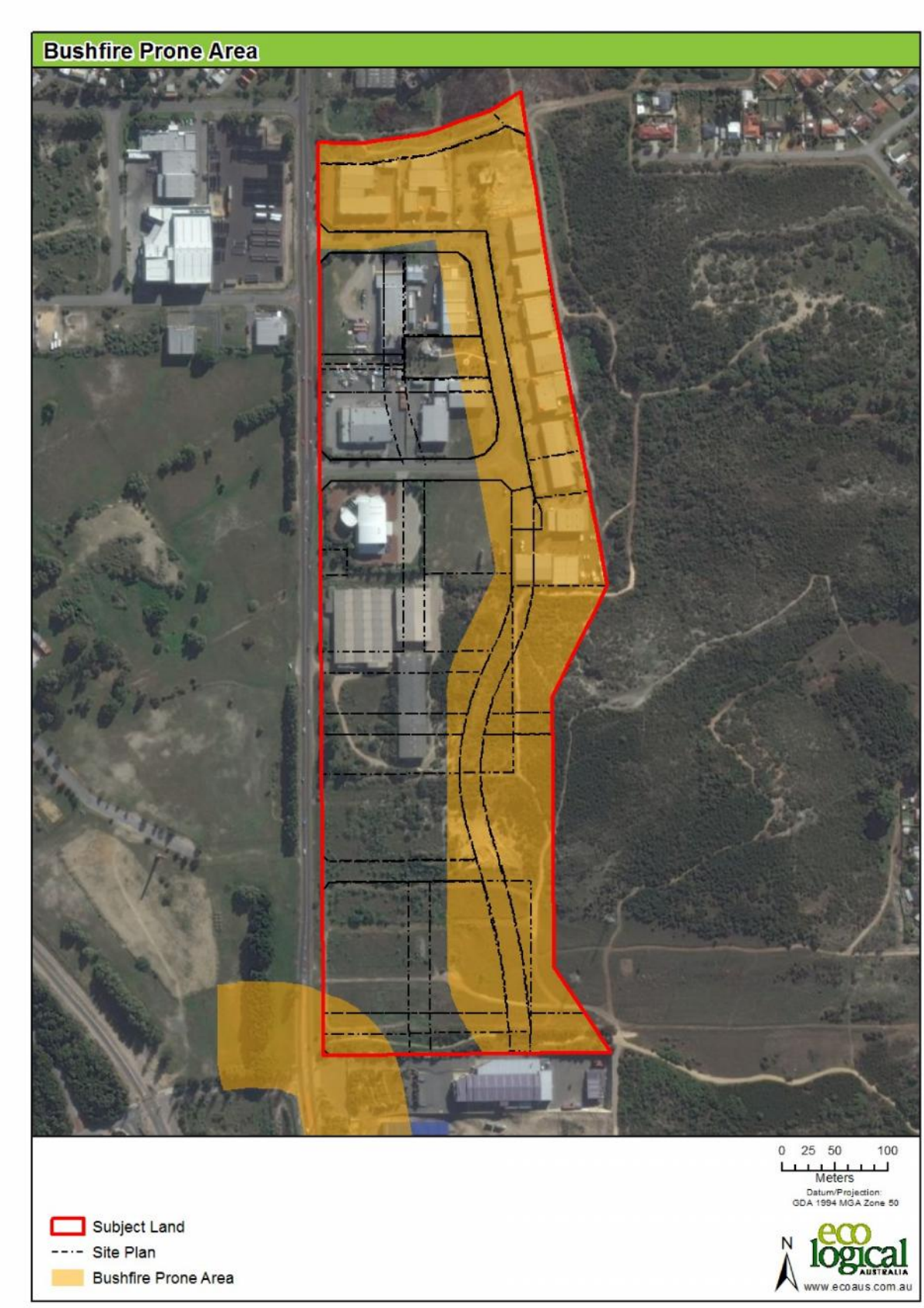

Figure 7: Bushfire Prone Area

4 Bushfire hazard controls

This section assesses the LSP against the PBP performance criteria and acceptable solutions for future residential subdivision and other related development. Five management elements of a future subdivision are to be assessed; location, vehicular access, water, siting of development, and design of development. This assessment gives rise to a suite of recommendations to be incorporated into the LSP and related planning instruments. Other management items are noted for consideration in future subdivisions.

