



# REHABILITATING ROE 8

Rehabilitation Management Plan | March 2018









It is with great pleasure that I table the Rehabilitation Management Plan for the Roe 8 Corridor.

The Rehabilitating Roe 8 Working Group, formed in May 2017, has worked with environmental and community engagement consultants to prepare the plan to rehabilitate the 18 hectares of land, which stretches from the Kwinana Freeway, past Bibra Lake to Stock Road.

The 'Rehabilitating Roe 8' project arose out of the community capacity stimulated during opposition to the construction of Roe 8 and the newly elected State Labor Government's commitment to rehabilitation of the cleared areas. Essentially, Rehabilitating Roe 8 aims to restore local native vegetation and fauna habitat to the cleared areas along the proposed Roe 8 alignment. However, Rehabilitating Roe 8 is not a typical restoration project. Due to the publicity and controversy surrounding the construction of Roe 8, the restoration of the cleared areas is a uniquely high profile endeavour for Perth and Western Australia, with a correspondingly high level of community and stakeholder engagement.

This will allow it to be implemented by the appropriate land use manager and shared with the hundreds of people who contributed to its formulation.

Importantly, this 10-year plan gives equal weight to the ecological and community needs of the Corridor.

It has been drafted with input from the general community, the scientific community, various levels of government and community groups, making it a unique collaboration for a once-in-Australia opportunity to rehabilitate cleared land.

It is based on the principles and guidance provided in The National Standards for the Practice of Ecological Restoration in Australia (Standards Reference Group SERA 2017), with input from the Perth Urban Restoration Scientific Advisory Committee.

I acknowledge the invaluable input of my colleagues within the Working Group, which has resulted in a comprehensive report that ensures a considered approach to rehabilitation in the Roe 8 corridor.

It was a privilege to chair the Working Group and I am thankful for the opportunity to be involved in such a unique and complex project.

Yours sincerely

**Lisa O'Malley MLA**

State Member for Bicton  
Chair of Rehabilitating Roe 8 Working Group





# Rehabilitation Management Plan

Roe 8 Cleared Areas

Project No: EP17-085(07)

**Prepared for Rehabilitating Roe 8 Steering Committee  
March 2018**

# Rehabilitation Management Plan

## Roe 8 Cleared Areas



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## Rehabilitation Management Plan Roe 8 Cleared Areas



## Preface

*“Social aspects are critical to successful ecological restoration”*

*(Principle 6, Standards Reference Group SERA (2017))*

The ‘Roe 8’ extension of Roe Highway was a controversial and high profile road project for Western Australia. Prior to the suspension of Roe 8 on the 11 March 2017, approximately 18 hectares of native vegetation was cleared in Bibra Lake, North Lake and Coolbellup, Western Australia. The ‘Rehabilitating Roe 8’ project arose out of community capacity that was stimulated during opposition to Roe 8 and the newly elected Labor State Government's commitment to repairing the impacts of the clearing along the proposed alignment of Roe 8. The Rehabilitating Roe 8 project aims to repair both the social and ecological impacts that resulted from Roe 8's construction.

This document, the *Rehabilitation Management Plan Roe 8 Cleared Areas* (the RMP), has been prepared for the Rehabilitating Roe 8 Steering Committee, as part of the Rehabilitating Roe 8 project. It provides guidance on communications, engagement, involvement, restoration and monitoring activities associated with the social rehabilitation and ecological restoration of Roe 8 over a ten year period.

### Acknowledgment of Contributors

Several rounds of community and stakeholder consultation informed the preparation of the RMP. Important contributions were made to the RMP by members of the Rehabilitating Roe 8 Steering Committee, the Perth Urban Restoration Scientific Advisory Committee (PURSAC) and the many community members and stakeholders who participated in the consultation process.

The communications, engagement and involvement components of the RMP are designed using Creating Communities ‘rope model’, which aims to weave various stakeholder objectives, actions and outcomes into a compatible and coherent series of activities.

The restoration component of the RMP is designed with attention to the principles and guidance provided in *The National Standards for the Practice of Ecological Restoration in Australia* (Standards Reference Group SERA 2017).

### Acknowledgement of Country

The Rehabilitating Roe 8 Steering Committee and consultants Emerge Associates and Creating Communities acknowledge the Australian Aboriginal and Torres Strait Islander peoples of this nation. We acknowledge the traditional custodians of the lands on which our organisations are located and where we conduct our business. We pay our respects to ancestors and Elders, past and present.

In particular we would like to acknowledge that the Rehabilitating Roe 8 project area is Wadjuk country and pay respect to Elders and all Nyungar people, past, present and future. The Rehabilitating Roe 8 Steering Committee and consultants Emerge Associates and Creating Communities are committed to honouring Australian Aboriginal and Torres Strait Islander peoples' unique cultural and spiritual relationships to the land, waters and seas and their rich contribution to society.

# Rehabilitation Management Plan

## Roe 8 Cleared Areas



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# Rehabilitation Management Plan

## Roe 8 Cleared Areas



## Table of Contents

<b>1</b>	<b>Introduction .....</b>	<b>1</b>
1.1	Project background .....	1
1.1.1	Rehabilitating Roe 8 Working Group .....	1
1.1.2	Rehabilitating Roe 8 Steering Committee .....	2
1.2	Document purpose and scope .....	2
1.2.1	Site boundary .....	3
1.2.2	Structure of this document .....	3
<b>2</b>	<b>Targets, Goals and Objectives .....</b>	<b>4</b>
2.1	Social rehabilitation .....	5
2.1.1	Communications, engagement and involvement goals .....	5
2.1.2	Engagement and involvement objectives .....	6
2.2	Ecological restoration .....	7
2.2.1	Target ecosystems .....	7
2.2.2	Restoration goals .....	8
2.2.3	Restoration objectives .....	9
<b>3</b>	<b>Implementation .....</b>	<b>11</b>
3.1	Key activities .....	11
3.2	Community Engagement Coordinator/Project Manager .....	11
3.3	Key stakeholders .....	12
3.4	Stakeholder roles and responsibilities .....	13
3.5	Governance arrangement .....	14
3.6	Minimum standards .....	14
3.7	Management areas .....	15
3.8	Access .....	15
3.9	Construction and maintenance .....	16
3.10	Adaptive management framework .....	17
3.11	Contingency .....	18
3.12	Program of works .....	18
<b>4</b>	<b>Communications .....</b>	<b>25</b>
4.1	Key messages .....	25
4.2	Communication approach .....	26
4.3	Communication protocols .....	31
4.3.1	Authorised spokespeople .....	31
4.3.2	Responding to media enquiries .....	31
4.3.3	Responding to individual public enquiries .....	31
4.3.4	Content of public comment (including responses to media enquiries) .....	31
<b>5</b>	<b>Engagement and Involvement .....</b>	<b>32</b>
5.1	Engagement and involvement approach .....	32
5.2	Engagement and involvement activities .....	32
5.2.1	Aboriginal heritage survey .....	32
5.2.2	Local employment and training .....	33
5.2.3	Aboriginal employment and training .....	33
5.2.4	Community expectations and satisfaction survey .....	33
5.2.5	Community science conference .....	33
5.2.6	Input into governance arrangement .....	34
5.2.7	Open days .....	34
5.2.8	Rehabilitating Roe 8 Advisory Committee meetings .....	34
5.2.9	Review and revision of RMP .....	34

# Rehabilitation Management Plan

## Roe 8 Cleared Areas



5.2.10	Community education.....	35
5.2.11	Community involvement in restoration .....	35
5.2.12	Citizen science / community monitoring .....	35
5.2.13	Local community adoption of restoration areas.....	35
5.2.14	Partnership with primary / secondary schools .....	36
5.2.15	Partnership with tertiary education institutions.....	36
5.2.16	Partnerships with City of Cockburn events .....	36
5.2.17	Partnerships with Cockburn Wetlands Education Centre events / programs.....	36
5.3	Involvement protocols .....	36
5.3.1	Respect .....	36
5.3.2	Public liability .....	37
5.3.3	Safe work practices .....	37
5.3.4	Hygiene .....	37
5.3.5	Pedestrian access .....	37
5.3.6	Vehicle access.....	37
5.3.7	Pets and livestock.....	38
5.3.8	Rubbish and waste .....	38
5.3.9	Record keeping.....	38
<b>6</b>	<b>Restoration .....</b>	<b>39</b>
6.1	Restoration approach .....	39
6.1.1	Restoration areas .....	39
6.1.2	Input categories .....	40
6.1.3	Prioritisation.....	40
6.2	Restoration activities .....	41
6.3	Restoration protocols .....	42
6.3.1	Landform preparation .....	42
6.3.2	Habitat enhancement .....	42
6.3.3	Weed control .....	43
6.3.4	Seed / propagule collection .....	43
6.3.5	Sourcing tubestock.....	43
6.3.6	Planting tubestock.....	44
6.3.7	Direct seeding .....	44
6.3.8	Weed control .....	45
6.3.9	Updating restoration areas .....	46
<b>7</b>	<b>Monitoring, Evaluation and Reporting .....</b>	<b>47</b>
7.1	Social rehabilitation outcomes .....	47
7.1.1	Monitoring design .....	47
7.1.2	Monitoring protocols .....	47
7.1.2.1	Community expectations and satisfaction survey .....	47
7.1.2.2	Internal information review .....	47
7.1.3	Evaluation.....	47
7.2	Ecological restoration outcomes.....	47
7.2.1	Monitoring design .....	47
7.2.1.1	Sampling frame .....	48
7.2.1.2	Attributes of interest.....	50
7.2.1.3	Sample units.....	50
7.2.1.4	Measures.....	51
7.2.1.5	Key indicators.....	51
7.2.2	Monitoring protocols .....	52
7.2.2.1	Permanently marked plots.....	52
7.2.2.2	Unmarked sampling and mapping .....	53
7.2.2.3	Photopoints.....	54
7.2.2.4	Fauna survey .....	54
7.2.2.5	Material transfers.....	55



# Rehabilitation Management Plan

## Roe 8 Cleared Areas



7.2.2.6	Data analysis .....	55
7.2.3	Evaluation.....	55
7.2.3.1	Associated native flora species .....	55
7.2.3.2	Important species.....	86
7.2.3.3	Assessment against goals and objectives.....	88
7.3	Data management .....	89
7.4	Reporting .....	91
7.4.1	Internal .....	91
7.4.1.1	Regular reporting .....	91
7.4.1.2	Annual project reporting.....	91
7.4.2	External .....	92
7.4.2.1	Communicating performance and progress to community and stakeholders .....	92
<b>8</b>	<b>References .....</b>	<b>93</b>
8.1	General references .....	93
8.2	Online references.....	93

## List of Tables

Table 1: Engagement and involvement objectives.....	6
Table 2: Target ecosystems category and RMP labels.....	8
Table 3: Restoration goals for cleared areas and uncleared areas within 20m of cleared areas within the site ....	9
Table 4: Specific objectives for restoration within the site .....	10
Table 5: Proposed stakeholder, individual employee and subcontractor roles and responsibilities .....	13
Table 6: Minimum standards for implementation (adapted from Standards Reference Group SERA (2017)). ....	15
Table 7: Proposed annual schedule of RMP implementation .....	18
Table 8: Proposed schedule of RMP implementation per year - communication.....	20
Table 9: Proposed schedule of RMP implementation per year – engagement and involvement.....	21
Table 10: Proposed schedule of RMP implementation per year - restoration.....	22
Table 11: Proposed schedule of RMP implementation per year - monitoring, evaluation and reporting .....	24
Table 12: Key messages informed by engagement with community members and other key stakeholders. ....	25
Table 13: Communications tools and approaches .....	27
Table 14: Summary of community engagement and involvement activities to be undertaken. ....	32
Table 15: Scheme for prioritisation of tubestock planting and weed control .....	41
Table 16: Summary of restoration activities and options recommended for each input category .....	41
Table 17: Fauna enhancement options.....	42
Table 18: Weed control methods.....	43
Table 19: General guidance on the selection of weed control options.....	45
Table 20: Basic stratifications within sampling frame .....	48
Table 21: Attributes of interest .....	50
Table 22: Basic stratifications for biotic attributes of interest. ....	50
Table 23: Sample units for monitoring .....	51
Table 24: Monitoring protocol for permanently marked plots .....	53
Table 25: Monitoring protocol for unmarked plots and mapping.....	54
Table 26: Analysis options for comparison to objectives .....	55
Table 27: Associated species for wet forest and woodland target ecosystem .....	56
Table 28: Associated species for banksia woodland target ecosystem.....	61
Table 29: Associated species for banksia/jarraah woodland target ecosystem.....	65
Table 30: Associated species for holly-leaved banksia woodland target ecosystem .....	69
Table 31: Associated species for banksia/coastal blackbutt woodland target ecosystem.....	73
Table 32: Associated species for banksia/woody pear woodland target ecosystem .....	78
Table 33: Associated species for banksia/tuart woodland target ecosystem .....	82
Table 34: Important native flora species by target ecosystem .....	87

# Rehabilitation Management Plan

## Roe 8 Cleared Areas



Table 35: Non-native flora taxa recorded in the site that are considered important for restoration and management within the site .....	88
Table 36: Minimum information required for project data and records .....	89

## List of Plates

Plate 1: Adaptive management framework showing key stakeholders and roles .....	17
Plate 2: Murdoch University survey sample unit configuration indicating configuration of primary sample plot in green, secondary sub-plot in blue and tertiary sub plot in red.....	52

## Figures

Figure 1: Site Location
Figure 2: Management Areas
Figure 3: Existing and Proposed Gates and Paths
Figure 4: Restoration Areas
Figure 5: Restoration Area Input Categories
Figure 6: Monitoring Design

## Appendices

### Appendix A

Community and Stakeholder Feedback Report

### Appendix B

External Context Assessment Report

### Appendix C

Target Ecosystem Identification and Baseline Inventory Report

### Appendix D

Forward Planning Recommendations

## Rehabilitation Management Plan Roe 8 Cleared Areas

### Abbreviation Tables

*Table A1: Abbreviations – Organisations*

Organisations	
Main Roads WA	Main Roads Western Australia
DBCA	Department of Biodiversity, Conservation and Attractions
DoH	Department of Health
PURSAC	Perth Urban Restoration Scientific Advisory Committee

*Table A2: Abbreviations – units of measurement*

Units of measurement	
ha	Hectare
km	Kilometre
m	Metre
m <sup>2</sup>	Square metre

## Rehabilitation Management Plan Roe 8 Cleared Areas



## Definitions

The following definitions are provided to help explain terminology used in this document:

- **Adaptive management** is used to refer to using learnings as the basis for decision making in a process of continuous improvement.
- **Attributes** (of an ecosystem) are used to refer to the biotic (living) and abiotic (inert) properties and functions of an ecosystem.
- **Structure** is used to refer to the physical organisation of biotic and abiotic elements in an ecosystem.
- **Community** is used generally in this plan and is inclusive of a diverse group made up of individuals, organisations and stakeholders. It includes 'communities of interest' made up of residents of adjoining areas, interested non-resident individuals and groups and custodians of the land.
- **Communications** are a range of methods through which the community and other stakeholders are kept informed as the Rehabilitation Management Plan progresses. These include, but are not limited to: project updates, promotion of upcoming community engagement activities, on-site signage, press releases, advertising, social media etc.
- **Composition** is used to refer to the array and relative proportion of organisms within an ecosystem.
- **Clearing** is used to refer to a substantial level of impact to vegetation as result of physical disturbance.
- **Ecosystem** is used to refer to small or large scale assemblage of biotic and abiotic components in oceans, rivers and on land in which the components interact to form complex food webs, nutrient cycles and energy flows.
- **Engagement** activities are those that seek information, feedback and decision-making from community members and other stakeholders.
- **Involvement** activities involve the participation of community members.
- **Monitoring** is the process of collecting and evaluating observations to measure changes and evaluate progress towards objectives.
- **Native species** (fauna) refers to any vertebrate or invertebrate taxa that naturally occurs within the site.
- **Native species** (flora) refers to vascular flora taxa identified on the 'associated species list' (refer **Section 7.2.3**).
- **Non-native species** refers to any fauna or flora taxa that does not meet the definition for native species.
- **Reference ecosystem** is used to refer to a real or notional community of organisms able to act as a model or benchmark for restoration. Standards Reference Group SERA (2017) define a reference ecosystem as usually representing a non-degraded version of the ecosystem. For the purposes of this document it is acknowledged that ecosystem values within parts of the site were already impacted prior to clearing having occurred for Roe 8.
- **Rehabilitation** is used in this document to refer to the repair of social/community impacts.
- **Restoration** is used in this document to refer to the process of returning an ecosystem that has been degraded, damaged or destroyed to a prior (better) condition.
- **Threat** is used to refer to a factor potentially or already causing degradation, damage or destruction.
- **Trajectory** (ecological) is used to refer to a pathway of development over time, which can be defined and monitored using sequential measurements of ecological attributes.
- **Treatment** (restoration) is used to refer to the interventions, actions or activities undertaken to achieve restoration.



# Rehabilitation Management Plan

## Roe 8 Cleared Areas

## 1 Introduction

### 1.1 Project background

The 'Roe 8' extension of Roe Highway was a contentious and high profile road project for Western Australia. Roe 8 was suspended on 11 March 2017 following a State government election, which resulted in the election of a Labor State Government that had committed to stopping the controversial project. Prior to the suspension of Roe 8, approximately 18 hectares (ha) of vegetation was cleared between December 2016 and February 2017 in the localities of Bibra Lake, North Lake and Coolbellup, Western Australia. This clearing was a source of significant concern for members of the community who were opposed to Roe 8 and was accompanied by multiple protests, legal challenges and broad media coverage.

The 'Rehabilitating Roe 8' project arose out of the community capacity that was stimulated during opposition to the construction of Roe 8 and the newly elected State Labor Government's commitment to the restoration of the cleared areas. Essentially, Rehabilitating Roe 8 aims to restore local native vegetation and fauna habitat to the cleared areas along the proposed Roe 8 alignment. However, Rehabilitating Roe 8 is not a typical restoration project. Due to the publicity and controversy surrounding the construction of Roe 8, the restoration of the cleared areas is a uniquely high profile endeavour for Perth and Western Australia, with a correspondingly high level of community and stakeholder engagement. Opposition to Roe 8's construction was circulated widely through activism, politics and media and was strengthened by the longstanding connection of community members to the wetlands and bushland along the proposed Roe 8 alignment. Community and stakeholder interest in Rehabilitating Roe 8 is therefore heightened and extends well beyond the local area.

Representations by community members to the State Government resulted in the formation of the 'Rehabilitating Roe 8 Working Group' to oversee the restoration of the cleared areas. The Rehabilitating Roe 8 Working Group and its sub-committee the 'Rehabilitating Roe 8 Steering Committee' have since coordinated the Rehabilitating Roe 8 project.

#### 1.1.1 Rehabilitating Roe 8 Working Group

The Rehabilitating Roe 8 Working Group was formed by the Minister for Transport; Planning; Lands in April 2017. The formation of this group occurred after the Cockburn Community Wildlife Corridor group met with the Minister and the Minister for Environment, Members for Fremantle, Willagee and Bicton as well as the Mayor of Cockburn, and presented a plan for the 'Kings Park of the South' with restoration requirements for the cleared areas.

The Rehabilitating Roe 8 Working Group oversaw the initial management of cleared areas including the removal of asbestos, mulch piles and some limestone tracks, weed management, installation of conservation fencing with public access gates, ongoing communications and a tender process for the preparation of a 'rehabilitation management plan'.

## Rehabilitation Management Plan Roe 8 Cleared Areas



The Rehabilitating Roe 8 Working Group includes representatives from the following organisations:

- City of Cockburn
- Cockburn Community Wildlife Corridor
- Cockburn Wetlands Education Centre
- Conservation Council of WA
- Department of Biodiversity, Conservation and Attractions (DBCA)
- Main Roads WA and the Alliance
- Lisa O'Malley (Member for Bicton) (chair)
- Member for Willagee
- Minister for the Environment and Energy
- Minister for Transport; Planning; Lands
- Perth Urban Restoration Scientific Advisory Committee (PURSAC)<sup>1</sup>
- Traditional Custodians of Beeliar Regional Park.

### 1.1.2 Rehabilitating Roe 8 Steering Committee

The Rehabilitating Roe 8 Steering Committee was tasked with overseeing the preparation of a 'rehabilitation management plan' for the Roe 8 cleared areas. The Rehabilitating Roe 8 Steering Committee includes representatives from the following community and stakeholder organisations:

- City of Cockburn
- Cockburn Community Wildlife Corridor
- Cockburn Wetlands Education Centre
- Conservation Council of WA (chair)
- DBCA
- Lisa O'Malley (Member for Bicton)
- Main Roads WA
- Member for Bicton - Lisa O'Malley
- PURSAC.

## 1.2 Document purpose and scope

This document, the *Rehabilitation Management Plan Roe 8 Cleared Areas* (the RMP), has been prepared for the Rehabilitating Roe 8 Steering Committee, as part of the Rehabilitating Roe 8 project.

The twin purposes of the RMP are to provide guidance for coordinating community and stakeholder communications, engagement and involvement in restoration and related activities; and outline methods for conducting the restoration of cleared areas within the Roe 8 alignment, over a ten year period.

The RMP will be an adaptive document that can be altered and improved over time to best meet the goals and objectives of Rehabilitating Roe 8. The RMP therefore aims to provide a framework to achieve the 'social rehabilitation' and 'ecological restoration' desired by the Rehabilitating Roe 8 Working Group and Rehabilitating Roe 8 Steering Committee, following the clearing of areas along the proposed Roe 8 alignment.

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<sup>1</sup> A group facilitated by the Western Australian Biodiversity Science Institute (WABSI).

## Rehabilitation Management Plan

### Roe 8 Cleared Areas



The communications, engagement and involvement components of the RMP have been designed using Creating Communities' 'rope model', which aims to weave various stakeholder objectives, actions and outcomes into a compatible and coherent string of activities.

The restoration component of the RMP has been designed with attention to the principles and guidance provided in *The National Standards for the Practice of Ecological Restoration in Australia* (Standards Reference Group SERA 2017) (hereafter referred to as the *Standards*).

#### 1.2.1 Site boundary

A site boundary for the RMP is shown in **Figure 1**.

The site extends over an area of approximately 69.1 hectares (ha). The site boundary was defined to encompass cadastral parcels, or portions of cadastral parcels, within which clearing occurred as part of construction of Roe 8 or whose inclusion was considered beneficial to the restoration of cleared areas as part of an east/west corridor<sup>2</sup>.

Note that the site boundary may be revised in the future to accurately reflect the details of management agreements between Main Roads WA and any future management authority.

The site has historically been open to public access as road reserve or as part of the Beeliar Regional Park.

#### 1.2.2 Structure of this document

Consistent with its dual purposes, this document has been prepared with the following structure:

- Section 2 – Goals and objectives
- Section 3 – Implementation
- Section 4 – Communications
- Section 5 – Engagement and involvement
- Section 6 – Restoration
- Section 7 – Monitoring, evaluation and reporting.
- **Appendix A** – Community and Stakeholder Feedback Report
- **Appendix B** – External Context Assessment Report
- **Appendix C** – Reference Ecosystem Identification and Baseline Inventory Report
- **Appendix D** – Forward Planning Recommendations

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<sup>2</sup> Establishment of an east/west corridor is a community aspiration identified through consultation.

## 2 Targets, Goals and Objectives

*“Recovery of ecosystem attributes is facilitated by identifying clear targets, goals and objectives”*

*(Principle 3, Standards Reference Group SERA (2017))*

It is important to identify clear targets, goals and objectives for restoration projects to ensure that activities are focused and meaningful; and to facilitate the monitoring and evaluation of outcomes. The *Standards* define ‘targets’ as the ecosystems that restoration activities aspire to re-establish, ‘goals’ as the desired state of the ecosystem after restoration activities have been completed and ‘objectives’ as the immediate outcomes needed to achieve the targets and goals relative to specific spatial zones and timeframes (Standards Reference Group SERA 2017). Although not designed for application to social activities, the ‘target, goals and objectives’ model recommended by the *Standards* has been applied across the communication, engagement and involvement activities, as well as, the restoration activities identified in the RMP.

Specific objectives are, in particular, crucial to the implementation of the RMP, as they guide the scale and timing of activities and translate directly to the criteria used to evaluate project ‘success’ or ‘completion’. Necessarily, objectives are more specific than targets and goals, and must be stated in terms of measurable and quantifiable indicators and timeframes. For example a ‘goal’ may be to re-establish native vegetation within an area, while an ‘objective’ may be to establish a specific number of plants per unit area, of a particular species, within a specific time frame.

The Rehabilitating Roe 8 Steering Committee has endorsed the vision that “over a ten-year period of management, actions will transform the impacted corridor into a young but thriving range of ecological communities. These areas will be home to local biological diversity as well as become community spaces, allowing the public access to enjoy and respect the local environment via a connected pathway network” (Rehabilitating Roe 8 Steering Committee, July 2017).

The Rehabilitating Roe 8 Steering Committee confirmed that this vision corresponds with the primary goal for the ‘full ecological restoration’ of the indigenous ecosystems that were directly impacted by the clearing that occurred along the proposed Roe 8 alignment. However, in the first instance, the minimum goal for Rehabilitating Roe 8 should be to restore the indigenous ecosystems to a condition that is equivalent to that which was present before clearing occurred.

The Rehabilitating Roe 8 Steering Committee has also indicated that that the RMP shall have social outcomes. Substantial personal and community effort was involved in opposing the construction of Roe 8 and the clearing of vegetation along the Roe 8 alignment was a significant cause for concern for many community members and stakeholders. Targets, goals and objectives for social rehabilitation are therefore identified and, being a precursor to the aspiration to restore indigenous ecosystems, are hereafter dealt with first throughout the RMP.



## Rehabilitation Management Plan

### Roe 8 Cleared Areas

## 2.1 Social rehabilitation

### *“Social aspects are critical to successful ecological restoration”*

*(Principle 6, Standards Reference Group SERA (2017))*

Extensive community and stakeholder engagement was conducted between August and November 2017 to gain input into the RMP. Over 210 people provided input via meetings and events. Details of the community consultation activities and feedback obtained are presented in **Appendix A**.

The following engagement actions were completed to provide input into the RMP:

- Community representations to the State Government.
- Formation of the Rehabilitating Roe 8 Working Group, Rehabilitating Roe 8 Steering Committee and sub-committees.
- Contracting Emerge Associates and Creating Communities to develop the RMP.
- Rehabilitating Roe 8 Steering Committee input into the draft RMP.
- Fifteen (15) meetings with key stakeholders to understand background, context, relevance of the RMP and identify communications engagement, involvement, restoration activities.
- Engagement with Aboriginal Custodians to understand areas of cultural and personal significance and identify communications engagement, involvement and restoration activities.
- A ‘community open day’ to gain input into areas/locations of special personal significance, areas/locations that may require special treatment, how the community could receive communications, and identify the types of engagement and activities that community members would like to be involved in.
- A ‘stakeholder workshop’ to review key components of the draft RMP.
- Document revisions based on Rehabilitating Roe 8 Steering Committee and stakeholder feedback.

### 2.1.1 Communications, engagement and involvement goals

The following goals for communications, engagement and involvement are identified from the consultation and engagement on the RMP:

1. Recognise Aboriginal heritage and continued connection to land ensuring Nyungar culture is maintained at each step of the project.
2. Ensure the community has input into decision-making and into the roll-out of the project.
3. Ensure the community has opportunities for hands-on involvement in the implementation of the RMP.
4. Develop trust, alignment and a shared understanding of social rehabilitation aspect of the Rehabilitating Roe 8 project.
5. Honour and acknowledge the long and recent history of community and stakeholder involvement on the Rehabilitating Roe 8 project.
6. Regularly guide updates and adaptations to the RMP informed by engagement with community of interest and stakeholders.
7. Ensure communications are consistent, accessible and transparent from the outset of the implementation of the RMP.
8. Involve community in organisational activities.
9. Strengthen the unique community of interest and sense of place.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

### 2.1.2 Engagement and involvement objectives

Specific engagement and involvement objectives for the RMP are outlined in **Table 1**.

*Table 1: Engagement and involvement objectives*

Goal		Objectives
1.	Recognise Aboriginal heritage and continued connection to land ensuring Nyungar culture is maintained at each step in the implementation of the RMP	<b>1.1</b> The Wadjuk Working Group and other key Aboriginal stakeholders support the Rehabilitating Roe 8 project's approach to Aboriginal heritage
		<b>1.2</b> The Wadjuk Working Group and other key Aboriginal stakeholders are further consulted and through consultation indicate support for any proposed update to the RMP's approach to Aboriginal heritage
		<b>1.3</b> A full 'Aboriginal heritage survey' is completed within the first two years of implementation and the outcomes of that survey inform review of the RMP as required <sup>†</sup>
		<b>1.4</b> A cultural protocol tool is developed through work with the Wadjuk Working Group that outlines how Nyungar culture will be reflected in each step of the project
		<b>1.5</b> An 'acknowledgement of country' recognises Nyungar culture at each step of the project
2.	Ensure the community has input into decision-making and into the implementation of the RMP	<b>2.1</b> Membership to the Rehabilitating Roe 8 Advisory Committee <sup>†</sup> is open to all interested community groups and individuals
		<b>2.2</b> Term limits are established for members of the Rehabilitating Roe 8 Advisory Committee
		<b>2.3</b> Invitation is extended every year to the local community to join the Rehabilitating Roe 8 Advisory Committee
		<b>2.4</b> At least 60% of respondents to the 'community expectations and satisfaction' survey <sup>†</sup> support the Rehabilitating Roe 8 project <sup>^</sup>
		<b>2.5</b> At least 60% of respondents to the 'community expectations and satisfaction' survey <sup>†</sup> feel involved in the Rehabilitating Roe 8 project <sup>^</sup>
3.	Ensure the community has opportunities for hands-on involvement in the implementation of the RMP	<b>3.1</b> A range of different community organisations are given the opportunity to involve their members in implementation of the RMP
		<b>3.2</b> Key stakeholder organisations identified in this plan are given the opportunity to involve their members in implementation of the RMP
		<b>3.3</b> At least 60% of respondents to the 'community expectations and satisfaction' survey report having had the opportunity to be involved in RMP activities
4.	Develop trust, alignment and a shared understanding of the RMP	<b>4.1</b> At least 60% of respondents to the 'community expectations and satisfaction' survey indicate that they understand the objectives of the Rehabilitating Roe 8 project

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 1: Engagement and involvement objectives (continued)

Goal		Objectives
5.	Honour, involve and acknowledge the long and recent history of community and stakeholder involvement on the Rehabilitating Roe 8 project during the implementation of the RMP	5.1 Community and stakeholder participation to date is acknowledged at the commencement of all engagement and involvement initiatives
6.	Regularly guide updates and adaptations to the RMP informed by engagement	6.1 Complete one review of the plan per year, informed by the 'community expectations and satisfaction' survey and an analysis of other community and stakeholder feedback
		6.2 Using the adaptive management process, update and improve all components of the RMP as required
7.	Ensure communications are consistent, accessible and transparent from the outset of the implementation of the RMP	7.1 At least 60% of respondents to the 'community expectations and satisfaction' survey indicate that communications are consistent, accessible and transparent
8.	Strengthen the unique community and sense of place associated with the site	8.1 Respondents to the 'community expectations and satisfaction' survey give examples of strengthened community and sense of place in open-ended responses
		8.2 Incorporate a cultural/interpretive element into all management areas

†Refer **Section 5.2**

^refer **Section 3.2**

## 2.2 Ecological restoration

### 2.2.1 Target ecosystems

*“Ecological restoration practice is based on an appropriate local indigenous reference ecosystem”*

*(Principle 1, Standards Reference Group SERA (2017))*

Biological surveys undertaken prior to clearing occurring along the Roe 8 alignment and baseline monitoring surveys undertaken in 2017 were used to identify and characterise 'target ecosystems' for restoration (as detailed in **Appendix B** and **Appendix C**).

Broadly, two types of ecosystem occur within the site:

- 'wetland'
- 'banksia/eucalypt woodland'.

The banksia/eucalypt woodland ecosystem was further separated into six categories based on differences in species composition<sup>3</sup>. This resulted in the identification of one wetland and six banksia/eucalypt woodland target ecosystems, as outlined in **Table 2**.

<sup>3</sup> Provisionally based on overt differences in canopy or emergent species.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 2: Target ecosystems category and RMP labels

Ecosystem category	Ecosystem label
Wetland	Wet forest and woodland
Banksia/eucalypt woodland	Banksia woodland
	Banksia/jarrah woodland
	Holly-leaved banksia woodland
	Banksia/coastal blackbutt woodland
	Banksia/woody pear woodland
	Banksia/tuart woodland.

Detailed descriptions of each target ecosystem are provided in **Appendix C**.

### 2.2.2 Restoration goals

*“The goal of ecological restoration is full recovery, insofar as possible, even if outcomes take long timeframes or involve high inputs”*

*(Principle 4, Standards Reference Group SERA (2017))*

‘Primary’ and ‘minimum’ restoration goals are proposed for ‘cleared areas’ and ‘uncleared areas within 20m of cleared areas’<sup>4</sup>, as outlined in **Table 3**. The primary goals aim to optimise restoration outcomes within the site over the ten year implementation period such that the full ecological restoration of the site has the highest potential to be achieved in the long term. The intention of the minimum goals is to enable ‘completion’ of restoration activities to be evaluated within a practicable timeframe. Nevertheless minimum goals are still aligned with aspiration to achieve full ecological restoration over a long term time frame. Having primary and minimum restoration goals provides a reasonable basis for planning and implementation decisions and supports the evaluation of the ‘trajectory’ of restoration outcomes<sup>5</sup>.

<sup>4</sup> The Rehabilitating Roe 8 Steering Committee determined that restoration activities shall be conducted within cleared areas and a 20 m area surrounding cleared areas. Restoration is proposed within the 20 m area around cleared areas to limit threats and assist restoration of cleared areas.

<sup>5</sup> Although ten years is a relatively long time to operate a restoration project, ‘full recovery’ of the target ecosystems is unrealistic within a ten year period. Assessing the trajectory of restored ecosystem is an accepted approach for evaluating restoration performance (Standards Reference Group SERA 2017).



## Rehabilitation Management Plan

### Roe 8 Cleared Areas



*Table 3: Restoration goals for cleared areas and uncleared areas within 20m of cleared areas within the site*

Goal		Primary goal	Minimum goals
9.	Re-establish native vegetation within cleared areas and manage threats such that:	a) the condition of the restored native vegetation is better than that prior to clearing	b) the condition of the restored native vegetation is equal to or better than that prior to clearing
10.	Re-establish fauna habitat within cleared areas and manage threats such that:	a) the target ecosystems have the highest potential to be fully restored in the long term	b) the target ecosystems can reasonably be expected to be fully restored in the long-term
11.	Re-establish ecosystem function within cleared areas and manage threats such that:	a) the target ecosystems have the highest potential to be fully restored in the long term	b) the target ecosystems can reasonably be expected to be fully restored in the long-term
12.	Manage uncleared areas within 20m of cleared areas and manage threats such that:	a) the condition of the native vegetation is better than that prior to clearing	b) the condition of the native vegetation is equal to or better than that prior to clearing

### 2.2.3 Restoration objectives

Specific restoration objectives for cleared and uncleared areas (within 20m of cleared areas) are outlined in **Table 4**. These objectives are proposed in relation to the aforementioned restoration goals and information used to characterize the target ecosystems is presented in **Appendix C**.

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 4: Specific objectives for restoration within the site

Goal		Primary objectives	Minimum objectives
9	Re-establish native <sup>a</sup> vegetation in cleared areas	<b>9.1a</b> Density (stems/unit area) of each important <sup>#</sup> native species <b>±25%</b> of that recorded in reference sites	<b>9.1b</b> Density (stems/unit area) of each important <sup>#</sup> native species <b>±50%</b> of that recorded in reference sites
		<b>9.2a</b> Count of native flora <b>≥90%</b> mean species richness identified for target ecosystem <sup>^</sup>	<b>9.2b</b> Count of native flora species richness <b>≥60%</b> mean species richness identified for target ecosystem <sup>^</sup>
		<b>9.3a</b> Cover (%) native understorey flora species <b>≥95%</b> of total understorey cover (%)	<b>9.3b</b> Cover (%) native understorey flora species <b>≥80%</b> of total understorey cover (%)
		<b>9.4a</b> Understorey cover (%) <b>±25%</b> mean understorey cover (%) recorded in reference sites	<b>9.4b</b> Understorey cover (%) <b>&gt;50%</b> mean understorey cover (%) recorded in reference sites
10	Re-establish fauna habitat <sup>†</sup> in cleared areas	<b>10.1a</b> Frequency of records for native fauna species <b>≥100%</b> that recorded in baseline survey and/or reference sites <sup>&amp;n</sup>	<b>10.1b</b> Frequency of records for native fauna species <b>≥50%</b> that recorded in baseline survey and/or reference sites <sup>&amp;n</sup>
11	Re-establish ecosystem function <sup>†*</sup> in cleared areas	<b>11.1a</b> Cover (%) litter <b>±25%</b> mean cover (%) recorded in reference sites	<b>11.2b</b> Cover (%) litter <b>±50%</b> mean cover (%) recorded in reference sites
		<b>11.2a</b> Depth (cm) litter <b>±25%</b> mean depth litter (cm) recorded in reference sites	<b>11.2b</b> Depth (cm) litter <b>±50%</b> mean depth litter (cm) recorded in reference sites
		<b>11.3a</b> Cover (%) bare ground <b>±25%</b> mean cover (%) recorded in reference sites	<b>11.3b</b> Cover (%) bare ground <b>±50%</b> mean cover (%) recorded in reference sites
		<b>11.4a</b> Count of native flora species recorded as naturally recruited juveniles <sup>‡</sup> <b>±50%</b> that recorded in reference sites	<b>11.4b</b> Naturally recruited juveniles <sup>‡</sup> of any native flora species recorded.
12	Manage native vegetation in uncleared areas within 20 m of cleared areas	<b>12.1a</b> Cover (%) native understorey flora species <b>≥95%</b> of total understorey cover (%)	<b>12.1b</b> Cover (%) native understorey flora species <b>≥80%</b> of total understorey cover (%)

<sup>a</sup>Native species defined as species identified in 'associated species list' that were identified from Keighery *et al.* (2012) sample plots nearby to the site and/or as naturally recruited species recorded during monitoring.

<sup>#</sup> 'Important' species currently comprise canopy and large shrub taxa only. The important species identified vary for each target ecosystem as outlined in **Table 24** (refer **Section 7.2.3.2**).

<sup>^</sup>Mean species richness derived from the 'associated species list' that were identified from Keighery *et al.* (2012) sample plots nearby to the site and/or as naturally recruited species recorded during monitoring.

<sup>†</sup>In addition to re-establishing native vegetation.

<sup>&</sup>Records of sightings, scats, diggings, tracks and/or foraging evidence by major vertebrate and invertebrate classes, as defined as appropriate by a fauna specialist during the 'level 2' fauna survey. Note at a minimum comparison should include ants.

<sup>^</sup>Where vegetation monitoring sites are not sufficient, additional fauna reference sites may need to be established during proposed 'level 2' fauna survey (see **Section 7.2**).

<sup>†\*</sup>In addition to re-establishing fauna habitat.

<sup>‡</sup>Juvenile defined as a germinant/seedling/sapling that has not yet flowered.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

## 3 Implementation

### 3.1 Key activities

Key categories of activities proposed to be implemented under the RMP include:

- communications (refer **Section 4**)
- engagement (refer **Section 5**)
- involvement (refer **Section 5**)
- restoration (refer **Section 6**)
- monitoring, evaluation and reporting (refer **Section 6.3.9**).

‘Communications’ comprise a range of activities through which the community and other stakeholders are kept informed as the RMP is implemented. These include, but are not limited to: project updates, promotion of upcoming community engagement activities, on-site signage, press releases, advertising and social media.

‘Engagement’ activities seek information, feedback and input into decision-making from community members and other stakeholders into the RMPs operation, throughout the implementation of the RMP. These include, but are not limited to, surveys, open days, representation of stakeholder groups and in project governance arrangements.

‘Involvement’ activities include the act of participation of community members and stakeholders in the implementation of any or all of the activities identified in the RMP.

‘Restoration’ is the process of returning an ecosystem that has been degraded, damaged or destroyed to a prior (or improved) condition. Restoration includes, but is not limited to, activities such as plant establishment, weed control and fauna habitat creation/enhancement.

‘Monitoring’ is the process of collecting and evaluating observations to measure changes and evaluate progress towards objectives. Monitoring includes, but is not limited to, activities such as sampling and recording information, managing information, analyzing information; and evaluating and reporting information.

### 3.2 Community Engagement Coordinator/Project Manager

The following individual employee role(s) are identified as crucial to the implementation of the RMP:

- community engagement coordinator
- project manager.

The ‘community engagement coordinator’ role is responsible for the implementation of ‘communications’, ‘community engagement’ and ‘involvement’ activities under the RMP. The project manager role is responsible for the implementation of ‘restoration’ and ‘monitoring, evaluation and reporting’, which also comprises ‘involvement’.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas



The two roles are hereafter discussed as a combined **Community Engagement Coordinator/Project Manager**, which is identified as requiring 1.0 full-time equivalent (FTE) position for the first five years and provisionally identified as requiring 0.6 FTE position for the second five years of implementation.

The **Community Engagement Coordinator/Project Manager** is crucial to the implementation of the RMP. The **Community Engagement Coordinator/ Project Manager** will work with community and stakeholders, in a collaborative and adaptive manner, to achieve the stated goals and objectives of the RMP (**Section 2**).

### 3.3 Key stakeholders

The key stakeholders identified during community and stakeholder consultation as expecting to have roles in the implementation of the RMP include:

- City of Cockburn
- Cockburn Community Wildlife Corridor
- Cockburn Wetlands Education Centre
- DBCA
- PURSAC
- Main Roads WA
- Murdoch University
- Traditional Owners and Aboriginal Custodians.

Other important stakeholders are listed below, including those who may take on future roles and responsibilities under the RMP:

- Anti-Roe 8 activist groups
- Beeliar Regional Park Community Advisory Committee
- Communities of interest or who have a sense of place connected to the area
- Landcare groups
- Local community associations
- Local environmental groups
- Local Members of State Parliament
- Local residents
- Neighbouring local governments (City of Melville, City of Fremantle, City of Kwinana).
- Non-local environmental interest groups
- Other State Government Departments
- Primary schools
- Pro-Roe 8 activist groups
- Scientific and research community
- Secondary schools
- Tertiary education institutions
- Western Power (landowners immediately below powerlines in the Bibra Drive area)
- Young people and youth organisations.



## Rehabilitation Management Plan

### Roe 8 Cleared Areas



Protocols for coordinating future involvement in the Rehabilitating Roe 8 project are outlined in **Section 5.2**.

### 3.4 Stakeholder roles and responsibilities

The following roles for stakeholders are identified as being relevant to the implementation of the RMP:

- 'Primary Management Authority'
- 'Secondary Management Authority'
- 'Funding Body'
- 'Project Administrator'
- 'Rehabilitating Roe 8 Advisory Committee' (RR8AC)
- 'Aboriginal Advisory Committee'
- Interested community participants/volunteers
- Scientific advisor(s)
- Specialist restoration contractor(s)
- Specialist monitoring contractor(s)
- Specialist native nurseries.

Note that the Primary Management Authority, Secondary Management Authority, Funding Body, Project Administrator and the **Rehabilitating Roe 8 Advisory Committee** are identified as being singular entities with defined roles with the governance arrangement. The '**Rehabilitating Roe 8 Advisory Committee**' (RR8AC) is identified to represent the community engagement group or forum that will succeed the Rehabilitating Roe 8 Working Group and Rehabilitating Roe 8 Steering Committee<sup>6</sup>.

Proposed roles and responsibilities for project stakeholders are outlined in **Table 5**. As more community members and stakeholders are engaged, a greater range of roles and responsibilities and/or new roles and responsibilities may be assigned.

*Table 5: Proposed stakeholder, individual employee and subcontractor roles and responsibilities*

Role	Stakeholder	Responsibility
Primary Management Authority	City of Cockburn	<ul style="list-style-type: none"> <li>• Management Authority for the road reserve parcels associated with the proposed alignment of Roe 8, provisionally defined by the boundary of the site (as shown in <b>Figure 1</b>)</li> <li>• Management Authority for parts of Beeliar Regional Park south of Hope Road and adjacent to the site</li> </ul>
Secondary Management Authority	DBCA	<ul style="list-style-type: none"> <li>• Management Authority for parts of Beeliar Regional Park north of Hope Road</li> </ul>
Funding Body	Main Roads WA	<ul style="list-style-type: none"> <li>• Administration of the funding agreement to implement the RMP on behalf of the State Government</li> </ul>

<sup>6</sup> The existing governance arrangement which operated in relation to the Rehabilitating Roe 8 Working Group and Rehabilitating Roe 8 Steering Committee will change following approval of the RMP.

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 5: Proposed stakeholder, individual employee and subcontractor roles and responsibilities (continued)

Role	Stakeholder	Responsibility
Project Administrator	<ul style="list-style-type: none"> <li>City of Cockburn</li> </ul>	<ul style="list-style-type: none"> <li>Receipt of funding to implement the RMP</li> <li>Administration of funding to implement the RMP</li> <li>Administration and supervision of <b>Community Engagement Coordinator/Project Manager</b> role(s)</li> <li>Facilitation of RR8AC</li> <li>Facilitation of yearly review and revision of the RMP</li> <li>Coordination of project communication</li> <li>Custodian of project data</li> </ul>
Rehabilitating Roe 8 Advisory Committee	<ul style="list-style-type: none"> <li>City of Cockburn</li> <li>Cockburn Community Wildlife Corridor</li> <li>Cockburn Wetlands Education Centre</li> <li>PURSAC</li> <li>DBCA (Regional Parks)</li> </ul>	<ul style="list-style-type: none"> <li>Provision of advice on the implementation of the RMP</li> <li>Support the <b>Community Engagement Coordinator/Project Manager</b> roles(s)</li> <li>Assistance with coordinating inputs into the implementation of the RMP</li> <li>Receive reports on the progress of the RMP</li> <li>Coordination of the yearly review and revision of the RMP</li> </ul>
Aboriginal Advisory Group	<ul style="list-style-type: none"> <li>Wadjuk Working Group</li> </ul>	<ul style="list-style-type: none"> <li>Communication to the broader Aboriginal community (groups such as the Cockburn Aboriginal Reference Group, Traditional Owners and Custodians noted in the community database)</li> <li>Communication with other members of the public when seeking broad representation</li> </ul>
Interested community members / participants / volunteers	<ul style="list-style-type: none"> <li>City of Cockburn</li> <li>Cockburn Community Wildlife Corridor</li> <li>Cockburn Wetlands Education Centre</li> </ul>	<ul style="list-style-type: none"> <li>Leadership/participation in engagement activities</li> <li>Leadership/participation in involvement activities</li> <li>Leadership/participation in restoration activities</li> <li>Leader/participation in monitoring activities</li> </ul>
Scientific advisor(s)	<ul style="list-style-type: none"> <li>PURSAC</li> </ul>	<ul style="list-style-type: none"> <li>Assistance and advice regarding the implementation of the RMP</li> </ul>
Specialist restoration contractor(s)	TBC	<ul style="list-style-type: none"> <li>Weed control</li> <li>Seed collection</li> <li>Tubestock installation</li> <li>Direct seeding</li> </ul>
Specialist monitoring contractor(s)	TBC	<ul style="list-style-type: none"> <li>Biological survey</li> <li>Fauna survey</li> <li>Monitoring survey</li> </ul>
Specialist native nursery	TBC	<ul style="list-style-type: none"> <li>Tubestock propagation</li> </ul>

### 3.5 Governance arrangement

A governance structure will be identified within the funding agreement between the Primary Management Authority and Funding Body that describes a role for interested community members and stakeholders to provide advice and receive reports on progress on the RMP.

### 3.6 Minimum standards

Minimum standards for implementation of the RMP are outlined in **Table 6** (adapted from Standards Reference Group SERA (2017)).

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 6: Minimum standards for implementation (adapted from Standards Reference Group SERA (2017)).

#### Minimum standards for implementation of the RMP

1. No further and lasting damage shall be caused to land, water or ecosystems within the site, including physical damage, chemical pollution or biological contamination.
2. No further and lasting damage shall be caused to culture, community and community sense of place
3. Communication, engagement, involvement and restoration activities shall be interpreted and carried out responsibly, effectively and efficiently by suitably qualified, skilled and experienced people; or people who are under the supervision of a suitably qualified, skilled and experienced person.
4. All activities shall be undertaken in a manner that is responsive to natural processes and fosters and protects natural recovery. Primary treatments including substrate and hydrological amendments, pest species control, application of recovery triggers and biotic reintroductions shall be adequately followed up by secondary treatments as required.
5. Corrective changes of direction in response to unexpected ecosystem responses shall be facilitated in a timely manner and shall be ecologically informed and documented.
6. All activities shall exercise full compliance with occupational work, health and safety legislation and all other legislation including that relating to soil, air, water, oceans, heritage, species and ecosystem conservation.
7. The project representatives shall communicate regularly with key stakeholders and the general public to keep them informed of progress.

### 3.7 Management areas

To aid communication eight (8) management areas represent portions of the site separated by roads or practical management boundaries. East to west across the site these management areas are labelled<sup>7</sup>:

- Bibra Drive
- Hope Road North
- Turtle Corner
- North Lake Road East
- North Lake Road West
- Forrest Road South
- Forrest Road North
- Stock Road West.

The location of the management areas is shown **Figure 2**.

The management areas are identified to provide boundaries to the consideration of management activities, but do not indicate that management will be conducted across the entire site or that involvement is limited to activities that occur within the site.

### 3.8 Access

The management agreement for the site is expected to propose that the site is managed as public open space. The site is open to the public and no prior authorisation is required in order to enter the site on foot. As outlined in **Section 5.2** prior authorisation shall be obtained from the management

<sup>7</sup> These labels are nominal and in future local names may be applied which better reflect community and stakeholder connection and sense of place.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas



authority to bring vehicles, machinery or materials into the site or to perform activities which ordinarily require consent of a landholder or management authority (for example construction works or weed control).

Conservation fencing<sup>8</sup> has been erected around all or parts of each management area, except Turtle Corner, as shown in **Figure 3**. This fencing limits unauthorised access to the site. In the Bibra Drive and Hope Road North management areas rabbit proof fencing mitigates the threat posed by rabbit herbivory to revegetation (refer to discussion of threats provided in **Appendix B**).

Gates have been installed in the conservation fencing at a number of locations, including pedestrian entry points and locked vehicle gates. Additional locations for gates and pedestrian entry points are proposed where fencing interrupts the route of an existing or proposed path. The locations of existing and proposed gates are shown in **Figure 3**.

A network of existing and proposed path ways is identified to provide a route for authorised vehicles and pedestrians across the site. New paths are proposed within management areas based on consideration of:

- historical and pre-existing paths within cleared areas
- the alignment of machine and vehicle tracks, as identified in **Appendix B**.
- existing and proposed firebreaks
- locations of recently installed fencing and gates.

The primary path is proposed to be constructed from compacted limestone to create a formal pathway through the site. Other paths and firebreaks are proposed to be constructed and maintained from *in situ* soils. The location of existing and proposed paths is shown in **Figure 3**. Along with formalising access, these paths will provide management edges for restoration activities and fire control<sup>9</sup>.

### 3.9 Construction and maintenance

The following activities are identified that require implementation but are not directly related to communications, engagement, involvement, restoration or monitoring:

- path construction
- path maintenance
- fence maintenance
- signage maintenance
- general maintenance.

Where possible, completion of these activities should assist and compliment the implementation of other activities. For example, path construction may include installation of permanent markers that corresponded to restoration area boundaries.

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<sup>8</sup> To Management Authority standard.

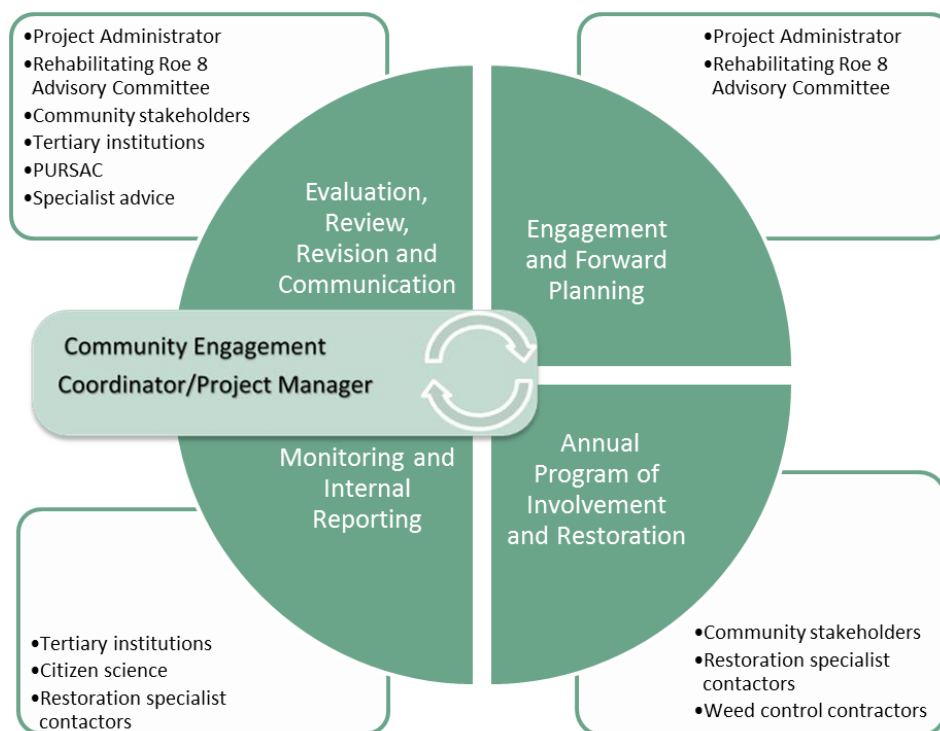
<sup>9</sup> Restoration area boundaries should be marked along path alignment to assist in orientation.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

### 3.10 Adaptive management framework

A collaborative and adaptive approach is proposed to the implementation of the RMP. In adaptive management the outcomes of implementation are monitored and learning is incorporated into planning and future management in a process of continuous improvement (Standards Reference Group SERA 2017). An adaptive management framework for the RMP is illustrated in **Plate 1**. The **Community Engagement Coordinator/Project Manager** is identified as having a crucial role in the adaptive management of the Rehabilitating Roe 8 project.



*Plate 1: Adaptive management framework showing key stakeholders and roles*

As part of annual review and planning, advice shall be sought from subject matter specialists including interested community and stakeholders, PURSAC and/or external specialist contractors. The acceptability of any proposed modification to the RMP should be confirmed with the Primary Management Authority, Secondary Management Authority and Funding Body.

All parts of the RMP are potentially modifiable. However, changes to the specified goals and objectives should only be considered after extensive consultation with community and stakeholders. Where it is demonstrated that the specified activities have been ineffective, alternative activities should be investigated as part of the annual review and evaluation component of the adaptive management approach. Methods that are considered to better achieve desired outcomes can be routinely adopted during annual planning and implemented during successive annual programs.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

### 3.11 Contingency

Contingency actions should only be required in extraordinary circumstances, where it is demonstrated that the operative adaptive management approach is unable to resolve an issue facing the project. In the event that contingencies are required, advice shall be sought from subject matter specialists including community members and stakeholders, PURSAC and/or external specialist contractors.

### 3.12 Program of works

A proposed yearly schedule of implementation for communication, engagement, involvement restoration and monitoring activities is provided as **Table 7**.

Table 7: Proposed annual schedule of RMP implementation

Category	Activity	Annual timing (approx.)											
		J	F	M	A	M	J	J	A	S	O	N	D
Communications	Update community database	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Update stakeholder database	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Update RR8 website	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Update City of Cockburn website and social media	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Review and update Rehabilitating Roe 8 branding	✓											
	Review and update information				✓						✓		
	Publish promotions and/or articles in local newspapers	As appropriate											
	Create and distribute posters, banners and/or flyers	As appropriate											
	Maintain site signage	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Monitor scientific communications pathways for opportunities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Engagement and Involvement	Explore opportunities for Aboriginal and local employment and training	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	RR8AC regular meeting <sup>#</sup>	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	RR8AC annual meeting <sup>#</sup>		✓										
	Update RMP (where required)		✓	✓	✓								
	Community education (e.g. workshops, training programs)	Items and timing TBC											
	Community science conference <sup>^</sup>			✓									
	Partnerships with City of Cockburn events	As appropriate											
	Partnerships with Cockburn Wetlands Education Centre	As appropriate											
	Maintain partnerships with tertiary education institutions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Community open day(s) and community planting days					✓	✓	✓					



# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 7: Proposed annual schedule of RMP implementation (continued)

Category	Activity	Annual timing (approx.)											
		J	F	M	A	M	J	J	A	S	O	N	D
Restoration	Collect or source local provenance seed	✓	✓	✓							✓	✓	✓
	Place tubestock order										✓	✓	✓
	Apply direct seeding (TBC)					✓	✓						
	Plant tubestock					✓	✓	✓					
	Weed control - 1 (general - manual or broad spectrum blanket and spot spray)				✓	✓	✓	✓		✓	✓	✓	
	Weed control - 2 (bulb - selective blanket and spot spray)						✓	✓	✓	✓			
	Weed control - 3 (grass - selective blanket or spot spray)						✓	✓	✓				
	Weed control - 4 (general – manual or broad spectrum spot spray)	✓		✓									
	Review and maintain conservation access (fences, gates and paths)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Monitoring, Evaluation and Reporting	Review social media	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Produce annual community report card			✓									
	Undertake 'community expectations and satisfaction' survey											✓	✓
	Citizen science/community monitoring	Program and timing TBC											
	Monitoring (weed mapping)									✓	✓		
	Monitoring (photopoints)		✓			✓			✓			✓	
	Monitoring (restoration areas)									✓	✓		
	Monitoring (fauna surveys)~	Program and timing TBC											
	Data analysis, QA and entry into databases					✓					✓	✓	✓
	Produce summary report for informal reporting <sup>#</sup>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Produce annual internal monitoring report	✓											✓
	Evaluation of annual progress and forward planning	✓	✓										✓
	Evaluation of RMP outcomes against goals	✓	✓										✓
	Update RMP (where required)	✓	✓										✓

<sup>#</sup>=Frequency of meetings may be reduced after year 1 of the RMP, <sup>^</sup>=every 2 years commencing in 2019, <sup>~</sup>Programmed for four out of ten years timing TBC.

A proposed yearly schedule of implementation for communication, engagement, involvement, restoration and monitoring activities is provided in **Table 8** to **Table 11**.

# Rehabilitation Management Plan

Roe 8 Cleared Areas



Table 8: Proposed schedule of RMP implementation per year - communication

Category	Activity/tool	Activity	Year									
			1	2	3	4	5	6	7	8	9	10
Communication	Community database	Update and maintain	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Stakeholder database	Update and maintain	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Rehabilitating Roe 8 brand	Review and update	✓									
	RR8 website and social media	Review and update	✓		✓		✓		✓		✓	✓
	'Frequently asked questions' and information booklet	Develop	✓									
		Update		✓	✓	✓	✓	✓	✓	✓	✓	✓
	City of Cockburn website and social	Update and monitor	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Local newspapers	Publish promotions and articles	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Posters, banners and flyers	Create and distribute	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Site signage	Install	✓									
		Maintain		✓	✓	✓	✓	✓	✓	✓	✓	✓
	Annual community report card	Produce	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Scientific communications pathways	Use to inform of opportunities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

# Rehabilitation Management Plan

Roe 8 Cleared Areas



Table 9: Proposed schedule of RMP implementation per year – engagement and involvement

Category	Activity/tool	Activity	Year									
			1	2	3	4	5	6	7	8	9	10
Engagement and Involvement	Aboriginal heritage survey	Undertake	✓									
	Aboriginal employment and training	Seek opportunities as required	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Local employment and training	Seek opportunities as required	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Governance structure	Develop	✓									
		Revise		✓	✓	✓	✓	✓	✓	✓	✓	✓
	Rehabilitating Roe 8 Advisory Committee	Determine committee members	✓									
		Hold meeting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Community education	TBC										
	Citizen science/community monitoring	Develop program	✓	✓	✓							
	Local community adoption of restoration areas	Develop program	✓	✓	✓							
		Undertake activities			✓	✓	✓	✓	✓	✓	✓	✓
	Community science conference	Planning	✓	✓								
		Hold conference		✓		✓		✓		✓		✓
	City of Cockburn events	Partnerships	Dependent on appropriate events									
	Cockburn Wetlands Education Centre	Partnerships	Dependent on appropriate events									
	Tertiary education institutions	Partnerships	TBC									
	Open days	Hold open day	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

# Rehabilitation Management Plan

## Roe 8 Cleared Areas



Table 10: Proposed schedule of RMP implementation per year - restoration

Category	Activity/tool	Activity	Year									
			1	2	3	4	5	6	7	8	9	10
Restoration	Seed	Seek advice from an experienced restoration contractor	✓									
		Seed collection	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		Source local provenance seed	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		Apply direct seeding		✓	✓							
	Tubestock	Place tubestock order	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		Plant tubestock (incl. community planting days) - 1st year of planting										
		1 Bibra Drive		✓			✓					
		2 Forrest Road North		✓	✓	✓	✓					
		3 Forrest Road South		✓		✓						
		4 Hope Road North			✓	✓						
		5 North Lake Road East	✓	✓		✓	✓					
		6 North lake Road West		✓	✓	✓	✓					
		7 Stock Road West			✓							
		8 Turtle Corner					✓					

# Rehabilitation Management Plan

Roe 8 Cleared Areas



Table 10: Proposed schedule of RMP implementation per year - restoration (continued)

Category	Activity/tool	Activity	Year									
			1	2	3	4	5	6	7	8	9	10
Restoration	Tubestock	Plant tubestock (incl. community planting days) - infill planting										
		1 Bibra Drive			✓	✓		✓	TBC	TBC	TBC	TBC
		2 Forrest Road North			✓	✓	✓	✓	TBC	TBC	TBC	TBC
		3 Forrest Road South			✓	✓	✓	✓	TBC	TBC	TBC	TBC
		4 Hope Road North				✓	✓	✓	TBC	TBC	TBC	TBC
		5 North Lake Road East		✓	✓	✓	✓	✓	TBC	TBC	TBC	TBC
		6 North lake Road West			✓	✓	✓	✓	TBC	TBC	TBC	TBC
		7 Stock Road West				✓	✓	TBC	TBC	TBC	TBC	TBC
		8 Turtle Corner						✓	TBC	TBC	TBC	TBC
	Weed control	Manual or herbicide weed control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Site security and access	Construct path ways through management areas	✓									
		Review and maintain conservation fencing , gates and path ways	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 11: Proposed schedule of RMP implementation per year - monitoring, evaluation and reporting

Category	Tool/category	Activity	Year									
			1	2	3	4	5	6	7	8	9	10
Monitoring, Evaluation and Reporting	RR8 website and social media	Record feedback	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Community expectations and satisfaction survey	Design community expectations and satisfaction survey	✓									
		Undertake community expectations and satisfaction survey	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Citizen science/community monitoring	Undertake monitoring		✓	✓	✓	✓	✓	✓	✓	✓	✓
	Monitoring	Weed mapping	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Photopoints	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Restoration areas (including permanent plots)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Fauna survey <sup>†</sup>	✓	✓						✓	✓	
		Database management and analysis	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Reporting and evaluation	Reporting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Evaluation of annual progress and forward planning	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		Update RMP (where required)	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		Evaluation of RMP outcomes against goals										✓

<sup>†</sup>Comprehensive EPA (2016) 'level 2' equivalent.



# Rehabilitation Management Plan

## Roe 8 Cleared Areas

## 4 Communications

### 4.1 Key messages

Communications shall reinforce the key messages informed by engagement with community members and other key stakeholders outlined in **Table 12**.

*Table 12: Key messages informed by engagement with community members and other key stakeholders.*

Theme	Message
Aboriginal heritage and continued connection to land	Recognition of Aboriginal heritage and continued connection to land is crucial to the RMP. The following are key messages identified during engagement with Traditional Elders: "Nyungars everywhere gathered here" "The Lakes have been well-preserved but not the culture"
	In regards to the rehabilitation – "we can fix this, but tell the story first." Get important cultural things right, like returning places to their Nyungar names, before starting the rehabilitation.
	There needs to upfront recognition of the significance of the area, including the heritage, culture and stories associated with the site and the wider region
	It is important that any stories told through engagement with Aboriginal people are recognised as the stories of those Aboriginal people and that the rights to peoples' own stories are not impinged.
Project governance and communities of interest	The communities of interest for this project include adjoining residents and communities as well as interested individuals, groups and traditional custodians of the land.
	To date the project has been managed by the Rehabilitating Roe 8 Working Group and the Rehabilitating Roe 8 Steering Committee. This governance structure is likely to change in the future and will be clearly communicated when this happens.
Rehabilitating Roe 8 Project	The Rehabilitating Roe 8 project is embarking on the next phase.
	Extensive stakeholder and community engagement has been conducted to gain input into the RMP.
	The cleared areas which this plan relates to are part of the broader Cockburn Community Wildlife Corridor vision. The <i>Community Wildlife Corridor Briefing Paper 2017</i> is a key document that has informed the RMP.
	The RMP recommends adaptive management; hence, it will be updated as required. Any updates will be informed by a robust review process, community and stakeholder engagement, and increased knowledge and awareness.
Security of tenure	The site is currently zoned as a road reserve. There is a desire from the majority of stakeholder groups to see this land reserved for Parks and Recreation under the <i>Metropolitan Region Scheme</i> to increase certainty of restoration and future conservation.
Communication from and with the scientific community	There is a great opportunity to communicate all upcoming research opportunities with scientific groups and tertiary institutions.
	The research, social rehabilitation and ecological restoration journey of this unique project must be communicated to the scientific and broader communities to inform future restoration projects.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas



#### 4.2 Communication approach

The following communication tools are proposed to be used to convey the above project messages:

- community database
- stakeholder database
- Rehabilitating Roe 8 brand
- Rehabilitating Roe 8 website and social media
- booklet with 'frequently asked questions'
- City of Cockburn website and social media
- local newspapers
- posters, banner and flyers
- site signage
- annual community report card.

A description of each communication tool, timing and target audience is detailed in **Table 13**.

# Rehabilitation Management Plan

Roe 8 Cleared Areas



Table 13: Communications tools and approaches

Tool / Method	Description	Time / Frequency	Who is targeted	Information promoted through this method?
Community database (refer <b>Appendix A</b> )	<ul style="list-style-type: none"> <li>Use the database to connect directly with community members who have signed up to receive project updates.</li> <li>Primarily used for email updates but potential for mail/phone updates if necessary.</li> <li>Details may be sourced through RSVPs and sign-in sheets at engagement and involvement activities.</li> </ul>	<ul style="list-style-type: none"> <li>Original community database supplied in December 2017.</li> <li>Updates to continue throughout life of project.</li> </ul>	Community members who have signed up to receive project updates. N.B privacy laws prevent including people who have not consented to being on the database.	All upcoming activities and subsequent outcomes to be distributed to the whole community database, with the exception of activities that target proximate residents only.
Stakeholder database (refer <b>Appendix A</b> )	<ul style="list-style-type: none"> <li>Existing stakeholders and stakeholder channels including Facebook pages of environmental and community groups.</li> <li>Details may be sourced through RSVPs and sign-in sheets at engagement and involvement activities, and through direct contact with stakeholders.</li> </ul> <p>NOTE: Traditional Owners and Aboriginal Custodians may be engaged through the City of Cockburn Aboriginal Reference Group, Wadjuk Working Group, City of Kwinana, City of Melville.</p> <p>NOTE: Local businesses may be engaged through the Melville-Cockburn Chamber of Commerce.</p>	<ul style="list-style-type: none"> <li>Original community database supplied in December 2017.</li> <li>Updates to continue throughout life of project.</li> </ul>	Stakeholder organisations	All upcoming activities and subsequent outcomes to be distributed to relevant organisations in the database.
Rehabilitating Roe 8 brand	<p>Review and update the Rehabilitating Roe 8 branding, including:</p> <ul style="list-style-type: none"> <li>logo</li> <li>project name</li> <li>site name</li> <li>names of management areas.</li> </ul>	Following Aboriginal Heritage Study and first 'community expectations and satisfaction' survey.	All community members and other stakeholders.	To be used in all following communication materials.

# Rehabilitation Management Plan

Roe 8 Cleared Areas



Table 13: Communications tools and approaches (continued)

Tool / Method	Description	Time / Frequency	Who is targeted	Information promoted through this method?
RR8 website and social media monitoring	<p>Update the rehabilitating Roe 8 website to include the following components</p> <ul style="list-style-type: none"> <li>• Project background</li> <li>• Information downloads (<i>Rehabilitation Management Plan</i>, FAQs and Information)</li> <li>• Project updates</li> <li>• Program of upcoming community engagement and involvement activities</li> <li>• Links to partner organisation website and social media (update existing “links” page)</li> <li>• Social media monitoring</li> <li>• Registration form to be part of community database may be used as a platform for the online survey if website has the capacity</li> <li>• Project dashboard based on report card (see below) that can include fast and slow moving variables and show information from formal and informal (citizen science) monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>• Developed in early 2018</li> <li>• Regular updates and monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>• Partner organisations</li> <li>• Key stakeholder groups</li> <li>• Highly interested and invested community members</li> <li>• Social media users (through links to the website shared on social media accounts of project team and key stakeholders).</li> </ul>	<p>Primarily, the website shall be utilised for background information that is relatively static, and as a platform for online engagement where possible.</p> <p>Broad communications cannot be achieved through a website as visitors are unlikely to be frequent or regular. Upcoming activities and subsequent outcomes shall be placed on the website, but the website shall not be considered the primary tool for communicating these important messages.</p>
Frequently Asked Questions and Information	<p>Develop draft ‘frequently asked questions’ and information booklet, include general project information, and questions frequently asked by stakeholders during the both formal and informal engagement (related to rehabilitation, citizen science, engagement and involvement opportunities). This information shall be available in hard copy and online. These key project information and FAQ materials shall be produced as early as possible in the process and can be updated as the project progresses so that additional feedback can inform future questions.</p>	Early 2018, reviewed 6-monthly	Community members with limited background knowledge of the project	Frequently asked questions and background information booklet.

# Rehabilitation Management Plan

Roe 8 Cleared Areas



Table 13: Communications tools and approaches (continued)

Tool / Method	Description	Time / Frequency	Who is targeted	Information promoted through this method?
City of Cockburn website and social media	Liaise with the City of Cockburn to utilise the City's website and social media channels.	Monthly	City of Cockburn residents	All upcoming activities and subsequent outcomes to be shared on City of Cockburn website and social media, with the exception of activities that target proximate residents only.
Local newspapers	<ul style="list-style-type: none"> <li>Promotions of upcoming activities via advertisement or flyer as an insert.</li> <li>Key outcomes and milestones via articles/press releases.</li> </ul>	<ul style="list-style-type: none"> <li>Upcoming activities approximately monthly</li> <li>Key outcomes and milestones approximately 3 times annually.</li> </ul>	Local residents	Upcoming activities that involve broad community input Key outcomes and milestones of interest to the broader community.
Posters, banners and flyers	Promotions of upcoming activities via advertisement	Approximately 3 times annually (for major events).	Local residents and visitors	Upcoming activities that shall involve local community input.
Signage on Site	On-site signage regarding rehabilitation information, access (e.g. dogs required to be on leads) and science communications (e.g. signage regarding local flora and fauna, outcomes of local research). NOTE: There is the potential to use signposts as reference points indicating the corners of monitoring plots Signage within Beeliar Regional Park should be in the appropriate Regional Park format.	Access and rehabilitation signage as required. Science communications signage may be permanent.	Local residents and visitors	<ul style="list-style-type: none"> <li>Rehabilitation information</li> <li>Access (including limitations due to sensitivity and research)</li> <li>Science communications.</li> </ul>

# Rehabilitation Management Plan

Roe 8 Cleared Areas



Table 13: Communications tools and approaches (continued)

Tool / Method	Description	Time / Frequency	Who is targeted	Information promoted through this method?
Annual community report card	Produce a brief (3-4 page) annual community report card to show what is being achieved. Recommend including a one page dashboard summarising key 'community expectations and satisfaction' survey results, and at least one page of visual feedback showing the progress of rehabilitations(e.g. map showing how close each plot is to completion).	Annually	<ul style="list-style-type: none"> <li>Community members who have signed up to receive project updates</li> <li>Stakeholder organisations</li> <li>Local residents</li> </ul>	Summarise rehabilitation milestones, the findings of engagement, key involvement activities and research and scientific outcomes.
Scientific communications pathways	Utilise PURSAC and tertiary institutions to informing the scientific and community of upcoming research opportunities and research/rehabilitation outcomes.	As required for relevant activities	<ul style="list-style-type: none"> <li>Scientists</li> <li>Students</li> </ul>	Research opportunities and research/rehabilitation outcomes.



