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

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WOOD & GRIEVE ENGINEERS

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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 DESIGN
EXISTING PU
LONG TERM PU

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

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 '303 - 066'
SEWER DESIGN FLOW - 2.

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 'Y6118 - 066'
SEWER DESIGN FLOW - 1.9 L/s

CATCHMENT 'W1504 - 06
SEWER DESIGN FLOW

SPEARWOOD P.S 8 -
PARAKEET WAY
PUMP STN. '8 - 066'
REDUCTION '[illegible] - 066'
SEWER DESIGN FLOW - 8 L/s
EXISTING PUMP RATE - 13.4 L/s
LONG TERM PUMP RATE - 18.1 L/s

CATCHMENT 'V6185 - 066'
SEWER DESIGN FLOW - 3.9 L/s

CATCHMENT 'V438
SEWER DESIGN FL

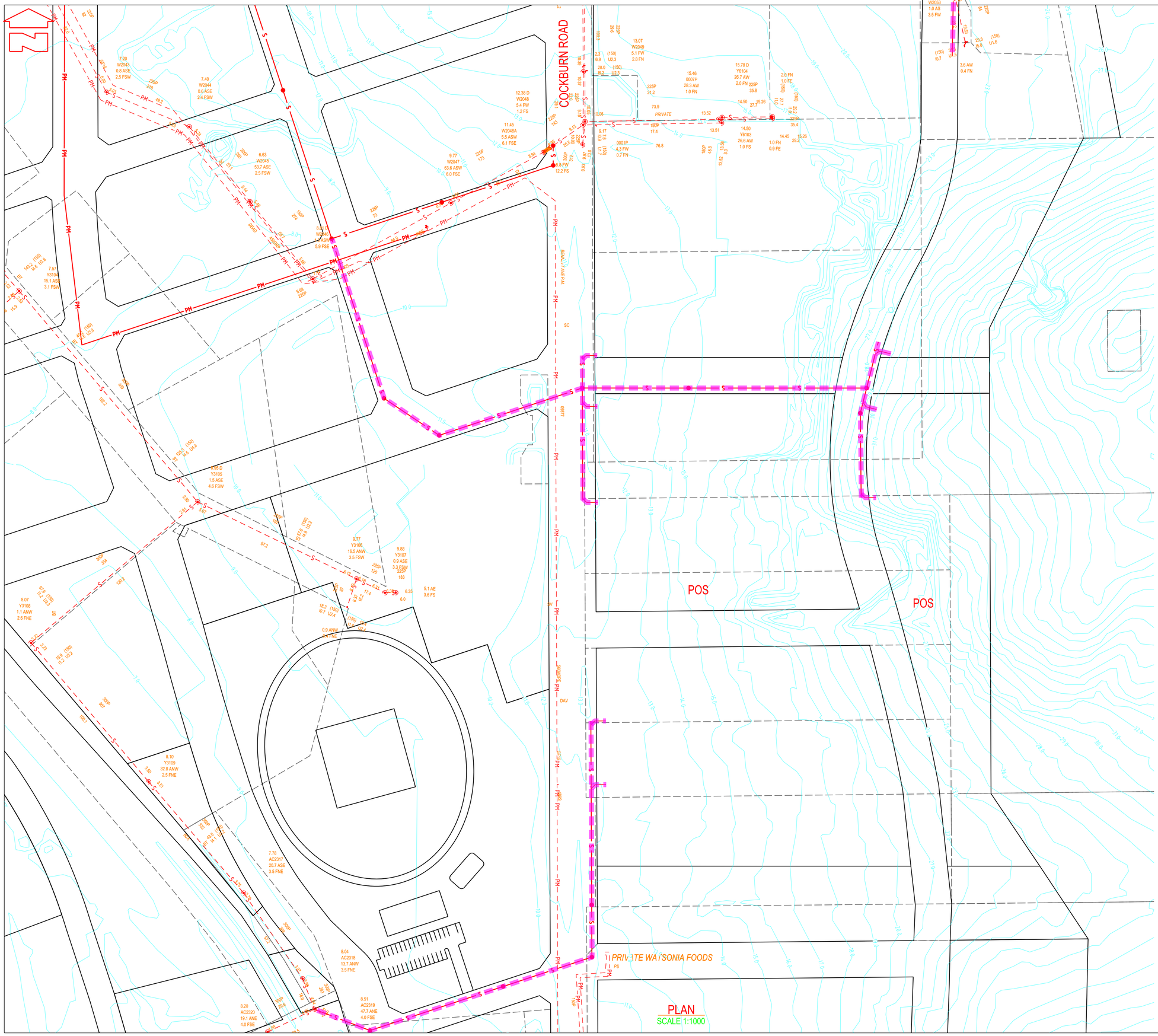
Owen

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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PERTH
MELBOURNE
SYDNEY
BRISBANE
ALBANY
BUSSELTON
SHENZHEN

CLIENT:
LANDCORP

PROJECT:
COCKBURN COAST

TITLE:
GRAVITY SEWER

PRELIMINARY

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DRAWN : LZ	APPROVED FOR CONSTRUCTION :	WAPC : -

