



Baldivis District Sporting Complex Revegetation Plan

City of Rockingham

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Template 2.8.1

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Abbreviations

Abbreviation	Description
ASS	Acid Sulphate Soils
BAM Act	Biosecurity and Agricultural Management Act 2007
BC Act	Biodiversity Conservation Act 2016
BDSC	Baldivis District Sporting Complex
CCW	Conservation Category Wetland
CoR	City of Rockingham
DBCA	Department of Biodiversity Conservation and Attractions
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water Environment and Regulation
ELA	Eco Logical Australia Pty Ltd
LPS2	City of Rockingham Local Planning Scheme No. 2
MRS	Metropolitan Region Scheme
NVCP	Native Vegetation Clearing Permit
Tranen	Tranen Revegetation Systems
UFI	Unique feature identifier

1. Introduction

1.1 Background

The City of Rockingham (CoR) is proposing to develop the Baldivis District Sporting Complex (BDSC) (referred to as the application area, shown in Figure 1), including the following lots:

- Lot 4 on Plan D031062 (9.7 ha);
- Lot 103 on Plan D050627 (3.24 ha);
- Lot 104 on Plan D050627 (3.24 ha); and
- Lot 105 on Plan D050627 (3.23 ha).

The BDSC is required to meet the current and future demand for organised sporting spaces in the locality. The development will include five large playing fields (consisting of cricket, AFL and soccer ovals), cricket nets, two club rooms, change rooms, 18 outdoor hard courts, and indoor recreation centre, an outdoor youth recreation space, nature play area, maintenance shed and carpark (herein referred to as 'the proposal').

The proposal was referred to the Commonwealth Department of Environment and Energy (DoEE) by CoR under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and was granted a 'not a controlled action' decision by DoEE on 8 January 2019 (EPBC 2018/8323). A Native Vegetation Clearing Permit (NVCP) application was also submitted by CoR (2018) to the Department of Water Environment and Regulation (DWER) under Part V Division 2 of the State *Environmental Protection Act 1986* (EP Act) (CPS 8172/1).

1.2 Purpose of this document

As part of the NVCP application commitments (CoR 2018) and in order to minimise the environmental impacts from the proposal, the CoR have committed to a number of mitigation measures including retaining and enhancing 3.15 ha of tuart/jarraah woodland in the north-western portion of the site as shown on Figure 2 through revegetation and installation of nine artificial nesting boxes for black cockatoos. The Department of Water Environment and Regulation (DWER) requested a Revegetation Plan be prepared for the north-western portion of the site to mitigate the impacts associated with the proposed clearing prior to issuing a NVCP.

Eco Logical Australia Pty Ltd (ELA) were engaged to prepare this Revegetation Plan for CoR for the proposed BDSC development. This document has been prepared in line with the draft DWER guidance document '*A Guide to Preparing Revegetation Plans for Clearing Permits*' ('the guidelines'; DER 2016) and in line with consultation with the CoR and DWER.

It should be noted that the 3.15 ha revegetation area is slightly smaller than the 3.3 ha area which was included in previous correspondence between CoR and DWER. The reason for the 0.15 ha reduction is due to the requirement for 4 m wide firebreaks along the boundary of the revegetation area, including 10 m turning radiuses at the north western and south western corners of the revegetation area which are in place for emergency access.

Figure 1: Baldivis District Sporting Complex Site

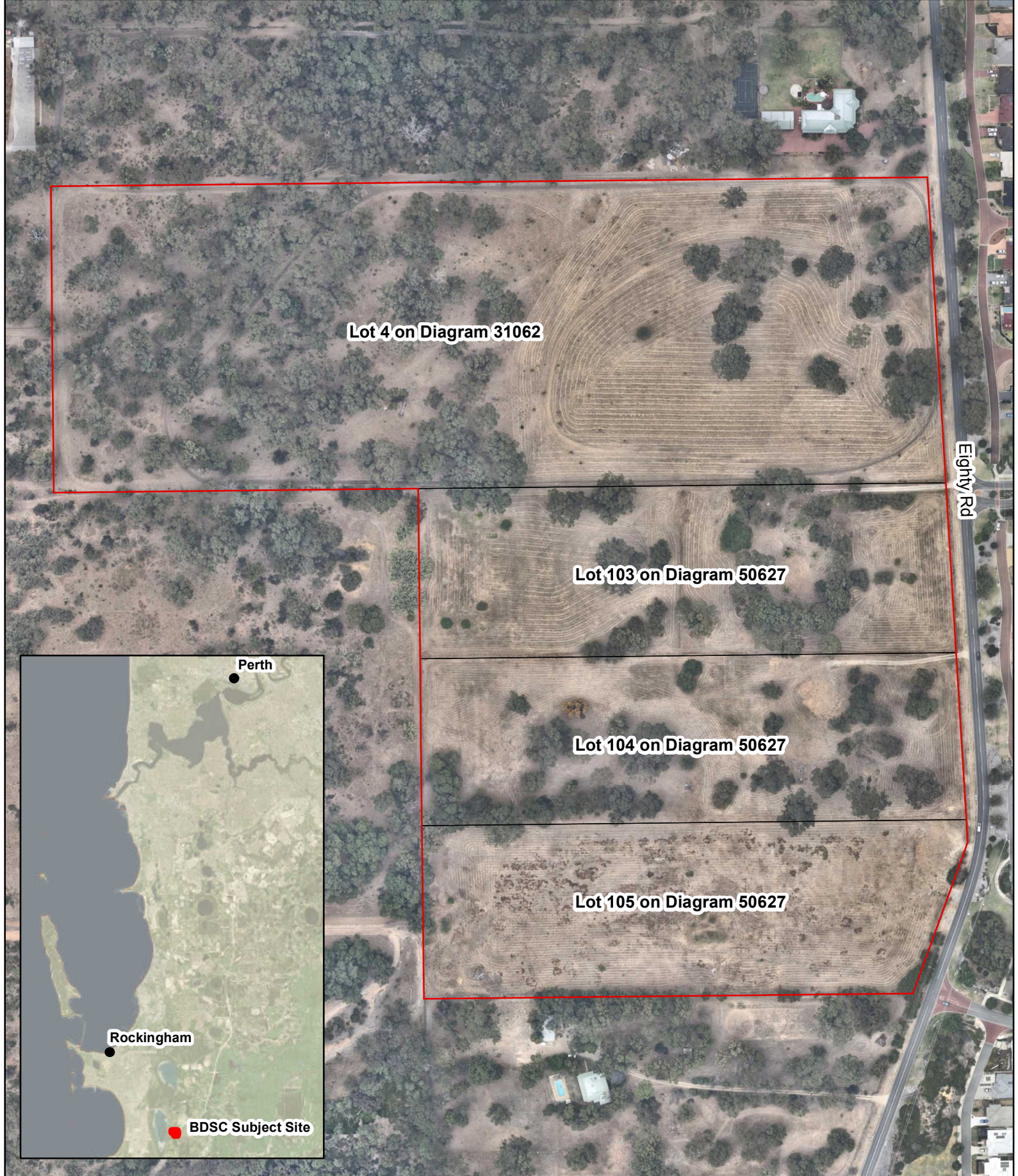
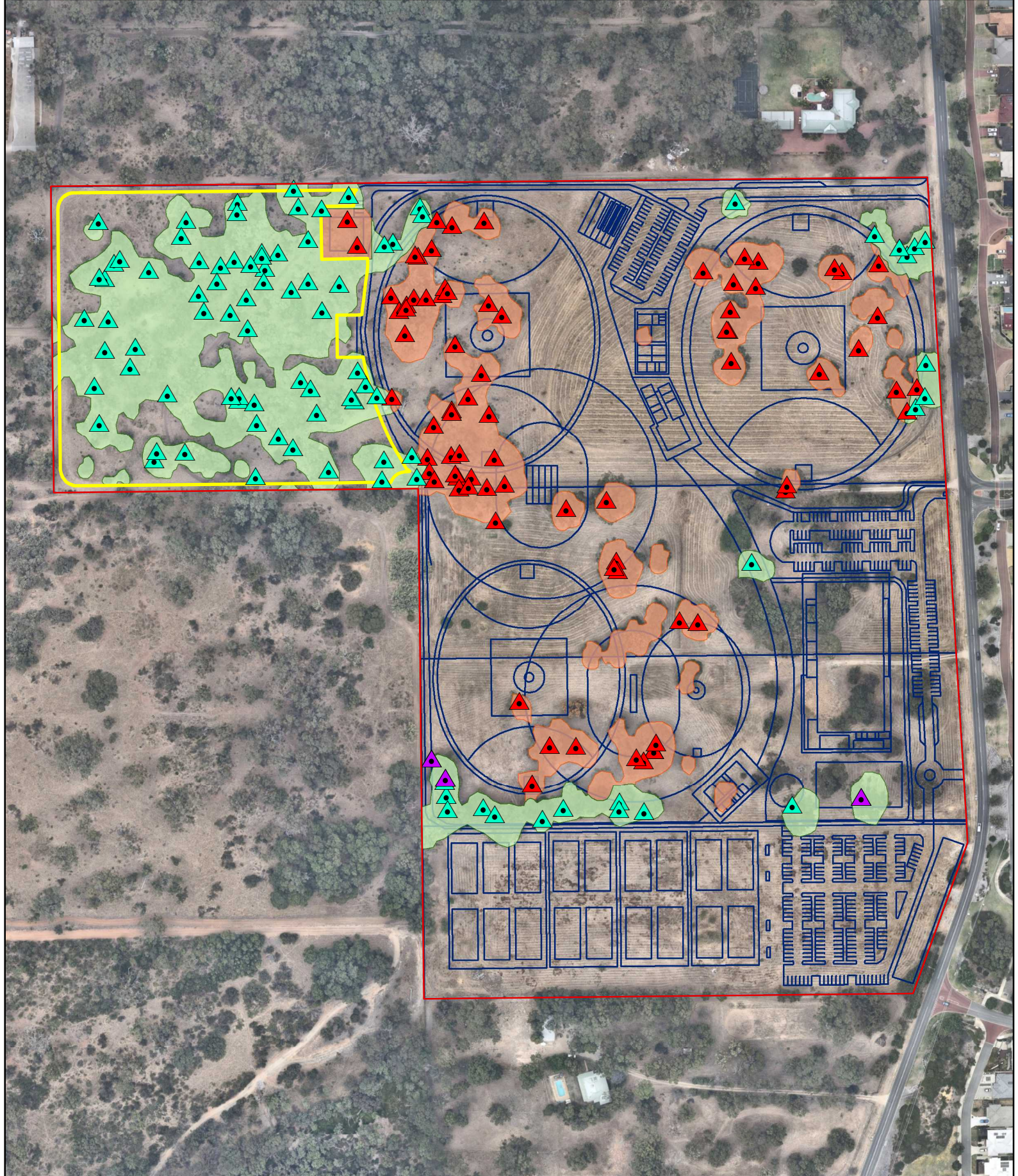


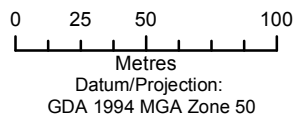
Figure 2: Proposed BDSC development and clearing footprint



Legend

- Application Area
- Revegetation site (3.15ha)
- Development design
- Potential Black Cockatoo breeding trees**
- ▲ To be retained
- ▲ To be cleared

- ▲ Require removal for safety reasons
- Native Vegetation**
- To be retained (2.99 ha)
- To be removed (1.85 ha)



1.3 Clearing impacts and proposed revegetation

The application area was assessed by GHD (2018a and 2018b) who undertook a targeted and detailed flora and vegetation survey and reconnaissance fauna survey and black cockatoo assessment. The flora and vegetation survey identified three vegetation types within the application area ranging from a degraded to completely degraded condition, using the condition rating scale devised by EPA (2016) (adapted from Keighery 1994). These vegetation types are listed below:

- Tuart/jarrah woodland;
- Grevillea shrubland (re-established after historical clearing); and
- Parkland cleared.