## Rehabilitation Management Plan

### Roe 8 Cleared Areas

#### 4.3 Communication protocols

##### 4.3.1 Authorised spokespeople

It is important that a spokesperson or spokespeople be appointed as a contact for the media and other external sources. This may include the **Community Engagement Coordinator/Project Manager** and/or an individual or individuals identified by the Project Administrator within the agreed governance arrangement (**Section 3.5**).

##### 4.3.2 Responding to media enquiries

All responses to media enquiries shall be directed through the authorised spokesperson/spokespeople identified by the Project Administrator within the agreed governance arrangement. This person will then notify the other Rehabilitating Roe 8 Advisory Committee or analogous group of the enquiry. Generally the member organisation responsible for the particular issue under enquiry will prepare a response and circulate it for comment to the other group members prior to release (where time permits).

##### 4.3.3 Responding to individual public enquiries

All public enquiries may be answered by the **Community Engagement Coordinator/Project Manager**, Rehabilitating Roe 8 Advisory Committee or representatives of the key stakeholder organisation receiving the enquiry. Other key stakeholders or committee members shall be consulted if anything in the enquiry or response is considered potentially controversial. If necessary, the respondent may liaise with the authorised spokesperson/spokespeople identified by the Project Administrator within the agreed governance arrangement.

##### 4.3.4 Content of public comment (including responses to media enquiries)

All public comment, from whichever Rehabilitating Roe 8 Advisory Committee or key stakeholder organisation, must be consistent with the key messages outlined within this document (which may be updated as the RMP is adapted).

## Rehabilitation Management Plan Roe 8 Cleared Areas

## 5 Engagement and Involvement

### 5.1 Engagement and involvement approach

An extensive community and stakeholder engagement process was conducted between August and November 2017 (detailed in **Appendix A**) to gain input into this RMP. During this community and stakeholder engagement process the primary activities outlined in **Table 14** were recommended.

*Table 14: Summary of community engagement and involvement activities to be undertaken.*

Initiative	Engagement	Involvement
Explore opportunities for local and local Aboriginal employment and training	✓	✓
'Community expectations and satisfaction' survey	✓	
Community science conference	✓	
Develop governance structures that allow input from community and other stakeholders in decision-making, and revise this structure annually	✓	
Open days	✓	
Rehabilitating Roe 8 Advisory Committee meetings	✓	
Review and update RMP	✓	
Community education related to rehabilitation		✓
Community planting, weeding, watering and monitoring		✓
Creation of 'tribes' of locals caring for and monitoring sections near their homes		✓
Partner with schools and tertiary institutions		✓
Partnerships with City of Cockburn events		✓
Partnerships with Cockburn Wetlands Education Centre events/programs		✓

It was identified during engagement that the absence of an Aboriginal heritage study for the site is a significant constraint. It is proposed that an Aboriginal heritage study be commissioned at the commencement of this RMP and that this plan be reviewed and amended with Traditional Owners and Aboriginal Custodians.

### 5.2 Engagement and involvement activities

#### 5.2.1 Aboriginal heritage survey

Consultation with Aboriginal stakeholders and other stakeholders has reinforced the need for the Aboriginal heritage of the site to be correctly understood and reflected in the ongoing implementation of the RMP.

It is recommended that an 'Aboriginal heritage survey' be commissioned and that the RMP is reviewed and updated as required to reflect Aboriginal heritage values upon its completion.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas



The scope of work for an Aboriginal heritage survey is yet to be confirmed and requires additional planning and stakeholder engagement.

#### 5.2.2 Local employment and training

There is interest in the local community to be involved and to gain employment opportunities on the rehabilitation works. Opportunities shall be further explored to employ interested local people, community groups or businesses on restoration activities.

The details of local employment and training opportunities are yet to be confirmed and require additional planning and stakeholder engagement.

#### 5.2.3 Aboriginal employment and training

Through consultation, it has been determined that there is significant restoration experience amongst the local Aboriginal community.

Opportunities shall be further explored to employ local Aboriginal custodians and other Aboriginal people on the rehabilitation works. Training opportunities can also be considered, but genuine employment shall be prioritized.

The details of Aboriginal employment and training opportunities are yet to be confirmed and require additional stakeholder engagement.

#### 5.2.4 Community expectations and satisfaction survey

A 'community expectations and satisfaction survey' is required to inform the review and revision of the RMP and provide accountability to interested community members. This survey will serve as a monitoring and evaluation tool for the project as outlined in **Section 7.1.1**.

The survey would ideally be informed by a pre-implementation baseline, which means the first round of survey should be delivered as soon as possible.

The format of the survey is yet to be confirmed and will require additional planning and stakeholder engagement<sup>10</sup>.

#### 5.2.5 Community science conference

A community science conference that is targeted at informed and interested community members could potentially be the "flagship" community event in the Rehabilitating Roe 8 program calendar.

The conference has been proposed to provide scientists, citizen-scientists and students with the opportunity to present findings and updates to the community. The conference would include presentations on the progress of the Rehabilitating Roe 8 project and relevant and local research projects that are not within the scope of the RMP.

The conference may be modeled on the Brixton St Symposium and Banksia Woodland Symposium and shall include funding to ensure that community can attend. Possibly the conference could be a

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<sup>10</sup> May be interview-based or based online using a web based survey portal, or interviews can be used to inform survey design that is then based online.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas



component of the annual Cockburn Wetland Education Centre Wetlands Management Conference, if the theme of the wetland conference targets the same intended audience.

The details regarding a community science conference are yet to be confirmed and require additional planning and stakeholder engagement.

#### 5.2.6 Input into governance arrangement

Engagement with stakeholders both within and external to the current governance structure of the Rehabilitating Roe 8 Working Group and Rehabilitating Roe 8 Steering Committee, is required to confirm an appropriate ongoing arrangement for the RMP.

Representation of community groups and others in the formal governance structure is an efficient way of communicating with these groups and, when these groups share promotional materials, with their membership and audience.

Following the confirmation of a governance arrangement an inclusive selection process for membership to the Rehabilitating Roe 8 Advisory Committee and other roles will be established.

Membership to the Rehabilitating Roe 8 Advisory Committee shall be reassessed annually and a term limit will be imposed on committee members. This will ensure broad representation within the committee.

The details of input into the governance arrangement are yet to be confirmed and require additional planning and stakeholder engagement.

#### 5.2.7 Open days

A successful open day was conducted as part of consultation on the preparation of the RMP (refer **Appendix A**). Open days provide opportunity for gathering community input, reporting on progress and may link to education or involvement through site visits or lining to a community planting day.

The details regarding open days are yet to be confirmed and require additional planning and stakeholder engagement.

#### 5.2.8 Rehabilitating Roe 8 Advisory Committee meetings

Meetings of the Rehabilitating Roe 8 Advisory Committee are initially proposed to occur on a monthly basis, and then as required. The Project Manager shall give a monthly report to Rehabilitating Roe 8 Advisory Committee at these meetings.

The details of the Rehabilitating Roe 8 Advisory Committee are yet to be confirmed and require additional planning and stakeholder engagement.

#### 5.2.9 Review and revision of RMP

The RMP will be updated adaptively on an annual basis. These updates will be informed by monitored outcomes of activities, ongoing community engagement including the 'Community Expectations and Satisfaction Survey', environmental change, new knowledge and other changes,

## Rehabilitation Management Plan

### Roe 8 Cleared Areas



such as changes to project context. The process for the review and revision of the RMP is outlined in **Section 3.10**.

#### 5.2.10 Community education

The implementation of the RMP offers excellent opportunity for education. The following community education options related to restoration are identified:

- Restoration and ecology workshops, including understanding local/endemic plants.
- Weed identification and weeding workshops.
- Training for citizen science community monitoring programs.
- Understanding site sensitivity and minimising impact (to ensure large groups do not damage the site).
- Link with Cockburn Wetlands Education Centre, NativeARC, Millennium Kids and City of Cockburn community education opportunities.
- Links with relevant research programs.
- Guided tours of site by community ‘champions’.

Note that these are not the only education options and options may be identified over time. The details of any of the community education options are yet to be confirmed and require additional planning and stakeholder engagement.

#### 5.2.11 Community involvement in restoration

A strong desire was identified for community involvement in planting, weeding and other restoration activities for appropriate areas of the site (according to protocols outlined in **Section 6.3.6**).

Planting areas for 2018 to 2023 are identified in **Appendix D**.

The location and details regarding community planting areas are yet to be confirmed and require additional planning and stakeholder engagement.

#### 5.2.12 Citizen science / community monitoring

The implementation of the RMP offers an excellent opportunity for citizen science/community monitoring programs and input (according to protocols outlined in **Section 7**).

The details regarding citizen science/community monitoring are yet to be confirmed and require additional planning and stakeholder engagement<sup>11</sup>.

#### 5.2.13 Local community adoption of restoration areas

The details regarding the local community “adopt-a-spot” program are yet to be confirmed and require additional planning and stakeholder engagement.

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<sup>11</sup> Will include photo-monitoring, records of observations and other monitoring as appropriate.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

#### 5.2.14 Partnership with primary / secondary schools

The implementation of the RMP offers excellent opportunity for partnerships with primary/secondary schools including restoration activities such as planting, weeding, monitoring and other citizen science programs, the potential for an “adopt-a-spot” program to include specific area or areas for a particular school to maintain/report on monitoring (refer **Section 5.2.13**). Young people may be able to audit the area, conceptualise and implement their own citizen science projects.

The details regarding partnerships with primary/secondary schools are yet to be confirmed and require additional planning and stakeholder engagement.

#### 5.2.15 Partnership with tertiary education institutions

The implementation of the RMP offers excellent opportunity for partnerships with tertiary education institutions including engaging and supporting researchers to further understanding of restoration process and outcomes and establishing the Rehabilitating Roe 8 project as a ‘centre of learning’.

The details regarding partnerships with tertiary education institutions are yet to be confirmed and require additional planning and stakeholder engagement<sup>12</sup>.

#### 5.2.16 Partnerships with City of Cockburn events

The details regarding partnerships with City of Cockburn events are yet to be confirmed and require additional planning and stakeholder engagement<sup>13</sup>.

#### 5.2.17 Partnerships with Cockburn Wetlands Education Centre events / programs

The details regarding partnerships with Cockburn Wetlands Education Centre events are yet to be confirmed and require additional planning and stakeholder engagement<sup>14</sup>.

### 5.3 Involvement protocols

Protocols for involvement in the implementation of the RMP are outlined below. These protocols apply to all people, vehicles, equipment or materials entering the site to undertake activities associated with the RMP.

#### 5.3.1 Respect

The site is Wadjuk country. Traditional Owners, Elders and all Nyungar people, past and present shall be acknowledged and respected when referring to, or accessing, the site.

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<sup>12</sup> For example regarding monitoring and other research projects.

<sup>13</sup> For example the Bibra Lake Fun Run, Aboriginal Reference Group/Wadjuk Working Group engagement and Bush Tucker Tours.

<sup>14</sup> For example training for on-site rehabilitation, seed collection, site tours, frog-friendly gardens workshops, planting workshops.



## Rehabilitation Management Plan

### Roe 8 Cleared Areas



The restoration of cleared areas associated with Roe 8 is important to many people. The restoration areas and remnant native ecosystems within the site, and connection of community members and stakeholders to the site, shall accordingly be treated with respect at all times.

#### 5.3.2 Public liability

Public liability will be held by the Project Administrator and Management Authority.

#### 5.3.3 Safe work practices

Prior to commencing any works, notification shall be given to the **Community Engagement Coordinator/Project Manager** and/or Management Authority.

Where physical works are being carried out (such as planting, hand weeding, herbicide application, installing stakes for monitoring, general maintenance) a 'work plan and job safety assessment' shall be prepared, provided to, and approved by, the **Community Engagement Coordinator/Project Manager** and/or Management Authority prior to entering the site. The work plan and job safety assessment shall identify risk of harm to persons, environment or property and measures taken to reduce risks to an acceptable standard.

#### 5.3.4 Hygiene

Vehicles, machinery, tools, equipment and clothing shall be free of all mud, soil and plant material (especially weed seed) on arrival at the site. If vehicles, machinery, tools, equipment or clothing are temporarily removed from the site during works they must be free of all mud, soil and plant material on return.

All personnel entering management areas for restoration or monitoring works should ensure that footwear is clean and free of soil and weed seed.

Imported materials shall be certified free of *Phytophthora cinnamomi* (dieback) and environmental weeds.

#### 5.3.5 Pedestrian access

Pedestrian access to the site shall be via the gates and entry points only.

Whenever possible pedestrians shall walk on dedicated paths to avoid impacting restoration areas.

#### 5.3.6 Vehicle access

Vehicles shall only be brought into the site by persons authorized by the **Community Engagement Coordinator/Project Manager** and/or Management Authority.

Vehicle access gates shall be used to access the site.

Vehicles shall travel along existing and proposed paths at all times. Any deviation from the paths will require prior authorization.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas



#### 5.3.7 Pets and livestock

Pets and livestock shall only be allowed within the site as per Management Authority policy. Pets and livestock are otherwise not permitted within the site.

#### 5.3.8 Rubbish and waste

All rubbish and waste brought into the site shall be removed from site and deposited in an appropriate receptacle, or at a suitable licensed facility.

#### 5.3.9 Record keeping

A record of the type and location of any RMP related activities completed shall be provided to the **Community Engagement Coordinator/Project Manager** and/or Project Administrator.

The record shall include spatial reference using location obtained from a GPS enabled device, or at minimum a description of relative location within a management area.

Where monitoring data is collected protocols for data management outlined in **Section 7** shall be adhered to.

## 6 Restoration

*“Restoration inputs will be dictated by level of resilience and degradation”*

*(Principle 2, Standards Reference Group SERA (2017))*

### 6.1 Restoration approach

The Rehabilitating Roe 8 Steering Committee determined that restoration activities shall be conducted within cleared areas and a 20 m area surrounding cleared areas. Restoration is proposed within the 20 m area around cleared areas to limit threats and assist restoration of cleared areas.

The following restoration activities are proposed to be conducted (refer to **Section 6.1.3** for detailed description):

- landform preparation (largely complete)
- habit enhancement
- weed control
- tubestock installation
- maintenance (including litter and selective vegetation management).

To aid communication and planning each management area contains smaller ‘restoration areas’, which have specific target ecosystem and restoration input requirements (refer to **Section 6.1.1**). Restoration is proposed to be completed progressively across the restoration areas (as previously outlined in **Section 3.12**). Restoration input categories are assigned to each restoration area to inform the type and intensity of activities that may be conducted (refer to **Section 6.1.2**). Protocols to guide the implementation of restoration activities are outlined in **Section 6.1.3**. Parts of management areas that are not identified as a restoration area are currently not allocated restoration activities.

#### 6.1.1 Restoration areas

Restoration areas that are currently identified across the site are shown in **Figure 4a** to **Figure 4c**.

Each restoration area has a unique identification number which was assigned east to west across the site. The boundaries of restoration areas were defined based on consideration of relevant target ecosystem, as well as, clearing status, distance from cleared areas, fencing status and regeneration response as identified during site assessment (**Appendix C**). A total of 191 separate restoration areas are currently identified extending over 33.64 ha.

Note that further separation of restoration areas or changes to the boundaries of restoration areas may be required in response to planned or unplanned variations in restoration treatments (see **Section 6.3.9** for further discussion).

## Rehabilitation Management Plan

### Roe 8 Cleared Areas



#### 6.1.2 Input categories

The restoration areas were classified into one of the following three restoration input categories dependent on their requirements:

- low intervention
- assisted regeneration
- reconstruction.

The input categories were assigned to restoration areas following consideration clearing status, distance from cleared areas, fencing status and recorded regeneration response as shown in **Figure 5**.

‘Low intervention’ is specified for areas that do not require tubestock planting because they are either:

- uncleared (within 20 m of cleared areas)
- recorded as having a high natural regeneration response during site assessment (as detailed in **Appendix C**) (Bibra Drive wetland area only).

Restoration of low intervention areas will only involve weed control.

‘Assisted regeneration’ is specified for areas where low levels of natural regeneration are present and some planting, seeding, habitat enhancement and weed control will be required in order to meet the restoration objectives. The majority of the restoration areas are assigned this input category.

Full ‘reconstruction’ is specified for areas that have been subject to higher levels of historical disturbance and modification meaning they will require landform preparation, intensive planting, habitat enhancement and weed control in order to meet the minimum restoration objectives.

#### 6.1.3 Prioritisation

Restoration areas were further prioritised to inform the scheduling of the ten-year program works as outlined in **Table 15** (refer to **Section 3.12**). All restoration areas are identified as a medium to high priority for weed control<sup>15</sup>.

A manageable portion of restoration areas with relatively high visibility was identified for planting in 2018 (refer **Appendix D**). Planting in the remainder of restoration areas was allocated progressively, based on consideration of location, restoration input and regeneration response and cumulative scale of respective annual program. The majority of restoration activities are spread over the first 3 to 5 year period of implementation to ensure restoration works are completed as soon as practicable.

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<sup>15</sup> The distribution and cover of weed species varies across restoration areas and across the site.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 15: Scheme for prioritisation of tubestock planting and weed control

Restoration activity	Clearing status	Restoration input category			
		Reconstruction	Assisted regeneration (lower regeneration response)	Assisted regeneration (moderate regeneration response)	Low intervention
Tubestock planting	Cleared	Low	High	Medium	Low
Weed control	Cleared	Medium	High	High	High
	<20m from cleared area	Medium	Medium	Medium	Medium

## 6.2 Restoration activities

Restoration activities and treatment options recommended for each restoration input category are shown in **Table 16**.

Table 16: Summary of restoration activities and options recommended for each input category

Activity	Options	Restoration input category		
		Reconstruction	Assisted regeneration	Low intervention
Landform preparation	Ripping	✓	-	-
	Auguring holes	✓	✓	-
Habitat enhancement	Installation of large wood/tree logs	✓ (suitable areas only)	✓ (limited opportunity)	-
	Turtle breeding habitat creation	✓ (suitable areas only)	-	-
Weed control	Manual (hand weeding)	✓	✓	✓
	Broad spectrum herbicide (spot spray application)	✓	✓	✓
	Selective herbicide (spot spray or blanket application)	✓	✓	-
Revegetation	Tubestock planting	✓	✓	-
	Direct seeding	✓	✓	-
Maintenance	Rubbish removal	✓	✓	✓
	Selective vegetation removal to maintain height restrictions		✓ <sup>†</sup>	-

<sup>†</sup>Hope Road North only

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

### 6.3 Restoration protocols

#### 6.3.1 Landform preparation

Areas that are completely devoid of native vegetation and showing signs of compaction may require mechanical soil ripping. This action is only recommended for parts of the site that are easily accessible by vehicles to avoid damage to other areas. Ripping shall be completed to a depth of 0.3 - 0.5m, using appropriate machinery.

#### 6.3.2 Habitat enhancement

After re-establishing vegetation, the installation of large wood is the primary option for habitat enhancement within cleared areas. Large wood was introduced or re-spread following clearing and stockpiling as outlined in **Appendix B**. Management areas such as Turtle Corner, which did not have wood installed, may benefit from the addition of large wood. However, it is unlikely that large wood can be easily installed in other management areas that are surrounded by conservation fencing.

Other identified habitat enhancement options are proposed in **Table 17**.

*Table 17: Fauna enhancement options*

Management area	Activity	Description
Turtle Corner	Large wood installation	<ul style="list-style-type: none"> <li>Installed using machinery ensuring that material is securely bedded down and stable on landform</li> </ul>
Turtle Corner	Turtle breeding habitat installation	<ul style="list-style-type: none"> <li>Female turtles move into terrestrial habitats surrounding wetlands to lay their eggs</li> <li>Sandy areas and enclosures may be installed in suitable locations to provide suitable nesting site and shelter for migrating turtles</li> <li>A habitat feature may be installed as landscape construction works in suitable locations to provide nesting sites and shelter from threats for migrating turtles</li> <li>Details of turtle habitat are to be determined</li> </ul>
All	Feral bee control	<ul style="list-style-type: none"> <li>Undertaken by qualified and experienced person</li> <li>Where pesticides are used these shall only be applied by a Department of Health licensed pesticide management technician in accordance with manufacturer's instructions as provided on product label</li> </ul>
All	Important non-native fauna (pest) control	<ul style="list-style-type: none"> <li>Undertaken by qualified and experienced person</li> <li>In accordance with all relevant legislation, licences and permits</li> <li>Where pesticides are used these shall only be applied by a Department of Health licensed pesticide management technician in accordance with manufacturer's instructions as provided on product label</li> </ul>

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

### 6.3.3 Weed control

Three methods of weed control are proposed for use in the site, as outlined in **Table 18**.

*Table 18: Weed control methods*

Method	
Manual i.e. hand weeding	<ul style="list-style-type: none"> <li>Weeds may be removed by hand where appropriate for target species (e.g. based on life stage or species trait)</li> <li>Weed material should be placed into bags and removed from site and disposed in an appropriate waste depository</li> </ul>
Broad spectrum herbicide application (blanket and/or spot spray)	<ul style="list-style-type: none"> <li>Weeds may be treated using a broad spectrum herbicide as a blanket spray or as a targeted spot spray</li> <li>Herbicides should be APVMA permit PER13333 approved</li> <li>Herbicide should only be applied by a licensed pesticide management technician in accordance with manufacturer's instructions as provided on product label</li> <li>Guidance on herbicide treatment for important weeds is available at DBCA (2017)</li> </ul>
Selective herbicide application (blanket and/or spot spray)	<ul style="list-style-type: none"> <li>Weeds may be treated with selective herbicide as appropriate to target species</li> <li>Herbicides should be APVMA permit PER13333 approved</li> <li>Herbicide should only be applied by a licensed pesticide management technician in accordance with manufacturer's instructions as provided on product label</li> <li>Guidance on herbicide treatment for important weeds is available at DBCA (2017)</li> </ul>

All herbicides used must be APVMA permit PER13333 approved and shall only be applied by a Department of Health licensed 'pesticide management technician' in accordance with the requirements of APVMA permit PER13333 and the manufacturer's instructions as provided on product label. Further guidance on herbicide treatment for weed species can be found online via *Florabase* (DBCA 2017).

### 6.3.4 Seed / propagule collection

Seed or propagule material shall be sourced by or with advice from an accredited supplier to ensure that material is obtained sustainably and handled correctly (NIASA 2017, RIAWA 2017).

All material shall be of local provenance collected from within the site or within bushland that supports similar ecosystems and within a similar regional soil association. As far as practical seed or propagule material for a species shall be obtained from a range of individuals and locations to ensure genetic diversity. A specialist revegetation contractor or accredited seed supplier, will be able to advise on appropriate seed collecting distances.

Species targeted for seed collection shall be selected from the appropriate list for a target ecosystem and meet requirements of annual restoration planning.

### 6.3.5 Sourcing tubestock

Tubestock shall be sourced from an accredited nursery (NIASA 2017) and grown from local provenance seed or propagules with genetic diversity.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas



Tubestock quantities shall be determined to meet requirements of restoration forward planning (refer to **Section 3.10** and **Section 3.12**). As a guide the number of tubestock planted should be approximately twice that required to achieve the objective density to accommodate for plant mortality<sup>16</sup>. Increasing plant density in this way will reduce the requirement for future infill planting.

Detailed floristic information for each target ecosystem from which species lists may be prepared is presented in **Appendix C**. Note a height restriction applies to plant selections for some restoration areas within the Hope Road North management area due to the presence of powerlines.

#### 6.3.6 Planting tubestock

Tubestock should be planted once the early winter rains have started and the ground is sufficiently moist. Planting should be initiated as soon as possible following break of winter season to allow plants the maximum time for establishment before the summer dry period.

Tubestock should be installed using a deep planting method whenever possible<sup>17</sup> (WAPC 2003). For example tubestock can be planted with approximately one third stem showing above the soil surface. This positions the roots closer to water supplies and decreases water loss in hot and dry conditions. Deep planting will also help to prevent herbivory from resulting in the death of seedlings, which can easily re-sprout if the top of the plant is removed.

Where compaction is a concern holes should be pre-dug with a hand auger to a depth of ~600mm to limit influence of compaction. Note this does not mean that the hole that the tubestock is planted into is 600 mm deep. Rather, the soil profile will have been loosened allowing for easier root development.

A tubestock planting density of 3 plants per m<sup>2</sup> is recommended for the first year of planting in a restoration area. Infill planting should be conducted in second year at a density of approximately 1 plants per m<sup>2</sup> and for a third year at approximately 0.5 plants per m<sup>2</sup>. After that supplementary infill planting should be conducted as required.

Species should be planted in a mixed pattern as appropriate to restoration objectives so that appropriate species diversity and vegetation pattern is established across each restoration area.

#### 6.3.7 Direct seeding

Seed of native species can be directly applied to restoration areas to establish native plants. However, this is best done in the first years after landform preparation before soils have settled.

The inclusion of direct seeding treatments in the restoration program is yet to be confirmed and requires additional planning and stakeholder engagement.

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<sup>16</sup> Assuming a 70% or better annual survival rate, approximately half of the tubestock planted in a given year will survive after two years. A 70% survival rate is a reasonable expectation for most native species that are planted without supplementary water, as long as they are installed correctly within the appropriate season and are not subject to predation or other limiting factors.

<sup>17</sup> Common sense should be applied. If tubestock are small or if a species is less suited to deep planting then tubestock should be planted into a hole slightly larger than the root ball, and to a depth just below the surface of the potting mix.



## Rehabilitation Management Plan

### Roe 8 Cleared Areas

#### 6.3.8 Weed control

The recommended weed control options include manual and herbicide based approaches. The appropriateness of these methods at a given time will depend on an assessment of the types and amount of resources available and the risks to restoration outcomes that might result from a particular treatment. General guidance on selecting weed control options is provided in **Table 19**. The species listed in **Table 19** provide an indication of the most common weeds recorded in the site during the site assessment (refer **Appendix C**). Weed control options shall be reviewed as part of annual planning and specialist advice sought where it is uncertain what method is appropriate.

Table 19: General guidance on the selection of weed control options

Weed category	Species	Manual (hand weeding, cutting)	Broad spectrum herbicide (blanket)	Broad spectrum herbicide (spot spray)	Herbicide targeted (stem injection, basal bark)	Selective herbicide (spot spray or blanket)
Grassy	<i>Avena spp.</i> (wild oats)	J	R	✓		✓
	<i>Ehrharta calycina</i> (perennial veldt grass)	J	R	✓		✓
	<i>Ehrharta longifolia</i> (annual veldt grass)	✓	R	✓		✓
	<i>Eragrostis curvula</i> (African love grass)	J	R	✓		✓
Bulbous	<i>Lachenalia reflexa</i> (yellow soldier)			✓		
	<i>Gladiolus caryophyllaceus</i> (wild gladiolus)			✓		✓
	<i>Freesia alba</i> × <i>leichtlinii</i> (freesia)		✓	✓		✓
	<i>Zantedeschia aethiopica</i> (arum lily)		✓	✓		✓
Woody	<i>Acacia iteaphylla</i> (Finders Range wattle)	J		✓	✓	
	<i>Chamelaucium uncinatum</i> (Geraldton wax)	J		✓	✓	
	<i>Acacia longifolia</i> (Sydney golden wattle)	✓		✓	✓	
	<i>Chamaecytisus palmensis</i> (tagasaste)	J		✓	✓	
	<i>Leptospermum laevigatum</i> (Victorian tea-tree)	J		✓	✓	
Other	<i>Carpobrotus edulis</i> (hottentot fig)	✓		✓		
	<i>Lupinus angustifolius</i> (narrowleaf lupin)	✓		✓		✓
	<i>Pelargonium capitatum</i> (rose pelargonium)	✓		✓		
	<i>Solanum nigrum</i> (black berry nightshade)	✓		J		

J = juveniles only, R = reconstruction areas or bare areas within assisted regeneration areas.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas



#### 6.3.9 Updating restoration areas

As the restoration program progresses decisions may be made to include different treatments or vary the treatments that have been applied within all or part of a restoration area (refer to adaptive management **Section 3.10**).

During community and stakeholder consultation, some reasons for varying restoration treatments that were identified included dedicating specific restoration areas or parts of restoration areas to:

- manual or chemical free weed control techniques
- the establishment of scientific trials
- management by specific community groups or community members
- tree bags
- supplementary watering.

Such decisions may affect the creation of a new restoration area or sub-area, out of the initial restoration areas identified. They may also warrant creation of new basic stratifications for the RMP (refer **Section 7.1.1**).

Where new or varied treatments warrant the creation of a new restoration area it is important that:

- the label applied to the new restoration area is consistent with the initial labelling scheme (refer **Section 6.1.1**)
- an additional label (alphabetical suffix) is added to identify restoration areas subject to a new treatment
- records are maintained of changes (refer to data management in **Section 7.3**).

Where a new restoration area is a division, or sub-area, of an existing restoration area, an alphabetical suffix shall be applied to the existing number, east to west. For example, if restoration area '17' was hypothetically split into three sub-areas, these areas would be labelled east to west as restoration areas '17a', '17b' and '17c' respectively.

## 7 Monitoring, Evaluation and Reporting

*“Restoration science and practice are synergistic”*

*(Principle 5, Standards Reference Group SERA (2017))*

### 7.1 Social rehabilitation outcomes

#### 7.1.1 Monitoring design

Annual monitoring of social rehabilitation outcomes is proposed through two approaches:

- ‘community expectations and satisfaction’ survey
- collation of information obtained through the adaptive operation of the RMP and analysis of community and stakeholder feedback.

#### 7.1.2 Monitoring protocols

##### 7.1.2.1 Community expectations and satisfaction survey

The format of the ‘community expectations and satisfaction survey’ is yet to be confirmed and will require additional planning and stakeholder engagement.

##### 7.1.2.2 Internal information review

All communication, engagement and involvement activities undertaken and feedback received shall be recorded as outlined in **Section 7.3**.

#### 7.1.3 Evaluation

Evaluation of social rehabilitation performance requires that an assessment is made against the restoration objectives previously outlined in **Table 4**.

Details of the evaluation process for social rehabilitation outcomes is yet to be confirmed and will require additional planning and stakeholder engagement.

### 7.2 Ecological restoration outcomes

#### 7.2.1 Monitoring design

Annual monitoring of restoration outcomes is proposed using an approach that is analogous to a ‘before/after–control/ impact’ (BACI) design. In addition, ‘reference’ areas are identified that are used to characterise the ‘target ecosystem’. The reference areas may include some ‘before’ and ‘control’ locations within the site, as well as other locations outside of the site.

In the proposed design ‘before’ is represented by uncleared locations within the site that were monitored in 2017 and from information available from biological surveys conducted prior to

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

clearing occurring along the Roe 8 alignment. 'After' is provided by ongoing monitoring. 'Control' applies to, or is provided by, un-cleared parts of the site that are greater than 20 m away from cleared areas that are excluded from restoration activities. 'Impact' applies to restoration areas, inclusive of cleared and un-cleared areas within the site that are subject to restoration activities.

#### 7.2.1.1 Sampling frame

A sample frame based on a grid of 20 m x 20 m primary sample units is proposed to guide monitoring, as illustrated in **Figure 6**. Basic stratifications identified within the sampling frame that provide a basis for the evaluation of performance against the identified objectives are outlined in **Table 20**.

Table 20: Basic stratifications within sampling frame

Stratification	Strata	Description
Clearing status	Cleared	Areas where vegetation was cleared as part of construction of Roe 8
	Uncleared	Areas of remnant native vegetation within the site that were not cleared as part of construction of Roe 8
Distance from cleared areas	< 20 m from cleared areas	Areas of remnant native vegetation within the site that were not cleared as part of construction of Roe 8 and are located within 20 m of cleared areas
	> 20 m from cleared areas	Areas of remnant native vegetation within the site that were not cleared as part of construction of Roe 8 and are located more than 20 m from cleared areas
Restoration status	Restoration area	Cleared or uncleared locations that are subject to restoration activities under the RMP
	Reference area	Areas of remnant native vegetation that are considered to provide an example of reference ecosystem for use in characterising target ecosystem for restoration <sup>†</sup>
	Control area	Areas of remnant native vegetation within the site that are <u>not</u> subject to restoration activities under the RMP
Management area	Bibra Drive	Labels applied to portions of the site to assist in communication of restoration and management activities
	Hope Road North	
	Turtle Corner	
	North Lake Road East	
	North Lake Road West	
	Forrest Road South	
	Forrest Road North	
	Stock Road West	

<sup>†</sup>These areas may or may not be subject to restoration activities (such as weed control)

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 20: Basic stratifications within sampling frame (continued)

Stratification	Strata	Description
Target ecosystem	Wet forest and woodland	Label applied to a type of wetland ecosystem within the site
	Banksia woodland	Label applied to a type of eucalypt/banksia woodland ecosystem within the site
	Banksia/jarrah woodland	
	Holly-leaved banksia woodland	
	Banksia/coastal blackbutt woodland	
	Banksia/woody pear woodland	
	Banksia/tuart woodland.	
Historical or clearing related factor	Mulch pile storage location	Location used to temporarily store mulch created during clearing occurring along the Roe 8 alignment prior to removal and disposal in April 2017
	Asbestos removal location	Location where asbestos contamination was recorded prior to removal and disposal in April 2017
	Historical path location	Location of path prior to clearing occurring along the Roe 8 alignment
	Construction vehicle track location	Location of primary vehicle tracks created during clearing occurring along the Roe 8 alignment
Regeneration response	Low - resprouter	Resprouters infrequently observed, less than 5 % cover
	Moderate - resprouter	Resprouters commonly observed, 6-33% cover
	High - resprouter	Resprouters frequently observed, greater than 33% cover
	Low - germinant	Germinants infrequently observed, less than 5% cover
	Moderate - germinant	Germinants commonly observed, 6-33% cover
	High - germinant	Germinants frequently observed, greater than 33% cover
Restoration treatment	Low intervention	Areas that do not require or will not receive tubestock planting and will only involve weed control
	Assisted regeneration	Areas where low levels of natural regeneration are present and so some planting, seeding, habitat enhancement and weed control will be required in order to meet the restoration objectives
	Full reconstruction	Areas that have been subject to higher levels of historical disturbance and modification meaning they will require landform preparation, and intensive planting, habitat enhancement and weed control in order to meet the minimum restoration objectives
Restoration area	ID	Unique label applied to a discrete area of restoration based on timing and method of treatment
Restoration treatment date	Planting Date	Year, month, day, time of day etc
	Seeding Date	
	Weed Control Date	

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

#### 7.2.1.2 Attributes of interest

Ecosystem 'attributes of interest' that may be assessed during monitoring are outlined in **Table 21**.

*Table 21: Attributes of interest*

Category	Attributes
Abiotic components	<ul style="list-style-type: none"> <li>• Leaf litter</li> <li>• Large wood</li> <li>• Soil</li> <li>• Bare ground</li> <li>• Disturbed ground</li> <li>• Built form</li> <li>• Refuse</li> </ul>
Biotic components	<ul style="list-style-type: none"> <li>• Flora species</li> <li>• Flora species composition</li> <li>• Vegetation cover</li> <li>• Native flora life stage and recruitment (juveniles)</li> <li>• Fauna species</li> </ul>
Threats	<ul style="list-style-type: none"> <li>• Disturbance</li> <li>• Plant pathogens</li> <li>• Non-native flora (weed) species</li> <li>• Non-native fauna (pest) species</li> </ul>

Basic stratifications identified for biotic attributes of interest are outlined in **Table 22**.

*Table 22: Basic stratifications for biotic attributes of interest.*

Attribute	Stratification
Species	<ul style="list-style-type: none"> <li>• Higher order taxonomic rank (flora/fauna)</li> <li>• Origin (native/non-native)</li> <li>• Association (to target ecosystem i.e. previously recorded in reference areas or previous or ongoing biological surveys of the site)</li> <li>• Importance (to target ecosystem)</li> </ul>
Species (flora)	<ul style="list-style-type: none"> <li>• Structural layer (overstorey/understorey/groundstorey)</li> <li>• Regenerative pathway (resprouter/germinant, planted/seeded/self-propagated)</li> <li>• Life stage (mature/juvenile)</li> <li>• Life strategy (perennial, annual, geophyte)</li> </ul>
Species (non-native flora)	<ul style="list-style-type: none"> <li>• Category (grassy/bulbous/woody/other)*</li> </ul>
Species (fauna)	<ul style="list-style-type: none"> <li>• Category (invertebrate, herbivore, carnivore)</li> <li>• Life stage (mature/juvenile)</li> <li>• Habitat use (foraging, roosting/sheltering, breeding)</li> </ul>

\* Non-native species ('grassy' = Poaceae, 'bulbous' = including Araceae, Asparagaceae, Iridaceae, Oxalidaceae, 'woody' = including Apocynaceae, Fabaceae, Moraceae, Myrtaceae, 'other' = including Aizoaceae, Asteraceae, Papaveraceae, Solanaceae).

#### 7.2.1.3 Sample units

Sample units identified to provide a systematic basis for measurements or assessments of attributes of interest across the sample frame are outlined in **Table 23**.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 23: Sample units for monitoring

Unit	Description
Permanently marked plots	<ul style="list-style-type: none"> <li>Permanently marked 20 m x 20 m plots with nested 5 m x 5 m and 0.5 m x 0.5 m subplots.</li> <li>Provide basis for a detailed and statically robust evaluation of change over time for wide range of attributes through comparison of paired impact and reference plots arrayed across sampling frame.</li> </ul>
Unmarked sample plots and mapping	<ul style="list-style-type: none"> <li>20 m x 20 m sample plots or sub plots identified by spatial coordinates.</li> <li>Provide a flexible option for evaluating ecosystem attributes including mapping attributes comprehensively across sample frame.</li> </ul>
Photopoints	<ul style="list-style-type: none"> <li>Oblique photographs from fixed locations and orientation.</li> <li>Provide rapid low intensity option for visually evaluating change in ecosystem attributes across sampling frame over time.</li> </ul>
Fauna monitoring plots, sensors, camera traps and/or traps	<ul style="list-style-type: none"> <li>TBC</li> </ul>

#### 7.2.1.4 Measures

Measures identified for use in sample units include the following:

- count
- cover (% unit area)
- density (stems/unit area)
- depth/height (cm)
- life stage (juvenile/mature)
- species composition
- species richness.

Additional measures should be identified as required.

#### 7.2.1.5 Key indicators

The combination of a basic stratification, attribute of interest and a measure provides an 'indicator'. Monitoring indicators provides a basis for evaluation of outcomes against the restoration objectives<sup>18</sup>. For example, a measure of the height of canopy and height of understorey provides an indicator of the degree of recovery of woodland structure when compared to the canopy and understorey height in reference sites.

Key indicators that are directly relevant to the evaluation of the restoration objectives include:

- density (stems/ha) important<sup>19</sup> native flora species
- count (species richness) native flora species
- composition native flora species
- cover (%) native understorey vegetation
- cover (%) non-native (weed) understorey vegetation

<sup>18</sup> A restoration objective can be understood as the aspiration that the measurement of a particular indicator has a particular value or is located within a particular range of values.

<sup>19</sup> See **Section 7.2.3.2**

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

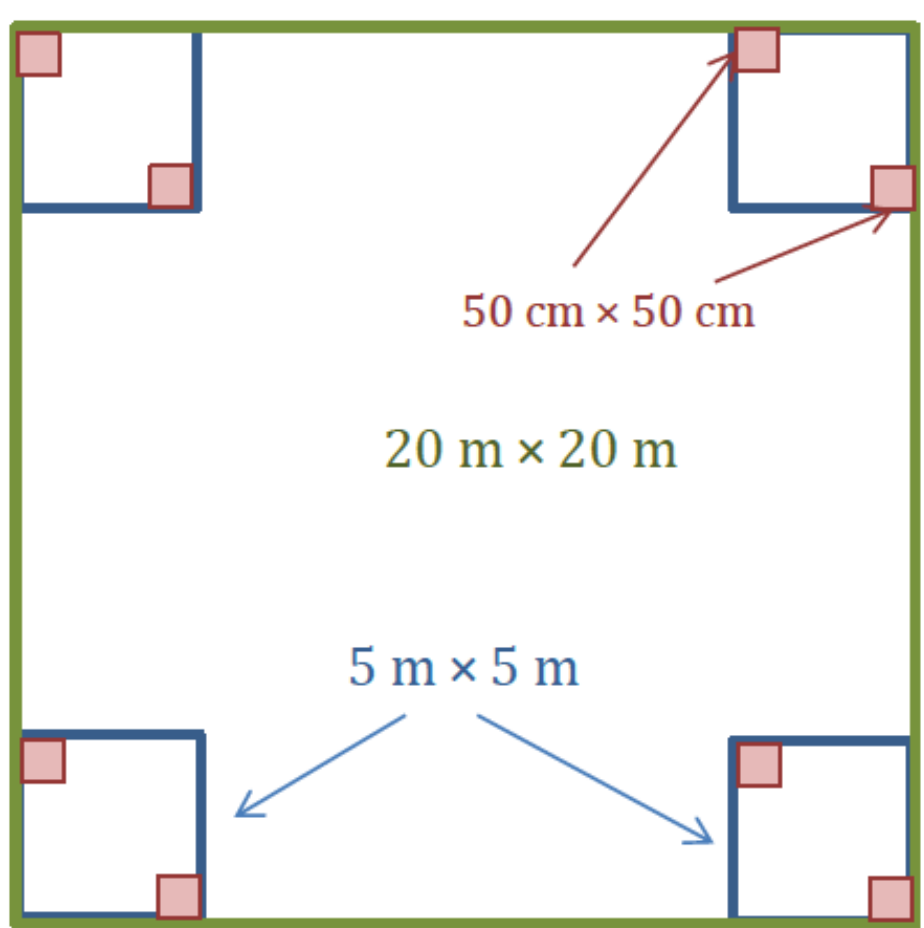
- count native fauna species (including ants)
- cover (%) litter
- depth (cm) litter
- cover (%) bare ground
- count naturally recruited juvenile native flora species.

Additional indicators should be identified as required.

### 7.2.2 Monitoring protocols

#### 7.2.2.1 Permanently marked plots

A total of 52 permanently marked plots were established in 2017, of which 33 were located in cleared areas and 19 within uncleared areas (Murdoch University 2017). Each permanently marked plot comprises a primary 20 m x 20 m plot nested with 5 m x 5 m and 0.5 m x 0.5 m sub plots as shown in **Plate 2**.



*Plate 2: Murdoch University survey sample unit configuration indicating configuration of primary sample plot in green, secondary sub-plot in blue and tertiary sub plot in red*

Protocols for measurement within permanently marked plots are outlined in **Table 24**.



## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 24: Monitoring protocol for permanently marked plots

Plot	Indicator	Method
20 m x 20 m	<ul style="list-style-type: none"> <li>Composition overstorey flora species</li> <li>Cover (%) overstorey flora species</li> <li>Density (stems/unit area) important native flora species</li> <li>Records fauna species</li> <li>Records naturally recruited juvenile native flora species</li> </ul>	Assess indicator over sample unit area.
5 m x 5 m	<ul style="list-style-type: none"> <li>Composition flora species</li> <li>Cover (%) native flora understorey/groundstorey species</li> <li>Cover (%) non-native flora (weed) species</li> <li>Cover (%) litter</li> <li>Cover (%) bare ground</li> <li>Records fauna species</li> <li>Records naturally recruited juvenile native flora species</li> </ul>	Assess indicator over sample unit area.
0.5 m x 0.5 m	<ul style="list-style-type: none"> <li>Depth (cm) litter</li> <li>Density (stems/unit area) native flora species</li> </ul>	Assess indicator over sample unit area.

#### 7.2.2.2 Unmarked sampling and mapping

Records of indicators can be collected at any time without the need to pre-determine a sampling method. At the most simple level sampling can include any record of an observation made regarding an attribute of interest or any other feature within the site.

Using the sampling frame to guide the collection of samples and records provides a basis for systematic and unbiased sample collection; from opportunistic records through to comprehensive mapping.

Protocols for unmarked sampling are identified using 20 m x 20 m primary sample units from the grid based sampling frame. The protocol may equally be applied to other sample units if required (for example sub-samples assessed within a 20 m x 20 m cell that provide increased accuracy of, or reduce the time required for, measurement).

Protocols for measurement within unmarked plots are outlined in **Table 25**.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 25: Monitoring protocol for unmarked plots and mapping

Sampling Logic	Method
Systematic/randomised sample 20 m x 20 m primary sample unit	<ul style="list-style-type: none"> <li>Select sample locations using appropriate sample logic</li> <li>Using a GPS receiver locate the centre of given 20 m x 20 m grid cell</li> <li>Scan and traverse the interior of the grid cell as appropriate for attribute of interest and assess and record measures as required<sup>^</sup></li> <li>Progress to next selected grid cell</li> </ul>
Mapping (assessment of contiguous 20 m x 20 m primary units)	<ul style="list-style-type: none"> <li>Using a GPS receiver locate the centre of initial 20 m x 20 m grid cell.</li> <li>Scan and traverse the interior of the grid cell as appropriate for feature of interest and assess and record measures of attributes<sup>^</sup></li> <li>Progress to adjacent cell</li> </ul>
Sub plots (systematic/randomised sub sample)	<ul style="list-style-type: none"> <li>Select sub sample size and locations using appropriate sample logic</li> <li>Using a GPS receiver locate the centre of given 20 m x 20 m grid cell</li> <li>Using a GPS receiver or other appropriate method locate sub sample areas</li> <li>Scan sub sample area as appropriate for feature of interest and assess and record measures of attributes<sup>^</sup></li> </ul>
Point/observation	<ul style="list-style-type: none"> <li>Using a GPS receiver record point location of observation</li> <li>Record photo and notes as appropriate</li> </ul>

<sup>^</sup>Data may be attributed to a waypoint (vector point) which is later related to grid cell. Alternatively using GIS software on laptop or tablet platform data may be attributed directly to grid cell (vector polygon).

### 7.2.2.3 Photopoints

Photopoints have been established at 50 locations across the site, with 25 located in the cleared areas and 25 located in the uncleared areas. At each location an image is captured facing towards and facing away from cleared areas. Multiple sets of images have been captured, commencing prior to clearing (Cockburn Wetland Centre 2018).

### 7.2.2.4 Fauna survey

A comprehensive fauna survey (EPA (2016) level 2 equivalent) shall be conducted twice within the ten years of the RMP. Both surveys should include multiple visits within a year over two consecutive years, to maximize information collected and to account for seasonal variation. The first survey is programmed for years' 1 and 2 (2018 and 2019) with the aim of providing initial data that can be used in conjunction with the pre-clearing survey data to establish a baseline for monitoring (as described in **Appendix C**). The second fauna survey should be conducted towards the end of the RMP implementation period to assess the success of fauna habitat re-establishment.

Details of the design of the fauna survey are to be determined and will require additional planning and stakeholder engagement. The fauna survey may utilise information obtained from existing permanently marked plots (**Section 7.2.2.1**) and also require that new sample units and monitoring locations are employed.

Sampling techniques may include the following methods employed during pre-clearing surveys (as described in **Appendix C**):

- observations (including spotlighting, active searching, bird watching)
- physical traps (such as pit, funnel, box, cage)
- camera traps
- hair tubes.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Once the fauna monitoring design has been confirmed details of methodology should be included in the RMP.

#### 7.2.2.5 Material transfers

Records shall be maintained for all abiotic and biotic materials that are brought into the site or removed from the site.

#### 7.2.2.6 Data analysis

Comparison of values and/or mean values will be sufficient to evaluate most indicators<sup>20</sup>.

Recommended options for using data for comparisons against restoration objectives are outlined in **Table 26**.

Table 26: Analysis options for comparison to objectives

Sample type	Data type	Analysis options
Permanently marked plot	Repeated measures	<ul style="list-style-type: none"> <li>Comparison of mean values to objective value over time</li> <li>Comparison of mean values to objective value across basic strata</li> </ul>
	Species presence/absence	<ul style="list-style-type: none"> <li>Presence/absence comparison to objective value over time</li> <li>Presence/absence comparison to objective value by basic strata</li> </ul>
Unmarked plot with sampling logic	Single measure	<ul style="list-style-type: none"> <li>Comparison of values to objective value across strata</li> <li>Comparison of mean values to objective value across strata</li> </ul>
Unmarked plot mapping	Repeated measures	<ul style="list-style-type: none"> <li>Change over time by primary sample unit</li> <li>Comparison of values / mean values by primary sample unit across strata</li> <li>Change over time of values / mean values by primary sample unit across strata</li> </ul>
Photopoint	RGB oblique imagery	<ul style="list-style-type: none"> <li>Visual comparison</li> </ul>
Fauna monitoring (TBC)	Repeated measures	<ul style="list-style-type: none"> <li>Comparison of mean values to objective value over time</li> <li>Comparison of mean values to objective value across basic strata</li> </ul>
	Species presence/absence	<ul style="list-style-type: none"> <li>Presence/absence comparison to objective value over time</li> <li>Presence/absence comparison to objective value by basic strata</li> </ul>

### 7.2.3 Evaluation

#### 7.2.3.1 Associated native flora species

Native flora species associated with each target ecosystem were identified from Keighery *et al.* (2012) sample plots nearby to the site and ongoing during monitoring competed within restoration areas and reference areas. Species on the 'appropriate species lists' represent native flora species for the purposes of the RMP.

Species for 'banksia woodland' and 'holly-leaved banksia woodland' target ecosystems were selected from the closest five Keighery *et al.* (2012) sample plots for FCT 23a, plus limited inclusions from monitoring data recorded to date. Species for 'banksia/coastal blackbutt woodland' target ecosystem

<sup>20</sup> More sophisticated analysis options should be identified, as required, as monitoring progresses.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

were selected from the closest five Keighery *et al.* (2012) sample plots for FCT 21c and FCT 23a plus limited inclusions from monitoring data recorded to date. Species for 'banksia/jarrah woodland', 'banksia/tuart woodland' and 'banksia/woody pear woodland' target ecosystems were selected from the closest five Keighery *et al.* (2012) sample plots for FCT 28 plus limited inclusions from monitoring data recorded to date. Species for 'wet forest and woodland' target ecosystem were selected from all 15 Keighery *et al.* (2012) sample plots for FCT 11 plus limited inclusions from monitoring data recorded to date.

As monitoring data becomes available the lists of appropriate species for each target ecosystem shall be updated. Because native species that naturally occur within the site can be incorporated through monitoring the associated species list should always reflect the indigenous reference ecosystem.

The associated species list for each target ecosystem is provided in **Table 27** to **Table 33**.

Re-establishing native flora species is specifically identified within multiple restoration objectives (refer **Table 4**).

Table 27: Associated species for wet forest and woodland target ecosystem

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Acacia dentifera</i>	7%	-
<i>Acacia pulchella</i>	20%	-
<i>Acacia saligna</i>	27%	✓
<i>Acacia stenoptera</i>	7%	-
<i>Adenanthos meisneri</i>	7%	-
<i>Adiantum aethiopicum</i>	7%	-
<i>Agrostocrinum scabrum</i>	7%	-
<i>Alternanthera nodiflora</i>	7%	-
<i>Amphipogon laguroides</i>	7%	-
<i>Anigozanthos viridis</i> subsp. <i>viridis</i>	7%	-
<i>Anthotium junciforme</i>	7%	-
<i>Aotus intermedia</i>	20%	-
<i>Aphelia cyperoides</i>	7%	-
<i>Astartea affinis</i>	13%	-
<i>Astartea fascicularis</i>	60%	-
<i>Asteridea pulverulenta</i>	7%	-
<i>Astroloma pallidum</i>	7%	-
<i>Austrostipa compressa</i>	7%	-
<i>Banksia littoralis</i>	13%	-
<i>Baumea articulata</i>	7%	-

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 27: Associated species for wet forest and woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Baumea juncea</i>	13%	-
<i>Burchardia multiflora</i>	7%	-
<i>Caesia micrantha</i>	13%	-
<i>Caladenia flava</i> subsp. <i>flava</i>	7%	-
<i>Caladenia latifolia</i>	7%	-
<i>Caladenia longicauda</i>	13%	-
<i>Caladenia paludosa</i>	13%	-
<i>Calothamnus lateralis</i>	7%	-
<i>Carex thecata</i>	7%	-
<i>Cassytha racemosa</i>	27%	-
<i>Centrolepis aristata</i>	33%	-
<i>Centrolepis drummondiana</i>	13%	-
<i>Centrolepis glabra</i>	13%	-
<i>Centrolepis mutica</i>	13%	-
<i>Conostephium preissii</i>	7%	-
<i>Conostylis aculeata</i> subsp. <i>aculeata</i>	7%	-
<i>Corymbia calophylla</i>	20%	-
<i>Corynotheca micrantha</i> var. <i>micrantha</i>	7%	-
<i>Cotula coronopifolia</i>	47%	-
<i>Crassula natans</i> var. <i>minus</i>	27%	-
<i>Cycnogeton lineare</i>	20%	-
<i>Dampiera linearis</i>	13%	-
<i>Dasypogon bromeliifolius</i>	13%	-
<i>Daucus glochidiatus</i>	7%	-
<i>Deyeuxia quadriseta</i>	13%	-
<i>Dianella revoluta</i> var. <i>divaricata</i>	7%	-
<i>Dichelachne crinita</i>	7%	-
<i>Dielsia stenostachya</i>	27%	-
<i>Dillwynia dillwynioides</i>	7%	-
<i>Drosera glanduligera</i>	7%	-
<i>Drosera stolonifera</i> subsp. <i>porrecta</i>	7%	-

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 27: Associated species for wet forest and woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Epilobium billardioreanum</i>	7%	-
<i>Epilobium hirtigerum</i>	7%	-
<i>Eryngium pinnatifidum</i> subsp. <i>pinnatifidum</i>	7%	-
<i>Eucalyptus marginata</i> subsp. <i>marginata</i>	20%	-
<b><i>Eucalyptus rudis</i> subsp. <i>rudis</i></b>	<b>60%</b>	-
<i>Ficinia nodosa</i>	7%	-
<i>Gahnia trifida</i>	7%	-
<i>Gompholobium tomentosum</i>	7%	-
<i>Goodenia pulchella</i>	20%	-
<i>Gratiola pubescens</i>	20%	-
<i>Hemiandra pungens</i>	7%	-
<i>Hibbertia cuneiformis</i>	-	✓
<i>Hibbertia stellaris</i>	13%	-
<i>Homalosciadium homalocarpum</i>	13%	-
<i>Hydrocotyle alata</i>	7%	-
<i>Hydrocotyle scutellifera</i>	7%	-
<i>Hypocalymma angustifolium</i>	13%	-
<i>Hypolaena exsulca</i>	7%	-
<i>Hypolaena pubescens</i>	7%	-
<i>Isolepis cernua</i>	20%	-
<i>Isolepis marginata</i>	47%	-
<i>Isolepis oldfieldiana</i>	13%	-
<i>Isolepis setiformis</i>	7%	-
<i>Isolepis stellata</i>	7%	-
<i>Ixiolaena viscosa</i>	7%	-
<i>Jacksonia furcellata</i>	13%	-
<i>Kennedia prostrata</i>	13%	-
<i>Kunzea glabrescens</i>	27%	-
<i>Lachnagrostis filiformis</i>	27%	-
<i>Lachnagrostis plebeia</i>	7%	-
<i>Lagenophora huegelii</i>	7%	-

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 27: Associated species for wet forest and woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Lechenaultia expansa</i>	7%	-
<i>Lepidosperma longitudinale</i>	80%	-
<i>Leptocarpus coangustatus</i>	13%	-
<i>Leptocarpus roycei</i>	7%	-
<i>Leptoceras menziesii</i>	7%	-
<i>Leucopogon propinquus</i>	7%	-
<i>Levenhookia stipitata</i>	7%	-
<i>Liparophyllum capitatum</i>	13%	-
<i>Lobelia alata</i>	27%	-
<i>Macrozamia fraseri</i>	20%	-
<i>Melaleuca incana</i> subsp. <i>incana</i>	7%	-
<i>Melaleuca lateritia</i>	33%	-
<b><i>Melaleuca preissiana</i></b>	<b>47%</b>	-
<b><i>Melaleuca raphiophylla</i></b>	<b>27%</b>	-
<i>Melaleuca teretifolia</i>	7%	-
<i>Melaleuca viminea</i> subsp. <i>viminea</i>	7%	-
<i>Microlaena stipoides</i>	27%	-
<i>Microtis media</i>	40%	-
<i>Monotaxis occidentalis</i>	7%	-
<i>Opercularia hispidula</i>	33%	-
<i>Ornduffia albiflora</i>	27%	-
<i>Patersonia occidentalis</i>	20%	-
<i>Patersonia occidentalis</i> (wetland form)	20%	-
<i>Phyllanthus calycinus</i>	13%	-
<i>Platysace compressa</i>	13%	-
<i>Podolepis gracilis</i>	7%	-
<i>Polypogon tenellus</i>	7%	-
<i>Pseudognaphalium luteoalbum</i>	7%	-
<i>Pteridium esculentum</i>	7%	-
<i>Pterostylis</i> sp. Slender Snail Orchid (G.J. Keighery 14516)	13%	-
<i>Regelia ciliata</i>	7%	-

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 27: Associated species for wet forest and woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Schoenus brevisetis</i>	13%	-
<i>Schoenus efoliatus</i>	13%	-
<i>Schoenus elegans</i>	7%	-
<i>Schoenus maschalinus</i>	7%	-
<i>Schoenus rigens</i>	7%	-
<i>Schoenus tenellus</i>	13%	-
<i>Siloxerus filifolius</i>	7%	-
<i>Siloxerus humifusus</i>	7%	-
<i>Sowerbaea laxiflora</i>	13%	-
<i>Sphaerolobium vimineum</i>	7%	-
<i>Stylidium brunonianum</i> subsp. <i>brunonianum</i>	20%	-
<i>Stylidium divaricatum</i>	13%	-
<i>Stylidium junceum</i> subsp. <i>junceum</i>	7%	-
<i>Stylidium longitubum</i>	13%	-
<i>Stylidium roseolatum</i>	13%	-
<i>Stylidium utricularioides</i>	7%	-
<i>Thelymitra macrophylla</i>	13%	-
<i>Thysanotus manglesianus/patersonii</i> complex	27%	-
<i>Thysanotus multiflorus</i>	7%	-
<i>Thysanotus patersonii</i>	7%	-
<i>Thysanotus thyrsoideus</i>	13%	-
<i>Trachymene pilosa</i>	20%	-
<i>Tribonanthes australis</i>	7%	-
<i>Tribonanthes violacea</i>	7%	-
<i>Tricoryne elatior</i>	7%	-
<i>Utricularia violacea</i>	7%	-
<i>Wahlenbergia preissii</i>	7%	-
<i>Waitzia suaveolens</i> var. <i>suaveolens</i>	7%	-
<b><i>Xanthorrhoea preissii</i></b>	<b>20%</b>	-
<i>Xanthosia huegelii</i> subsp. <i>huegelii</i>	7%	-

<sup>†</sup>= Keighery *et al.* (2012) frequency calculated based on all 15 sites representing FCT 11; **Bold** font indicates 'important species' (see **Section 7.2.3.2**).



# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 28: Associated species for banksia woodland target ecosystem

Species	Keighery <i>et al.</i> (2012) frequency	Ongoing monitoring
<i>Acacia huegelii</i>	20%	-
<i>Acacia pulchella</i>	80%	-
<i>Acacia stenoptera</i>	60%	-
<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	20%	-
<b><i>Allocasuarina fraseriana</i></b>	<b>40%</b>	-
<i>Allocasuarina humilis</i>	40%	-
<i>Amphipogon turbinatus</i>	60%	-
<i>Anigozanthos humilis</i> subsp. <i>humilis</i>	20%	-
<i>Arnocrinum preissii</i>	20%	-
<i>Austrostipa compressa</i>	80%	-
<b><i>Banksia attenuata</i></b>	<b>80%</b>	-
<i>Banksia ilicifolia</i>	60%	-
<b><i>Banksia menziesii</i></b>	<b>100%</b>	-
<i>Bossiaea eriocarpa</i>	100%	-
<i>Brachyloma preissii</i>	20%	-
<i>Burchardia congesta</i>	80%	-
<i>Caladenia flava</i> subsp. <i>flava</i>	20%	-
<i>Calectasia narragara</i>	20%	-
<i>Calytrix flavescens</i>	80%	-
<i>Calytrix fraseri</i>	40%	-
<i>Carex thecata</i>	20%	-
<i>Cassytha flava</i>	40%	-
<i>Centrolepis drummondiana</i>	60%	-
<i>Centrolepis humillima</i>	20%	-
<i>Chamaescilla corymbosa</i> var. <i>corymbosa</i>	40%	-
<i>Comesperma calymega</i>	20%	-
<i>Conostephium pendulum</i>	80%	-
<i>Conostylis aculeata</i> subsp. <i>aculeata</i>	40%	-
<i>Conostylis caricina</i> subsp. <i>caricina</i>	20%	-
<i>Conostylis juncea</i>	20%	-
<i>Conostylis setigera</i> subsp. <i>setigera</i>	40%	-

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 28: Associated species for banksia woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency	Ongoing monitoring
<i>Crassula colorata</i> var. <i>colorata</i>	40%	-
<i>Croninia kingiana</i>	20%	-
<i>Dampiera linearis</i>	80%	-
<i>Dasypogon bromeliifolius</i>	100%	-
<i>Daviesia divaricata</i> subsp. <i>divaricata</i>	20%	-
<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>	20%	-
<i>Daviesia triflora</i>	40%	-
<i>Desmocladius flexuosus</i>	60%	-
<i>Drosera menziesii</i> subsp. <i>penicillaris</i>	20%	-
<i>Drosera paleacea</i> subsp. <i>paleacea</i>	60%	-
<i>Eremaea asterocarpa</i> subsp. <i>asterocarpa</i>	20%	-
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	40%	-
<i>Eucalyptus marginata</i> subsp. <i>marginata</i>	#	-
<i>Gastrolobium capitatum</i>	40%	-
<i>Gompholobium confertum</i>	20%	-
<i>Gompholobium tomentosum</i>	100%	-
<i>Gonocarpus pithyoides</i>	40%	-
<i>Hardenbergia comptoniana</i>	20%	-
<i>Hibbertia aurea</i>	20%	-
<i>Hibbertia huegelii</i>	40%	-
<i>Hibbertia hypericoides</i>	60%	-
<i>Hibbertia racemosa</i>	40%	-
<i>Hibbertia subvaginata</i>	40%	-
<i>Homalosciadium homalocarpum</i>	60%	-
<i>Hovea pungens</i>	20%	-
<i>Hovea trisperma</i> var. <i>trisperma</i>	40%	-
<i>Hypocalymma robustum</i>	60%	-
<i>Hypocalymma xanthopetalum</i>	80%	-
<i>Hypolaena exsulca</i>	60%	-
<i>Isolepis cernua</i>	20%	-
<i>Isolepis marginata</i>	40%	-

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 28: Associated species for banksia woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency	Ongoing monitoring
<i>Jacksonia furcellata</i>	60%	-
<i>Jacksonia sternbergiana</i>	20%	-
<i>Kennedia prostrata</i>	20%	-
<i>Kunzea glabrescens</i>	40%	-
<i>Laxmannia squarrosa</i>	40%	-
<i>Lechenaultia floribunda</i>	60%	-
<i>Lepidosperma squamatum</i>	40%	-
<i>Leucopogon australis</i> subsp. <i>australis</i>	80%	-
<i>Leucopogon gracillimus</i>	20%	-
<i>Leucopogon polymorphus</i>	20%	-
<i>Leucopogon propinquus</i>	20%	-
<i>Levenhookia stipitata</i>	40%	-
<i>Lobelia tenuior</i>	40%	-
<i>Lomandra hermaphrodita</i>	80%	-
<i>Lomandra nigricans</i>	40%	-
<i>Lomandra suaveolens</i>	20%	-
<i>Lyginia barbata</i>	100%	-
<i>Lysinema ciliatum</i>	20%	-
<b><i>Macrozamia fraseri</i></b>	<b>40%</b>	-
<i>Melaleuca preissiana</i>	20%	-
<i>Melaleuca ryeae</i>	40%	-
<i>Melaleuca thymoides</i>	60%	-
<i>Mesomelaena pseudostygia</i>	20%	-
<i>Microtis media</i>	20%	-
<i>Millotia tenuifolia</i> var. <i>tenuifolia</i>	20%	-
<i>Nuytsia floribunda</i>	40%	-
<i>Patersonia occidentalis</i>	100%	-
<i>Patersonia occidentalis</i> (wetland form)	20%	-
<i>Persoonia saccata</i>	20%	-
<i>Petrophile linearis</i>	100%	-
<i>Philothea spicata</i>	60%	-

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 28: Associated species for banksia woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency	Ongoing monitoring
<i>Phlebocarya ciliata</i>	60%	-
<i>Phlebocarya filifolia</i>	40%	-
<i>Pimelea sulphurea</i>	40%	-
<i>Platysace compressa</i>	20%	-
<i>Podolepis gracilis</i>	20%	-
<i>Podotheca angustifolia</i>	20%	-
<i>Poranthera microphylla</i>	60%	-
<i>Prasophyllum parvifolium</i>	20%	-
<i>Pyrorchis nigricans</i>	20%	-
<i>Quinetia urvillei</i>	40%	-
<i>Regelia ciliata</i>	20%	-
<i>Regelia inops</i>	20%	-
<i>Rytidosperma occidentale</i>	80%	-
<i>Scaevola repens</i> var. <i>repens</i>	40%	-
<i>Schoenus clandestinus</i>	20%	-
<i>Schoenus curvifolius</i>	100%	-
<i>Schoenus efoliatus</i>	20%	-
<i>Scholtzia involucrata</i>	80%	-
<i>Siloxerus humifusus</i>	20%	-
<i>Stackhousia monogyna</i>	20%	-
<i>Stirlingia latifolia</i>	60%	-
<i>Stylidium brunonianum</i> subsp. <i>brunonianum</i>	80%	-
<i>Stylidium carnosum</i>	20%	-
<i>Stylidium piliferum</i> subsp. <i>piliferum</i>	20%	-
<i>Stylidium repens</i>	60%	-
<i>Tetraria octandra</i>	20%	-
<i>Thysanotus manglesianus/patersonii</i> complex	20%	-
<i>Thysanotus multiflorus</i>	20%	-
<i>Thysanotus patersonii</i>	40%	-
<i>Thysanotus sparteus</i>	20%	-
<i>Thysanotus thyrsoideus</i>	20%	-

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 28: Associated species for banksia woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency	Ongoing monitoring
<i>Trachymene pilosa</i>	100%	-
<i>Tricoryne tenella</i>	40%	-
<i>Wahlenbergia preissii</i>	20%	-
<i>Waitzia suaveolens</i> var. <i>suaveolens</i>	60%	-
<b><i>Xanthorrhoea preissii</i></b>	<b>80%</b>	-
<i>Xanthosia huegelii</i> subsp. <i>huegelii</i>	60%	-

†= Keighery *et al.* (2012) frequency calculated based on the five closest sites representing FCT 23a (jand04, beel02, jand01, jand02 and bibra01); #=species recorded in Keighery *et al.* (2012) site/s but not included in target ecosystem due to powerline vegetation height restrictions; **Bold** font indicates 'important species' (see Section 7.2.3.2).

Table 29: Associated species for banksia/jarrah woodland target ecosystem

Species	Keighery <i>et al.</i> (2012) <sup>†</sup>	Ongoing monitoring
<i>Acacia applanata</i>	20%	-
<i>Acacia huegelii</i>	40%	-
<i>Acacia pulchella</i>	20%	✓
<i>Acacia stenoptera</i>	40%	✓
<i>Acacia willdenowiana</i>	20%	-
<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	20%	-
<b><i>Allocasuarina fraseriana</i></b>	<b>20%</b>	-
<i>Allocasuarina humilis</i>	-	✓
<i>Amphipogon turbinatus</i>	40%	-
<i>Anigozanthos humilis</i> subsp. <i>humilis</i>	40%	-
<i>Anigozanthos manglesii</i> subsp. <i>manglesii</i>	20%	✓
<i>Asteridea pulverulenta</i>	20%	-
<i>Astroloma pallidum</i>	20%	-
<i>Austrostipa compressa</i>	40%	-
<i>Babingtonia camphorosmae</i>	20%	-
<b><i>Banksia attenuata</i></b>	<b>100%</b>	✓
<i>Banksia dallanneyi</i>	20%	-
<i>Banksia ilicifolia</i>	20%	-
<b><i>Banksia menziesii</i></b>	<b>60%</b>	-
<i>Bossiaea eriocarpa</i>	40%	✓
<i>Brachyloma preissii</i>	20%	-

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 29: Associated species for banksia/jarrah woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) <sup>†</sup>	Ongoing monitoring
<i>Burchardia congesta</i>	100%	✓
<i>Caesia micrantha</i>	40%	-
<i>Caladenia flava</i> subsp. <i>flava</i>	60%	-
<i>Caladenia georgei</i>	20%	-
<i>Centrolepis drummondiana</i>	40%	-
<i>Chamaecilla corymbosa</i> var. <i>corymbosa</i>	40%	-
<i>Conospermum triplinervium</i>	20%	-
<i>Conostephium pendulum</i>	60%	-
<i>Conostylis aculeata</i> subsp. <i>aculeata</i>	80%	✓
<i>Conostylis candicans</i> subsp. <i>candicans</i>	-	✓
<i>Conostylis setigera</i> subsp. <i>setigera</i>	80%	-
<i>Corymbia calophylla</i>	60%	✓
<i>Corynotheca micrantha</i> var. <i>micrantha</i>	20%	-
<i>Dampiera linearis</i>	40%	✓
<i>Dasypogon bromeliifolius</i>	60%	-
<i>Daviesia divaricata</i> subsp. <i>divaricata</i>	40%	-
<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>	40%	-
<i>Daviesia triflora</i>	20%	-
<i>Desmocladus fasciculatus</i>	40%	-
<i>Desmocladus flexuosus</i>	40%	-
<i>Dianella revoluta</i> var. <i>divaricata</i>	60%	✓
<i>Dichelachne crinita</i>	20%	-
<i>Dichopogon capillipes</i>	-	✓
<i>Diuris longifolia</i>	60%	-
<i>Drosera erythrorhiza</i> subsp. <i>erythrorhiza</i>	-	✓
<i>Drosera macrantha</i> subsp. <i>macrantha</i>	-	✓
<i>Drosera pallida</i>	20%	-
<i>Drosera stolonifera</i>	80%	✓
<i>Eryngium pinnatifidum</i> subsp. <i>pinnatifidum</i>	80%	✓
<i>Eucalyptus gomphocephala</i>	20%	-
<b><i>Eucalyptus marginata</i> subsp. <i>marginata</i></b>	<b>60%</b>	<b>✓</b>

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 29: Associated species for banksia/jarrah woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) <sup>†</sup>	Ongoing monitoring
<i>Gastrolobium capitatum</i>	100%	-
<i>Gompholobium tomentosum</i>	100%	✓
<i>Hakea prostrata</i>	20%	-
<i>Hardenbergia comptoniana</i>	60%	✓
<i>Hibbertia huegelii</i>	40%	-
<i>Hibbertia hypericoides</i>	80%	✓
<i>Hibbertia racemosa</i>	60%	-
<i>Homalosciadium homalocarpum</i>	40%	-
<i>Hovea pungens</i>	-	✓
<i>Hovea trisperma</i> var. <i>trisperma</i>	60%	✓
<i>Hypocalymma robustum</i>	40%	✓
<i>Hypolaena exsulca</i>	40%	-
<i>Isotropis cuneifolia</i> subsp. <i>cuneifolia</i>	60%	-
<i>Jacksonia furcellata</i>	-	✓
<i>Jacksonia sericea</i>	20%	-
<i>Jacksonia sternbergiana</i>	20%	-
<i>Kennedia prostrata</i>	60%	✓
<i>Lagenophora huegelii</i>	60%	-
<i>Lepidobolus preissianus</i>	20%	-
<i>Lepidosperma scabrum</i>	20%	-
<i>Lepidosperma squamatum</i>	60%	-
<i>Leucopogon parviflorus</i>	40%	-
<i>Leucopogon racemulosus</i>	20%	-
<i>Lomandra caespitosa</i>	80%	-
<i>Lomandra hermaphrodita</i>	20%	-
<i>Lomandra micrantha</i> subsp. <i>micrantha</i>	20%	-
<i>Lomandra nigricans</i>	20%	-
<i>Lomandra preissii</i>	20%	-
<i>Lomandra suaveolens</i>	20%	-
<i>Lyginia barbata</i>	40%	-
<i>Lyperanthus serratus</i>	20%	-

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 29: Associated species for banksia/jarrah woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) <sup>†</sup>	Ongoing monitoring
<b><i>Macrozamia fraseri</i></b>	<b>80%</b>	✓
<i>Melaleuca systema</i>	20%	-
<i>Mesomelaena pseudostygia</i>	100%	✓
<i>Microlaena stipoides</i>	40%	-
<i>Monotaxis grandiflora</i>	20%	-
<i>Neurachne alopecuroidea</i>	20%	-
<i>Patersonia occidentalis</i>	40%	-
<i>Patersonia occidentalis</i> (wetland form)	40%	-
<i>Petrophile linearis</i>	100%	-
<i>Petrophile macrostachya</i>	20%	-
<i>Philothea spicata</i>	20%	✓
<i>Pimelea rosea</i> subsp. <i>rosea</i>	20%	-
<i>Pimelea sulphurea</i>	20%	-
<i>Poa drummondiana</i>	20%	-
<i>Podolepis gracilis</i>	20%	-
<i>Poranthera microphylla</i>	20%	-
<i>Scaevola canescens</i>	40%	-
<i>Scaevola repens</i> var. <i>repens</i>	60%	-
<i>Schoenus clandestinus</i>	60%	-
<i>Sowerbaea laxiflora</i>	60%	✓
<i>Stirlingia latifolia</i>	80%	-
<i>Stylidium brunonianum</i> subsp. <i>brunonianum</i>	20%	-
<i>Stylidium schoenoides</i>	20%	-
<i>Tetraria octandra</i>	100%	-
<i>Thelymitra benthamiana</i>	20%	-
<i>Thysanotus arenarius</i>	40%	-
<i>Thysanotus manglesianus/patersonii</i> complex	20%	-
<i>Thysanotus patersonii</i>	40%	-
<i>Thysanotus sparteus</i>	40%	✓
<i>Thysanotus thyrsoides</i>	20%	-
<i>Trachymene pilosa</i>	80%	-



## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 29: Associated species for banksia/jarrah woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) <sup>†</sup>	Ongoing monitoring
<i>Tricoryne elatior</i>	20%	-
<i>Wahlenbergia preissii</i>	20%	-
<b><i>Xanthorrhoea preissii</i></b>	<b>100%</b>	✓
<i>Xanthosia huegelii</i> subsp. <i>huegelii</i>	60%	-

<sup>†</sup>= Keighery *et al.* (2012) frequency calculated based on the five closest sites representing FCT 28 (beel01, wire01, sand01, wire02, sams01); **Bold** font indicates 'important species' (see **Section 7.2.3.2**).