PROJECT No.	DRAWING No.	REVISION
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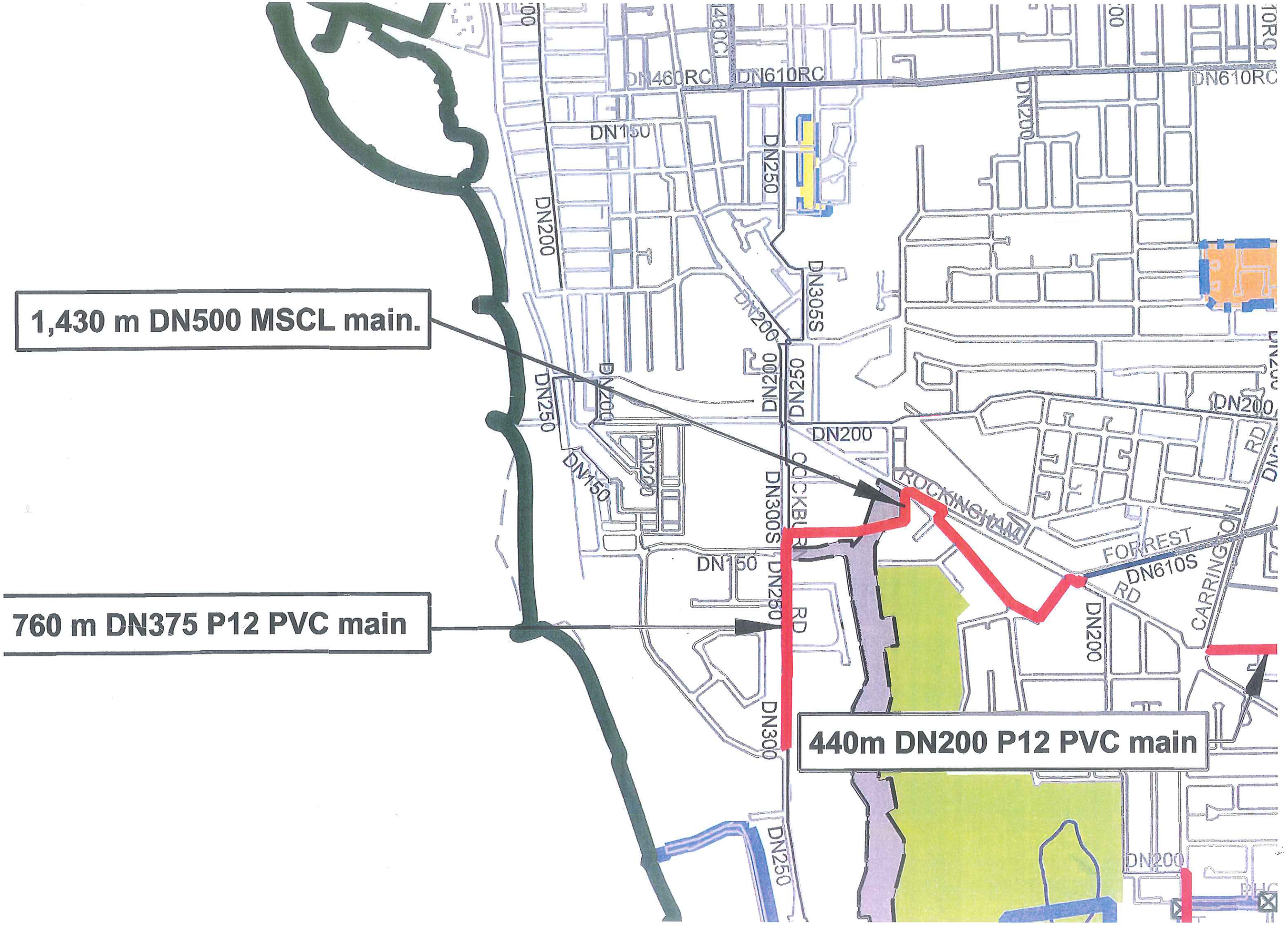
Appendix 3