The application area was also found to contain suitable foraging, roosting and breeding habitat for all three species of threatened black cockatoos: Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*), Baudin's Black-Cockatoo (*Calyptorhynchus baudinii*) and Forest Red-tailed Black-Cockatoo [FRBC] (*Calyptorhynchus banksii naso*). In addition, Carnaby's and Forest Red-tailed Black-Cockatoos were recorded during the fauna assessments. A total of 4.84 ha of potential foraging habitat and 172 potential breeding trees were identified in the parts of the application area containing native vegetation.

The BDSC masterplan was designed in an environmentally sensitive manner to reduce the clearing of native vegetation as much as possible. Of the 4.84 ha of native vegetation including 172 potential breeding trees recorded within the application area, 1.85 ha of native vegetation and 78 potential breeding trees will be impacted by the proposal (Table 1 and Table 2). In addition, a further three potential breeding trees were considered to be structurally compromised in an arborist assessment and pose a risk to human safety. These trees therefore require removal. It was agreed between the CoR and DWER that these three trees would be exempt from requiring a clearing permit under Regulation 5, Item 2 under the EP Act. Therefore, of the remaining 2.99 ha of native vegetation, 91 potential breeding trees for threatened black cockatoos will be retained (CoR 2018; Figure 2).

Table 1: Breakdown of native vegetation to be retained vs cleared (Taken from Table 1 of CoR 2018)

	To be cleared (ha)	To be retained (ha)	Total (ha)
Native vegetation	1.85	2.99	4.84

Table 2: Breakdown of trees to be retained vs cleared (taken from Table 2 of CoR 2018)

	To be cleared (No.)	To be retained (No.)	Total (No.)
Potential breeding trees (≥ 500 mm DBH)	78	91	169*
Trees < 500 mm DBH	102	307	409

* Of the 172 trees originally identified as potential breeding trees, three trees identified as structurally compromised require removal and are exempt from a clearing permit.

CoR will commit to revegetating a 3.15 ha area containing 2.2 ha of the existing tuart/jarrah woodland community, located in the northwest portion of the application area (i.e. 'the revegetation site'; Figure 3). The proposed revegetation works address the impacts of the clearing by enhancing the tuart/jarrah vegetation community present within the revegetation site and provide enhanced foraging

and roosting habitat for threatened black cockatoos. In addition, potential impacts to threatened black cockatoo breeding habitat will be mitigated through the installation of nine artificial nesting boxes.

To fulfil this objective, the species list and completion criteria are based on:

- Commitments within the NVCP supporting report (CoR 2018) and species listed in the ecological assessments by GHD (2018a and 2018b);
- Species recorded during site assessment by ELA and Tranen (undertaken on Tuesday 12 February 2019) as well as other species deemed commercially practical to source and grow based on extensive experience in the Perth region;
- Species that will enhance the current tuart/jarraah woodland vegetation community and enhance the foraging and roosting habitat for threatened black cockatoos; and
- Consultation with CoR and DWER.

1.4 Relevant experience

This plan has been jointly developed by ELA and Tranen Revegetation Systems (Tranen). As a company, ELA has extensive expertise undertaking environmental assessment and preparing environmental management plans for other Local Governments to support environmental approvals, including the Masterplan for the BDSC. In development of this document, ELA engaged Tranen to provide input on several aspects of the Revegetation Plan given Tranen's comprehensive experience in the revegetation industry which in the Perth region dates back to 2002. Their input has been invaluable in ensuring the Revegetation Plan is based on practical and achievable outcomes for both the environment and the CoR.

More specifically, the authors of this Revegetation Plan include:

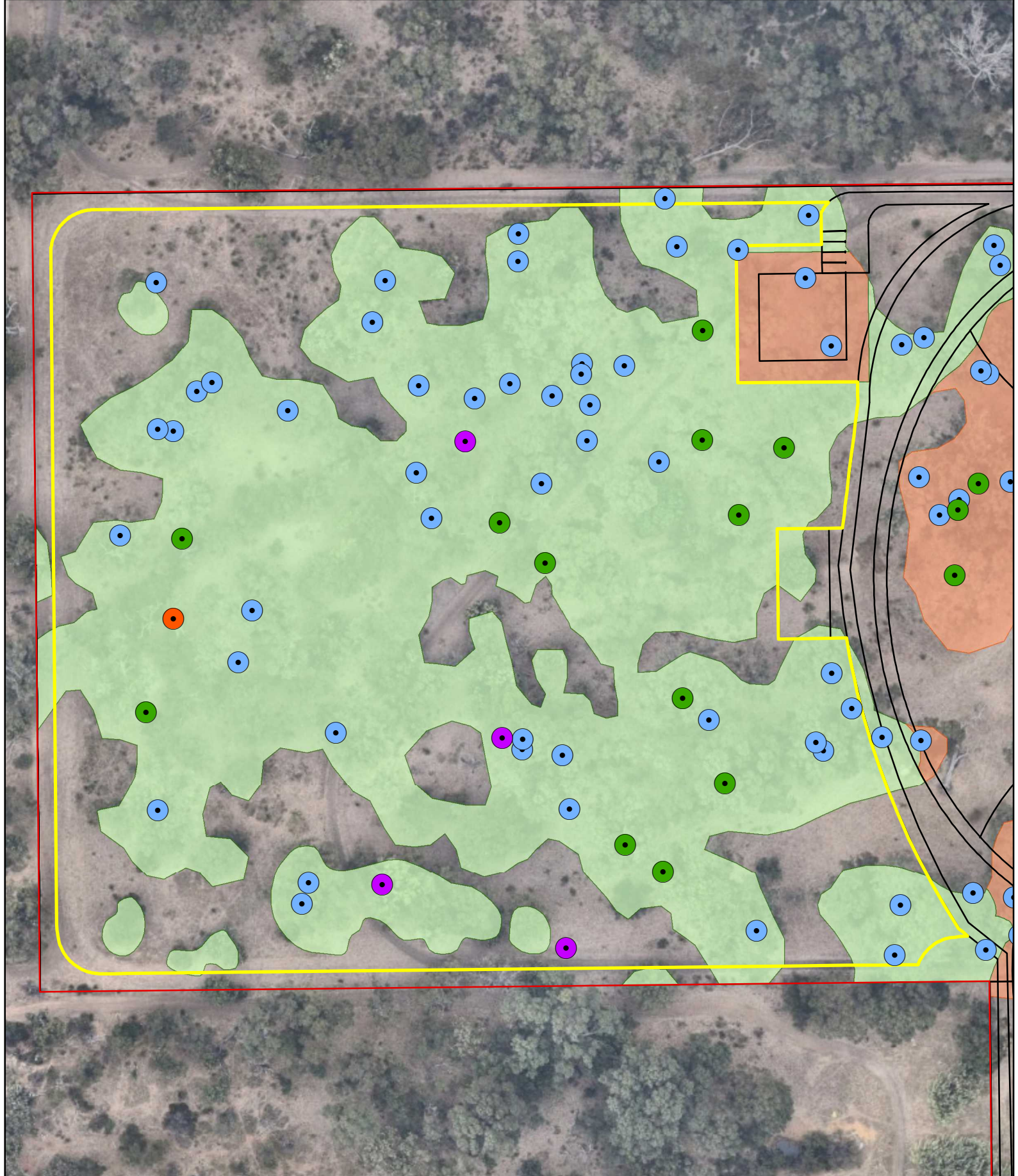
Ian Mullins (ELA): Ian is a senior environmental consultant and project manager with a focus on environmental planning and assessment projects and over 8 years' experience providing environmental science and management services in Western Australia and New South Wales.

Daniel Panickar (ELA): Daniel has over eight years' experience in the consulting industry. Initially trained as an ecologist and environmental planner, Daniel has gained invaluable experience in fire ecology, flora and fauna surveys and environmental approvals. Daniel currently manages ELA's Western Australian operations.

Damian Grose (Tranen): As a director at Tranen since 1994, and full time since 2002, Damian has over 20 years revegetation experience in Australia and overseas with a focus on revegetation projects in the Perth region.

Full CVs for the above personnel are provided in Appendix A.

Figure 3: Revegetation site



Legend

- Application Area
- Development design
- Revegetation site (3.15ha)
- Tuart/ Jarrah Woodland (Degraded)**
- To be retained (2.20 ha within revegetation site)
- To be removed

Potential Black Cockatoo breeding trees

- Eucalyptus gomphocephala* - hollows
- Eucalyptus gomphocephala* - no hollows
- Eucalyptus marginata* - hollows
- Eucalyptus marginata* - no hollows

0 10 20 40
Metres
Datum/Projection: GDA 1994 MGA Zone 50

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Prepared by: JL Date:06/03/2019

2. Background of revegetation site

2.1 Ownership and zoning

The revegetation site is owned by the CoR in freehold and is zoned 'Rural' under both the Metropolitan Region Scheme (MRS) and the City of Rockingham Local Planning Scheme No. 2 (LPS2). As the CoR own the land, advice was sought from the Department of Planning, Lands and Heritage (DPLH) as to whether the proposed development of the BDSC will constitute 'Public Works'.

Advice received in writing on 4 July 2017 from DPLH stated that "The proposed works are deemed to be public works under the *Public Works Act 1902*. Therefore, planning approval under the MRS is not required by the City of Rockingham". This means that rezoning of the site is not required as long as the CoR complies with section 6 (2) and (3) of the *Planning and Development Act 2005* whereby the local government:

- Have regard to the purpose and intent of the region planning scheme;
- Have regard to the orderly and proper planning and the preservation of the amenity of that locality; and
- Consult the WAPC to ensure that the public work will comply with subsection (2).

Given the CoR own the land, no agreement is required for access or to undertake revegetation works. With regard to future security of the revegetation site, the CoR has formally committed to not clearing or developing the north western portion of the site (i.e. revegetation site) for the next ten years.

2.2 Existing environment

2.2.1 Flora and vegetation

Broad scale vegetation mapping of the area undertaken by Beard (1979) identified one vegetation association: 998: *Medium woodland; tuart (Eucalyptus gomphocephala)* within the revegetation site. Regional vegetation mapped by Heddle *et al.* (1980) indicates there are two vegetation complexes within the survey area: *Karrakatta complex – central and south*; and *Herdsmen complex*.

The majority of the revegetation site has been mapped by GHD (2018a) as tuart/jarrah woodland with cleared areas around the edges associated with tracks, fence lines and firebreaks (Figure 3). The tuart/Jarrah Woodland community was described by GHD (2018a) as being in degraded condition due to historical clearing, logging, grazing, fencing, tracks and weed invasion with vegetation structure having been significantly altered and an understorey dominated by common herbaceous and grassy weeds. The condition rating scale used was that devised by EPA (2016) (adapted from Keighery 1994).

Dominant trees across the revegetation site, described by GHD (2018a) and validated by ELA and Tranen during the site inspection consisted of *Eucalyptus gomphocephala* (tuart), *E. marginata* (jarrah), *Banksia grandis*, *B. attenuata* and *Allocasuarina fraseriana*.

Eighty seven (87) native and non-native flora taxa (including subspecies and varieties) representing 41 families and 71 genera were recorded from the application area during the field survey by GHD (2018a). Of these, 45 introduced flora taxa were recorded with one listed as a Declared Pest under the *Biosecurity*

and Management Act 2007, *Gomphocarpus fruticosus* (Narrowleaf Cottonbush). No EPBC Act or *Wildlife Conservation Act 1950* (now the *Biodiversity Conservation Act 2016* [BC Act]) listed flora were recorded within the survey area. Additionally, no Department of Biodiversity Conservation and Attractions (DBCA) Priority-listed flora species were recorded within the application area during the field survey.

2.2.2 Fauna habitat

The primary fauna habitat type present within the revegetation site as shown in Figure 3 was tuart/jarrah woodland with cleared areas around the edges associated with tracks, fence lines and firebreaks. GHD (2018b) described the tuart/jarrah woodland as being of high-quality fauna habitat with trees and shrubs providing shelter and food resources for native bird species, in particular high value foraging habitat as well as potential breeding and roosting habitat for threatened black cockatoo species. It was also noted by GHD (2018b) that given the very open and degraded nature of the understorey, the revegetation site would provide limited value habitat for ground-dwelling fauna, particularly mammals.