Table 30: Associated species for holly-leaved banksia woodland target ecosystem

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Acacia alata</i> var. <i>alata</i>	-	✓
<i>Acacia huegelii</i>	20%	-
<i>Acacia pulchella</i>	80%	-
<i>Acacia stenoptera</i>	60%	-
<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	20%	-
<b><i>Allocasuarina fraseriana</i></b>	<b>40%</b>	-
<i>Allocasuarina humilis</i>	40%	-
<i>Amphipogon turbinatus</i>	60%	-
<i>Anigozanthos humilis</i> subsp. <i>humilis</i>	20%	-
<i>Arnocrinum preissii</i>	20%	-
<i>Austrostipa compressa</i>	80%	-
<b><i>Banksia attenuata</i></b>	<b>80%</b>	-
<b><i>Banksia ilicifolia</i></b>	<b>60%</b>	-
<b><i>Banksia menziesii</i></b>	<b>100%</b>	-
<i>Bossiaea eriocarpa</i>	100%	-
<i>Brachyloma preissii</i>	20%	-
<i>Burchardia congesta</i>	80%	-
<i>Caladenia flava</i> subsp. <i>flava</i>	20%	-
<i>Calectasia narragara</i>	20%	-
<i>Calytrix flavescens</i>	80%	-
<i>Calytrix fraseri</i>	40%	-
<i>Carex thecata</i>	20%	-
<i>Cassytha flava</i>	40%	-

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 30: Associated species for holly-leaved banksia woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Centrolepis drummondiana</i>	60%	-
<i>Centrolepis humillima</i>	20%	-
<i>Chamaescilla corymbosa</i> var. <i>corymbosa</i>	40%	-
<i>Comesperma calymega</i>	20%	-
<i>Conostephium pendulum</i>	80%	-
<i>Conostylis aculeata</i> subsp. <i>aculeata</i>	40%	-
<i>Conostylis caricina</i> subsp. <i>caricina</i>	20%	-
<i>Conostylis juncea</i>	20%	-
<i>Conostylis setigera</i> subsp. <i>setigera</i>	40%	-
<i>Crassula colorata</i> var. <i>colorata</i>	40%	-
<i>Croninia kingiana</i>	20%	-
<i>Dampiera linearis</i>	80%	-
<i>Dasypogon bromeliifolius</i>	100%	-
<i>Daviesia divaricata</i> subsp. <i>divaricata</i>	20%	-
<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>	20%	-
<i>Daviesia triflora</i>	40%	-
<i>Desmocladius flexuosus</i>	60%	-
<i>Drosera menziesii</i> subsp. <i>penicillaris</i>	20%	-
<i>Drosera paleacea</i> subsp. <i>paleacea</i>	60%	-
<i>Eremaea asterocarpa</i> subsp. <i>asterocarpa</i>	20%	-
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	40%	-
<b><i>Eucalyptus marginata</i> subsp. <i>marginata</i></b>	<b>40%</b>	-
<i>Gastrolobium capitatum</i>	40%	-
<i>Gompholobium confertum</i>	20%	-
<i>Gompholobium tomentosum</i>	100%	-
<i>Gonocarpus pithyoides</i>	40%	-
<i>Hardenbergia comptoniana</i>	20%	-
<i>Hibbertia aurea</i>	20%	-
<i>Hibbertia huegelii</i>	40%	-
<i>Hibbertia hypericoides</i>	60%	-
<i>Hibbertia racemosa</i>	40%	-

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 30: Associated species for holly-leaved banksia woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Hibbertia subvaginata</i>	40%	-
<i>Homalosciadium homalocarpum</i>	60%	-
<i>Hovea pungens</i>	20%	-
<i>Hovea trisperma</i> var. <i>trisperma</i>	40%	-
<i>Hypocalymma robustum</i>	60%	-
<i>Hypocalymma xanthopetalum</i>	80%	-
<i>Hypolaena exsulca</i>	60%	-
<i>Isolepis cernua</i>	20%	-
<i>Isolepis marginata</i>	40%	-
<i>Jacksonia furcellata</i>	60%	-
<i>Jacksonia sternbergiana</i>	20%	-
<i>Kennedia prostrata</i>	20%	-
<i>Kunzea glabrescens</i>	40%	-
<i>Laxmannia squarrosa</i>	40%	-
<i>Lechenaultia floribunda</i>	60%	-
<i>Lepidosperma squamatum</i>	40%	-
<i>Leucopogon australis</i> subsp. <i>australis</i>	80%	-
<i>Leucopogon gracillimus</i>	20%	-
<i>Leucopogon polymorphus</i>	20%	-
<i>Leucopogon propinquus</i>	20%	-
<i>Levenhookia stipitata</i>	40%	-
<i>Lobelia tenuior</i>	40%	-
<i>Lomandra hermaphrodita</i>	80%	-
<i>Lomandra nigricans</i>	40%	-
<i>Lomandra suaveolens</i>	20%	-
<i>Lyginia barbata</i>	100%	-
<i>Lysinema ciliatum</i>	20%	-
<b><i>Macrozamia fraseri</i></b>	<b>40%</b>	-
<i>Melaleuca preissiana</i>	20%	-
<i>Melaleuca ryeae</i>	40%	-
<i>Melaleuca thymoides</i>	60%	-

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 30: Associated species for holly-leaved banksia woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Mesomelaena pseudostygia</i>	20%	-
<i>Microtis media</i>	20%	-
<i>Millotia tenuifolia</i> var. <i>tenuifolia</i>	20%	-
<i>Nuytsia floribunda</i>	40%	-
<i>Patersonia occidentalis</i>	100%	-
<i>Patersonia occidentalis</i> (wetland form)	20%	-
<i>Persoonia saccata</i>	20%	-
<i>Petrophile linearis</i>	100%	-
<i>Philotheca spicata</i>	60%	-
<i>Phlebocarya ciliata</i>	60%	-
<i>Phlebocarya filifolia</i>	40%	-
<i>Pimelea sulphurea</i>	40%	-
<i>Platysace compressa</i>	20%	-
<i>Podolepis gracilis</i>	20%	-
<i>Podotroche angustifolia</i>	20%	-
<i>Poranthera microphylla</i>	60%	-
<i>Prasophyllum parvifolium</i>	20%	-
<i>Pyrorchis nigricans</i>	20%	-
<i>Quinetia urvillei</i>	40%	-
<i>Regelia ciliata</i>	20%	-
<i>Regelia inops</i>	20%	-
<i>Rytidosperma occidentale</i>	80%	-
<i>Scaevola repens</i> var. <i>repens</i>	40%	-
<i>Schoenus clandestinus</i>	20%	-
<i>Schoenus curvifolius</i>	100%	-
<i>Schoenus efoliatus</i>	20%	-
<i>Scholtzia involucrata</i>	80%	-
<i>Siloxerus humifusus</i>	20%	-
<i>Stackhousia monogyna</i>	20%	-
<i>Stirlingia latifolia</i>	60%	-
<i>Stylidium brunonianum</i> subsp. <i>brunonianum</i>	80%	-

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 30: Associated species for holly-leaved banksia woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Stylidium carnosum</i>	20%	-
<i>Stylidium piliferum</i> subsp. <i>piliferum</i>	20%	-
<i>Stylidium repens</i>	60%	-
<i>Tetraria octandra</i>	20%	-
<i>Thysanotus manglesianus/patersonii</i> complex	20%	-
<i>Thysanotus multiflorus</i>	20%	-
<i>Thysanotus patersonii</i>	40%	-
<i>Thysanotus sparteus</i>	20%	-
<i>Thysanotus thyrsoideus</i>	20%	-
<i>Trachymene pilosa</i>	100%	-
<i>Tricoryne tenella</i>	40%	-
<i>Wahlenbergia preissii</i>	20%	-
<i>Waitzia suaveolens</i> var. <i>suaveolens</i>	60%	-
<b><i>Xanthorrhoea preissii</i></b>	<b>80%</b>	-
<i>Xanthosia huegelii</i> subsp. <i>huegelii</i>	60%	-

<sup>†</sup>= Keighery *et al.* (2012) frequency calculated based on the five closest sites representing FCT 28 (beel01, wire01, sand01, wire02, sams01); **Bold** font indicates 'important species' (see **Section 7.2.3.2**).

Table 31: Associated species for banksia/coastal blackbutt woodland target ecosystem

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Acacia cyclops</i>	-	✓
<i>Acacia huegelii</i>	60%	-
<i>Acacia pulchella</i>	80%	✓
<i>Acacia saligna</i>	-	✓
<i>Acacia sessilis</i>	20%	-
<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	60%	-
<b><i>Allocasuarina fraseriana</i></b>	<b>40%</b>	-
<i>Allocasuarina humilis</i>	40%	-
<i>Amphipogon turbinatus</i>	60%	-
<i>Anarthria gracilis</i>	20%	-
<i>Anigozanthos manglesii</i> subsp. <i>manglesii</i>	60%	-
<i>Aotus procumbens</i>	20%	-

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 31: Associated species for banksia/coastal blackbutt woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Arnocrinum preissii</i>	40%	-
<i>Astartea fascicularis</i>	-	✓
<i>Asteridea pulverulenta</i>	20%	-
<i>Astroloma xerophyllum</i>	20%	-
<i>Austrostipa compressa</i>	80%	-
<i>Austrostipa flavescens</i>	20%	-
<b><i>Banksia attenuata</i></b>	<b>80%</b>	-
<i>Banksia dallanneyi</i>	20%	-
<i>Banksia ilicifolia</i>	60%	-
<i>Banksia littoralis</i>	-	✓
<b><i>Banksia menziesii</i></b>	<b>100%</b>	-
<i>Beaufortia elegans</i>	20%	-
<i>Boronia ramosa</i> subsp. <i>ramosa</i>	20%	-
<i>Bossiaea eriocarpa</i>	100%	-
<i>Brachyloma preissii</i>	20%	-
<i>Burchardia congesta</i>	80%	✓
<i>Caladenia flava</i> subsp. <i>flava</i>	-	✓
<i>Caladenia georgei</i>	-	✓
<i>Caladenia latifolia</i>	-	✓
<i>Calandrinia corrigioloides</i>	-	✓
<i>Calectasia narragara</i>	20%	-
<i>Calytrix angulata</i>	20%	-
<i>Calytrix flavescens</i>	80%	-
<i>Calytrix fraseri</i>	40%	-
<i>Cartonema philydroides</i>	40%	✓
<i>Centrolepis drummondiana</i>	60%	✓
<i>Chamaescilla corymbosa</i> var. <i>corymbosa</i>	40%	-
<i>Chordifex sinuosus</i>	20%	-
<i>Conospermum stoechadis</i> subsp. <i>stoechadis</i>	20%	-
<i>Conostylis aculeata</i> subsp. <i>aculeata</i>	60%	✓
<i>Conostylis setigera</i> subsp. <i>setigera</i>	40%	-

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 31: Associated species for banksia/coastal blackbutt woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Corynotheca micrantha</i> var. <i>micrantha</i>	20%	-
<i>Crassula colorata</i> var. <i>colorata</i>	40%	✓
<i>Crassula decumbens</i>	-	✓
<i>Crassula exserta</i>	-	✓
<i>Cyathochaeta equitans</i>	20%	-
<i>Dampiera linearis</i>	80%	✓
<i>Dasypogon bromeliifolius</i>	100%	✓
<i>Desmocladius fasciculatus</i>	20%	-
<i>Desmocladius flexuosus</i>	60%	✓
<i>Dianella revoluta</i> var. <i>divaricata</i>	20%	✓
<i>Drosera erythrorhiza</i> subsp. <i>erythrorhiza</i>	20%	-
<i>Drosera menziesii</i> subsp. <i>menziesii</i>	-	✓
<i>Drosera menziesii</i> subsp. <i>penicillaris</i>	40%	-
<i>Drosera stolonifera</i>	-	✓
<i>Drosera stolonifera</i> subsp. <i>porrecta</i>	20%	-
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	40%	-
<b><i>Eucalyptus marginata</i> subsp. <i>marginata</i></b>	<b>40%</b>	-
<i>Eucalyptus rudis</i> subsp. <i>rudis</i>	-	✓
<b><i>Eucalyptus tottiana</i></b>	-	✓
<i>Gastrolobium ebracteolatum</i>	-	✓
<i>Gompholobium tomentosum</i>	100%	✓
<i>Haemodorum laxum</i>	20%	-
<i>Hakea candolleana</i>	20%	-
<i>Hardenbergia comptoniana</i>	-	✓
<i>Hensmania turbinata</i>	20%	-
<i>Hibbertia cuneiformis</i>	-	✓
<i>Hibbertia huegelii</i>	40%	-
<i>Hibbertia hypericoides</i>	-	✓
<i>Hibbertia racemosa</i>	60%	-
<i>Hibbertia subvaginata</i>	40%	-
<i>Homalosciadium homalocarpum</i>	60%	-

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 31: Associated species for banksia/coastal blackbutt woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Hovea pungens</i>	-	✓
<i>Hypocalymma robustum</i>	-	✓
<i>Jacksonia floribunda</i>	20%	-
<i>Jacksonia furcellata</i>	60%	✓
<i>Kennedia prostrata</i>	-	✓
<i>Kunzea glabrescens</i>	-	✓
<i>Laxmannia sessiliflora</i> subsp. <i>australis</i>	20%	-
<i>Lechenaultia expansa</i>	20%	-
<i>Lechenaultia floribunda</i>	60%	-
<i>Lepidosperma leptostachyum</i>	-	✓
<i>Lepidosperma longitudinale</i>	-	✓
<i>Lepidosperma squamatum</i>	40%	✓
<i>Leporella fimbriata</i>	20%	-
<i>Leucopogon australis</i> subsp. <i>australis</i>	-	✓
<i>Leucopogon conostephioides</i>	80%	-
<i>Leucopogon polymorphus</i>	20%	-
<i>Levenhookia stipitata</i>	40%	-
<i>Lomandra caespitosa</i>	80%	-
<i>Lomandra hermaphrodita</i>	80%	-
<i>Lomandra micrantha</i> subsp. <i>micrantha</i>	20%	✓
<i>Lomandra preissii</i>	-	✓
<i>Lyginia barbata</i>	100%	-
<i>Macarthuria apetala</i>	20%	-
<i>Macarthuria australis</i>	20%	-
<b><i>Macrozamia fraseri</i></b>	<b>40%</b>	✓
<i>Melaleuca preissiana</i>	-	✓
<i>Melaleuca raphiophylla</i>	-	✓
<i>Melaleuca ryeae</i>	40%	-
<i>Melaleuca thymoides</i>	60%	-
<i>Mesomelaena pseudostygia</i>	20%	-
<i>Mesomelaena tetragona</i>	20%	-
<i>Microtis media</i>	20%	✓



# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 31: Associated species for banksia/coastal blackbutt woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Millotia tenuifolia</i> var. <i>tenuifolia</i>	20%	-
<i>Neurachne alopecuroidea</i>	60%	-
<i>Nuytsia floribunda</i>	40%	-
<i>Patersonia occidentalis</i>	100%	✓
<i>Pelargonium littorale</i>	20%	-
<i>Persoonia angustiflora</i>	20%	-
<i>Petrophile juncifolia</i>	20%	-
<i>Petrophile linearis</i>	100%	-
<i>Philotheca spicata</i>	60%	-
<i>Phlebocarya ciliata</i>	60%	-
<i>Phyllangium paradoxum</i>	20%	-
<i>Pithocarpa pulchella</i> var. <i>pulchella</i>	20%	-
<i>Podotheca angustifolia</i>	20%	-
<i>Podotheca chrysantha</i>	20%	-
<i>Poranthera microphylla</i>	-	✓
<i>Pteridium esculentum</i>	-	✓
<i>Pterochaeta paniculata</i>	20%	-
<i>Pterostylis vittata</i>	20%	-
<i>Quinetia urvillei</i>	40%	-
<i>Regelia inops</i>	20%	-
<i>Rytidosperma caespitosum</i>	20%	-
<i>Rytidosperma occidentale</i>	80%	-
<i>Schoenus curvifolius</i>	100%	-
<i>Schoenus discifer</i>	20%	-
<i>Schoenus grandiflorus</i>	20%	-
<i>Schoenus pedicellatus</i>	20%	-
<i>Scholtzia involucrata</i>	80%	✓
<i>Siloxerus humifusus</i>	20%	-
<i>Sowerbaea laxiflora</i>	20%	-
<i>Stirlingia latifolia</i>	60%	✓
<i>Stylidium brunonianum</i> subsp. <i>brunonianum</i>	80%	-

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 31: Associated species for banksia/coastal blackbutt woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Stylidium calcaratum</i>	20%	-
<i>Stylidium repens</i>	80%	-
<i>Taxandria linearifolia</i>	-	✓
<i>Thysanotus arbuscula</i>	20%	-
<i>Thysanotus manglesianus/patersonii</i> complex	60%	-
<i>Thysanotus multiflorus</i>	20%	-
<i>Thysanotus patersonii</i>	-	✓
<i>Thysanotus thyrsoides</i>	20%	-
<i>Trachymene pilosa</i>	100%	✓
<i>Tricoryne elatior</i>	20%	-
<i>Wahlenbergia preissii</i>	20%	-
<b><i>Xanthorrhoea preissii</i></b>	<b>80%</b>	✓

†= Keighery *et al.* (2012) frequency calculated based on the highest percentage of the five closest sites representing FCT 21c (YULE-3, DEJONG02, FL-5, FL-6 and jand05) and FCT 23a (jand04, beel02, jand01, jand02 and bibra01); **Bold** font indicates 'important species' (see **Section 7.2.3.2**).

Table 32: Associated species for banksia/woody pear woodland target ecosystem

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Acacia applanata</i>	20%	-
<i>Acacia huegelii</i>	40%	✓
<i>Acacia pulchella</i>	20%	✓
<i>Acacia saligna</i>	-	✓
<i>Acacia stenoptera</i>	40%	-
<i>Acacia willdenowiana</i>	20%	-
<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	20%	-
<b><i>Allocasuarina fraseriana</i></b>	<b>20%</b>	-
<i>Amphipogon turbinatus</i>	40%	-
<i>Anigozanthos humilis</i> subsp. <i>humilis</i>	40%	-
<i>Anigozanthos manglesii</i> subsp. <i>manglesii</i>	20%	-
<i>Asteridea pulverulenta</i>	20%	-
<i>Astroloma pallidum</i>	20%	-
<i>Austrostipa compressa</i>	40%	-
<i>Babingtonia camphorosmae</i>	20%	-

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 32: Associated species for banksia/woody pear woodland target ecosystem (continued)

Species	Keighery et al. (2012) frequency <sup>†</sup>	Ongoing monitoring
<b><i>Banksia attenuata</i></b>	<b>100%</b>	✓
<i>Banksia dallanneyi</i>	20%	-
<i>Banksia ilicifolia</i>	20%	-
<b><i>Banksia menziesii</i></b>	<b>60%</b>	-
<i>Boronia ramosa</i> subsp. <i>ramosa</i>	-	✓
<i>Bossiaea eriocarpa</i>	40%	✓
<i>Brachyloma preissii</i>	20%	-
<i>Burchardia congesta</i>	100%	✓
<i>Caesia micrantha</i>	40%	✓
<i>Caladenia flava</i> subsp. <i>flava</i>	60%	✓
<i>Caladenia georgei</i>	20%	-
<i>Centrolepis drummondiana</i>	40%	-
<i>Chamaescilla corymbosa</i> var. <i>corymbosa</i>	40%	-
<i>Conospermum triplinervium</i>	20%	-
<i>Conostephium pendulum</i>	60%	✓
<i>Conostylis aculeata</i> subsp. <i>aculeata</i>	80%	✓
<i>Conostylis candicans</i> subsp. <i>candicans</i>	-	✓
<i>Conostylis setigera</i> subsp. <i>setigera</i>	80%	-
<i>Corymbia calophylla</i>	60%	✓
<i>Corynotheca micrantha</i> var. <i>micrantha</i>	20%	-
<i>Dampiera linearis</i>	40%	-
<i>Dasypogon bromeliifolius</i>	60%	-
<i>Daviesia divaricata</i> subsp. <i>divaricata</i>	40%	✓
<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>	40%	-
<i>Daviesia triflora</i>	20%	-
<i>Desmocladius fasciculatus</i>	40%	-
<i>Desmocladius flexuosus</i>	40%	✓
<i>Dianella revoluta</i> var. <i>divaricata</i>	60%	✓
<i>Dichelachne crinita</i>	20%	-
<i>Dichopogon capillipes</i>	-	✓
<i>Diuris longifolia</i>	60%	-

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 32: Associated species for banksia/woody pear woodland target ecosystem (continued)

Species	Keighery et al. (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Drosera erythrorhiza</i> subsp. <i>erythrorhiza</i>	-	✓
<i>Drosera menziesii</i> subsp. <i>menziesii</i>	-	✓
<i>Drosera pallida</i>	20%	-
<i>Drosera stolonifera</i>	80%	✓
<i>Eryngium pinnatifidum</i> subsp. <i>pinnatifidum</i>	80%	✓
<i>Eucalyptus gomphocephala</i>	20%	-
<b><i>Eucalyptus marginata</i> subsp. <i>marginata</i></b>	<b>60%</b>	<b>✓</b>
<i>Gastrolobium capitatum</i>	100%	-
<i>Gastrolobium ebracteolatum</i>	-	✓
<i>Gompholobium tomentosum</i>	100%	✓
<i>Hakea prostrata</i>	20%	-
<i>Hardenbergia comptoniana</i>	60%	✓
<i>Hibbertia huegelii</i>	40%	-
<i>Hibbertia hypericoides</i>	80%	✓
<i>Hibbertia racemosa</i>	60%	-
<i>Homalosciadium homalocarpum</i>	40%	-
<i>Hovea trisperma</i> var. <i>trisperma</i>	60%	-
<i>Hypocalymma robustum</i>	40%	✓
<i>Hypolaena exsulca</i>	40%	-
<i>Isotropis cuneifolia</i> subsp. <i>cuneifolia</i>	60%	-
<i>Jacksonia furcellata</i>	-	✓
<i>Jacksonia sericea</i>	20%	-
<i>Jacksonia sternbergiana</i>	20%	-
<i>Kennedia prostrata</i>	60%	✓
<i>Lagenophora huegelii</i>	60%	-
<i>Lepidobolus preissianus</i>	20%	-
<i>Lepidosperma scabrum</i>	20%	-
<i>Lepidosperma squamatum</i>	60%	-
<i>Leucopogon conostepoides</i>	-	✓
<i>Leucopogon parviflorus</i>	40%	-
<i>Leucopogon propinquus</i>	-	✓

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 32: Associated species for banksia/woody pear woodland target ecosystem (continued)

Species	Keighery et al. (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Leucopogon racemosus</i>	20%	-
<i>Lomandra caespitosa</i>	80%	-
<i>Lomandra hermaphrodita</i>	20%	-
<i>Lomandra maritima</i>	-	✓
<i>Lomandra micrantha</i> subsp. <i>micrantha</i>	20%	-
<i>Lomandra nigricans</i>	20%	-
<i>Lomandra preissii</i>	20%	-
<i>Lomandra suaveolens</i>	20%	✓
<i>Lyginia barbata</i>	40%	-
<i>Lyperanthus serratus</i>	20%	-
<i>Macarthuria australis</i>	-	✓
<b><i>Macrozamia fraseri</i></b>	<b>80%</b>	<b>✓</b>
<i>Melaleuca systema</i>	20%	-
<i>Mesomelaena pseudostygia</i>	100%	✓
<i>Microlaena stipoides</i>	40%	-
<i>Monotaxis grandiflora</i>	20%	-
<i>Neurachne alopecuroidea</i>	20%	-
<i>Patersonia occidentalis</i>	40%	-
<i>Patersonia occidentalis</i> (wetland form)	40%	-
<i>Petrophile linearis</i>	100%	✓
<i>Petrophile macrostachya</i>	20%	-
<i>Philoteca spicata</i>	20%	✓
<i>Pimelea rosea</i> subsp. <i>rosea</i>	20%	✓
<i>Pimelea sulphurea</i>	20%	-
<i>Poa drummondiana</i>	20%	-
<i>Podolepis gracilis</i>	20%	✓
<i>Poranthera microphylla</i>	20%	-
<i>Scaevola canescens</i>	40%	✓
<i>Scaevola repens</i> var. <i>repens</i>	60%	-
<i>Schoenus clandestinus</i>	60%	-
<i>Senecio condylus</i>	-	✓

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 32: Associated species for banksia/woody pear woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency <sup>†</sup>	Ongoing monitoring
<i>Sowerbaea laxiflora</i>	60%	✓
<i>Stirlingia latifolia</i>	80%	-
<i>Stylidium brunonianum</i> subsp. <i>brunonianum</i>	20%	-
<i>Stylidium schoenoides</i>	20%	-
<i>Tetraria octandra</i>	100%	-
<i>Thelymitra benthamiana</i>	20%	-
<i>Thysanotus arenarius</i>	40%	-
<i>Thysanotus manglesianus/patersonii</i> complex	20%	-
<i>Thysanotus patersonii</i>	40%	-
<i>Thysanotus sparteus</i>	40%	-
<i>Thysanotus thyrsoideus</i>	20%	-
<i>Trachymene pilosa</i>	80%	-
<i>Tricoryne elatior</i>	20%	-
<i>Tricoryne tenella</i>	-	✓
<i>Wahlenbergia preissii</i>	20%	-
<b><i>Xanthorrhoea preissii</i></b>	<b>100%</b>	✓
<i>Xanthosia huegelii</i> subsp. <i>huegelii</i>	60%	-
<b><i>Xylomelum occidentale</i></b>	-	✓

<sup>†</sup>= Keighery *et al.* (2012) frequency calculated based on the five closest sites representing FCT 28 (beel01, wire01, sand01, wire02, sams01); **Bold** font indicates 'important species' (see **Section 7.2.3.2**).

Table 33: Associated species for banksia/tuart woodland target ecosystem

Species	Keighery <i>et al.</i> (2012) frequency	Ongoing monitoring
<i>Acacia applanata</i>	20%	-
<i>Acacia huegelii</i>	40%	-
<i>Acacia pulchella</i>	20%	✓
<i>Acacia stenoptera</i>	40%	-
<i>Acacia willdenowiana</i>	20%	-
<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	20%	-
<b><i>Allocasuarina fraseriana</i></b>	<b>20%</b>	-
<i>Amphipogon turbinatus</i>	40%	-
<i>Anigozanthos humilis</i> subsp. <i>humilis</i>	40%	✓

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 33: Associated species for banksia/tuart woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency	Ongoing monitoring
<i>Anigozanthos manglesii</i> subsp. <i>manglesii</i>	20%	-
<i>Asteridea pulverulenta</i>	20%	-
<i>Astroloma pallidum</i>	20%	-
<i>Austrostipa compressa</i>	40%	-
<i>Babingtonia camphorosmae</i>	20%	-
<b><i>Banksia attenuata</i></b>	100%	✓
<i>Banksia dallanneyi</i>	20%	✓
<i>Banksia ilicifolia</i>	20%	-
<b><i>Banksia menziesii</i></b>	60%	-
<i>Bossiaea eriocarpa</i>	40%	✓
<i>Brachyloma preissii</i>	20%	-
<i>Burchardia congesta</i>	100%	✓
<i>Caesia micrantha</i>	40%	✓
<i>Caladenia flava</i> subsp. <i>flava</i>	60%	✓
<i>Caladenia georgei</i>	20%	✓
<i>Centrolepis drummondiana</i>	40%	-
<i>Chamaecilla corymbosa</i> var. <i>corymbosa</i>	40%	-
<i>Conospermum triplinervium</i>	20%	-
<i>Conostephium pendulum</i>	60%	-
<i>Conostylis aculeata</i> subsp. <i>aculeata</i>	80%	✓
<i>Conostylis setigera</i> subsp. <i>setigera</i>	80%	-
<i>Corymbia calophylla</i>	60%	-
<i>Corynotheca micrantha</i> var. <i>micrantha</i>	20%	-
<i>Dampiera linearis</i>	40%	-
<i>Dasypogon bromeliifolius</i>	60%	-
<i>Daviesia divaricata</i> subsp. <i>divaricata</i>	40%	-
<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>	40%	-
<i>Daviesia triflora</i>	20%	-
<i>Desmocladius fasciculatus</i>	40%	-
<i>Desmocladius flexuosus</i>	40%	✓
<i>Dianella revoluta</i> var. <i>divaricata</i>	60%	✓

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 33: Associated species for banksia/tuart woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency	Ongoing monitoring
<i>Dichelachne crinita</i>	20%	-
<i>Diuris longifolia</i>	60%	-
<i>Drosera pallida</i>	20%	-
<i>Drosera stolonifera</i>	80%	✓
<i>Eryngium pinnatifidum</i> subsp. <i>pinnatifidum</i>	80%	✓
<b><i>Eucalyptus gomphocephala</i></b>	<b>20%</b>	<b>✓</b>
<b><i>Eucalyptus marginata</i> subsp. <i>marginata</i></b>	<b>60%</b>	<b>✓</b>
<i>Gastrolobium capitatum</i>	100%	-
<i>Gompholobium tomentosum</i>	100%	✓
<i>Hakea prostrata</i>	20%	✓
<i>Hardenbergia comptoniana</i>	60%	✓
<i>Hibbertia huegelii</i>	40%	-
<i>Hibbertia hypericoides</i>	80%	-
<i>Hibbertia racemosa</i>	60%	-
<i>Homalosciadium homalocarpum</i>	40%	-
<i>Hovea trisperma</i> var. <i>trisperma</i>	60%	-
<i>Hypocalymma robustum</i>	40%	-
<i>Hypolaena exsulca</i>	40%	-
<i>Isotropis cuneifolia</i> subsp. <i>cuneifolia</i>	60%	-
<i>Jacksonia sericea</i>	20%	-
<i>Jacksonia sternbergiana</i>	20%	-
<i>Kennedia prostrata</i>	60%	✓
<i>Lagenophora huegelii</i>	60%	-
<i>Lepidobolus preissianus</i>	20%	-
<i>Lepidosperma scabrum</i>	20%	-
<i>Lepidosperma squamatum</i>	60%	✓
<i>Leucopogon parviflorus</i>	40%	-
<i>Leucopogon racemosus</i>	20%	-
<i>Lomandra caespitosa</i>	80%	✓
<i>Lomandra hermaphrodita</i>	20%	-
<i>Lomandra micrantha</i> subsp. <i>micrantha</i>	20%	✓



# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 33: Associated species for banksia/tuart woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency	Ongoing monitoring
<i>Lomandra nigricans</i>	20%	-
<i>Lomandra preissii</i>	20%	-
<i>Lomandra suaveolens</i>	20%	-
<i>Lyginia barbata</i>	40%	-
<i>Lyperanthus serratus</i>	20%	-
<b><i>Macrozamia fraseri</i></b>	<b>80%</b>	✓
<i>Melaleuca systema</i>	20%	-
<i>Mesomelaena pseudostygia</i>	100%	-
<i>Microlaena stipoides</i>	40%	-
<i>Monotaxis grandiflora</i>	20%	-
<i>Neurachne alopecuroides</i>	20%	-
<i>Patersonia occidentalis</i>	40%	-
<i>Patersonia occidentalis</i> (wetland form)	40%	-
<i>Petrophile linearis</i>	100%	-
<i>Petrophile macrostachya</i>	20%	-
<i>Philothea spicata</i>	20%	-
<i>Pimelea rosea</i> subsp. <i>rosea</i>	20%	✓
<i>Pimelea sulphurea</i>	20%	-
<i>Poa drummondiana</i>	20%	-
<i>Podolepis gracilis</i>	20%	✓
<i>Poranthera microphylla</i>	20%	-
<i>Scaevola canescens</i>	40%	-
<i>Scaevola repens</i> var. <i>repens</i>	60%	-
<i>Schoenus clandestinus</i>	60%	✓
<i>Sowerbaea laxiflora</i>	60%	✓
<i>Stirlingia latifolia</i>	80%	-
<i>Stylidium brunonianum</i> subsp. <i>brunonianum</i>	20%	-
<i>Stylidium schoenoides</i>	20%	-
<i>Tetraria octandra</i>	100%	✓
<i>Thelymitra benthamiana</i>	20%	-
<i>Thysanotus arenarius</i>	40%	-

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 33: Associated species for banksia/tuart woodland target ecosystem (continued)

Species	Keighery <i>et al.</i> (2012) frequency	Ongoing monitoring
<i>Thysanotus manglesianus/patersonii</i> complex	20%	-
<i>Thysanotus patersonii</i>	40%	✓
<i>Thysanotus sparteus</i>	40%	✓
<i>Thysanotus thyrsoides</i>	20%	-
<i>Trachymene pilosa</i>	80%	-
<i>Tricoryne elatior</i>	20%	-
<i>Wahlenbergia preissii</i>	20%	-
<b><i>Xanthorrhoea preissii</i></b>	<b>100%</b>	✓
<i>Xanthosia huegelii</i> subsp. <i>huegelii</i>	60%	-

†= Keighery *et al.* (2012) frequency calculated based on the five closest sites representing FCT 28 (beel01, wire01, sand01, wire02, sams01); **Bold** font indicates 'important species' (see **Section 7.2.3.2**).

#### 7.2.3.2 Important species

Important species are identified to guide the focus of restoration based on criteria outlined in **Appendix B**. Note that labelling the important species is not intended to convey that they are the only native species that have a significant, valuable or otherwise meaningful role within the identified target ecosystems. Rather, they are identified as important because they are diagnostic, structural components (canopy species), are conservation significant or represent potentially significant threats to the restoration of target ecosystems (weeds and pest fauna species). The species identified as important may change over time as new information is obtained.

Native flora species identified as important to the target ecosystems are outlined in **Table 34**. Re-establishing specific density of these species within restoration areas is identified as a restoration objective (refer **Table 4**).

# Rehabilitation Management Plan

## Roe 8 Cleared Areas

Table 34: Important native flora species by target ecosystem

Species	Target Ecosystem						
	Banksia woodland	Banksia/coastal blackbutt woodland	Banksia/jarrah woodland	Banksia/tuart woodland	Banksia/woody pear woodland	Holly-leaved banksia woodland	Wet forest and woodland
<i>Allocasuarina fraseriana</i>	✓	✓	✓	✓	✓	✓	
<i>Banksia attenuata</i>	✓	✓	✓	✓	✓	✓	
<i>Banksia ilicifolia</i>						✓	
<i>Banksia menziesii</i>	✓	✓	✓	✓	✓	✓	
<i>Eucalyptus gomphocephala</i>				✓			
<i>Eucalyptus marginata</i> subsp. <i>marginata</i>	X <sup>†</sup>	✓	✓	✓	✓	✓	
<i>Eucalyptus rudis</i> subsp. <i>rudis</i>							✓
<i>Eucalyptus tottiana</i>		✓					
<i>Macrozamia fraseri</i>	✓	✓	✓	✓	✓	✓	
<i>Melaleuca preissiana</i>							✓
<i>Melaleuca raphiophylla</i>							✓
<i>Xanthorrhoea preissii</i>	✓	✓	✓	✓	✓	✓	
<i>Xylomelum occidentale</i>					✓		

<sup>†</sup>jarrah omitted due to height restriction relevant to this target ecosystem in Hope Road North.

A range of non-native flora (weed) species are identified as important to the restoration areas as outlined in **Table 35**. These species were recorded during 2017 site assessment (as outlined in **Appendix C**) and are considered potentially high threat. Note that other weed species may also be present in the site and of particular note are species listed in the *Environmental weed census and prioritisation* (Keighery and Bettink 2008). The important weed species may change over time as informed by monitoring and will form part of the adaptive management process.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 35: Non-native flora taxa recorded in the site that are considered important for restoration and management within the site

Weed category	Species	Status	
		BAM Act	Environmental Weed <sup>†</sup>
Grassy	<i>Avena</i> spp. (wild oats)	-	✓
	<i>Ehrharta calycina</i> (perennial veldt grass)	-	✓
	<i>Ehrharta longifolia</i> (annual veldt grass)	-	✓
	<i>Eragrostis curvula</i> (African love grass)	-	✓
Bulbous	<i>Freesia alba</i> × <i>leichtlinii</i> (freesia)	-	✓
	<i>Gladiolus caryophyllaceus</i> (wild gladiolus)	-	✓
	<i>Lachenalia reflexa</i> (yellow soldier)	-	✓
	<i>Zantedeschia aethiopica</i> (arum lily)	✓	✓
Woody	<i>Acacia longifolia</i> (Sydney golden wattle)	-	✓
	<i>Acacia iteaphylla</i> (Finders Range wattle)	-	✓
	<i>Chamaecytisus palmensis</i> (tagasaste)	-	✓
	<i>Chamelaucium uncinatum</i> (Geraldton wax)	-	✓
	<i>Leptospermum laevigatum</i> (Victorian tea-tree)	-	✓

<sup>†</sup>*Swan Weeds* (DBCAs 2017)

Due to the threat posed by these important weed species, limiting their presence and/or cover within restoration areas shall be a priority of weed control activities. Designing the annual weed control program around important weed species categories will ensure that weed control actions are generally appropriately timed and effective. Limiting the cover of all weed species is identified as a specific restoration objective (refer **Table 4**).

Important native and non-native fauna species shall be identified in the forthcoming fauna surveys (as detailed in **Section 7.2.2.4**). Objectives are identified in relation to native fauna species (refer **Table 4**) but currently no restoration objectives are identified in relation to important non-native fauna species. No protocols are specified for the management of important non-native fauna species and additional planning and stakeholder engagement is required.

### 7.2.3.3 Assessment against goals and objectives

The evaluation of restoration performance requires that an assessment is made against the restoration goals and specifically against the restoration objectives previously outlined in **Table 4**. Currently, the indicators identified in **Section 7.2.1.5** must be assessed in order to evaluate performance against the objectives. The assessment of any combination of additional indicators provides a basis for further evaluation of restoration outcomes.

Ideally, the evaluation against objectives is spatially comprehensive so that reported outcomes reflect the performance across the whole of a restoration area. However, as the assessment of certain indicators can be time consuming, especially where assessment is required over relatively

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

large areas, a combination of permanently marked plots, unmarked plots and mapping based approaches is likely to provide sufficient information.

A banksia woodland restoration project may take many decades to complete (attributed to Drs. Hans Lambers and Kingsley Dixon, ABC News report 30 March 2017). While ten years is a relatively long period of time to operate a restoration project, it is unrealistic to expect that restoration could be completed within a ten year period. Therefore, to provide practicable boundaries for evaluation, 'completion' is defined as the point when a restoration area has been demonstrated to have met the minimum restoration goals and associated objectives after at least 4 years of management (refer **Table 4**).

Note that the minimum goals and objectives are expected to be met over the entire ten year period for which the project is currently forecast to operate. Attainment of minimum restoration goals is intended to indicate that the restoration areas can be maintained on a trajectory for continued improvement towards the primary goals (refer **Section 2**).

### 7.3 Data management

All data collected for the RMP shall at minimum include information fields described in **Table 36**. Recorders and the **Community Engagement Coordinator/Project Manager** shall undertake quality assurance and quality control (QAQC) to ensure quality and consistency of information.

*Table 36: Minimum information required for project data and records*

Data type	Fields
Communication	<ul style="list-style-type: none"> <li>• Date</li> <li>• Author name</li> <li>• Medium/forum</li> <li>• Description of message</li> <li>• Indicator fields</li> </ul>
Engagement	<ul style="list-style-type: none"> <li>• Date</li> <li>• Recorder name</li> <li>• Description of activity</li> <li>• Indicator fields</li> </ul>
Involvement	<ul style="list-style-type: none"> <li>• Date</li> <li>• Recorder name</li> <li>• Spatial location (GDA 94, MGA 50)</li> <li>• Description of activity</li> <li>• Indicator fields</li> </ul>

## Rehabilitation Management Plan

### Roe 8 Cleared Areas

Table 36: Minimum information required for project data and records (continued)

Data type	Fields
Observation/record (any)	<ul style="list-style-type: none"> <li>• Date</li> <li>• Recorder name</li> <li>• Description</li> <li>• Spatial location (GDA 94, MGA 50)</li> <li>• Waypoint ID               <ul style="list-style-type: none"> <li>○ Indicator fields</li> </ul> </li> </ul>
Permanently marked plot data	<ul style="list-style-type: none"> <li>• Date</li> <li>• Recorder name</li> <li>• Spatial location (GDA 94, MGA 50)</li> <li>• Plot ID               <ul style="list-style-type: none"> <li>○ Indicator fields</li> </ul> </li> <li>• 5m subplot ID               <ul style="list-style-type: none"> <li>○ Indicator fields</li> </ul> </li> <li>• 0.5m subplot ID               <ul style="list-style-type: none"> <li>○ Indicator fields</li> </ul> </li> </ul>
Unmarked sample plot	<ul style="list-style-type: none"> <li>• Date</li> <li>• Recorder name</li> <li>• Spatial location (GDA 94, MGA 50)</li> <li>• Waypoint ID               <ul style="list-style-type: none"> <li>○ Indicator fields</li> </ul> </li> </ul>
Photopoint	<ul style="list-style-type: none"> <li>• Date</li> <li>• Recorder name</li> <li>• Spatial location (GDA 94, MGA 50)</li> <li>• Photopoint ID</li> <li>• Aspect</li> <li>• Image ID</li> </ul>
Material samples (including basic materials, abiotic/biotic samples, seed / propagule collection, tubestock)	<ul style="list-style-type: none"> <li>• Date collected</li> <li>• Date of acquisition</li> <li>• Date applied/installed</li> <li>• Collector/applicator/installer name</li> <li>• Spatial location (for example GDA94, MGA50)</li> <li>• Description of donor and receiving sites</li> <li>• Collection and identification methods</li> <li>• Collector/propagators name</li> </ul>

All information recorded must be stored in secure and dedicated databases. Separation of information based on its type and use is recommended as follows:

- community database (information related to individual community participants)
- stakeholder database (information related to government/organisation participants)
- restoration database (information related to restoration including general records for site management).

The Project Administrator shall be the custodian of the databases. The databases may be stored concurrently on a local platform, such as Microsoft Access and shared platform, such as the *Atlas of Living Australia*. The Project Administrator may therefore host a server on which the databases are stored and liaise with and provide access to data via other server administrators subject to future data licencing agreements.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas



All data must be submitted to the dedicated database via the **Community Engagement Coordinator/Project Manager** or approved delegate<sup>21</sup>. Data will be made available to interested community and stakeholders, as appropriate<sup>22</sup>.

The protocols for data management and access are yet to be confirmed and require additional planning and stakeholder engagement.

## 7.4 Reporting

### 7.4.1 Internal

#### 7.4.1.1 Regular reporting

At each meeting of the Rehabilitating Roe 8 Advisory Committee a brief summary shall be prepared and delivered by the Project Manager. The summary shall outline the recent activities completed as part of the RMP as well as works proposed for the upcoming month/s.

The summary report is not required to be more than one page and shall cover activities undertaken and proposed for topics including the following:

- Communication
- Engagement and involvement
- Restoration:
  - weed control
  - tubestock planting
  - monitoring
- Other.

#### 7.4.1.2 Annual project reporting

At the end of each restoration season an annual internal monitoring report shall be prepared by the Project Manager submitted to the Rehabilitating Roe 8 Advisory Committee for review and comment.

The report shall outline the scope of activities completed and demonstrate current performance of communications, engagement, involvement and restoration activities against the objectives as outlined in **Section 2**.

The report shall include all relevant information, maps, figures and charts as required and at minimum have a structure that includes the following headings:

- Introduction
- Methods
- Results
- Discussion
- Conclusions / recommendations.

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<sup>21</sup>With assistance provided by PURSAC

<sup>22</sup> Pending consideration of privacy and intellectual property.

## Rehabilitation Management Plan

### Roe 8 Cleared Areas



The report shall also forecast a program of works for the forward year(s) as input into planning and preparation. A template for forward planning is provided in **Appendix D**.

#### 7.4.2 External

##### 7.4.2.1 Communicating performance and progress to community and stakeholders

Refer to **Section 4.2** for communication tools.

The *Standards* recommend a ‘recovery wheel’ tool, wherein progress against attribute categories can be displayed together to provide an overview of performance (Standards Reference Group SERA 2017). An annual community report card is proposed that may include a recovery wheel or similar device.

The format of the annual community report card is yet to be confirmed and will require additional planning and stakeholder engagement. However, may be akin to a one page “dashboard” summarising the annual and cumulative outcomes of engagement, involvement and restoration. The report may also include visual tools such as a map showing how close restoration area is to reaching minimum or aspirational objectives.



## Rehabilitation Management Plan

### Roe 8 Cleared Areas

## 8 References

### 8.1 General references

- Environmental Protection Authority (EPA) 2016, *Technical Guidance - Terrestrial Fauna Surveys*, EPA, Western Australia.
- Keighery, G. J. and Bettink, K. 2008, *Environmental weed census and prioritisation, Swan NRM Region*, Swan Catchment Council (SCC) and Department of Environment and Conservation (DEC), Perth.
- Standards Reference Group SERA 2017, *National Standards for the Practice of Ecological Restoration in Australia*, Society for Ecological Restoration Australasia.
- Western Australian Planning Commission (WAPC) 2003, *Coastal Planning and Management Manual*, Western Australian Planning Commission, Perth, Western Australian Planning Commission, Perth.

### 8.2 Online references

- ABC News 2017, *Roe 8 environmental damage could take decades to restore according to experts*, viewed 29 November 2017 <<http://www.abc.net.au/news/2017-03-30/roe-8-environmental-damage-could-take-decades-to-restore/8402126>>
- Bureau of Meteorology (BOM) 2017, *Climate Averages*, viewed 14 June 2017, <<http://www.bom.gov.au/climate/data/>>.
- Department of Parks and Wildlife (DBCA) 2017, *Florabase*, viewed 29th November 2017 <<https://florabase.dpaw.wa.gov.au/>>.
- Nursery Industry Accreditation Scheme (NIASA) 2017, *NIASA Best Practice Management Guidelines*, viewed 29 November 2017 <[https://www.ngia.com.au/Category?Action=View&Category\\_id=125/](https://www.ngia.com.au/Category?Action=View&Category_id=125/)>
- Rehabilitating Roe 8 Steering Committee 2017, *Rehabilitating Roe 8*, viewed 3 December 2017 <<https://rehabilitatingroe8.org/>>
- Revegetation Industry Association of Western Australia (RIAWA) 2017, *Accreditation*, viewed 29 November 2017 <[http://riawa.com.au/wordpress/?page\\_id=1059/](http://riawa.com.au/wordpress/?page_id=1059/)>



# Figures



*Figure 1: Site Location*

*Figure 2: Management Areas*

*Figure 3: Existing and Proposed Gates and Paths*

*Figure 4: Restoration Areas*

*Figure 5: Restoration Area Input Categories*

*Figure 6: Monitoring Design*







**Figure 1: Site Location**

**Project:** Rehabilitation Management Plan  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)--F28a

**Drawn:** KNM

**Date:** 31/01/2018

**Checked:** RAO

**Approved:** TAA

**Date:** 31/01/2018



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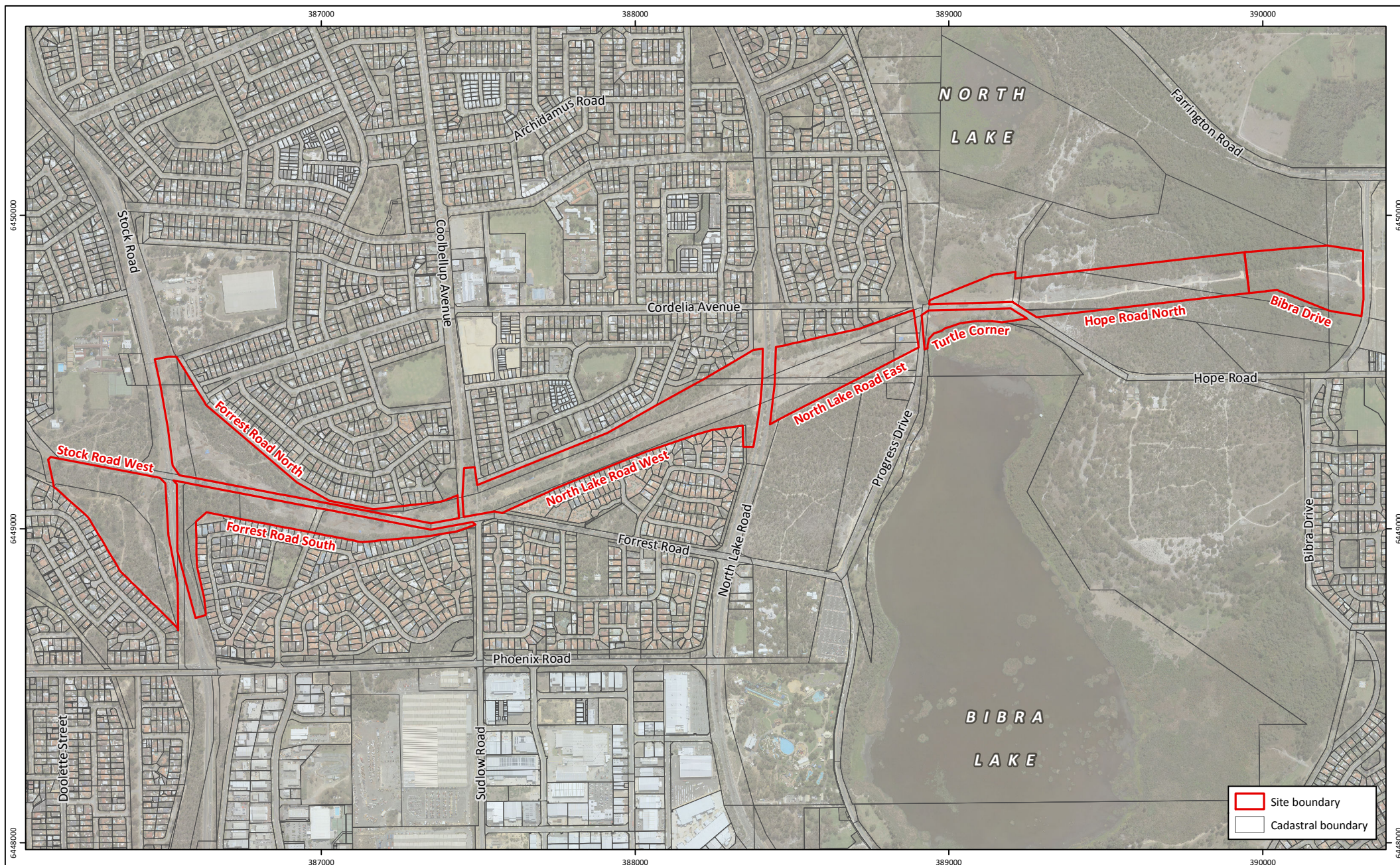
GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES









**Figure 2: Management Areas**

**Project:** Rehabilitation Management Plan  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)--F29a

**Drawn:** KNM

**Date:** 31/01/2018

**Checked:** RAO

**Approved:** TAA

**Date:** 31/01/2018



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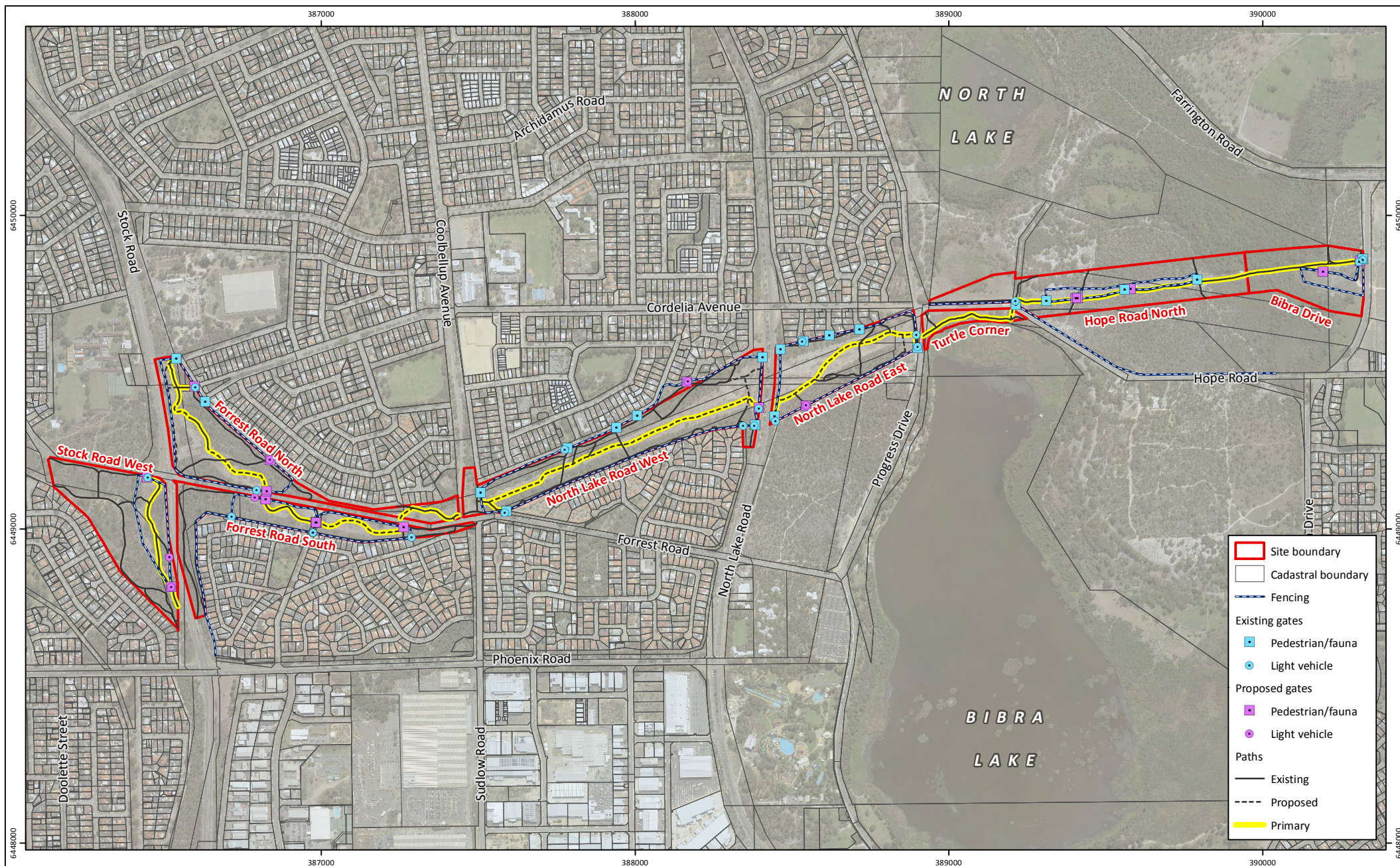
GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES









**Figure 3: Existing and Proposed Gates and Paths**

**Project:** Rehabilitation Management Plan  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F51a

**Drawn:** RAO

**Date:** 22/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 22/02/2018



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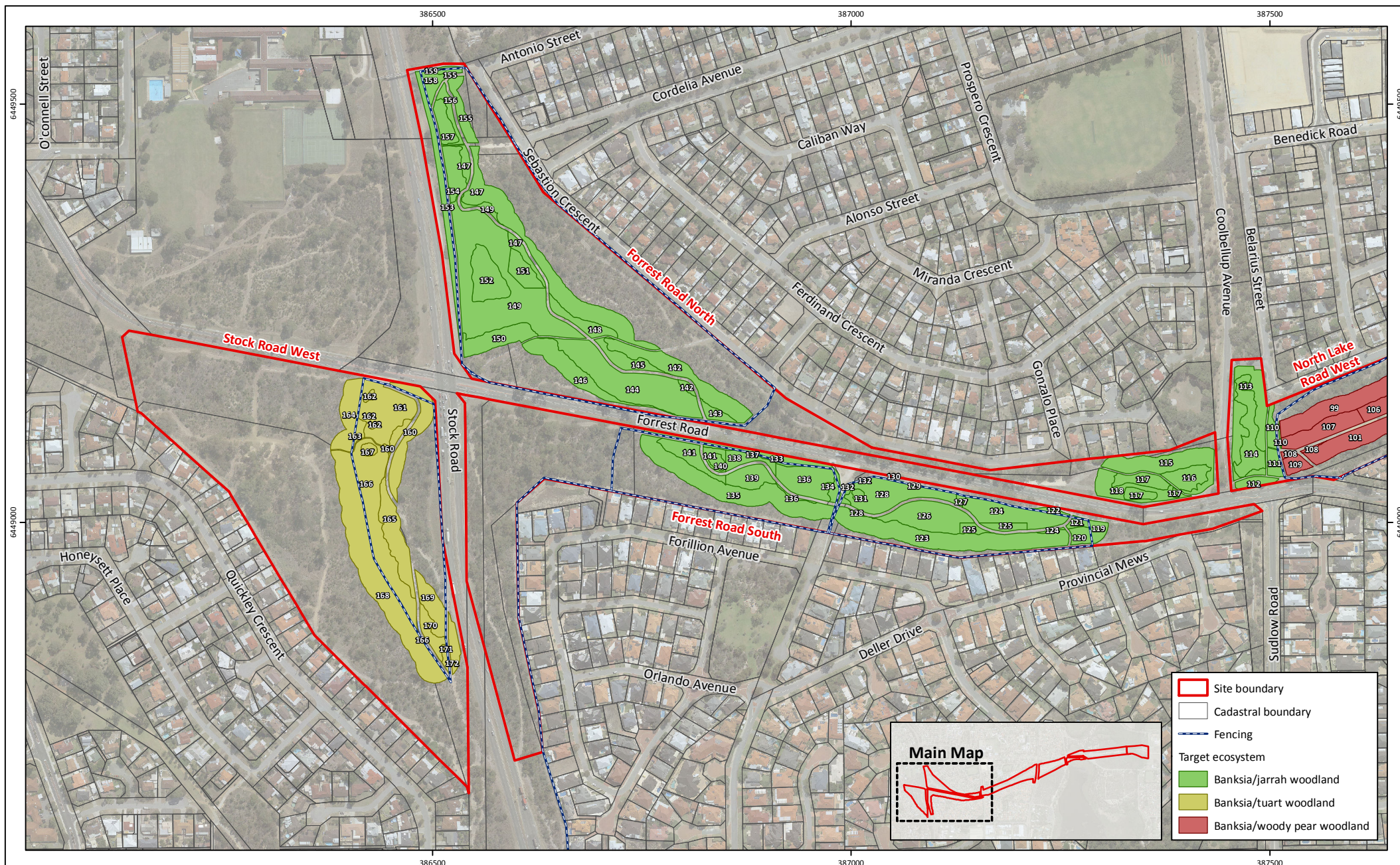
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GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES









**Figure 4a: Restoration Areas (1 of 3)**

**Project:** Rehabilitation Management Plan  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)--F52

**Drawn:** KNM

**Date:** 31/01/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 31/01/2018



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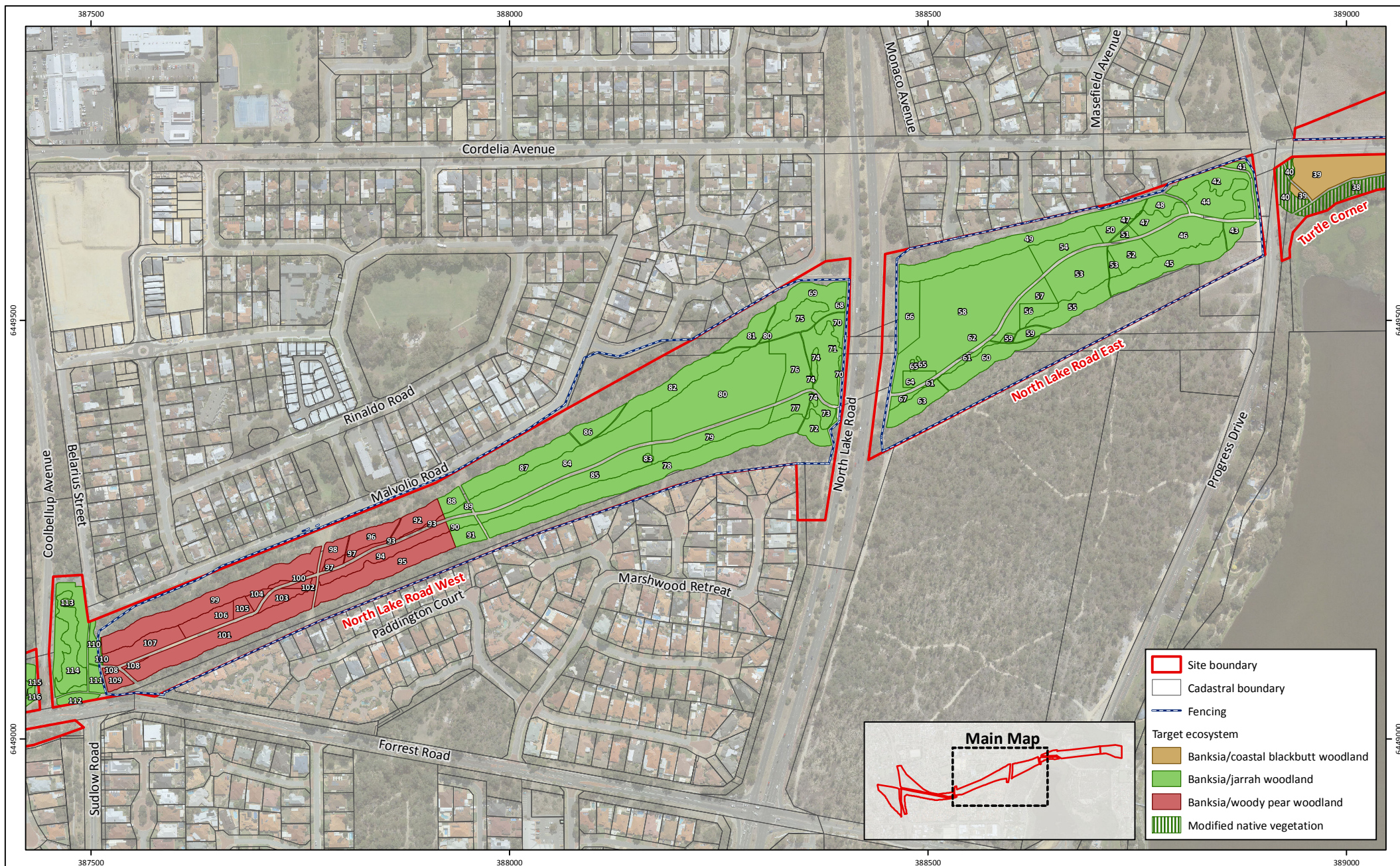
GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES









**Figure 4b: Restoration Areas (2 of 3)**

**Project:** Rehabilitation Management Plan  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)--F57

**Drawn:** KNM

**Date:** 31/01/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 31/01/2018



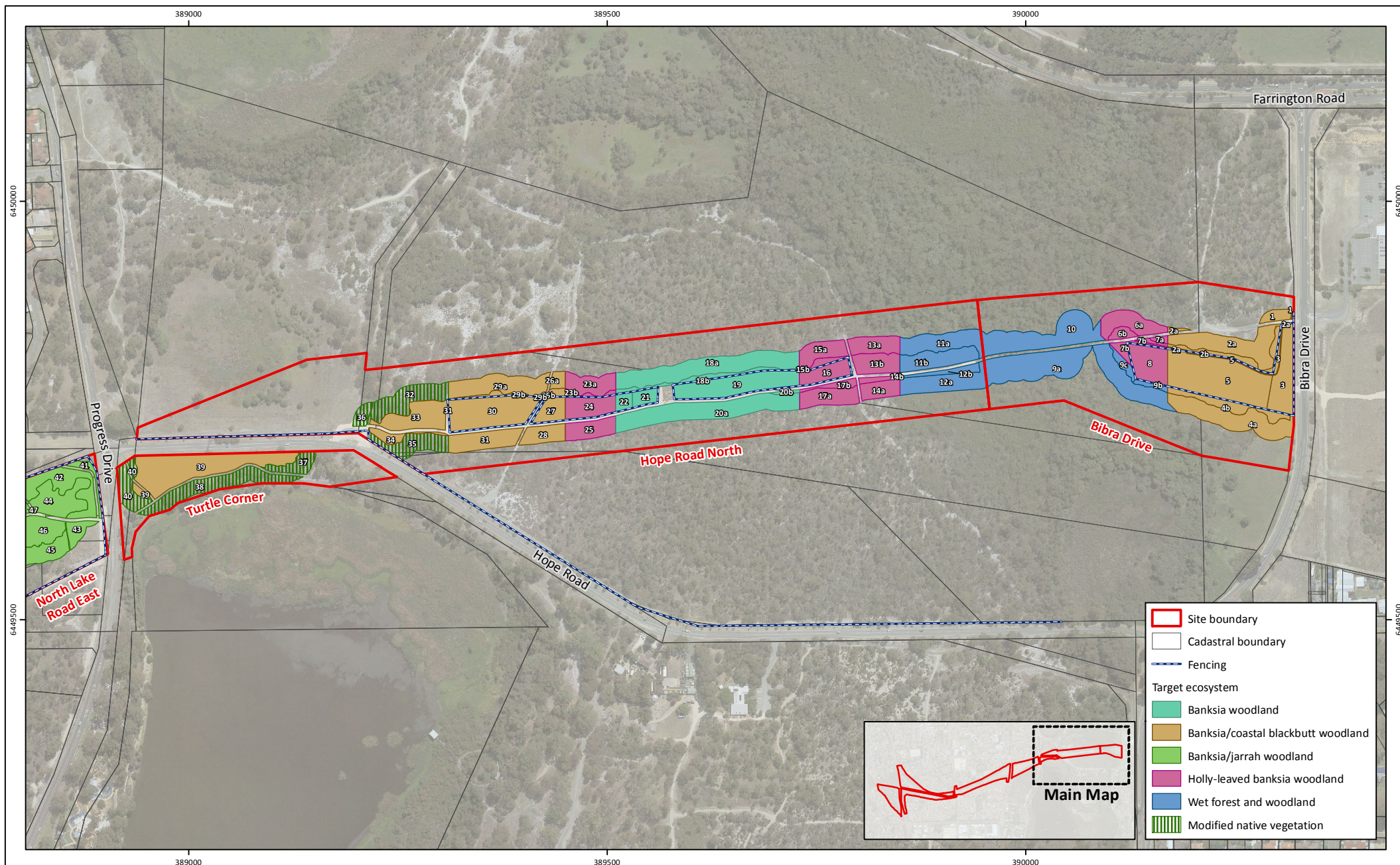
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GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES







**Figure 4c: Restoration Areas (3 of 3)**

**Project:** Rehabilitation Management Plan  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F58a

**Drawn:** RAO

**Date:** 23/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 23/02/2018



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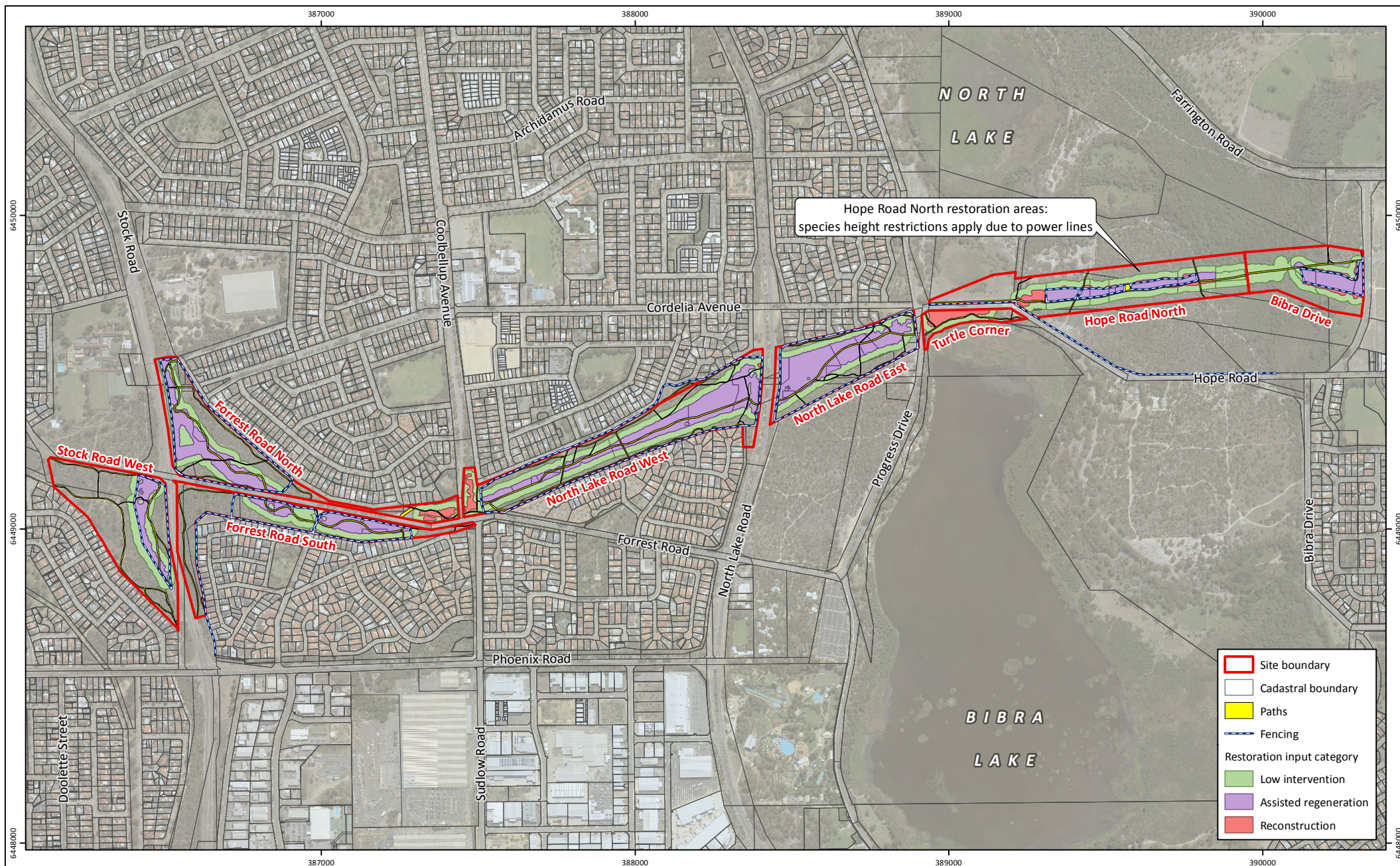
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GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES







**Figure 5: Restoration Inputs**

**Project:** Rehabilitation Management Plan  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F53a

**Drawn:** RAO

**Date:** 20/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 22/02/2018



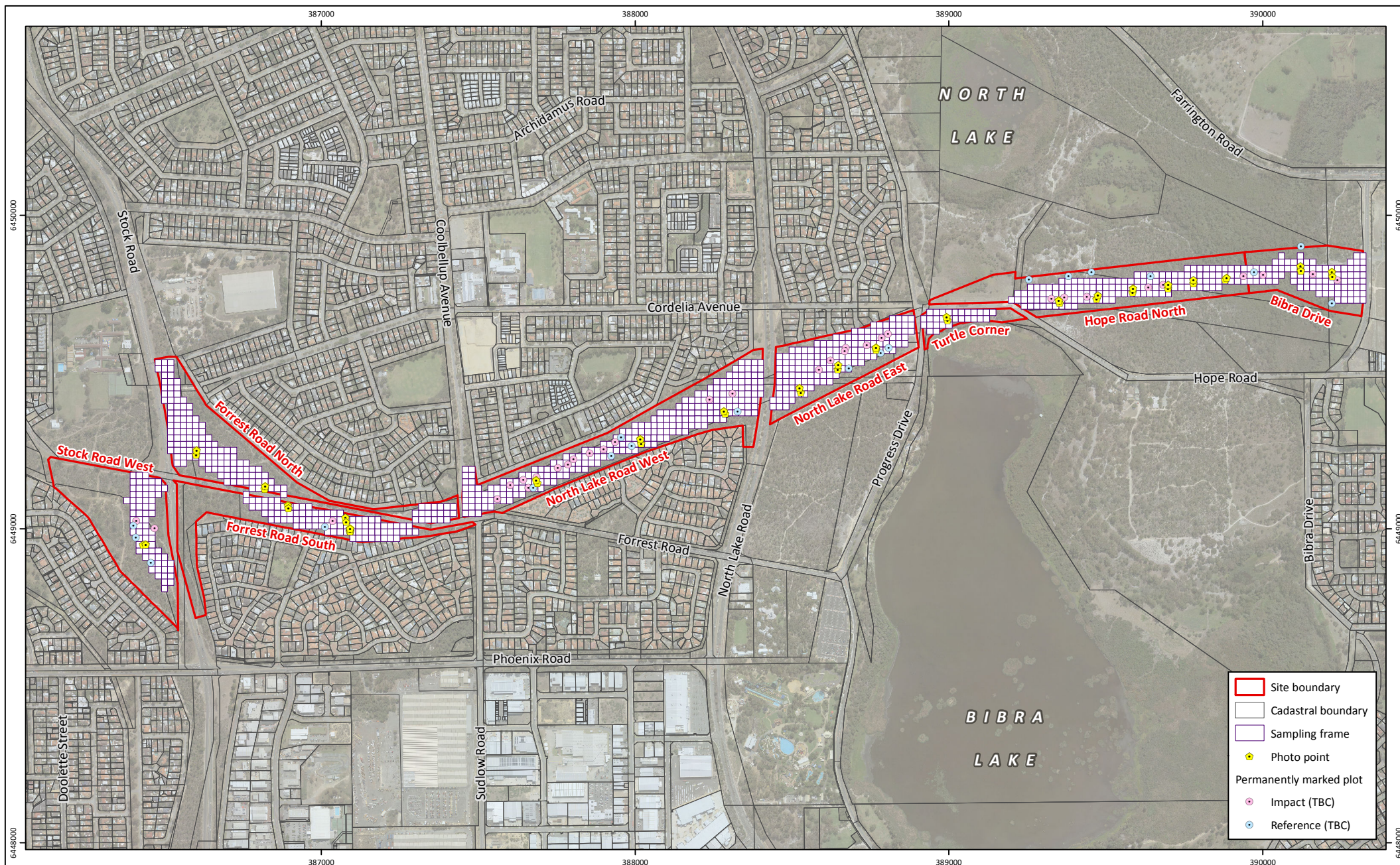
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GDA 1994 MGA Zone 50

**emerge**  
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**Figure 6: Monitoring Design**

**Project:** Rehabilitation Management Plan  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)--F31b

**Drawn:** RAO

**Date:** 30/01/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 31/01/2018



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Metres

Scale: 1:16,000@A4

GDA 1994 MGA Zone 50

**emerge**  
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# Appendix A

Community and Stakeholder Feedback Report







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## **Rehabilitating Roe 8**

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### Community and Stakeholder Feedback Report

JANUARY 2018

**Creating  
Communities**

## Project Details

<b>PREPARED FOR</b>	Rehabilitating Roe 8 Steering Committee
<b>CONTACT DETAILS</b>	Tim Barling Chair
<b>ADDRESS</b>	Cockburn Wetlands Education Centre Bibra Lake WA 6163
<b>PHONE</b>	08 9337 9315
<b>EMAIL</b>	tim.barling@ccwa.org.au
<b>CLIENT</b>	Emerge Associates
<b>CONTACT DETAILS</b>	Tom Atkinson Senior Environmental Consultant, Team Leader
<b>ADDRESS</b>	Suite 4, 26 Railway Road Subiaco WA 6008B
<b>PHONE</b>	08 9380 4988
<b>EMAIL</b>	Tom.atkinson@emergeassociates.com.au
<b>PREPARED BY</b>	Creating Communities Pty Ltd
<b>PROJECT TEAM</b>	Joseph Sollis Consultant Donna Shepherd Director
<b>ADDRESS</b>	100 Jersey Street Jolimont WA 6014
<b>PHONE</b>	08 9284 0910
<b>EMAIL</b>	joseph@creatingcommunities.com.au

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Email      info@creatingcommunities.com.au  
Phone      +61 8 9284 0910  
Fax          +61 8 9284 0912  
Mail        100 Jersey Street, Jolimont, WA 6014  
Web        www.creatingcommunities.com.au

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## EXECUTIVE SUMMARY

In August 2017 the Rehabilitating Roe 8 Steering Committee appointed Emerge Associated and Creating Communities to design and prepare a 10 year Rehabilitation Management Plan for the areas disturbed by the Roe 8 road project from Bibra Drive to west of Stock Road.