4.1 ELEMENT 1: LOCATION

Performance criteria (P1): *The subdivision/development is located in an area where the bush fire hazard level is manageable.*

Acceptable solution (A1.1.): *The subdivision/development is located on land that is not subject to either an extreme bush fire hazard land classification or requires construction standards to BAL-40 or BAL-FZ.*

Assessment and recommendation: BAL-40 and BAL-FZ zones are combined to create a minimum Building Protection Zone as shown in Figure 6. The zone ranges from 8 m to 17 m depending on the combination of predominant vegetation and effective slope (See Figure 6 table). This zone will ensure all future buildings will have a maximum construction standard of BAL-29 and all buildings within 100 m of the hazard will require compliance with AS 3959.

4.2 ELEMENT 2: VEHICULAR ACCESS

Performance criteria (P2): *The internal layout, design and construction of public and private vehicular access in the subdivision/development allows emergency and other vehicles to move through it easily and safely at all times.*

Acceptable solution (A2.1): *Two different vehicular access routes, both of which connect to the public road network, are available to all residents/the public at all times.*

Assessment and recommendation: The proposed LSP has four public roads linking to the surrounding public road network.

Acceptable solution (A2.2): *Public roads meet the following requirements:*

- *Minimum trafficable surface: 6 metres*
- *Horizontal clearance: 6 metres*
- *Vertical clearance: 4 metres*
- *Maximum grades: 1 in 8*
- *Maximum grade over <50 metres: 1 in 5*
- *Maximum average grade: 1 in 7*

- *Minimum weight capacity: 15 tonnes*
- *Maximum crossfall: 1 in 33*
- *Curves minimum inner radius: 12 metres*

Assessment and recommendation: These road design criteria are achievable.

Acceptable solution (A2.3): *Cul-de-sacs (including dead end roads) are generally not encouraged in bush fire prone areas. Where used, however, cul-de-sac standards are to be as follows*

- *Maximum length: 200 metres (if emergency access is provided between cul-de-sac heads maximum length can be increased to 600 metres provided no more than 8 lots are serviced)*
- *Minimum trafficable surface: 6 metres*
- *Horizontal clearance: 6 metres*
- *Maximum grades: 1 in 8*
- *Maximum grade over <50 metres: 1 in 5*
- *Maximum average grade: 1 in 7*
- *Minimum weight capacity: 15 tonnes*
- *Maximum crossfall: 1 in 33*

  Curves minimum inner radius: 12 metres
- *As per turn around area requirements – including 21 metre diameter head*

Assessment and recommendation: These road design criteria are achievable..

Acceptable solution (A2.4): *Battle axe access legs meet the following requirements:*

- *Maximum length: 600 metres*
- *Minimum width: 6 metres*
- *Minimum trafficable surface: 4 metres*
- *Horizontal clearance: 6 metres*
- *Vertical clearance: 4 metres*
- *Maximum grades: 1 in 8*
- *Maximum grade over <50 metres: 1 in 5*
- *Maximum average grade: 1 in 7*
- *Minimum weight capacity: 15 tonnes*
- *Maximum crossfall: 1 in 33*

- *Curves minimum inner radius: 12 metres*

Assessment and recommendation: These road design criteria are achievable..

Acceptable solution (A2.5): *Constructed private driveways meet the following requirements:*

- *Required where house site is more than 50 metres from a public road*
- *Minimum trafficable surface: 4 metres*
- *Horizontal clearance: 6 metres*
- *Vertical clearance: 4 metres*
- *Maximum grades: 1 in 8*
- *Maximum grade over <50 metres: 1 in 5*
- *Maximum average grade: 1 in 7*
- *Minimum weight capacity: 15 tonnes*
- *Maximum crossfall: 1 in 33*
- *Curves minimum inner radius: 12 metres*
- *Passing bays: every 200 metres with a minimum length of 20 metres and a minimum width of 2 metres (ie the combined width of the passing bay and constructed private driveway to be minimum 6 metres)*
- *Turn around areas designed to accommodate 3.4 fire appliances and to enable them to turn around safely: every 500 metres and within 50 metres of a house*

Assessment and recommendation: These road design criteria are achievable.