A total of 30 fauna species were recorded in the total application area, the majority of which are generally common and are known to occur in the area, and three species are introduced species (GHD 2018b).

Two conservation significant fauna species were recorded (or evidence of occurrence was noted) during the survey including:

- Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*); and
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*).

A Likelihood of Occurrence assessment was conducted by GHD (2018b) post-field survey for all conservation significant fauna taxa identified in the desktop assessment. Based on habitat present a further five species were considered likely to occur including:

- Baudin's Black Cockatoo (*Calyptorhynchus baudinii*);
- Peregrine Falcon (*Falco peregrinus*);
- Rainbow Bee-eater (*Merops ornatus*);
- Perth Slider, Lined Skink (*Lerista lineata*); and
- Black-striped Snake (*Neelaps calonotos*).

As part of GHD (2018b) assessment a targeted black cockatoo habitat assessment was undertaken. Foraging species within the revegetation site were recorded including *Eucalyptus marginata* (jarrah), *Eucalyptus gomphocephala* (tuart), *Allocasuarina fraseriana*, *Banksia attenuata*, *B. grandis*, *B. menziesii*, *B. sessilis* and *Hakea prostrata*. In addition, 61 potential breeding trees with a diameter at breast height (DBH) of greater than 500 mm were recorded within the revegetation site including 5 *Eucalyptus marginata* and 56 *Eucalyptus gomphocephala*. Of these, 13 trees (12 *Eucalyptus gomphocephala* and 1 *Eucalyptus marginata*) were recorded as containing nest hollows with area diameter greater than 10 cm and which are considered currently suitable for black cockatoo breeding. No night roosting sites were recorded during the survey, although the tuart/jarrah woodland was noted as providing suitable roosting habitat for threatened black cockatoos (GHD 2018b).

2.2.3 Soil, landform and topography

The *Rockingham 1:50,000 Environmental Geology map* (Gozzard, 1983) indicates that the sub-surface conditions of the revegetation site are *Sand (S7) derived from Tamala Limestone*. Sands are described as pale yellowish brown, medium to coarse-grained, sub-angular quartz with traces of feldspar, moderately sorted and of residual origin.

The Department of Primary Industries and Regional Development (previously Department of Agriculture and Food Western Australia [DAFWA]) soil mapping (DAFWA 2007) indicates there are three different soil subsystems within the revegetation site:

- Spearwood S4a phase: Flat to gently undulating sandplain with deep, pale and sometimes bleached, sands with yellow-brown subsoils;
- Spearwood S1b: Dune ridges with deep siliceous yellow brown sands or pale sands with yellow-brown subsoil and slopes up to 15%; and
- Spearwood S2a: Lower slopes (1-5%) of dune ridge with moderately deep to deep siliceous yellow-brown sands or pale sands with yellow-brown subsoils and minor limestone outcrop.

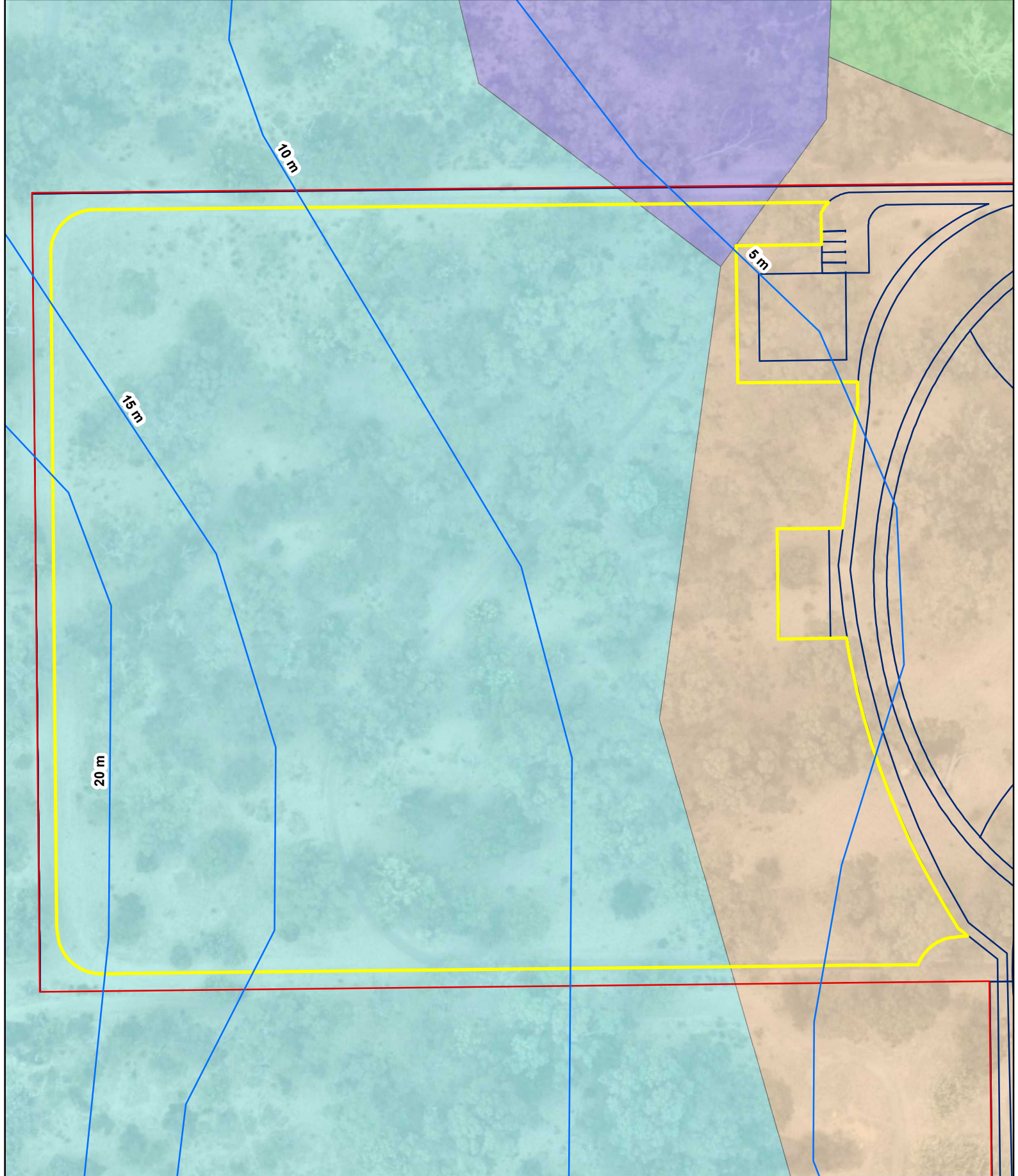
There is no known risk of Acid Sulfate Soils (ASS) beneath the revegetation site based on ASS Risk Mapping (DWER 2018). Topography of the revegetation site slopes up from east to west ranging from approximately 5 mAHD in the eastern portion to approximately 20 mAHD in the western portion (Landgate 2018).

2.2.4 Hydrology and drainage

The revegetation site does not contain any watercourses or wetlands, however it is surrounded by a number of wetlands mapped under the Geomorphic Wetlands of the Swan Coastal Plain Dataset (DBCA 2018b). Lake Walyungup (Unique feature identifier [UFI] – 6230), a large Conservation Category Wetland (CCW) managed by DBCA that forms part of the Rockingham Lakes Regional Park exists approximately 460 m to the west of the revegetation site. Fount Swamp (UFI – 6393), a smaller CCW is located approximately 80 m north east of the revegetation site and Outridge Swamp (UFI – 6394), also a CCW is located approximately 200 m south of the revegetation site. The revegetation site does not form part of the 50 m buffer of any of the CCWs but is located just outside of the Fount Swamp buffer. No vegetation typically associated with wetlands (seasonally waterlogged soils) is present on the revegetation site (CoR 2018).

The City received a groundwater licence from DWER in October 2018 which allows the CoR to take 98,250 kL of groundwater per annum from two production bores for the BDSC development (GWL201976[1]).

Figure 4: Soil type and topography



Legend

- Application Area
- Development design
- Revegetation site (3.15ha)
- Contours 5m Intervals (Statewide)

Soil-landscape mapping (DAFWA 2007)

- Spearwood S1b Phase
- Spearwood S2a Phase
- Spearwood S4a Phase
- Spearwood wet, swamp Phase

0 10 20 40
Metres
Datum/Projection:
GDA 1994 MGA Zone 50

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3. Current disturbance and threats

The tuart/jarrah woodland community was described by GHD (2018a) as being in degraded condition due to historical clearing, logging, grazing, fencing, tracks and weed invasion with vegetation structure having been significantly altered and an understorey dominated by common herbaceous and grassy weeds.

In addition, ELA and Tranen validated the condition of the revegetation site during a site walkover on 12 February 2019 (see Appendix B for photos indicating current condition of the revegetation site). Although not directly observed, it is considered that rabbits are also likely to occupy the general area, noting that these animals can be even more destructive than kangaroos on revegetation works. ELA and Tranen also noted that the main weed species recorded on site are predominantly annual and perennial grasses, and annual broadleaf weeds. Most are common bushland weeds with known effective control measures. One species is a declared pest *Gomphocarpus fruticosus* (Cottonbush), but this was not widely distributed across the site and is relatively easy to eradicate.

Although degraded, it was also noted that there is considerable scattered remnant native understorey vegetation, which would be lost if surface preparation were undertaken. Therefore, direct seeding is not recommended nor proposed in this revegetation plan. No formal Phytophthora dieback surveys have been conducted in the area. Given the good health of the remaining indicator species, it is presumed that dieback is not present in the revegetation site.

4. Revegetation commitments

The vision of the revegetation is to protect and enhance the existing degraded tuart/jarrah vegetation present in the designated revegetation site and provide enhanced foraging and roosting habitat for threatened black cockatoos.

The objectives of the revegetation are to mitigate the loss of native vegetation within the BDSC by:

- replacing lost tuart and jarrah trees with new seedlings at a ratio of 3:1;
- increasing the potential food sources on site for black-cockatoo species; and
- improving the condition of the degraded revegetation site, to provide long-term self-sustaining ecological support for the new seedlings and other established vegetation.

5. Reference site floristic data collection

No reference site for the revegetation works is proposed or required. Based on desktop and field survey by ELA and Tranen, deviation from the guidelines (DER 2016) was recommended to DWER regarding the requirement to include a reference site in the Revegetation Plan. The recommendation was based on lack of reserves under the control of the CoR which contain vegetation associations aligning with the tuart/jarrah woodland vegetation community described by GHD (2018a).

Given the above constraints, ELA and Tranen proposed that the species list and completion criteria within this plan would be based on:

- Commitments within the NVCP supporting report (CoR 2018) and species listed in GHD (2018a);
- Species recorded during site assessment by ELA and Tranen as well as others deemed as commercially practical to source and grow by Tranen based on experience; and
- Species that will enhance the current tuart/jarraah woodland vegetation community and enhance the foraging and roosting habitat for threatened black cockatoos.

DWER accepted the recommendations via email correspondence received on 14 February 2019 (Appendix B).

6. Targets and completion criteria

The primary goal of the revegetation effort is to mitigate the impacts of removing 180 native trees during construction, and to protect and enhance the 2.2 ha of degraded remnant vegetation in the designated revegetation site. This will be achieved by planting tuart and jarraah trees and other black cockatoo foraging species and re-establishing the vegetation community that would normally support these species.

It is not possible to achieve full restoration of a vegetation community within a short timeframe, and therefore some interim success targets must be set. The targets outlined in Table 1 below are easily measurable, not subjective, and of quantifiable and controllable attributes which when compared over time can demonstrate that the site is on a successional pathway for long-term success. Progress will be formally monitored in autumn by the CoR in years 1, 3 and 5 of the 5 year revegetation program. More frequent informal monitoring will also be undertaken to ensure potential issues do not go undetected. Infill planting will be undertaken during subsequent winters should there be shortfalls in requirements.