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
DN610RC
DN150
DN250
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DN200
DN305S
DN200
DN250
DN200
DN250
DN200
DN200
DN150
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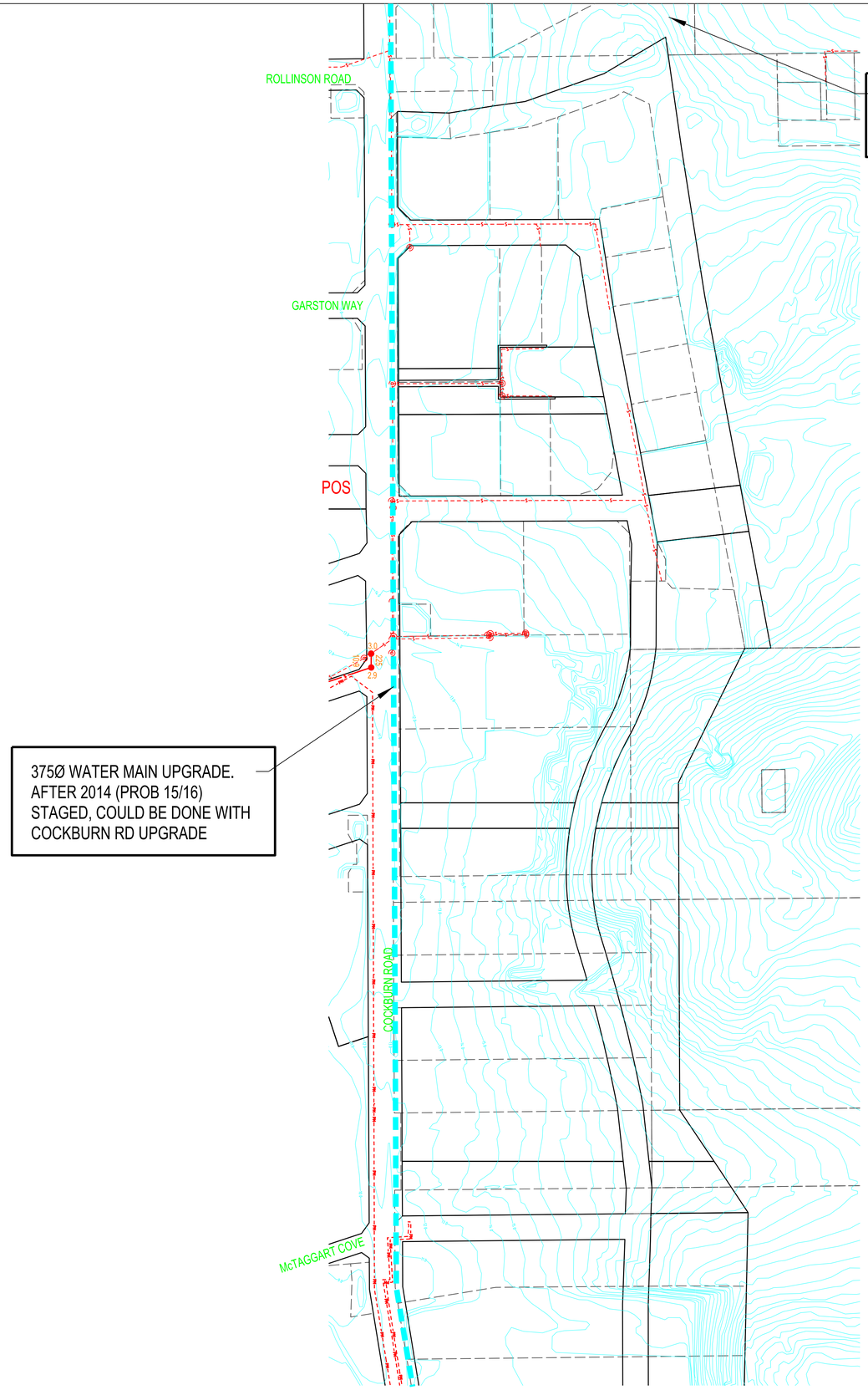
ROCKINGHAM
FORREST
RD
CARRINGTON
RD



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

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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
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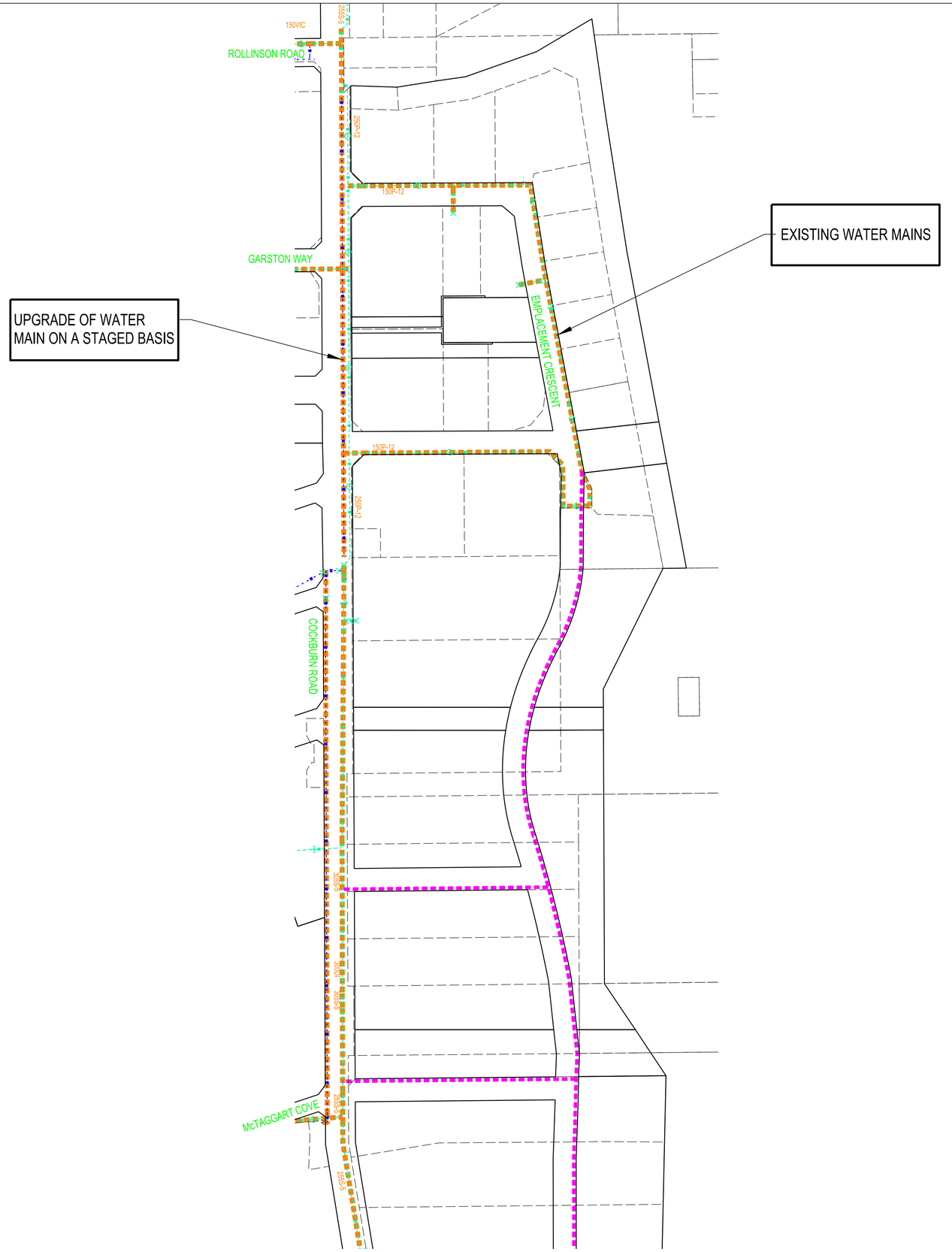
Appendix 4

