# REHABILITATION AND DECOMMISSIONING PROGRAMME
# LOT 393 SOUTH WESTERN HIGHWAY, GWINDINUP

PREPARED FOR:

MARIO MICHELE GIACCI

MARCH 2019


PREPARED BY:

Martinick Bosch Sell Pty Ltd
4 Cook Street
West Perth WA 6005
Ph: (08) 9226 3166
Email: info@mbsenvironmental.com.au
Web: www.mbsenvironmental.com.au


MBS ENVIRONMENTAL

MARTINICK BOSCH SELL PTY LTD
ABN 60 102 614 479
MBS ENVIRONMENTAL
environmental and geoscience consultants

# LOT 393 LOWRIE ROAD, GWINDINUP
# REHABILITATION AND DECOMMISSIONING PROGRAMME

Distribution List:

| Company | Contact name | Copies | Date |
|---|---|---|---|
| MGM Limestone | Craig Carbone, Quarry Manager | electronic | 29 March 2019 |

Document Control for Job Number: MGML393

| Document Status | Prepared By | Authorised By | Date |
|---|---|---|---|
| Draft Report | Kirsi Kauhanen, Julia White | Kristy Sell | 29 March 2019 |
| Final Report | Kirsi Kauhanen | Kristy Sell | 29 March 2019 |

# TABLE OF CONTENTS



# TABLES



# FIGURES



# PLATES



# APPENDICES

# 1. INTRODUCTION

This Rehabilitation and Decommissioning Programme outlines how the planned extraction area (31.4 ha) on Lot 393 Lowrie Road in Gwindinup will be gradually rehabilitated on completion of sand and gravel extraction. The rehabilitation will include a combination of traditional farming pasture (18.6 ha) and native vegetation corridors (12.8 ha) for wildlife. This Rehabilitation and Decommissioning Programme has been prepared to address requirements of the Shire of Capel Extractive Industry Local Law and will be submitted for approval as an appendix of the application for an Extractive Industry Licence. This 2019 Rehabilitation and Decommissioning Programme replaces all previous versions submitted to and approved by Shire of Capel.

This document should be read in conjunction with the Extractive Industry Licence application report and related plans.

# 2. OBJECTIVES AND SCOPE

The objectives of rehabilitation and decommissioning on Lot 393 are following:

- Establish stable and safe landform.
- Remove any temporary infrastructure, rubbish and debris.
- Establish pasture in 18.6 ha of the extraction area to cater for future rural use.
- Establish native vegetation corridors for wildlife covering 12.8 ha of the extraction area.

Rehabilitation measures to pasture are detailed in this document whereas rehabilitation to native vegetation is described in a separate plan (Appendix 1).

# 3. EXISTING ENVIRONMENT

## 3.1 LOT 393

Lot 393 covers total of 52 ha in two parts (40.94 ha and 10.94 ha). The proposed extraction area (also referred to as the site) covers 31.4 ha (Figure 1). The property used to be covered in mostly blue gums (Plate 1) that were harvested in 2018. There are some patches of remnant native vegetation (Plate 2) and some sporadic individual native trees or shrubs that are described in more detail in Appendix 1. The proponent holds a current clearing permit (CPS 7171/1) from Department of Water and Environmental Regulation to remove remaining native vegetation within the previously approved EIL area and has applied to modify this permit to include all native vegetation within the current EIL application area.

Plate 1: Blue Gum Plantation Pre-Harvest 2018

Plate 2: Remnant Native Vegetation

Based on test excavations on site and on neighbouring Lot 287, there is a thin layer of topsoil with a significant litter component. Below this there is a general grading from sand through to gravel with varying grades of sandy gravel and gravelly sand mixes depending on the location. The sands are predominately white, with some yellow sands at isolated points. Under varying depths of gravel, there is clay.

Groundwater monitoring of two bores on site in 2016 indicated that groundwater was over 5 m below natural ground level (Table 1). There is no surface water within the proposed extraction area and no evidence of stormwater runoff leaving the proposed extraction area (i.e. gullies or erosion).

Table 1: Groundwater Levels in the Proposed Extraction Area on Lot 393

| Piezometer | Ground Level (AHD) | Groundwater Depth from Natural Ground Level | Groundwater Level (AHD) | Sampling Date |
|---|---|---|---|---|
| 1 (southeast) | 94.30 m | More than 8.8 m as bore dry | Bore dry at 85.50 m | 18 Oct 2016 |
| | | More than 8.8 m as bore dry | Bore dry at 85.50 m | 2 Nov 2016 |
| | | More than 8.8 m as bore dry | Bore dry at 85.50 m | 14 Dec 2016 |
| 2 (northwest) | 45.80 m | 5.25 m | 40.55 m | 18 Oct 2016 |
| | | 5.35 m | 40.45 m | 2 Nov 2016 |
| | | 5.74 m | 40.06 m | 14 Dec 2016 |

The natural landform within the extraction area slopes from 96 mAHD in the southeastern corner down to 45 mAHD in the northwestern corner. The slope is relatively consistent across the area. The lowest point of the proposed excavation is 45 mAHD (attenuation basin) and this is expected to remain approximately at least 3 m above the groundwater in the area.