Table 3: Completion criteria

No.	Attribute	Completion Criteria
1	Weed cover (maximum)	20%
2	Declared weeds	Declared weeds are absent from the revegetation area
3	*Species richness as percentage of species planted	*Total number of species represented.
4	Total native species stem density	1 plant / m ²
5	Tuart and Jarraah trees established across the site (3:1 planting to loss ratio)	Plant a total of 540 trees comprising 50% Tuart trees and 50% Jarraah trees
6	Black-cockatoo foraging species stem density (30% of initial numbers)	0.3 plants / m ²

* Total number of species represented.

7. Species list compilation and revegetation techniques

The two most effective revegetation techniques are seedling planting, and direct seeding. However, for direct seeding to be successful, adequate surface preparation must be undertaken. Although the revegetation site is degraded, there is considerable scattered remnant native understorey vegetation, which would be lost if surface preparation were undertaken. Therefore, direct seeding is to be omitted as a revegetation technique as it is unlikely to be an effective use of resources.

To meet the objectives for the site, factoring in existing vegetation, the revegetation strategy will be as follows:

- Undertake an extensive pre and post-planting weed control program;
- Plant tubestock at a rate of 1 plant / m² across the revegetation site, resulting in the installation of an additional 31,500 plants over the 3.15 ha site staggered over the first two years (Appendix E);
- 540 seedlings will be planted comprising 50% Tuart trees and 50% Jarrah trees to achieve a 3:1 replacement for the trees lost;
- No less than 30% of the total seedling numbers will be primary food species for black-cockatoos;
- No mulch or soil amendments will be used to preserve the existing vegetation; and
- The site is to be managed for five years post-installation to ensure the success targets are achieved.

A list of recommended revegetation species is presented in Appendix D. As no local reference sites could be found matching the site vegetation complex, the list has been compiled from the clearing permit flora survey, additional site inspections, and a review of other literature regarding species of the Karrakatta soil complex. The list is not exhaustive and is limited to those that are readily available from commercial nurseries but includes understory, mid story and canopy species. In addition, the list contains 58 species, of which 13 are plants used by Carnaby's Black-Cockatoo (DBCA, 2019).

All seedlings will be installed with a 10 g fertiliser tablet suitable for use with native species.

In order to prepare the site and facilitate successful revegetation, an intensive pre and post revegetation weed management program is required to reduce competition with establishing seedlings. Weed control will be undertaken at the most effective times of year based on the species present.

8. Site preparation

Fresh kangaroo scats are evident throughout the site indicating that the site is frequented by the animals. The installation of turf within the BDSC is also likely to attract them to the area. Kangaroos can target establishing seedlings and therefore protective measures are required. Exclusion fencing is the most effective tool for preventing herbivory by kangaroos and consequently, a 1.2 m permanent conservation fence to the CoR specifications will be installed around the revegetation site to exclude them, as well as the general public. Although not directly observed, rabbits are also likely to occupy the general area, and these animals can be even more destructive than kangaroos. Therefore, a rabbit proof skirt buried 300 mm vertically below ground will be fitted to the conservation fence to prevent them

from entering the revegetation site. The site will be included in the CoR feral animal inspection and control program, with action taken if species impacting on revegetation efforts are discovered.

Locked gates will be installed to allow maintenance access to the site. Appropriate signage will be attached to the fencing to alert the public to the significance of the area and discourage them from entering the site. Proposed infrastructure to enhance revegetation site and control access is shown in Figure 5.

The main weed species recorded on site are predominantly annual and perennial grasses, and annual broadleaf weeds. Most are common bushland weeds with known effective control measures. One species is a declared pest *Gomphocarpus fruticosus* (Cottonbush), but this was not widely distributed across the site and is relatively easy to eradicate. Weed control will commence immediately and be primarily through herbicide application. Herbicides will be selected for the target species, taking into account the surrounding vegetation and the constraints this may present. Selective herbicides (i.e. grass or broadleaf-specific) will be favoured over general knockdown herbicides to keep off-target damage to a minimum. Manual weed control may also be undertaken where herbicide use is inappropriate or likely to lead to off-target damage.

Although no Phytophthora dieback surveys have been undertaken within the application area, the good health of the indicator species confirmed from field surveys indicate that dieback is unlikely to be present in the revegetation site. Appropriate hygiene measures will be put in place to ensure the disease is not introduced, including the sourcing of seedlings from NIASA (Nursery Industry Accreditation Scheme of Australia) accredited nurseries, and vehicles entering and exiting the area are to be free of soil.

Weed control within the revegetation site will focus on managing plants that are declared pests under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) as well as common bushland weeds present on-site. Weed control will use a combination of a boom unit, 4WD mounted spray unit, hand removal, stem injection (cut and painting), as well as spot spraying. The weed control methodology will be adapted depending on weed species present. Spray drift will be kept to a minimum, which will avoid damage to surrounding vegetation.

Herbicide spray will cease immediately under the following conditions:

- Wind speed stronger than 10 km per hour;
- Temperatures greater than 35°C; and
- Rain.

These site preparation measures are summarised in Table 4 below.

HYGIENE CONTROLS





Vehicles, equipment, machinery and footwear to be used in the revegetation works are to be inspected to ensure they are free of mud and soil prior to entering revegetation site. A hygiene checklist will be maintained to confirm inspections have been undertaken when applicable. If cleaning is required, soil will be removed from vehicles, equipment, machinery and footwear with water if soil is wet; or brushed off if soil is dry. Cleaning will be undertaken on a hard well drained surface (such as a road) that does not drain into the revegetation site.

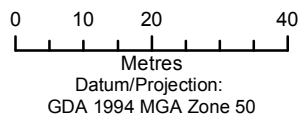
Table 4: Site preparation management actions

Item	Management action	Timing	Responsibility
Fencing	Install 1.2 m high conservation fence around revegetation site	Pre-weed control activities	CoR
	Install rabbit-proof skirt buried 300 mm vertically below ground to exclusion fence	Pre-weed control activities	CoR
Weed and pest control	Undertake a site inspection to identify the Declared Pest weed species and target infestations within the revegetation site.	Pre and post-planting as specified in Appendix E	CoR
	Undertake weed control in areas within revegetation site on the results of site inspection.	Pre and post-planting as specified in Appendix E	CoR
	Control of feral fauna within the fenced area as required.	Annually as part of the City's feral animal control program	CoR
Hygiene measures	Ensure vehicles, machinery, equipment and footwear are free of mud and soil when entering revegetation site.	At all times	CoR
	Ensure all plants and other materials used in revegetation are free of dieback and weeds	At all times	CoR

Figure 5: Proposed infrastructure to enhance revegetation area and control access



- Legend**
-  Application Area
 -  Development design
 -  Conservation fencing 1.2m
 -  Perimeter path/firebreak and access for emergency vehicles



9. Maintenance and contingency measures

Formal monitoring will be undertaken once per year during years 1, 3 and 5 of the five-year maintenance period. These assessments will measure progress towards the completion criteria and will determine remedial action requirements where the targets are not being, or not likely to be met. Informal assessments will be undertaken in between formal monitoring events to observe weed development, check fence integrity, and identify potential issues before they develop. Post-planting weed control will be undertaken based on the observation of species present with the most effective control method to be selected at the time. Control events are to be scheduled twice a year in November and April, with additional events undertaken as necessary to target species present that are active outside of these periods. With regular control events the intensity of treatment is expected to decline over the course of the maintenance period, and not all events may be required.

Seedling watering has not been specified for the maintenance period. Watering can promote shallow root development and reliance on supplementary watering, which does not promote resilience or long-term sustainable survival. Failed plants will be replaced in the following winter wet period when conditions are most conducive for planting success.

Infill planting will be undertaken when the measured native plant densities drop below the target levels. Stem densities will be determined in the formal annual surveys, so that if required seedlings can be secured for the upcoming winter planting season. Infill quantities will be determined by calculating the variance between each target and the actual number of stems. The difference in numbers will be infilled, with species selected based on the species richness target performance.

Other remedial activities not specifically mentioned above (i.e. fencing repair, pest management, soil amendments, etc.) may also be undertaken on an as needed basis if it is determined that inaction may negatively influence the outcome.

Records will be kept for all maintenance activities and informal inspections detailing the actions undertaken, dates, methods, who undertook the work, and other noteworthy observations.

The CoR will maintain ownership and management of the site following the official maintenance period specified in this revegetation plan. If after the five-year maintenance period, revegetation has still not achieved the completion criteria then an analysis of the variance between revegetation and targets will be undertaken to determine what is required in order for revegetation to meet the specified targets. A report will be prepared and provided to DWER at the completion of the five-year monitoring period to summarise this analysis and provide recommendations. The CoR will then consult with DWER on the best approach to achieve completion criteria and/or determine if alternative solutions are required. Once an agreed way forward has been determined the CoR will undertake contingency actions to achieve revegetation outcomes to allow DWER to sign off on the approval condition.

Table 5 contains a summary of contingency measures.

Table 5: Contingency actions

Trigger	Action
<p>If formal or informal monitoring indicates that:</p> <ul style="list-style-type: none"> species richness of planted species is below 70% of those planted total native species stem density is below 1 plant / m² Black-cockatoo foraging species stem density is less than 0.3 plants per m² 	<ol style="list-style-type: none"> 1. Identify cause 2. Implement approach to remedy cause which could include: <ul style="list-style-type: none"> Undertake infill seedling planting the following winter to extent required to maintain target levels Application of additives such as Seasol, water granules, soil breaker, water retainer, wetting agent or fertilizer tablets as deemed necessary by revegetation contractor Further weed and/or pest control if required as per methodology detailed below. 3. Monitor success of contingency measures.
Approximately 30% of seedlings planted show evidence of damage by animal (i.e. grazing)	<ol style="list-style-type: none"> 1. Implement measures to prevent further damage which could include: <ul style="list-style-type: none"> Animal control program Repair of fencing as necessary Application of pesticides in form of spot spraying around planted seedlings Removing damaged or failed plantings and replant Undertake infill planting as per the methodology detailed below 2. Monitor success of contingency measure (s)
Approximately 30% of seedlings planted show evidence of damage by pests	
Approximately 30% of seedlings planted show evidence of water stress	
Weed cover >20%	<ol style="list-style-type: none"> 1. Investigate cause (e.g. adjacent sources of weed seed) 2. Implement measures to remove weeds (e.g. weed control as detailed below) 3. Monitor success of contingency measure(s).
Unauthorised access (people and vehicles, unless required for emergency access)	<ol style="list-style-type: none"> 1. Implement measures to prevent further unauthorised access (e.g. Repair of fencing as necessary). 2. Monitor success of contingency measure(s). 3. Restrict access to controlled areas already disturbed or degraded.
Following five-year maintenance period, completion criteria have still not been achieved.	<ol style="list-style-type: none"> 1. Undertake analysis of the variance between revegetation and targets to determine what works are required in order for revegetation to meet the completion criteria. 2. Consult with DWER on the best approach to achieve completion criteria and/or determine if alternative solutions are required. 3. Following agreed approach with DWER, undertake contingency actions to achieve revegetation outcomes to allow DWER to sign off on the approval condition.

10. Schedule and budget

An indicative schedule of works can be found in Appendix E and an indicative budget estimate is provided in Appendix F. The estimate is conservative in both rates and maintenance provisions to ensure there is sufficient overall budget to deliver the completion criteria, factoring in unforeseen activities. This includes staggered planting across the first two years (i.e. 50% of seedlings in initial planting and 50% in the following year) to avoid mass planting failures and to enable the use of local provenance seed. A minimum of two weed control events per year have been included, as well as infill

planting provisions of 30%, 20%, 10%, 5% of original quantities respectively in each of the five years of maintenance. The infill planting figures reflect expected survival rates for the vegetation complex based on typical meteorological conditions.

11. Monitoring and analysis

The progress of revegetation will be formally monitored during autumn in years 1, 3 and 5 of the five-year maintenance period. The purpose of the formal monitoring is to assess the progress of revegetation against the completion criteria, and to initiate remedial action if required.