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
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CLIENT:
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COCKBURN COAST

TITLE:
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PROJECT No.	DRAWING No.	REVISION
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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.

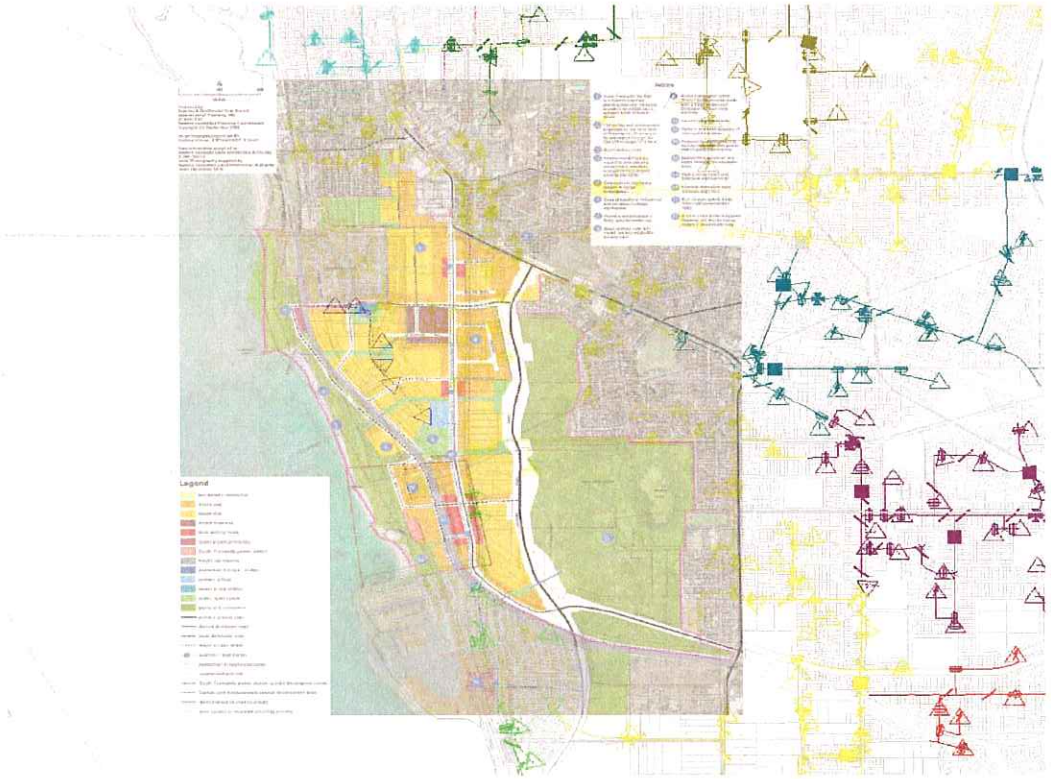


Figure 1: Location of Cockburn Coast

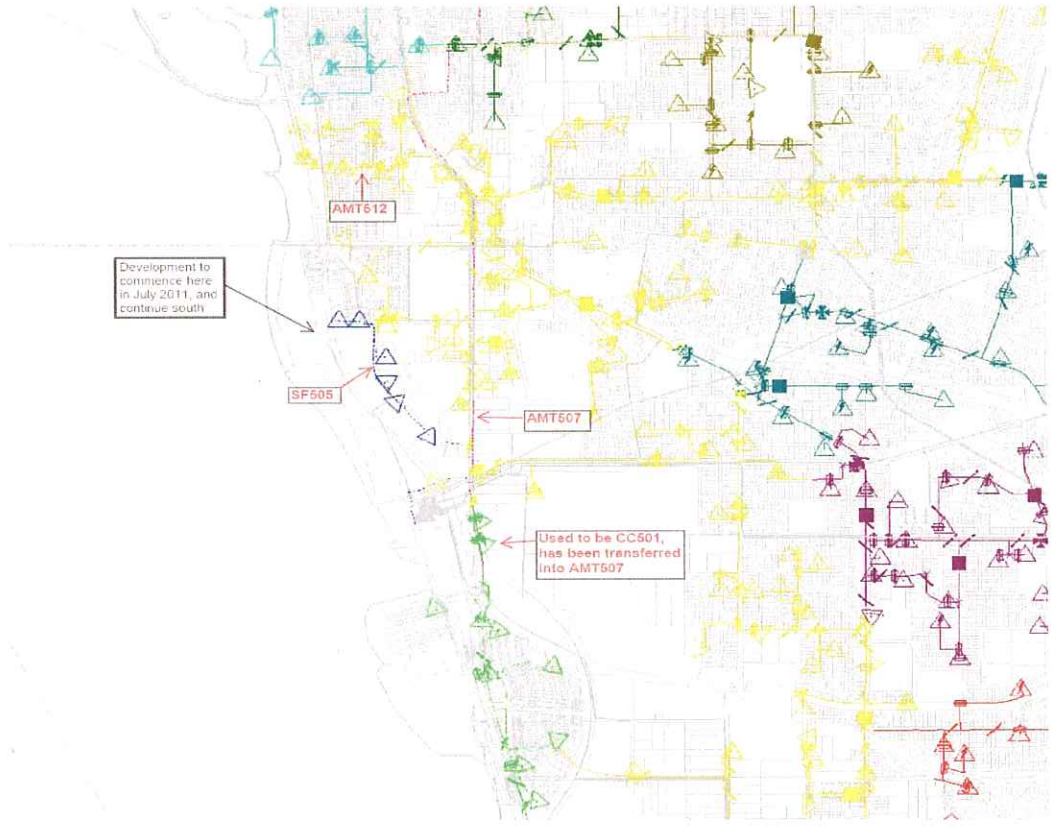


Figure 2: Existing Infrastructure – Distribution

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

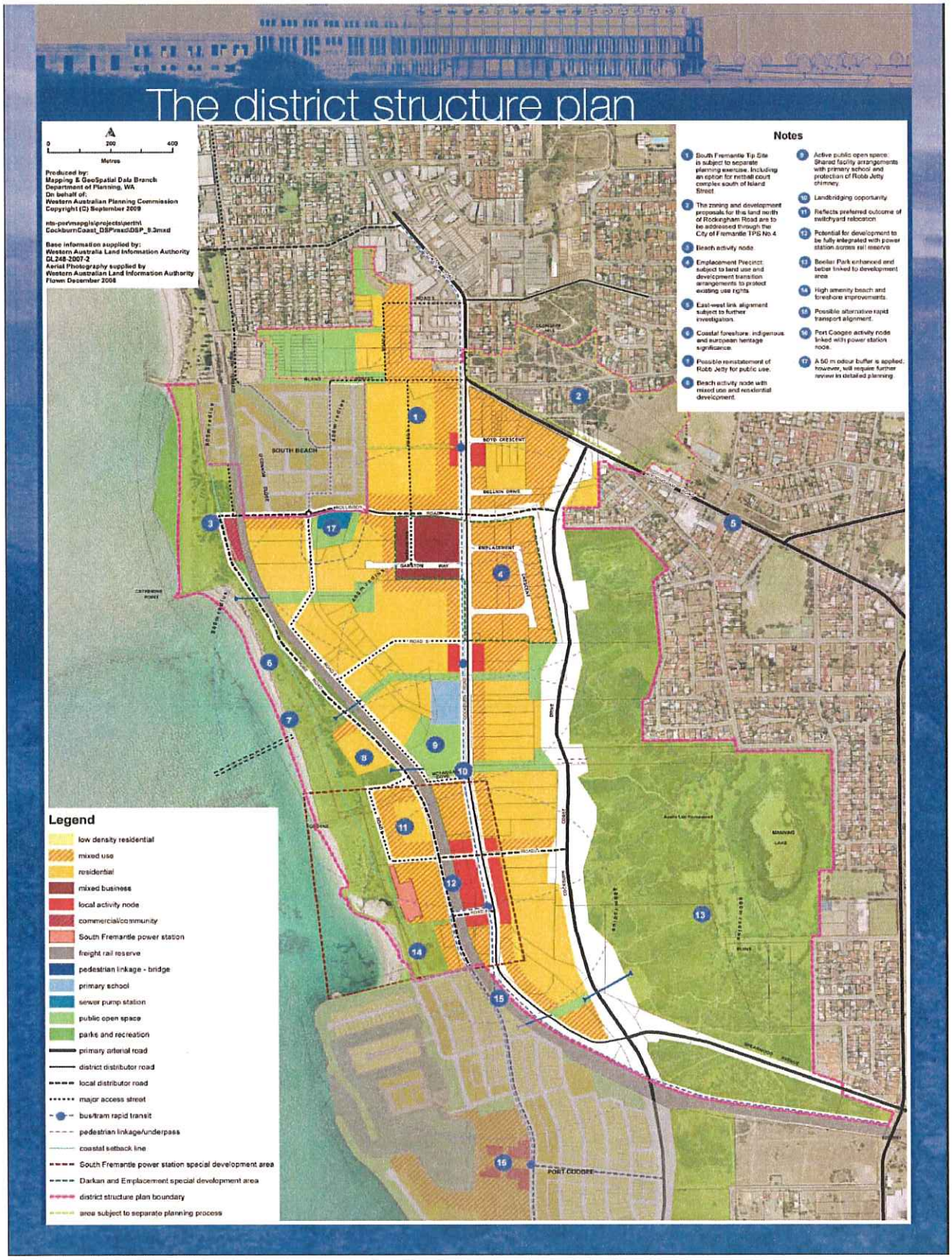
ADMD per lot	9kVA
Comments	