Due to the lack of sufficient native vegetation within the proposed extraction area, the presence or absence of dieback cannot be determined and consequently the area should be considered as potentially dieback infected.

## 3.2 SURROUNDS

The adjacent private properties have rural zoning and contain a mixture of pastures and native vegetation. There is an active extractive site to the east on Lot 287 and a finished mineral sands mine to the west. There are also three reserves in close vicinity, some of which are covered by the Management Plan for the Gwindinup Reserves (Jennings and Pearce, Year unknown). Vegetation in the reserves has been described as predominately Marri woodland with a diverse understorey, influenced by the changing soil type.

381900 m 382100 m 382300 m 382500 m 382700 m

N

6291000 m
6290800 m
6290600 m
6290400 m
6290200 m
6290000 m

**Legend**

- Lot 393 Boundary
- Proposed EIL Boundary
- Permanent Retention Pond
- Rehabilitation to Native Vegetation (12.8 ha)
- Rehabilitation to Pasture (18.6 ha incl. pond)

381900 m 382100 m 382300 m 382500 m 382700 m

Scale: 1:3500
Original Size: A3
Air Photo Date: 2017
Grid: MGA94(50)
0 100 m

Mario Michele Giacci
Lot 393 Lowrie Road, Gwindinup
EIL Application -
Rehabilitation and Decommissioning Programme

**Figure 1**

**Site Layout**

Martinick Bosch Sell Pty Ltd
4 Cook St West Perth WA 6005
Australia

t:+61 8 9226 3166
info@mbsenvironmental.com.au
www.mbsenvironmental.com.au

MBS ENVIRONMENTAL

E:\Kirsi\PROJECTS\MGM\Lowrie Rd\Drawings\Lot 393 Rehab and Decom Prog Map.map 27/03/2019 F1 Site Layout Map

# 4. ON-SITE WORKS

The site is planned to be worked in 2.0 ha stages. Once excavation of sand and gravel has been completed, the stage will be rehabilitated as excavation moves forward. Rehabilitation to native vegetation will cover 12.8 ha and rehabilitation to pasture the remaining of the extraction area (approximately 18.6 ha). These rehabilitation areas are shown in Appendix 1 that describes in detail the native vegetation rehabilitation. The following sections will describe general rehabilitation measures applicable to all areas or specifically to pasture areas. It is noted that some of these works will be undertaken already prior to or during the extractive operations in preparation for rehabilitation.

## 4.1 BLUE GUM REMOVAL

The blue gums on Lot 393 were removed in 2018 and the stumps and excess litter were burned.

## 4.2 CLEARING AND HANDLING OF NATIVE VEGETATION

- Clearing of native vegetation will be undertaken gradually in stages. Clearing will not be undertaken between 1 July and 28 February each year in accordance with Clearing Permit CPS 7171, to avoid any disturbing potential black cockatoo breeding.
- Some of the cleared vegetation, such as canopy material and smaller branches, will be mulched. As far as possible, mulching will be undertaken during or immediately after vegetation clearing, with a minimal stockpiling period, followed by direct transfer to native vegetation rehabilitation areas. When necessary, mulch will be stockpiled for later use.
- Other plant matter, such as larger branches and tree trunks removed from the clearing areas will be transferred to the native vegetation rehabilitation areas to create microhabitats and assist with topsoil retention

## 4.3 SOIL MANAGEMENT AND EARTHWORKS

- Removal of topsoil (approximately 100 mm thick) and remaining litter will proceed in stages ahead of extraction. When possible, stripped topsoil will be directly transferred into rehabilitation areas and spread across finalised land surfaces to avoid stockpiling thus maximising seed and microbial benefits. When necessary, topsoil will be stockpiled for later use in windrows to a maximum height of 4 m.
- Sand and gravel extraction will proceed in stages in accordance with the EIL report.
- Dust generation from topsoil and other stockpiles (wind erosion) will be minimised as necessary with water truck (spraying water).
- As each stage of extraction is completed, the permanent land form contours will be established in accordance with the latest approved Development Plan. Batter slopes will be maximum 1:10. The final contours shall be achieved and confirmed by way of digital survey.
- A drainage basin will be excavated in the northwest corner to collect any surface drainage from the extraction area (see separate Stormwater Management Plan for further details).
- Ripping will be undertaken along contour lines to a minimum of 0.6 m deep with approximately 1 m centres between lines. This will promote root penetration and runoff infiltration.
- To further manage runoff, increase infiltration and reduce sediment movement post mining, contour banks will be constructed along the final landform contour at 100 m intervals. These are to be constructed during post mining rehabilitation works for each cell after completion of extraction

- The stockpiled topsoil/litter mix will then be replaced across the rehabilitation area.