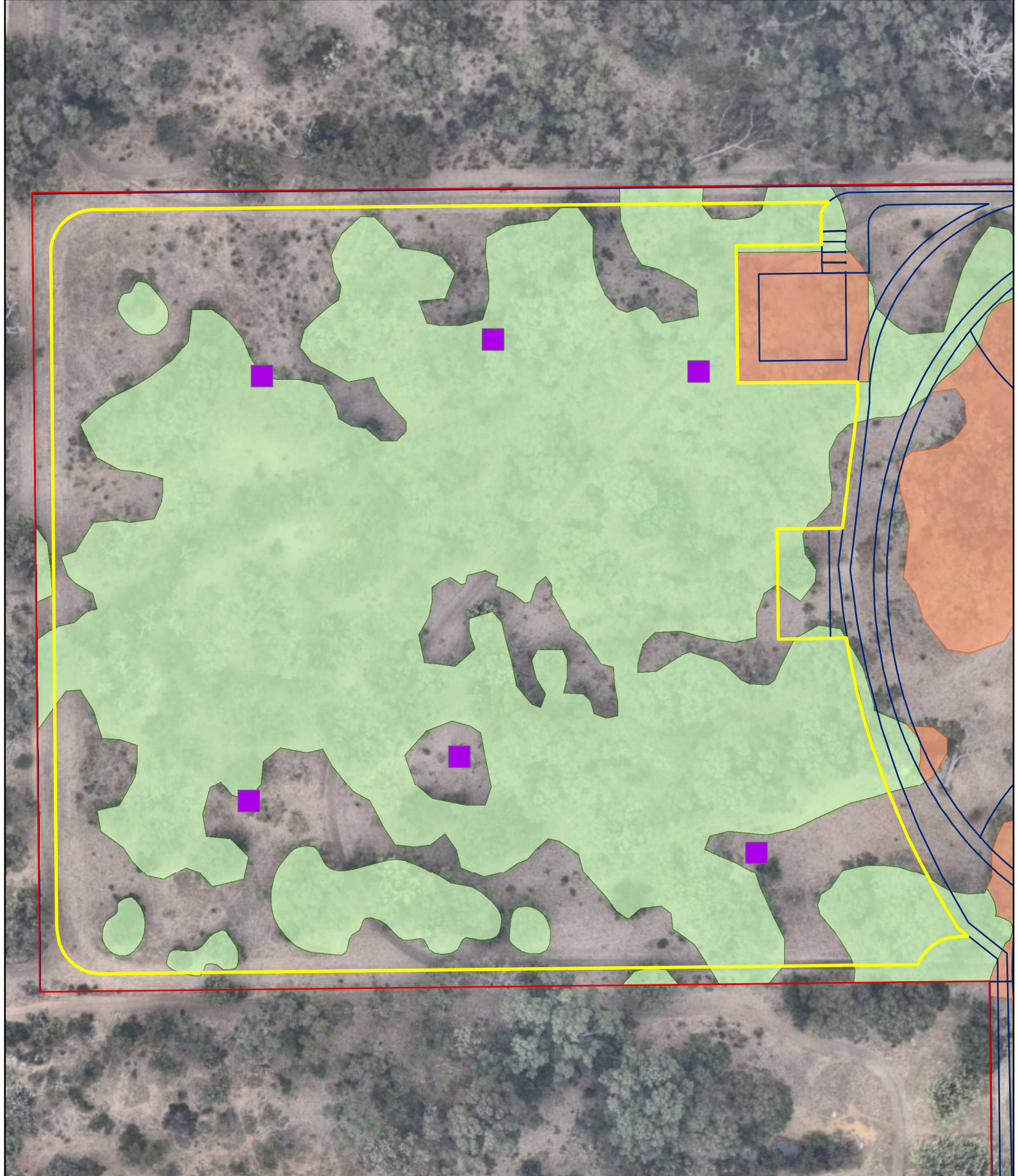
Permanent monitoring quadrats will be installed throughout the revegetation site prior to the first monitoring event. The placement of quadrats will be as per a stratified random sampling design, where quadrats are located randomly but differences in topography, soils and other edaphic factors taken into consideration to sample the variation across revegetation sites. Two 5 m x 5 m quadrats will be established per hectare resulting in six representative sample areas across the 3.15 ha site. Figure 6 shows indicative locations for the six quadrats with the exact locations to be randomly finalised prior to the first monitoring event. The quadrats will be marked with permanent markers and the locations recorded by GPS. Formal quantitative assessments will be undertaken each spring and autumn, with the results contextualised with observations from the representative surrounds.

Within each quadrat the following observations and records will be made:

1. Identification and count of native species present;
2. Native foliage cover;
3. Identification of predominant weed species;
4. Weed foliage cover include any declared weeds;
5. Erosion and site stability; and
6. All other general factors that may be affecting or contributing to progress.

Analysis is a relatively simple comparison of average monitoring parameters against the defined completion targets. Data will either be 'meeting' or 'not meeting' the target for the given parameter. Where the targets are not being met remedial action will be triggered, with infill planting numbers to be determined by calculating the shortfalls from the target.

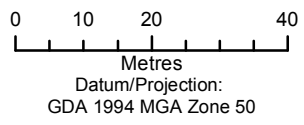
Figure 6: Indicative monitoring quadrat sites



Legend

- Application Area
- Development design
- Revegetation site (3.15ha)
- Indicative monitoring quadrats (5m x 5m)

- Tuart/ Jarrah Woodland vegetation (Degraded)**
- To be retained (2.20 ha within revegetation site)
 - To be removed



12. References and appendices

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Appendix A – CV's of document authors



Ian Mullins SENIOR ENVIRONMENTAL CONSULTANT

Ian is an environmental consultant and project manager with a focus on environmental planning and assessment projects. With over 8 years' experience in providing environmental science and management services to land development, government, construction, and resource industry clients, Ian has operated as a consultant, project manager, environmental liability insurance risk underwriter and researcher in both the public and private sectors.

Ian has strong experience in the project management of multidisciplinary environmental and approvals projects, and in particular has a strong understanding of ecological, bushfire, soil contamination, water and heritage issues as they relate to land development, infrastructure and mining projects. Ian has worked on numerous large and small environmental assessment and approval projects for private and public entities under WA, NSW and Commonwealth legislation and in addition has extensive experience in developing bushfire management plans, vegetation clearing permits, works approvals and Commonwealth referral documentation. Further, Ian has also prepared numerous construction environmental management plans, water allocation applications and has provided on-site environmental compliance auditing and implementation services.

Throughout Ian's career his colleagues have always expressed confidence in his ability to succeed with difficult tasks and drive projects through to successful completion using strong leadership and team management skills. These abilities are aided by his developed communication skills to negotiate, influence and build strong relationships with key stakeholders both internal and external, as well as across multiple organisational levels and technical disciplines.

QUALIFICATIONS

Bachelor of Science in Natural Resource Management (Majoring in Land and Water Management) – University of Western Australia (UWA) 2009

Diploma of Project Management – Australian Institute of Management (AIM) 2014

Bushfire Attack Level (BAL) Assessor Training Certificate of Completion – Fire Protection Association of Australia (FPAA) 2018

PROJECT EXPERIENCE

Urban Development

North Ellenbrook Bushfire Hazard Level (BHL) Assessment: *Parcel Property*. BHL assessment to inform bushfire constraints for large landholding zoned for residential development.

WA Assets Environmental Constraints Analysis: *Juniper*. Constraints analysis of Juniper's undeveloped WA Assets to identify potential environmental opportunities and constraints on six of their undeveloped assets to assist in future planning and development.

Kemerton Road and Drainage Area EPBC Act Referral. *LandCorp*. Assessment and preparation of documentation to support an EPBC Referral for road and drainage infrastructure within the Kemerton Strategic Industrial Area.

Breakwater Stage 2B Bushfire Attack Level (BAL) assessment: *Acumen Development Solutions*. BAL assessments to support future building applications for purchasers in Breakwater Stage 2B.

Beenyup Grove Estate Stage 2 Bushfire Attack Level (BAL) assessment: *Parcel Property*. BAL assessment to support future building applications for purchasers in Stage 2 of Beenyup Grove Estate, Byford.

Lots 504 and 505 Wanneroo Road Bushfire Attack Level (BAL) assessment. *WA Childcare Partners Pty Ltd*. BAL assessment to support a development application for a proposed childcare centre.

64 MacKillop Drive Baulkham Hills: *Aqualand Pty Ltd*. Ecological, heritage and arboricultural investigation, constraints advice and reporting to support a rezoning and residential masterplan development proposal.

Northern Gateway Precinct: *Boyuan Holdings Limited*. Ecological, riparian and bushfire investigation, constraints advice and reporting to support a rezoning and masterplan precinct development proposal.

Werrington Campus Precinct: *University of Western Sydney*. Ecological, riparian and bushfire investigation, constraints advice and reporting to support a rezoning and masterplan precinct development proposal.

Merryland City Centre Project: *Stockland Development Pty Ltd*. Ecological and arborist assessments to support a development application for a commercial development in the Merryland City Centre.

5-15 Dunning Avenue Arboricultural Impact Assessment: *Stockland Development Pty Ltd*. Arborist assessment and documentation to support a development application for a multi-story residential development.

25-27 Stringer Road Development Application: *Stringer Units Pty Ltd*. Ecological assessment and Vegetation Management Plan to support a development application for a residential development.

Northern Road Bringelly Due Diligence: *Calibre Consulting Pty Ltd*. Ecological, riparian and bushfire investigation and constraints advice to inform property purchase and potential for site development.

45-49 Warriewood Road: *Golden Tierra*. Ecological, bushfire and arboriculture assessments to support a development application for a residential development.

1, 3 & 7 Old Glenhaven Road development application: *Zenafone Pty Ltd*. Ecological and bushfire assessments to support development applications for multiple aged care dwellings.

280 Garfield Road Riverstone Due Diligence: *Sunglow Property Development Pty*. Desktop environmental due diligence to inform property purchase and potential for site development.

Chullora Resource Recovery Centre: *SUEZ*. Ecological constraints to inform potential extensions and a development application for a resource recovery centre.

Resources

Lakewood Mill Annual Environmental Compliance Reporting: *Golden Mile Miling Pty Ltd*. Preparation of an Annual Environmental Report (AER) and Annual Audit Compliance Report (AACR) to satisfy licence conditions under Part V of the WA Environmental Protection Act 1986 for submission to the Department of Water and Environmental Regulation (DWER).

Cape Lambert Marine Structures Refurbishment Environmental Approvals: *Rio Tinto*. Referral of the Proposal to the WA Environmental Protection Authority under s38 of the WA Environmental Protection Act 1986.

West Erregulla-2 Environmental Plan: *Strike Energy*. Preparation of an Environmental Plan to support a new on-shore gas exploration well for submission to the Department of Mines, Industry, Regulation and Safety (DMIRS).

Oakajee Port onshore infrastructure EPBC Referral: *Oakajee Port and Rail*. Assessment and preparation of documentation to support a Commonwealth Environmental Protection and Biodiversity Conservation (EPBC) Act referral of onshore infrastructure for a proposed port in the mid-west of WA.

Island Quarantine Management Plan: *BHP*. Island Quarantine Management Plan for several Kimberly operations including presentations for indigenous stakeholders.

Government

Lawson Crown Land Environmental Constraints Study: *Blue Mountains City Council*. Assessment, mapping and reporting of numerous environmental constraints including ecology, bushfire, riparian, visual impact, terrain and soils to inform potential future development of Crown Land.

Environmental Constraints Assessment for Warringah Aquatic Centre: *Warringah Council*. Assessment, mapping and reporting of ecological, bushfire and contamination constraints to inform potential future development of a community aquatic centre in Warringah, Sydney.

Manly Dam Playground Upgrade: *Northern Beaches Council*. Ecological and heritage assessment and environmental impact assessment under Part V of the NSW Environmental Planning and Assessment Act 1979.