Extensive community and stakeholder engagement was conducted between August and November 2017 to gain input into this plan. This report details the input received during the engagements which included meetings with key stakeholders, engagement with Aboriginal Custodians, a Community Open Day and a Stakeholder Workshop. There was a high level of input into this plan with over 210 people providing input via meetings and events.

The themes coming through the engagement included the following.

- The importance of Traditional Owners input, leadership and engagement in all aspects of the plan and related activities.
- A desire for certainty that the rehabilitation project will be implemented for the full 10 years and protection of the land into the future.
- Willingness and eagerness amongst community members to get involved in the rehabilitation.
- The need for meaningful feedback into the *Rehabilitation Management Plan* during its 10 year lifespan and for the plans to be adaptive documents.
- The importance of public access to the site with minimal impact to the rehabilitation itself.
- The need for transparency around any changes to the plans.

The community and stakeholders have strong interest in being involved in the Rehabilitating Roe 8 Project and proposed a range of involvement and ongoing communications activities including:

- Community involvement in planting
- Community involvement in weeding and weed control
- Citizen science opportunities, including community involvement in monitoring
- Community engagement to inform, discuss and create updates to the plan
- Community education related to rehabilitation
- Community science conference.

# CONTENTS

<b>Project Details .....</b>	<b>2</b>
<b>Executive summary.....</b>	<b>2</b>
<b>1. Acknowledgement of Country .....</b>	<b>4</b>
<b>2. Introduction.....</b>	<b>5</b>
<b>3. Background.....</b>	<b>6</b>
3.1 Document Structure .....	6
3.2 Definitions.....	6
<b>4. Engagement methodology .....</b>	<b>7</b>
<b>5. Engagement Feedback .....</b>	<b>8</b>
5.1 Engagement with Aboriginal Custodians.....	8
5.2 Community Open Day – Feedback Boards .....	10
5.3 Community Open Day – Anecdotal Feedback Sheets.....	18
5.4 One-on-one Stakeholder Meetings .....	21
<b>6. The Rehabilitating Roe 8 Community Engagement and Involvement .....</b>	<b>24</b>
6.1 Ongoing Acknowledgment and Involvement of Traditional Owners .....	24
6.2 Engagement, Involvement and Communications Objectives.....	24
6.3 Engagement Context .....	24
6.4 Communications Context .....	25
<b>7. Conclusions.....</b>	<b>27</b>
<b>8. Appendices .....</b>	<b>28</b>
8.1 Appendix 1: Promotional and Information Materials (2017 Engagement Period).....	28

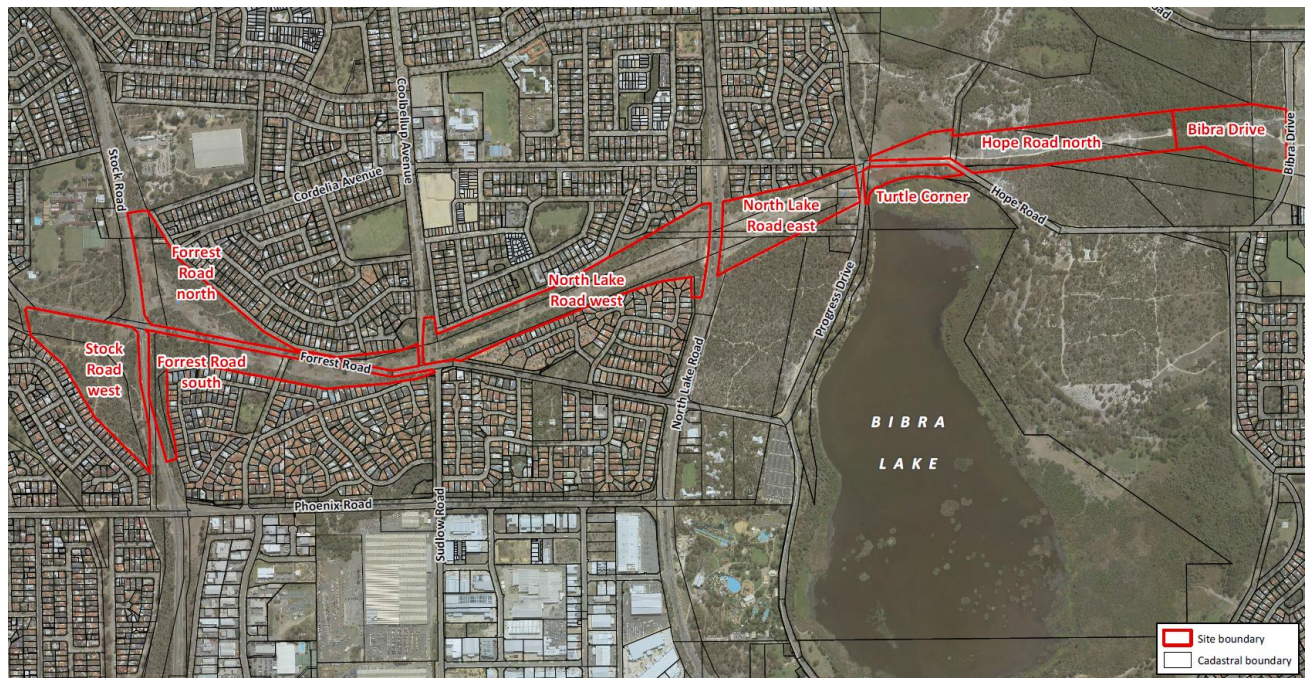
# 1. ACKNOWLEDGEMENT OF COUNTRY

The Rehabilitating Roe 8 Steering Committee and consultants Emerge Associates and Creating Communities acknowledge the Australian Aboriginal and Torres Strait Islander peoples of this nation. We acknowledge the traditional custodians of the lands on which our organisations are located and where we conduct our business. We pay our respects to ancestors and Elders, past and present. In particular we would like to acknowledge that the Rehabilitating Roe 8 project area is Whadjuk country and pay respect to Elders and all Nyungar people, past, present and future. The Roe 8 Steering Committee and consultants Emerge Associates and Creating Communities are committed to honouring Australian Aboriginal and Torres Strait Islander peoples' unique cultural and spiritual relationships to the land, waters and seas and their rich contribution to society.

## 2. INTRODUCTION

In August 2017 the Rehabilitating Roe 8 Steering Committee appointed Emerge Associated and Creating Communities to design and prepare a 10 year Rehabilitation Management Plan for the areas disturbed by the Roe 8 road project from Bibra Drive to west of Stock Road (see Figure 1).

**Figure 1. Site Map with area labels.**



Extensive community and stakeholder engagement was conducted between August and November 2017 to gain input into this plan. This report details the input received during the engagements which included meetings with key stakeholders, engagement with Aboriginal Custodians, a Community Open Day and a Stakeholder Workshop. There was a high level of input into this plan with over 210 people providing input via meetings and events.

## 3. BACKGROUND

The 'Roe 8' portion of Roe Highway was a controversial and high profile road project for Western Australia. The construction of Roe 8 was suspended on 11 March 2017 following a State government election and a preceding period of protests, legal challenges and broad media coverage. Before construction was halted, clearing was undertaken along the proposed alignment of Roe 8 in the localities of Bibra Lake, North Lake and Coolbellup, Western Australia. This clearing was a source of significant concern for members of the community opposed to Roe 8's construction.

The 'Rehabilitating Roe 8' project arose out of the community capacity stimulated during opposition to the construction of Roe 8. Essentially, Rehabilitating Roe 8 aims to restore local native vegetation and fauna habitat to the cleared areas along the proposed Roe 8 alignment. However, Rehabilitating Roe 8 is not a typical restoration project, and also seeks to restore community vitality, build local capacity and rebuild trust.

### 3.1 Document Structure

- Section 4 summarises the engagement methodology that took place during the development of this plan in August to November 2017
- Section 5 details the results of the 2017 engagement
- Section 6 outlines the engagement, involvement and communications principles, tools and plans for the next 10 years
- Section 7 appendices include the communications and engagement material used during the 2017 engagement period

### 3.2 Definitions

Community engagement, involvement and communications have specific functions. For the purposes of the Rehabilitating Roe 8 project community engagement, community involvement and communications are defined as follows:

**Community engagement** initiatives are those that seek information, feedback and decision-making from community members and other stakeholders into the Plans and throughout the implementation of the rehabilitation. These include, but are not limited to: surveys, open days, representation of stakeholder groups in the governance structure of the project

**Community involvement** initiatives are the participation of community members in the rehabilitation of the land itself (through planting, weeding, watering, monitoring) as well as a range of other initiatives that build the capacity of the community (including citizen science opportunities).

**Communications** are a range of methods through which the community and other stakeholders are kept informed as the Plans progresses. These include, but are not limited to: project updates, promotion of upcoming community engagement initiatives, on-site signage, press releases, advertising, social media etc.

## 4. ENGAGEMENT METHODOLOGY

This section summarises the community and stakeholder engagement methodology from August to November 2017.

An extensive community and stakeholder engagement process was conducted between August and November 2017 to gain input into the *Rehabilitation Management Plan* and to seek input into the Community Engagement, Involvement and Communication Plan.

A range of engagement activities were implemented to gain input into the *Rehabilitation Management Plan*. The activities included:

- **Formation of Working Group, Steering Committee and Sub-Committees**
- **Contracting Emerge Associates and Creating Communities** to develop the *Rehabilitation Management Plan*
- **Gaining input into the draft engagement plan**
- **15 meetings with key stakeholders** to understand background, context, relevance of the Plan to these groups, and recommendations for future rehabilitation, engagement, involvement and communications
- **Engagement with Aboriginal Custodians** to understand areas of special cultural and personal significance, and recommendations for future rehabilitation, engagement, involvement and communications
- **A Community Open Day** to gain input into areas/locations of special personal significance, areas/locations that may require special treatment, how the community could receive communications site the types of engagement and initiatives that individuals would like to be involved in
- **A Stakeholder Workshop** to review key components of the draft Plan

The *Rehabilitation Management Plan* has been informed by these engagement initiatives.

124 people attended the 3 larger scale events (Engagement with Aboriginal Custodians, Open Day and Stakeholder Workshop). 15 stakeholder organisations attended meetings. Over 70 people contributed via meetings of existing groups such as the Working Group, Steering Committee and PURSAC. In addition, Creating Communities staff attended initiatives of other stakeholder groups to further understand the context for stakeholders, including a meeting of the Cockburn Aboriginal Reference Group, a smoking ceremony at Turtle Corner and Millennium Kids Un-Conference.

The promotional and information material used is provided in **Appendix 1**.



## 5. ENGAGEMENT FEEDBACK

This section summarises the community and stakeholder feedback that have informed the development of the Rehabilitation Roe 8 Plan. The feedback shown in this section was collected at:

- Engagement with Aboriginal Custodians
- A Community One Day
- One-on-one stakeholder meetings

### 5.1 Engagement with Aboriginal Custodians

Maps of the site and preliminary plans were discussed with Traditional Owners at Bibra Lake. Project team members recorded anecdotal feedback relevant to:

- Key messages for the project
- Cultural Significance and how to celebrate this through the project
- Involvement in the project
- Communications channels

The feedback recorded during these discussions is listed below:

#### 5.1.1 Key messages

- Look at how to maintain Nyungar culture first
- “Nyungars everywhere gathered here”
- “The Lakes have been well-preserved but not the culture”
- In regards to Roe 8 Corridor rehabilitation – “we can help fix this but tell the story first.” Get the these things right, like returning to Nyungar names, before starting on the rehabilitation
- There needs to upfront recognition of the significance of the area, including the heritage, culture and stories associated with the site and the wider region
- Strong concern that these stories are recognised as the stories of Aboriginal people and that the rights to peoples’ own stories are not impinged
- Nyungar people see themselves as protectors of the place – the people we met with are the next generation of caretakers and have the role to pass on knowledge
- There will need to be some symbolic gestures to demonstrate the seriousness of the intent to understand and recognise Aboriginal heritage and that this then informs the planning and the roll-out of the plan
- Address uncertainty around land tenure (this is a key concern for all stakeholders)

#### 5.1.2 Cultural significance and how to celebrate this through the Project

- Re-establish the heritage of the area
- Native title has been extinguished (give us back our last significant site south of the river)
- Sacred sites at Roe 8 may have been destroyed
- The area is an important place for Nyungars. Many people have stories that date back a long time
- There are some stories from the place and throughout the Whadjuk trails archived in Canberra
- Significant examples/findings that demonstrate the length of time and history in the area:
  - Corner of the Hope and Progress – a finding of charcoal carbon-dated at 55 thousand years old

- At the lake near Murdoch University – found a curved Whitegum stick used as a firestick lighter 180 years old.
- At the black water at the end of North Lake Road – Boomerangs found
- Trees around the lake with scarring on them need to be identified and protected
- Where are these artefacts that were found during construction? (These need to come back to a keeping place and not go to another Aboriginal Corporation)
- There are probably more artefacts
- There hasn't been a study done of the whole area – there needs to be an Aboriginal Heritage Study for at least the immediate site, if not the broader area. The Heritage Study should include a focus on further Aboriginal Engagement
- No surveying of the ground has happened
- Maps of de-listed heritage areas need to be provided
- People used to travel by horse and cart from Cottesloe to Jandakot and used Coolbellup oval as a burial ground
- All wetlands are sites of special cultural significance – resting places for the Waugal
- Desire for Keeping Places
- Multipurpose Nyungar Centre at the corner of Progress Dr and Hope Rd
  - Those we met with have a share of \$45 million in Native Title money – could be used on Nyungar Rangers program with State Departments
  - Interpretive heritage (e.g. QR codes on signage – also around the site more broadly)
  - Funding for this centre may include Ranger Programs
  - Running of Cert I and II management programs
  - Training in land management, not only of the immediate site but of surrounding areas
- Aboriginal connection to land and scientific outcomes are not necessarily compatible
- Much of the area was cleared in the 60s
- Very important that sites of significance are name properly to reflect ancestors
  - Rename North Lake and Bibra Lake with their Nyungar names – “von Bibra has no significance to us”
  - Some sites here are named e.g. Coolbellup. Other are not e.g. Willagee should be Wilgi – water holes and rock holes
  - Elders know the names of the people who used to camp here – the Inditch family had camps all round this lake, meeting places and walk trails
- Nyungar interpretation and Nyungar signage
- Extend the Whadjuk walking trails to the site and lake
- Nyungar people have the right to carry out ceremonies in parks and wildlife areas – there need to be protocols and communication around this, including communication to government who may not understand the right to ceremony
- Re-list all the sites for protection under the Aboriginal Heritage Act – state and federally
- Site vested in the Nyungar Trust
- Balga trees were taken out – where did they go? These should be given back to the local people to be re-planted
- During the process of fighting for Country there were also a group of Elders who ticked the box to allow Roe 8 to go ahead. There is a view that this group were not representative of the local community and that there was a lack of transparency around this decision



### 5.1.3 Involvement in the project

- Not tokenistic work (i.e. work for the dole) – but meaningful rehabilitation and research contracts
- Due to the significant rehabilitation experience of the local Aboriginal population (e.g. in mine site and form rehabilitation) there is potential for the whole project to Indigenous
- Also partnership opportunities e.g. with local universities
- Project Manager position could be two positions – i.e. a partnership between an Aboriginal and non-Aboriginal Project Manager
- Work may include:
  - Planting
  - Seed collection and identification
  - Weed control
  - Work in / establishment of nurseries
  - Animal monitoring and identification
- Consider a KEEDAC / PEEDAC model for sourcing Aboriginal employment (e.g. providing connections with business and industry promoting Aboriginal people as an integral part of a skilled workforce)

### 5.1.4 Communications channels

- Always hold meetings on site to get the local mob to come
- Word of mouth – through Elders
- Libraries and community centres

## 5.2 Community Open Day – Feedback Boards

Five different feedback boards were used at the Community Open Day to gather feedback from participants. These boards asked the following questions:

- What areas are of special personal significance?
- What areas need special treatment and how?
- How do you want to be involved in the rehabilitation project?
- How do we best keep in contact with you?
- How do you want to contribute to the project?

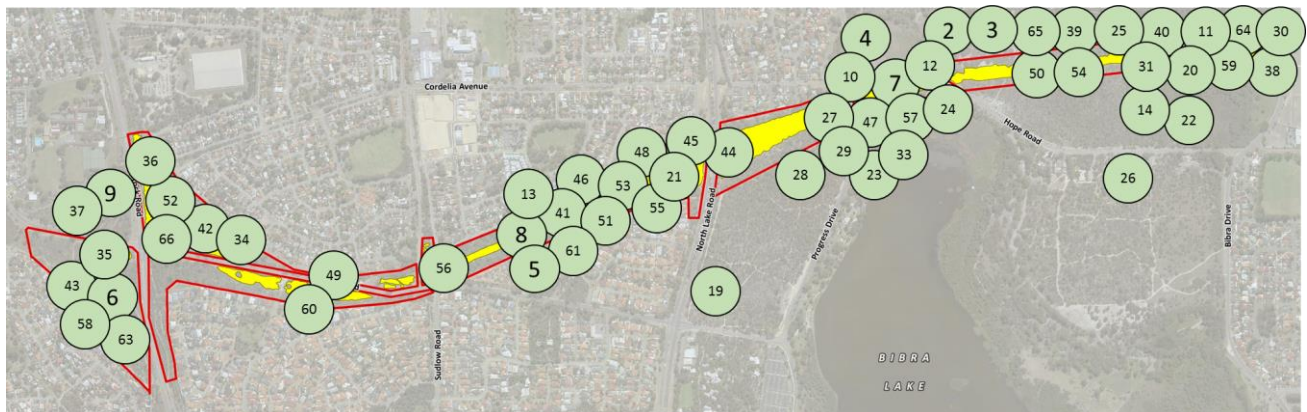
Where the feedback related to a specific location, participants placed a sticker on a map of the project area in order to indicate where this feedback applies. This location-specific feedback is shown on the maps on the following pages and corresponds to the text in bold.

### 5.2.1 What areas are of special personal significance?

The responses to this question are listed below.

The responses in **bold** correspond to a specific location (as indicated by the participant). In these cases, the number at the beginning of each line corresponds to a dot on the map.

The number in brackets indicates how many different participants gave the same or a similar response.



1. The entire area is special and precious (5)
2. **Silence, sacred beauty (2)**
3. **Christmas tree – significant tree (2)**
4. **Paperbark (rare to extinct) (2)**
5. **Woody Pear Grove: community has a connection with this area (2)**
6. **Only tuart area left (2)**
7. **Large reedy bird feeding area at edge of lake (2)**
8. **Walk nature trail – limestone/cement along Malvolio Road and with park benches to rest and enjoy the nature (2)**
9. **We want jobs here (I protested here) (1)**
10. Environmental carers needed (1)
11. **Sacred birthing area – heritage listing (1)**
12. **Replanting (1)**
13. **Malvolio Road – rehabilitation (1)**
14. **Theatre and creative groups (1)**
15. Wetlands (1)
16. Weed control and site assessments (all areas) (1)
17. Barnett paid to destroy – shouldn't rely on community volunteering (1)
18. Jobs for local conservation workers/students (1)
19. **Traditional dance – Elders' respect (1)**
20. **Replant the ancient melaleucas/banksias (1)**
21. **Beautiful bush on my doorstep. Places for nesting and feeding for local wildlife (1)**
22. **Special area for walking with my children, has special significance for times in any family's life (whole area) (1)**
23. **Turtles, Camp 2 (1)**
24. **Sacred area (1)**
25. **Traditional mens' ground – needs monitoring (1)**
26. **One to three year internships/scholarships from Council/Wetlands Centre for students or unemployed to learn conservation skills and help rehabilitation (1)**
27. **Turtle corner – special enclosed park for memorial and contemplation garden (keep the two pine stumps) (1)**
28. **Artefacts found – special spiritual place overlooking wetland (1)**
29. **Turtles, heritage Norfolk Island Pines – can they be carved or something? Special place (1)**

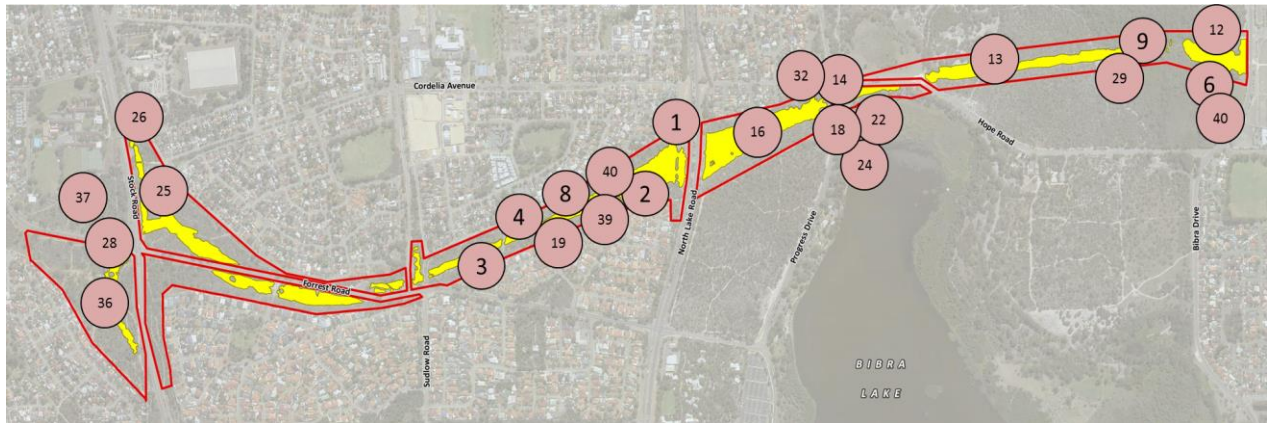
30. Roe Swamp floodplain: rare vegetation and fauna, and adjacent rainbow bee-eater nesting sites
31. Rainbow bee-eater wetland sites (1)
32. Rare flora and fauna – this year rainbow bee-eater nesting sites (1)
33. Pines Corner: turtle nesting (1)
34. Rainbow bee-eater nesting (1)
35. Rainbow bee-eater nesting (1)
36. Only marri-dominant community in the whole corridor (1)
37. Only untouched section from Roe 8 site – should be left as is (1)
38. I drive past every day and I like looking at the trees, not the destruction (1)
39. Great place for walking (3)
40. TEC – all banksia woodland / mound spring (1)
41. Woody pears: rare trees in urban areas – some are sprouting. On Cockburn heritage register (1)
42. Kate's[?] tuart: old tree sentinel over the bushland (1)
43. South-west corner of Forrest and Stock Roads: I walk here almost every day. It is full of bandicoots, birds and natives despite having some areas that are degraded. Black cockatoos feed here every afternoon on their way East. (1)
44. Tree sitter's area (1)
45. Tait Place Protectors' Camp: this is where the campaign began (1)
46. Malvolio Road (1)
47. I have experienced shock and hope here! (watched trees come down, gathered to protest) (1)
48. Aboriginal Heritage Centre Building – near Fox tree (1)
49. Save Me Tree (1)
50. Great winter walking track (1)
51. Site of mass sit-in: a significant moment in the campaign (1)
52. Quenda population still in existence (1)
53. Banksias, quendas, tuarts, wildflowers, woody pear. A lovely place to walk (1)
54. Banksias – great pace to walk with children. Close to seasonal lake (1)
55. "Malvolio" block bushland walk (1)
56. Quenda corner (1)
57. Dixon pines: don't cut down or carve into artwork (1)
58. Fence remaining bush (1)
59. First fences and arrests (1)
60. 350 year old tree (1)
61. Trees where red-tailed black cockatoos roost every night (1)
62. All sacred sites over the whole site (1)
63. This area has some plant diversity – large grass trees and tuarts, marri, banksia etc. it needs to be protected from dumping and four wheel drive damage (1)
64. Heart of wetland area (1)
65. Pedestrian crossing area to rest of North Lake park walk (1)
66. This area was so densely vegetated prior to clearing (1)

## 5.2.2 What areas need special treatment and how?

The responses to this question are listed below.

The responses in **bold** correspond to a specific location (as indicated by the participant). In these cases, the number at the beginning of each line corresponds to a dot on the map.

The number in brackets indicates how many different participants gave the same or a similar response.



1. **Tait Place: Protectors' Camp art piece (6)**
2. **East end of Malvolio Road: weeding, rehabilitation and nesting boxes for cockatoos (5)**
3. **Woody pear grove: very important to community. A lot of people have a connection (5)**
4. **Malvolio Road: another memorial, where the struggle started this time (4)**
5. Foxes tree: memorial (alternative comment: "building site here, no access from park") (4)
6. **Roe Swamp: high cultural significance (4)**
7. Make sure new fire regulations don't adversely affect plan (4)
8. Malvolio – protect regrowth (3)
9. **Ancient banksia and melaleuca grove: old, magic, dense, low-light fairy land (3)**
10. Womens' Site: heritage listed – mark traditional boundaries (3)
11. Traditional Mens' Area – seek Elder permission for rehabilitation (3)
12. **Roe swamp floodplain: severely damaged by post-clearing fencing works and spraying – rare flora and fauna killed since initial clearing. Urgent remediation required (3)**
13. **Banksia woodlands between wetlands severely damaged by spray and fencing work since June. Urgent remediation required if any of original seed bank is to survive. Summer watering and hard weeding (3)**
14. **Turtle Corner: make a memorial / Roe 8 victory gazebo with native bush/trees, paths and fences between the memorial and the road. Shade and contemplation (3)**
15. No vehicles on site at all (3)
16. **Need to replace large trees as soon as possible, add roosting and nesting boxes, place habitat in upland areas. Species surveys and monitoring (3)**
17. More engagement with of Traditional Owners (2)
18. **Pines Corner: no to idea of pine trees being used for sculpture (2)**
19. **Walk trail / cycle path / park benches (non-intrusive) (2)**
20. Bike path to support safe community and bringing users in who will keep an eye on things – more use and a feeling of safety for the walkers. Location made to be independent to sensitive areas (2)
21. All areas: include as many Phytophthora Dieback-resistant plants (endemic) as possible in plant selection to decrease the spread (2)
22. **Pines Corner: rehab of nesting sites, nesting mounds (1)**
23. Don't get bogged down in red tape – needs action (1)
24. **Pines Corner: wood sculpture sentinel trees – man and woman (1)**
25. **Known quenda sightings (pre-clearing). Possible colony at Water Corporation for recolonisation to cleared site – pesticide spraying will impact this species (1)**
26. **Rainbow bee-eater site – pesticide spraying will impact this species (1)**

27. Nyungar place names are really, really important (1)
- 28. Replace ecosystem and continue monitoring and management (1)**
- 29. Wetland area needs special care, especially from Turtle Corner to Roe Swamp. Let community help (tell them what they can do – e.g. pulling arum lilies) (1)**
30. Weed control to reduce reliance on pesticides/herbicides. Refer to “the bush is a garden” (1)
31. No herbicides – steam weeding (weed design) (1)
- 32. Turtle corner, Malvolio Road and Bibra Drive area – repair and restore, create a barrier (1)**
33. Weed control of the unaffected areas on each side of the scar! Especially adjacent to Coolbellup (1)
34. Right plants for the right spot (1)
35. Land use plan to ensure ongoing community use to ensure protection of the corridor into the future (1)
- 36. As a result of vehicle access this area has some degraded parts with large feeds and rubbish, however there are some excellent quality woodlands that can support rehab in the degraded areas (1)**
- 37. This area should be included in the management plan (1)**
38. Need for trees as soon as possible to provide shade and support for regrowth (1)
- 39. Cleared area to be fully rehabilitated, I don’t want parkland or bike paths, I want to see bush regrown (1)**
- 40. Need to mark out paths – but just keep dirt paths (through the middle?) (1)**
41. Habitat for turtles and other fauna at turtle corner (1)
42. Priority around lakes and wetlands (1)
43. Access and walking are important (1)
44. *Banksia littoralis* deaths need checking (1)

### 5.2.3 How do you want to be involved in the rehabilitation project?

The responses to this question are listed below.

The number in brackets indicates how many different participants gave the same or a similar response.

- Planting/re-planting (56)
- Weeding / weed control (42)
- Citizen science (23)
- Monitoring (21)
- Community engagement to inform, discuss and create updates to the Plan (21)
- Community education related to rehabilitation (20)
- Community science conference (20)
- Face-to-face meetings (19)
- Seed collection (18)
- Links with existing Wetlands Centre events (16)
- Membership to environmental/landcare groups (15)
- Site visit (14)
- Links with existing City of Cockburn events (13)
- Community surveys (13)
- Art and photography (12)
- Visiting Wetlands Centre or NativeARC (12)
- Weed identification workshops (11)
- Membership to local community associations (10)
- Leading/joining wildflower walks (10)
- Education of young people through the curriculum (5)
- Scientific research (5)
- Helping wildlife / NativeARC (2)
- Community strength groups (theatre/arts) (2)

- “Tribes” of locals caring for sections near their homes, weeding, planting etc. (2)
- Creating the Rehabilitation Management Plan (1)
- Give people seedlings to look after and grow ready for planting next winter (1)
- Nameplates for the plants – “own” [adopt?] a tree/plant (1)



### 5.2.4 How do we best keep in contact with you?

The responses to this question are listed below.

The number in brackets indicates how many different participants gave the same or a similar response.

- Email (42)
- Facebook (35)
- E-newsletter (21)
- Rehabilitating Roe 8 website (19)
- Local newspaper (Herald or Gazette) (13)
- CCWC Website (12)
- CCWC Facebook (11)
- Through City of Cockburn (website and other means) (9)
- Newsletters (6)
- Save Beeliar Wetlands Facebook (5)
- Hamilton Hill Community Group Facebook (5)
- Other social media (besides Facebook) (5)
- Through City of Fremantle (website and other means) (4)
- Through City of Melville (website and other means) (3)
- Multi-model ("it's 2017") (3)
- Flyers (2)
- Freo Massive Facebook (1)
- Letters (1)
- Information phone line (1)

### 5.2.5 How do you want to contribute to the project?

The responses to this question are listed below.

The number in brackets indicates how many different participants gave the same or a similar response.

This feedback board also allowed participants to list their contact details. These details have been stored in a community database (Provided in **Appendix 2**) and will be used to contact community members regarding future engagement and involvement opportunities.

- Planting/re-planting (31)
- Weeding (28)
- Monitoring (including monitoring of revegetation and fauna, photo monitoring, turtle monitoring) (8)
- Seed collection (6)
- Rehabilitation (5)
- Citizen science (5)
- Meetings / Workshops / Committees (4)
- Clean-up (3)
- Communications / passing on information (3)
- Ongoing community engagement (3)
- Assessment (of current site and of revegetation) (3)
- Design and build walking tracks (2)
- Weed mapping (1)
- Employment options (1)
- Watering (1)
- Protect the bush (1)
- Grow the bush back (1)
- Encourage involvement by children (1)
- Art work (1)
- Culture (1)
- Grass (1)
- Lead wildflower walks (1)
- Revegetation (1)
- Growing plants (1)
- Landscaping (1)
- Civic education representative for environmental curriculums (1)
- Turtle science (1)
- Learning (1)
- Teaching (1)
- Maintenance (1)
- Research and advice to support Environmental Management Plan (1)
- Landscape architect – interpretation (1)
- Blocking 4WD access (1)
- Community decision-making (1)
- Governance (1)

- Share models and experiences of NRM groups in WA practicing non-chemical regrowth and weed control (1)
- Be a section/area leader for restoration (1)

## 5.3 Community Open Day – Anecdotal Feedback Sheets

During discussions with Open Day participants, project team members recorded anecdotal feedback. This feedback is recorded below according to three themes:

- Questions
- Recommendations/suggestions
- Other comments

The number in brackets indicates how many different participants gave the same or a similar response.

### 5.3.1 Questions

- What will the cost be over 10 years? (1)
- What will the governance structure be for the 10 years? (1)
- Are there areas being eroded or susceptible to erosion? (1)
- What will the timing be for the Plans? (1)
- Could prison labour be used for grass weeding? (1)
- How will weeds be managed, including in the most sensitive wetland areas and near residential area? (1)
- How will community members and groups be included in decision-making? (1)
- Will the plan use herbicides/pesticides or non-chemical bushland regeneration practices? (1)
- Impacts of Murdoch Drive / Roe 7 Connection: what recompense will Hope Road residents receive what will presumably happen? Road spurs? To Bibra Drive – where is the rationale for these? Has there been genuine modelling done regarding the impact of Bibra Drive traffic? There needs to be a complete review of the need for this infrastructure (1)

### 5.3.2 Recommendations/suggestions

- Seek further advice from and engage Traditional Owners to be leaders and actively engaged in all aspects of the Plan and related activities (e.g. a “Friends of” group should engage Traditional Owners) (5)
- Steam-weeding / non-chemical NRM /no herbicides (East Metropolitan Regional Council and several Friends of Groups are commencing and having success with this) – notice that many people have volunteered to help with weeding so there are resources available (5)
- Re-zone the site under the Metropolitan Region Scheme (5)
- Should be returned to how it was (as close as possible or better) (3)
- Engage with wetland and bushland groups using non-chemical NRM (2)
- Blackwell Road east could also be a good site for volunteer restoration (1)
- Broad and ongoing consultation needs to happen first (1)
- Cut from the project all contractors who are deliberately vandalising the site (2)
- Offer an alternative to Roe 8 (1)

- Contractors spraying around the Christmas tree and sitting tree need to get an Aboriginal Elder to make sure that important areas aren't being disturbed (1)
- Plants are sensitive to chemicals - community want to do their own burning and pulling of weeds (1)
- There are two roads to close: Farrington and Hope – opportunity to take down the powerlines that cross the lake. Instead build an elevated road on the bases of the powerline following this route (1)
- Womens' area – heritage (1)
- Weed control (1)
- Bike track (1)
- Something needs to happen as people are becoming cynical of the process. Weeding and cleaning up if planting is not possible (1)
- Number one priority is that it never happens again (1)
- Return the banksia woodlands (1)
- Improve the area for the next generation (1)
- More public transport through the area will help with the City of Melville's issue with trucks (1)
- Teams of people to pull grasses (veldt and similar) by hand (1)
- Ensuring transparent and regular reviews of the Plans (1)
- Community arts project that marks and makes places all along the route – especially those around which there is a strong sense of ownership and sense of place from community members (oral histories, legacy items in places "lily pads," stories from before the protests about walking in the bush: e.g. as the bush was cleared a lot of walkers could see each other, this formed communities but was a loss of sense of solitude) (1)
- Localise rubbish-picking ("adopt-a-spot") (1)
- Local community groups may be able to receive grants to manage small areas (1)
- Noise modelling (test the legitimacy of current noise modelling) (1)
- Better oversight of the dumping happening in both areas (1)
- Need community involvement in monitoring (1)
- Signage to warn against dumping and a program to prevent this happening (including on Blackwood Avenue land) (1)
- Don't treat this as a large top-down scientific project (1)
- Limit public accessibility to firebreaks only (1)
- Allow tours but do not have formal tracks (more like South Lake than Bibra Lake) – there is tourism potential despite lack of formal pathways (1)
- No carparks or rubbish bins (1)
- I would like the rehabilitation to include public access to increase the overall value of the site in terms of walkways and tracks (similar to Bibra Lake) and increase the natural experiences for people. This may lead to an increased appreciation of the wetland system, including education points for significant parts – culturally and ecologically etc. Provides education as well as experience (1)
- Greater community involvement in decision-making processes (1)
- Broader and deeper community involvement in weeding and watering (1)
- Hiring of contractors and employees based upon rehabilitation and bushland knowledge and experience (1)
- Need a wide diversity of input (1)
- Use existing crushed limestone to create walkways (1)

- Create a Rehabilitating Roe 8 Facebook page (1)
- Engage the South West Biodiversity Group (1)
- Engage Friends of Blackwood Ave (1)
- Engage WA Alliance for a Clean Environment (ACE) (1)
- Engage Friends of Coolbellup Bushland (1)
- Engage Pesticide Action Group (1)

### 5.3.3 Other comments

- Sounds like a lot of work, budget will be important (1)
- Keen to be involved in restoration (1)
- Never before felt a sense of grieving for a place, the plants and animals (1)
- Asbestos and noise were big issues (1)
- Approximately 30 people meeting at parks and rec centre (Cooby Concerned Residents) (1)
- Cooby is a high-functioning, well-connected community (1)
- Concerned by current pesticide use practices on site, including observed non-compliance with regulations and unsuitable products for wildlife, soil and humans (1)
- Warning that large control plots will attract guerrilla planting (1)
- Murdoch interchange reference group was shut down (“disgraceful”) (1)
- Contractors deliberately vandalising the area and abusing community members (1)
- Poor weed-spraying practices, including dragging of hoses across seedlings (1)
- The less that has been done, the more likely it is that the road may end up going through (1)
- Community anger over being excluded from decision-making processes is at a flashpoint (1)
- It would be sad to see this project fail and a government fall because of failure to accept ongoing community participation and consultation (1)
- Currently too many small groups working independently (“clique-y”) (1)

## 5.4 One-on-one Stakeholder Meetings

15 one-on-one meetings with the following key stakeholder organisations were conducted:

- Millennium Kids
- City of Cockburn
- Cockburn Aboriginal Reference Group
- Main Roads WA
- PURSAC
- Cockburn Community Wildlife Corridor
- Lisa O'Malley
- Cockburn Wetlands Education Centre
- Conservation Council of WA
- Melville-Cockburn Chamber of Commerce
- Steering Committee
- Department of Biodiversity, Conservation and Attractions (phone meeting)
- Coolbellup Community Association
- Native ARC
- Hamilton Hill Community Group.

Feedback recorded during these discussions is listed below.

### 5.4.1 Structure/format of the plan

- The CECP must be a **public** document which is **adaptable** and is **reviewed regularly**.
- The CECP must outline a phased approach that reflects the phases of Rehabilitation Management Plan.
- The CECP must be responsive to:
  - Changes in land tenure
  - Changes in the rehabilitation requirements and environmental changes (e.g. where timeframes are affected by unexpectedly hot/cold/dry/wet seasons).

### 5.4.2 Key messages

- Recognition of Indigenous Heritage and continued connection to land.
- Honour and acknowledge the long and recent history of community and stakeholder involvement that have led to today.
- The current phase marks embarking on a new process.
- Ensure transparency and inclusion from the outset.
- Describe how the plan relates to the Rehabilitation Management Plan.
- Describe how the plan relates to the broader Community Wildlife Corridor.
- Celebrate the creation of a new community of interest and sense of place.
- Acknowledge and communicate the complexity of the community (some communities are those of proximate residents, many are spread far beyond the local area, a mix of views).
- Communicate the likely/proposed governance structure for the ongoing project and uncertainty.
- Communicate the complexity and uncertainty around land tenure (if not confirmed prior to finalisation of this plan).



### 5.4.3 Objectives

- Build ownership and buy-in for the project.
- Harness the energy, passion and resources of stakeholders into the project.
- Identify key stakeholders, resources and communications channels for the project.
- Providing mechanisms through which people of all communities will continue to be engaged.
- Provide opportunities for communities to continue working together, but also to involve new groups and individuals.
- Find out what the community want to see from the rehabilitation process at regular intervals.
- Identify the appropriate level of engagement and communication for different community and stakeholder groups.
- Outline a calendar and action plan for engagement and communications.
- Identify specific locations and timeframes for each type of engagement initiative.
- Clearly identify the engagement, capacity-building and communications initiatives that are to be conducted during the implementation of this plan, and the involvement and capacity-building initiatives that will be briefly noted in this plan but would be further detailed in a Community Development Plan.

### 5.4.4 Governance

- Governance needs to be transparent and broadly communicated from the outset.
- Representation from a broad range of community groups and other stakeholders.
- Regular community input into project governance.
- Consider Advisory Committees in preference to Steering Committees.
- Cockburn Aboriginal Reference Group indicated that this group is not representative of the broader Aboriginal community and that further engagement should be conducted [this led to the decision to hold the engagement event with Aboriginal Custodians].

### 5.4.5 Potential engagement and capacity-building initiatives

- Relevant engagement for each step of the Rehabilitation Management Plan (e.g. sessions/programs prior to key rehabilitation initiatives to educate community members on proper practice and allow for input into the rehabilitation).
- Engagement to inform the governance structure and how the community will aid in decision-making through this governance structure.
- Representation from a wider range of community groups and other stakeholders on committees and sub-committees.
- Annual Community Expectations and Satisfaction survey to review and update the CECF.
- Regular opportunities for face-to-face meeting and project updates
  - For key stakeholders; and
  - For broader community.
- Links with existing City of Cockburn events in the area.
- Links with existing Cockburn Wetlands Education Centre (CWEC) events (e.g. World Wetlands Day, Get Wild about Wetlands).
- Links with science (PURSAC) and citizen science initiatives.
- Community science conference.
- Youth engagement through school, Native ARC, Millennium Kids, CWEC etc.
- Engagement through art and photography.
- Planting days that link to the Rehabilitation Management Plan.
- Training for community members to be involved in rehabilitation and land care – run through CWEC.

- Training for community members to be involved in citizen science.
- Formation of a “Friends of” group.
- New citizen science opportunities.
- Partnerships with Millennium Kids projects in the area.
- Skills-sharing with an environmental / land care focus

*Note that the engagement plan would identify potential community development initiatives and who to connect with, but will not have the scope to confirm or build these into the action plan.*

#### **5.4.6 Potential communications initiatives and channels**

- **Ensure clear and consistent messaging**
- **Utilise and describe existing stakeholder network**
- Promote all engagement and rehabilitation initiatives to community members and stakeholders across a wide area
- Communicate all changes and updates to the Rehabilitation Management Plan, CCEP and Community Development Plan
- Communicate the project timeline
- Review and potentially update the Rehabilitating Roe 8 brand
- Revise and upgrade the Rehabilitating Roe 8 website to build this into an engagement platform
- Develop PURSAC’s proposed online toolbox (may be part of the RR\* website or require a separate platform)
- Communicate the project governance and land tenure
- Develop and regularly update an Information and FAQ document
- Communicate rehabilitation progress and outcomes at key milestones
- Communicate progress and outcomes of scientific projects at key milestones
- Develop signage
- Communicate why the public will be allowed into and, conversely, kept out of specific areas. Also that some areas may be open to public access at certain stages or if community members have received training/education for a specific rehabilitation initiative
- Communicate what the rehabilitation and science projects are focusing on and why (e.g. why the rehabilitation project is monitoring plants but not animals, why there are sites where no rehabilitation is happening (control quadrats))
- Outline strategy for responding to negative feedback regarding management of the site i.e. a strong and defensible position based upon science and based upon advice from WA’s leading biodiversity scientists. Broad stakeholder and community group representation on committees/sub-committees provides an efficient and direct communication channel.

## 6. FINDINGS FOR REHABILITATION MANAGEMENT PLAN

This section outlines the findings of community engagement and research that are relevant to the Rehabilitation Management Plan.

### 6.1 Ongoing Acknowledgment and Involvement of Traditional Owners

Throughout the engagement process stakeholders and the community reinforced the importance of acknowledging, respecting and actively involving Traditional Owners and Aboriginal Custodians during the roll-out of the Rehabilitating Roe 8 project.

Traditional Owners and Aboriginal Custodians have had input and proposed strategies have been incorporated into this plan. Planning for engagement has been constrained by the absence of an Aboriginal Heritage Study. It is proposed that an Aboriginal Heritage Study be commissioned and that this plan be reviewed and amended with Traditional Owners and Aboriginal Custodians upon its completion.

### 6.2 Engagement, Involvement and Communications Objectives

The engagement, involvement and communications objectives identified by stakeholders and the community for the next phase of the project are to:

- Recognise Aboriginal heritage and continued connection to land ensuring Nyungar culture is maintained at each step of the project.
- Ensure the community has input into decision-making and into the roll-out of the project.
- Develop trust, alignment and a shared understanding of rehabilitation project.
- Honour and acknowledge the long and recent history of community and stakeholder involvement on the project.
- Regularly guide update and adapt the plan, informed by engagement (the Expectations and Satisfaction will be a major tool for these updates).
- Ensure communications are consistent, accessible and transparent from the outset of the project.
- Strengthen the unique community of interest and sense of place.

### 6.3 Engagement Context

Due to the publicity of and controversy around the suspended Roe 8 highway extension, Rehabilitating Roe 8 is a high profile project, with a correspondingly high level of community and stakeholder interest.

There is generally very high awareness of the suspension of Roe 8, but considerably lower awareness of the upcoming Rehabilitating Roe 8 project. Communicating the distinction between the two projects is crucial. The difference between the desired outcomes of the Roe 8 Freight Link and Rehabilitating Roe 8 is

clear, but emphasising the distinction between the governance structures and methods of community engagement and involvement are just as important in order to begin re-building trust.

The formation of the Rehabilitating Roe 8 Working Group, Steering Committee and the appointment of consultants to develop the *Rehabilitation Management Plan* marked the commencement of new phase of the project and the associated commencement of a phase of formal community engagement.

For many community members and stakeholder groups, the primary concern related to Rehabilitating Roe 8 is uncertainty that the 10 year rehabilitation project will be delivered and the long term land tenure of the project area.

This uncertainty is the major barrier to building trust between the project team and stakeholder groups.

The project team must therefore aim to achieve certainty around governance, tenure and zoning as soon as practical, but continue to acknowledge and communicate aspects of the project around which there is uncertainty.





## 6.4 Communications Context

The digital and social media landscape relevant to the project is active, with a range of environmental and community groups having a high number of followers and frequent posts. These groups include the Cockburn Community Wildlife Corridor, Save Beeliar Wetlands, Rethink the Link, the Cockburn Wetlands Education Centre, Hamilton Hill Community Group, Coolbellup Community Association and Bibra Lake Residents Association. A high number of posts relate to the suspension of Roe 8, regrowth, rehabilitation, related or nearby environmental concerns, community events and the nearby Murdoch Drive Connection road development.

The Steering Committee has developed a Rehabilitating Roe 8 website as the central hub and point of contact on the project. Currently the Rehabilitating Roe 8 website receives low visitation, and appears low on online search results. As websites tend to be more static than social media and are not visited frequently except by those with very high interest in the subject, the Rehabilitating Roe 8 website will need to be heavily supplemented by social media.

The City of Cockburn actively utilises a number of digital channels, including their Comment on Cockburn engagement platform. The City's "What's On" page also shares a range of both the City's internal events and event organised by local groups. Figure 2 below shows a screen-grab from the "What's On" page. The first event is organised by Native ARC and the remaining three by Cockburn Wetlands Education Centre. The high proportion of "What's On" initiatives related to the environment, and specifically the wetlands area, reflects the high activity of key groups (in particular the Wetlands Centre) and the existing strength of communication channels between these groups and the City of Cockburn. These events are all exemplars of existing stakeholder initiatives that could be leveraged for potential partnership opportunities with the Rehabilitating Roe 8 project.

Figure 2. Screen-grab from City of Cockburn "What's On" page. Source: <https://www.cockburn.wa.gov.au/Recreation-and-Attractions/Whats-On>

			
<p><b>Native ARC Holiday Fun</b></p> <p>26 September &amp; 2 October</p> <p>Does your family love nature and caring for wildlife? Join Native ARC this school holidays for two exciting wildlife and nature based activities!</p>	<p><b>Get Wild About Wetlands</b></p> <p>School holiday program</p> <p>Join us for some exciting environment events with a series of eco-walks, talks and night stalks held for families during these September/ October school holidays.</p>	<p><b>Painting the plants and animals of Bibra Lake</b></p> <p>21 October, 2017</p> <p>A workshop for nature lovers. Join artist and environmental educator Angela Rossen and discover the animals and plant life of the Bibra Lake wetlands through paint medium.</p>	<p><b>Build Your Own Frog Habitat Workshop</b></p> <p>11 November, 2017</p> <p>We invite you to learn about our local frogs and how you can create your own frog habitat in your garden. Experts from SERCUL will introduce you to the frogs of the south-west and show you the secrets of building...</p>

## 7. CONCLUSIONS

Based on the community engagement taken from August to November 2017, the following themes were identified.

- The importance of Traditional Owners input, leadership and engagement in all aspects of the plan and related activities.
- A desire for certainty that the rehabilitation project will be implemented for the full 10 years and protection of the land into the future.
- Willingness and eagerness amongst community members to get involved in the rehabilitation.
- The need for meaningful feedback into the *Rehabilitation Management Plan* during its 10 year lifespan and for the plans to be adaptive documents.
- The importance of public access to the site with minimal impact to the rehabilitation itself.
- The need for transparency around any changes to the plans.

The community and stakeholders have strong interest in being involved in the Rehabilitating Roe 8 Project and proposed a range of involvement and ongoing communications activities including:

- Community involvement in planting
- Community involvement in weeding and weed control
- Citizen science opportunities, including community involvement in monitoring
- Community engagement to inform, discuss and create updates to the plan
- Community education related to rehabilitation
- Community science conference.



## 8. APPENDICES

### 8.1 Appendix 1: Promotional and Information Materials (2017 Engagement Period)

This Appendix shows promotional and information materials used during the 2017 phase of engagement.

### 8.1.1 Flyer for engagement with Aboriginal Custodians



## Rehabilitating Roe 8 Your Say

The consultants working on the rehabilitation of Roe 8 are keen to hear the views of the traditional custodians of the land. To do this we are holding a BBQ at Bibra Lake.

You are invited to attend the BBQ to express your view on:

- the history and cultural significance of the area
- what the rehabilitation project means to you
- how the project can reflect and celebrate local history and culture
- how you and others might like to be involved in the rehabilitation, revegetation and other aspects of the project

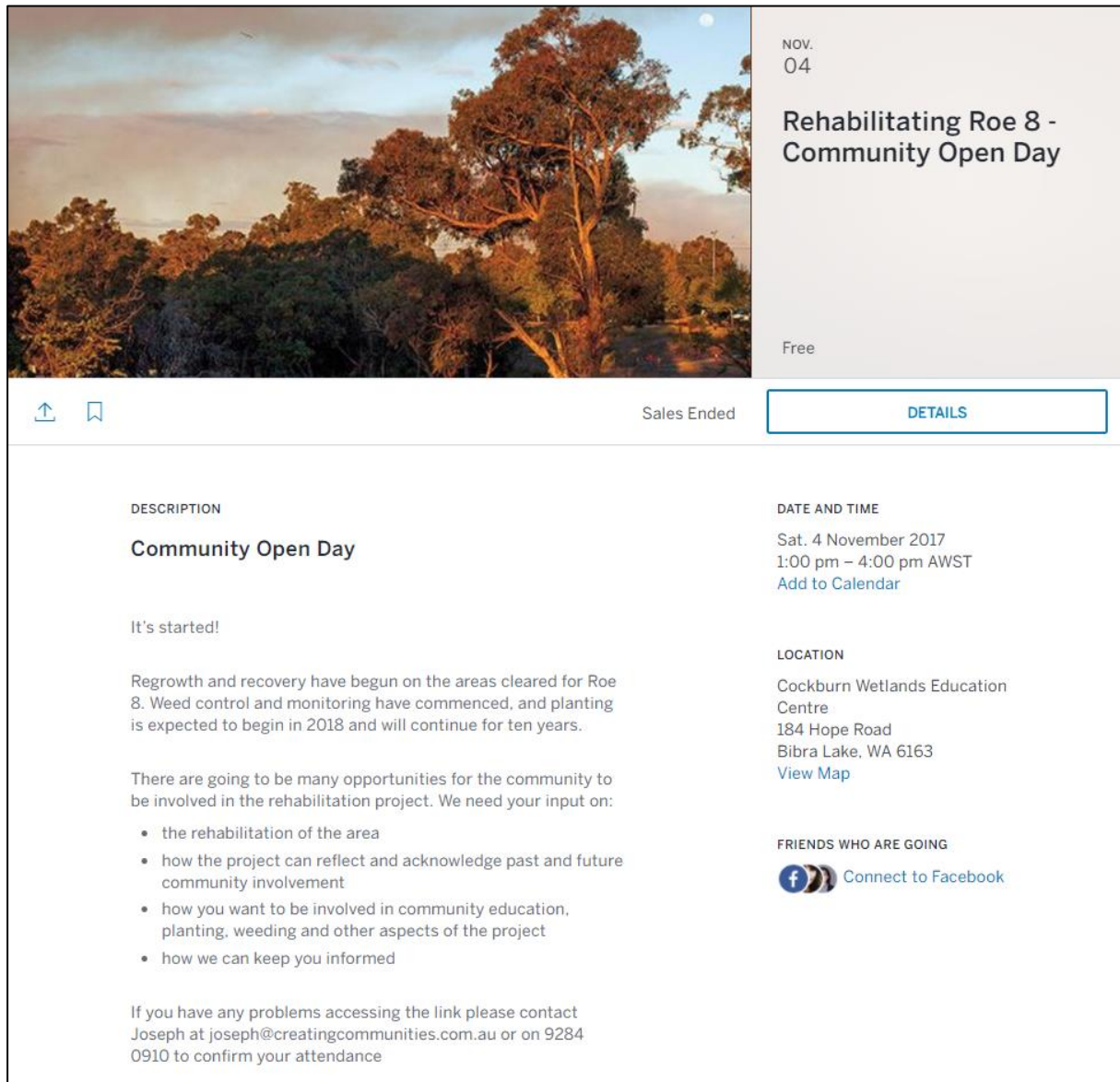
**Date:** Wednesday 25 October

**Time:** 6pm – 7.30pm

**Location:** Bibra Lake – BBQs South of Nature Playground. Follow signage on the day

**RSVP:** Please contact Joseph at [joseph@creatingcommunities.com.au](mailto:joseph@creatingcommunities.com.au) or on 9284 0910 to confirm your attendance and for catering purposes

### 8.1.2 Online invitation for Community Open Day (Eventbrite)



The image shows a screenshot of an Eventbrite event page. At the top, there is a header section with a large background image of trees. To the right of the image, the date 'NOV. 04' is displayed, followed by the event title 'Rehabilitating Roe 8 - Community Open Day' and the price 'Free'. Below the header, there is a navigation bar with a share icon, a bookmark icon, the text 'Sales Ended', and a 'DETAILS' button. The main content area is divided into two columns. The left column is titled 'DESCRIPTION' and contains the event title 'Community Open Day', the text 'It's started!', a paragraph about the project's progress, a list of community involvement opportunities, and contact information. The right column is titled 'DATE AND TIME' and 'LOCATION', providing the event date, time, and address, along with a 'View Map' link. At the bottom of the right column, there is a section for 'FRIENDS WHO ARE GOING' with a Facebook share button.

DESCRIPTION

## Community Open Day

It's started!

Regrowth and recovery have begun on the areas cleared for Roe 8. Weed control and monitoring have commenced, and planting is expected to begin in 2018 and will continue for ten years.

There are going to be many opportunities for the community to be involved in the rehabilitation project. We need your input on:

- the rehabilitation of the area
- how the project can reflect and acknowledge past and future community involvement
- how you want to be involved in community education, planting, weeding and other aspects of the project
- how we can keep you informed

If you have any problems accessing the link please contact Joseph at [joseph@creatingcommunities.com.au](mailto:joseph@creatingcommunities.com.au) or on 9284 0910 to confirm your attendance


DATE AND TIME

Sat. 4 November 2017  
1:00 pm – 4:00 pm AWST  
[Add to Calendar](#)


LOCATION

Cockburn Wetlands Education Centre  
184 Hope Road  
Bibra Lake, WA 6163  
[View Map](#)

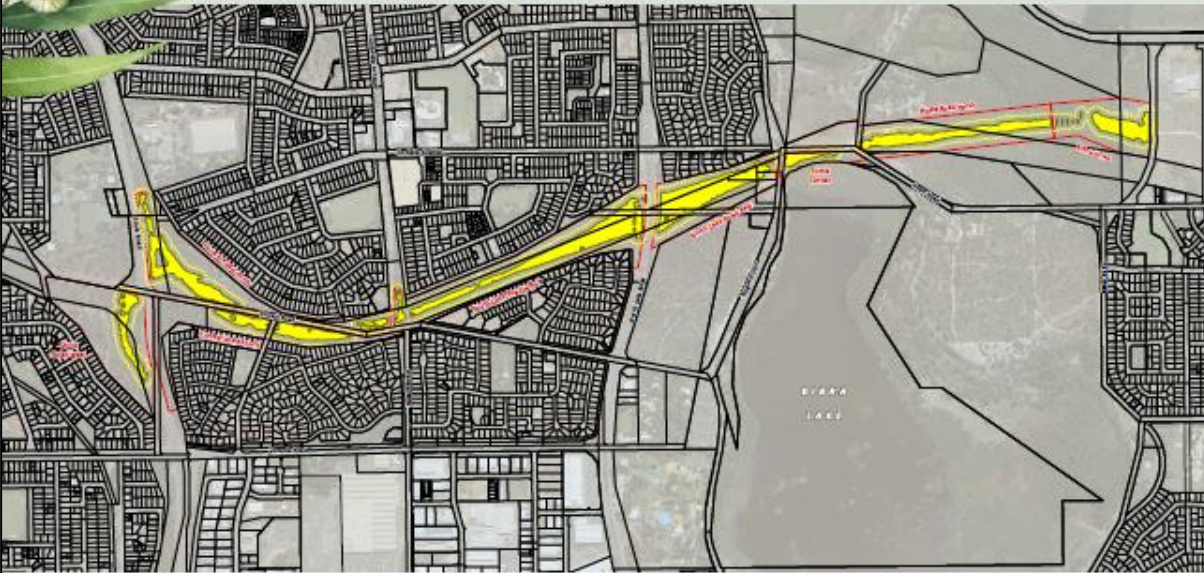
FRIENDS WHO ARE GOING

 [Connect to Facebook](#)

### 8.1.3 Open day feedback boards





## Rehabilitating Roe 8




**What areas are of special personal significance?**  
Put a sticker on the areas of special significance, number it with the next free number below and provide a description of what makes it special.


1		13	
2		14	
3		15	
4		16	
5		17	
6		18	
7		19	
8		20	
9		21	
10		22	
11		23	
12		24	








# Rehabilitating Roe 8




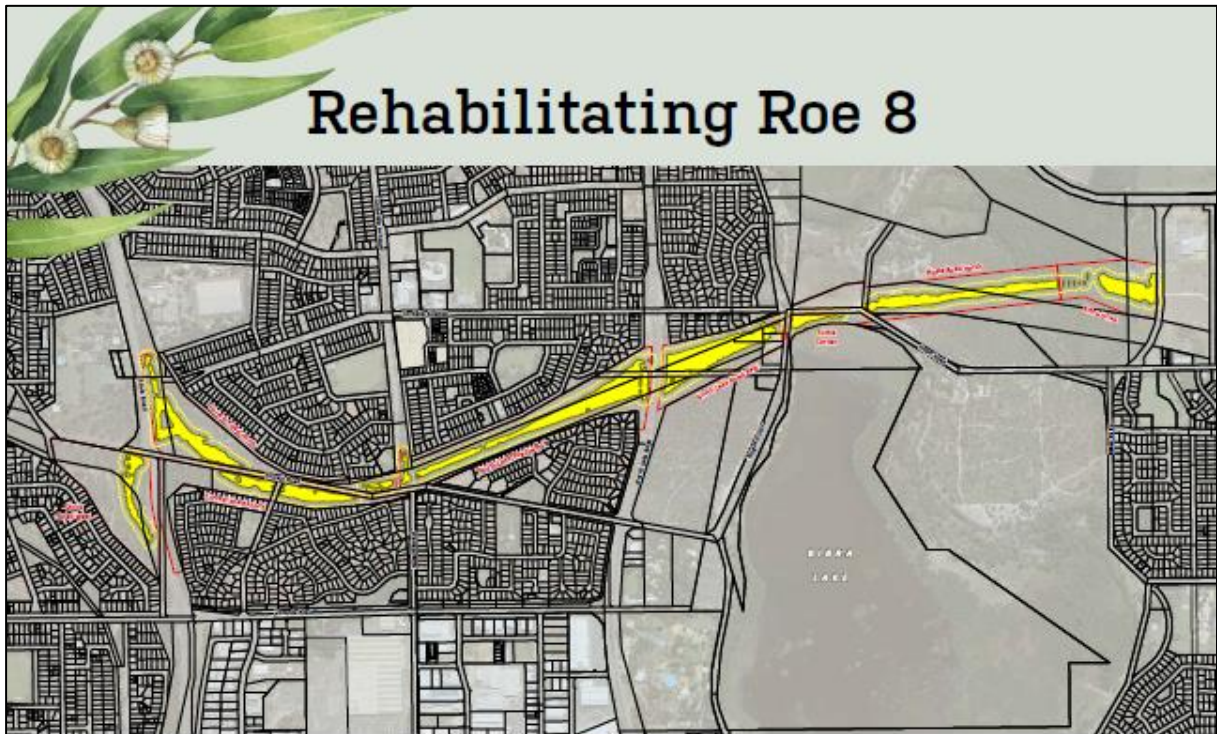
## How do you want to be involved in the rehabilitation project?

Place a tick next to the engagement option below which suits you best or suggest another option.  
If your feedback relates to a specific location, place a sticker on the map, number it with a spare number below and provide a description.

1		13	
2		14	
3		15	
4		16	
5		17	
6		18	
7		19	
8		20	
9		21	
10		22	
11		23	
12		24	







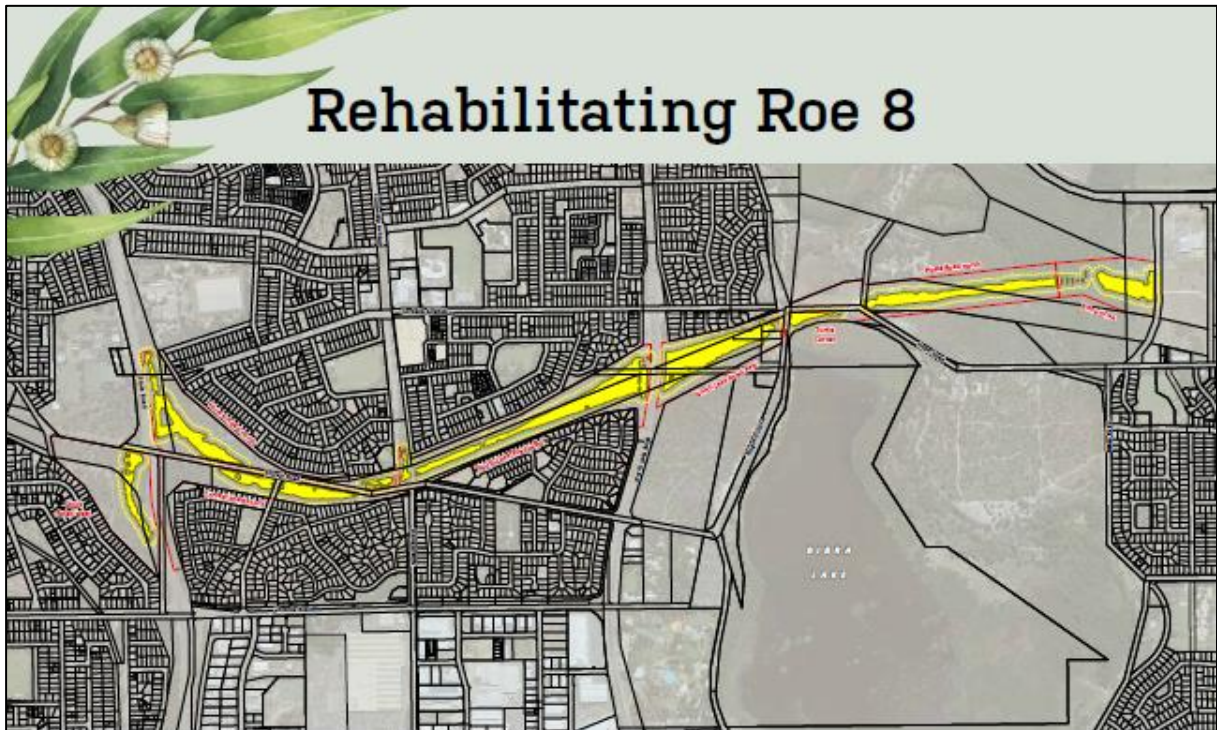
### What areas need special treatment and how?

Put a sticker on the areas you believe require special treatment, number it with the next free number below and provide a description of the treatment required.

1		13	
2		14	
3		15	
4		16	
5		17	
6		18	
7		19	
8		20	
9		21	
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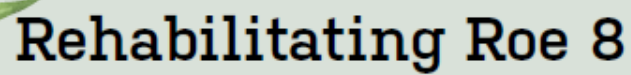


### How do we best keep in contact with you?

Which communication channel suits you best, or suggest another option.

1		13	
2		14	
3		15	
4		16	
5		17	
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7		19	
8		20	
9		21	
10		22	
11		23	
12		24	



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# Appendix B

External Context Assessment Report





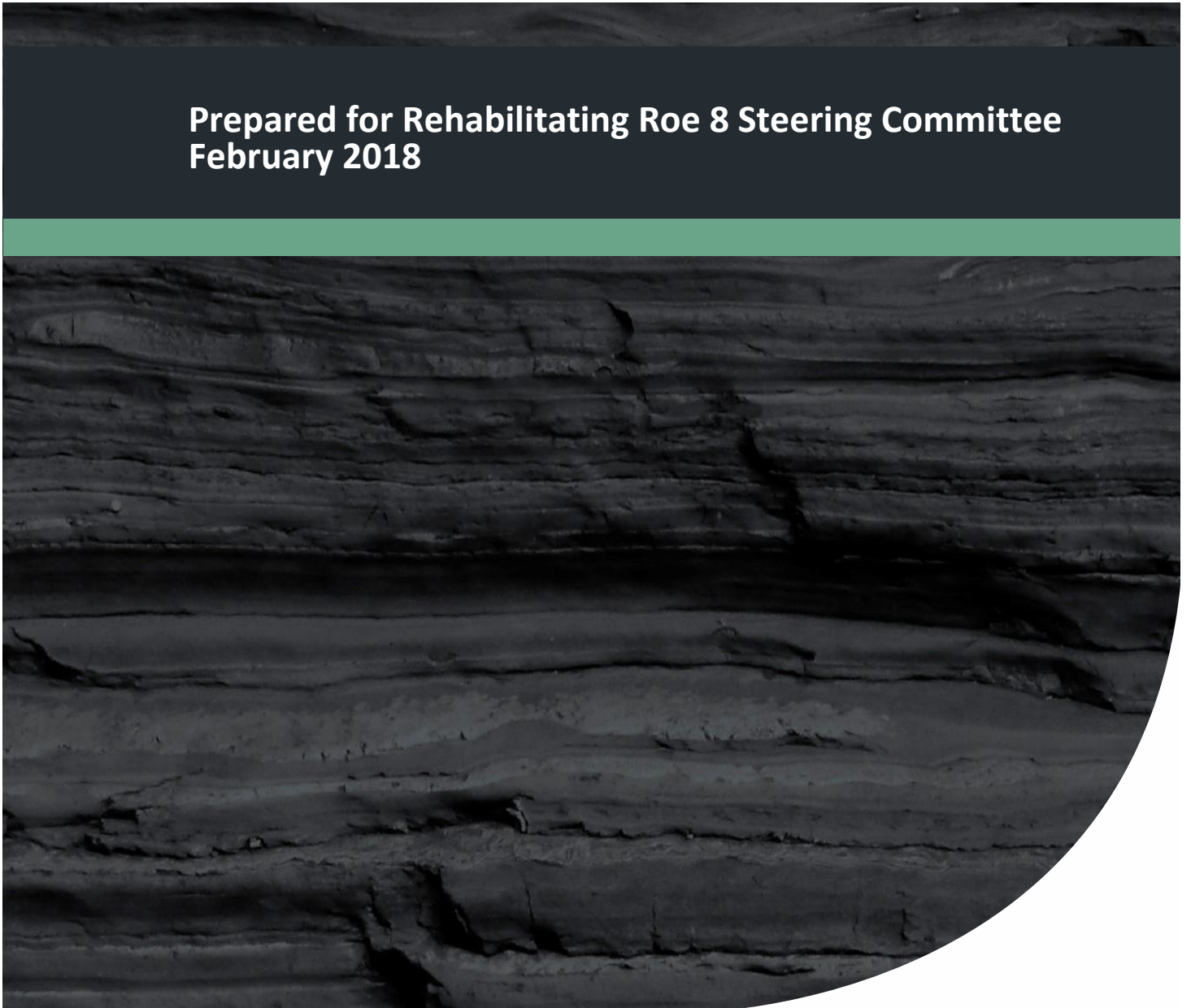


# External Context Assessment Report

Roe 8 Cleared Areas

Project No: EP17-085(07)

**Prepared for Rehabilitating Roe 8 Steering Committee  
February 2018**



# External Context Assessment Report

## Roe 8 Cleared Areas



## Document Control

<b>Doc name:</b>	<b>External Context Assessment Report Roe 8 Cleared Areas</b>				
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1	December 2017	Rachel Omodei	RAO	Tom Atkinson	TAA
	Draft to client for review				
A	December 2017	Rachel Omodei	RAO	Tom Atkinson	TAA
	Draft to client for review				
B	February 2018	Rachel Omodei	RAO	Sarah Paul	SKP
	Updates to address client comments and incorporate social context				
C	February 2018	Rachel Omodei	RAO	Tom Atkinson	TAA
	Final issued to the Rehabilitating Roe 8 Working Group				

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## External Context Assessment Report

### Roe 8 Cleared Areas



## Executive Summary

The 'Roe 8' portion of Roe Highway was a controversial and high profile road project for Western Australia. The construction of Roe 8 was suspended on 11 March 2017 following a State government election and a preceding period of protests, legal challenges and broad media coverage. Before construction was halted, clearing was undertaken along the proposed alignment of Roe 8 in the localities of Bibra Lake, North Lake and Coolbellup, Western Australia.