Acceptable solution (A2.6): *Emergency access ways, providing alternative links to public roads during emergencies meet the following requirements:*

- *Minimum trafficable surface: 6 metres*
- *Horizontal clearance: 6 metres*
- *Vertical clearance: 4 metres*
- *Maximum grades: 1 in 8*
- *Maximum grade over <50 metres: 1 in 5*
- *Maximum average grade: 1 in 7*
- *Minimum weight capacity: 15 tonnes*
- *Maximum crossfall: 1 in 33*
- *Curves minimum inner radius: 12 metres*

- *Must be signposted*

Assessment and recommendation: These road design criteria are achievable.

Acceptable solution (A2.7): *Fire services access routes, providing links between public road networks for fire fighting purposes, meet the following requirements:*

- *Surface: all weather*
- *Dead end: not permitted*
- *Minimum trafficable surface: 6 metres*
- *Horizontal clearance: 6 metres*
- *Vertical clearance: 4 metres*
- *Maximum grades: 1 in 7*
- *Maximum grade over <50 metres: 1 in 4*
- *Maximum average grade: 1 in 5*
- *Minimum weight capacity: 15 tonnes*
- *Maximum crossfall: 1 in 33*
- *Curves minimum inner radius: 12 metres*
- *Turn around areas designed to accommodate 3.4 appliances and to enable them to turn around safely: every 500 metres*
- *Erosion control measures and long term maintenance arrangements in place*
- *Access to public road network: every 1000 metres*
- *Allow for two way traffic*

Assessment and recommendation: The LSP incorporate a compliant emergency access way (or public road) within the Building Protection Zone of the subject land (refer to Figure 6).

Acceptable solution (A2.8): *All gates used to restrict traffic on emergency access ways and fire service access routes meet the following requirements:*

- *Minimum width 3.6 metres*
- *Design and construction: to be approved by relevant local government*
- *Emergency access way gates: must not be locked*
- *Fire service access route gates: may be locked but only with a common key that is available to local fire service personnel*
- *Signposted*

Assessment and recommendation: These road design criteria are achievable.

Acceptable solution (A2.9): *Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum 3 metres width.*

Assessment and recommendation: These criteria are achievable.

Acceptable solution (A2.10): *Signs are erected where emergency access ways and fire services access routes adjoin public roads, and meet the following requirements:*

- *Minimum height above ground: 0.9 metres*
- *Design and construction: to be approved by relevant local government*

  Lettering height: 100 millimetres
- *To display the following wording (as appropriate): 'Fire Service Access – No Public Access' or 'Emergency Access Only'*

Assessment and recommendation: These criteria are achievable.

4.3 ELEMENT 3: WATER SUPPLY

Performance criteria (P3): *The development is provided with a permanent and secure water supply that is sufficient for fire fighting purposes.*

Acceptable solution (A3.1.): *The development is provided with a reticulated water supply, together with fire hydrants, in accordance with the specifications of the relevant water supply authority and FESA.*

Assessment and recommendation: These criteria are achievable.

4.4 ELEMENT 4: SITING OF DEVELOPMENT

Performance criteria (P4): The siting (including paths and landscaping) of the development minimises the bush fire risk to life and property.

Acceptable solution (A4.1.): *Every building is sited a minimum distance of 100 metres from any vegetation classified under table 1 and figure 1 as forests, woodlands, closed shrub, open shrub, mallee/mulga and rainforest (i.e. in an area with an moderate or extreme bush fire hazard level) or has its construction standard increased to align with the appropriate bush fire attack level for that location. Under AS 3959, the distance between the predominant vegetation and the building can be reduced but, the construction standard must be increased.*

Assessment and recommendation: BAL-40 and BAL-FZ zones are combined to create a minimum Building Protection Zone as shown in Figure 6. The zone ranges from 8 m to 17 m depending on the combination of predominant vegetation and effective slope (See Figure 6 table). This zone will ensure all future buildings will have a maximum construction standard of BAL-29 and all buildings within 100 m of the hazard will require compliance with AS 3959.