Hoxton Park Culvert Bridge Crossing: *Liverpool City Council*. Ecological and heritage assessment and environmental impact assessment under Part V of the NSW Environmental Planning and Assessment Act 1979.

Better Boating Program: *Penrith City Council*. Ecological, riparian and heritage assessment and environmental impact assessment under Part V of the NSW Environmental Planning and Assessment Act 1979.

Canterbury Town Centre and Riverfront Upgrade works: *Canterbury Council*. Ecological, heritage and contamination assessment and environmental impact assessment under Part V of the NSW Environmental Planning and Assessment Act 1979.

Nolan's Reserve Bridge Upgrade: *Warringah Council*. Ecological and heritage assessment and environmental impact assessment under Part V of the NSW Environmental Planning and Assessment Act 1979.

Fiona Stanley Hospital Environmental Support: *Department of Health WA*. Compliance auditing and implementation under Commonwealth environmental approval conditions.

Public Land Management Review: *NSW Natural Resources Commission*. Review and assessment of public land use and management in NSW.

Infrastructure

Yanchep Rail Extension (YRE) Part 1 Environmental Approvals: *Public Transport Authority*. Impact assessment and preparation of an Environmental Review Document to support approval of the YRE Part 1 under Part V of the WA Environmental Protection Act 1986.

Feeder Vegetation Maintenance, Greater Sydney, Hunter and Illawarra Regions: *Sydney Trains*. Environmental due diligence assessment and management documentation for vegetation maintenance works along the entire rail network within the Greater Sydney, Hunter and Illawarra regions. The project involved detailed technical studies in relation to ecology, heritage and bushfire and the preparation of over 120 technical reports and management documents for approval under Part V of the NSW Environmental Planning and Assessment Act 1979.

Mt Ku-ring-gai and Brisbane Water National Parks: *Sydney Trains*. Ecological and environmental impact assessment under Part V of the NSW Environmental Planning and Assessment Act 1979 for access track maintenance.

Sewer Lead-in Pipeline, Box Hill: *Goldmate Property Box Hill No. 4 Pty Ltd*. Environmental impact assessment under Part V of the NSW Environmental Planning and Assessment Act 1979 for construction and operation of a sewer pipeline to support residential development.

Water Lead-in Pipeline, Box Hill: *Welsh Property Consulting Pty Ltd*. Environmental impact assessment under Part V of the NSW Environmental Planning and Assessment Act 1979 for construction and operation of a water pipeline to support residential development.

Garfield Road Water Lead-in Construction Environmental Management Plan (CEMP): *GMR Riverstone Pty Ltd*. Preparation of a CEMP for construction of a water pipeline to support residential development.

Highway Service Centre Flooding Constraints Assessment: *NSW Road and Maritime Services*. Flooding constraints assessment for multiple Highway Service Centres in NSW.

Eraring Culvert Upgrade: *Sydney Trains*. Environmental impact assessment under Part V of the NSW Environmental Planning and Assessment Act 1979 for construction and operation of a new culvert.

Water Lead-in in Box Hill: *Celestino Developments Pty Ltd*. Environmental impact assessment under Part V of the NSW Environmental Planning and Assessment Act 1979 for construction and operation of a water pipeline to support residential development.



Daniel Panickar **MANAGER AND BUSHFIRE LEAD - WA**

Daniel is an experienced environmental and bushfire consultant with over eight years' experience in the consulting industry. Initially trained as an ecologist and environmental planner, Daniel has gained invaluable experience in fire ecology, flora and fauna surveys and environmental approvals. Since being involved in the industry, Daniel's skills have diversified to include bushfire management planning and team management and he has held senior roles including lead ecologist and lead bushfire consultant. Daniel currently manages ELA's Western Australian operations.

Daniel also possesses well-developed project management skills and has managed over 50 land development projects throughout Western Australia and has been responsible for undertaking field investigations, managing sub-consultants and provision of advice regarding bushfire and environmental approvals.

Daniel has worked on over 500 bushfire management projects across Australia and is an accredited Level 2 Bushfire Planning and Design (BPAD) practitioner with experience in Bushfire Attack Level (BAL) assessments, preparation of Bushfire Management Plans, Bushfire Emergency Evacuation Plans, Bushfire Risk Assessments and providing expert advice at Joint Development Assessment Panel (JDAP) meetings and State Administrative Tribunal (SAT) hearings.

Daniel's experience in environmental approvals and bushfire planning, particularly in the land development and infrastructure sectors allow him to provide accurate, pragmatic advice regarding opportunities and constraints, and develop innovative solutions to facilitate development in potentially problematic areas. This experience has been acknowledged through Daniel's membership on the Fire Protection Association Australia (FPAA) WA Bushfire Working Group, National Environmental Law Association (NELA) WA State Committee and the Urban Development Institute of Australia (UDIA) Outlook Committee.

QUALIFICATIONS

Bachelor of Science (Environmental Biology; Honours), Curtin University of Technology, 2011

Graduate Diploma in Bushfire Protection, Western Sydney University, in progress

Level 2 accredited Bushfire Planning and Design (BPAD) practitioner, 2016

PUBLICATIONS

Panickar, D 2018, 'Bushfire protection and environmental management for mine sites in arid and semi-arid regions', *Goldfields Environmental Management Group, Kalgoorlie, 16-18 May*.

PROJECT EXPERIENCE

Land development

Daniel has been involved in over 100 urban development projects across WA, NSW and QLD. A few detailed examples are provided below, and some other key projects have been listed further to this.

The Hales: Satterley Property Group: Environmental project manager to ensure the project meets the requirements of all relevant environmental legislation whilst meeting project timeframes and yield objectives. Undertook and/or coordinated all environmental surveys within the development site (ecological and bushfire assessments, groundwater monitoring and contaminated sites investigations). Provided ongoing strategic environmental and bushfire management advice and prepared all required environmental approvals documentation including a native vegetation clearing permit application and referral to the Commonwealth Department of the Environment. Prepared the Bushfire Management Plan for the estate.

Shorehaven: Peet Limited: Led and coordinated all bushfire assessments within the development site. Provided ongoing strategic advice to reduce bushfire risk and maintain visual amenity and prepared/reviewed Bushfire Management Plans, Bushfire Attack Level Assessments and associated Native Vegetation Clearing permits to facilitate development. Assisted in negotiations with adjacent landowners to clear vegetation and reduce bushfire risk to the Shorehaven site.

Kemerton Strategic Industrial Area: LandCorp/Department of Jobs, Tourism, Science and Innovation: Environmental project manager to obtain approvals for the life of the project (approx.. 2000 ha developed over 50 years). Coordinated ecological surveys within the site and associated industrial buffer, provided ongoing strategic environmental management advice and prepared all required environmental approvals documentation for individual projects within the site (referrals to the Commonwealth Department of the Environment, Native Vegetation Clearing Permits, offsets proposals etc.). Currently coordinating an investigation into a more strategic environmental approvals strategy for the project to expedite development.

Sienna Wood: Stockland: Undertook a bushfire hazard level assessment of the estate (including wetlands of conservation significance, revegetation areas and Aboriginal heritage areas). Provision of advice to the project team regarding redesigning road networks and landscaping areas (including natural streams and wetlands) to achieve a layout that was fully compliant with bushfire planning guidelines and State legislation while maintaining the integrity of the planning vision for the estate. The final Bushfire Management Plan prepared for the estate was endorsed by the Department of Fire and Emergency Services (DFES), the Department of Parks and Wildlife (Parks and Wildlife) and local government and approved for use.

Redevelopment of St Vincent's Aged Care Facility: Catholic Homes Inc.: Undertook a bushfire hazard level assessment, prepared a Bushfire Management and Evacuation Plan and coordinated geotechnical investigations. Site constraints compromised the ability to achieve a compliant bushfire management outcome and a strategy was developed whereby vegetation on neighbouring land would be cleared and landscaped to facilitate a compliant outcome. Organised meetings between the Western Australia Planning Commission, the project team and other relevant stakeholders to negotiate a favourable outcome. All stakeholders agreed with my proposed approach and following the preparation of the revised development design; the DA was lodged successfully.

Environmental due diligence assessments: Juniper Aged Care: Managed and undertook environmental opportunities and constraints analyses of Juniper's undeveloped WA Assets (six sites across Western Australia) to assist in future planning and development.

Rezoning support – 119 Hammond Road: Private land developer: Managed and undertook an environmental opportunities and constraints analysis to inform proposed rezoning of the site. Facilitated environmental and bushfire planning approvals for the site which included undertaking a flora, vegetation and black cockatoo survey and preparation of a Bushfire Management Plan.

Masterplan support: Murdoch University: Undertook flora, vegetation and black cockatoo surveys throughout Murdoch University's South Street Campus and assisted in the preparation of environmental approvals documentation to facilitate redevelopment of the newly developed Murdoch University Masterplan.

Frenchman Bay Resort: Private land developer: Developed a Bushfire Management Plan and Bushfire Emergency Evacuation Plan to support a resort in Frenchman Bay (an extreme bushfire risk area). Method 2 Bushfire Attack Level (BAL) assessments and performance-based bushfire management solutions were developed to facilitate development and ensure a safer outcome for future guests. The plans were approved by the City of Albany and Department of Fire and Emergency Services.

Some other key land development projects Daniel has been involved in as an environmental and bushfire consultant are:

- Butler North District Open Space, Butler;
- Baldivis District Open Space;
- Catalina Estate, Clarkson;
- Brightwood Estate, Baldivis;
- Flamewood Estate, Brabham;
- Mason Green Estate, Piara Waters;
- The Village at Wellard Estate, Wellard;
- Newhaven Estate, Piara Waters;
- Beenyup Grove Estate, Byford;
- Allara Estate, Eglinton;
- Burns Beach Estate, Burns Beach;
- Holland Park Estate, Piara Waters;
- Numerous BP and Caltex service stations across Western Australia;
- Chinatown Revitalisation Project, Broome;
- Glenmore Park/Mulgoa, Western Sydney;
- New Breeze Estate, Bardia (NSW).

Infrastructure

Albany Highway widening (SLK 138 140): Main Roads Western Australia: Undertook baseline floristic surveys within the road widening area. Coordinated targeted black cockatoo survey for the project and prepared environmental approvals advice.

Kwinana Freeway widening (Roe Highway to Beeliar Drive): Main Roads Western Australia: Undertook baseline floristic and black cockatoo surveys within the road widening area and prepared environmental approvals advice.

Yanchep Rail Extension (Part 2 – Eglinton to Yanchep): Public Transport Authority: Preparation of Environmental Review Document (ERD) to support Public Environmental Review and strategic offsets advice.

Armadale Road widening (Fraser Road to Taylor Road): Main Roads Western Australia: Undertook baseline floristic and black cockatoo surveys within the road widening area and prepared environmental approvals advice.

Shelley Bridge Duplication: Main Roads Western Australia: Undertook baseline floristic surveys within the duplication area. Coordinated fauna surveys for the project and prepared environmental approvals advice.

Roe 8 Extension: Main Roads Western Australia: Prepared numerous management plans for the project which were approved by regulatory agencies (Fauna Management Plan, Flora and Vegetation Management Plan, Weed Management Plans).

Kemerton Pipeline extension: DBNGP: Coordinated ecological surveys and prepared State and Commonwealth referrals and approvals documents to support extension of the existing DBNGP infrastructure to the Albemarle LiOH processing facility. Undertook liaison with key regulators and managed project delivery timeframes.

Mining, Oil and Gas

Daniel has undertaken flora and vegetation surveys on over 40 mine sites and exploration tenements across Western Australia in the Swan Coastal Plain, Jarrah Forest, Northern Sandplains, Murchison, Pilbara and Kimberley bioregions.

Daniel has also been responsible for facilitating and managing environmental approvals for numerous resource projects and some key examples are highlighted below.

Mineral Sands/Sand Mines

Cooljarloo West Expansion: Tronox Limited: Coordination and review of all technical surveys (flora & vegetation, terrestrial fauna, subterranean fauna, soil, hydrological studies and wetland investigations) to support an Environmental Review Document. Project and subcontractor management, regulator liaison, approvals advice and preparation of Public Environmental Review document.