The 'Rehabilitating Roe 8' project arose out of the community capacity stimulated during opposition to the construction of Roe 8. Rehabilitating Roe 8 aims to restore local native vegetation and fauna to the cleared areas along the proposed Roe 8 alignment, and also seeks to restore community vitality, build local capacity and rebuild trust.

This *External Context Assessment Report* provides background information on the restoration areas that was considered in the preparation of the *Part 1- Rehabilitation Management Plan (RMP)* (Emerge Associates 2018) for the Rehabilitating Roe 8 project. The scope of this assessment was guided by the *National Restoration Standards* (Standards Reference Group SERA 2017), which recommend background information is assembled regarding external context and security of site tenure as part of planning for a restoration project.

Specifically, the site background information covered in this report includes:

- social context
  - community leadership
  - Whadjuk country
  - community engagement
  - communications
- environmental context
  - climate
  - landforms and soils
  - State recognised protected lands
  - flora and vegetation
  - historic land use
- planning context
- threats
- site tenure security.

## External Context Assessment Report

Roe 8 Cleared Areas



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# External Context Assessment Report

## Roe 8 Cleared Areas

## Table of Contents

<b>1</b>	<b>Introduction .....</b>	<b>1</b>
1.1	Project background .....	1
1.1.1	Site boundary .....	1
1.1.2	Management areas .....	1
1.2	Document purpose and scope .....	2
<b>2</b>	<b>External context.....</b>	<b>3</b>
2.1	Social context.....	3
2.1.1	Community leadership .....	3
2.1.4	Whadjuk country.....	4
2.1.5	Community engagement.....	4
2.1.6	Communications .....	5
2.2	Environmental context.....	6
2.2.1	Climate .....	6
2.2.2	Landform and soils .....	6
2.2.3	Topography .....	6
2.2.4	Wetlands .....	7
2.2.5	Bush Forever .....	8
2.2.6	Environmentally sensitive areas (ESAs).....	8
2.2.7	Ecological linkages.....	8
2.2.8	Regional vegetation .....	9
2.2.9	Site vegetation .....	9
2.2.10	Threatened and priority flora.....	10
2.2.11	Threatened and priority ecological communities .....	11
2.2.12	Plant disease .....	12
2.2.13	Weeds .....	12
2.2.14	Historic land use.....	12
2.3	Planning context .....	13
2.4	Summary of threats .....	13
<b>3</b>	<b>Security of site tenure .....</b>	<b>15</b>
<b>4</b>	<b>References .....</b>	<b>16</b>
4.1	General references .....	16
4.2	Online references.....	17

## List of Plates

Plate 1: Screen-grab from City of Cockburn "What's On" page. ....	5
-------------------------------------------------------------------	---

## Figures

- Figure 1: Site Location
- Figure 2: Site Management Areas
- Figure 3: Landforms, soils and topography
- Figure 4: Wetlands
- Figure 5: Bush Forever, ESAs and Ecological Linkages
- Figure 6: Regional Vegetation

## External Context Assessment Report

### Roe 8 Cleared Areas

## Abbreviation Tables

*Table A1: Abbreviations – General terms*

General terms	
CCW	Conservation category wetland
ESA	Environmentally sensitive area
FCT	Floristic community type
MUW	Multiple use wetland
P1	Priority 1
P2	Priority 2
P3	Priority 3
P4	Priority 4
PEC	Priority ecological community
REW	Resource enhancement wetland
T	Threatened
TEC	Threatened ecological community
UFI	Unique feature identifier

*Table A2: Abbreviations – units of measurement*

Units of measurement	
ha	Hectare
km	Kilometre
m	Metre
m AHD	Metres in relation to the Australian Height Datum
mm	Millimetre

*Table A3: Abbreviations – Organisations*

Organisations	
DBCA	Department of Biodiversity, Conservation and Attractions
CoC	City of Cockburn
EPA	Environmental Protection Authority
WALGA	Western Australia Local Government Association



## External Context Assessment Report

### Roe 8 Cleared Areas

Table A4: Abbreviations –Legislation

Legislation	
BAM Act	<i>Biosecurity and Agriculture Management Act 2007</i>
EP Act	<i>Environmental Protection Act 1986</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
WC Act	<i>Wildlife Conservation Act 1950</i>

Table A5: Abbreviations – Planning terms

Planning terms	
TPS	Town planning scheme
MRS	Metropolitan region scheme

# External Context Assessment Report

## Roe 8 Cleared Areas

## 1 Introduction

### 1.1 Project background

The 'Roe 8' portion of the Roe Highway extension, in the localities of Bibra Lake, North Lake and Coolbellup, Western Australia, was a controversial and high profile road project for Western Australia. Approximately 18 hectares (ha) of vegetation was cleared for Roe 8 between December 2016 and February 2017. The construction of Roe 8 was suspended on 11 March 2017 following a State government election which resulted in the election of a Labor state government that had committed to stopping the controversial project. This clearing was a source of significant concern for members of the community opposed to Roe 8's construction and was accompanied with multiple protests, legal challenges and broad media coverage.

The 'Rehabilitating Roe 8' project arose out of the community capacity stimulated during opposition to the construction of Roe 8 as well as the newly elected state Labor government's commitment to rehabilitation of the cleared areas. Essentially, Rehabilitating Roe 8 aims to restore local native vegetation and fauna habitat to the cleared areas along Roe 8. However, Rehabilitating Roe 8 is not a typical restoration project. Due to the publicity and controversy surrounding the construction of Roe 8, the restoration of these cleared areas is a uniquely high profile endeavour for Perth and Western Australia, with a correspondingly high level of community and stakeholder engagement.

As part of the Rehabilitating Roe 8 project the 'Rehabilitating Roe 8 Steering Committee' sought the preparation of the *Rehabilitation Management Plan Roe 8 Cleared Areas* (RMP) (Emerge Associates 2018). The RMP defines management areas and outlines communication, involvement, engagement, restoration and monitoring actions based on feedback obtained during community and stakeholder consultation and guidance from *National standards for the Practice of Ecological Restoration in Australia* (hereafter referred to as 'the Standards') (Standards Reference Group SERA 2017).

#### 1.1.1 Site boundary

The site encompasses cadastral parcels, or portions of cadastral parcels, within which clearing occurred as part of construction of Roe 8 or whose inclusion enhanced the appearance of the site as an east/west corridor<sup>1</sup>, as shown in **Figure 1**.

The site spans approximately 2 kilometres (km) in length and totals approximately 69 hectares (ha) in area.

#### 1.1.2 Management areas

To assist in communication eight (8) management areas are identified within the RMP representing portions of the site separated by roads or practical management boundaries (Emerge Associates 2018).

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<sup>1</sup> Establishment of a corridor is a community aspiration identified through consultation undertaken for preparation of the RMP (Emerge Associates 2018).

## External Context Assessment Report

### Roe 8 Cleared Areas



East to west across the site these management areas are labelled:

- Bibra Drive
- Hope Road North
- Turtle Corner
- North Lake Road East
- North Lake Road West
- Forrest Road South
- Forrest Road North
- Stock Road West.

The locations of these management areas are shown **Figure 2**.

### 1.2 Document purpose and scope

The *Standards* recommend that a detailed review of the social and environmental context of a site is input into planning and design of restoration projects.

This document outlines background information relevant the management areas that was considered in the preparation of the RMP (Emerge Associates 2018). Creating Communities have provided input into the preparation of the RMP as well as to the social context section of this document (**Section 2.1**).

The scope of this assessment was guided by the *Standards* (Standards Reference Group SERA 2017), which recommend background information is assembled regarding:

- external context (social and environmental)
- security of site tenure.

## External Context Assessment Report

### Roe 8 Cleared Areas

## 2 External context

### 2.1 Social context

The clearing that occurred in the site along the proposed alignment of Roe 8 was controversial and the subject of protests, legal challenges and broad media coverage. Consequentially, the Rehabilitating Roe 8 project has a high level of community and stakeholder awareness and engagement.

#### 2.1.1 Community leadership

The Rehabilitating Roe 8 project is a collaboration between the government and community organisations.

#### 2.1.2 Rehabilitating Roe 8 Working Group

The Rehabilitating Roe 8 Working Group was formed by the Minister for Transport; Planning; Lands in April 2015. The formation of this group occurred after the Cockburn Community Wildlife Corridor met with the Minister and the Minister for Environment, Members for Fremantle, Willagee and Bicton as well as the Mayor of Cockburn, and presented a plan for the 'Kings Park of the South' with restoration requirements for the cleared areas.

The Rehabilitating Roe 8 Working Group oversaw the initial management of cleared areas including the removal of asbestos, mulch piles and some limestone tracks, weed management, installation of conservation fencing with public access gates, ongoing communications and a tender process for the preparation of a 'rehabilitation management plan'.

The Rehabilitating Roe 8 Working Group includes representatives from the following organisations:

- Member for Bicton - Lisa O'Malley (chair)
- City of Cockburn
- Cockburn Community Wildlife Corridor Group
- Cockburn Wetlands Education Centre
- Conservation Council of WA
- Department of Biodiversity Conservation and Attractions
- Main Roads WA and the Alliance
- Member for Willagee
- Minister for the Environment and Energy
- Minister for Transport; Planning; Lands
- Perth Urban Restoration Scientific Advisory Committee
- Traditional Custodians of Beeliar Regional Park.

#### 2.1.3 Rehabilitating Roe 8 Steering Committee

The Rehabilitating Roe 8 Steering Committee is tasked with overseeing the preparation of the RMP. The Rehabilitating Roe 8 Steering Committee includes representatives from the following community and stakeholder organisations:

## External Context Assessment Report

### Roe 8 Cleared Areas



- City of Cockburn
- Cockburn Community Wildlife Corridor Group
- Cockburn Wetlands Education Centre
- Conservation Council of WA
- Department of Biodiversity Conservation and Attractions
- Lisa O'Malley (Member of Parliament)
- Main Roads WA
- Perth Urban Restoration Scientific Advisory Committee.

#### 2.1.4 Whadjuk country

The site is within Whadjuk country and the RMP authors and Rehabilitating Roe 8 Steering Committee pay respect to Elders and all Nyungar people, past and present. The RMP was prepared on the basis that ecological restoration and recognition of cultural connection to country are compatible goals. Nonetheless it is recognized that until Nyungar cultural values are properly addressed there can be no true restoration.

Consultation with local Nyungar people undertaken during the preparation of the RMP indicated the heritage information available for the site (and the wider local area) is incomplete and insufficient to properly identify cultural heritage values. Some of this information is presented in documents associated with the Roe 8 construction project (South Metro Connect 2011). However, cultural information has not been specifically identified in this assessment or the RMP. To address the lack of accurate heritage information available for the site, completion of an Aboriginal heritage survey has been proposed as recommended engagement activity in the RMP (Emerge Associates 2018).

#### 2.1.5 Community engagement

There is generally a very high awareness of the suspension of the construction of Roe 8, but considerably lower awareness of the upcoming Rehabilitating Roe 8 project. Communicating the distinction between the two projects is crucial. The difference between the desired outcomes of the Roe 8 Freight Link and Rehabilitating Roe 8 is clear, but emphasising the distinction between the governance structures and methods of community engagement and involvement are just as important in order to begin re-building trust.

The formation of the Rehabilitating Roe 8 Working Group, Steering Committee and the appointment of consultants to develop the Rehabilitating Roe 8 Plan marked the commencement of new phase of the project and the associated commencement of a phase of formal community engagement.

For many community members and stakeholder groups, the primary concern related to Rehabilitating Roe 8 is uncertainty that the 10 year rehabilitation project will be delivered and the long term land tenure of the project area. This uncertainty is the major barrier to building trust between the project team and stakeholder groups. The project team must therefore aim to achieve certainty around governance, tenure and zoning as soon as practical, but continue to acknowledge and communicate aspects of the project around which there is uncertainty.

## External Context Assessment Report




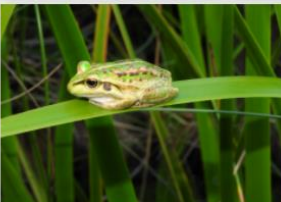
### Roe 8 Cleared Areas

#### 2.1.6 Communications

The digital and social media landscape relevant to the project is active, with a range of environmental and community groups having a high number of followers and frequent posts. These groups include the Cockburn Community Wildlife Corridor, Save Beeliar Wetlands, Rethink the Link, the Cockburn Wetlands Education Centre, Hamilton Hill Community Group, Coolbellup Community Association and Bibra Lake Residents Association. A high number of posts relate to the suspension of Roe 8, regrowth, rehabilitation, related or nearby environmental concerns, community events and the nearby Murdoch Drive Connection road development.

The Steering Committee has developed a Rehabilitating Roe 8 website as the central hub and point of contact on the project. Currently the Rehabilitating Roe 8 website receives low visitation, and appears low on online search results. As websites tend to be more static than social media and are not visited frequently except by those with very high interest in the subject, the Rehabilitating Roe 8 website will need to be heavily supplemented by social media.

The City of Cockburn actively utilises a number of digital channels, including their Comment on Cockburn engagement platform. The City's "What's On" page also shares a range of both the City's internal events and event organised by local groups. **Plate 1** below shows a screen-grab from the "What's On" page. The first event is organised by Native ARC and the remaining three by Cockburn Wetlands Education Centre. The high proportion of "What's On" initiatives related to the environment, and specifically the wetlands area, reflects the high activity of key groups (in particular the Wetlands Centre) and the existing strength of communication channels between these groups and the City of Cockburn. These events are all exemplars of existing stakeholder initiatives that could be leveraged for potential partnership opportunities with the Rehabilitating Roe 8 project.

 <p><b>Native ARC Holiday Fun</b> 26 September &amp; 2 October</p> <p>Does your family love nature and caring for wildlife? Join Native ARC this school holidays for two exciting wildlife and nature based activities!</p>	 <p><b>Get Wild About Wetlands</b> School holiday program</p> <p>Join us for some exciting environment events with a series of eco-walks, talks and night stalks held for families during these September/ October school holidays.</p>	 <p><b>Painting the plants and animals of Bibra Lake</b> 21 October, 2017</p> <p>A workshop for nature lovers. Join artist and environmental educator Angela Rossen and discover the animals and plant life of the Bibra Lake wetlands through paint medium.</p>	 <p><b>Build Your Own Frog Habitat Workshop</b> 11 November, 2017</p> <p>We invite you to learn about our local frogs and how you can create your own frog habitat in your garden. Experts from SERCUL will introduce you to the frogs of the south-west and show you the secrets of building...</p>
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*Plate 1: Screen-grab from City of Cockburn "What's On" page.*

Source: <https://www.cockburn.wa.gov.au/Recreation-and-Attractions/Whats-On>



## External Context Assessment Report

### Roe 8 Cleared Areas

## 2.2 Environmental context

### 2.2.1 Climate

Climate has a strong influence on ecosystems and correspondingly understanding climatic conditions is crucial to ecological restoration.

An average of 702.7 millimetres (mm) of rainfall is recorded annually from the Murdoch weather station, which is the closest weather station, located approximately 1.17 km from the eastern boundary of the site. The majority of this rainfall is received between the months of May and September. Mean maximum temperatures at the Jandakot Aero station, which is the nearest temperature recording station approximately 4.4 km south east of the site, range from 17.9°C in July to 31.6°C in February. Mean minimum temperatures range from 6.8°C in July and August to 17.1°C in February (BoM 2017).

### 2.2.2 Landform and soils

Landform and soils influence are important influences and attributes of ecosystems. The site occurs on the Swan Coastal Plain, which is the geomorphic unit that characterises much of the Perth metropolitan region. Broadly, the Swan Coastal Plain comprises three dune systems on the western side, referred to as the Quindalup, Spearwood and Bassendean associations, and an alluvial plain on the eastern side.

The western and central portions of the site are located within the Spearwood dune system which consists of a core of limestone overlain with yellow sand (Churchward and McArthur 1980). Variation in wind erosion has produced two units within the Spearwood system: the Cottesloe unit and Karrakatta unit. The western end of the site is located within the Cottesloe association which consists of yellow brown sands and exposed limestone. The central and western portion is within the Karrakatta association which consists of deep yellow brown sands.

The eastern portion of the site is in the Bassendean association which comprises the oldest dune system on the Swan Coastal Plain and subsequently the most leached and infertile.

Within the Bassendean and Spearwood associations large swamps have been separately mapped as the Herdsman association, which contain black organic sands, peaty loams, black clays and true peats (Churchward and McArthur 1980). A small portion of the eastern end of the site, associated with lower-lying wetlands, is within the Herdsman association.

The landforms and soils in the site are shown in **Figure 3**.

### 2.2.3 Topography

The elevation of the site is highest on the western end, ranging from 42-59 m in relation to the Australian height datum (mAHD). The eastern end of the site is lower lying and ranges from 15-20 mAHD (DoW 2008) and being lowest in the portion of the site between Bibra Lake and North Lake.

The topography of the site is shown in **Figure 3**.

## External Context Assessment Report

### Roe 8 Cleared Areas

#### 2.2.4 Wetlands

Wetlands include “areas of seasonally, intermittently or permanently waterlogged soils or inundated land, whether natural or otherwise, fresh and saline, e.g. waterlogged soils, ponds, billabongs, lakes, swamps, tidal flats, estuaries, rivers and their tributaries” (Wetlands Advisory Committee 1977). Wetlands can further be recognised by the presence of vegetation associated with waterlogging or the presence of hydric soils such as peat, peaty sand or carbonate mud (Hill *et al.* 1996).

Wetlands of national or international significance may be afforded special protection under Commonwealth or international agreements. The following lists of important wetlands were checked as part of this assessment:

- *Ramsar List of Wetlands of International Importance* (DSEWPac 2013)
- *A Directory of Important Wetlands in Australia* (Environment Australia 2001).

No Ramsar or listed ‘important’ wetlands are located within the site. The closest RAMSAR site is located 5.7 km south of the site and the closest ‘important’ wetland is located 3.8 km north-east of the site.

On the Swan Coastal Plain the geomorphic wetland classification system of Semeniuk (1987) is used to classify wetlands based on the landform shape and water permanence (hydro-period). The Department of Biodiversity, Conservation and Attractions (DBCA) maintains the *Geomorphic Wetlands of the Swan Coastal Plain* dataset, which further categorises geomorphic wetland features into specific management categories (Hill *et al.* 1996) to guide landuse and conservation as shown in **Table 1**. Each wetland feature in the dataset is given a ‘unique feature identifier’ (UFI). As this dataset was drafted at a regional scale the boundaries of mapped wetland features are often inconsistent with physical wetland boundaries.

Table 1: *Geomorphic Wetlands of the Swan Coastal Plain management categories* (Hill *et al.* 1996).

Management category	Description of wetland	Management objectives
Conservation (CCW)	Support high levels of attributes	Preserve wetland attributes and functions through reservation in national parks, crown reserves and state owned land. Protection provided under environmental protection policies.
Resource enhancement (REW)	Partly modified but still supporting substantial functions and attributes	Restore wetland through maintenance and enhancement of wetland functions and attributes. Protection via crown reserves, state or local government owned land, environmental protection policies and sustainable management on private properties.
Multiple use (MUW)	Few wetland attributes but still provide important hydrological functions	Use, development and management considered in the context of water, town and environmental planning through land care.

A review of DBCA’s *Geomorphic Wetlands of the Swan Coastal Plain* dataset indicated that four conservation category wetland features (UFIs 6600, 14645 and 14425) and one multiple use category wetland feature (UFI 6601 (Bibra Lake)) occur within the eastern portion of the site. No wetlands occur within the central and western portions of the site. UFIs 6601 and 6600 are classified as lakes and UFIs 14645 and 14425 are classified as sumplands. The wetlands in the site are part of a chain of

## External Context Assessment Report

### Roe 8 Cleared Areas

wetlands that occur to the north and south of the western portion of the site, as detailed in the (South Metro Connect 2011).

The wetlands within and adjacent to the site are shown in **Figure 4**.

#### 2.2.5 Bush Forever

The Government of Western Australia's *Bush Forever* policy is a strategic plan for conserving regionally significant bushland within the Swan Coastal Plain portion of the Perth Metropolitan Region. The objective of *Bush Forever* is to protect comprehensive representations of all original ecological communities by targeting a minimum of 10% of each vegetation complex for protection (Government of WA 2000). *Bush Forever* sites are representative of regional ecosystems and habitat and have a key role in the conservation of Perth's biodiversity.

Bush Forever Site 244 (North Lake and Bibra Lake) occurs in the eastern portion of the site. This *Bush Forever* site extends beyond the site, comprising 128.2 ha of vegetation and as well as areas of open water. Other *Bush Forever* sites occur outside of the site to the south and north-west.

The location of Bush Forever Site 244 is shown in **Figure 5**.

#### 2.2.6 Environmentally sensitive areas (ESAs)

'Environmentally sensitive areas' (ESAs) are prescribed under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* and have been identified to protect native vegetation values of areas surrounding significant, threatened or scheduled flora, vegetation communities or ecosystems. Within an ESA none of the exemptions under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* apply. However, exemptions under Schedule 6 of the EP Act still apply, including any clearing in accordance with a subdivision approval under the *Planning and Development Act 2005* (a recognised exemption under the Schedule 6 of the EP Act).

ESA No. 3686 occurs in the eastern portion of the site and extends beyond to the north and south. ESA 3686 is associated with multiple wetlands and *Bush Forever* sites.

The ESA associated with the site is shown in **Figure 5**.

#### 2.2.7 Ecological linkages

Ecological linkages are linear landscape elements that allow the movement of fauna, flora and genetic material between areas of remnant habitat. The movement of fauna and the exchange of genetic material between vegetation remnants improve the viability of those remnants by allowing greater access to breeding partners and food sources, refuge from disturbances such as fire and maintenance of genetic diversity of plant communities and populations. Ecological linkages are ideally continuous or near-continuous as the more fractured a linkage is, the less ease flora and fauna have in moving within the corridor (Alan Tingay and Associates 1998).

The Perth Biodiversity Project, supported by the Western Australia Local Government Association (WALGA), have identified and mapped regional ecological linkages within the Perth Metropolitan Region (WALGA and PBP 2004).

## External Context Assessment Report

### Roe 8 Cleared Areas

Three mapped ecological linkages occur within the site. Linkage No. 51 commences near the coast and passes through the western and central portions of the site and then diverges in a south-easterly direction. This linkage joins up with Linkage No. 50 which is situated in a north-south direction and passes through the eastern portion of the site. Linkage No. 48 connects with Linkage No. 50 in the eastern portion of the site and travels in a south-easterly direction.

The ecological linkages associated with the site are shown in **Figure 5**.

#### 2.2.8 Regional vegetation

Native vegetation in Western Australia is described and mapped at different scales in order to illustrate patterns in its distribution. Regional vegetation association mapping by Beard *et al.* (2013) shows that the site supports four vegetation associations. Finer scale vegetation complex mapping by Heddle *et al.* (1980) also indicates that the site occurs within four vegetation complexes. As described in **Section 2.2.2**, the western and central portions of the site are within the Spearwood dune system (Cottesloe and Karrakatta units) and are mapped as supporting medium eucalypt woodland. The low lying central portion of the site, associated with Bibra Lake and surrounds, has been mapped as supporting lakes and associated wetland vegetation. The Bassendean sands in the eastern portion of the site are mapped as supporting medium woodland with eucalypts and banksias.

These associations and complexes are described in **Table 2** and the vegetation complexes mapped in the site (Heddle *et al.* 1980) are shown in **Figure 6**.

Table 2: Regional vegetation mapping within the site

Portion of site	Vegetation association (Beard <i>et al.</i> 2013)	Vegetation complex (Heddle <i>et al.</i> 1980)
Western	'Spearwood 998': medium woodland with <i>Eucalyptus gomphocephala</i> (tuart)	'Cottesloe complex – central and south': mosaic of woodland of tuart and open forest of tuart - jarrah - <i>Corymbia calophylla</i> (marri); closed heath on the limestone outcrops.
Central	Spearwood 6': medium woodland with tuart and <i>Eucalyptus marginata</i> (jarrah)	'Karrakatta complex – central and south': Open forest of tuart - jarrah - marri
Central-eastern (wetlands and Bibra Lake)	'Bassendean 126': bare areas and freshwater lakes'	'Herdsman complex': Sedgelands and fringing woodland of <i>Eucalyptus rudis</i> (flooded gum) - <i>Melaleuca</i> spp.
Eastern	'Bassendean 1001': medium to very sparse woodland with jarrah and low woodland with <i>Banksia</i> spp. and <i>Allocasuarina</i> spp.	'Bassendean complex – central and south': Vegetation ranges from woodland of jarrah - <i>Allocasuarina fraseriana</i> - <i>Banksia</i> spp. to low woodland of <i>Melaleuca</i> spp. and sedgelands on the moister sites

#### 2.2.9 Site vegetation

A total of 38 vegetation communities were previously recorded in the site (AECOM 2011), predominantly comprising woodlands, shrublands and herb/sedgelands. The condition of vegetation in the site was assessed as ranging from 'very good' to 'completely degraded' using a combination of

## External Context Assessment Report

### Roe 8 Cleared Areas

the descriptive Keighery (1994) vegetation condition scale and the Braun-Blanquet scale of cover abundance (Ellenberg and Mueller-Dombois 1974) for non-native species.

AECOM (2011) undertook comparison of vegetation data with the regional 'floristic community type' (FCT) dataset (Gibson *et al.* 1994) and indicated the presence of five FCTs in the site:

- Central *Banksia attenuata* – *Banksia menziesii* woodlands (FCT 23a)
- Central *Banksia attenuata* – *Eucalyptus marginata* woodlands (FCT 21a)
- Spearwood *Banksia attenuata* or *Banksia attenuata* – *Eucalyptus* woodlands (FCT 28)
- Wet forests and woodlands (FCT 11)
- *Melaleuca preissiana* damplands (FCT 4).

These FCTs are all listed as 'well reserved' and at 'low risk' of extinction by Gibson *et al.* (1994).

Detailed information regarding vegetation previously recorded in the site is provided in the AECOM (2011) report.

#### 2.2.10 Threatened and priority flora

Certain flora species that are considered to be rare or under threat warrant special protection under Commonwealth and/or State legislation. At a Commonwealth level, flora species may be listed as 'threatened' pursuant to Schedule 1 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Any action likely to have a significant impact on a species listed under the EPBC Act requires approval from the Commonwealth Minister for the Environment and Energy.

In Western Australia flora species may also be classed as 'threatened' species under the *Wildlife Conservation Act 1950* (WC Act). Threatened flora species are gazetted under subsection 2 of section 23F of the WC Act and it is an offence to "take" or damage rare ('threatened') flora without Ministerial approval.

Threatened flora species listed under the EPBC Act and/or WC Act are assigned a conservation status ranking of 'critically endangered', 'endangered' or 'vulnerable', according to their national extent.

Flora species that may be threatened or near threatened but lack sufficient information to be listed under the WC Act may be added to the DBCA's *Priority Flora List*. These species are ranked from 'Priority 1 (P1)', being species in urgent need of survey to provide information, down to 'Priority 4 (P4)', being species that are not in urgent need of information.

A previous search of DBCA's threatened and priority flora database recorded five threatened ('declared rare') and 14 priority flora species in the vicinity of the study area AECOM (2011). A search of the *Protected Matters Search Tool* (DoEE 2017) in November 2017 indicates that 12 flora species listed as threatened under the EPBC Act have potential to occur in the site.

No threatened flora species were recorded in the site during the previous flora and vegetation assessment (AECOM 2011). Six priority flora species were previously recorded in the site (AECOM 2011):

- *Tetraria* sp. Chandala (G.J.Keighery 17055) (P2)
- *Cyathochaeta teretifolia* (P3)

## External Context Assessment Report

### Roe 8 Cleared Areas

- *Dampiera triloba* (P3)
- *Eryngium pinnatifidum* subsp. *Palustre* (G.J. Keighery 13459) (P3)
- *Jacksonia gracillima* (P3)
- *Dodonaea hackettiana* (P4).

One occurrence of *Eucalyptus caesia* (P4) was also previously recorded within the site. However, this taxon was planted in a road reserve in the site and does not naturally occur in the vicinity of the site (AECOM 2011).

#### 2.2.11 Threatened and priority ecological communities

An ecological community is a naturally occurring group of native plants, animals and other organisms that are interacting in a unique habitat. An ecological community's structure, composition and distribution are determined by environmental factors such as soil type, position in the landscape, altitude, climate and water availability (DoEE 2017b). 'Threatened ecological communities' (TECs) are ecological communities that are recognised as rare or under threat and therefore warrant special protection.

Selected TECs are afforded statutory protection at a Commonwealth level under section 181 of the EPBC Act. Any action likely to have a significant impact on a community listed under the EPBC Act requires approval from the Commonwealth Minister for the Environment and Energy. TECs are also listed within Western Australia but are currently are not afforded direct statutory protection at a State level. Nonetheless their significance is acknowledged through other State environmental approval processes such as 'environmental impact assessment' pursuant to Part IV of the *Environmental Protection Act 1986* (EP Act) and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. A plant community that is under consideration for listing as a TEC in Western Australia, but does not yet meet survey criteria or has not been adequately defined, may be listed as a 'priority ecological community' (PEC). Listing as a PEC is similarly considered during State approval processes.

AECOM (2011) previously conducted a search of DBCA's threatened and priority ecological communities' database which recorded occurrences of two priority ecological communities (PECs) in the vicinity of the site. One PEC (Priority 3), 'low lying *Banksia attenuata* woodland or shrubland' (SCP21c), was identified as occurring within a portion of the study area. The other PEC (Priority 2), '*Banksia illicifolia* woodlands' (SCP 22), was identified as occurring approximately 1.7 km south east of the site.

A search of the *Protected Matters Search Tool* (DoEE 2017) in November 2017 indicates that two threatened ecological communities (TECs) are likely to occur within 10 km of the site:

- 'banksia woodlands of the Swan Coastal Plain' (listed as endangered under the EPBC Act)
- 'subtropical and temperate coastal saltmarsh' (listed as vulnerable under the EPBC Act).

The 'banksia woodlands of the Swan Coastal Plain' TEC was not listed at the time of the previous survey (AECOM 2011) and applies to a range of FCTs including FCT 21c (which corresponds to PEC SCP21c present in the AECOM (2011) study area).



## External Context Assessment Report

### Roe 8 Cleared Areas



A large portion of the site contains banksia woodland vegetation previously mapped as being in 'good' or better condition. Therefore, the 'banksia woodlands of the Swan Coastal Plain' TEC is likely to be present within a large portion of the site, subject to meeting specific thresholds.

The site is unlikely to contain the TEC 'subtropical and temperate coastal saltmarsh' as this community requires tidal influence.

#### 2.2.12 Plant disease

*Phytophthora cinnamomi* (commonly known as dieback) is a soil borne fungal pathogen which spreads through surface and sub-surface water flows and soil movement, and is a serious threat to much of the flora of the south west Western Australia.

A dieback survey of the site in 2011 (Glevan Consulting 2010) recorded the following:

- 15.9% of the site was deemed to be 'uninfested' by dieback, indicating there was no evidence of dieback disease.
- 54% of the site was categorised as 'uninterpretable' due to the location on the Spearwood dune system and/or the presence of wetlands. The soil pH of the Spearwood dune system is unfavourable to dieback, meaning dieback may be present but has no capacity to negatively impact the vegetation. Wetlands are naturally devoid of reliable dieback indicator species.
- 30.1% of the site was categorised as unmappable [sic] due to significant levels of disturbance (and subsequent lack of dieback indicator species).

More recently, DBCA have indicated that dieback has been recorded in at least one location within the site (personal communication, Mark Brundrett DBCA). The current status of dieback throughout the site is unconfirmed but dieback is likely to be within at least a portion of the site.

#### 2.2.13 Weeds

The term 'weed' can refer to any plant that requires some form of action to reduce its effect on the economy, the environment, human health and amenity. Many non-native flora species and some native species are considered to be weeds. A particularly invasive or detrimental weed species may be listed as a 'declared pest' pursuant to the Western Australia's Biosecurity and Agriculture Management Act 2007 (BAM Act), indicating that it warrants special management to limit its spread.

The previous survey recorded a total of 129 non-native (weed) flora species in the site (AECOM 2011). Of these, three are listed as a declared pest pursuant to the BAM Act: *\*Asparagus asparagoides* (bridal creeper), *\*Moraea flaccida* (one-leaf cape tulip) and *\*Zantedeschia aethiopica* (arum lily).

#### 2.2.14 Historic land use

The site and surrounding area was historically used for stock grazing, market gardens and cropping (South Metro Connect 2011), during which vegetation was cleared to various intensities. Rubbish, including fragments of asbestos, were previously recorded in the site (South Metro Connect 2011). Presently, the site is surrounded by residential housing and reserved vegetated land.

## External Context Assessment Report

### Roe 8 Cleared Areas

### 2.3 Planning context

The site is zoned 'primary regional roads' under the *Metropolitan Region Scheme* (MRS) and 'primary regional roads' under the *City of Cockburn Town Planning Scheme (TPS) 3*. This zoning was applied for the now suspended construction of the Roe 8.

It is understood that preparations are currently being made to re-zone the site under the MRS (ABC News report 4 December 2017).

### 2.4 Summary of threats

Key threats to restoration outcomes that may require management are identified in **Table 3**.

Table 3: Summary of key threats to restoration outcomes.

Threat	Description
Plant pathogens (dieback)	<p>The soil borne water mould <i>Phytophthora cinnamomi</i> (dieback) occurs in the surrounding area and is known to have been recorded within the site (pers. comms. Mark Brundrett DBCA). Dieback kills susceptible plants by attacking their root system which inhibits uptake of water and nutrients (DPaW 2015). A large range of native species are susceptible to dieback which is spread through movement of soil and mud, especially by vehicles and footwear.</p> <p>There is no practical large-scale cure for dieback and therefore containment is the primary option available for management.</p> <p>Dieback is not expected to be a critical issue for restoration within the site, nor is exclusion of dieback from the site realistic given its' historically disturbed, urban context. Nonetheless monitoring for dieback symptoms and appropriate soil hygiene practices are recommended to limit the potential that dieback or other pathogens are introduced as part of restoration activities.</p>
Unmanaged access	<p>The movement of people, domesticated animals and/or vehicles over the restoration areas may result in erosion, damage to plants, and introduction of weeds and/or pathogens and directly limit restoration outcomes. Therefore management of access to the restoration areas is required over the duration of restoration works and will moreover be important to long term sustainability of the site. However, as the site is accessible to the public, complete elimination of access threats is impossible and management should aim to minimise related threats.</p>
Erosion	<p>Within the exception of wetland areas, surface water is likely to drain freely across the site due to the permeable nature of in situ sands present. Therefore erosion from surface water runoff would occur infrequently, if at all, and only in response to intense events.</p> <p>Wind erosion has the potential to impact on restoration due to the ground disturbance and removal of vegetation cover within the development footprint. The restoration area may therefore be prone to wind erosion and so may require management until stabilising vegetation can be restored.</p>
Non-native flora species (weeds)	<p>Invasive non-native plants, or weeds, may degrade native vegetation through competition for space and resources. Relatively high or increasing weed cover will limit restoration outcomes.</p> <p>Some weed species are already well established within the site including grassy weeds, bulbous weeds and woody weeds.</p> <p>The cover and/or diversity of weeds may also be increased during restoration through the effects of ground disturbance and by the introduction of new weeds on clothing, vehicles or equipment.</p> <p>Management is therefore required to limit the introduction of weeds and to control weeds within restoration areas.</p>

## External Context Assessment Report

### Roe 8 Cleared Areas



*Table 3: Summary of key threats to restoration outcomes.(continued)*

Threat	Description
Non-native fauna (pest) species	<p>Herbivory can directly limit the outcomes of restoration by destroying small plants and damaging mature plants.</p> <p>Herbivores such as non-native (pest) species rabbits could pose a risk to restoration areas. To a lesser degree native herbivores such as kangaroos (unlikely) and birds may predate vegetation impacting restoration outcomes.</p> <p>Management may be required to manage rabbits particularly in initial periods when plants within the revegetated areas are small.</p> <p>Carnivores like foxes and cats are predators of native fauna such as turtles, quenda and birds.</p> <p>Management of these predators may be considered to limit the impact of these pests.</p>
Climate change	<p>The increasingly dry climate predicted with advancing global warming can increase drought stress in immature plants and can lead to high seedling mortality.</p>
Frequent unplanned fires	<p>Too frequent fires can destroy and exhaust the seed bank as well as kill or damage mature and juvenile plants.</p> <p>Fire management is required to ensure that the site is monitored for unplanned fires and actions taken to reduce their occurrence.</p>

## External Context Assessment Report

### Roe 8 Cleared Areas

### 3 Security of site tenure

The *Standards* recommends that a long term restoration commitment that allows for appropriate ongoing access and management is established for restoration projects (Standards Reference Group SERA 2017).

Main Roads is the current management authority for the site. Negotiations are currently underway to transfer management authority to the City of Cockburn. These negotiations include an agreement for the management of the broader road reserve and the site, in the context of restoration under the RMP (Emerge Associates 2018).

The option to re-zone the land associated with the site, removing its status as a road reserve under the MRS, is currently being reviewed by the State Government.

Until the site is rezoned security of tenure cannot be warranted. Nonetheless it is expected that the agreement with the City of Cockburn will at least ensure that the site is transferred into a management framework where restoration and management can be sustained.

## External Context Assessment Report

### Roe 8 Cleared Areas

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## External Context Assessment Report

### Roe 8 Cleared Areas



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#### 4.2 Online references

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Bureau of Meteorology (BOM) 2017, Climate Averages, viewed 22nd November 2017, <<http://www.bom.gov.au/climate/data/>>.



# Figures



*Figure 1: Site Location*

*Figure 2: Site Management Areas*

*Figure 3: Landforms, soils and topography*

*Figure 4: Wetlands*

*Figure 5: Bush Forever, ESAs and Ecological Linkages*

*Figure 6: Regional Vegetation*







**Figure 1: Site Location**

**Project:** External Context Assessment Report  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)--F32a

**Drawn:** KNM

**Date:** 31/01/2018

**Checked:** RAO

**Approved:** TAA

**Date:** 31/01/2018



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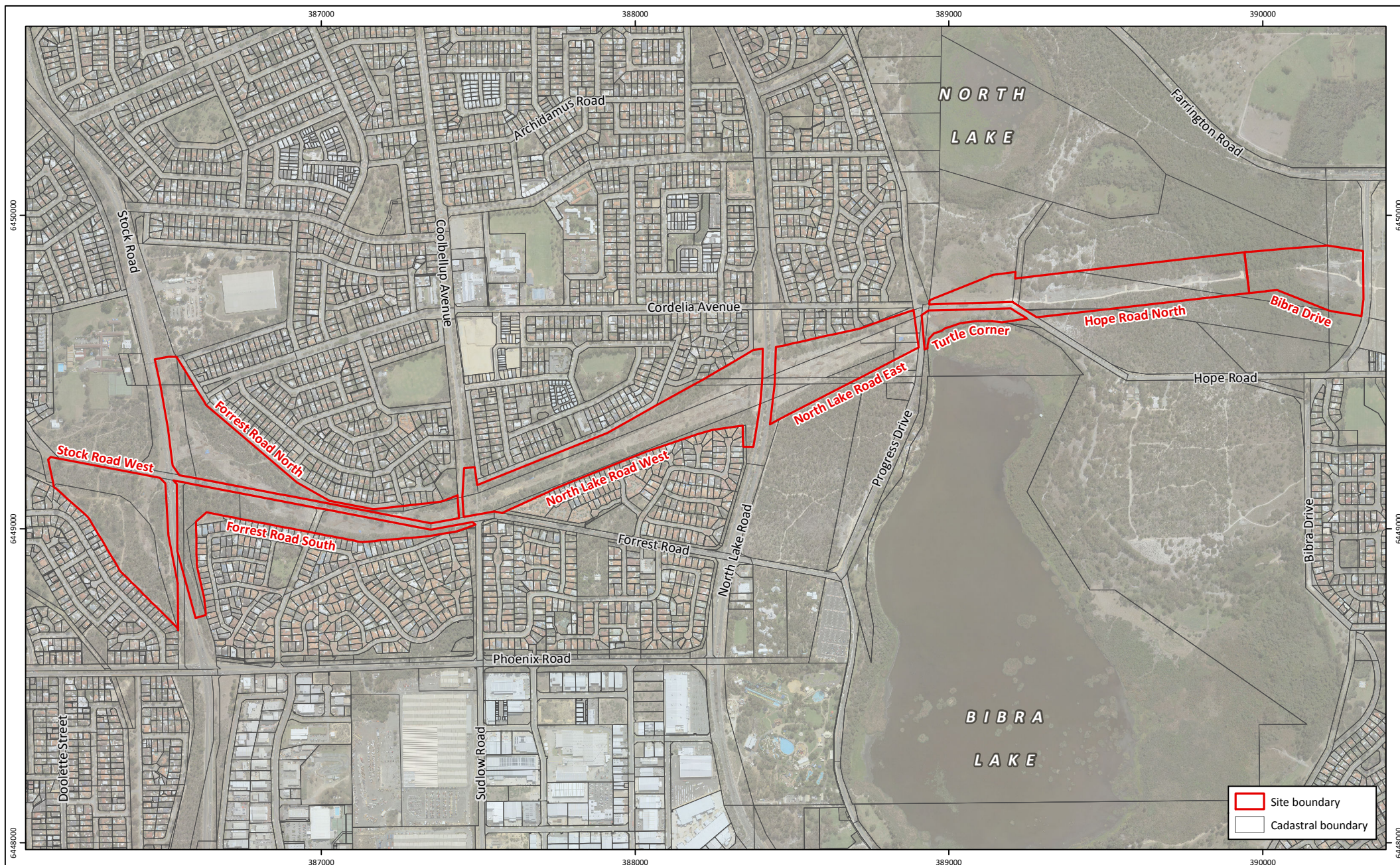
GDA 1994 MGA Zone 50











**Figure 2: Management Areas**

**Project:** External Context Assessment Report  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)--F33a

**Drawn:** KNM

**Date:** 31/01/2018

**Checked:** RAO

**Approved:** TAA

**Date:** 31/01/2018



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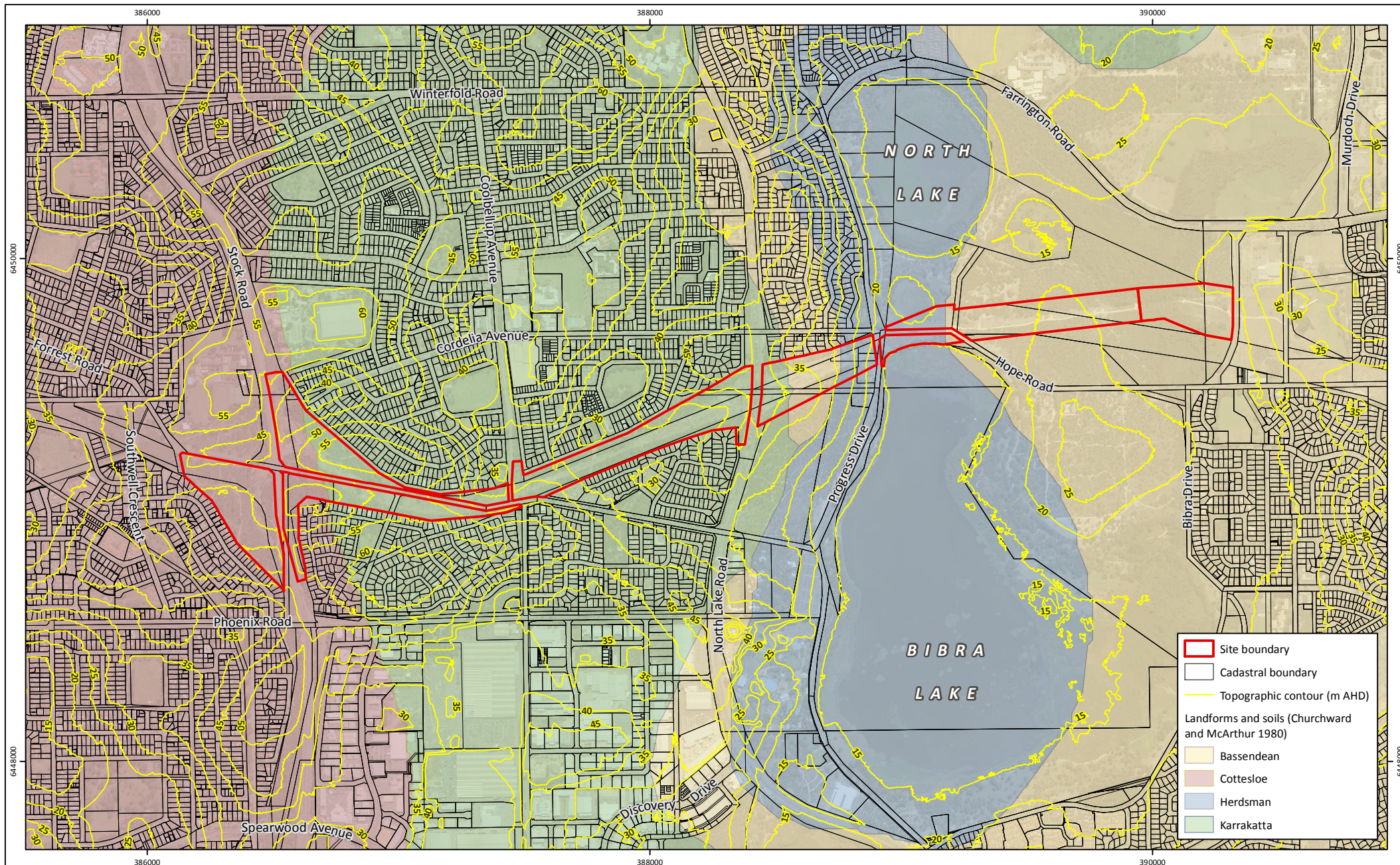
GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES









**Figure 3: Landforms, Soils and Topography**

**Project:** External Context Assessment Report  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)--F34a

**Drawn:** KNM

**Date:** 31/01/2018

**Checked:** RAO

**Approved:** TAA

**Date:** 31/01/2018



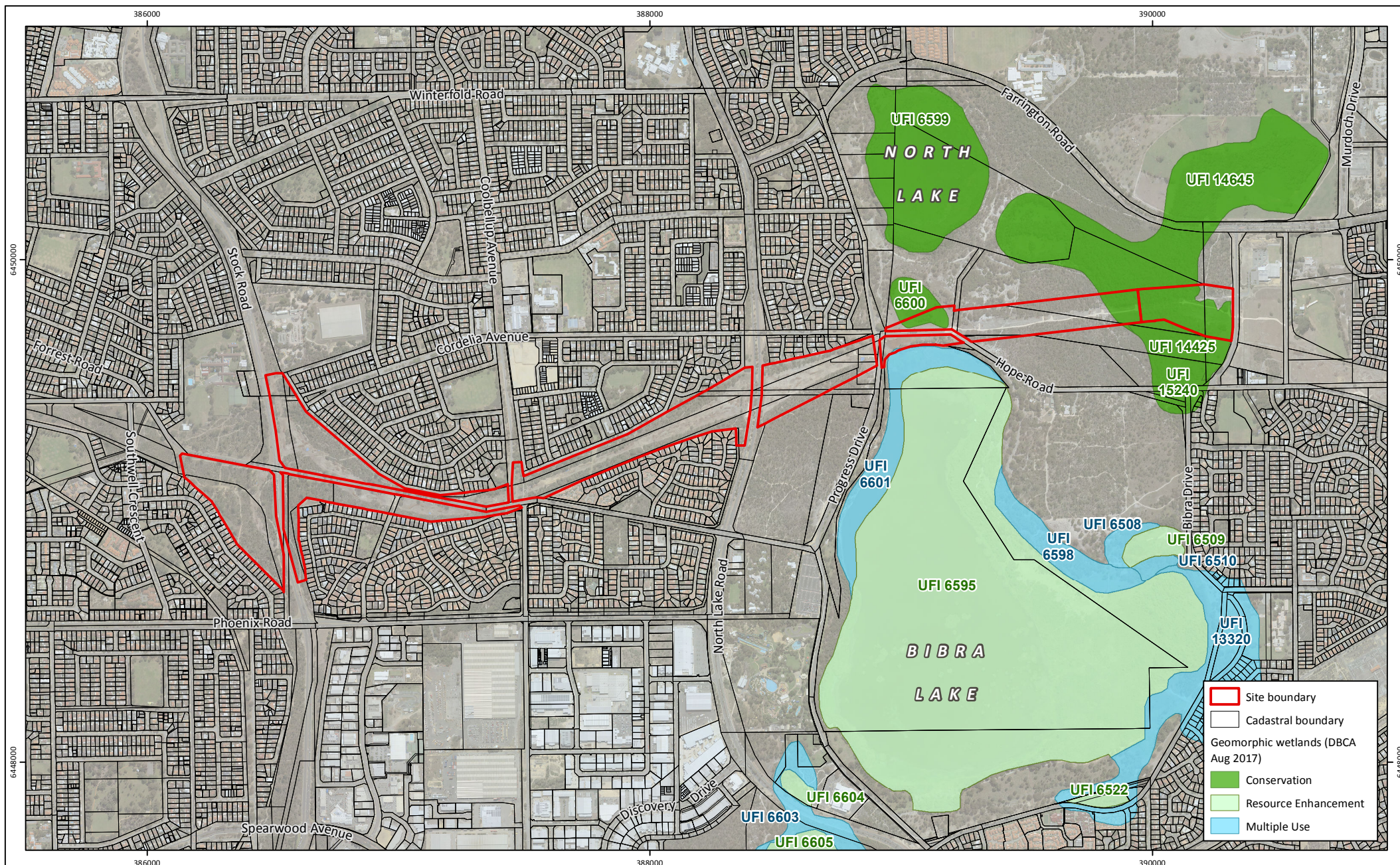
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Scale: 1:20,000@A4  
GDA 1994 MGA Zone 50

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**Figure 4: Wetlands**

**Project:** External Context Assessment Report  
Roe 8 Cleared Areas  
**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F35a  
**Drawn:** KNM  
**Date:** 31/01/2018  
**Checked:** RAO  
**Approved:** TAA  
**Date:** 31/01/2018



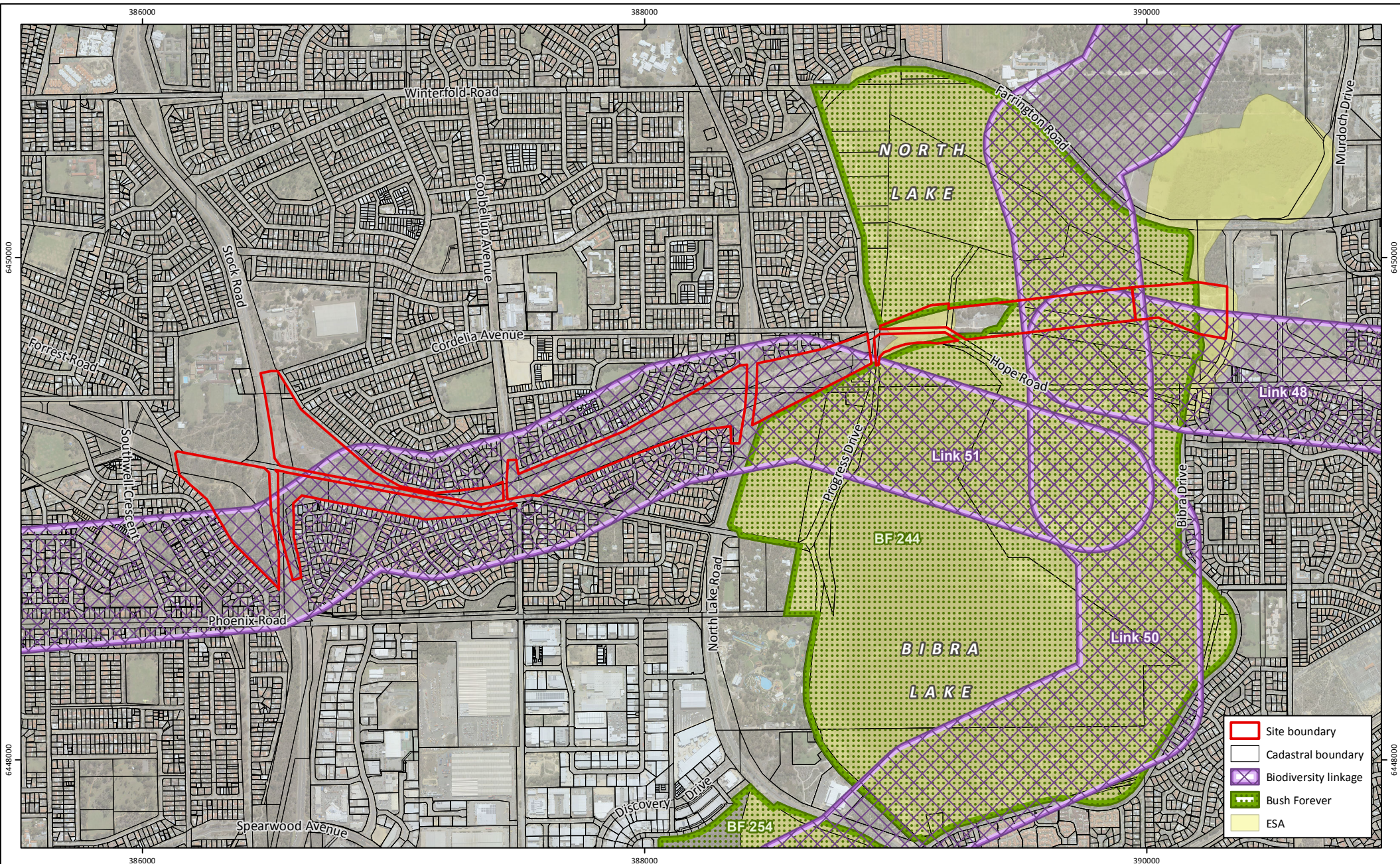
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Scale: 1:20,000@A4  
GDA 1994 MGA Zone 50

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**Figure 5: Bush Forever Sites, Environmentally Sensitive Areas (ESAs) and Ecological Linkages**

**Project:** External Context Assessment Report  
Roe 8 Cleared Areas  
**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)--F36a  
**Drawn:** KNM  
**Date:** 31/01/2018  
**Checked:** RAO  
**Approved:** TAA  
**Date:** 31/01/2018



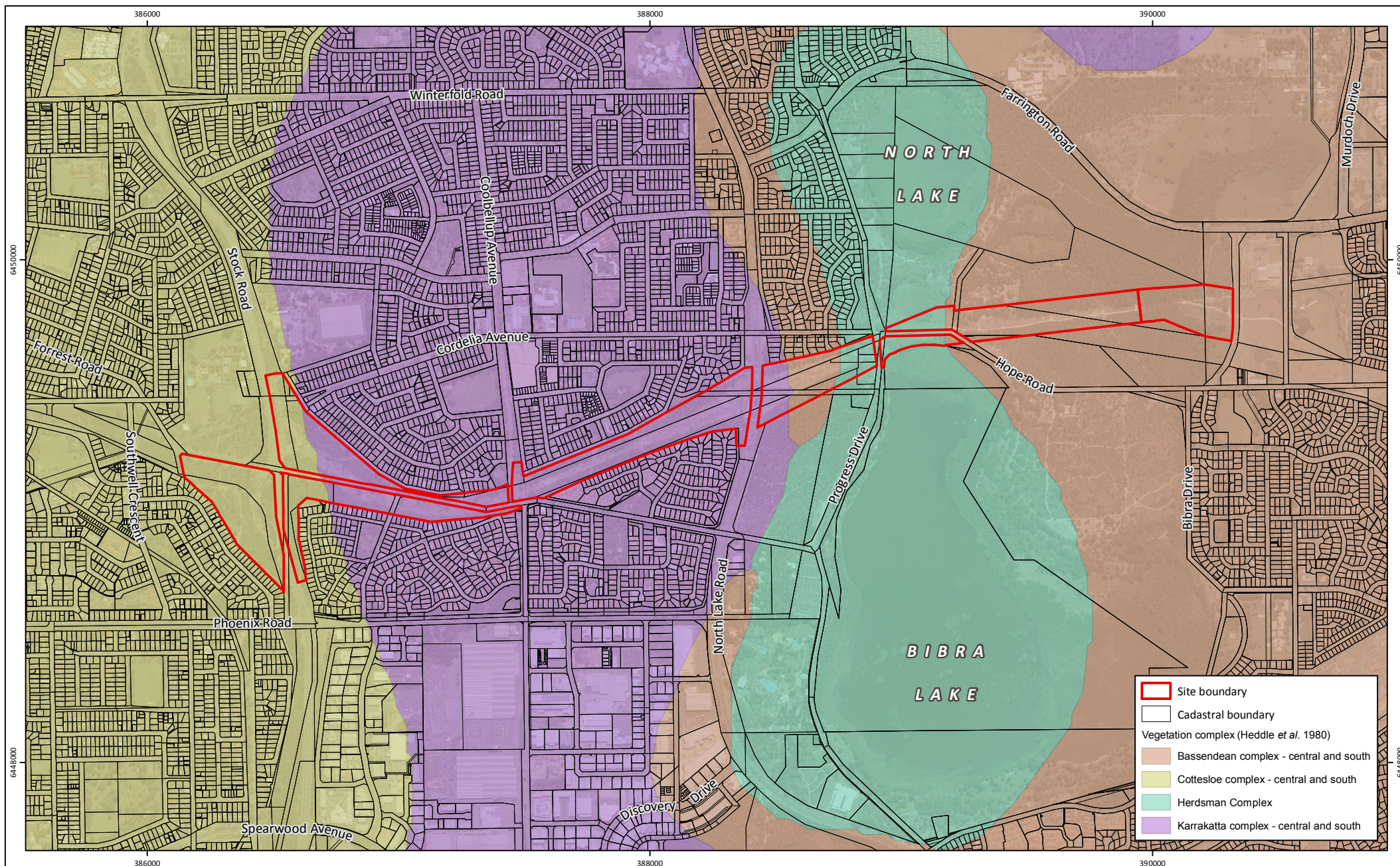
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Scale: 1:20,000@A4  
GDA 1994 MGA Zone 50

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**Figure 6: Regional Vegetation**

**Project:** External Context Assessment Report  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)--F37a

**Drawn:** KNM

**Date:** 31/01/2018

**Checked:** RAO

**Approved:** TAA

**Date:** 31/01/2018



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Metres

Scale: 1:20,000@A4

GDA 1994 MGA Zone 50

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# Appendix C

Target Ecosystem Identification and Baseline Inventory Report





# Target Ecosystem Identification and Baseline Inventory Report

Roe 8 Cleared Areas

Project No: EP17-085(07)

**Prepared for Rehabilitating Roe 8 Steering Committee  
February 2018**





# Target Ecosystem Identification and Baseline Inventory Report

## Roe 8 Cleared Areas



## Document Control

<b>Doc name:</b>	<b>Target Ecosystem Identification and Baseline Inventory Report Roe 8 Cleared Areas</b>				
<b>Doc no.:</b>	<b>EP17-085(07)--005B RAO</b>				
Version	Date	Author		Reviewer	
1	December 2017	Rachel Omodei	RAO	Tom Atkinson	TAA
	Draft to client for review				
A	January 2018	Rachel Omodei	RAO	Tom Atkinson	TAA
	Updates to address following comments from Rehabilitating Roe 8 Steering Committee				
B	February 2018	Rachel Omodei	RAO	Tom Atkinson	TAA
	Final issued to the Rehabilitating Roe 8 Working Group				

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# Target Ecosystem Identification and Baseline Inventory Report

## Roe 8 Cleared Areas



## Executive Summary

This document outlines target ecosystem identification and ecosystem baseline information relevant to the restoration areas identified in the *Rehabilitation Management Plan* (RMP)(Emerge Associates 2018).

Seven target ecosystems were identified within the site:

- Wet forest and woodland
- Banksia/coastal blackbutt woodland
- Banksia woodland
- Banksia/jarrah woodland
- Holly-leaved banksia woodland
- Banksia/woody pear woodland
- Banksia/tuart woodland.

Site assessments identified the following information:

- Records of recent relevant management actions.
- Mapping of key site features such as the extent of cleared areas, historical mulch piles and existing and proposed paths.
- Mapping of regeneration response within cleared areas according to two categories (resprouter and germinant).
- Mapping of weed cover across the site according to four categories (grassy, bulbous, woody and other).
- Data obtained from establishment of permanently marked plots within the cleared (impact) and remnant (reference) areas.

# Target Ecosystem Identification and Baseline Inventory Report

## Roe 8 Cleared Areas



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# Target Ecosystem Identification and Baseline Inventory Report

## Roe 8 Cleared Areas



## Table of Contents

<b>1</b>	<b>Introduction .....</b>	<b>1</b>
1.1	Project background .....	1
1.1.1	Site boundary .....	1
1.1.2	Management areas .....	2
1.2	Document purpose and scope .....	2
<b>2</b>	<b>Methods .....</b>	<b>3</b>
2.1	Review of pre-existing information .....	3
2.1.1	Flora and vegetation surveys .....	3
2.1.2	Fauna surveys .....	4
2.2	Site assessment .....	5
2.3	Photopoints .....	7
2.4	Baseline monitoring survey .....	7
<b>3</b>	<b>Results .....</b>	<b>8</b>
3.1	Site assessment .....	8
3.1.1	Site management records .....	8
3.1.2	Key site features .....	8
3.1.3	Remnant vegetation .....	9
3.1.4	Weed distribution and cover .....	9
3.1.5	Regeneration response .....	10
3.2	Photopoints .....	10
3.3	Baseline monitoring survey .....	10
<b>4</b>	<b>Target ecosystem identification .....</b>	<b>11</b>
4.1	Reference ecosystems .....	11
4.2	Target ecosystems .....	13
4.3	Associated native flora species .....	16
4.4	Important species .....	16
4.4.1	Native flora .....	16
4.4.2	Non-native flora (weeds) .....	17
4.4.3	Native fauna .....	18
4.4.4	Non-native fauna .....	18
<b>5</b>	<b>References .....</b>	<b>19</b>
5.1	General references .....	19
5.2	Online references .....	20

## List of Tables

Table 1: Indicators assessed during site assessment in 2017 .....	7
Table 2: Key events relevant to the restoration and management of cleared areas .....	8
Table 3: Comparison of vegetation condition methods used in the site .....	9
Table 4: Summary of reference ecosystems in the site .....	12
Table 5: Target ecosystems in the site .....	14
Table 6: Important species for each target ecosystem .....	16
Table 7: Non-native flora taxa recorded in the site that are considered important for management .....	17
Table 8: Native fauna considered important for restoration and management within the site .....	18
Table 9: Non-native fauna taxa considered important for restoration and management within the site .....	18

# Target Ecosystem Identification and Baseline Inventory Report

## Roe 8 Cleared Areas



## List of Plates

<i>Plate 1: Example of wet forest and woodland ecosystem. ....</i>	14
<i>Plate 2: Example of banksia/coastal blackbutt woodland target ecosystem. ....</i>	14
<i>Plate 3: Example of holly-leaved banksia woodland ecosystem.....</i>	14
<i>Plate 4: Example of banksia woodland ecosystem.....</i>	14
<i>Plate 5: Example of banksia woodland target ecosystem. ....</i>	15
<i>Plate 6: Example of banksia/woody pear woodland target ecosystem.....</i>	15
<i>Plate 7: Example of banksia/tuart woodland target ecosystem. ....</i>	15

## Figures

Figure 1: Site Location
Figure 2: Management Areas
Figure 3: Site features
Figure 4: Existing and Proposed Tracks and Gates
Figure 5: Grassy Weed Cover
Figure 6: Bulbous Weed Cover
Figure 7: Woody Weed Cover
Figure 8: Native Germinant Abundance
Figure 9: Native Resprouter Abundance
Figure 10: Permanently Marked Plot Locations
Figure 11: Reference Ecosystems
Figure 12: Target Ecosystems

## Appendices

### Appendix A

Baseline Monitoring Survey Methodology – Murdoch University 2017

### Appendix B

Raw data – 2017 Site Assessment (Emerge Associates 2017)

### Appendix C

Raw Data – Baseline Monitoring Survey (Murdoch University 2017)

### Appendix D

Reference Flora Species Lists



# Target Ecosystem Identification and Baseline Inventory Report

## Roe 8 Cleared Areas



## Abbreviation Tables

*Table A1: Abbreviations – General terms*

General terms	
DBH	Diameter at breast height
FCT	Floristic community type
GPS	Global positioning system
P3	Priority 3
P4	Priority 4
RMP	Rehabilitation management plan
SRE	Short range endemic
T	Threatened
TEC	Threatened ecological community

*Table A2: Abbreviations – units of measurement*

Units of measurement	
ha	Hectare
m	Metre
mm	Millimetre

*Table A3: Abbreviations – Organisations*

Organisations	
DBCA	Department of Biodiversity, Conservation and Attractions

*Table A4: Abbreviations – Legislation*

Legislation	
BAM Act	<i>Biosecurity and Agriculture Management Act 2007</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
WC Act	<i>Wildlife Conservation Act 1950</i>

# Target Ecosystem Identification and Baseline Inventory Report

## Roe 8 Cleared Areas



*Table A5: Abbreviations – restoration ecology terms from Standards Reference Group SERA (2017).*

General terms	
Attributes (of an ecosystem)	The biotic and abiotic properties and functions of an ecosystem (In this document referred to as including absence of threats, physical conditions, species composition, community structure, ecosystem function and external exchanges).
Community structure	The physical organisation of biotic and abiotic elements in a community. This refers to the degree of layering and spatial patchiness in an ecosystem; whether of substrates (e.g. rocks, coral or shell reefs, woody debris) or organisms (e.g. trees, shrubs, ground layer vegetation). This enables the development of complexity of habitats and functions.
Ecological restoration	The process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed. (Note: Single species restoration can be considered complementary and an important component of ecological restoration.)
Ecosystem	Small or large scale assemblage of biotic and abiotic components in oceans, rivers and on land in which the components interact to form complex food webs, nutrient cycles and energy flows. The term 'ecosystem'; is used in the Standards to describe an ecological community of any size or scale.
Reference ecosystem	A real or notional community of organisms able to act as a model or benchmark for restoration. A reference ecosystem usually represents a non- degraded version of the ecosystem complete with its flora, fauna (and other biota), functions, processes and successional states that would have existed on the restoration site had degradation, damage or destruction not occurred—but should be adjusted to accommodate changed or predicted environmental conditions.

# Target Ecosystem Identification and Baseline Inventory Report

## Roe 8 Cleared Areas



## 1 Introduction

### 1.1 Project background

The 'Roe 8' portion of the Roe Highway extension, in the localities of Bibra Lake, North Lake and Coolbellup, Western Australia, was a controversial and high profile road project for Western Australia. Approximately 18 hectares (ha) of vegetation was cleared for Roe 8 between December 2016 and February 2017. The construction of Roe 8 was suspended on 11 March 2017 following a State government election which resulted in the election of a Labor state government that had committed to stopping the controversial project. This clearing was a source of significant concern for members of the community opposed to Roe 8's construction and was accompanied with multiple protests, legal challenges and broad media coverage.

The 'Rehabilitating Roe 8' project arose out of the community capacity stimulated during opposition to the construction of Roe 8 and the newly elected State Labor government's commitment to rehabilitation of the cleared areas. Essentially, Rehabilitating Roe 8 aims to restore local native vegetation and fauna habitat to the cleared areas along Roe 8. However, Rehabilitating Roe 8 is not a typical restoration project. Due to the publicity and controversy surrounding the construction of Roe 8, the restoration of the cleared areas is a uniquely high profile endeavour for Perth and Western Australia, with a correspondingly high level of community and stakeholder engagement.

As part of the Rehabilitating Roe 8 Project, Emerge Associates and Creating Communities prepared the Rehabilitation Management Plan Roe 8 Cleared Areas (RMP) (Emerge Associates 2018). The RMP defines management areas and outlines communication, involvement, engagement, restoration and monitoring actions over a ten year period based on feedback obtained during community and stakeholder consultation and guidance from the *National Standards for the Practice of Ecological Restoration in Australia* (hereafter referred to as 'the Standards') (Standards Reference Group SERA 2017).

#### 1.1.1 Site boundary

A site boundary for the RMP is shown in **Figure 1**. This site boundary has been defined to encompass cadastral parcels, or portions of cadastral parcels, within which clearing occurred as part of construction of Roe 8 or whose inclusion was considered beneficial to the restoration of cleared areas as part of an east/west corridor<sup>1</sup>. Note that this boundary is nominal and may be revised in the future (for example to accurately reflect the boundary associated with the management agreement between Main Roads WA and a future management authority).

The site spans approximately 2 kilometres (km) in length and totals approximately 69 hectares (ha) in area. Within the site boundary are 'cleared areas' which were directly cleared during construction for the proposed Roe 8 alignment, and 'uncleared areas' which comprise a mixture of native and non-native vegetation but were not directly impacted by the Roe 8 works.

---

<sup>1</sup> Establishment of an east/west corridor is a community aspiration identified through consultation.

## Target Ecosystem Identification and Baseline Inventory Report

### Roe 8 Cleared Areas



#### 1.1.2 Management areas

To assist in communication eight (8) management areas are identified within the RMP representing portions of the site separated by roads or practical management boundaries (Emerge Associates 2018). East to west across the site these management areas are labelled:

- Bibra Drive
- Hope Road North
- Turtle Corner
- North Lake Road East
- North Lake Road West
- Forrest Road South
- Forrest Road North
- Stock Road West.

The locations of these management areas are shown **Figure 2**.

#### 1.2 Document purpose and scope

The *Standards* state that “ecological restoration practice should be based on an appropriate local indigenous reference ecosystem” (Standards Reference Group SERA 2017).

This document details the identification of reference ecosystems for restoration areas within the site and subsequent target ecosystem definitions. The target ecosystems are used to guide targets, goals and objectives outlined in the RMP (Emerge Associates 2018).

Specifically this document details:

- vegetation assessment methods
- the site’s current ecosystem and its features and condition
- the identification and description of local native reference ecosystem(s)
- the identification of target ecosystems for restoration works.

## Target Ecosystem Identification and Baseline Inventory Report

### Roe 8 Cleared Areas



## 2 Methods

### 2.1 Review of pre-existing information

#### 2.1.1 Flora and vegetation surveys

A flora and vegetation survey of a larger area including the current site was undertaken in 2011, prior to vegetation clearing (AECOM 2011). The purpose of this survey was to determine potential environmental impacts of the then proposed clearing footprint associated with the construction of the proposed Roe 8 extension. Although the study area for the AECOM (2011) survey was larger than the current site it did not include 0.42 hectares (ha) of land within the current site. This additional area is spread across multiple narrow pieces of land near the site boundary and is not considered to be an important limitation to the use of AECOM (2011) results as part of reference ecosystem identification.

AECOM (2011) recorded 20 vegetation communities within the current site. The majority of these communities are woodlands and the others comprise non-native herbland/sedgeland and vegetation dominated by planted shrubs and/or trees.