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.

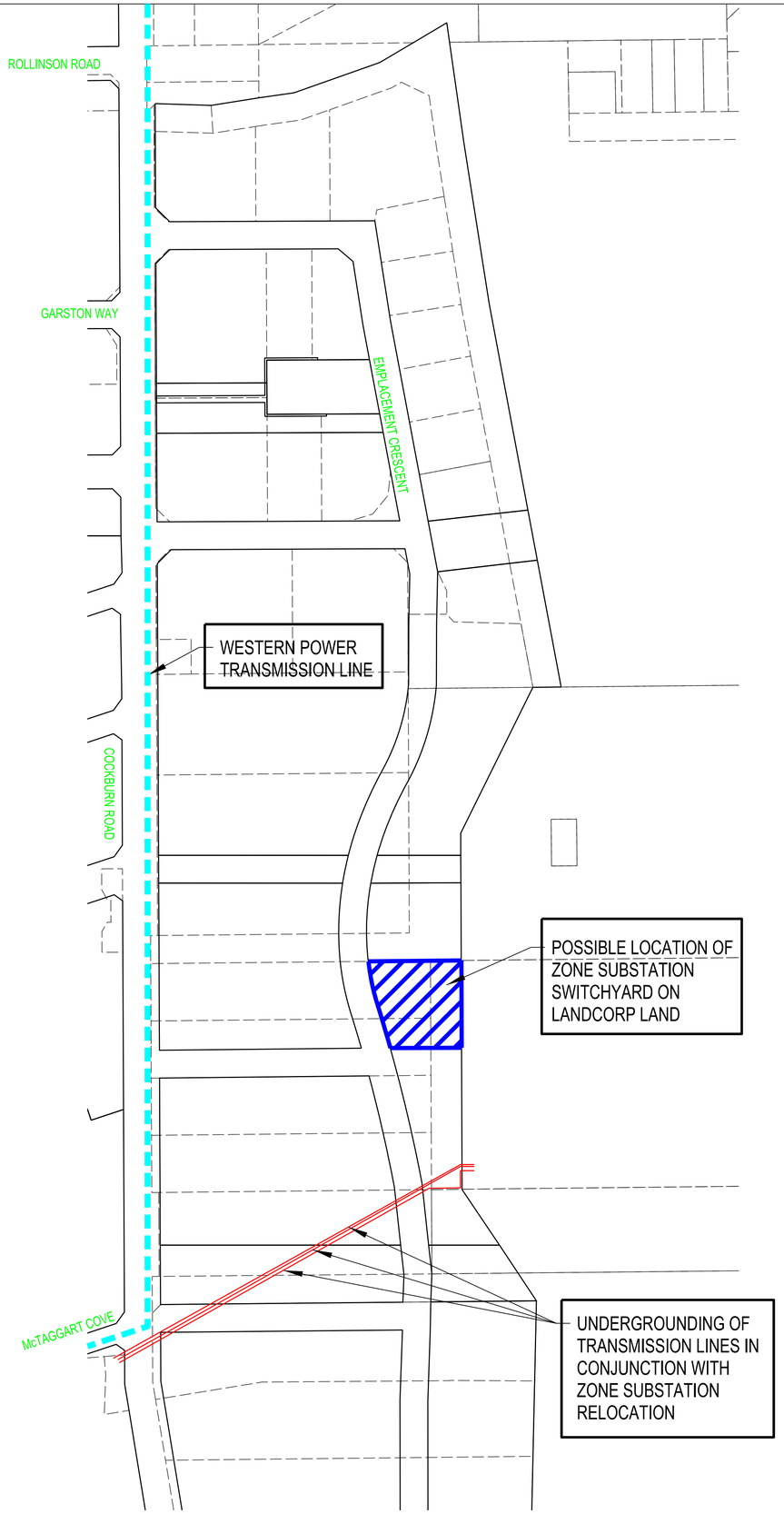
8. **Fluctuations**
Construction costs, including materials and labour, are subject to fluctuation and may change significantly over time. The final quoted cost may be higher or lower. In some cases final quoted costs are SIGNIFICANTLY HIGHER than indicative estimates.