As stated in the explanatory notes for acceptable solution A4.1 in PBP, the minimum distance of 100 m set may be reduced using a performance criteria assessment. One way for residential development to meet this performance criterion is compliance with AS 3959. Under AS 3959, as the distance from the vegetation is reduced, the construction standard must be increased.

Acceptable solution (A4.2.): *Every building is sited a minimum distance of 20 metres from any vegetation classified under table 1 and figure 1 of appendix 1 as grassland (ie in an area with a low bush fire hazard level).*

Assessment and recommendation: Satisfy the performance criteria by achieving a maximum BAL-29 construction level and a setback less than 20 m.

As stated in the explanatory notes for acceptable solution A4.2 in PBP, the minimum distance of 20 m may be reduced using a performance criteria assessment. One way for residential development to meet this performance criterion is compliance with AS 3959. Under AS 3959, as the distance from the vegetation is reduced, the construction standard must be increased.

Acceptable solution (A4.3): *Every building is surrounded by a building protection zone that meets the following requirements:*

- Width: 20 metres measured from any external wall of the building
- *Location: within the boundaries of the lot on which the building is situated*
- *Fuel load: reduced to and maintained at 2 tonnes per hectare*
- *Trees (crowns) are a minimum of 10 metres apart*
- *Trees are low pruned at least to a height of 2 metres*
- *No tall shrub or tree is located within 2 metres of a building (including windows)*
- *There are no tree crowns overhanging the building*
- *Fences and sheds within the building protection zone are constructed using non-combustible materials (eg colourbond iron, brick, limestone)*
- *Shrubs in the building protection zone have no dead material within the plant*
- *Tall shrubs in the building protection zone are not planted in clumps close to the building ie within 3 metres*
- *Trees in the building protection zone have no dead material within the plant's crown or on the bole*

Assessment and recommendation: It is proposed to satisfy the performance criteria by achieving a maximum BAL-29 construction level and a setback (Building protection Zone) less than 20 m. The fuel management measures are achievable.

Acceptable solution (A4.4): *Every building and its contiguous building protection zone is surrounded by a hazard separation zone that meets the following requirements:*

- *Minimum width: 80 metres in the case of vegetation classified under table 1 and figure 1 as forests, woodlands, closed shrub, open shrub, mallee/mulga and rainforest, measured from the outer edge of the building protection zone.*
- *Location: within the boundaries of the lot on which the building is situated or, where this is not possible or desirable, within the boundaries of the overall residential development in which the building is proposed to be located*

- *Fuel load: reduced to and maintained at between 5 and 8 tonnes per hectare for jarrah/marri dominated forest and woodlands, below 12-15t/ha in mallee heath and below 15t/ha in karri forest*
- *Trees (crowns) are a minimum of 10 metres apart*
- *Trees in the hazard separation zone have no dead material within the plant's crown or on the bole*

Assessment and recommendation: A maximum BAL-29 construction level with a Building Protection Zone for those lots that are adjacent the hazard interface only.

Acceptable solution (A4.5): A reduction in the bushfire attack level (BAL) due to shielding from direct flame contact or radiant heat via a stand-alone non-combustible structure shall be considered achieved when the following applies:

- *A building elevation that is not exposed to the source of bushfire attack can be classified to the next lower bushfire attack level for those elevations*
- *A reduction in the bushfire attack level (see (a) above) and the according construction standards cannot fall below BAL-12.5*
- *An elevation is deemed to be exposed to the source of the bush fire if any of the straight lines between that elevation and source of bush fire attack is not obstructed by another part of the building, for this method, only the side(s) furthest from the vegetation will gain the reduction*

Assessment and recommendation: These measures are achievable at later stages during development application for buildings.