To assess vegetation condition a combination of the descriptive Keighery (1994) vegetation condition scale and the Braun-Blanquet scale of cover abundance (Ellenberg and Mueller-Dombois 1974) for non-native species. The condition of vegetation in the AECOM (2011) survey area ranged from 'completely degraded' to 'very good'. Over half of the site was determined to be in 'degraded' to 'completely degraded' condition.

AECOM (2011) completed a comparison of site vegetation data with the regional 'floristic community type' (FCT) dataset (Gibson *et al.* 1994) and indicated the presence of five FCTs in the site:

- Central *Banksia attenuata* – *Banksia menziesii* woodlands (FCT 23a)
- Central *Banksia attenuata* – *Eucalyptus marginata* woodlands (FCT 21a)
- Spearwood *Banksia attenuata* or *Banksia attenuata* – *Eucalyptus* woodlands (FCT 28)
- Wet forests and woodlands (FCT 11)
- *Melaleuca preissiana* damplands (FCT 4).

These FCTs are all listed as 'well reserved' and at 'low risk' of extinction by Gibson *et al.* (1994).

Since the completion of the AECOM (2011) assessment the 'banksia woodlands of the Swan Coastal Plain' threatened ecological community (TEC) was listed as 'endangered' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). FCTs '23a', '21a' and '28' are all associated with the 'banksia woodlands of the Swan Coastal Plain' TEC (DoEE 2016). Specific patch size and vegetation condition thresholds apply to the identification of the 'banksia woodlands of the Swan Coastal Plain' TEC. In addition to other factors, the conservation advice states that banksia woodland vegetation must be in 'good' or better condition, using the scale provided.

The vegetation condition scale used in the AECOM (2011) assessment differs from that provided in the conservation advice for the 'banksia woodlands of the Swan Coastal Plain' TEC (DoEE 2016). The condition scale used by AECOM (2011) is likely to have classified vegetation into lower condition



## Target Ecosystem Identification and Baseline Inventory Report

### Roe 8 Cleared Areas



categories than if the DoEE (2016) scale had been used, in part due to the use of the Braun-Blanquet scale for weed cover. If the DoEE (2016) had been applied up to 137.22 ha of vegetation previously mapped as being in 'degraded' to 'very good' condition (55% of the site) would have been considered to represent the 'banksia woodlands of the Swan Coastal Plain' TEC.

#### 2.1.2 Fauna surveys

Multiple fauna surveys of a larger area including the current site were undertaken between 2009 and 2011, prior to vegetation clearing. The following surveys were undertaken:

- Level 1 fauna survey (habitat assessment and reconnaissance) (Phoenix Environmental Sciences 2011c).
- Level 2 vertebrate fauna survey (Phoenix Environmental Sciences 2011c) comprising six systematic bushland trapping sites.
- *Isoodon obesulus* (quenda) (Priority 4) monitoring program (Phoenix Environmental Sciences 2011b).
- Targeted *Chelodina oblonga* (oblong turtle) survey (Phoenix Environmental Sciences 2011a).
- Wetland bird and shorebird surveys at 13 of the Beeliar Wetlands (of which four are located within the project area) (Western Wildlife 2010).
- Short-range endemic (SRE) invertebrate survey (Phoenix Environmental Sciences 2010b).
- Targeted invertebrate assessment for conservation significant species (Phoenix Environmental Sciences 2010b).
- An aquatic macroinvertebrate survey of five wetlands in the area (of which three are located within the project area) (Phoenix Environmental Sciences 2010a).

In regards to threatened species of black cockatoos, the following actions were undertaken during the level 1 and level 2 surveys:

- Identification and assessment of suitability of potential breeding habitat trees (diameter at breast height (DBH) greater than 500mm).
- Assessment of potential nest hollows for evidence of nesting by black cockatoos.
- Searches for evidence of black cockatoo feeding activity for foraging habitat mapping.
- Searches for potential black cockatoo roost sites.

A total of nine fauna habitat types were identified within study area are larger than the current site, comprising five upland *Eucalyptus marginata* – *Corymbia calophylla* – *Banksia* spp. woodlands, two lowland riparian types and two man-made habitats (e.g. roadsides, parkland).

The following fauna were recorded within the previous larger survey area:

- The vertebrate surveys recorded 120 native vertebrate species comprising up to eight amphibians, 83 birds, eight mammals and 21 reptiles.
- Five introduced mammal species and five naturalised exotic bird species.
- Approximately 125 invertebrate species
- Seven SRE invertebrate species (distribution limited to the Perth metropolitan region) of which one could not be accurately identified to species level and is rarely found in the Perth metropolitan area.

## Target Ecosystem Identification and Baseline Inventory Report

### Roe 8 Cleared Areas



Bird and macroinvertebrate surveys of the wetlands in the project area recorded the following:

- North and Bibra lakes consistently rank high in species richness and highest total count of wetlands and shorebirds, while Horse Paddock and Lower swamps rank relatively low.
- Bibra Lake is recognised for its high waterbird diversity and North Lake is an important breeding area for ducks.
- Bibra Lake recorded the highest number of threatened migratory shorebirds while North Lake, Horse Paddock Swamp and Lower Swamp recorded two or less records each.
- None of the wetlands of the project area were considered to support significant levels of macroinvertebrate species diversity.

In terms of conservation significant fauna, the following species were recorded within the project area:

- *Calyptorhynchus latirostris* (Carnaby's black cockatoo) and *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) (T) with the following recorded:
  - Confirmed sightings
  - Evidence of foraging
  - Approximately 177 ha of potential foraging habitat for Carnaby's black cockatoo
  - Approximately 166 ha of potential foraging habitat for forest red-tailed black cockatoo.
  - 605 potential habitat trees >500 mm DBH, of which 71 contained potential nesting hollows.
- *Lerista lineata* (Perth slider) (Priority 3) was recorded at several locations within the project area.
- A quenda (P4) population comprising at least 107 individuals, with an estimated population density of 28/ha.
- A total of 23 adult oblong turtles were captured within Bibra Lake and an additional 37 were sighted, with an estimated population of 168. Anecdotal evidence and observational findings suggest they are also present in the vicinity of North Lake.

No evidence of black cockatoo nesting or breeding was recorded in the project area. No roost sites were identified during the surveys but some roost sites had previously been recorded by Birdlife Australia within 6km of the centre point of the project area.

A variety of other conservation significant fauna species were not recorded during surveys but were considered to have potential to occur in the project area due to presence of suitable habitat.

## 2.2 Site assessment

Emerge undertook multiple surveys of the site in spring 2017 by a team of experienced botanists/ecologists. These assessments consisted of a review of spatial data and aerial imagery followed by a site inspection on foot over four days:

- 31<sup>st</sup> October 2017
- 2<sup>nd</sup> November 2017
- 7<sup>th</sup> November 2017
- 10<sup>th</sup> November 2017.

## Target Ecosystem Identification and Baseline Inventory Report

### Roe 8 Cleared Areas



The purpose of these surveys was to identify and confirm key site features, review previous vegetation mapping and record weed and native regeneration response monitoring data to inform planning for the preparation and implementation of the RMP. Site management activities were discussed with community and stakeholders to establish a timeline of key events within the site.

The following attributes were located from interpretation of aerial imagery (captured November 2016 and October 2017) and confirmed during site inspection:

- extent of cleared areas
- extent of historical and existing remnant vegetation
- infrastructure
- fences and gates
- mulch pile storage locations
- asbestos removal locations
- historical and pre-existing paths
- machine and vehicle tracks
- large wood
- other features.

The vegetation community boundaries and vegetation condition boundaries previously identified (AECOM 2011) were reviewed within the current site boundary. Opportunistic observations were made during site traverses and a combination of notes, photographs and locations (using a hand-held GPS receiver) were recorded. The previous vegetation condition mapping was compared to categories identified in (Keighery 1994) and, for banksia woodland vegetation, the vegetation condition scale provided in the conservation advice for the 'banksia woodlands of the Swan Coastal Plain' TEC (DoEE 2016).

Data collection for monitoring weed and native regeneration response was focused within cleared areas and within remnant vegetation within 20 m of cleared areas. Using the 20 m x 20 m sampling frame identified in the RMP (Emerge Associates 2018) as a guide, an assessment was made of the indicators outlined in **Table 1**.

# Target Ecosystem Identification and Baseline Inventory Report

## Roe 8 Cleared Areas



Table 1: Indicators assessed during site assessment in 2017

Indicator	Location	Method
Non-native (weed) species composition	Cleared and uncleared areas	<ul style="list-style-type: none"> <li>• Identification of presence of dominant weed species across four categories:               <ul style="list-style-type: none"> <li>○ grassy<sup>2</sup></li> <li>○ bulbous<sup>3</sup></li> <li>○ woody<sup>4</sup></li> <li>○ other<sup>5</sup></li> </ul> </li> </ul>
Non-native (weed) species cover	Cleared and uncleared areas	<ul style="list-style-type: none"> <li>• Estimate of percentage cover of weed species across four categories:               <ul style="list-style-type: none"> <li>○ grassy</li> <li>○ bulbous</li> <li>○ woody</li> <li>○ Other</li> </ul> </li> </ul>
Native flora species composition	Cleared areas	<ul style="list-style-type: none"> <li>• Rapid assessment of dominant native species</li> </ul>
Native flora regeneration abundance	Cleared areas	<ul style="list-style-type: none"> <li>• Estimate of abundance by broad category (low, moderate or high) across two categories:               <ul style="list-style-type: none"> <li>○ Resprouter (plants that had resprouted from root stock or branches after the recent clearing).</li> <li>○ Germinant (juvenile plants that had grown from seed in 2017).</li> </ul> </li> </ul>

<sup>2</sup> Non-native flora species from Poaceae family.

<sup>3</sup> Non-native flora species from families such as but not limited to Araceae, Asparagaceae, Iridaceae, Oxalidaceae.

<sup>4</sup> Non-native flora species from families such as but not limited to Apocynaceae, Fabaceae, Moraceae, Myrtaceae.

<sup>5</sup> Non-native flora species from families such as but not limited to Aizoaceae, Asteraceae, Papaveraceae, Solanaceae.

## 2.3 Photopoints

Photo monitoring locations ('photopoints') were established within the site in late 2017 in cleared and uncleared areas (Cockburn Wetland Centre 2017). At each photopoint at least two digital photographs were taken, facing towards and away from the cleared areas.

## 2.4 Baseline monitoring survey

Murdoch University students, under supervision from Murdoch University and DBCA demonstrators, established and undertook surveys of permanently marked monitoring plots in cleared and uncleared areas. Surveys occurred over multiple days in October, November and December 2017.

The survey methodology for these plots is provided in **Appendix A**.

# Target Ecosystem Identification and Baseline Inventory Report

## Roe 8 Cleared Areas



## 3 Results

### 3.1 Site assessment

Raw data recorded during the site assessment is provided as **Appendix B**.

#### 3.1.1 Site management records

Multiple actions have occurred within the site that are relevant to the restoration works including events prior to, during, and after vegetation clearing. The timing of previous events are summarised in **Table 2**.

*Table 2: Key events relevant to the restoration and management of cleared areas*

Date	Event	Description	Reference
April 2011	Previous biological surveys	Flora and vegetation survey Dieback survey Multiple fauna surveys	AECOM (2011) Glevan Consulting (2010) See <b>Section 2.1.2</b>
December 2016 – February 2017	Clearing and mulching	Clearing and mulching of vegetation and storage on site in piles. Topsoil was not removed.	Aerial photographs
Between October and April 2017	Mulch removal	Mulch piles placed into trucks using front end loader and removed from site	Aerial photographs
May 2017	Weed control	Spot spaying using glyphosate and metsulfuron to target grass and bulb weeds species	Work power (2017)
October 2017	Weed control	Spot spaying using glyphosate and metsulfuron to target grass and bulb weeds species	Work power (2017)
October - November 2017	Fence installation	Fences and gates (pedestrian, vehicle and fauna) installed around perimeter of cleared area	Details provided by MRWA
November 2017	Weed control	Grass selective herbicide targeting perennial grass weeds	-
November 2017	Vegetation surveys	Reference ecosystem surveys Site assessment surveys (Emerge) Establishment of permanent plots and baseline inventory surveys (Murdoch University)	See <b>Section 2.2</b> See <b>Section 3.2</b>

#### 3.1.2 Key site features

Features within the site that have been identified as being relevant and important to the RMP include the:

- extent of cleared areas
- existing powerline alignment and power line tower locations
- conservation fencing and gate locations
- historical mulch pile locations within cleared areas
- historical asbestos contamination locations within cleared areas
- historical and pre-existing path locations
- machine and vehicle track locations within cleared areas



## Target Ecosystem Identification and Baseline Inventory Report

### Roe 8 Cleared Areas



- large fallen wood locations within cleared areas
- *Araucaria heterophylla* (Norfolk Island pine) tree stumps in Turtle Corner.

These key features are shown in **Figure 3** and **Figure 4**.

#### 3.1.3 Remnant vegetation

The vegetation recorded during the site assessment was generally consistent with the plant communities previously identified (AECOM 2011). Broadly, this vegetation comprises wet forest or wetland plant communities and banksia woodland plant communities. The wetland communities are located in association with wetlands to the east of the site. The banksia woodland communities are located on upland landforms.

The condition of vegetation within un-cleared areas was considered to be generally higher than that previously recorded (AECOM 2011). Some previously identified boundaries between condition categories were also not discernable. These differences in vegetation condition assessment are likely to have been partly due to the different scales used as shown in **Table 3**. The majority of remnant banksia woodland vegetation in the site was determined to be in 'good' or 'very good' condition according to the DoEE (2016) scale.

Table 3: Comparison of vegetation condition methods used in the site

Condition category	% Weed cover		Species diversity
	Braun-Blanquet Scale <sup>†</sup>	Banksia woodland TEC (DoEE 2016)	Banksia woodland TEC (DoEE 2016)
Pristine	0	0 (or close to)	Native plant species diversity fully retained or almost so
Excellent	1-5	<10	High native plant species diversity
Very good	5-25	5-20	Moderate native plant species diversity
Good	25-50	5-50	Low native plant species diversity
Degraded	50-75	20-70	Very low native plant species diversity
Completely degraded	>75	>70	Very low to no native species diversity

<sup>†</sup>Ellenberg and Mueller-Dombois (1974)

#### 3.1.4 Weed distribution and cover

The cover of grassy weeds in the site is shown in **Figure 5**. A total of 16 grassy weed taxa were recorded and *\*Avena* spp. (oats), *\*Briza maxima* (blowfly grass), *\*Bromus* spp. (brome), *\*Ehrharta calycina* (perennial veldt grass) and *\*Ehrharta longifolia* (annual veldt grass), were the most common.

The cover of bulbous weeds in the site is shown in **Figure 6**. A total of 11 bulbous weed taxa were recorded and *\*Gladiolus caryophyllaceus* (wild gladiolus), *\*Freesia alba* × *leichtlinii* (freesia), *\*Romulea rosea* (Guildford grass) and *\*Zantedeschia aethiopica* (arum lily) were the most common taxa.

## Target Ecosystem Identification and Baseline Inventory Report

### Roe 8 Cleared Areas



The cover of woody weeds in the site is shown in **Figure 7**. A total of 12 woody weed taxa were recorded and \* *Acacia longifolia* (Sydney golden wattle), \* *Acacia iteaphylla* (Finders Range wattle), \* *Chamaecytisus palmensis* (tagasaste) and \* *Chamelaucium uncinatum* (Geraldton wax) were the most common taxa.

#### 3.1.5 Regeneration response

Understandably the cleared areas largely comprised bare ground across the majority of the site. The diversity and abundance of native germinants and resprouters across cleared areas varied considerably. The cleared areas also had lower cover of weeds than most uncleared areas in the site, albeit that these areas had been subject to herbicide weed control.

The abundance of native germinants in the site is shown in **Figure 8**. The most common native germinant taxa were *Gompholobium tomentosum* (hairy yellow pea), *Hardenbergia comptoniana* (native wisteria), *Jacksonia furcellata* (grey stinkwood), *Kennedia prostrata* (scarlet runner) and *Kunzea glabrescens* (spearwood)<sup>2</sup>.

Germinants of the annual native species *Eryngium pinnatifidum* subsp. *Palustre* (listed as Priority 3 on the Department of Biodiversity, Conservation and Attractions (DBCA)'s *Priority Flora List*) were also recorded in the cleared areas.

The general abundance of native resprouters is shown in **Figure 9**. The most common native resprouting taxa were *Corymbia calophylla* (marri), *Eucalyptus* sp. (likely comprising marri and *Eucalyptus marginata* (jarrah)), *Macrozamia fraseri* (zamia palm), *Xanthorrhoea preissii* (grass tree), *Hibbertia hypericoides* (yellow buttercups) and *Kunzea glabrescens* (spearwood)<sup>2</sup>.

#### 3.2 Photopoints

A total of 50 photopoints were established in the site, with 25 located in the cleared areas and 25 located in the uncleared areas. Digital photographs were taken at each location. The locations of photopoints are shown in **Figure 10**.

#### 3.3 Baseline monitoring survey

A total of 52 monitoring plots were established in the site, with 33 located in the cleared areas and 19 located in the uncleared areas. The locations of monitoring plots are shown in **Figure 10** and raw data from the baseline monitoring survey will be provided as **Appendix C** (Murdoch University, 2018)<sup>3</sup>.

<sup>2</sup> Frequently observed in eastern/wetter areas of the site.

<sup>3</sup> Full QA'd data yet to be supplied.

## Target Ecosystem Identification and Baseline Inventory Report

### Roe 8 Cleared Areas



## 4 Target ecosystem identification

Principle 1 of the *Standards* states that ecological restoration practice should be based on an appropriate local indigenous reference ecosystem (Standards Reference Group SERA 2017). The target ecosystem is therefore a model of the reference ecosystem that the restoration project aims to restore.

In the *Standards* a reference ecosystem is defined as a “real or notional community of organisms able to act as a model or benchmark for restoration”. Notionally a reference ecosystem is a non-degraded version of a restoration site, with attributes that would have been present prior to disturbance. However, the *Standards* also acknowledge that the attributes of a reference ecosystem may need to be adjusted to accommodate changed or predicted environmental conditions. This is relevant to the site as native vegetation, including cleared vegetation and remnant vegetation adjacent to the cleared areas, has been subject to historical disturbance prior to clearing occurring along the proposed alignment for Roe 8. Disturbance intensity varied across the site, but largely consisted of clearing for tracks, firebreaks, rubbish dumping and the introduction of non-native species. Historically, the site would also have been logged and subject to other changes in land and cultural management resulting from European settlement on the Swan Coastal Plain. However, the impact of historical disturbance is more difficult to quantify.

### 4.1 Reference ecosystems

Reference ecosystems for the site were identified using information obtained from the pre-clearing surveys of the site (AECOM 2011) and surveys undertaken in 2017 by Emerge and Murdoch University (as described in **Section 2** and **Section 3**).

Broadly, two types of ecosystem broadly occur within the site:

- ‘wetland’
- ‘banksia/eucalypt woodland’.

Relatively intact areas of wetland vegetation occur at the interface of Hope Road North and Bibra Lake management areas. This vegetation contains an overstorey of *Melaleuca preissiana* (moonah), *Melaleuca raphiophylla* (swamp paperbark) and *Eucalyptus rudis* (flooded gum) over either a dense shrubland of *Pteridium esculentum* (bracken) or a dense native sedgeland on brown clay to loam soils. Varying levels of inundation were present in this vegetation during the 2017 surveys, ranging from completely inundated to moist soils. The most common weed in this vegetation was *\*Zantedeschia aethiopica* (arum lily) which was primarily located on the boundary and where the bracken was less dense. The reference ecosystem for this wetland vegetation is representative of the FCT 11 ‘wet forests and woodlands’ identified by Gibson *et al.* (1994).

The banksia woodland vegetation throughout the site generally has an overstorey dominated by *Banksia attenuata* (slender banksia), *Banksia menziesii* (firewood banksia) and *Eucalyptus marginata* (jarrah), with some *Corymbia calophylla* (marri) and *Allocasuarina fraseriana* (sheoak). Particular management areas contain additional canopy or sub-canopy species as detailed below:

## Target Ecosystem Identification and Baseline Inventory Report

### Roe 8 Cleared Areas



- Stock Road West overstorey contains co-dominant *Eucalyptus gomphocephala* (tuart). This species was low to absent across the remainder of the site.
- The western portion of North Lake Road West supports *Xylomelum occidentale* (woody pear) in midstorey/overstorey layer. This species appears to be restricted to this portion of the site, potentially due to the topography and/or soil association.
- In the east of the site, the overstorey in Hope Road North and Bibra Drive management areas contain distinct bands of co-dominant *Banksia ilicifolia* (holly-leaved banksia) and *Eucalyptus tottiana* (coastal blackbutt) trees. Holly-leaved banksia often occurs in low-lying areas close to the water table (Stevens *et al.* 2016) and coastal blackbutt is commonly associated with the Bassendean soil system which is in this portion of the site.

The understorey of the banksia woodland vegetation includes some species which were consistently recorded across the site including, for example *Dasypogon bromeliifolius* (pineapple bush), *Hibbertia hypericoides* (yellow buttercups), *Macrozamia fraseri* (zamia) and *Xanthorrhoea preissii* (grass tree). Further analysis of baseline monitoring data is required to accurately characterise understory species composition of remnant vegetation within the site associated with each reference ecosystems.

A summary of the reference ecosystems identified in the site and their corresponding FCTs is provided in **Table 4**. The locations of reference ecosystems in the site are shown in **Figure 11**.

Table 4: Summary of reference ecosystems in the site

Ecosystem category	Dominant overstorey species+	Applicable FCT (Gibson <i>et al.</i> 1994)	Management area
Wetland	Flooded gum, moonah and swamp paperbark	FCT 11 'wet forests and woodlands'	Bibra Drive, Hope Road North
Banksia woodland	Jarrah	FCT 23a 'central <i>Banksia attenuata</i> – <i>B. menziesii</i> woodlands'	Hope Road North
	Coastal blackbutt	FCT 23a 'central <i>Banksia attenuata</i> – <i>B. menziesii</i> woodlands' and/or FCT 21c 'low lying <i>Banksia attenuata</i> woodlands or shrublands'	Bibra Drive, Hope Road North
	Holly-leaved banksia	FCT 23a 'central <i>Banksia attenuata</i> – <i>B. menziesii</i> woodlands'	Bibra Drive, Hope Road North
	Jarrah	FCT 28 'spearwood <i>Banksia attenuata</i> or <i>Banksia attenuata</i> – <i>Eucalyptus</i> woodlands'	North Lake Road East, North Lake Road West, Forrest Road South, Forest Road North.
	Woody pear	FCT 28 'spearwood <i>Banksia attenuata</i> or <i>Banksia attenuata</i> – <i>Eucalyptus</i> woodlands'	North Lake Road West (western portion)
	Tuart	FCT 28 'Spearwood <i>Banksia attenuata</i> or <i>Banksia attenuata</i> – <i>Eucalyptus</i> woodlands'	Stock Road West

\*Additional to *Allocasuarina fraseriana* and *Banksia* spp.

Turtle Corner and the western portion of Hope Road North management areas include native flora species but were assigned the label 'modified native vegetation'. Consultation with community and stakeholders identified that some of the native vegetation in these areas was a product of historical revegetation activities, including the *Eucalyptus rudis* (flooded gum) trees that are present in Hope Road North (pers. comms. Denise Crosby, Cockburn Wetland Centre). Fill has also been imported as part of construction of Hope Road and has altered the landform within Turtle Corner.

## Target Ecosystem Identification and Baseline Inventory Report

### Roe 8 Cleared Areas



#### 4.2 Target ecosystems

As outlined previously in **Section 4.1**, 'wetland' and 'banksia/eucalypt woodland' ecosystems occurred within the site prior to clearing. The wetland target ecosystem is analogous to FCT 11 'wet forests and woodlands' identified by Gibson *et al.* (1994). The banksia/eucalypt woodland ecosystem category was separated based on overt differences in canopy species composition, resulting in the identification six (6) banksia/eucalypt woodland target ecosystems.

The labels applied to the target ecosystems within the site are as follows:

- Wet forest and woodland (wetland)
- Banksia/coastal blackbutt woodland
- Holly-leaved banksia woodland
- Banksia woodland
- Banksia/jarrah woodland
- Banksia/woody pear woodland
- Banksia/tuart woodland<sup>4</sup>.

The six banksia woodland target ecosystems were defined based on differences in the reference ecosystem overstorey stratum. This simplification of vegetation patterns was aimed at rationalizing target ecosystems labels and descriptions. Although the understory flora is generally consistent within banksia woodland areas across the site, it is acknowledged that the pattern of vegetation is likely more complex than indicated by the identified scheme for target ecosystems. In particular, areas of banksia/jarrah woodland which align to FCT 23a are likely to have some distinct flora taxa compared to banksia woodland which aligns with FCT 28. Nonetheless, the target ecosystem labels and descriptions are considered to be a good starting point as they confer accessible themes for conceptualising the differences in ecosystems within the site. Improvements to the characterisation of each target ecosystem can be made as new information is obtained on their attributes through implementation of monitoring under the RMP.

The majority of the banksia woodland target ecosystems are synonymous with the reference ecosystem in the same location. However, two exceptions were identified. The banksia woodland target ecosystem differs from its' banksia/jarrah woodland reference ecosystem. Since this target ecosystem is located under existing electrical powerlines it must conform to Western Power height restrictions. Therefore, tall eucalypt species such as *Eucalyptus marginata* and *Corymbia calophylla* are not included in this target ecosystem. The areas of modified vegetation in Turtle corner and the western end of Hope Road North were assigned the banksia/coastal blackbutt woodland target ecosystem. This was based on consideration of broader patterns in surrounding vegetation and is an appropriate near wetland woodland option for the eastern portion of the site based on landform, soils and predicted FCT.

The seven target ecosystems are identified in **Table 5** and representative photographs are provided in **Plate 1** to **Plate 7**. The extents of the target ecosystems are shown in **Figure 12**.

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<sup>4</sup> Wetland ecosystem introduced first and banksia woodland ecosystems introduced in order of occurrence from east to west across the site.







# Target Ecosystem Identification and Baseline Inventory Report

## Roe 8 Cleared Areas



Table 5: Target ecosystems in the site




Target Ecosystem <sup>†</sup>	Description
<b>Wet forest and woodland</b>  <p>Plate 1: Example of wet forest and woodland ecosystem.</p>	<ul style="list-style-type: none"> <li>The 'wet forest and woodland' ecosystem is characterized by a canopy of flooded gum, moonah and swamp paperbark and an understorey of wetland adapted species.</li> <li>This ecosystem corresponds with FCT 11 (Gibson <i>et al.</i> 1994).</li> <li>The extent of this ecosystem within the site is associated with the presence of seasonally saturated hydric soils of the Bibra Lakes wetland system, in the eastern portion of the site.</li> <li>This ecosystem is located in Hope Road North management area.</li> </ul>
<b>Banksia/coastal blackbutt woodland</b>  <p>Plate 2: Example of banksia/coastal blackbutt woodland target ecosystem.</p>	<ul style="list-style-type: none"> <li>The 'banksia/coastal blackbutt woodland' ecosystem is characterized by the presence of coastal blackbutt amongst a mixed canopy of sheoak, slender banksia, firewood banksia, marri and jarrah.</li> <li>This ecosystem corresponds to FCT 23a and/or FCT 21c (Gibson <i>et al.</i> 1994).</li> <li>The extent of this ecosystem is associated with the interface between target ecosystems 'wet forest and woodland' and the adjacent banksia woodland ecosystems in the east of the site.</li> <li>This ecosystem is located in the Bibra Drive, Hope Road North and Turtle Corner management areas.</li> </ul>
<b>Holly-leaved banksia woodland</b>  <p>Plate 3: Example of holly-leaved banksia woodland ecosystem</p>	<ul style="list-style-type: none"> <li>The 'holly-leaved banksia woodland' ecosystem is characterized by the presence of holly-leaved banksia amongst a mixed canopy of sheoak, slender banksia, firewood banksia, marri and jarrah.</li> <li>This ecosystem corresponds to FCT 23a (Gibson <i>et al.</i> 1994).</li> <li>This ecosystem is on the Bassendean soil association in the transition zones between low lying and elevated vegetation.</li> <li>The extent of this ecosystem is associated with the interface between target ecosystems 'wet forest and woodland' and the adjacent banksia woodland ecosystems in the east of the site.</li> <li>This ecosystem is located in the Hope Road North and Bibra Drive management areas.</li> </ul>
<b>Banksia woodland</b>  <p>Plate 4: Example of banksia woodland ecosystem</p>	<ul style="list-style-type: none"> <li>The 'banksia woodland' ecosystem is characterized by a mixed low canopy of slender banksia and firewood banksia with occasional sheoak.</li> <li>This ecosystem is located under existing electrical powerlines and must conform to Western Power height restrictions, hence the lack of tall eucalypt trees.</li> <li>This ecosystem is located in Hope Road North management area.</li> </ul>

# Target Ecosystem Identification and Baseline Inventory Report

## Roe 8 Cleared Areas



Table 1 (cont.): Target ecosystems within the site.

Target Ecosystem <sup>†</sup>	Description
<b>Banksia/jarrah woodland</b>  <p>Plate 5: Example of banksia woodland target ecosystem.</p>	<ul style="list-style-type: none"> <li>The 'banksia/jarrah woodland' ecosystem is characterized by a mixed canopy of slender banksia, firewood banksia and jarrah with occasional jarrah, marri and sheoak.</li> <li>This ecosystem corresponds to FCT 28 (Gibson <i>et al.</i> 1994).</li> <li>This ecosystem is widespread across the site and occurs in Spearwood and Bassendean soil associations.</li> <li>This ecosystem is located in Hope Road North, North Lake Road East, North Lake Road West, Forrest Road North and Forrest Road South management areas.</li> </ul>
<b>Banksia/woody pear woodland</b>  <p>Plate 6: Example of banksia/woody pear woodland target ecosystem.</p>	<ul style="list-style-type: none"> <li>The 'banksia/woody pear woodland' ecosystem is characterized by the presence of woody pear amongst a mixed canopy of sheoak, slender banksia, firewood banksia, marri and jarrah.</li> <li>This ecosystem corresponds to FCT 28 (Gibson <i>et al.</i> 1994).</li> <li>The presence of woody pear is unique to this part of the site and is uncommonly recorded within FCT 28.</li> <li>The extent of this ecosystem is associated with a shallow dune swale that occurs in this location. The soil in this area is mapped as Tamala sand (Gozzard 2011).</li> <li>This ecosystem is located in the North Lake Road West management area.</li> </ul>
<b>Banksia/tuart woodland</b>  <p>Plate 7: Example of banksia/tuart woodland target ecosystem.</p>	<ul style="list-style-type: none"> <li>The 'banksia/tuart woodland' ecosystem is characterized by the presence of tuart amongst a mixed canopy of sheoak, slender banksia, firewood banksia, marri and jarrah.</li> <li>This ecosystem corresponds to FCT 28 (Gibson <i>et al.</i> 1994).</li> <li>Tuarts are known to occur in a narrow band along the coast of SW WA, and correspond to the presence of limestone which is present in this area (Gozzard 2011).</li> <li>The extent of this ecosystem is associated with the western margin of the site.</li> <li>This ecosystem is located in the Stock Road West management zone.</li> </ul>

<sup>†</sup>Wetland ecosystem introduced first and banksia woodland ecosystems introduced in order of occurrence from east to west across the site.



## Target Ecosystem Identification and Baseline Inventory Report

### Roe 8 Cleared Areas



#### 4.3 Associated native flora species

Native flora species that are associated with each target ecosystem were primarily identified from the Keighery *et al.* (2012) FCT dataset. For the wet forest and woodland target ecosystem species were selected from all 13 of the Keighery sample plots. For the banksia woodland target ecosystem species were selected from the closest five Keighery sample plots for FCTs 21c, 23a and 28. Additional species were then included where they were recorded during previous surveys or monitoring undertaken in 2017. As more species are recorded during monitoring the list of associated species may be updated.

The lists of associated native flora species that are currently identified for each target ecosystem are provided in **Appendix D**.

#### 4.4 Important species

Important species are identified to guide the focus of restoration. The important species outlined include diagnostic, larger structural components of the target ecosystems (native canopy flora species), conservation significant species (native fauna) and potentially significant threats to the restoration of target ecosystems (weeds and pest fauna species). Note the important species are not the only native species that have a significant, valuable or otherwise meaningful role within the target ecosystems. The species identified as important may change over time as new information is obtained.

##### 4.4.1 Native flora

The flora species identified as 'important' to each target ecosystem include canopy and large midstorey species that were considered diagnostic for that ecosystem<sup>5</sup>. The important flora species currently identified for each ecosystem are shown in **Table 6**.

Table 6: Important species for each target ecosystem

Species	Target Ecosystem						
	Banksia woodland	Banksia/coastal blackbutt woodland	Banksia/jarrah woodland	Banksia/tuart woodland	Banksia/woody pear woodland	Holly-leaved banksia woodland	Wet forest and woodland
<i>Allocasuarina fraseriana</i>	✓	✓	✓	✓	✓	✓	
<i>Banksia attenuata</i>	✓	✓	✓	✓	✓	✓	
<i>Banksia ilicifolia</i>						✓	
<i>Banksia menziesii</i>	✓	✓	✓	✓	✓	✓	
<i>Eucalyptus gomphocephala</i>				✓			
<i>Eucalyptus marginata</i> subsp. <i>marginata</i>	✓	✓	✓	✓	✓	✓	

<sup>5</sup> Does not indicate that other species are not valued or important.

# Target Ecosystem Identification and Baseline Inventory Report

## Roe 8 Cleared Areas



Table 6: Important species for each target ecosystem (cont)

Species	Target Ecosystem						
	Banksia woodland	Banksia/ coastal blackbutt woodland	Banksia/ jarrah woodland	Banksia/ tuart woodland	Banksia/ woody pear woodland	Holly-leaved banksia woodland	Wet forest and woodland
<i>Eucalyptus rudis</i> subsp. <i>rudis</i>							✓
<i>Eucalyptus tottiana</i>		✓					
<i>Macrozamia fraseri</i>	✓	✓	✓	✓	✓	✓	
<i>Melaleuca preissiana</i>							✓
<i>Melaleuca raphiophylla</i>							✓
<i>Xanthorrhoea preissii</i>	✓	✓	✓	✓	✓	✓	
<i>Xylomelum occidentale</i>					✓		

### 4.4.2 Non-native flora (weeds)

Non-native flora species identified as 'important' across the site are listed **Table 7**. This list comprises the non-native flora (weed) species most commonly recorded during the 2017 baseline inventory survey and the monitoring survey. Other weed species may also be present in the site and of particular note are species listed in the *Environmental weed census and prioritisation* (Keighery and Bettink 2008).

Table 7: Non-native flora taxa recorded in the site that are considered important for management

Wee category	Species	Pest Status	
		BAM Act	Environmental Weed <sup>†</sup>
Grassy	<i>Avena</i> spp. (wild oats)	-	✓
	<i>Ehrharta calycina</i> (perennial veldt grass)	-	✓
	<i>Ehrharta longifolia</i> (annual veldt grass)	-	✓
	<i>Eragrostis curvula</i> (African love grass)	-	✓
Bulbous	<i>Freesia alba</i> × <i>leichtlinii</i> (freesia)	-	✓
	<i>Gladiolus caryophyllaceus</i> (wild gladiolus)	-	✓
	<i>Lachenalia reflexa</i> (yellow soldier)	-	✓
	<i>Zantedeschia aethiopica</i> (arum lily)	✓	✓
Woody	<i>Acacia longifolia</i> (Sydney golden wattle)	-	✓
	<i>Acacia iteaphylla</i> (Finders Range wattle)	-	✓
	<i>Chamaecytisus palmensis</i> (tagasaste)	-	✓
	<i>Chamelaucium uncinatum</i> (Geraldton wax)	-	✓
	<i>Leptospermum laevigatum</i> (Victorian tea-tree)	-	✓

<sup>†</sup>Swan Weeds (DBCA 2017)

## Target Ecosystem Identification and Baseline Inventory Report

### Roe 8 Cleared Areas



#### 4.4.3 Native fauna

Native fauna species identified as 'important' within the site are identified in **Table 8**. This list comprises fauna species of conservation significance that were recorded during previous surveys (see **Section 2.1.2**) and/or considered to have potential to occur in the site during the 2017 surveys.

Table 8: Native fauna considered important for restoration and management within the site.

Species	Conservation Status		
	EPBC Act	WC Act	DBC Conservation Category
<i>Calyptorhynchus baudinii</i> (Baudin's black cockatoo)	Endangered	Endangered (Schedule 2)	-
<i>Calyptorhynchus latirostris</i> (Carnaby's black cockatoo)	Endangered	Endangered (Schedule 2)	-
<i>Calyptorhynchus banksii naso</i> (Forest red-tailed black cockatoo)	Vulnerable	Vulnerable (Schedule 3)	-
<i>Lerista lineata</i> (Perth slider)	-	-	Priority 3
<i>Isoodon obesulus fusciventer</i> (quenda)	-	-	Priority 4
<i>Chelodina oblonga</i> (oblong tortoise)^	-	-	-

^=Not listed as a species of conservation significance but considered to have local significance.

#### 4.4.4 Non-native fauna

Non-native fauna species identified as 'important' across the site are listed in **Table 9**. This list comprises non-native fauna species that were recorded during previous surveys (see **Section 2.1.2**) and considered to pose a high threat and/or considered to have potential to occur in the site during the 2017 surveys.

Table 9: Non-native fauna taxa considered important for restoration and management within the site

Species	Pest Status (BAM Act)
<i>Oryctolagus cuniculus</i> (European rabbit)	C3
<i>Vulpes vulpes</i> (European red fox)	C1, C3
<i>Apis mellifera</i> (European honeybee)	C1
<i>Felis catus</i> (feral cat)	Permitted



## Target Ecosystem Identification and Baseline Inventory Report

### Roe 8 Cleared Areas



## 5 References

### 5.1 General references

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- Department of the Environment and Energy (DoEE) 2016, *Banksia Woodlands of the Swan Coastal Plain in Community and Species Profile and Threats Database*, Canberra.
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- Stevens, J., Rokich, D., Newton, V., Barrett, R. and Dixon, K. 2016, *Banksia woodlands: A restoration guide for the Swan Coastal Plain*, UWA Publishing, Crawley, Western Australia.
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## Target Ecosystem Identification and Baseline Inventory Report

### Roe 8 Cleared Areas



#### 5.2 Online references

Bureau of Meteorology (BOM) 2017, Climate Averages, viewed 14 June 2017,  
<<http://www.bom.gov.au/climate/data/>>.

Department of Biodiversity, Conservation and Attractions' (DBCA) 2017, Swan Weeds,  
accessed viewed 4nd December 2017,  
<<https://florabase.dpaw.wa.gov.au/weeds/swanweeds/>>

# Figures



*Figure 1: Site Location*

*Figure 2: Management Areas*

*Figure 3: Site features*

*Figure 4: Existing and Proposed Tracks and Gates*

*Figure 5: Grassy Weed Cover*

*Figure 6: Bulbous Weed Cover*

*Figure 7: Woody Weed Cover*

*Figure 8: Native Germinant Abundance*

*Figure 9: Native Resprouter Abundance*

*Figure 10: Photo Points and Permanently Marked Plots*

*Figure 11: Reference Ecosystems*

*Figure 12: Target Ecosystems*







**Figure 1: Site Location**

**Project:** Reference Ecosystem Identification and Baseline Inventory Report  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)--F38a

**Drawn:** KNM

**Date:** 31/01/2018

**Checked:** RAO

**Approved:** TAA

**Date:** 31/01/2018



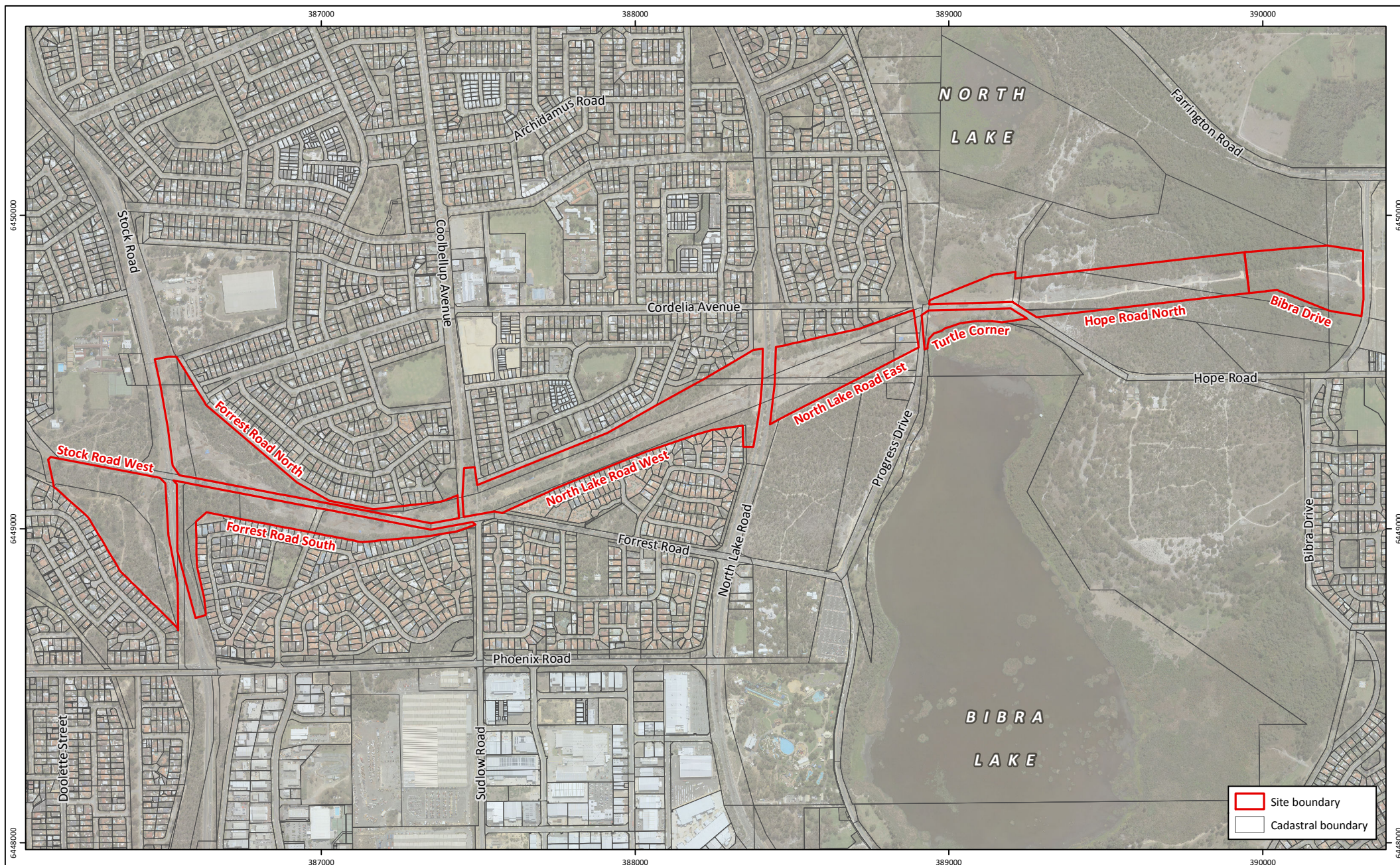
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GDA 1994 MGA Zone 50

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ASSOCIATES









**Figure 2: Management Areas**

**Project:** Reference Ecosystem Identification and Baseline Inventory Report  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)--F39a

**Drawn:** KNM

**Date:** 31/01/2018

**Checked:** RAO

**Approved:** TAA

**Date:** 31/01/2018



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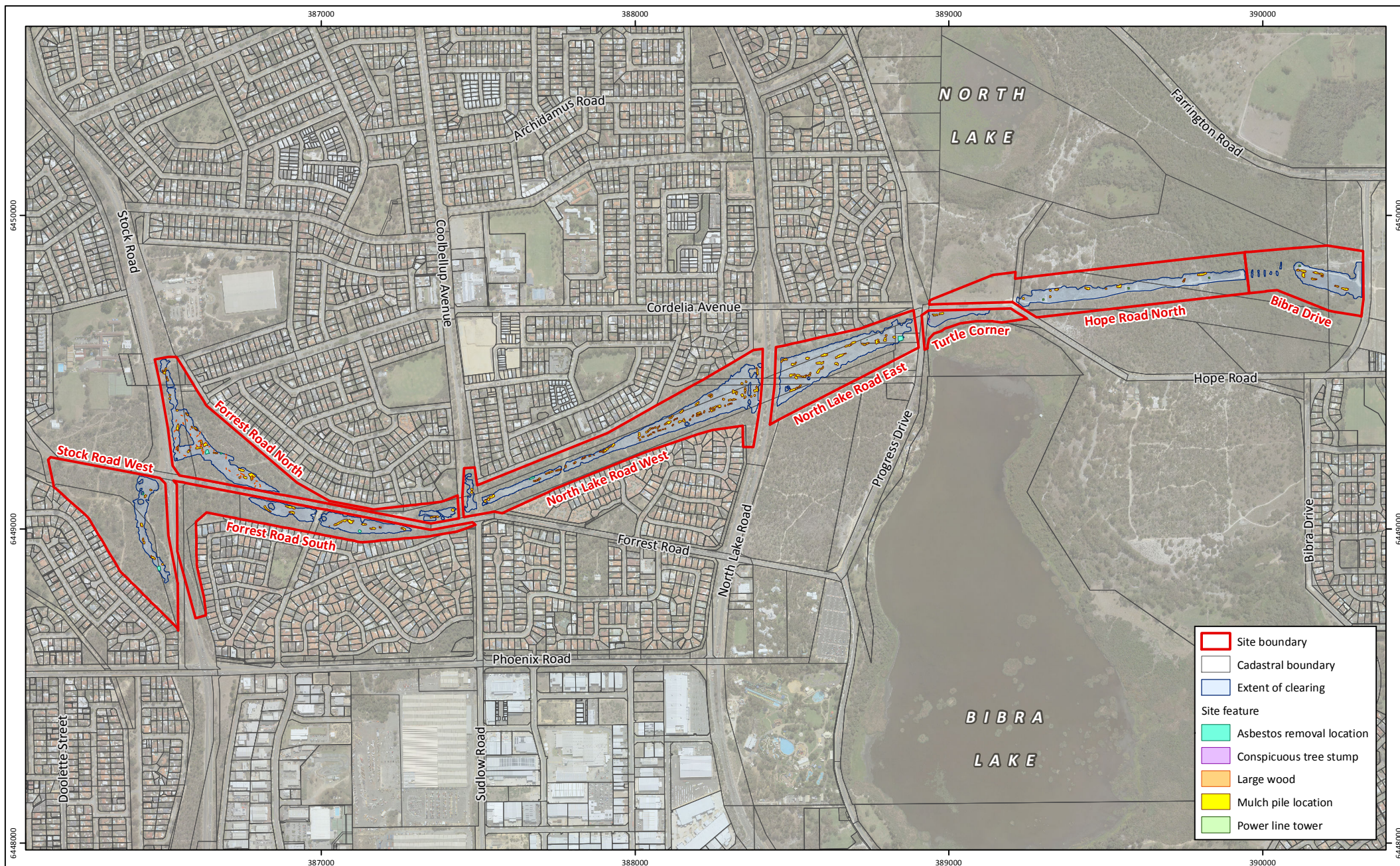
GDA 1994 MGA Zone 50

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**Figure 3: Site Features**

**Project:** Reference Ecosystem Identification and Baseline Inventory Report  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F41b

**Drawn:** RAO

**Date:** 23/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 23/02/2018



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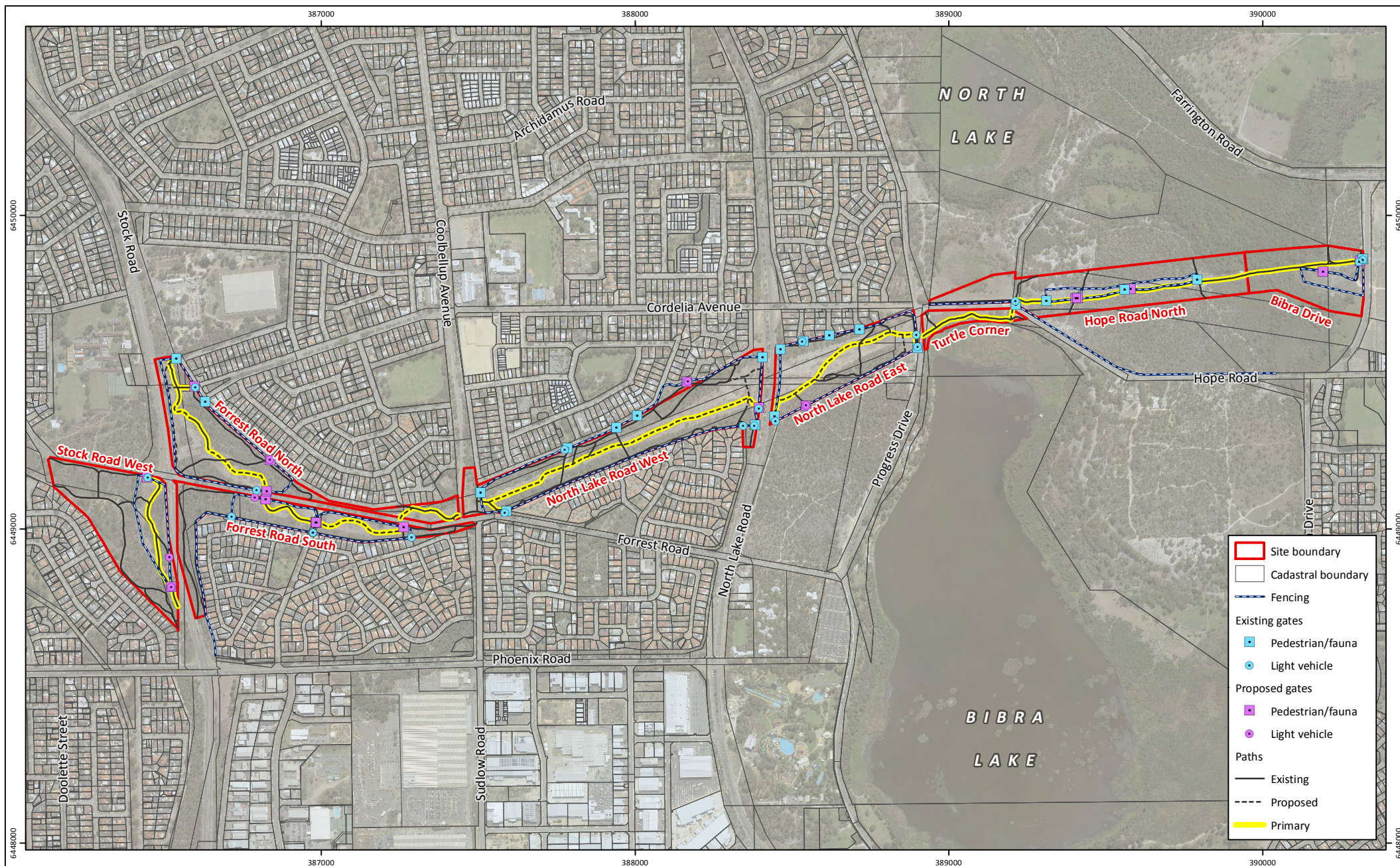
GDA 1994 MGA Zone 50

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**Figure 4: Existing and Proposed Gates and Paths**

**Project:** Reference Ecosystem Identification and Baseline Inventory Report  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F56a

**Drawn:** RAO

**Date:** 23/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 23/02/2018



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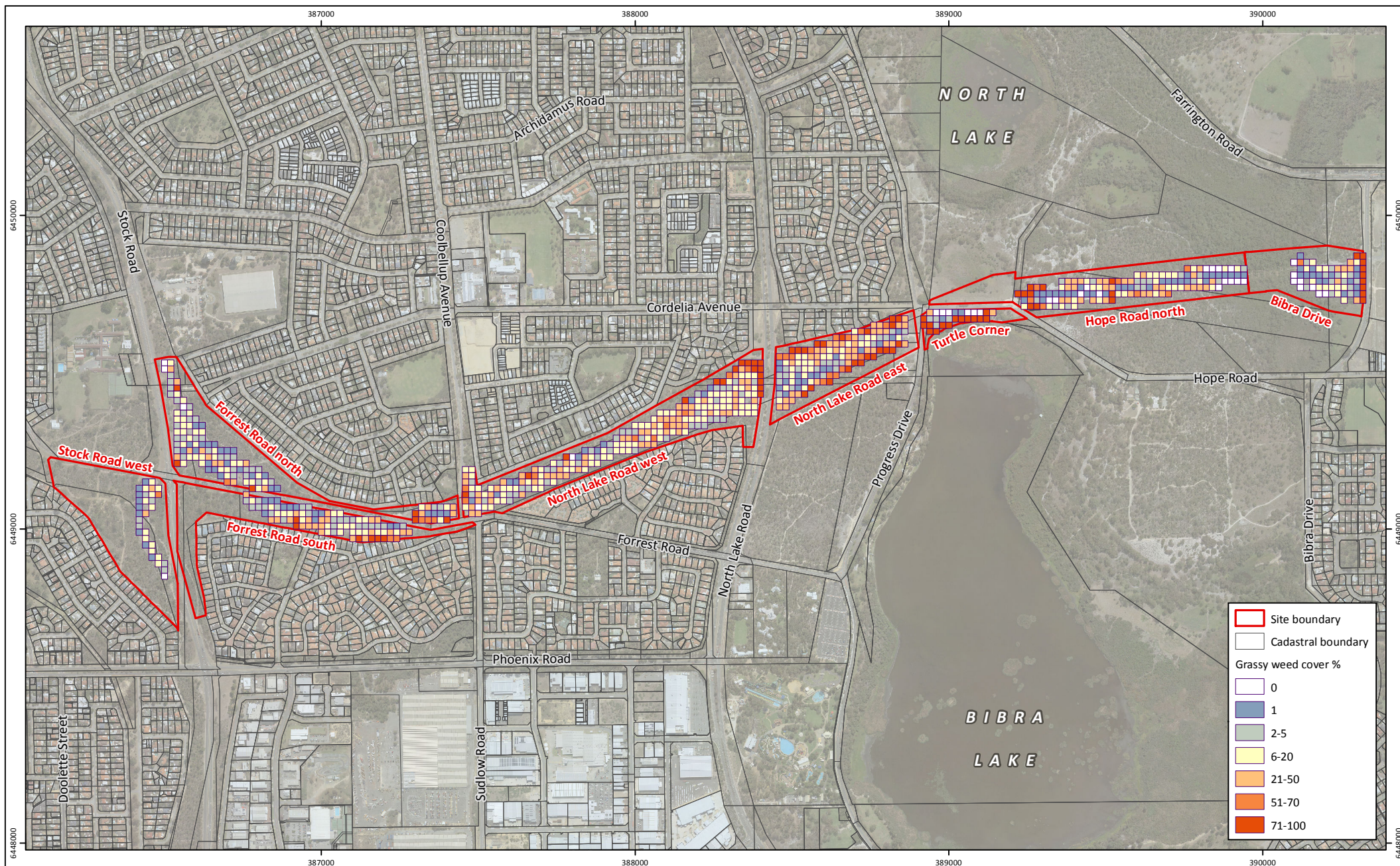
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GDA 1994 MGA Zone 50

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**Figure 5: Grassy Weed Cover**

**Project:** Reference Ecosystem Identification and Baseline Inventory Report  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F42b

**Drawn:** RAO

**Date:** 23/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 23/02/2018



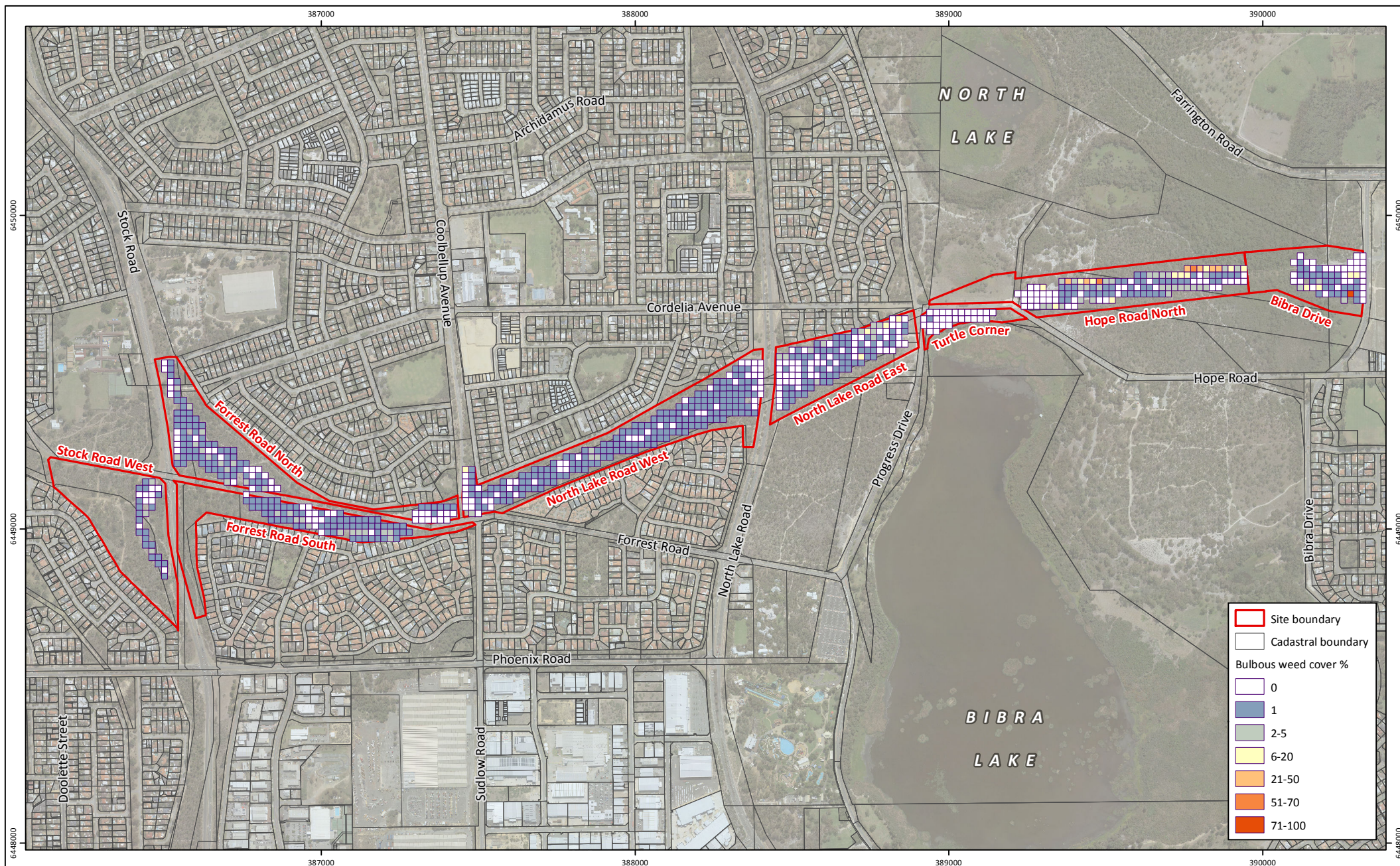
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GDA 1994 MGA Zone 50

**emerge**  
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**Figure 6: Bulbous Weed Cover**

**Project:** Reference Ecosystem Identification and Baseline Inventory Report  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F43b

**Drawn:** RAO

**Date:** 23/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 23/02/2018



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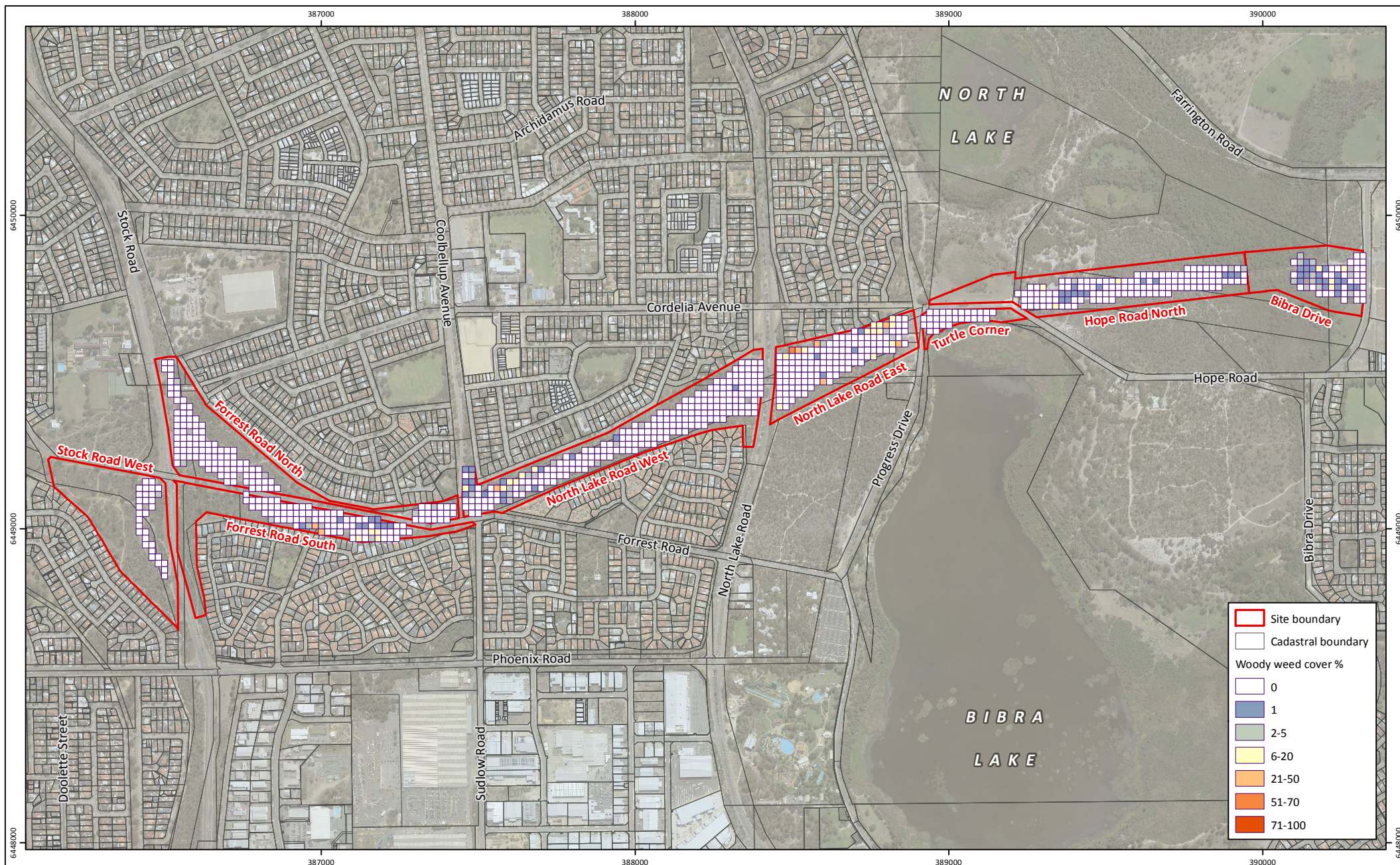
GDA 1994 MGA Zone 50

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**Figure 7: Woody Weed Cover**

**Project:** Reference Ecosystem Identification and Baseline Inventory Report  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F44b

**Drawn:** RAO

**Date:** 23/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 23/02/2018



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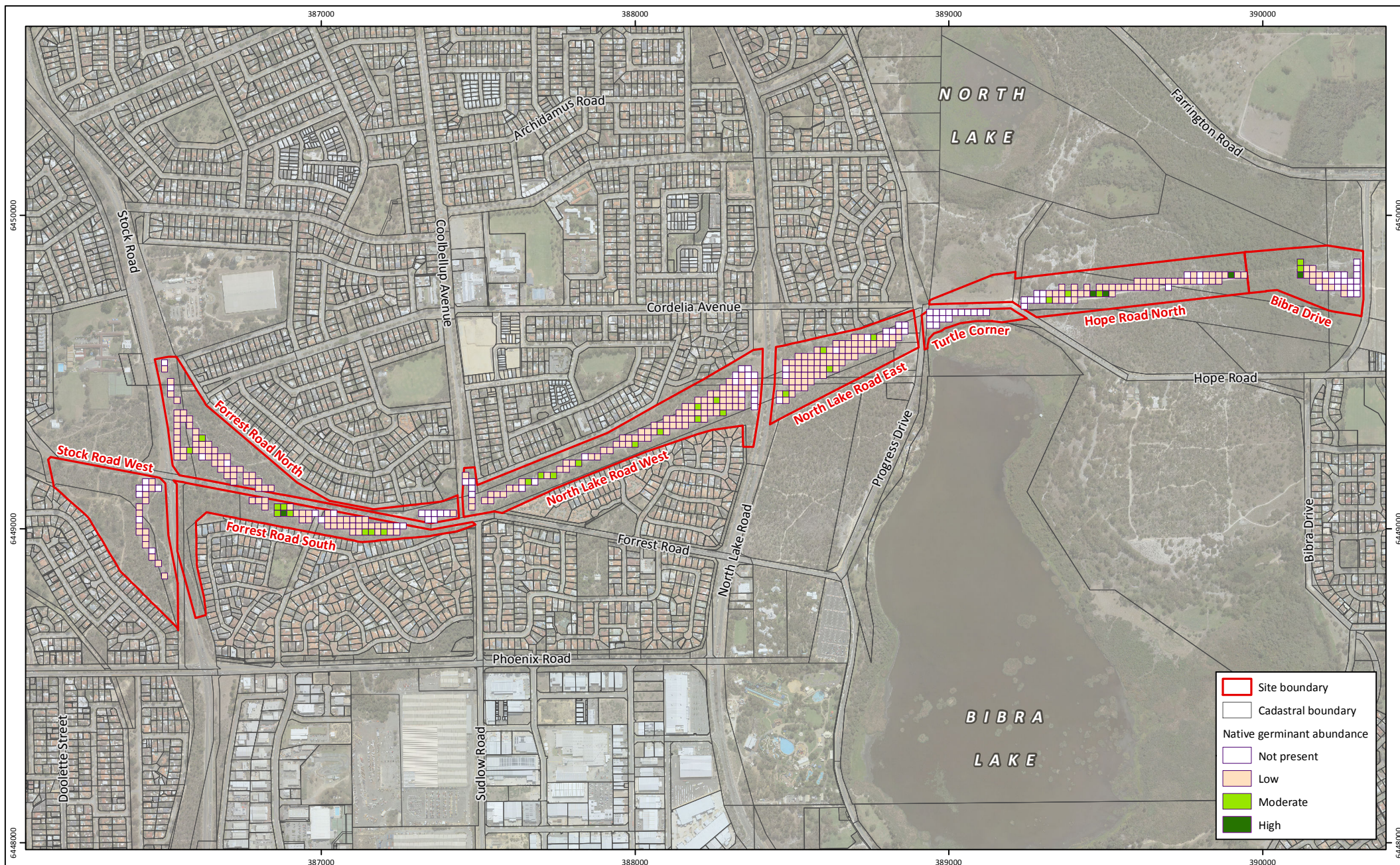
GDA 1994 MGA Zone 50

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**Figure 8: Native Germinant Abundance**

**Project:** Reference Ecosystem Identification and Baseline Inventory Report  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F45b

**Drawn:** RAO

**Date:** 23/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 23/02/2018



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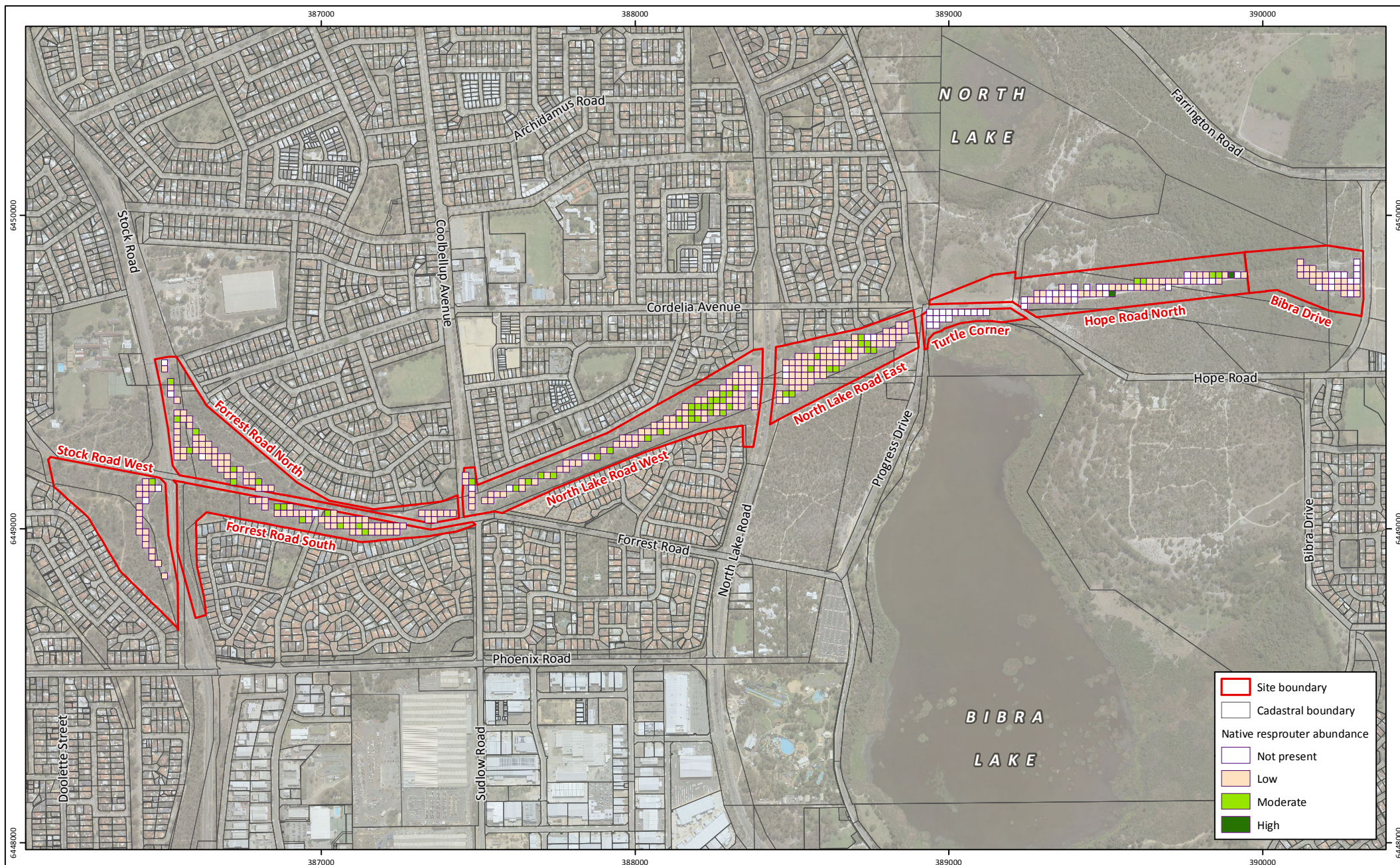
GDA 1994 MGA Zone 50

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**Figure 9: Native Resprouter Abundance**

**Project:** Reference Ecosystem Identification and Baseline Inventory Report  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F46b