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

Wood & Grieve Engineers Ltd
A.C.N. 137 999 609
Ground Floor
226 Adelaide Tce, Perth
Western Australia 6000
Phone: +61 8 6222 7000
Fax: +61 8 6222 7100
Email wge@wge.com.au
Web www.wge.com.au

PERTH
MELBOURNE
SYDNEY
BRISBANE
ALBANY
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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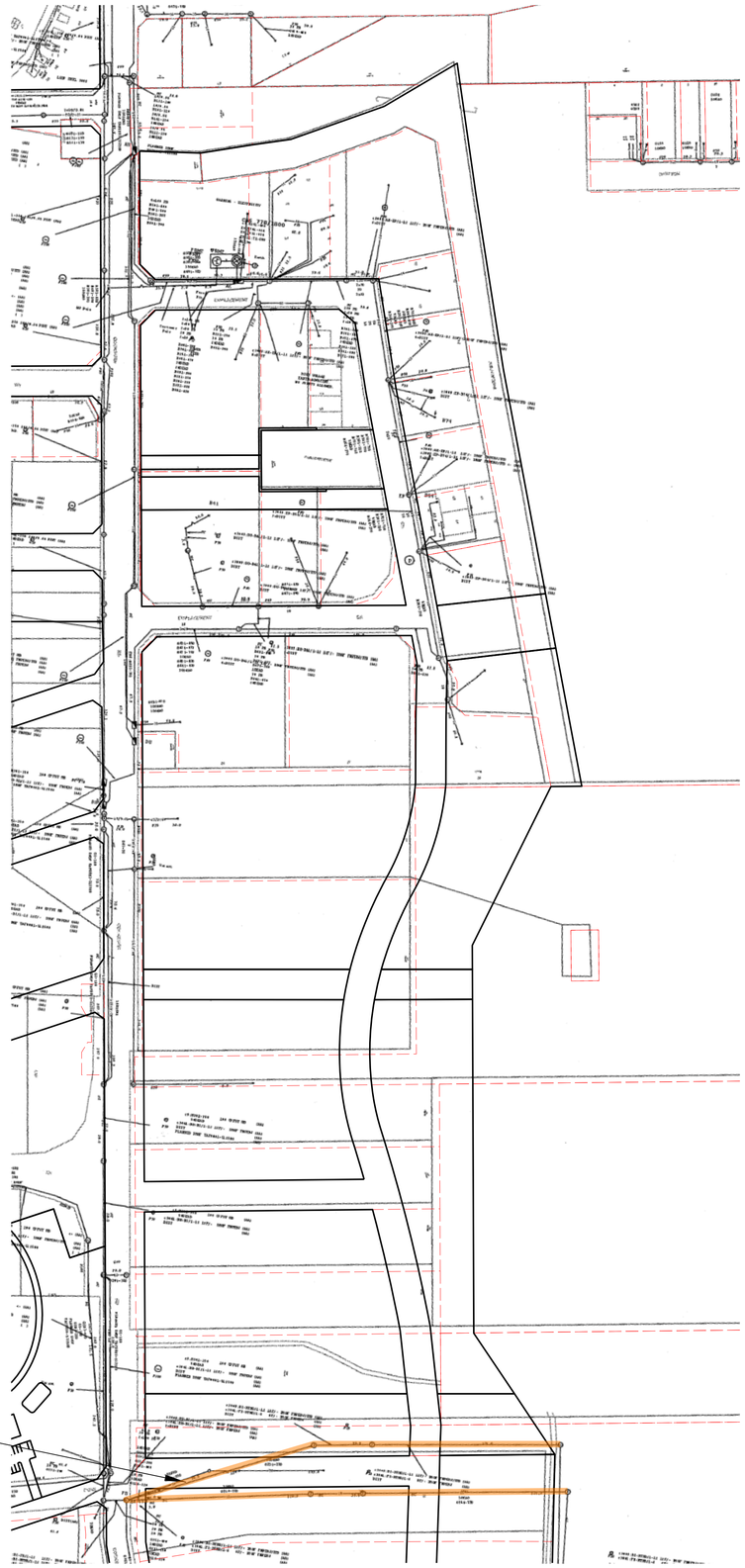
A1 @ 1:1000
A3 @ 2000

Appendix 7

WOOD & GRIEVE ENGINEERS

Existing Telstra Cabling and Required Relocations



TELSTRA SERVICES
NEEDING RELOCATION

PLAN
SCALE 1:2000

LEGEND

TELSTRA SERVICES
NEEDING RELOCATION

REV.	DESCRIPTION	DRAWN	VER	APPROVED
A	ORIGINAL ISSUE			

CELEBRATING 50 YEARS
WOOD & GRIEVE ENGINEERS

Wood & Grieve Engineers Ltd
A.C.N. 137 999 609
Ground Floor
226 Adelaide Tce, Perth
Western Australia 6000
Phone: +61 8 6222 7000
Fax: +61 8 6222 7100
Email wge@wge.com.au
Web www.wge.com.au