4.5 ELELMENT 5: DESIGN OF DEVELOPMENT

Performance criteria (P5): *The design of the development is appropriate to the level of bush fire hazard that applies to the development site.*

Acceptable solution (A5.1): *For development that complies with acceptable solutions A4.1, A4.2, A4.3 and A4.4 there are no special design requirements.*

Assessment and recommendation: The LSP will not comply with all acceptable solutions. The Building Protection Zone and Hazard Separation Zone will be less than 20 m and 80 m, respectively, therefore AS 3959 will be utilised to ensure buildings are designed and constructed to withstand fire attack at a maximum of BAL-29. To ensure the future enforcement and application of AS3959 to building construction, it is recommended that a Bushfire Prone Area is demarcated as shown in Figure 7.

Acceptable solution (A5.2): *For development that does not comply with acceptable solutions A4.1, A4.2, A4.3 and A4.4 there is no acceptable solution. All such proposals must be assessed under performance criterion P5.*

Assessment and recommendation: As noted in A5.1above.

5 Conclusion

The bushfire hazard assessment has mapped the hazard and identified bushfire hazard controls to address the hazard and risk that comply with the PBP. Building Protection and Hazard Separation Zones less than that prescribed by the acceptable solutions of the PBP are proposed for the LSP. The proposed protection zone will be equivalent of the AS 3959 BAL-40 and BAL-FZ zones in combination (amalgamated) and AS 3959 will be relied upon via the demarcated Bushfire Prone Area to ensure all future dwellings and buildings are constructed to comply with AS 3959. Other bushfire hazard controls (such as those related vehicular access and water supply) are also recommended and noted.

In conclusion the proposed LSP is capable of providing a level of bushfire hazard management compliant with the PBP. A response to the PBP guidance statements for structure plans and the list of recommendations is provided in the subsections below.

5.1 SATISFACTION OF GUIDANCE STATEMENTS

Table 1 below lists the PBP guidance statements for structure plans and a corresponding response on how they have been achieved throughout this assessment and by the LSP.

Table 1: Satisfaction of PBP guidance statement for structure plans

PBP GUIDANCE STATEMENT FOR STRUCTURE PLANS	RESPONSE
Guidance statement A1 - Bush fire hazard assessment and analysis required *Unless it is clear to the decision-making authority that the land in question is not in an area that has a moderate or extreme bush fire hazard level, any new proposals or proposals which will effect a change of land use or design resulting in the introduction of, or an intensification of development should:* • include a bush fire hazard assessment based on the fire hazard assessment methodology and classifications set out in appendix 1 of these guidelines; • *identify any bush fire hazard issues arising from that assessment; and* • *address those issues, in accordance with the general principles that underpin these guidelines, in a statement or a report which demonstrates that all fire protection requirements can be achieved to the satisfaction of the WAPC.*	Satisfied. The proposal will effect a change of use resulting in the introduction and intensification of development adjacent areas of moderate and extreme hazard. A hazard assessment has been prepared with corresponding controls.
Guidance statement A2 - Areas with extreme bush fire hazard levels *Any change of zoning/planning provisions or design resulting in the introduction of, or an intensification of, development in an area that has an extreme bush fire hazard level will normally not be approved.*	Satisfied. Refer to following guidance statement A3. The extreme hazard within the site will be removed to make way for the development. Extreme hazard will remain to the east adjacent the site,