**Drawn:** RAO

**Date:** 23/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 23/02/2018



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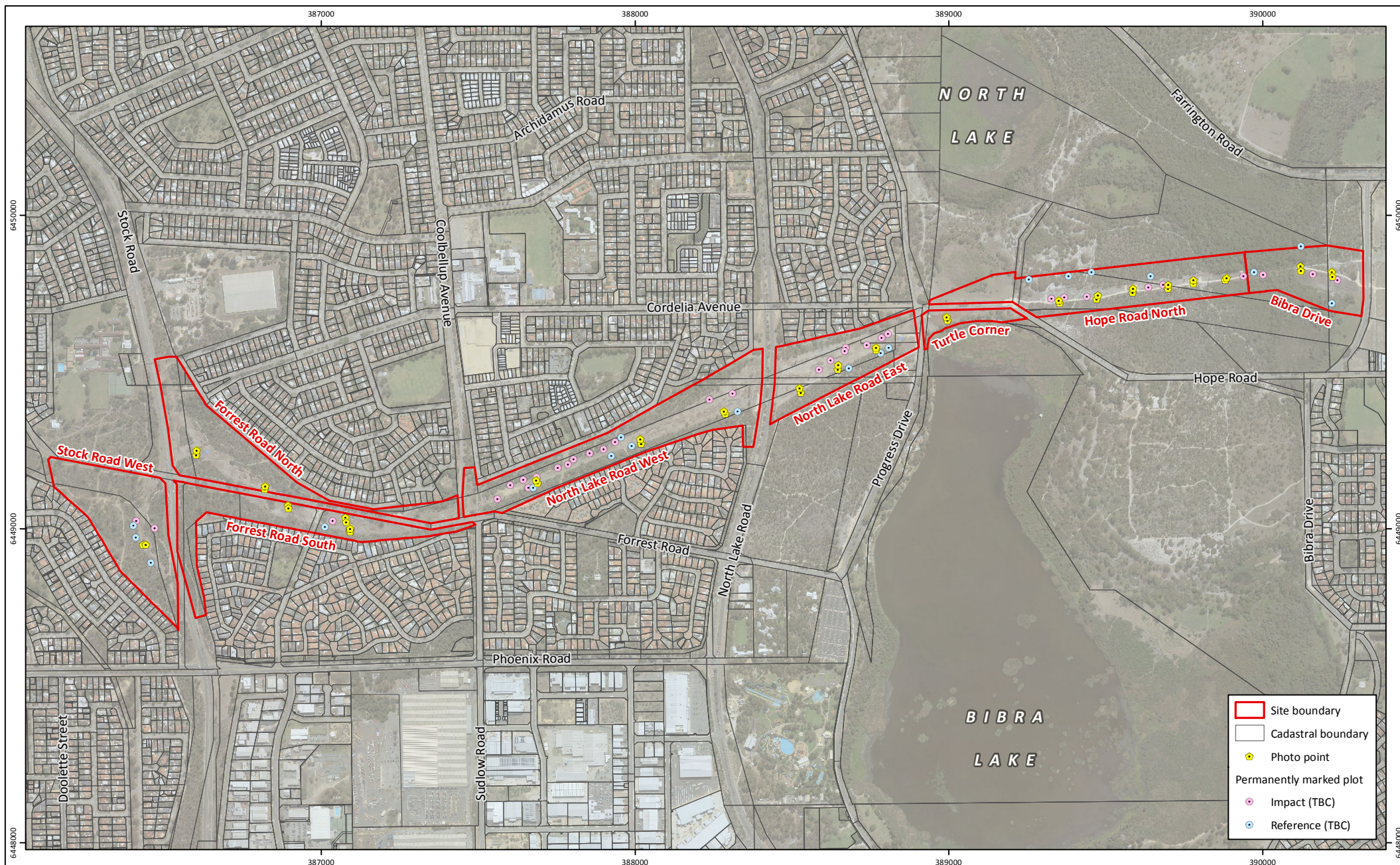
GDA 1994 MGA Zone 50

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**Figure 10: Photo Points and Permanently Marked Plots**

**Project:** Reference Ecosystem Identification and Baseline Inventory Report  
Roe 8 Cleared Areas  
**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F47b  
**Drawn:** RAO  
**Date:** 23/02/2018  
**Checked:** TAA  
**Approved:** TAA  
**Date:** 23/02/2018



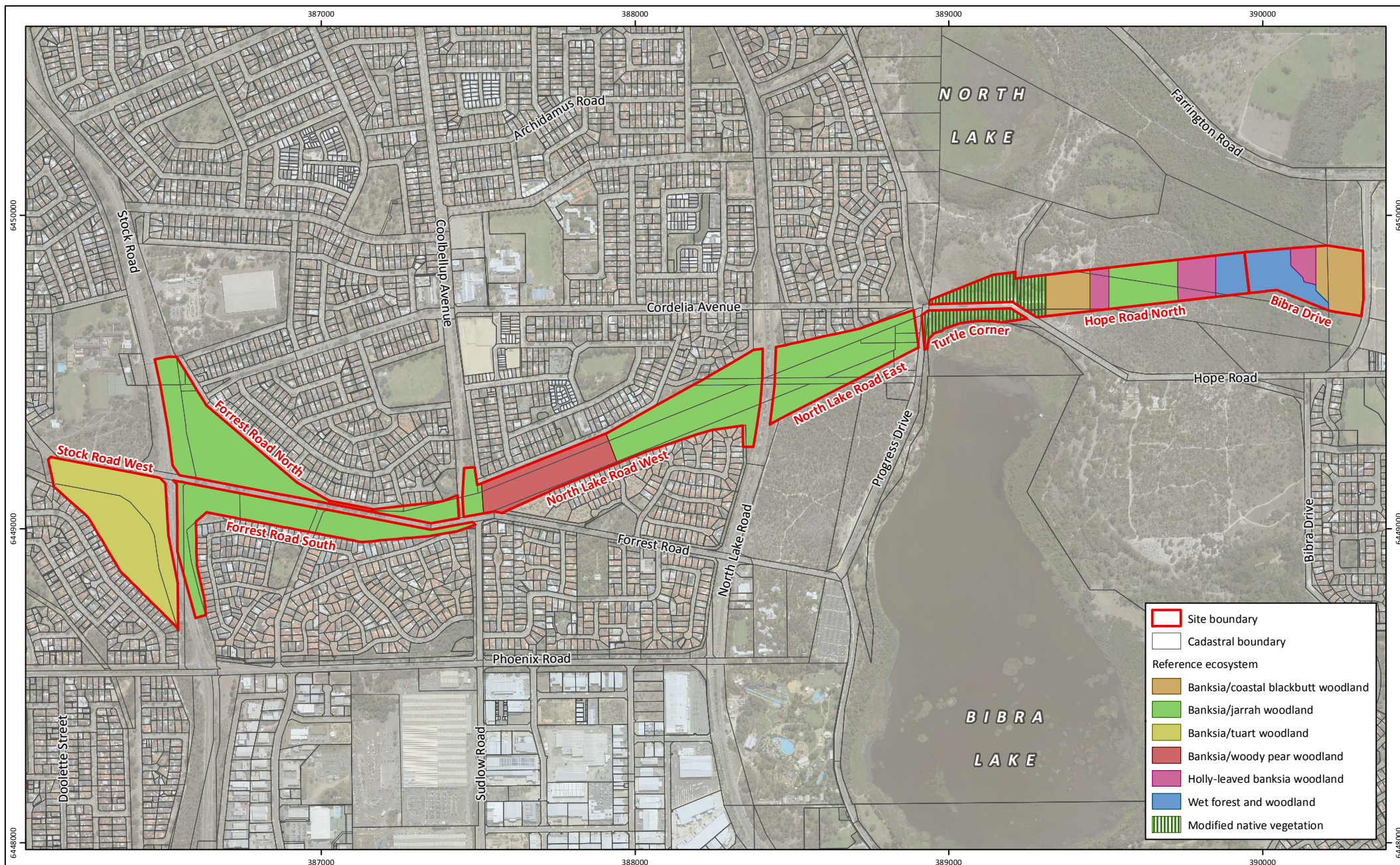
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GDA 1994 MGA Zone 50

**emerge**  
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**Figure 11: Reference Ecosystems**

**Project:** Reference Ecosystem Identification and Baseline Inventory Report  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F54a

**Drawn:** RAO

**Date:** 23/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 23/02/2018



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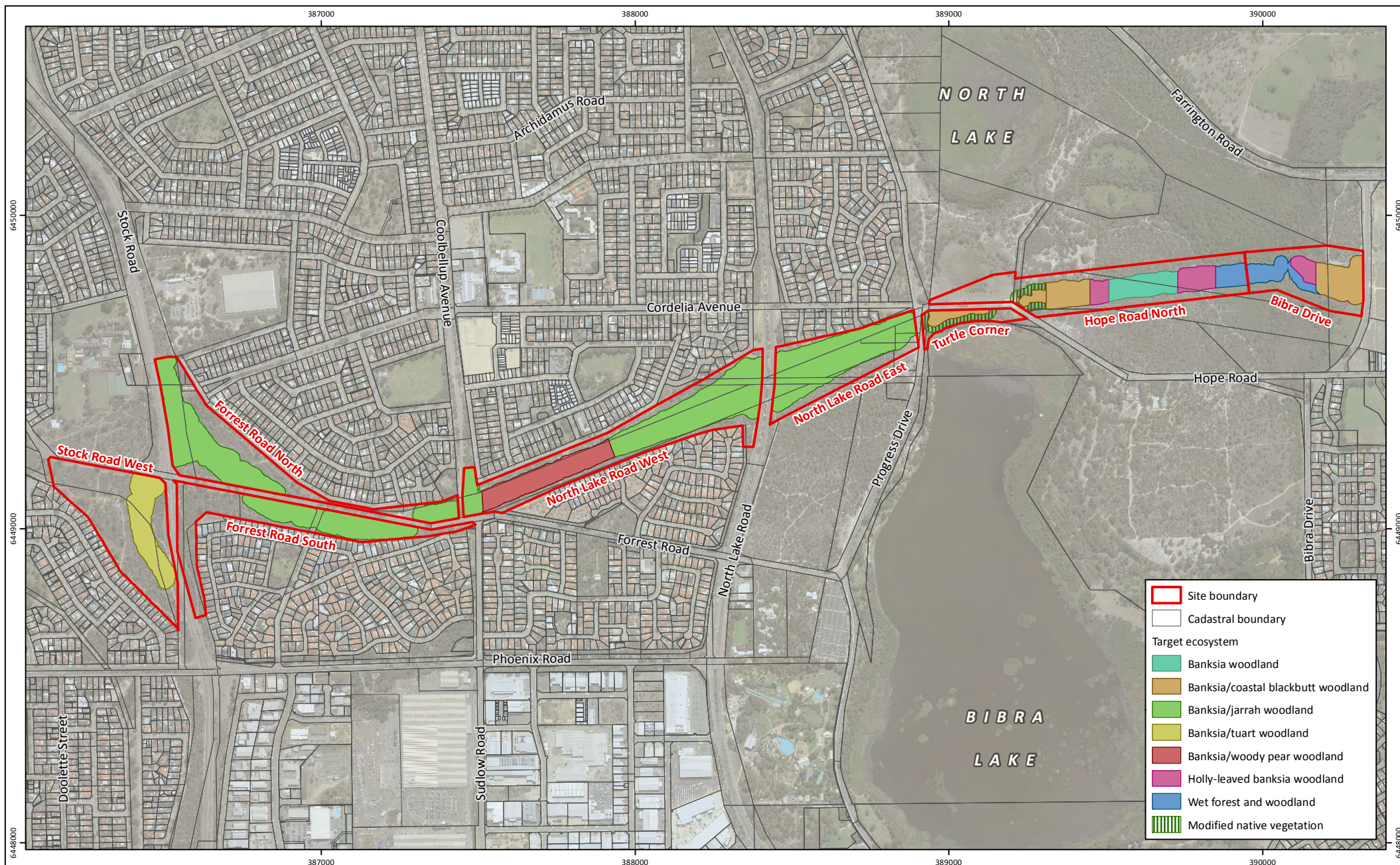
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**emerge**  
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**Figure 12: Target Ecosystems**

**Project:** Reference Ecosystem Identification and Baseline Inventory Report  
Roe 8 Cleared Areas  
**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F55a  
**Drawn:** RAO  
**Date:** 23/02/2018  
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**Approved:** TAA  
**Date:** 23/02/2018



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# Appendix A

Baseline Monitoring Survey Methodology – Murdoch  
University 2017







## Recovery of native vegetation at Roe 8

Written by Dr Rachel Standish, adapting methodology for the Swan Coastal Plain developed by Dr Mark Brundrett and others (Department of Biodiversity Conservation and Attractions)

Demonstrators: Dr Rachel Standish, Dr Phil Ladd and Dr Jane Chambers, Dr Thea Linke, Dr Mark Brundrett (Department of Biodiversity Conservation and Attractions), Dr Karen Clarke (Department of Biodiversity Conservation and Attractions)

*Project 3 for ENV241 students, on and around campus, September 2017*

**Important notice:** The Roe 8 site is a construction site and as such it is managed by Main Roads. Main Roads will supervise our research and everyone must wear high-visibility vests (supplied), closed shoes, long-sleeved shirts and long trousers. People not suitably dressed will not be able to work on site. Please bring your wet weather gear.

### Meeting place:

Group D and B meet at the Cockburn Wetlands Education Centre carpark (see map on last page) at 9.00 am on Monday 25 September

Group A and C meet at the Progress Drive carpark (see map on last page) at 1.30 pm on Wednesday 27 September

### Before you start:

1. Review some field guides for common native and weedy plants that grow in Perth (e.g., Dell and Bennett 1986, Hussey et al. 2007).
2. Revise basic statistics (e.g., means, variance, tests to determine statistical significance between means) and the use of Excel spread sheets.
3. Read some of the articles listed under 'References cited'.
4. Pack a raincoat, warm clothes, closed shoes, a notebook, a memory stick and other items listed in your Unit Information and Learning Guide.

### Introduction

Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed (SER 2004). At best, the practice of restoration is informed by ecological science, and actioned by the stakeholders with vested interests in the ecosystem requiring restoration. Stakeholders include conservation land managers,

ecologists, local community, and industry. One of the first steps in the restoration process is to assess the level of intervention required to achieve restoration goals. Intervention can range from doing nothing (i.e., unassisted recovery) to moderate intervention (e.g., installing fences to protect seedling recruits from herbivores; Prober et al. 2011) right through to high levels of intervention that include multiple activities (e.g., topsoil application, seeding, planting and fertiliser application; Daws et al. 2015). In some cases, the ecosystem will recover certain attributes without intervention. In these cases, restoration interventions would be designed to return attributes that the ecosystem has not recovered on its own. Measuring recovery prior to restoration is particularly important where the goal is the restoration of the historic native ecosystem (i.e., the native ecosystem that grew at the site prior to its being degraded, damaged or destroyed; the 'Vegetation reference' in Table 2).

Theory predicts unassisted recovery will occur in the absence of abiotic and biotic thresholds (Whisenant 1999). Thresholds are essentially barriers that prevent ecosystem recovery. For example, an abiotic barrier might be compact soils that limit growth of plant roots whereas a biotic barrier might be the presence of a competitive weed that negatively effects growth of native plants. Restoration would focus on interventions to overcome these barriers, so intervention to reduce soil compaction (e.g., through soil ripping) and interventions to reduce the abundance of the competitive weed (e.g., through herbicide application or hand-weeding). More than one barrier can be present at any one site and so the effort involved can be significant, particularly for large areas requiring restoration (Menz et al. 2013). For this reason, the absence of abiotic and biotic thresholds is particularly fortunate because it means the ecosystem itself will help with the process of recovery.

At the Roe 8 corridor, south of the Murdoch University South Street campus, there is an opportunity to measure how well the native vegetation has recovered since being cleared in February this year (Save Beelihar Wetlands 2017). The Roe 8 corridor cuts through a diversity of woodland and wetland communities and we will establish plots along the corridor that encompass this diversity. The data you and your fellow students collect will be used to inform the future restoration plan for the site (Flint 2017). We are very excited to give students the unique experience of seeing ecology in action! Demonstrators will be available to help students identify and distinguish seeders and sprouters (Table 1) and to ensure data are collected using the same methodology by groups of students working at different plots along the corridor. In this project, students will collect the following data from plots in the Roe 8 corridor and adjacent reference communities. For plots in the Roe 8 corridor, we will estimate

the percentage area of the plots that were covered in mulch between February and May 2017 (i.e., 0 to 100% cover). A thin layer of mulch cover will be evident indicating the footprint of the mulch piles that were removed in May. Also, we will estimate the percentage area of the plots that have been sprayed with herbicide on two occasions since the site was cleared (last application in late August 2017).

1. Plot attributes: Location, either Roe 8 corridor or reference community; distance to nearby native remnant vegetation for plots in the Roe 8 corridor (in m); and Heddl vegetation-soil type (Table 2)
2. Plot-level data: number and identity of trees (>1.2 m); soil pH and penetration resistance.
3. Sub-plot data: number, identity and percentage cover of native resprouters and seeders; percentage cover of leaf litter and bare ground.
4. Quadrat data: number, identity and percentage cover of native and weedy groundcovers.

Table 1. Glossary of key terms

Term	Definition
Seeder	Plant that recruits from seeds in soil
Resprouter	Plant that resprouts from root stock after disturbance, commonly fire, but also other disturbances such as clearing.



Table 2. Heddle soil-vegetation types along the Roe 8 corridor after Heddle (1979). Sections are numbered consecutively from east (inland; Section 1) to west (coastal; Section 20). The older soils are inland (i.e., Bassendean) and become progressively younger towards the coast. In addition to the Roe 8 disturbance, power-lines and a limestone track runs through regions 5 to 7. Sections 8, 18 and 19 won't be surveyed. **\*PLEASE REFER TO MAPS AT THE END OF THE DOCUMENT FOR DAILY MEETING POINTS.**

Section	Heddle soil type	Vegetation reference	Scheduled day & details*
1	Bassendean	Banksia woodland	MON AM Group B
2	Wetland	Low open flooded-gum forest	MON AM Group D
3	Wetland	Low open flooded-gum forest	MON AM Group D
4	Wetland	Low open paperbark woodland	MON AM Group D
5	Bassendean	Low banksia woodland	MON AM Group B
6	Bassendean	Low open banksia woodland	MON AM Group B
7	Bassendean	Banksia woodland	MON AM Group B
8	Herdsmen	Low open coastal-blackbutt woodland	NA
9	Herdsmen	Low open coastal-blackbutt woodland	WED PM Group A+C
10	Bassendean	Open jarrah-marri woodland	WED PM Group A+C
11	Karrakatta	Open jarrah-marri woodland	WED PM Group A+C
12	Karrakatta	Open jarrah-marri woodland	THURS PM Group A+C
13	Karrakatta	Jarrah-marri woodland	THURS PM Group A+C
14	Karrakatta	Jarrah-marri woodland	THURS PM Group A+C
15	Karrakatta	Jarrah-marri woodland	THURS AM Group A+C
16	Karrakatta	Jarrah-marri woodland	THURS AM Group A+C
17	Karrakatta	Jarrah-marri woodland	THURS AM Group A+C
18	Spearwood	Jarrah-marri woodland	NA
19	Spearwood	Jarrah-marri woodland	NA
20	Spearwood	Tuart woodland	TUES AM Group D+B

## Predictions

1. The vegetation structure, weed cover and species composition of vegetation in the Roe 8 corridor will be different to that of the nearby reference.
2. Resprouting plant species will be more abundant in plots compared with native plant species that recruit from seed.
3. Percentage cover and species richness of native plants will be inversely related to abundance and cover of weeds.
4. Recovery of native species will be greater for plots surrounded by mature native vegetation compared with recovery in plots close to sites where soils and/or vegetation has been modified (e.g., walking paths, urban areas).
5. Recovery of vegetation will be higher for unmodified soils (i.e., pH and penetration resistance similar to nearby soils under remnant vegetation) compared with recovery in plots with modified soils (e.g., mulch-affected, compacted).

## Materials and methods

### Field work

In the field you will need:

- Clipboard, pen and datasheets
- Robust footwear that encloses your feet (some groups will work in vegetation fringing wetlands)
- Sunscreen, hat and a raincoat in case of rain
- Drinking water to avoid dehydration and a snack
- Insect repellent if you do not like mosquitoes and hayfever medication if you suffer from hayfever.
- Zip-lock bag for soil samples (these will be provided).

Students will work in groups of three. Each group will collect data in 2-3 plots over 1.5 days and spend two half-days in the lab doing soil pH tests, checking and entering data into an Excel spreadsheet, and exploring the data. In the field on the first day, each 3-person group, will be assigned regions in which to work and a demonstrator. Groups will establish plots. Each plot is 20 m × 20 m plot and there are four 5 m × 5 m sub-plots nested within these larger plots. Additionally, students will collect data from 50 cm × 50 cm quadrats nested with the sub-plots (Figure 1). PLEASE WRITE NEATLY; ALL DATA SHEETS WILL BE COLLECTED AND KEPT AS A RECORD.

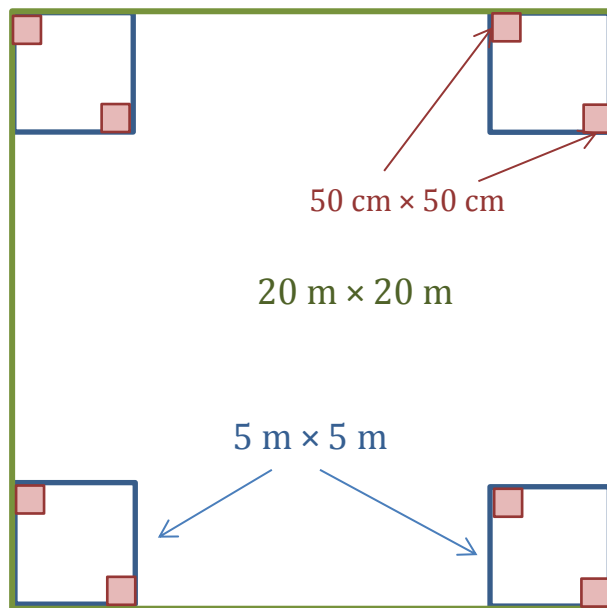


Figure 1. Size and configuration of plots ( $20\text{ m} \times 20\text{ m}$ ), sub-plots ( $5\text{ m} \times 5\text{ m}$ ) and quadrats ( $50\text{ cm} \times 50\text{ cm}$ ).

### Plant data

#### **$20\text{ m} \times 20\text{ m}$ plots**

- Establish a plot. Make it as square as you can by measuring the distance between diagonal corners of the plot; this distance should be 28.3 m.
- Record location of plot—corridor or reference.
- Visually estimate percentage cover of mulch-affected area in the plot.
- Visually estimate percentage cover of herbicide-affected area in the plot.
- Identify and count all the trees in the plot. Trees are defined as being taller than breast height (1.2 m).
- If you are unsure of the species identity of the trees then ask a demonstrator or take a photo.

#### **$5\text{ m} \times 5\text{ m}$ sub-plots**

- Consider each sub-plot in turn. Note whether or not you can see vehicle tracks in the sub-plot.
- Make a species list of all the native plant species in the sub-plot. Ask your demonstrator to help identify the species and whether or not they are seeders or resprouters. If you are unsure of the species identity of any plants and the demonstrator is not available then take a photo and use the pop-sticks to mark unknown plants.

- Visually estimate the percentage cover of each native plant species to the nearest ~1 % in the sub-plot using the cardboard squares provided as a guide. Some of the small and rare herbaceous species may occupy less than 1 % cover; for these species, it is fine to record percentage cover values less than 1 % (i.e., 0.5 %). Record the names of the people visually estimating percentage cover and note that the data will be more accurate if both people estimate and then verbally agree on the value to be recorded.
- Record the percentage cover of leaf litter and bare ground in the sub-plot.
- Repeat for all four sub-plots. Record data for each sub-plot separately.

### **50 cm × 50 cm quadrats**

- Consider each quadrat in turn. Make a species list of all the groundcover plant species in the sub-plot. Include both native and weedy species. Ask your demonstrator to help identify the species and whether or not they are seeders or resprouters. If you are unsure of the species identity of any plants and the demonstrator is not available then take a photo and use the pop-sticks to mark unknown plants.
- Count and also visually estimate the percentage cover of each groundcover plant species to the nearest ~5 % in the sub-plot using the cardboard squares provided as a guide. Some of the small and rare herbaceous species may occupy less than 5 % cover; for these species, it is fine to record percentage cover values less than 5 % (i.e., 1 or 2 %). Record the names of the people visually estimating percentage cover and note that the data will be more accurate if both people estimate and then verbally agree on the value to be recorded.
- Repeat for all eight quadrats. Record data for each quadrat separately.



Check if you have collected these data:

Data collected	50 cm × 50 cm quadrat	5 m × 5m sub-plot	20 m × 20 m plot
Groundcover species count	Yes		
Groundcover species percentage cover	Yes		
Native species count		Yes	
Native species percentage cover		Yes	
Leaf litter percentage cover		Yes	
Bare ground percentage cover		Yes	
Tree species count			Yes

#### Soil data

Label one of the zip-lock bags provided with the plot number, date, depth of soil sample (10 cm) and name of person collecting the soil. Use the auger provided to collect one soil core from the centre of the 20 m × 20 m plot. The top of the auger should be flush with the soil to reach a depth of 10 cm. Keep the sample cool (in the shade if possible) pending lab analysis.

Liaise with your demonstrator and Rachel to ensure Penny the penetrometer measures soil penetration resistance in your plot. Insert Penny to the left or right of where soil was collected with the auger, and away from the 5 m × 5 m sub-plots. Record the depth at which the probe stops penetrating the soil.

#### Other plot data

Use the measuring tapes provided to measure the distance between the centre of the 20 m × 20 m plot and the nearest patch of native vegetation. Make notes on any other things that you observe: animal scats, evidence of herbivory, animal diggings, track marks, etc.

Obtain a GPS reading for the centre of your plot.

#### Laboratory-based research

In the laboratory you will need:

- Books to help identify the plant species

- Hand lens (if you have one)
- Laptop computer
- Calculator
- pH meter, spoon and balance (all provided)

There are three tasks to complete in the laboratory before you move onto the next project or go home. The first two tasks should be prioritized ahead of the third, because it is important to confirm species identification while the plants are fresh in your mind. The third task, data entry, shouldn't be neglected though because you won't be able to write the report without copies of the data. Data entry should be a group effort.

#### Task 1: Soil pH

- Use a spoon to weigh out about 10 g (to the nearest half gram), of your soil sample into the container provided.
- Add 50ml of distilled water to the soil. The ideal is a 1:5 ratio of soil to water.
- Shake the container for about three minutes then allow the soil to settle for 2 minutes.
- Measure the pH value on the water above the soil in the container. Ensure you get a steady reading on the digital readout.
- Wash the container ready for the next sample.

#### Task 2: Confirm identification of plant species collected in the field

- Use the field guides and search the Western Australian herbarium (1998-) online to confirm the identification of the plant species in your field herbarium.

#### Task 3: Data entry

- Work within and between groups to design spread-sheets for your data.
- Ultimately you will need every group's data in one file.

### **Data analysis**

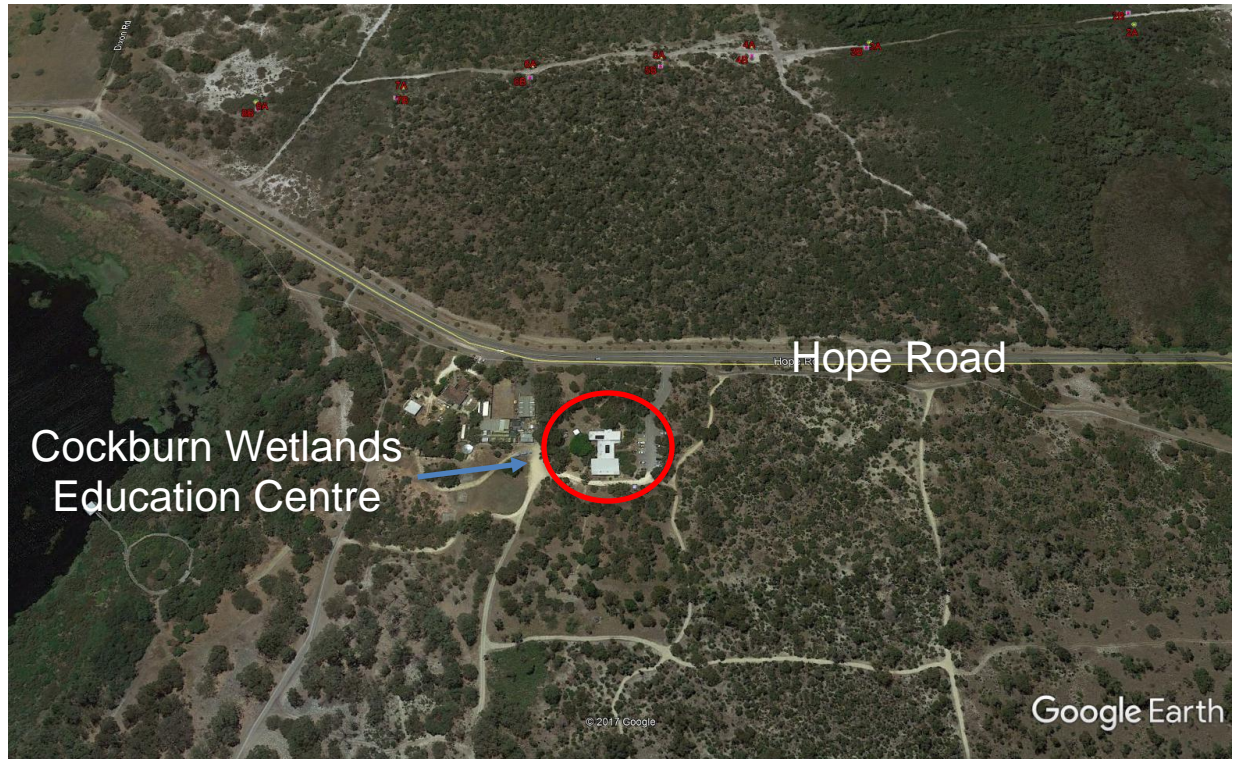
Use bar charts and scatter plots to explore your data and test the predictions listed at the beginning of this document. Use simple tests such as t-tests, ANOVA and regression analysis to provide statistical support for the observed patterns. Refer to the Unit Information and Learning Guide for information on how to write your scientific report.

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Map showing Cockburn Wetlands Education Centre carpark meeting point circled in red: MON AM + PM



Map showing Yorston Place meeting point circled in red: TUES AM





Map showing Progress Drive car park meeting point circled in red: WED PM



Map showing Malvolio Road meeting point circled in red: THURS AM + PM



# Appendix B

Raw data – 2017 Site Assessment (Emerge Associates 2017)

To be provided as a Microsoft *Excel* file





# Appendix C

Raw Data – Baseline Monitoring Survey (Murdoch University  
2017)

To be provided by Murdoch University







# Appendix D

Associated Native Flora Species Lists





#### Appendix D: Native flora species associated with each target ecosystem

Keighery *et al.* (2012) frequency % shown is for the closest five (5) sites for all target ecosystems except wet forest and woodland for which frequency % is from all Keighery *et al.* (2012) sites. Presence/absence data from a portion of Murdoch (2017) monitoring sites is also displayed as 'ongoing monitoring'. Complete data from Murdoch 2017 and Emerge Associates 2017 surveys will be included once finalised data is provided. Bold font indicates 'important species' for each target ecosystem which comprise canopy and large shrub species.

Species	Target Ecosystem													
	Banksia woodland		Banksia/coastal blackbutt woodland		Banksia/jarrah woodland		Banksia/tuart woodland		Banksia/woody pear woodland		Holly-leaved banksia woodland		Wet forest and woodland	
	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring
<i>Acacia alata</i> var. <i>alata</i>	-	-	-	-	-	-	-	-	-	-	-	✓	-	-
<i>Acacia applanata</i>	-	-	-	-	20%	-	20%	-	20%	-	-	-	-	-
<i>Acacia cyclops</i>	-	-	-	✓	-	-	-	✓	-	-	-	-	-	-
<i>Acacia dentifera</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Acacia huegelii</i>	20%	-	60%	-	40%	-	40%	-	40%	✓	20%	-	-	-
<i>Acacia pulchella</i>	80%	-	80%	✓	20%	✓	20%	✓	20%	✓	80%	-	20%	-
<i>Acacia saligna</i>	-	-	-	✓	-	-	-	-	-	✓	-	-	27%	✓
<i>Acacia sessilis</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Acacia stenoptera</i>	60%	-	-	-	40%	✓	40%	-	40%	-	60%	-	7%	-
<i>Acacia willdenowiana</i>	-	-	-	-	20%	-	20%	-	20%	-	-	-	-	-
<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	20%	-	60%	-	20%	-	20%	-	20%	-	20%	-	-	-
<i>Adenanthos meisneri</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Adiantum aethiopicum</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Agrostocrinum scabrum</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<b><i>Allocasuarina fraseriana</i></b>	<b>40%</b>	-	<b>40%</b>	-	<b>20%</b>	-	<b>20%</b>	-	<b>20%</b>	-	<b>40%</b>	-	-	-
<i>Allocasuarina humilis</i>	40%	-	40%	-	-	✓	-	-	-	-	40%	-	-	-
<i>Alternanthera nodiflora</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Amphipogon laguroides</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Amphipogon turbinatus</i>	60%	-	60%	-	40%	-	40%	-	40%	-	60%	-	-	-
<i>Anarthria gracilis</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Anigozanthos humilis</i> subsp. <i>humilis</i>	20%	-	-	-	40%	-	40%	✓	40%	-	20%	-	-	-
<i>Anigozanthos manglesii</i> subsp. <i>manglesii</i>	-	-	60%	-	20%	✓	20%	-	20%	-	-	-	-	-
<i>Anigozanthos viridis</i> subsp. <i>viridis</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Anthotium junciforme</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Aotus intermedia</i>	-	-	-	-	-	-	-	-	-	-	-	-	20%	-
<i>Aotus procumbens</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Aphelia cyperoides</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Arnocrinum preissii</i>	20%	-	40%	-	-	-	-	-	-	-	20%	-	-	-
<i>Astartea affinis</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Astartea fascicularis</i>	-	-	-	✓	-	-	-	-	-	-	-	-	60%	-
<i>Asteridea pulverulenta</i>	-	-	20%	-	20%	-	20%	-	20%	-	-	-	7%	-
<i>Astroloma pallidum</i>	-	-	-	-	20%	-	20%	-	20%	-	-	-	7%	-
<i>Astroloma xerophyllum</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Austrostipa compressa</i>	80%	-	80%	-	40%	-	40%	-	40%	-	80%	-	7%	-
<i>Austrostipa flavescens</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Babingtonia camphorosmae</i>	-	-	-	-	20%	-	20%	-	20%	-	-	-	-	-
<b><i>Banksia attenuata</i></b>	<b>80%</b>	-	<b>80%</b>	-	<b>100%</b>	✓	<b>100%</b>	✓	<b>100%</b>	✓	<b>80%</b>	-	-	-
<i>Banksia dallanneyi</i>	-	-	20%	-	20%	-	20%	✓	20%	-	-	-	-	-
<b><i>Banksia ilicifolia</i></b>	60%	-	60%	-	20%	-	20%	-	20%	-	<b>60%</b>	-	-	-
<i>Banksia littoralis</i>	-	-	-	✓	-	-	-	-	-	-	-	-	13%	-



**Appendix D: Native flora species associated with each target ecosystem**

Keighery *et al.* (2012) frequency % shown is for the closest five (5) sites for all target ecosytems except wet forest and woodland for which frequency % is from all Keighery *et al.* (2012) sites. Presence/absence data from a portion of Murdoch (2017) monitoring sites is also displayed as 'ongoing monitoring'. Complete data from Murdoch 2017 and Emerge Associates 2017 surveys will be included once finalised data is provided. Bold font indicates 'important species' for each target ecosystem which comprise canopy and large shrub species.

Species	Target Ecosystem													
	Banksia woodland		Banksia/coastal blackbutt woodland		Banksia/jarrah woodland		Banksia/tuart woodland		Banksia/woody pear woodland		Holly-leaved banksia woodland		Wet forest and woodland	
	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring
<b><i>Banksia menziesii</i></b>	100%	-	100%	-	60%	-	60%	-	60%	-	100%	-	-	-
<i>Banksia sessilis</i> var. <i>sessilis</i>	-	-	-	-	-	-	-	✓	-	-	-	-	-	-
<i>Baumea articulata</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Baumea juncea</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Beaufortia elegans</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Boronia ramosa</i> subsp. <i>ramosa</i>	-	-	20%	-	-	-	-	-	-	✓	-	-	-	-
<i>Bossiaea eriocarpa</i>	100%	-	100%	-	40%	✓	40%	✓	40%	✓	100%	-	-	-
<i>Brachyloma preissii</i>	20%	-	20%	-	20%	-	20%	-	20%	-	20%	-	-	-
<i>Burchardia congesta</i>	80%	-	80%	✓	100%	✓	100%	✓	100%	✓	80%	-	-	-
<i>Burchardia multiflora</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Caesia micrantha</i>	-	-	-	-	40%	-	40%	✓	40%	✓	-	-	13%	-
<i>Caladenia flava</i> subsp. <i>flava</i>	20%	-	-	✓	60%	-	60%	✓	60%	✓	20%	-	7%	-
<i>Caladenia georgei</i>	-	-	-	✓	20%	-	20%	✓	20%	-	-	-	-	-
<i>Caladenia latifolia</i>	-	-	-	✓	-	-	-	-	-	-	-	-	7%	-
<i>Caladenia longicauda</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Caladenia paludosa</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Calandrinia corrigioloides</i>	-	-	-	✓	-	-	-	✓	-	-	-	-	-	-
<i>Calectasia narragara</i>	20%	-	20%	-	-	-	-	-	-	-	20%	-	-	-
<i>Calothamnus lateralis</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Calytrix angulata</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Calytrix flavescens</i>	80%	-	80%	-	-	-	-	-	-	-	80%	-	-	-
<i>Calytrix fraseri</i>	40%	-	40%	-	-	-	-	-	-	-	40%	-	-	-
<i>Carex thecata</i>	20%	-	-	-	-	-	-	-	-	-	20%	-	7%	-
<i>Cartonema philydroides</i>	-	-	40%	✓	-	-	-	-	-	-	-	-	-	-
<i>Cassytha flava</i>	40%	-	-	-	-	-	-	-	-	-	40%	-	-	-
<i>Cassytha racemosa</i>	-	-	-	-	-	-	-	-	-	-	-	-	27%	-
<i>Centrolepis aristata</i>	-	-	-	-	-	-	-	-	-	-	-	-	33%	-
<i>Centrolepis drummondiana</i>	60%	-	60%	✓	40%	-	40%	-	40%	-	60%	-	13%	-
<i>Centrolepis glabra</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Centrolepis humillima</i>	20%	-	-	-	-	-	-	-	-	-	20%	-	-	-
<i>Centrolepis mutica</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Chamaescilla corymbosa</i> var. <i>corymbosa</i>	40%	-	40%	-	40%	-	40%	-	40%	-	40%	-	-	-
<i>Chordifex sinuosus</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Comesperma calymega</i>	20%	-	-	-	-	-	-	-	-	-	20%	-	-	-
<i>Conospermum stoechadis</i> subsp. <i>stoechadis</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Conospermum triplinervium</i>	-	-	-	-	20%	-	20%	-	20%	-	-	-	-	-
<i>Conostephium pendulum</i>	80%	-	-	-	60%	-	60%	-	60%	✓	80%	-	-	-
<i>Conostephium preissii</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Conostylis aculeata</i> subsp. <i>aculeata</i>	40%	-	60%	✓	80%	✓	80%	✓	80%	✓	40%	-	7%	-
<i>Conostylis candicans</i> subsp. <i>candicans</i>	-	-	-	-	-	✓	-	-	-	✓	-	-	-	-

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Species	Target Ecosystem													
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	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring
<i>Conostylis caricina</i> subsp. <i>caricina</i>	20%	-	-	-	-	-	-	-	-	-	20%	-	-	-
<i>Conostylis juncea</i>	20%	-	-	-	-	-	-	-	-	-	20%	-	-	-
<i>Conostylis setigera</i> subsp. <i>setigera</i>	40%	-	40%	-	80%	-	80%	-	80%	-	40%	-	-	-
<i>Corymbia calophylla</i>	-	-	-	-	60%	✓	60%	-	60%	✓	-	-	20%	-
<i>Corynotheca micrantha</i> var. <i>micrantha</i>	-	-	20%	-	20%	-	20%	-	20%	-	-	-	7%	-
<i>Cotula coronopifolia</i>	-	-	-	-	-	-	-	-	-	-	-	-	47%	-
<i>Crassula colorata</i> var. <i>colorata</i>	40%	-	40%	✓	-	-	-	✓	-	-	40%	-	-	-
<i>Crassula decumbens</i>	-	-	-	✓	-	-	-	-	-	-	-	-	-	-
<i>Crassula exserta</i>	-	-	-	✓	-	-	-	-	-	-	-	-	-	-
<i>Crassula natans</i> var. <i>minus</i>	-	-	-	-	-	-	-	-	-	-	-	-	27%	-
<i>Croninia kingiana</i>	20%	-	-	-	-	-	-	-	-	-	20%	-	-	-
<i>Cyathochaeta equitans</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Cycnogeton lineare</i>	-	-	-	-	-	-	-	-	-	-	-	-	20%	-
<i>Dampiera linearis</i>	80%	-	80%	✓	40%	✓	40%	-	40%	-	80%	-	13%	-
<i>Dasypogon bromeliifolius</i>	100%	-	100%	✓	60%	-	60%	-	60%	-	100%	-	13%	-
<i>Daucus glochidiatus</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Daviesia divaricata</i> subsp. <i>divaricata</i>	20%	-	-	-	40%	-	40%	-	40%	✓	20%	-	-	-
<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>	20%	-	-	-	40%	-	40%	-	40%	-	20%	-	-	-
<i>Daviesia triflora</i>	40%	-	-	-	20%	-	20%	-	20%	-	40%	-	-	-
<i>Desmocladus fasciculatus</i>	-	-	20%	-	40%	-	40%	-	40%	-	-	-	-	-
<i>Desmocladus flexuosus</i>	60%	-	60%	✓	40%	-	40%	✓	40%	✓	60%	-	-	-
<i>Deyeuxia quadriseta</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Dianella revoluta</i> var. <i>divaricata</i>	-	-	20%	✓	60%	✓	60%	✓	60%	✓	-	-	7%	-
<i>Dichelachne crinita</i>	-	-	-	-	20%	-	20%	-	20%	-	-	-	7%	-
<i>Dichopogon capillipes</i>	-	-	-	-	-	✓	-	-	-	✓	-	-	-	-
<i>Dielsia stenostachya</i>	-	-	-	-	-	-	-	-	-	-	-	-	27%	-
<i>Dillwynia dillwynioides</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Diuris longifolia</i>	-	-	-	-	60%	-	60%	-	60%	-	-	-	-	-
<i>Dodonaea hackettiana</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Drosera erythrorhiza</i> subsp. <i>erythrorhiza</i>	-	-	20%	-	-	✓	-	✓	-	✓	-	-	-	-
<i>Drosera glanduligera</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Drosera macrantha</i> subsp. <i>macrantha</i>	-	-	-	-	-	✓	-	✓	-	-	-	-	-	-
<i>Drosera menziesii</i> subsp. <i>menziesii</i>	-	-	-	✓	-	-	-	✓	-	✓	-	-	-	-
<i>Drosera menziesii</i> subsp. <i>penicillaris</i>	20%	-	40%	-	-	-	-	-	-	-	20%	-	-	-
<i>Drosera paleacea</i> subsp. <i>paleacea</i>	60%	-	-	-	-	-	-	-	-	-	60%	-	-	-
<i>Drosera pallida</i>	-	-	-	-	20%	-	20%	-	20%	-	-	-	-	-
<i>Drosera stolonifera</i>	-	-	-	✓	80%	✓	80%	✓	80%	✓	-	-	-	-
<i>Drosera stolonifera</i> subsp. <i>porrecta</i>	-	-	20%	-	-	-	-	-	-	-	-	-	7%	-
<i>Epilobium billardioreanum</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Epilobium hirtigerum</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-

#### Appendix D: Native flora species associated with each target ecosystem

Keighery *et al.* (2012) frequency % shown is for the closest five (5) sites for all target ecosystems except wet forest and woodland for which frequency % is from all Keighery *et al.* (2012) sites. Presence/absence data from a portion of Murdoch (2017) monitoring sites is also displayed as 'ongoing monitoring'. Complete data from Murdoch 2017 and Emerge Associates 2017 surveys will be included once finalised data is provided. Bold font indicates 'important species' for each target ecosystem which comprise canopy and large shrub species.

Species	Target Ecosystem													
	Banksia woodland		Banksia/coastal blackbutt woodland		Banksia/jarrah woodland		Banksia/tuart woodland		Banksia/woody pear woodland		Holly-leaved banksia woodland		Wet forest and woodland	
	Keighery et al. (2012)	Ongoing monitoring	Keighery et al. (2012)	Ongoing monitoring	Keighery et al. (2012)	Ongoing monitoring	Keighery et al. (2012)	Ongoing monitoring	Keighery et al. (2012)	Ongoing monitoring	Keighery et al. (2012)	Ongoing monitoring	Keighery et al. (2012)	Ongoing monitoring
<i>Eremaea asterocarpa</i> subsp. <i>asterocarpa</i>	20%	-	-	-	-	-	-	-	-	-	20%	-	-	-
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	40%	-	40%	-	-	-	-	-	-	-	40%	-	-	-
<i>Eryngium pinnatifidum</i> subsp. <i>pinnatifidum</i>	-	-	-	-	80%	✓	80%	✓	80%	✓	-	-	7%	-
<i>Eucalyptus gomphocephala</i>	-	-	-	-	20%	-	20%	✓	20%	-	-	-	-	-
<i>Eucalyptus marginata</i> subsp. <i>marginata</i>	#	-	40%	-	60%	✓	60%	✓	60%	✓	40%	-	20%	-
<i>Eucalyptus rudis</i> subsp. <i>rudis</i>	-	-	-	✓	-	-	-	-	-	-	-	-	60%	-
<i>Eucalyptus todtiana</i>	-	-	-	✓	-	-	-	-	-	-	-	-	-	-
<i>Ficinia nodosa</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Gahnia trifida</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Gastrolobium capitatum</i>	40%	-	-	-	100%	-	100%	-	100%	-	40%	-	-	-
<i>Gastrolobium ebracteolatum</i>	-	-	-	✓	-	-	-	-	-	✓	-	-	-	-
<i>Gompholobium capitatum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Gompholobium confertum</i>	20%	-	-	-	-	-	-	-	-	-	20%	-	-	-
<i>Gompholobium tomentosum</i>	100%	-	100%	✓	100%	✓	100%	✓	100%	✓	100%	-	7%	-
<i>Gonocarpus pithyoides</i>	40%	-	-	-	-	-	-	-	-	-	40%	-	-	-
<i>Goodenia pulchella</i>	-	-	-	-	-	-	-	-	-	-	-	-	20%	-
<i>Gratiola pubescens</i>	-	-	-	-	-	-	-	-	-	-	-	-	20%	-
<i>Haemodorum laxum</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Hakea candolleana</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Hakea prostrata</i>	-	-	-	-	20%	-	20%	✓	20%	-	-	-	-	-
<i>Hardenbergia comptoniana</i>	20%	-	-	✓	60%	✓	60%	✓	60%	✓	20%	-	-	-
<i>Hemiandra pungens</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Hensmania turbinata</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Hibbertia cuneiformis</i>	-	-	-	✓	-	-	-	-	-	-	-	-	-	✓
<i>Hibbertia aurea</i>	20%	-	-	-	-	-	-	-	-	-	20%	-	-	-
<i>Hibbertia huegelii</i>	40%	-	40%	-	40%	-	40%	-	40%	-	40%	-	-	-
<i>Hibbertia hypericoides</i>	60%	-	-	✓	80%	✓	80%	-	80%	✓	60%	-	-	-
<i>Hibbertia racemosa</i>	40%	-	60%	-	60%	-	60%	-	60%	-	40%	-	-	-
<i>Hibbertia stellaris</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Hibbertia subvaginata</i>	40%	-	40%	-	-	-	-	-	-	-	40%	-	-	-
<i>Homalosciadium homalocarpum</i>	60%	-	60%	-	40%	-	40%	-	40%	-	60%	-	13%	-
<i>Hovea pungens</i>	20%	-	-	✓	-	✓	-	-	-	-	20%	-	-	-
<i>Hovea trisperma</i> var. <i>trisperma</i>	40%	-	-	-	60%	✓	60%	-	60%	-	40%	-	-	-
<i>Hydrocotyle alata</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Hydrocotyle scutellifera</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Hypocalymma angustifolium</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Hypocalymma robustum</i>	60%	-	-	✓	40%	✓	40%	-	40%	✓	60%	-	-	-
<i>Hypocalymma xanthopetalum</i>	80%	-	-	-	-	-	-	-	-	-	80%	-	-	-
<i>Hypolaena exsulca</i>	60%	-	-	-	40%	-	40%	-	40%	-	60%	-	7%	-
<i>Hypolaena pubescens</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-

**Appendix D: Native flora species associated with each target ecosystem**

Keighery *et al.* (2012) frequency % shown is for the closest five (5) sites for all target ecosytems except wet forest and woodland for which frequency % is from all Keighery *et al.* (2012) sites. Presence/absence data from a portion of Murdoch (2017) monitoring sites is also displayed as 'ongoing monitoring'. Complete data from Murdoch 2017 and Emerge Associates 2017 surveys will be included once finalised data is provided. Bold font indicates 'important species' for each target ecosystem which comprise canopy and large shrub species.

Species	Target Ecosystem													
	Banksia woodland		Banksia/coastal blackbutt woodland		Banksia/jarrah woodland		Banksia/tuart woodland		Banksia/woody pear woodland		Holly-leaved banksia woodland		Wet forest and woodland	
	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring
<i>Isolepis cernua</i>	20%	-	-	-	-	-	-	-	-	-	20%	-	20%	-
<i>Isolepis marginata</i>	40%	-	-	-	-	-	-	-	-	-	40%	-	47%	-
<i>Isolepis oldfieldiana</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Isolepis setiformis</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Isolepis stellata</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Isotropis cuneifolia subsp. cuneifolia</i>	-	-	-	-	60%	-	60%	-	60%	-	-	-	-	-
<i>Ixiolaena viscosa</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Jacksonia floribunda</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Jacksonia furcellata</i>	60%	-	60%	✓	-	✓	-	✓	-	✓	60%	-	13%	-
<i>Jacksonia sericea</i>	-	-	-	-	20%	-	20%	-	20%	-	-	-	-	-
<i>Jacksonia sternbergiana</i>	20%	-	-	-	20%	-	20%	-	20%	-	20%	-	-	-
<i>Kennedia prostrata</i>	20%	-	-	✓	60%	✓	60%	✓	60%	✓	20%	-	13%	-
<i>Kunzea glabrescens</i>	40%	-	-	✓	-	-	-	-	-	-	40%	-	27%	-
<i>Lachnagrostis filiformis</i>	-	-	-	-	-	-	-	-	-	-	-	-	27%	-
<i>Lachnagrostis plebeia</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Lagenophora huegelii</i>	-	-	-	-	60%	-	60%	-	60%	-	-	-	7%	-
<i>Laxmannia sessiliflora subsp. australis</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Laxmannia squarrosa</i>	40%	-	-	-	-	-	-	-	-	-	40%	-	-	-
<i>Lechenaultia expansa</i>	-	-	20%	-	-	-	-	-	-	-	-	-	7%	-
<i>Lechenaultia floribunda</i>	60%	-	60%	-	-	-	-	-	-	-	60%	-	-	-
<i>Lepidobolus preissianus</i>	-	-	-	-	20%	-	20%	-	20%	-	-	-	-	-
<i>Lepidosperma leptostachyum</i>	-	-	-	✓	-	-	-	✓	-	-	-	-	-	-
<i>Lepidosperma longitudinale</i>	-	-	-	✓	-	-	-	-	-	-	-	-	80%	-
<i>Lepidosperma scabrum</i>	-	-	-	-	20%	-	20%	-	20%	-	-	-	-	-
<i>Lepidosperma squamatum</i>	40%	-	40%	✓	60%	-	60%	✓	60%	-	40%	-	-	-
<i>Leporella fimbriata</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Leptocarpus coangustatus</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Leptocarpus roycei</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Leptoceras menziesii</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Leucopogon australis subsp. australis</i>	80%	-	-	✓	-	-	-	-	-	-	80%	-	-	-
<i>Leucopogon conostephoides</i>	-	-	80%	-	-	-	-	-	-	✓	-	-	-	-
<i>Leucopogon gracillimus</i>	20%	-	-	-	-	-	-	-	-	-	20%	-	-	-
<i>Leucopogon parviflorus</i>	-	-	-	-	40%	-	40%	-	40%	-	-	-	-	-
<i>Leucopogon polymorphus</i>	20%	-	20%	-	-	-	-	-	-	-	20%	-	-	-
<i>Leucopogon propinquus</i>	20%	-	-	-	-	-	-	-	-	✓	20%	-	7%	-
<i>Leucopogon racemulosus</i>	-	-	-	-	20%	-	20%	-	20%	-	-	-	-	-
<i>Levenhookia stipitata</i>	40%	-	40%	-	-	-	-	-	-	-	40%	-	7%	-
<i>Liparophyllum capitatum</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Lobelia alata</i>	-	-	-	-	-	-	-	-	-	-	-	-	27%	-
<i>Lobelia tenuior</i>	40%	-	-	-	-	-	-	-	-	-	40%	-	-	-

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	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring
<i>Lomandra caespitosa</i>	-	-	80%	-	80%	-	80%	✓	80%	-	-	-	-	-
<i>Lomandra hermaphrodita</i>	80%	-	80%	-	20%	-	20%	-	20%	-	80%	-	-	-
<i>Lomandra maritima</i>	-	-	-	-	-	-	-	-	-	✓	-	-	-	-
<i>Lomandra micrantha</i> subsp. <i>micrantha</i>	-	-	20%	✓	20%	-	20%	✓	20%	-	-	-	-	-
<i>Lomandra nigricans</i>	40%	-	-	-	20%	-	20%	-	20%	-	40%	-	-	-
<i>Lomandra preissii</i>	-	-	-	✓	20%	-	20%	-	20%	-	-	-	-	-
<i>Lomandra suaveolens</i>	20%	-	-	-	20%	-	20%	-	20%	✓	20%	-	-	-
<i>Lyginia barbata</i>	100%	-	100%	-	40%	-	40%	-	40%	-	100%	-	-	-
<i>Lyperanthus serratus</i>	-	-	-	-	20%	-	20%	-	20%	-	-	-	-	-
<i>Lysinema ciliatum</i>	20%	-	-	-	-	-	-	-	-	-	20%	-	-	-
<i>Macarthuria apetala</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Macarthuria australis</i>	-	-	20%	-	-	-	-	-	-	✓	-	-	-	-
<b><i>Macrozamia fraseri</i></b>	<b>40%</b>	-	<b>40%</b>	✓	<b>80%</b>	✓	<b>80%</b>	✓	<b>80%</b>	✓	<b>40%</b>	-	<b>20%</b>	-
<i>Melaleuca incana</i> subsp. <i>incana</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Melaleuca lateritia</i>	-	-	-	-	-	-	-	-	-	-	-	-	33%	-
<b><i>Melaleuca preissiana</i></b>	20%	-	-	✓	-	-	-	-	-	-	20%	-	<b>47%</b>	-
<b><i>Melaleuca raphiophylla</i></b>	-	-	-	✓	-	-	-	-	-	-	-	-	<b>27%</b>	-
<i>Melaleuca ryeae</i>	40%	-	40%	-	-	-	-	-	-	-	40%	-	-	-
<i>Melaleuca systema</i>	-	-	-	-	20%	-	20%	-	20%	-	-	-	-	-
<i>Melaleuca teretifolia</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Melaleuca thymoides</i>	60%	-	60%	-	-	-	-	-	-	-	60%	-	-	-
<i>Melaleuca viminea</i> subsp. <i>viminea</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Mesomelaena pseudostygia</i>	20%	-	20%	-	100%	✓	100%	-	100%	✓	20%	-	-	-
<i>Mesomelaena tetragona</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Microlaena stipoides</i>	-	-	-	-	40%	-	40%	-	40%	-	-	-	27%	-
<i>Microtis media</i>	20%	-	20%	✓	-	-	-	-	-	-	20%	-	40%	-
<i>Millotia tenuifolia</i> var. <i>tenuifolia</i>	20%	-	20%	-	-	-	-	-	-	-	20%	-	-	-
<i>Monotaxis grandiflora</i>	-	-	-	-	20%	-	20%	-	20%	-	-	-	-	-
<i>Monotaxis occidentalis</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Neurachne alopecuroidea</i>	-	-	60%	-	20%	-	20%	-	20%	-	-	-	-	-
<i>Nuytsia floribunda</i>	40%	-	40%	-	-	-	-	-	-	-	40%	-	-	-
<i>Opercularia hispidula</i>	-	-	-	-	-	-	-	-	-	-	-	-	33%	-
<i>Ornduffia albiflora</i>	-	-	-	-	-	-	-	-	-	-	-	-	27%	-
<i>Patersonia occidentalis</i>	100%	-	100%	✓	40%	-	40%	-	40%	-	100%	-	20%	-
<i>Patersonia occidentalis</i> (wetland form)	20%	-	-	-	40%	-	40%	-	40%	-	20%	-	20%	-
<i>Pelargonium littorale</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Persoonia angustiflora</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Persoonia saccata</i>	20%	-	-	-	-	-	-	-	-	-	20%	-	-	-
<i>Petrophile juncifolia</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Petrophile linearis</i>	100%	-	100%	-	100%	-	100%	-	100%	✓	100%	-	-	-



#### Appendix D: Native flora species associated with each target ecosystem

Keighery *et al.* (2012) frequency % shown is for the closest five (5) sites for all target ecosystems except wet forest and woodland for which frequency % is from all Keighery *et al.* (2012) sites. Presence/absence data from a portion of Murdoch (2017) monitoring sites is also displayed as 'ongoing monitoring'. Complete data from Murdoch 2017 and Emerge Associates 2017 surveys will be included once finalised data is provided. Bold font indicates 'important species' for each target ecosystem which comprise canopy and large shrub species.

[illegible]

#### Appendix D: Native flora species associated with each target ecosystem

Keighery *et al.* (2012) frequency % shown is for the closest five (5) sites for all target ecosystems except wet forest and woodland for which frequency % is from all Keighery *et al.* (2012) sites. Presence/absence data from a portion of Murdoch (2017) monitoring sites is also displayed as 'ongoing monitoring'. Complete data from Murdoch 2017 and Emerge Associates 2017 surveys will be included once finalised data is provided. Bold font indicates 'important species' for each target ecosystem which comprise canopy and large shrub species.

Species	Target Ecosystem													
	Banksia woodland		Banksia/coastal blackbutt woodland		Banksia/jarrah woodland		Banksia/tuart woodland		Banksia/woody pear woodland		Holly-leaved banksia woodland		Wet forest and woodland	
	Keighery et al. (2012)	Ongoing monitoring	Keighery et al. (2012)	Ongoing monitoring	Keighery et al. (2012)	Ongoing monitoring	Keighery et al. (2012)	Ongoing monitoring	Keighery et al. (2012)	Ongoing monitoring	Keighery et al. (2012)	Ongoing monitoring	Keighery et al. (2012)	Ongoing monitoring
<i>Schoenus pedicellatus</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Schoenus rigens</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Schoenus tenellus</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Scholtzia involucrata</i>	80%	-	80%	✓	-	-	-	-	-	-	80%	-	-	-
<i>Senecio condylus</i>	-	-	-	-	-	-	-	-	-	✓	-	-	-	-
<i>Siloxerus filifolius</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Siloxerus humifusus</i>	20%	-	20%	-	-	-	-	-	-	-	20%	-	7%	-
<i>Sowerbaea laxiflora</i>	-	-	20%	-	60%	✓	60%	✓	60%	✓	-	-	13%	-
<i>Sphaerolobium vimineum</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Stackhousia monogyna</i>	20%	-	-	-	-	-	-	-	-	-	20%	-	-	-
<i>Stirlingia latifolia</i>	60%	-	60%	✓	80%	-	80%	-	80%	-	60%	-	-	-
<i>Stylidium brunonianum</i> subsp. <i>brunonianum</i>	80%	-	80%	-	20%	-	20%	-	20%	-	80%	-	20%	-
<i>Stylidium calcaratum</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Stylidium carnosum</i>	20%	-	-	-	-	-	-	-	-	-	20%	-	-	-
<i>Stylidium divaricatum</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Stylidium junceum</i> subsp. <i>junceum</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Stylidium longitubum</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Stylidium piliferum</i> subsp. <i>piliferum</i>	20%	-	-	-	-	-	-	-	-	-	20%	-	-	-
<i>Stylidium repens</i>	60%	-	80%	-	-	-	-	-	-	-	60%	-	-	-
<i>Stylidium roseoalatum</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Stylidium schoenoides</i>	-	-	-	-	20%	-	20%	-	20%	-	-	-	-	-
<i>Stylidium utricularioides</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Taxandria linearifolia</i>	-	-	-	✓	-	-	-	-	-	-	-	-	-	-
<i>Tetraria octandra</i>	20%	-	-	-	100%	-	100%	✓	100%	-	20%	-	-	-
<i>Thelymitra benthamiana</i>	-	-	-	-	20%	-	20%	-	20%	-	-	-	-	-
<i>Thelymitra macrophylla</i>	-	-	-	-	-	-	-	-	-	-	-	-	13%	-
<i>Thysanotus arbuscula</i>	-	-	20%	-	-	-	-	-	-	-	-	-	-	-
<i>Thysanotus arenarius</i>	-	-	-	-	40%	-	40%	-	40%	-	-	-	-	-
<i>Thysanotus manglesianus/patersonii</i> complex	20%	-	60%	-	20%	-	20%	-	20%	-	20%	-	27%	-
<i>Thysanotus multiflorus</i>	20%	-	20%	-	-	-	-	-	-	-	20%	-	7%	-
<i>Thysanotus patersonii</i>	40%	-	-	✓	40%	-	40%	✓	40%	-	40%	-	7%	-
<i>Thysanotus sparteus</i>	20%	-	-	-	40%	✓	40%	✓	40%	-	20%	-	-	-
<i>Thysanotus thyrsoides</i>	20%	-	20%	-	20%	-	20%	-	20%	-	20%	-	13%	-
<i>Trachymene pilosa</i>	100%	-	100%	✓	80%	-	80%	-	80%	-	100%	-	20%	-
<i>Tribonanthes australis</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Tribonanthes violacea</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Tricoryne elatior</i>	-	-	20%	-	20%	-	20%	-	20%	-	-	-	7%	-
<i>Tricoryne tenella</i>	40%	-	-	-	-	-	-	-	-	✓	40%	-	-	-
<i>Utricularia violacea</i>	-	-	-	-	-	-	-	-	-	-	-	-	7%	-
<i>Wahlenbergia preissii</i>	20%	-	20%	-	20%	-	20%	-	20%	-	20%	-	7%	-

Appendix D: Native flora species associated with each target ecosystem

Keighery *et al.* (2012) frequency % shown is for the closest five (5) sites for all target ecosytems except wet forest and woodland for which frequency % is from all Keighery *et al.* (2012) sites. Presence/absence data from a portion of Murdoch (2017) monitoring sites is also displayed as 'ongoing monitoring'. Complete data from Murdoch 2017 and Emerge Associates 2017 surveys will be included once finalised data is provided. Bold font indicates 'important species' for each target ecosystem which comprise canopy and large shrub species.

Species	Target Ecosystem													
	Banksia woodland		Banksia/coastal blackbutt woodland		Banksia/jarrah woodland		Banksia/tuart woodland		Banksia/woody pear woodland		Holly-leaved banksia woodland		Wet forest and woodland	
	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring	Keighery <i>et al.</i> (2012)	Ongoing monitoring
<i>Waitzia suaveolens</i> var. <i>suaveolens</i>	60%	-	-	-	-	-	-	-	-	-	60%	-	7%	-
<b><i>Xanthorrhoea preissii</i></b>	<b>80%</b>	-	<b>80%</b>	✓	<b>100%</b>	✓	<b>100%</b>	✓	<b>100%</b>	✓	<b>80%</b>	-	<b>20%</b>	-
<i>Xanthosia huegelii</i> subsp. <i>huegelii</i>	60%	-	-	-	60%	-	60%	-	60%	-	60%	-	7%	-
<b><i>Xylomelum occidentale</i></b>	-	-	-	-	-	-	-	-	-	✓	-	-	-	-

#=species recorded in Keighery et al. (2012) site/s but not included in target ecosystem due to powerline vegetation height restrictions



# Appendix D

Forward Planning Recommendations







# Forward Planning Recommendations

Roe 8 Cleared Areas

Project No: EP17-085(07)

**Prepared for Rehabilitating Roe 8 Steering Committee  
February 2018**



# Forward Planning Recommendations

## Roe 8 Cleared Areas Roe 8 Cleared Areas



## Document Control

<b>Doc name:</b>	<b>Forward Planning Recommendations Roe 8 Cleared Areas</b>				
<b>Doc no.:</b>	<b>EP17-0485(07)--006B RAO</b>				
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1	January 2018	Rachel Omodei	RAO	Tom Atkinson	TAA
	Draft to client for review				
A	February 2018	Rachel Omodei	RAO	Tom Atkinson	TAA
	Updated following comments from Rehabilitating Roe 8 Steering Committee				
B	February 2018	Rachel Omodei	RAO	Tom Atkinson	TAA
	Final issued to the Rehabilitating Roe 8 Working Group				

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## Forward Planning Recommendations

Roe 8 Cleared Areas Roe 8 Cleared Areas



### Executive Summary

This document outlines actions to be undertaken during the ten years of the *Rehabilitation Management Plan Roe 8 Cleared Areas* (RMP)(Emerge Associates 2018b).

Recommended actions are provided for year 1 of the RMP (2018) as well as provisional forward planning for a further five years of the RMP (2019 to 2023). These actions relate to communication, involvement, engagement and restoration goals outlined in the RMP.

The monitoring, reporting and evaluation activities that will be required by the completion of 2018 include, but are not limited to the following:

- Creation of databases and associated protocols for storage of data recorded as part of the RMP.
- Incorporation of the results of the Aboriginal heritage survey, if undertaken during 2018, into the RMP as appropriate.
- Monitoring of restoration areas following the methods outlined in the RMP using the following protocols as a minimum:
  - monitoring of permanently marked plots
  - photopoint monitoring
  - weed mapping
- Preparation of monthly informal (brief) summary reports by the **Project Manager** detailing restoration works and presented to the Rehabilitating Roe 8 Advisory Committee.
- An internal review of all communication, engagement and involvement activities undertaken in 2018 and any feedback received.
- Preparation of an annual report at the end of 2018 by the **Community Engagement Coordinator/Project Manager** and submitted to the RR8AC for review and comment.
- Preparation of a annual community report card by the **Community Engagement Coordinator** to detail the results of the 'community expectations and satisfaction survey' as well as any other community and/or stakeholder feedback. The complete evaluation process for social rehabilitation outcomes is yet to be confirmed and will require additional planning and stakeholder engagement in 2018.
- Incorporation of the preliminary results of the fauna survey, if undertaken in 2018, into the RMP as appropriate.
- Review and evaluation of the annual report and updates to the RMP, if required, prior to implementation in the following year.

## Forward Planning Recommendations

Roe 8 Cleared Areas Roe 8 Cleared Areas



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# Forward Planning Recommendations

## Roe 8 Cleared Areas Roe 8 Cleared Areas



## Table of Contents

<b>1</b>	<b>Introduction .....</b>	<b>1</b>
1.1	Project background .....	1
1.2	Document purpose and scope .....	1
1.3	RMP Implementation .....	1
<b>2</b>	<b>Communication, Involvement and Engagement.....</b>	<b>2</b>
2.1	Communication.....	2
2.2	Involvement and Engagement .....	2
<b>3</b>	<b>Restoration .....</b>	<b>8</b>
3.1	2018 forward planning.....	8
3.1.1	Landform preparation .....	8
3.1.2	Fauna habitat enhancement .....	8
3.1.3	Seed collection .....	8
3.1.4	Planting area .....	9
3.1.5	Tubestock order .....	9
3.1.6	Tubestock planting .....	10
3.1.7	Direct seeding areas .....	10
3.1.8	Weed control .....	10
3.2	Future forward planning .....	11
3.2.1	Planting areas .....	11
<b>4</b>	<b>Monitoring, reporting and evaluation .....</b>	<b>12</b>
4.1	Database creation .....	12
4.2	Communication, involvement and engagement .....	12
4.3	Restoration areas .....	12
4.4	Review and revision of the RMP .....	13
<b>5</b>	<b>References .....</b>	<b>14</b>
5.1	General references .....	14
5.2	Online references.....	14

## List of Tables

Table 1: Community engagement and involvement action plan .....	3
Table 2: Tubestock order for 2018 .....	9
Table 3: Part tubestock order for 2019 .....	10

## Forward Planning Recommendations

Roe 8 Cleared Areas Roe 8 Cleared Areas



## Figures

Figure 1: Site Location and Management Areas

Figure 2: Restoration Areas

Figure 3: Proposed 2018 Planting Area

Figure 4: Grassy Weed Cover in Restoration Areas

Figure 5: Bulbous Weed Cover in Restoration Areas

Figure 6: Woody Weed Cover in Restoration Areas

Figure 7: Proposed 2019 Planting Areas

Figure 8: Proposed 2020 Planting Areas

Figure 9: Proposed 2021 Planting Areas

Figure 10: Proposed 2022 Planting Areas

Figure 11: Proposed 2023 Planting Areas

## Forward Planning Recommendations

### Roe 8 Cleared Areas Roe 8 Cleared Areas



## Abbreviation Tables

*Table A1: Abbreviations – General terms*

General terms	
CES	Community expectations and satisfaction
RMP	Rehabilitation management plan

*Table A2: Abbreviations – units of measurement*

Units of measurement	
ha	Hectare

*Table A3: Abbreviations – Organisations*

Organisations	
DBCA	Department of Biodiversity, Conservation and Attractions
PURSAC	Perth Urban Restoration Scientific Advisory Committee
RR8	Rehabilitating Roe 8
RR8AC	Rehabilitating Roe 8 Advisory Committee

# Forward Planning Recommendations

## Roe 8 Cleared Areas Roe 8 Cleared Areas



## 1 Introduction

### 1.1 Project background

The *Rehabilitation Management Plan Roe 8 Cleared Areas* (RMP) was prepared by Emerge Associates with assistance from Creating Communities (Emerge Associates 2018b). The RMP provides guidance for communications, engagement, involvement and restoration related to cleared areas along the proposed Roe 8 alignment over a ten year period (2018-2027).

The location of the site and management areas relevant to the RMP is shown in **Figure 1**.

The RMP outlines a collaborative and adaptive approach to implementation. In adaptive management the outcomes of implementation are monitored and learning is incorporated into planning and future management in process of continuous improvement (Standards Reference Group SERA 2017). Forward planning is therefore crucial to the operation of the RMP.

### 1.2 Document purpose and scope

This document provides forward planning recommendations for both 'social rehabilitation' and 'ecological restoration' which comprise initial and longer term activities proposed for the site under the RMP.

Detailed activities are proposed for year 1 (2018) of the RMP implementation period.

Provisional planning recommendations for key communication, involvement, engagement and restoration activities are also provided for the following five years (2019-2023). The activities recommended for these years should be reassessed during annual review and evaluation as the implementation of the RMP progresses.

Actions for the remaining four years of the plan (2024-2027) are yet to be determined through the annual review, evaluation and forward planning process.

### 1.3 RMP Implementation

The following individual employee role(s) are identified as crucial to the implementation of the RMP:

- **Community Engagement Coordinator:** Coordinates the implementation of communications, community engagement and involvement.
- **Project Manager:** Coordinates the implementation of restoration.

While multiple stakeholders and groups are expected to have roles in the implementation of the RMP (Emerge Associates 2018b), the forward planning recommendations assume that prior approval for activities will be decided by the **Project Administrator** in consultation with the **Rehabilitating Roe 8 Advisory Committee** (RR8AC) and the **Community Engagement Coordinator/Project Manager** who will coordinate the implementation of the tasks.

## Forward Planning Recommendations

### Roe 8 Cleared Areas Roe 8 Cleared Areas



## 2 Communication, Involvement and Engagement

### 2.1 Communication

The following communication activities should be undertaken in 2018:

- Use community database to provide members with updates regarding the progress of the RMP.
- Review the Rehabilitating Roe 8 branding.
- Update the Rehabilitating Roe 8 website.
- Develop a draft information booklet including 'frequently asked questions'.
- Liaise with the City of Cockburn to utilise the City's website and social media channels.
- Promote upcoming engagement and involvement activities via advertisement or flyer format
- Install site signage.
- Utilise Perth Urban Restoration Scientific Advisory Committee (PURSAC) and tertiary institutions to inform the scientific community, community of interest and broader community of upcoming research opportunities and research/rehabilitation outcomes.
- Produce a brief (3-4 pages) annual community report card.

Communication actions for the nine remaining years of the plan are outlined in the RMP.

### 2.2 Involvement and Engagement

Involvement and engagement activities are provided in **Table 1**.

The following additional involvement and engagement activities should be undertaken in 2018:

- Liaise with the Department of Aboriginal Affairs to determine if a Section 18 approval under the *Aboriginal Heritage Act 1972* is required prior to works being undertaken in parts of the site.