PERTH
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BRISBANE
ALBANY
BUSSELTON
SHENZHEN

CLIENT:
LANDCORP

PROJECT:
COCKBURN COAST

TITLE:
TELSTRA SERVICING

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	SK17	A

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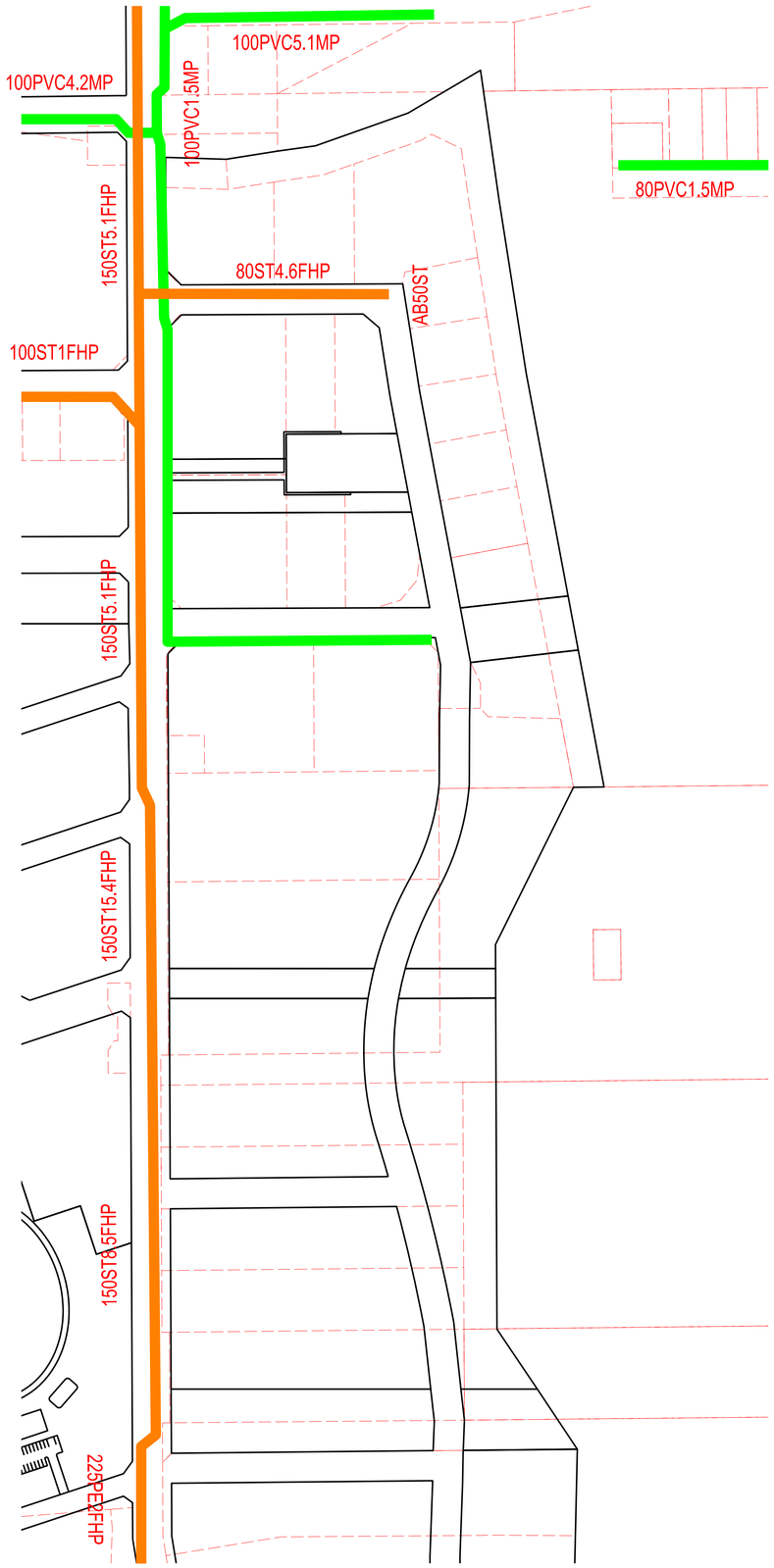
A1 @ 1:1000
A3 @ 2000

Appendix 8

WOOD & GRIEVE ENGINEERS

Existing Gas Mains



PLAN
SCALE 1:2000

LEGEND

EXISTING HIGH PRESSURE MAINS

EXISTING STANDARD PRESSURE MAINS

REV.	DESCRIPTION	DRAWN	VER	APPROVED
A	ORIGINAL ISSUE			

CELEBRATING 50 YEARS
WOOD & GRIEVE ENGINEERS

Wood & Grieve Engineers Ltd
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226 Adelaide Tce, Perth
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ALBANY
BUSSELTON
SHENZHEN

CLIENT:
LANDCORP

PROJECT:
COCKBURN COAST

TITLE:
GAS SERVICES

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	SK16	A

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A3 @ 1:2000