PBP GUIDANCE STATEMENT FOR STRUCTURE PLANS	RESPONSE
	however the appropriate controls will be put in place so that development will not be within an extreme hazard area or BAL-40 or BAL-FZ area.
Guidance statement A3 – Areas with extreme bushfire hazard levels where the introduction of, or intensification of land use is unavoidable *Any new proposals or proposed land use, zoning or design change that will result in the introduction of, or an intensification of development in an area that has an extreme bush fire hazard level, but which are considered unavoidable, will only be approved where it can be demonstrated that acceptable, permanent hazard reduction measures can be implemented at some subsequent stage in the planning process to reduce the hazard level to an acceptable level, and that the development can be undertaken in accordance with the general principles and building construction standards that underpin these guidelines. This may include an appropriate building protection zone, hazard separation zone and construction to an appropriate standard as specified in AS 3959 and as supported by a satisfactory risk assessment and analysis.*	Satisfied. The appropriate controls have been recommended that provide for a Building Protection Zone that will not allow future construction over BAL-29 and will ensure all future buildings will comply with the appropriate BAL by demarcating a Bushfire Prone Area.
Guidance statement A4 - Areas with moderate fire hazard levels *Any new proposals or proposed changes of zoning or design that will result in the introduction of, or an intensification of, development in an area that has a moderate bush fire hazard level will only be approved where the development can be undertaken in accordance with the general principles that underpin these guidelines. In the case of structure plans, where the bush fire hazard was addressed at the time of the zoning of the land, the information on that hazard may be re-used, if the information is still relevant.*	Satisfied. The bushfire hazard controls comply with PBP.
Guidance statement A5 - Incorporating bush fire hazard controls in local planning schemes and local planning strategies *Consideration is to be given to providing measures in local planning schemes and their amendments, and local planning strategies to identify bush fire hazard areas and ensure that development in these areas addresses bush fire hazard issues. Special control areas can be linked to the boundaries of the bush fire hazard areas established through a strategic bush fire hazard assessment.*	Satisfied. A demarcated Bushfire Prone Area has been recommended to ensure enforcement and application of AS 3959 to future buildings.
Guidance statement A6 - Consult with FESA for planning matters and strategic bush fire hazard assessments *The advice of FESA is to be sought where compliance with the guidelines is unlikely to be achieved or additional/alternative measures are proposed to achieve the objectives. FESA is also to be consulted to provide advice on a strategic bush fire hazard assessment and the selection of areas suitable for more intensive development from a bush fire safety point of view.*	Noted. This assessment will be referred to FESA during agency review.

PBP GUIDANCE STATEMENT FOR STRUCTURE PLANS	RESPONSE
Guidance statement A7 - Referral to DEC and other decision-making authorities *Where the land that is the subject of a new proposal or proposed changes of zoning or design that will result in the introduction of, or an intensification of, development in an area that abuts vegetated land managed by DEC or other relevant management agency, the application is to be referred to the DEC (or relevant agency) for advice, regarding the potential impact of their fire management practices on the amenity of the future occupants, prior to a decision being made by the decision-making authority.*	Noted. This assessment will be referred to neighbouring land management agency during agency review.
Guidance statement A8 - Matters to be taken into consideration *In addition to the matters normally required to be taken into consideration, any advice received from FESA, the DEC (regarding potential impacts of their fire regime on amenity) or other relevant authority regarding fire management practices is to be taken into consideration before a decision is made by the decision-making authority on that application. When assessing new proposals or proposed changes of zoning or design that will result in the introduction of, or an intensification of, development that abuts land vested in the DEC, FESA will consider input from DEC on bush fire management prior to providing final advice on fire management practices to the decision-making authority.*	Noted. Any comments provided by FESA or other agencies will be considered and incorporated into this assessment.

5.2 RECOMMENDATIONS

Table 2 below lists all the recommendations made within this assessment. The recommendations listed either need to be incorporated into the LSP, or to be noted for consideration at later planning stages such as subdivision.

Table 2: Recommendations

RECOMMENDATION	REPORT REFERENCE
BAL-40 and BAL-FZ zones are combined to create a minimum Building Protection Zone as shown in Figure 6. The zone ranges from 8 m to 17 m depending on the combination of predominant vegetation and effective slope (See Figure 6 table). This zone will ensure all future buildings will have a maximum construction standard of BAL-29 and all buildings within 100 m of the hazard will require compliance with AS 3959.	Section 4.1 (A1.1)
The proposed LSP has four public roads linkling to the surrounding public road network as proposed.	Section 4.2 (A2.1)
The LSP incorporate a compliant emergency access way (or public road) within the Building Protection Zone of the subject land (refer to Figure 6).	Section 4.2 (A2.7)
The LSP will not comply with all acceptable solutions. The Building Protection Zone and Hazard Separation Zone will be less than 20 m and 80 m, respectively, therefore	Section 4.5 (A5.1) and (A5.2)