## Forward Planning Recommendations

Roe 8 Cleared Areas



Table 1: Community engagement and involvement action plan

Activity	Description	Timing/frequency	Total occurrences over 10 year plan	Responsibility (and potential partners)	Methods of promotion
Aboriginal heritage survey	Consultation with Aboriginal stakeholders and other stakeholders has reinforced the need for the Aboriginal heritage of the site to be correctly understood and reflected in the ongoing implementation of the RMP. It is recommended that an 'Aboriginal heritage survey' be commissioned and that the RMP is reviewed and updated as required to reflect Aboriginal Heritage values upon its completion. The scope of work for an Aboriginal heritage survey is yet to be confirmed and requires additional planning and stakeholder engagement.				
Communicate plan to community members and other stakeholders at a 2018 'open day'	Potential for an open day or similar in early 2018 to present the launch of the <i>Rehabilitation Management Plan</i> and thank stakeholders for their input.  At RMP launch identify and promote future community events restoration activities.	Early 2018	1	Community Engagement Coordinator/Project Manager	Promote the event via: <ul style="list-style-type: none"> <li>Flyers to surrounding area</li> <li>Existing stakeholder channels, including environmental and community group Facebook pages</li> <li>Posters / information sheets at Cockburn Wetlands Education Centre</li> <li>Community email database</li> <li>RR8 website</li> <li>City of Cockburn website</li> <li>Local newspapers</li> <li>Signage/banners at Wetlands Centre</li> </ul>
Aboriginal employment and training	Through consultation, it has been determined that there is significant restoration experience amongst the local Aboriginal community. Opportunities shall be further explored to employ local Aboriginal custodians and other Aboriginal people on the rehabilitation works. Training opportunities can also be considered, but genuine employment shall be prioritized.  The details of Aboriginal employment and training opportunities are yet to be confirmed and require additional stakeholder engagement.	As required	As required	Community Engagement Coordinator/Project Manager, the City of Cockburn is will-placed through their procurement processes to deliver aspects of this.	<ul style="list-style-type: none"> <li>Community email database</li> <li>RR8 website</li> <li>City of Cockburn website</li> <li>City of Cockburn Aboriginal Reference Group</li> <li>local newspapers</li> <li>Existing stakeholder channels, including environmental and community group Facebook pages</li> <li>Local businesses may be engaged through the Melville-Cockburn Chamber of Commerce</li> </ul>
Local employment and training	There is interest in the local community to be involved and to gain employment opportunities on the rehabilitation works. Opportunities shall be further explored to employ interested local people on restoration activities.  The details of local employment and training opportunities are yet to be confirmed and require additional planning and stakeholder engagement.	As required	As required	Community Engagement Coordinator/Project Manager	See row above
Community expectations and satisfaction survey	A 'community expectations and satisfaction survey' (CES survey) is required to inform the review and revision of the RMP and provide accountability to interested community members. This survey will serve as a monitoring and evaluation tool for the project as outlined in the RMP.  The survey would ideally be informed by a pre-implementation baseline, which means the first round of survey should be delivered as soon as possible.  The format of the survey is yet to be confirmed and will require additional planning and stakeholder engagement. This may be interview-based or based online using a web based survey portal, or interviews can be used to inform survey design that is then based online.	Open for one month annually, commencing mid-2018	10	To be designed by Community Engagement Coordinator/Project Manager and PURSAC social science subcommittee	Promotion of survey via: <ul style="list-style-type: none"> <li>community email database</li> <li>RR8 website</li> <li>City of Cockburn website</li> <li>local newspapers</li> <li>Existing stakeholder channels, including environmental and community group Facebook pages</li> <li>Dashboard (1-pager) of results to be includes in annual community report card to show what is being achieved (see row below)</li> </ul>
Review and revision of RMP	The RMP will be updated adaptively on an annual basis. These updates will be informed by monitored outcomes of activities, ongoing community engagement including the CES survey, environmental change, new knowledge and other changes, such as changes to project context. The process for the review and revision of the RMP is outlined in the RMP.	Immediately following each CES survey, and 6 months following	20	Rehabilitating Roe 8 Advisory Committee based upon stakeholder and community feedback and with guidance from sub-committees, PURSAC and other key stakeholders	Produce a brief (3-4 page) annual community report card to show what is being achieved

## Forward Planning Recommendations

Roe 8 Cleared Areas

Table 1: Community engagement and involvement action plan (continued)

Activity	Description	Timing/frequency	Total occurrences over 10 year plan	Responsibility (and potential partners)	Methods of promotion
Input into governance arrangement	<p>Engagement with stakeholders both within and external to the current governance structure of the Rehabilitating Roe 8 Working Group and Rehabilitating Roe 8 Steering Committee, is required to confirm an appropriate ongoing arrangement for the RMP.</p> <p>Representation of community groups and others in the formal governance structure is an efficient way of communicating with these groups and, when these groups share promotional materials, with their membership and audience.</p> <p>Following the confirmation of a governance arrangement an inclusive selection process for membership to the proposed 'Rehabilitating Roe 8 Advisory Committee' (RR8AC) and other roles will be established.</p> <p>Membership to the proposed RR8AC shall be reassessed annually in order to ensure broad and current representation.</p> <p>The details of input into the governance arrangement are yet to be confirmed and require additional planning and stakeholder engagement.</p>	March 2018 and annually thereafter	10	<p>Selection process open to all stakeholders. In addition to existing organisations represented, ensure:</p> <ul style="list-style-type: none"> <li>Local Traditional Owners and local Aboriginal Custodian representation.</li> <li>Local community association representation.</li> </ul>	<p>Invitation to join committees to be distributed via:</p> <ul style="list-style-type: none"> <li>Community stakeholder database</li> <li>Existing stakeholder channels</li> <li>Broader distribution to Traditional Owners and community groups through City of Cockburn &amp; City of Cockburn ARG, City of Fremantle, City of Kwinana and City of Melville</li> <li>Local businesses may be engaged through the Melville-Cockburn Chamber of Commerce</li> <li>Updates to the makeup of the groups to be communicated via:</li> <li>Community email database</li> <li>RR8 website</li> <li>City of Cockburn website</li> </ul>
Project Advisory Committee meetings	<p>Meetings of the RR8AC are initially proposed to occur on a monthly basis, and then as required. The Project Manager shall give a monthly report to RR8AC at these meetings.</p> <p>The details of the RR8AC are yet to be confirmed and require additional planning and stakeholder engagement.</p>	Monthly initially, then as required	Up to 120	Rehabilitating Roe 8 Advisory Committee / sub-committees Community Engagement Coordinator/Project Manager to attend (may not include sub-committees)	<ul style="list-style-type: none"> <li>Terms of reference to outline how group members would be contacted regarding each meeting</li> <li>Regular updates of meeting outcomes on RR8 website, shared on City of Cockburn and committee member / stakeholder Facebook pages</li> </ul>
Community education	<p>The implementation of the RMP offers excellent opportunity for education. The following community education options related to restoration are identified:</p> <ul style="list-style-type: none"> <li>Restoration and ecology workshops, including understanding local/endemic plants.</li> <li>Weed identification and weeding workshops.</li> <li>Training for citizen science community monitoring programs.</li> <li>Understanding site sensitivity and minimising impact (to ensure large groups do not damage the site).</li> <li>Link with Cockburn Wetlands Education Centre, NativeARC, Millennium Kids and City of Cockburn community education opportunities.</li> <li>Links with relevant research programs.</li> <li>Guided tours of site by community 'champions'.</li> </ul> <p>Note that these are not the only education options and options may be identified over time.</p> <p>The details of any of the community education options are yet to be confirmed and require additional planning and stakeholder engagement.</p>	4/annum	40	<p>Community Engagement Coordinator/Project Manager to work with:</p> <ul style="list-style-type: none"> <li>Cockburn Wetlands Education Centre</li> <li>Cockburn Community Wildlife Corridor</li> <li>Traditional Owners and local Aboriginal Custodians</li> <li>Millennium Kids</li> <li>NativeARC</li> <li>Primary, secondary and tertiary education institutions</li> <li>Bibra Lake Scouts</li> <li>Local Community Associations (e.g. Coolbellup Residents Association, Hamilton Hill Community Group, Friends of North Lake, Cooby Concerned Residents, Bibra Lake Residents Association etc.)</li> <li>PURSAC</li> <li>The Beeliar Group of Professors</li> <li>Align with relevant tertiary institution course schedules</li> </ul>	<ul style="list-style-type: none"> <li>Existing stakeholder channels, including environmental and community group Facebook pages</li> <li>Posters / information sheets at Cockburn Wetlands Education Centre</li> <li>Community email database</li> <li>RR8 website</li> <li>City of Cockburn website</li> <li>Local newspapers</li> <li>Communicate future engagement and involvement initiatives at each event</li> </ul>

## Forward Planning Recommendations

Roe 8 Cleared Areas

Table 1: Community engagement and involvement action plan (continued)

Activity	Description	Timing/frequency	Total occurrences over 10 year plan	Responsibility (and potential partners)	Methods of promotion
Community involvement in planting, weeding and watering	<p>A strong desire was identified for community involvement in planting for appropriate areas of the site (according to protocols outlined in the RMP). Community planting areas for 2018 are identified in <b>Section 3.1.4</b>.</p> <p>The location and details regarding future community planting areas are yet to be confirmed and require additional planning and stakeholder engagement.</p>	Annually	Dependent upon number of community planting sites	<p>Community Engagement Coordinator/Project Manager to work with:</p> <ul style="list-style-type: none"> <li>Local residents</li> <li>Local Community Associations</li> <li>Cockburn Wetlands Education Centre</li> <li>Cockburn Community Wildlife Corridor</li> <li>Millennium Kids</li> <li>NativeARC</li> <li>Traditional Owners and local Aboriginal Custodians Bibra Lake Scouts</li> <li>PURSAC</li> </ul>	<ul style="list-style-type: none"> <li>Existing stakeholder channels, including environmental and community group Facebook pages</li> <li>Signage on site</li> <li>Flyer drops nearby households</li> <li>Posters / information sheets at Cockburn Wetlands Education Centre</li> <li>Community email database</li> <li>RR8 website</li> <li>City of Cockburn website</li> <li>local newspapers</li> <li>Communicate future engagement and involvement initiatives at each event</li> </ul>
Citizen science / community monitoring	<p>The implementation of the RMP offers an excellent opportunity for citizen science/community monitoring programs and input (according to protocols outlined in the RMP).</p> <p>The details regarding citizen science/community monitoring are yet to be confirmed and require additional planning and stakeholder engagement. This will include photo-monitoring, records of observations and other monitoring as appropriate.</p>	Once each season, with opportunities for additional citizen science monitoring outside the scope of this item	40	<p>Community Engagement Coordinator/Project Manager to work with:</p> <ul style="list-style-type: none"> <li>Local residents</li> <li>Local Community Associations</li> <li>Primary, secondary and tertiary education institutions</li> <li>Cockburn Wetlands Education Centre</li> <li>Cockburn Community Wildlife Corridor</li> <li>Millennium Kids</li> <li>NativeARC</li> <li>Traditional Owners and local Aboriginal Custodians</li> <li>PURSAC</li> <li>The Beeliar Group of Professors</li> </ul>	<ul style="list-style-type: none"> <li>Existing stakeholder channels, including environmental and community group Facebook pages</li> <li>Flyer drops nearby households</li> <li>Posters / information sheets at Cockburn Wetlands Education Centre</li> <li>Community email database</li> <li>RR8 website</li> <li>City of Cockburn website</li> <li>local newspapers</li> <li>Communicate future engagement and involvement initiatives at each event</li> </ul>
Local community adoption of restoration areas	The details regarding the local community “adopt-a-spot” program are yet to be confirmed and require additional planning and stakeholder engagement.	As required (see Community Planting, Weeding and Monitoring above)	As required (see Community Planting, Weeding and Monitoring above)	Local residents Local Community Associations	<ul style="list-style-type: none"> <li>Review addresses in community database</li> <li>Flyer drops to prioritise nearest households</li> <li>Communicate future engagement and involvement initiatives at each event</li> </ul>

## Forward Planning Recommendations

Roe 8 Cleared Areas

Table 1: Community engagement and involvement action plan (continued)

Activity	Description	Timing/frequency	Total occurrences over 10 year plan	Responsibility (and potential partners)	Methods of promotion
Community Science Conference	<p>A community science conference that is targeted at informed and interested community members could potentially be the “flagship” community event in the Rehabilitating Roe 8 program calendar.</p> <p>The conference has been proposed to provide scientists, citizen-scientists and students with the opportunity to present findings and updates to the community. The conference would include presentations on the progress of the RR8 project and relevant and local research projects that are not within the scope of the RMP.</p> <p>The conference may be modelled on the Brixton St Symposium and Banksia Woodland Symposium and shall include funding to ensure that community can attend. Possibly the conference could be a component of the annual Cockburn Wetland Education Centre Wetlands Management Conference, if the theme of the wetland conference targets the same intended audience. The details regarding a community science conference are yet to be confirmed and require additional planning and stakeholder engagement.</p>	Every two years	5	<p>To be held at Cockburn Wetlands Education Centre (if attendance does not exceed capacity) – or hold in another centre / suburbs</p> <p>All community members and stakeholders invited</p> <p>Key scientific stakeholders:</p> <ul style="list-style-type: none"> <li>• PURSAC</li> <li>• Tertiary institutions</li> <li>• Primary and secondary schools</li> <li>• Department of Biodiversity, Conservation and Attractions</li> <li>• Cockburn Wetlands Education Centre</li> <li>• Cockburn Community Wildlife Corridor</li> <li>• Millennium Kids</li> <li>• Native ARC</li> <li>• The Beeliar Group of Professors</li> <li>• Botanic Gardens and Parks Authority (incl. Kings Park Authority)</li> </ul>	<p>Promote the event via:</p> <ul style="list-style-type: none"> <li>• Flyers to surrounding area</li> <li>• Existing stakeholder channels, including environmental and community group Facebook pages</li> <li>• Posters / information sheets at Cockburn Wetlands Education Centre</li> <li>• Community email database</li> <li>• RR8 website</li> <li>• City of Cockburn website</li> <li>• local newspapers</li> <li>• Signage/banners at Wetlands Centre</li> </ul> <p>Communicate future engagement and involvement initiatives at each event</p> <p>Outcomes of the conference to be promoted via:</p> <ul style="list-style-type: none"> <li>• Existing stakeholder channels, including environmental and community group Facebook pages</li> <li>• Community email database</li> <li>• RR8 website</li> <li>• City of Cockburn website</li> <li>• local newspapers</li> <li>• Include results in annual community report card (see CES survey above)</li> </ul>
Partnerships with City of Cockburn Events	<p>The details regarding partnerships with City of Cockburn events are yet to be confirmed and require additional planning and stakeholder engagement. For examples may include Bibra Lake Fun Run, Aboriginal Reference Group Engagement, Bush Tucker Tours etc.</p>	As required seek opportunities	As required seek opportunities	<ul style="list-style-type: none"> <li>• City of Cockburn</li> <li>• City of Cockburn Aboriginal Reference Group</li> <li>• Local Community Associations</li> <li>• Use Save Beeliar Wetlands / Re-think the link to connect with all communities</li> </ul>	<ul style="list-style-type: none"> <li>• Existing stakeholder channels, including environmental and community group Facebook pages</li> <li>• Community email database</li> <li>• RR8 website</li> <li>• City of Cockburn website</li> <li>• local newspapers</li> </ul>
Partnerships with Cockburn Wetlands Education Centre Events/Programs	<p>The details regarding partnerships with Cockburn Wetlands Education Centre events are yet to be confirmed and require additional planning and stakeholder engagement</p> <p>For example may include training for on-site rehabilitation, seed collection, site tours, frog-friendly gardens workshops, planting workshops</p> <p>For citizen science elements use the sampling frame and appropriate monitoring protocols</p>	As required seek opportunities	As required seek opportunities	Cockburn Wetlands Education Centre	<ul style="list-style-type: none"> <li>• Existing stakeholder channels, including environmental and community group Facebook pages</li> <li>• Community email database</li> <li>• RR8 website</li> <li>• City of Cockburn website</li> <li>• local newspapers</li> </ul>
Partnership with primary/secondary schools (rehabilitation, education and research)	<p>The implementation of the RMP offers excellent opportunity for partnerships with primary/secondary schools including restoration activities such as planting, weeding, monitoring and other citizen science programs, the potential for an “adopt-a-spot” program to include a specific area or areas for a particular school to maintain/report on monitoring. Young people may be able to audit the area, conceptualise and implement their own citizen science projects.</p> <p>The details regarding partnerships with primary/secondary schools are yet to be confirmed and require additional planning and stakeholder engagement.</p>	As required seek opportunities	As required seek opportunities	Primary and Secondary Schools - engage Primary and Secondary Schools through Millennium Kids, NativeARC and Bibra Lake Scouts	<ul style="list-style-type: none"> <li>• Direct phone calls to schools – specifically “bushrangers” or similar programs</li> <li>• Through Millennium Kids, Native ARC and Bibra Lake Scouts</li> <li>• Stakeholder database</li> </ul>

Forward Planning Recommendations  
Roe 8 Cleared Areas



Table 1: Community engagement and involvement action plan (continued)

Activity	Description	Timing/frequency	Total occurrences over 10 year plan	Responsibility (and potential partners)	Methods of promotion
Partnership with tertiary education institutions (rehabilitation, education and research)	<p>The implementation of the RMP offers excellent opportunity for partnerships with tertiary education institutions including engaging and supporting researchers to further understanding of restoration process and outcomes and establishing the Rehabilitating Roe 8 project as a centre of learning.</p> <p>The details regarding partnerships with tertiary education institutions are yet to be confirmed and require additional planning and stakeholder engagement. For example may include monitoring and other research projects.</p>	As required seek opportunities	As required seek opportunities	Community Engagement Coordinator/Project Manager to develop Expression of Interest selection process for tertiary partnerships Understand that different universities all have different things to offer	<ul style="list-style-type: none"><li>• Contact institutions directly</li><li>• Stakeholder database</li><li>• PURSAC</li></ul>
Open Days	<p>Open days provide opportunity for gathering community input, reporting on progress and may link to education or involvement through site visits or lining to a community planting day.</p> <p>The details regarding open days are yet to be confirmed and require additional planning and stakeholder engagement.</p>	Every two years	5	Potential to be held at Cockburn Wetlands Education Centre every second year, and attend in surrounding suburbs every other year All community members and stakeholders invited Community Engagement Coordinator/Project Manager to organise Community Engagement Coordinator/Project Manager and Rehabilitating Roe 8 Advisory Committees to facilitate	<p>Promote the event via:</p> <ul style="list-style-type: none"><li>• Flyers to surrounding area</li><li>• Existing stakeholder channels, including environmental and community group Facebook pages</li><li>• Posters / information sheets at Cockburn Wetlands Education Centre</li><li>• Community email database</li><li>• RR8 website</li><li>• City of Cockburn website</li><li>• Local newspapers</li><li>• Signage/banners at Wetlands Centre</li><li>• Communicate future engagement and involvement initiatives at each event</li></ul>



## Forward Planning Recommendations

### Roe 8 Cleared Areas



## 3 Restoration

### 3.1 2018 forward planning

As identified in the RMP, restoration areas have been identified in which management actions will be undertaken. The restoration areas are shown in **Figure 2**.

#### 3.1.1 Landform preparation

No landform preparation is recommended prior to 2018 restoration works.

#### 3.1.2 Fauna habitat enhancement

Understanding changes to fauna, fauna habitat and fauna related ecological functions within the site will require that a detailed and comprehensive study is completed (level 2 equivalent). Ideally this fauna study will be completed within the first two years of implementation to verify the initial conditions within the site. Fauna surveys undertaken prior to clearing will provide some useful baseline information regarding fauna within the site. However, new information will also need to be collected in line with the key stratifications outlined in the RMP, to ensure that the fauna study adequately addresses information needed for project evaluation.

Therefore, the following actions are recommended for 2018 in regards to fauna:

- Engage an experienced fauna specialist to develop a fauna survey strategy for the site that can be used in conjunction with the pre-clearing surveys (outlined in ref external context report) to assess fauna habitat re-establishment in the cleared areas.
- Undertake the first round of fauna surveys within the site, as deemed appropriate by the fauna specialist.

#### 3.1.3 Seed collection

There is potential to collect seeds from some native species in the site during 2018, as well as, assess and plan for future seed collecting. An experienced restoration contractor should be engaged prior to spring 2018 to survey the remnant vegetation within the site and determine suitable source populations and/or plants for collection within 2018/2019 seed collection season.

Key species should include the following species identified as important in the RMP:

- *Allocasuarina fraseriana*
- *Banksia attenuata*
- *Banksia ilicifolia*
- *Banksia menziesii*
- *Eucalyptus gomphocephala*
- *Eucalyptus marginata subsp. marginata*
- *Eucalyptus rudis subsp. rudis*
- *Eucalyptus tottiana*
- *Macrozamia fraseri*
- *Melaleuca raphiophylla*

## Forward Planning Recommendations

### Roe 8 Cleared Areas



- *Xanthorrhoea preissii*
- *Xylomelum occidentale*.

Any species identified on the associated species list in the RMP that can be propagated and installed as tubestock should be considered for seed collection.

#### 3.1.4 Planting area

The recommended planting area for 2018 is approximately 1.14 hectares (ha) in size. The 2018 planting area is located within North Lake Road East and North Lake Road West management areas as shown in **Figure 3**.

#### 3.1.5 Tubestock order

A recommended tubestock order for 2018 is provided in **Table 2**. The list includes species of which some seed is available (Main Roads has local seed available *Final Seed Report - 2015/2016 Seed Collection Summary Report* (Workpower 2016) as does DBCA).

Table 2: Tubestock order for 2018

Species	No.
<i>Acacia pulchella</i>	1000
<i>Acacia stenoptera</i>	1000
<i>Allocasuarina fraseriana</i>	1000
<i>Allocasuarina humilis</i>	1000
<i>Anigozanthos humilis</i> subsp. <i>humilis</i>	1000
<i>Anigozanthos manglesii</i> subsp. <i>manglesii</i>	1000
<i>Banksia attenuata</i>	4000
<i>Banksia menziesii</i>	4000
<i>Bossiaea eriocarpa</i>	1000
<i>Conostylis aculeata</i> subsp. <i>aculeata</i>	1000
<i>Conostylis candicans</i> subsp. <i>candicans</i>	1000
<i>Daviesia divaricata</i> subsp. <i>divaricata</i>	1000
<i>Daviesia triflora</i>	1000
<i>Dianella revoluta</i> var. <i>divaricata</i>	1000
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	1000
<i>Eucalyptus marginata</i> subsp. <i>marginata</i>	1000
<i>Gompholobium tomentosum</i>	1000
<i>Hemiandra pungens</i>	1000

## Forward Planning Recommendations

### Roe 8 Cleared Areas

Table 2: Tubestock order for 2018 (cont)

Species	No.
<i>Hypocalymma robustum</i>	1000
<i>Jacksonia sternbergiana</i>	1000
<i>Kennedia prostrata</i>	1000
<i>Melaleuca thymoides</i>	1000
<i>Opercularia hispidula</i>	1000
<i>Patersonia occidentalis</i>	1000
<i>Pimelea rosea</i> subsp. <i>rosea</i>	1000
<i>Scholtzia involucrata</i>	1000
<i>Xylomelum occidentale</i>	1000
<b>TOTAL</b>	<b>33,000</b>

Some species that may take longer to propagate and should be ordered in 2018 for supply in 2019. These species and recommended tubestock numbers are provided in **Table 3**. Note the numbers provided in **Table 3** are inflated due to the larger proposed planting area for 2019 (see **Section 3.2.1**).

Table 3: Part tubestock order for 2019

Species	No.
<i>Macrozamia fraseri</i>	6,000
<i>Xanthorrhoea preissii</i>	32,000
<i>Nuytsia floribunda</i>	2,000
<b>TOTAL</b>	<b>40,000</b>

### 3.1.6 Tubestock planting

The tubestock planting should be undertaken following the protocols provided in the RMP.

### 3.1.7 Direct seeding areas

No direct seeding areas are currently recommended for 2018. Additional planning and stakeholder engagement is required in order to confirm the application of direct seeding.

### 3.1.8 Weed control

Weed control will be required across all restoration areas as shown in **Figure 2**. Weed control protocols are provided in the RMP. Each year weed control should be completed over at least three separate campaigns timed to ensure important weed species are controlled at the most suitable time.

## Forward Planning Recommendations

### Roe 8 Cleared Areas



The distribution of weeds in the site was identified in the baseline survey in 2017 (Emerge Associates 2018a) and provides an indication of weed control requirements across the site. The distribution of grassy weeds in the restoration areas is shown in **Figure 4**. The distribution of bulbous weeds in the restoration areas is shown in **Figure 5**. The distribution of woody weeds in the restoration areas is shown in **Figure 6**.

### 3.2 Future forward planning

Actions for the remaining nine years of the plan are outlined in the RMP and will also be dependent on implementation of the adaptive management framework provided in the RMP.

#### 3.2.1 Planting areas

Planting areas for 2019 to 2023 have been recommended using the prioritisation protocol detailed in the RMP. Assisted regeneration and reconstruction restoration areas will likely require more than one year of planting to meet the restoration objectives and one year of planting is proposed followed by two years of infill for each planted area.

The majority of tubestock should be planted in the first planting year at a rate of 3 plants per m<sup>2</sup>. Infill planting has been recommended for the second year at a density of 1 plant per m<sup>2</sup> and for a third year at 0.5 plants per m<sup>2</sup>.

Recommended planting areas for 2019 are shown in **Figure 7**.

Recommended planting areas for 2020 are shown in **Figure 8**.

Recommended planting areas for 2021 are shown in **Figure 9**.

Recommended planting areas for 2022 are shown in **Figure 10**.

Recommended planting areas for 2023 are shown in **Figure 11**.

A nominal allocation of tubestock has been proposed for the remaining years of implementation to facilitate infill of any remaining gaps as required.

## Forward Planning Recommendations

### Roe 8 Cleared Areas



## 4 Monitoring, reporting and evaluation

Monitoring and reporting protocols are outlined in the RMP should be carried out each year as specified in the program of works. The following sections outline specific activities related to monitoring, evaluation and reporting that are required to be undertaken during 2018.

### 4.1 Database creation

Records should be kept of any communication, engagement, involvement or restoration activities and associated outcomes throughout 2018 and submitted to the **Community Engagement Coordinator/Project Manager** and/or Project Administrator.

Databases and protocols for management and access to data need to be established in 2018.

### 4.2 Communication, involvement and engagement

The results of the Aboriginal heritage survey, will need to be incorporated into the RMP following completion.

At the end of 2018 a brief (3-4 pages) annual community report card needs to be prepared. The template/format for the report will need to be confirmed in advance of this.

The evaluation process for social rehabilitation outcomes is yet to be confirmed and will require additional planning and stakeholder engagement in 2018. This planning could be completed as part of the design and implementation of the Community expectation and satisfaction survey.

The first annual internal review of RMP activities, as undertaken in 2018, will need to be completed in early 2019 through the Rehabilitating Roe 8 Advisory Committee. Operating the adaptive management process for the first time will identify additional tools and process required.

### 4.3 Restoration areas

Data from Murdoch and Emerge Associates from 2017 monitoring needs to be QA'd and input into databases.

At a minimum the following monitoring should be undertaken in the restoration areas during 2018, following the protocols outlined in the RMP:

- monitoring of permanently marked plots
- photopoint monitoring
- weed mapping.

Additional monitoring/citizen science can easily be undertaken using the sampling frame identified in the RMP.

The fauna survey should be commenced in 2018 as guided by advice from specialist fauna contractor.



## Forward Planning Recommendations

### Roe 8 Cleared Areas



#### 4.4 Review and revision of the RMP

At the end of the restoration monitoring for 2018, an annual report should be prepared by the **Community Engagement Coordinator/Project Manager** and submitted to the RR8AC for review and comment. The report shall outline the scope of activities completed in 2018 and demonstrate current performance of communications, engagement, involvement and restoration activities against the objectives. It will also include an assessment against the relevant objectives outlined in the RMP.

As part of the adaptive management process, the RMP should be reviewed and updated, if required, prior to implementation in the following year. During the first few years of implementation the processes behind reporting and review and evaluation will need to be tested and confirmed.

The results of the Aboriginal heritage survey, will need to be incorporated into the RMP following completion.

The preliminary methods of the fauna survey, if undertaken in 2018, will need to be incorporated into the RMP as appropriate.

## Forward Planning Recommendations

### Roe 8 Cleared Areas



## 5 References

### 5.1 General references

Emerge Associates 2018a, *Reference Ecosystem Identification and Baseline Inventory Report*, report prepared for Rehabilitating Roe 8 Steering Committee, Perth.

Emerge Associates 2018b, *Rehabilitation Management Plan - Roe 8 Cleared Areas*, report prepared for Rehabilitating Roe 8 Steering Committee, Perth.

Standards Reference Group SERA 2017, *National Standards for the Practice of Ecological Restoration in Australia*, Society for Ecological Restoration Australasia.

### 5.2 Online references

Bureau of Meteorology (BOM) 2017, *Climate Averages*, viewed 14 June 2017, <<http://www.bom.gov.au/climate/data/>>.

Department of Biodiversity, Conservation and Attractions' (DBCA) 2017, *Swan Weeds*, accessed viewed 4nd December 2017, <<https://florabase.dpaw.wa.gov.au/weeds/swanweeds/>>



# Figures



*Figure 1: Site Location and Management Areas*

*Figure 2: Restoration Areas*

*Figure 3: Proposed 2018 Planting Area*

*Figure 4: Grassy Weed Cover in Restoration Areas*

*Figure 5: Bulbous Weed Cover in Restoration Areas*

*Figure 6: Woody Weed Cover in Restoration Areas*

*Figure 7: Proposed 2019 Planting Areas*

*Figure 8: Proposed 2020 Planting Areas*

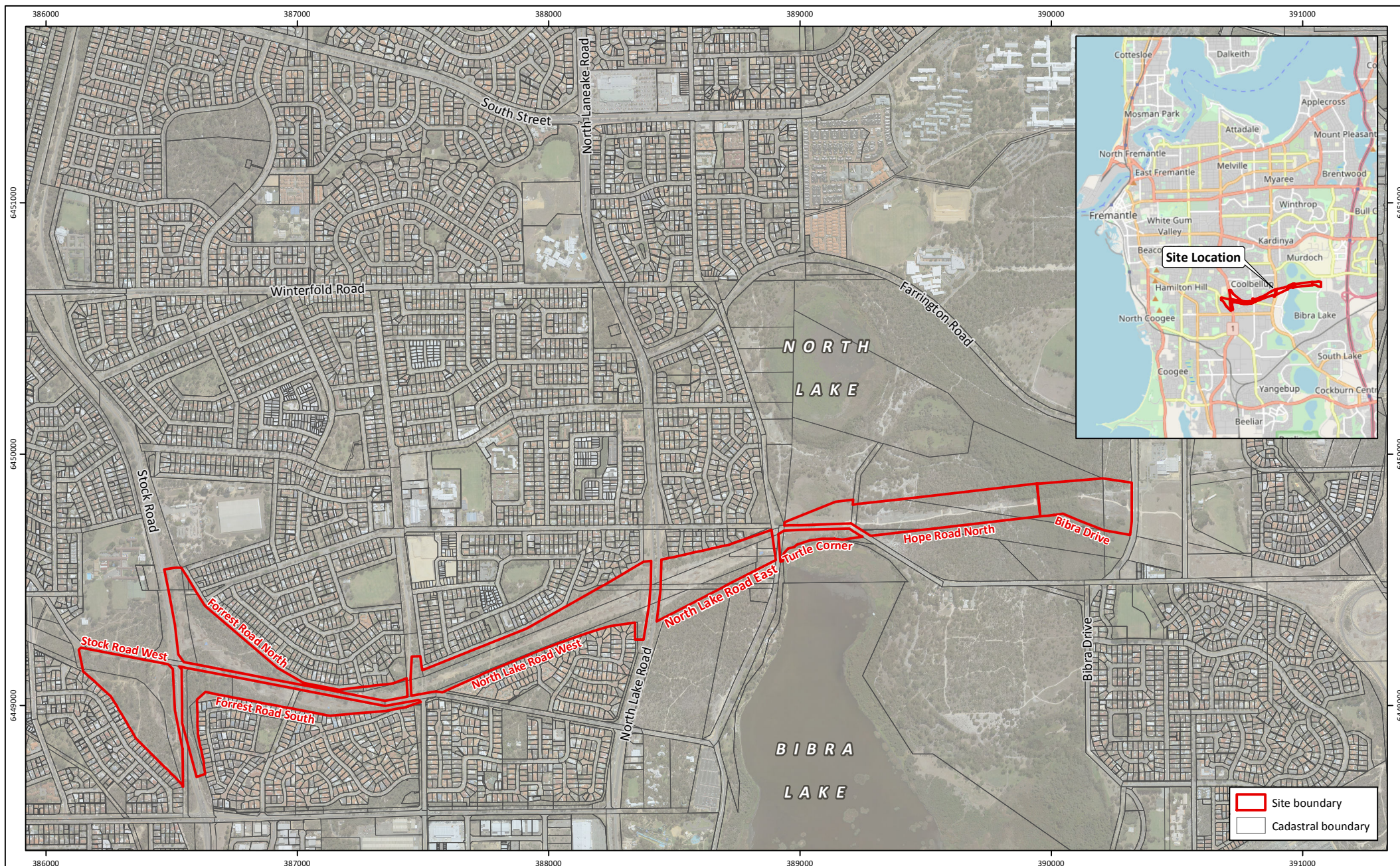
*Figure 9: Proposed 2021 Planting Areas*

*Figure 10: Proposed 2022 Planting Areas*

*Figure 11: Proposed 2023 Planting Areas*







**Figure 1: Site Location and Management Areas**

**Project:** Forward Planning Recommendations  
Roe 8 Cleared Areas  
**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)--F59  
**Drawn:** RAO  
**Date:** 31/01/2018  
**Checked:** TAA  
**Approved:** TAA  
**Date:** 31/01/2018



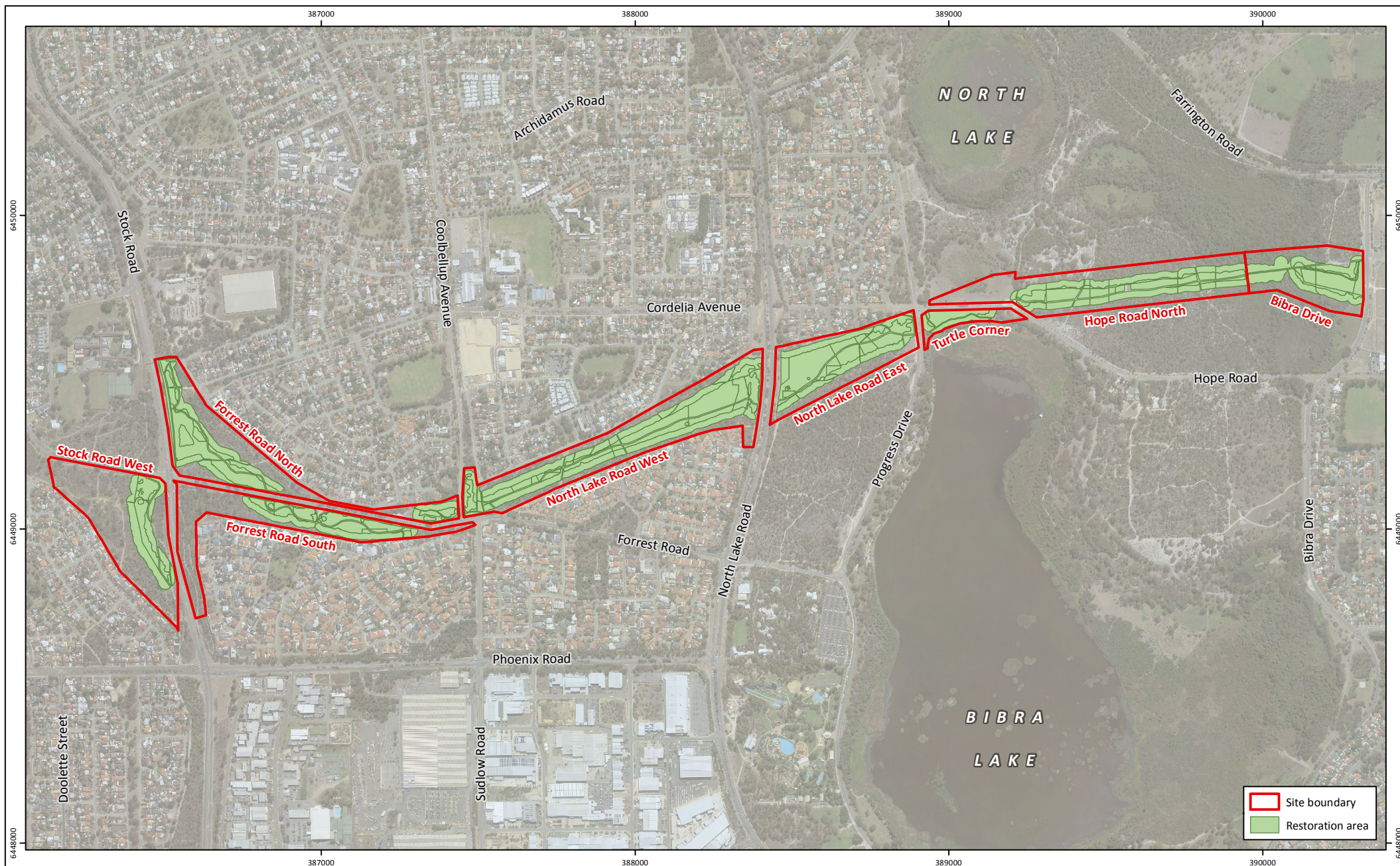
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GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES









**Figure 2: Restoration Areas**

**Project:** Forward Planning Recommendations  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F60a

**Drawn:** RAO

**Date:** 20/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 22/02/2018



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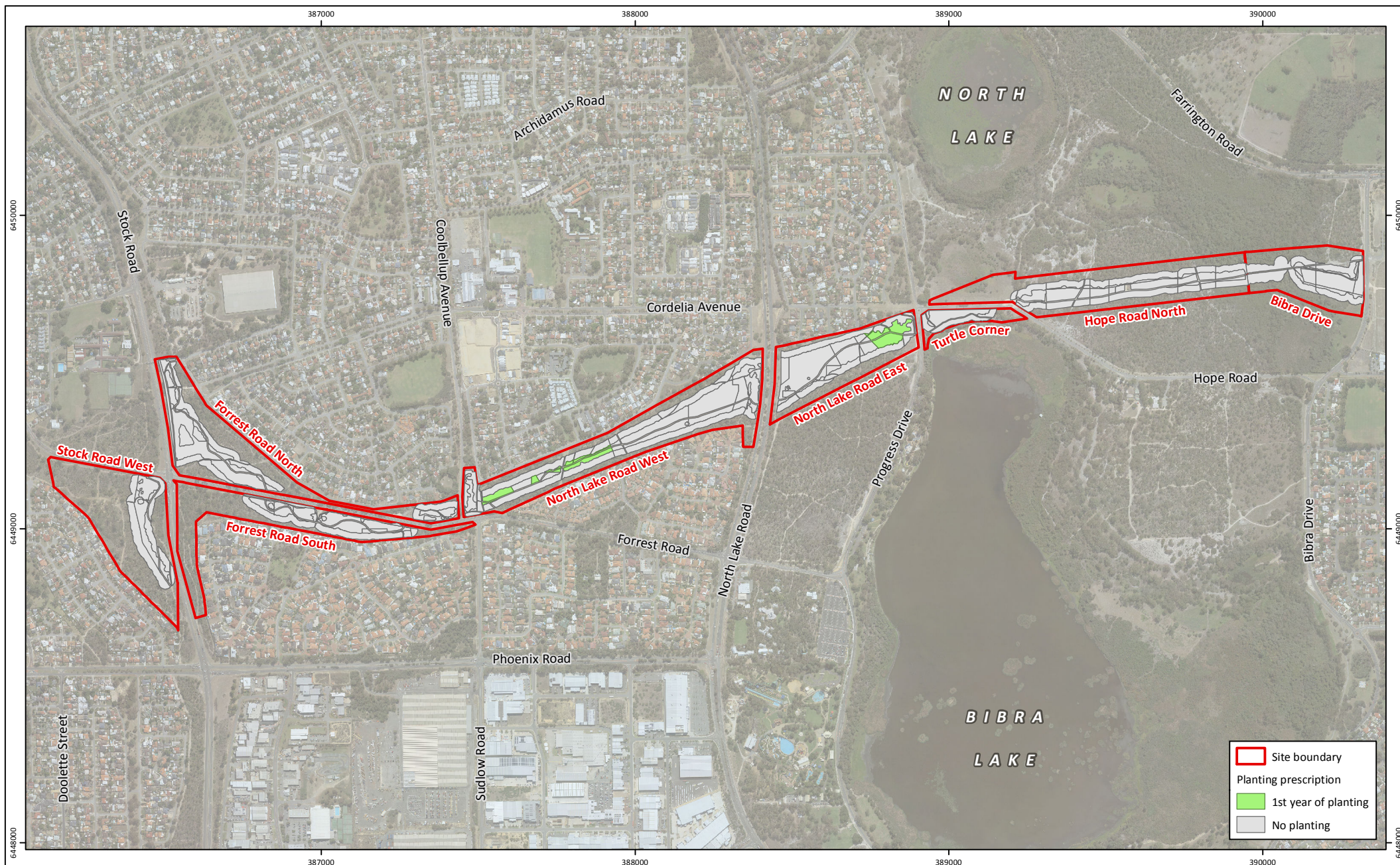
GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES









**Figure 3: Proposed 2018 Planting Areas**

**Project:** Forward Planning Recommendations  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F61a

**Drawn:** RAO

**Date:** 20/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 22/02/2018



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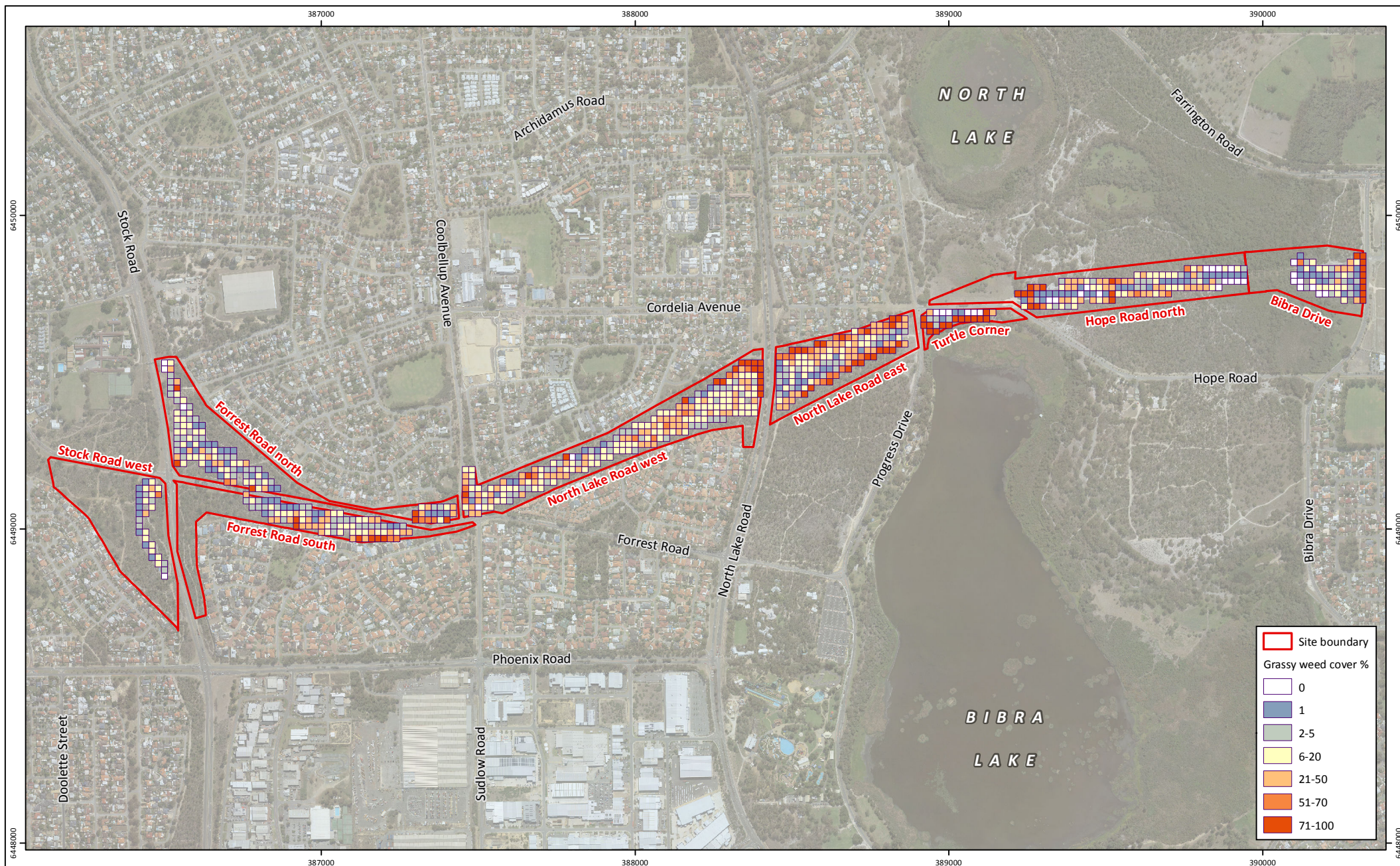
GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES









**Figure 4: Grassy Weed Cover in Restoration Areas**

**Project:** Forward Planning Recommendations  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F62

**Drawn:** RAO

**Date:** 31/01/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 31/01/2018



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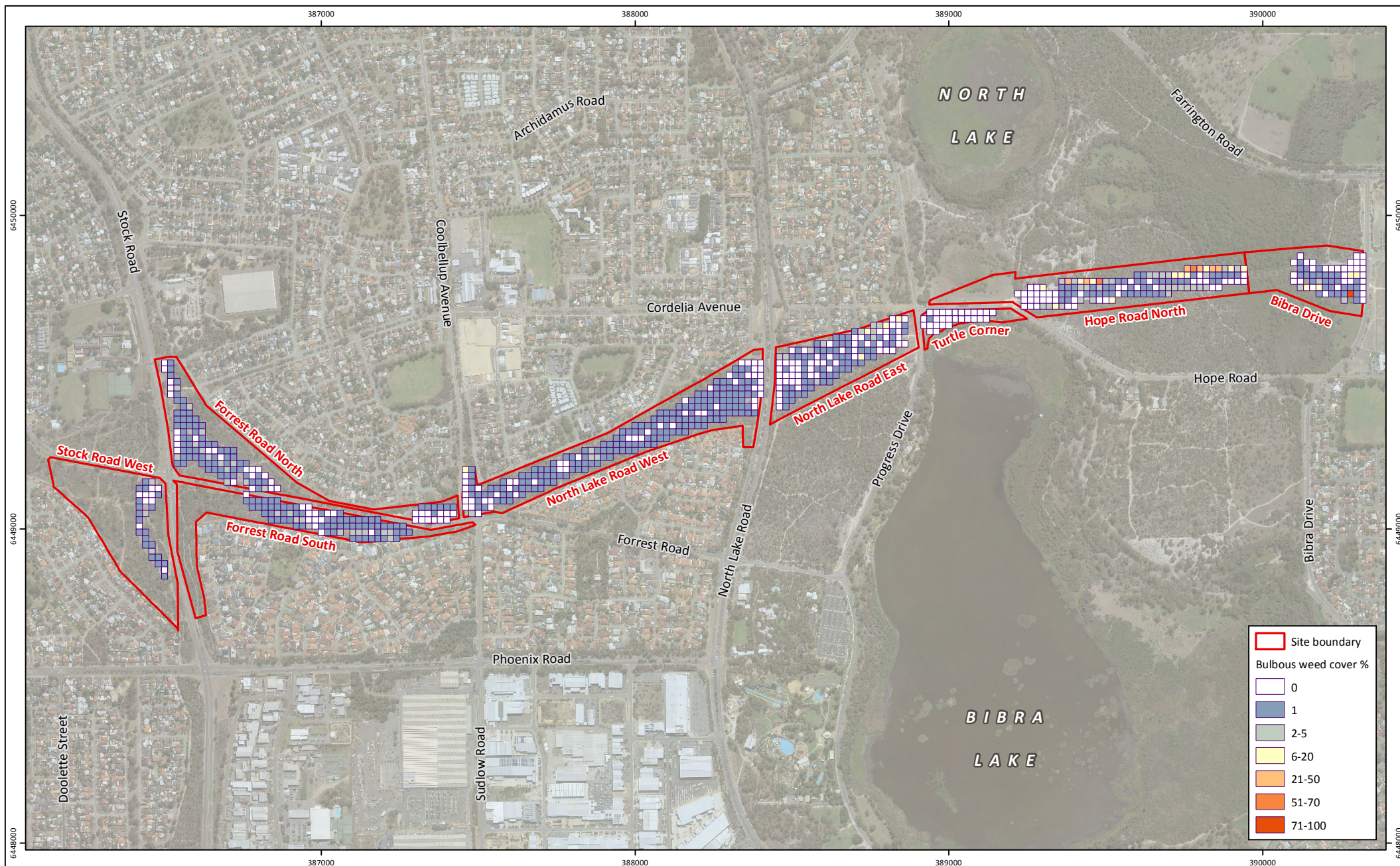
GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES









**Figure 5: Bulbous Weed Cover in Restoration Areas**

**Project:** Forward Planning Recommendations  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F63

**Drawn:** RAO

**Date:** 31/01/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 31/01/2018



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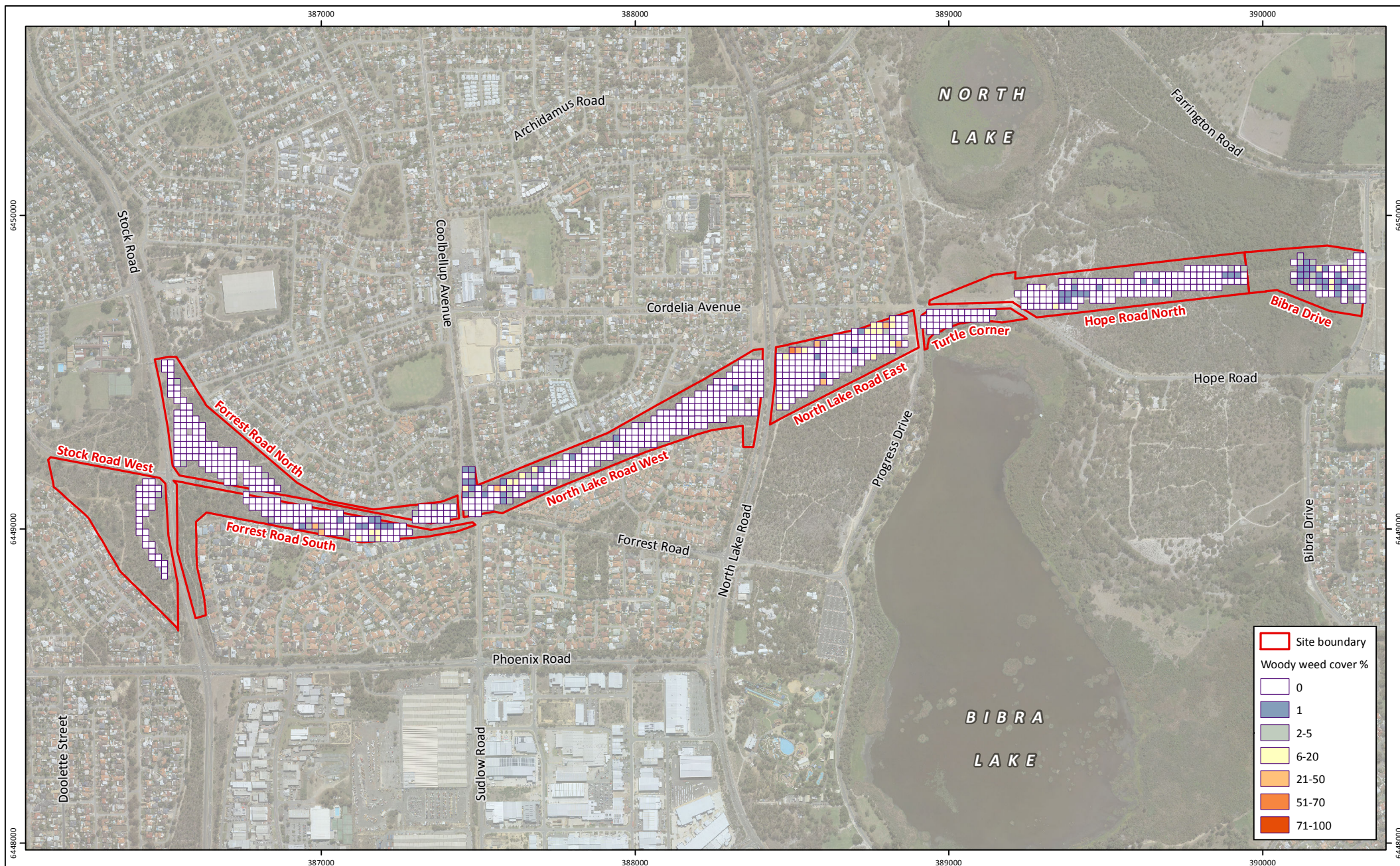
GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES









**Figure 6: Woody Weed Cover in Restoration Areas**

**Project:** Forward Planning Recommendations  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F64

**Drawn:** RAO

**Date:** 31/01/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 31/01/2018



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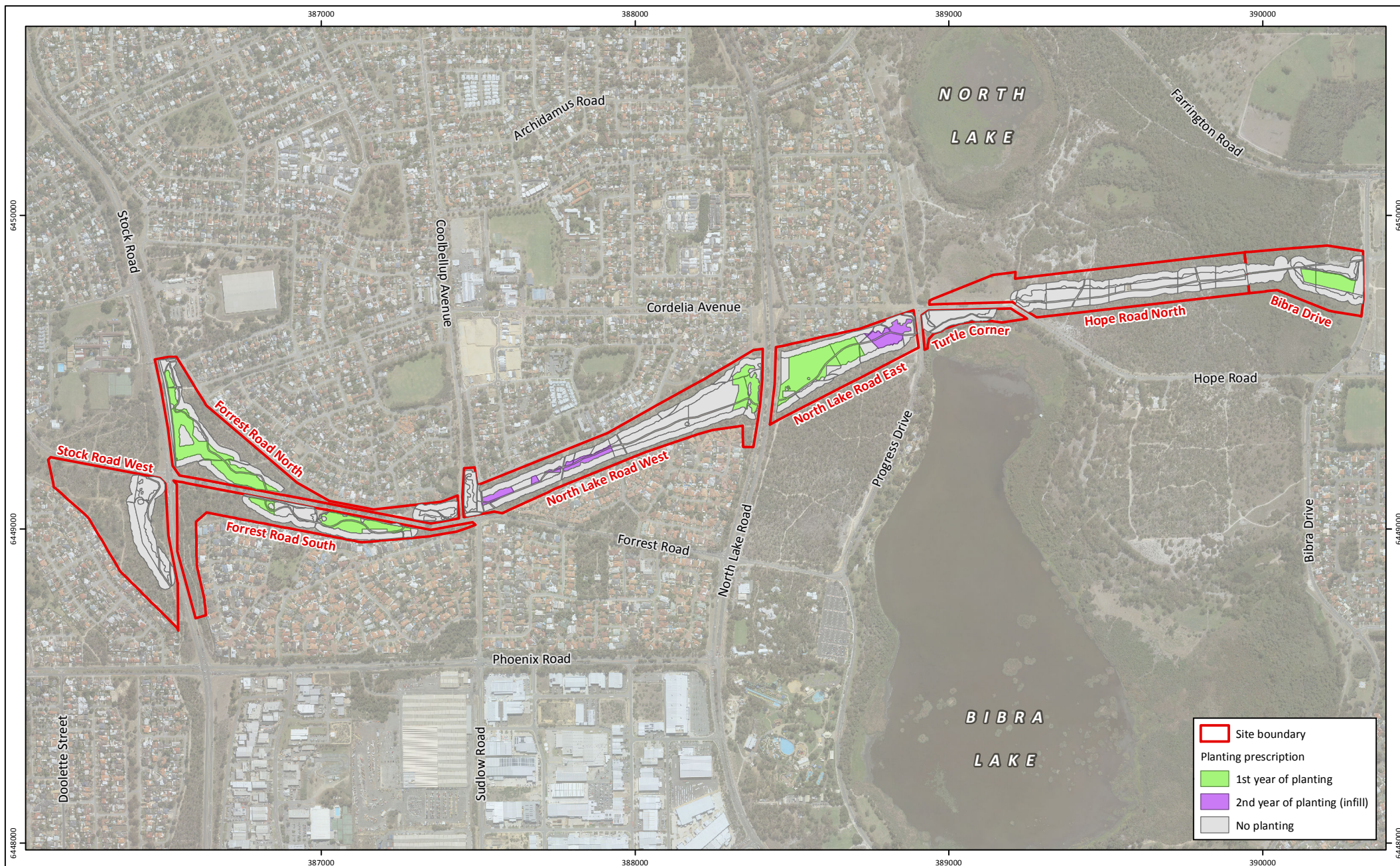
GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES









**Figure 7: Proposed 2019 Planting Areas**

**Project:** Forward Planning Recommendations  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F65a

**Drawn:** RAO

**Date:** 20/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 22/02/2018



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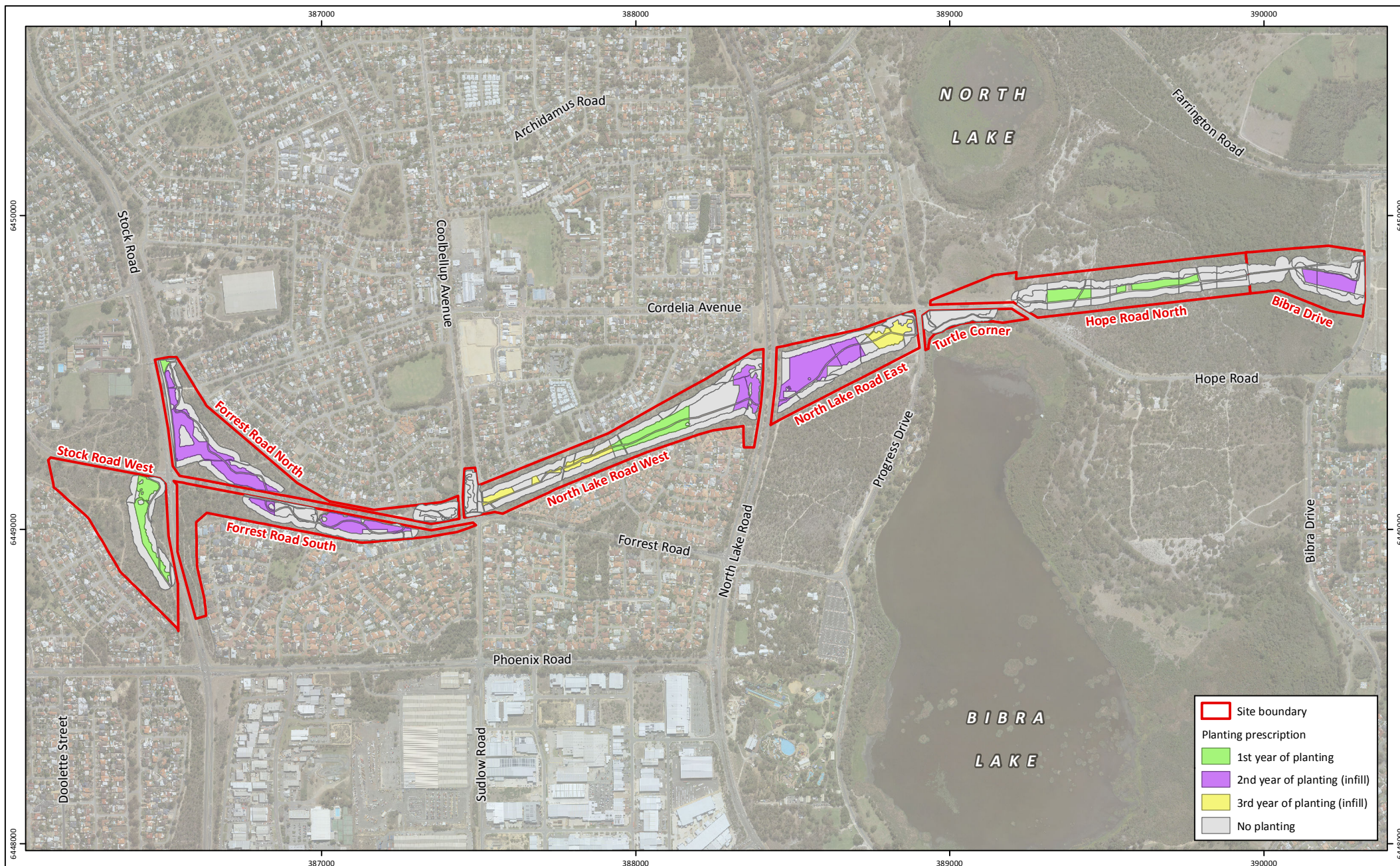
GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES









**Figure 8: Proposed 2020 Planting Areas**

**Project:** Forward Planning Recommendations  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F66a

**Drawn:** RAO

**Date:** 20/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 22/02/2018



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Metres

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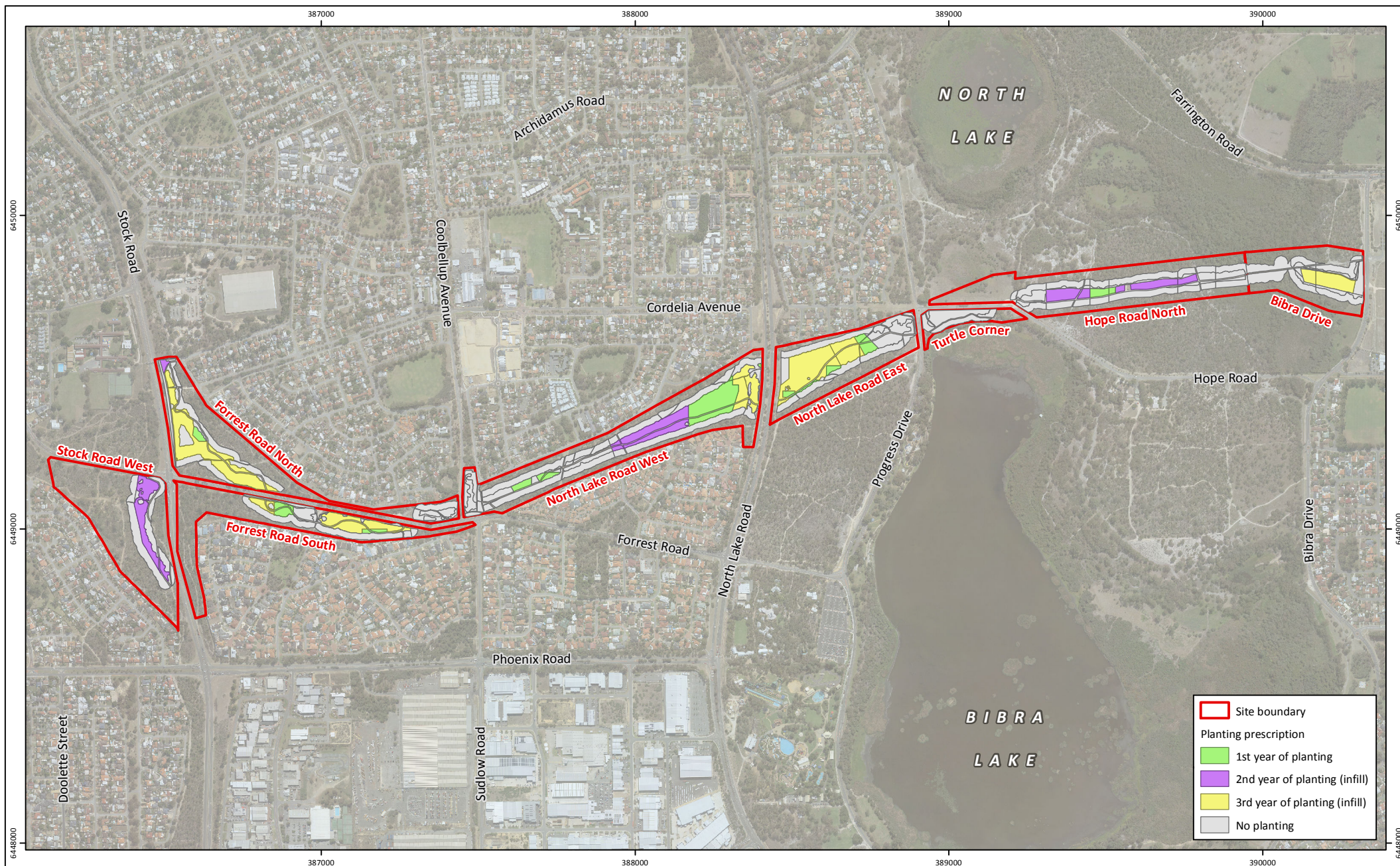
GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES









**Figure 9: Proposed 2021 Planting Areas**

**Project:** Forward Planning Recommendations  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F67a

**Drawn:** RAO

**Date:** 20/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 22/02/2018



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Metres

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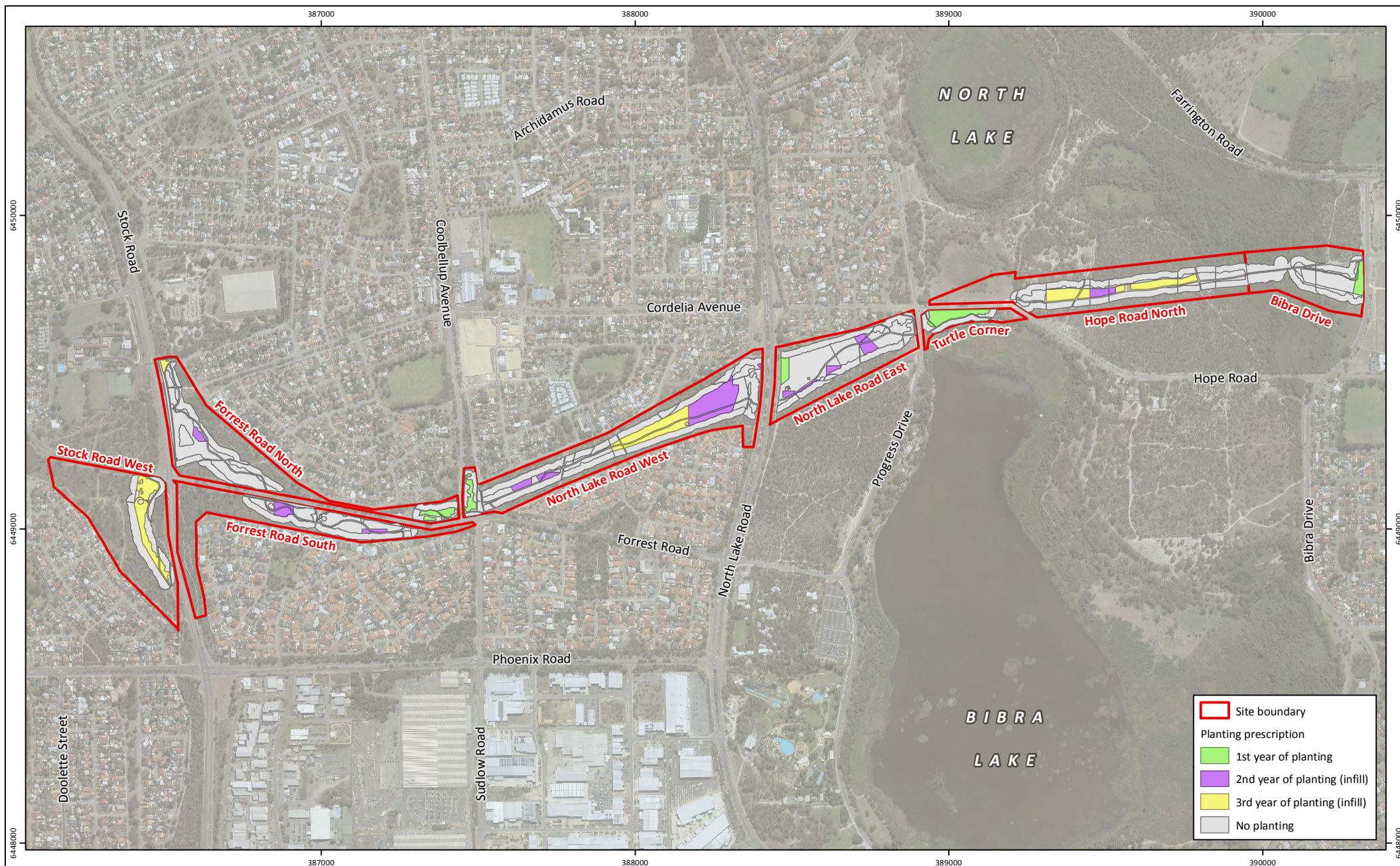
GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES









**Figure 10: Proposed 2022 Planting Areas**

**Project:** Forward Planning Recommendations  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F68a

**Drawn:** RAO

**Date:** 20/02/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 22/02/2018



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Metres

**Scale: 1:16,000@A4**

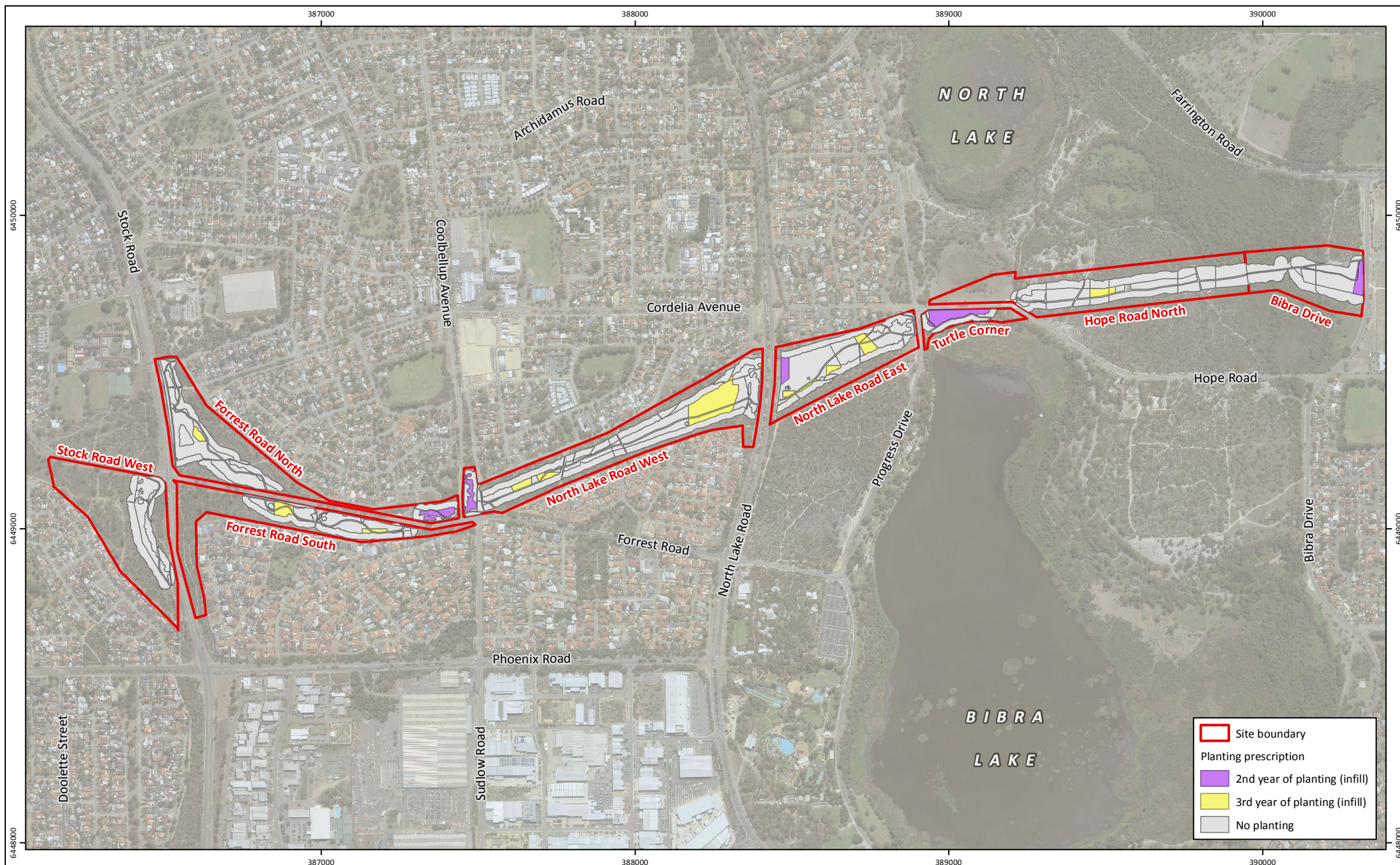
GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES









**Figure 11: Proposed 2023 Planting Areas**

**Project:** Forward Planning Recommendations  
Roe 8 Cleared Areas

**Client:** Rehabilitating Roe 8 Steering Committee

**Plan Number:**  
EP17-085(07)-F69

**Drawn:** RAO

**Date:** 31/01/2018

**Checked:** TAA

**Approved:** TAA

**Date:** 31/01/2018



0 200 400  
Metres

**Scale: 1:16,000@A4**

GDA 1994 MGA Zone 50

**emerge**  
ASSOCIATES