Karnup Sand Mine: Urban Resources: Undertook flora and vegetation surveys and assisted with the preparation of a section 38 referral document to the Environmental Protection Authority.

Jurien Gypsum Mine: CSR Building Products Ltd: Ongoing project support addressing all areas of environmental assessment and ongoing management. Preparation of annual environmental reports, and comprehensive updates to the Mine Closure Plan under the Mining Act. Preparation and later mandated revisions to environmental management plans. Undertook ongoing annual vegetation health monitoring and subsequent reporting to the OEPA/DWER. Stakeholder consultation and liaison, including key government agencies.

Iron Ore

Southdown Magnetite Project: Grange Resources: Project manager responsible for coordinating subcontractor investigations, scoping further surveys and assisting in the development of environmental approvals documentation.

Bungaroo South: Iron Ore Holdings (now BC Iron): The Environmental Protection Authority set the level of assessment for this project as *Assessment on Proponent Information* (API). I assisted in the compilation of environmental factor data and assisted in authoring the API documentation.

Buckland Project: BC Iron: Reviewed flora and vegetation studies and was a key author for works approvals supporting proposed expansion projects.

Onshore Oil and Gas

Arrowsmith EP413 exploration program: Norwest Energy: Prepared Environmental Plan to support exploration approval. Designed completion criteria and undertook rare flora surveys and annual revegetation monitoring. Provided compliance advice and support.

Coal

Muja South Extension: Griffin Coal: The Environmental Protection Authority set the level of assessment for this project as *Public Environmental Review* (PER). I was the lead author for *Wetlands*

and *Flora/Vegetation* chapters in the PER document. Key issues were impacts to Threatened flora, impacts to Groundwater Dependent Ecosystems and downstream effects of the proposal on the Collie River system and associated tributaries.

Department of Defence

Daniel has been involved in ecological surveys and the preparation of bushfire management reports for numerous Department of Defence bases across Australia. Some key projects are highlighted below. Daniel also has baseline security clearance from the Department of Defence.

Preparation of bushfire construction advice (Campbell Barracks and RAAF Base Townsville): Assessed proposed building upgrades, refurbishments and new structures at Campbell Barracks, Western Australia and RAAF Base Townsville, Queensland. All structures were assessed for bushfire risk and treatments were prescribed based on State and National guidelines as well as relevant construction standards.

Preparation of Bushfire Management Plans for HMAS Stirling and Exmouth properties: Project manager and author for a new Bushfire Risk Management Plan, Emergency Evacuation Plan and Operations Plan for the entirety of Defence's operations on Garden Island and Exmouth, Western Australia. The project involved close liaison with Defence, Department of Biodiversity Conservation and Attractions, Department of Fire and Emergency Services and local stakeholders. Risk workshops were organised and facilitated to discuss risks and responses prior to finalisation.

Preparation of Bushfire Management Plans for RAAF Base Learmonth and Lancelin Defence Training Area: Project manager and author for a new Bushfire Risk Management Plan, Emergency Evacuation Plan, Bushfire Prevention Plan and Operations Plan for the entirety of Defence's operations at Learmonth and Lancelin, Western Australia. State of the art fire spread modelling was also undertaken to identify impacts associated with Defence activities on the base and surrounding properties. The project involved close liaison with Defence, Department of Fire and Emergency Services and local stakeholders. Risk workshops were organised and facilitated to discuss risks and responses prior to finalisation.

Preparation of Bushfire Management Plans for HMAS Albatross, Bhowerre Ridge and Beecroft Air Weapons Range properties: Prepared bushfire risk management plans and strategies for these three Defence properties in Shoalhaven NSW. Developed Emergency Evacuation Plans for HMAS Albatross and the high-risk Bhowerre Ridge properties as part of the works package.

Weed surveys for HMAS Stirling Garden Island: Managed and coordinated weed surveys throughout Garden Island, Western Australia to inform annual weed control programs and identify new species of invasive plants on the naval base and surrounding island.

Curriculum Vitae

Damian McKay Grose

DATE OF BIRTH 13 November 1976

EXPERTISE

- Rehabilitation program planning, design and monitoring;
- Design and documentation quality control;
- Flora of the southwest;
- Rehabilitation project management;
- Erosion control, soil stability, and bioengineering;
- Geographic information systems (GIS) and seed banking databases

ACADEMIC QUALIFICATIONS

Bachelor of Engineering (Environmental), University of Western Australia, 1997

LANGUAGES

English (mother tongue), Indonesian (fluent)

OTHER TRAINING

Bushfire Attack Level Assessor Short Course, 2018
Manager Tools Effective Manager and Effective Communication, 2013
Leadership Training, Dale Carnegie, 2012
Quantum GIS, GAIA Resources, 2011
Soil Classification Workshop, Department of Agriculture, 2007
Microsoft Access 2000 Intermediate, The Centre for Business Solutions, 2003
Microsoft Access 2000 Introduction, The Centre for Business Solutions, 2002

COMPUTER

High proficiency in MS office programs (Excel, Word, Powerpoint), including Access database programming.
Quantum GIS (Geographic Information System)
Other general computer and electronic equipment tasks (set up, troubleshooting, photo editing, website design and maintenance, etc)

COUNTRIES OF WORK EXPERIENCE

Australia, Indonesia, New Caledonia

CURRENT ROLE AND RESPONSIBILITIES

General Manager

- Oversee all Tranen departments (planning, revegetation, seeds);
- Project assessment, design, planning, and cost estimation;
- Project implementation, monitoring, and reporting;
- Surface erosion management and bio-engineering design;
- Tranen operations database design and management;
- Quality control; and
- Research and development.

PROFESSIONAL EXPERIENCE

2015-18 General Manager, Tranen Pty Ltd, Perth

- Full-time company director;
- Oversee all Tranen operations including planning, revegetation and seed departments;
- Project design, costing, and management for over 180 individual projects;
- Database and website development / management; and
- Business development.

2002-15 Planning and Design Director, Tranen Pty Ltd, Perth

- Full-time company director;
- Director of all Tranen consulting, planning, and reporting activities;
- Project manager for over 180 individual revegetation projects;
- Design and management of the Tranen Database for operations and seed collection tracking;
- Rehabilitation project design, monitoring, and reporting quality control;
- Seed collection and botanical identification; and
- Business development.

1998-02 Environmental Engineer, Kimseed Environmental Pty Ltd, Perth

- Project Manager for several large scale revegetation projects throughout Perth, and one in New Caledonia;
- Site Project Manager for 18 months for the revegetation of the Batu Hijau Project, Indonesia, initially for PT Fluor Daniel Indonesia and later for PT Newmont Nusa Tenggara;
- Management of Geographical Information Systems for rehabilitation programs and Kimseed Forestry's Esperance Projects, WA.

1994-01 Director, Tranen Pty Ltd, Perth

- Part-time company director.

Appendix B – Sample photos showing condition of revegetation site



Plate 1: North eastern portion of the revegetation site, lower slope, facing west.



Plate 2: Central portion of the revegetation site, mid slope, facing west.



Plate 3: Central portion of the revegetation site, mid slope, facing south.



Plate 4: Western portion of the revegetation site, upper slope, facing west

Appendix C – Email correspondence with DWER

Mullins, Ian

Subject: RE: BDSC Revegetation Plan

From: Kerri Wilkes <kerri.wilkes@dwer.wa.gov.au>
Sent: Thursday, 14 February 2019 2:03 PM
To: Natalie Elliott <Natalie.Elliott@rockingham.wa.gov.au>
Cc: Rachel Halton <Rachel.Halton@rockingham.wa.gov.au>
Subject: RE: BDSC Revegetation Plan

Hi Natalie,

Thank you for our phone conversation this morning and your email below requesting DWER's advice on whether the approach outlined by the consultant is acceptable, due to the absence of a suitable local reference site for the Revegetation Plan.

The decision maker has reviewed the field findings and recommendation proposed by the consultant and advises that the measures outlined below are acceptable.

Kind Regards

Kerri Wilkes
Environmental Officer
Native Vegetation Regulation

Department of Water and Environmental Regulation
Level 4, The Atrium, 168 St Georges Terrace, PERTH WA 6000
Locked Bag 33, Cloisters Square, PERTH WA 6850
T: (08) 6364 7153
E: kerri.wilkes@dwer.wa.gov.au | www.dwer.wa.gov.au



From: Natalie Elliott [<mailto:Natalie.Elliott@rockingham.wa.gov.au>]

Sent: Thursday, 14 February 2019 12:58 PM

To: Kerri Wilkes <kerri.wilkes@dwer.wa.gov.au>

Cc: Rachel Halton <Rachel.Halton@rockingham.wa.gov.au>; Gary Rogers <Gary.Rogers@rockingham.wa.gov.au>; Carly Kroczek <IanM@ecoaus.com.au>; 'DanielP@ecoaus.com.au' <DanielP@ecoaus.com.au>

Subject: FW: BDSC Revegetation Plan

Hi Kerri

As discussed, please see the email below from Ecological Australia documenting their field assessment findings and the proposed way forward, in the absence of a suitable local reference site for the Revegetation Plan.

Given the timeframe for provision of the Revegetation Plan, it would be greatly appreciated if you could please confirm whether DWER considers the approach recommended by ELA as acceptable.

Following receipt of your advice, ELA can proceed to finalise the Plan.

Please do not hesitate to contact me should you have any queries or require further information.

Kind regards
Natalie



Natalie Elliott - Coordinator Sustainability and Environment

PO Box 2142 Rockingham DC WA 6967

telephone **+61 8 9527 0728** facsimile **+61 8 9592 1705**

mobile **+61 401 792 481**

email natalie.elliott@rockingham.wa.gov.au



From: Mullins, Ian <lanM@ecoaus.com.au>

Sent: Thursday, 14 February 2019 12:20 PM

To: Natalie Elliott <Natalie.Elliott@rockingham.wa.gov.au>; Gary Rogers <Gary.Rogers@rockingham.wa.gov.au>

Cc: Rachel Halton <Rachel.Halton@rockingham.wa.gov.au>; Carly Kroczek <Carly.Kroczek@rockingham.wa.gov.au>; Panickar, Daniel <DanielP@ecoaus.com.au>; Naden Scarfone <N.Scarfone@hamessharley.com.au>

Subject: RE: BDSC Revegetation Plan

Hi Natalie,

As discussed with regard to the Revegetation Plan for the Baldivis District Sporting Complex Development (BDSC), the below has been set out to put forward our argument for the Revegetation Plan and deviation from Section 5.3 of the Draft DWER guidelines for developing a revegetation plan 'A Guide to Preparing Revegetation Plans for Clearing Permits under Part V of the Environmental Protection Act 1986 (DER 2016).

1. What we did

Desktop assessment of documents provided by the City of Rockingham (CoR) was undertaken to develop a shortlist of four potential reference sites for use in the Revegetation Plan / revegetation works. Documents reviewed included:

- Reserve Prioritisation Report (CoR 2015)
- Wetland Management Plan (CoR 2018)
- Flora and Vegetation Assessment (GHD 2018)
- Native Vegetation Clearing Permit Supporting Report (CoR 2018)

Four reserves under the control of the CoR were then chosen for further field validation based on vegetation units described by GHD (2018) and vegetation units described within CoR (2015) and CoR (2018). The four potential reference sites were based on the closest alignment with the species described in GHD (2018) as per the table below.

Field assessment was undertaken on Tuesday 12 February by Ian Mullins (ELA), Daniel Panickar (ELA) and Damian Grose (Tranen). Sites visited included:

- BDSC Revegetation site
- Sawely Close Nature Reserve
- Tuart Park
- Karnup School Site
- Karnup Townsite

The field assessment comprised a walkthrough of each site to determine dominant vegetation types and comparison with the revegetation site. No formal flora and vegetation surveys were undertaken.