RECOMMENDATION	REPORT REFERENCE
AS 3959 will be utilised to ensure buildings are designed and constructed to withstand fire attack at a maximum of BAL-29. To ensure the future enforcement and application of AS3959 to building construction, it is recommended that a Bushfire Prone Area is demarcated as shown in Figure 7.	
Note vehicular access controls required for future subdivision and development. The criteria are achievable.	Section 4.2 (A2.2), (A2.3), (A2.4), (A2.5), (A2.6), (A2.8), (A2.9), (A2.10)
Note water supply controls required for future subdivision and development. The criteria are achievable.	Section 4.3 (A3.1)
Note fuel management requirements within the Building Protection Zone required for future subdivision and development. The fuel management measures are achievable.	Section 4.4 (A4.3)
Note potential reduction in BALs due to shielding at later stages during development. These measures are achievable at later stages during development application for buildings.	Section 4.4 (A4.5)

6 References

Standards Australia. 2009. *Australian Standard 3959 Construction of Buildings in Bushfire-Prone Areas* (AS-3959).

WAPC/FESA. 2010. *Planning for Bushfire Protection Guidelines edition 2, May 2010*. Western Australian Planning Commission and Fire and Emergency Services Authority of Western Australia.

Appendix A: PBP Objectives, General Principals and Guidance Statements

PBP Section 2.1 - Objectives of the guidelines

The guidelines have three objectives:

> ***Objective 1***
>
> *To identify areas where fire poses a significant threat to life and property, and through the use of an assessment methodology determine the level of bush fire hazard applying to those areas.*
>
> ***Objective 2***
>
> *To avoid increased fire risk to life and property through inappropriately located or designed land use, subdivision and development.*
>
> ***Objective 3***
>
> *To ensure that land use, subdivision and development takes into account fire protection requirements and includes specified fire protection measures where there is any risk from fires, especially involving land that has a moderate or extreme bush fire hazard level or a bush fire attack level between BAL-12.5 and BAL-FZ.*

PBP Section 2.2 - General principles underpinning the guidelines

There are five general principles underpinning the guidelines. These seek to give effect to the objectives:

> ***Principle 1***
>
> *Bush fire hazards must be considered in planning decisions at all stages of the planning process to avoid increased fire risk to life and property through inappropriately located or designed land use and development.*
>
> ***Principle 2***
>
> *Local governments are to identify bush fire hazard levels in their structure plans, local planning strategies and local planning schemes, based on the bush fire hazard assessment methodology in the guidelines. A detailed assessment is to be undertaken to review the accuracy of a 'broad brush' assessment, as a basis for determining land use and zoning for specific development proposals. The advice of FESA is to be sought in this regard.*
>
> ***Principle 3***

Subdivision and development in areas with an extreme bush fire hazard level or a bush fire attack level between BAL-40 and BAL-FZ, is to be avoided unless certain fire protection requirements can be implemented to the satisfaction of the WAPC, FESA and/or the local government.

Principle 4

In areas with an extreme bush fire hazard level where more intensive subdivision/development, such as residential, rural-residential, hobby farms, tourist and industrial developments, is considered unavoidable, permanent hazard reduction measures need to be implemented to the satisfaction of the decision-making authorities (i.e. FESA, the WAPC, and/or the relevant local government) to reduce the hazard level to low or moderate or bush fire attack levels between BAL-Low and BAL-29.