2. What we found

The vegetation community within the revegetation site was assessed by GHD (2018) as encompassing Tuart/Jarrah Woodland over a mixed mid story of banksia species, Macrozamia and Xanthorrhoea shrubs and native grasses (Full description provided in the table below). This community is unique with the combination of Jarrah and Tuarts as dominant canopy species and was noted by ELA and Tranen as being positioned on a perennial flood plain which transitions to a limestone ridge.

Desktop assessment did not identify any reserves under the control of CoR that included vegetation units with a Tuart/Jarrah Woodland mix. The four potential reference sites were however, chosen for further field validation based on the closest alignment with the species described in GHD (2018).

Based on the field assessment undertaken, and in the professional opinion of ELA and Tranen, none of the four potential reference sites, nor any of the reserves under the control of CoR could be considered as representing a Tuart/Jarrah Woodland vegetation community, nor would any of the reserves provide a suitable reference site for the revegetation works at the BDSC Site.

	BDSC Revegetation Area (3.17 ha)	Tuart Park	Karnup Nature Reserve	Karnup School Site	Sawley Close Nature Reserve
Beard (1979) association	Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo (association 998)	Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo (association 998)	Jarrah, banksia or casuarina Eucalyptus marginata, Banksia spp., Allocasuarina spp. (association 1001) Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo (association 968)	Jarrah, banksia or casuarina Eucalyptus marginata, Banksia spp., Allocasuarina spp. (association 1001) Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo (association 968)	Jarrah, banksia or casuarina Eucalyptus marginata, Banksia spp., Allocasuarina spp. (association 1001)
Hedde et al. (1980) complex	Karrakatta complex- central and south: Predominantly open forest of <i>E. gomphocephala</i> - <i>E. marginata</i> - <i>E. calophylla</i> and woodland of <i>E. marginata</i> - <i>Banksia</i> spp.	Karrakatta complex – central and south (south east of reserve)	Karrakatta complex – central and south (West side of reserve)	Karrakatta complex – central and south	Karrakatta complex – central and south
Vegetation unit	Tuart/Jarrah Woodland - <i>Eucalyptus gomphocephala</i> (tuart), <i>E. marginata</i> (jarrah) and <i>Banksia attenuata</i> woodland over <i>Macrozamia riedlei</i> (zamia palm) and <i>Xanthorrhoea gracilis</i> (Grass tree) isolated shrubs over Iridaceae sp. and * <i>Lupinus</i> spp. Open herbland over * <i>Ehrharta</i>	<i>Eucalyptus gomphocephala</i> open forest over mixed Banksia woodland (CoR 2015)	<i>Corymbia calophylla</i> - <i>Banksia attenuata</i> - <i>B. menziesii</i> woodland (CoR 2015)	<i>Corymbia calophylla</i> - <i>Eucalyptus marginata</i> woodland over <i>Banksia menziesii</i> , <i>B. attenuata</i> and <i>Allocasuarina fraseriana</i> low woodland (CoR 2015)	<i>Eucalyptus gomphocephala</i> open woodland over <i>Banksia littoralis</i> low woodland – Very Good condition (eastern extent) (CoR 2018)

	<i>calycina</i> , * <i>Briza maxima</i> and * <i>Bromus diandrus</i> grassland (GHD 2018).				
Soil Type (DPIRD mapping)	<p>Spearwood S4a phase: Flat to gently undulating sandplain with deep, pale and sometimes bleached, sands with yellow-brown subsoils.</p> <p>Spearwood S1b: Dune ridges with deep siliceous yellow brown sands or pale sands with yellow-brown subsoil and slopes up to 15%.</p>	211Sp_S4a Flat to gently undulating sandplain with deep, pale and sometimes bleached, sands with yellow-brown subsoils. (Southern portion of the site) (CoR 2015)	211Sp_S4a Flat to gently undulating sandplain with deep, pale and sometimes bleached, sands with yellow-brown subsoils. (Western Portion) (CoR 2015)	211Sp_S4a Flat to gently undulating sandplain with deep, pale and sometimes bleached, sands with yellow-brown subsoils (CoR 2015)	211Sp__S4c Flat to gently undulating sandplain with deep, yellow-brown or dark brown siliceous sands that are seasonally inundated (National Maps 2018)

3. Recommendation

Consultation with DWER is recommended for a deviation from the guidelines with regard to the need to include a reference site in the Revegetation Plan. In the opinion of ELA and Tranen, reserves under the control of CoR do not provide for a suitable reference site given the unique Tuart/Jarrah Woodland within the BDSC site. It is the professional opinion of ELA and Tranen that suitable species lists and completion criteria can be developed without a reference site that will enhance the vegetation community present on site, and provide enhanced foraging and roosting habitat for threatened black cockatoos.

In summary, it is proposed that ELA and Tranen draft a species list and completion criteria to present to DWER as part of the Revegetation Plan in the absence of a suitable local reference site. The species list and completion criteria will be based on:

- Commitments within the NVCP supporting report (CoR 2018) and species listed in GHD (2018);
- Species recorded during site assessment by ELA and Tranen as well as others deemed as commercially practical to source and grow by Tranen based on extensive experience; and
- Species that will enhance the current tuart/jarrah woodland vegetation community and enhance the foraging and roosting habitat for threatened black cockatoos.

Kind regards,

Ian Mullins

Senior Environmental Consultant

Eco Logical Australia Pty Ltd

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Appendix D – Recommended revegetation species

Species	Black Cockatoo species Y/N
<i>Acacia cyclops</i>	
<i>Acacia huegelii</i>	
<i>Acacia lasiocarpa</i>	
<i>Acacia pulchella</i>	
<i>Acacia stenoptera</i>	
<i>Acanthocarpus preissii</i>	
<i>Allocasuarina fraseriana</i>	
<i>Allocasuarina humilis</i>	
<i>Anigozanthos humilis</i>	
<i>Anigozanthos manglesii</i>	
<i>Banksia attenuata</i>	Y
<i>Banksia dallaneyi</i>	Y
<i>Banksia grandis</i>	Y
<i>Banksia menziesii</i>	Y
<i>Banksia sessilis</i>	Y
<i>Bossiaea eriocarpa</i>	
<i>Calothamnus sanguineus</i>	
<i>Conostylis aculeata</i>	
<i>Corymbia calophylla</i>	Y
<i>Daviesia divaricata</i>	
<i>Daviesia physodes</i>	
<i>Daviesia triflora</i>	
<i>Dianella revoluta var divaricata</i>	
<i>Eremaea pauciflora</i>	
<i>Eucalyptus gomphocephala</i>	Y
<i>Eucalyptus marginata</i>	Y
<i>Ficinia nodosa</i>	
<i>Gastrolobium capitatum</i>	
<i>Gompholobium tomentosum</i>	
<i>Grevillea crithmifolia</i>	
<i>Grevillea vestita</i>	
<i>Hakea lissocarpa</i>	Y
<i>Hakea prostrata</i>	Y

<i>Species</i>	Black Cockatoo species Y/N
<i>Hakea ruscifolia</i>	Y
<i>Hardenbergia comptoniana</i>	
<i>Hibbertia hypericoides</i>	
<i>Hibbertia racemosa</i>	
<i>Hovea trisperma</i>	
<i>Hypocalymma robustum</i>	
<i>Jacksonia furcellata</i>	Y
<i>Jacksonia sternbergiana</i>	
<i>Kennedia prostrata</i>	
<i>Lechenaultia floribunda</i>	
<i>Macrozamia fraseri</i>	
<i>Melaleuca systema</i>	
<i>Melaleuca thymoides</i>	
<i>Nuytsia floribunda</i>	
<i>Patersonia occidentalis</i>	
<i>Phyllanthus calycinus</i>	
<i>Rhagodia baccata subsp. Dioica</i>	
<i>Spyridium globulosum</i>	
<i>Stirlingia latifolia</i>	
<i>Templetonia retusa</i>	
<i>Thysanotus multiflorus</i>	
<i>Xanthorrhoea brunonis</i>	
<i>Xanthorrhoea gracilis</i>	
<i>Xanthorrhoea preissii</i>	Y
<i>Xylomelum occidentale</i>	
Total Species	58
Total Black-Cockatoo Species	13

Appendix E – Indicative revegetation schedule



Baldivis District Sporting Complex
Indicative Schedule

Activity	Year 0				Year 1				Year 2				Year 3				Year 4				Year 5			
	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter
Initial Works																								
Pre-planting weed control																								
Fencing and signage installation																								
Seedling procurement																								
Seedling planting (50% Year 0 and Year 1)																								
Maintenance - 5 Years																								
Install quadrats																								
Formal monitoring																								
Weed control																								
Infill planting																								

Appendix F – Indicative revegetation budget estimate



Baldvis District Sporting Complex Revegetation Budget Estimate

Item	Description	Quantity	Unit	Rate	Total	Comments
1.0	Site Preparation					
1.1	Fence supply and installation - 1.2 m	750	lin m	\$17.00	\$12,750.00	
1.2	Pre-planting weed control - spring	3.0	ha	\$1,100.00	\$3,300.00	
1.3	Pre-planting weed control - autumn	3.0	ha	\$1,100.00	\$3,300.00	
	Sub-Total				\$19,350.00	
2.0	Revegetation					
2.1	Tubestock supply (50%)	14,950	ea	\$2.00	\$29,900.00	
2.2	Tubestock install (50%)	14,950	ea	\$1.00	\$14,950.00	
2.3	Fertiliser tablet supply and install	14,950	ea	\$0.50	\$7,475.00	
	Sub-Total				\$52,325.00	
3.0	Monitoring and Maintenance Provisions - Year 1					
3.1	Formal monitoring - autumn	1	ea	\$2,000.00	\$2,000.00	
3.2	Weed control - spring	3.0	ha	\$1,100.00	\$3,300.00	
3.3	Weed control - autumn	3.0	ha	\$1,100.00	\$3,300.00	
3.4	Tubestock supply (50%)	14,950	ea	\$2.00	\$29,900.00	
3.5	Tubestock install (50%)	14,950	ea	\$1.00	\$14,950.00	Includes supply, installation, and fertiliser
3.6	Fertiliser tablet supply and install	14,950	ea	\$0.50	\$7,475.00	
	Sub-Total				\$60,925.00	
4.0	Monitoring and Maintenance Provisions - Year 2					
4.1	Weed control - spring	3.0	ha	\$1,100.00	\$3,300.00	
4.2	Weed control - autumn	3.0	ha	\$1,100.00	\$3,300.00	
4.3	Infill planting provision - 30%	8,970	ea	\$1.00	\$8,970.00	Includes supply, installation, and fertiliser
	Sub-Total				\$15,570.00	
5.0	Monitoring and Maintenance Provisions - Year 3					
5.1	Formal monitoring - autumn	1	ea	\$2,000.00	\$2,000.00	
5.2	Weed control - spring	3.0	ha	\$1,100.00	\$3,300.00	
5.3	Weed control - autumn	3.0	ha	\$1,100.00	\$3,300.00	
5.4	Infill planting provision - 20%	5,980	ea	\$1.00	\$5,980.00	Includes supply, installation, and fertiliser
	Sub-Total				\$14,580.00	
6.0	Monitoring and Maintenance Provisions - Year 4					
6.1	Weed control - spring	3.0	ha	\$1,100.00	\$3,300.00	
6.2	Weed control - autumn	3.0	ha	\$1,100.00	\$3,300.00	
6.3	Infill planting provision - 10%	2,990	ea	\$1.00	\$2,990.00	Includes supply, installation, and fertiliser
	Sub-Total				\$9,590.00	
7.0	Monitoring and Maintenance Provisions - Year 5					
7.1	Formal monitoring - autumn	1	ea	\$2,000.00	\$2,000.00	
7.2	Weed control - spring	3.0	ha	\$1,100.00	\$3,300.00	
7.3	Weed control - autumn	3.0	ha	\$1,100.00	\$3,300.00	
7.4	Infill planting provision - 5%	1,495	ea	\$1.00	\$1,495.00	Includes supply, installation, and fertiliser
	Sub-Total				\$10,095.00	
	TOTAL (ex-GST)				\$182,435.00	
	GST				\$18,243.50	
	TOTAL (inc-GST)				\$200,678.50	