Principle 5

Structure plans, subdivision and development in areas with a moderate to extreme (or BAL-12.5 to BAL-FZ) bush fire hazard level needs to be supported by an assessment of the bush fire risk and compliance with the performance criteria and acceptable solutions set out in these guidelines. If such development cannot achieve compliance with the performance criteria and acceptable solutions, any alternative acceptable solutions have to be jointly endorsed by FESA, the WAPC, and the relevant local government

PBP Section 2.3 - Guidance statements for strategic plans, planning strategies, planning schemes, planning scheme amendments and structure plans

There are eight guidance statements relating to strategic plans, planning strategies, planning schemes, planning scheme amendments and structure plans. These seek to give effect to the general principles and the objectives of the guidelines:

Guidance statement A1 - Bush fire hazard assessment and analysis required

Unless it is clear to the decision-making authority that the land in question is not in an area that has a moderate or extreme bush fire hazard level, any new proposals or proposals which will effect a change of land use or design resulting in the introduction of, or an intensification of development should:

- *Include a bush fire hazard assessment based on the fire hazard assessment methodology and classifications set out in appendix 1 of these guidelines*
- *Identify any bush fire hazard issues arising from that assessment; and*
- *Address those issues, in accordance with the general principles that underpin these guidelines, in a statement or a report which demonstrates that all fire protection requirements can be achieved to the satisfaction of the WAPC*

Guidance statement A2 - Areas with extreme bush fire hazard levels

Any change of zoning/planning provisions or design resulting in the introduction of, or an intensification of, development in an area that has an extreme bush fire hazard level will normally not be approved.

Guidance statement A3 – Areas with extreme bushfire hazard levels where the introduction of, or intensification of land use is unavoidable

Any new proposals or proposed land use, zoning or design change that will result in the introduction of, or an intensification of development in an area that has an extreme bush fire hazard level, but which are considered unavoidable, will only be approved where it can be demonstrated that acceptable, permanent hazard reduction measures can be implemented at some subsequent stage in the planning process to reduce the hazard level to an acceptable level, and that the development can be undertaken in accordance with the general principles and building construction standards that underpin these guidelines. This may include an appropriate building protection zone, hazard separation zone and construction to an appropriate standard as specified in AS 3959 and as supported by a satisfactory risk assessment and analysis.

Guidance statement A4 - Areas with moderate fire hazard levels

Any new proposals or proposed changes of zoning or design that will result in the introduction of, or an intensification of, development in an area that has a moderate bush fire hazard level will only be approved where the development can be undertaken in accordance with the general principles that underpin these guidelines. In the case of structure plans, where the bush fire hazard was addressed at the time of the zoning of the land, the information on that hazard may be re-used, if the information is still relevant.

Guidance statement A5 - Incorporating bush fire hazard controls in local planning schemes and local planning strategies

Consideration is to be given to providing measures in local planning schemes and their amendments, and local planning strategies to identify bush fire hazard areas and ensure that development in these areas addresses bush fire hazard issues. Special control areas can be linked to the boundaries of the bush fire hazard areas established through a strategic bush fire hazard assessment.

Guidance statement A6 - Consult with FESA for planning matters and strategic bush fire hazard assessments

The advice of FESA is to be sought where compliance with the guidelines is unlikely to be achieved or additional/alternative measures are proposed to achieve the objectives. FESA is also to be consulted to provide advice on a strategic bush fire hazard assessment and the selection of areas suitable for more intensive development from a bush fire safety point of view.

Guidance statement A7 - Referral to DEC and other decision-making authorities

Where the land that is the subject of a new proposal or proposed changes of zoning or design that will result in the introduction of, or an intensification of, development in an area that abuts vegetated land managed by DEC or other relevant management agency, the application is to be referred to the DEC (or relevant agency) for advice, regarding the potential impact of their fire management practices on the amenity of the future occupants, prior to a decision being made by the decision-making authority.

Guidance statement A8 - Matters to be taken into consideration

In addition to the matters normally required to be taken into consideration, any advice received from FESA, the DEC (regarding potential impacts of their fire regime on amenity) or other relevant authority regarding fire management practices is to be taken into consideration before a decision is made by the decision-making authority on that application. When assessing new proposals or proposed changes of zoning or design that will result in the introduction of, or an intensification of, development that abuts land vested in the DEC, FESA will consider input from DEC on bush fire management prior to providing final advice on fire management practices to the decision-making authority.

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