## 4.4 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures are described in separate Dust Management Plan and Stormwater Management Plan.

## 4.5 REVEGETATION - PASTURE

The focus of pasture rehabilitation is to stabilise the soil and provide an area for stock grazing in line with the rural zoning of the area. Pasture is well suited to the finished soil profile of topsoil over heavy gravelly clay, with the clay layer providing a moisture and nutrient reservoir. It is likely to be more productive than the deep sands found in nearby paddocks.

Pasture rehabilitation will take place in stages in areas that have been ripped and contoured and include following measures:

- The site will be allowed to wet up with autumn rains before fertiliser is applied at 200 kg per hectare of NPK + Trace Elements.
- A pasture species mix will then be direct seeded into the topsoil by appropriate machinery. This will include a mix of annual grasses, clovers and other species suitable to sand over gravel/clay soils. Seeding will only take place once sufficient rains have fallen to allow for successful germination.
- Pasture seed will be sown at a rate of 25 kg of seed per hectare.

## 4.6 NATIVE VEGETATION REHABILITATION

Please refer to separate Native Vegetation Rehabilitation Plan (Appendix 1).

## 4.7 WEED AND PEST MANAGEMENT

- Where necessary, weeds will be controlled prior to seeding/planting with a glyphosate based herbicide. The spraying will extend 2 m out from the edge of the rehabilitation area (into the buffer zone) to minimise new weed encroachment.
- Spot spraying with glyphosate or a selective herbicide will also be undertaken as necessary after seed germination and plant establishment.
- Stock-proof fence will be maintained around the property to protect the rehabilitation.

## 4.8 DIEBACK MANAGEMENT

- Due to the lack of sufficient native vegetation within the proposed extraction area, the occurrence of dieback cannot be determined and the area will be considered potentially dieback infected. Dieback management measures applicable to the extractive operations are detailed in the EIL application report and these apply to rehabilitation and decommissioning as well.

## 4.9 ACCESS

- Access to the extraction area (and rehabilitation area) will be maintained off Lowrie Road.
- Access will also be maintained through the use of a fire break compliant track around the edge of the property. The track will be constructed to allow access at all times of the year.

## 4.10 DECOMMISSIONING

As part of decommissioning, any temporary site infrastructure (e.g. portable toilets) and waste/debris will be removed.

# 5. MONITORING AND MAINTENANCE

## 5.1 PASTURE

Pasture monitoring and maintenance will be ongoing for the life of the extraction process and 2 years after the last seeding. Visual monitoring, with photographic record and written notes, will be undertaken in each July, October and March. Maintenance will be undertaken as necessary to address any issues identified through monitoring. Records of monitoring and maintenance works will be maintained by MGM.

Monitoring and maintenance measures to be undertaken in the extraction area are summarised in Table 2.

Table 2: Monitoring and Maintenance Measures

| Monitoring | Maintenance |
|---|---|
| Success of pasture establishment (plant vigour/resilience). | Re-seed areas of poor success.<br>Trial alternative pasture species. |
| Weed infestations. | Control weeds by manual removal or herbicide application. |
| Soil issues (e.g. areas lacking growth vigour). | Mitigate poor soils. |
| Erosion damage. | Repair erosion damage. |
| Boundary fence damage. | Fix fence. |

## 5.2 NATIVE VEGETATION

Monitoring and maintenance of native vegetation rehabilitation areas is described in Appendix 1.

# 6. REFERENCES

Jennings, A. and Pearce, D. (Year unknown). Management Plan for the Gwindinup Reserves. Prepared for Capel Land Conservation District Committee.

# APPENDICES

# APPENDIX 1: NATIVE VEGETATION REHABILITATION PLAN

# LOT 393 LOWRIE ROAD GWINDINUP
# NATIVE VEGETATION REHABILITATION PLAN

PREPARED FOR:

**MARIO MICHELE GIACCI**

MARCH 2019


PREPARED BY:

Martinick Bosch Sell Pty Ltd
4 Cook Street
West Perth WA 6005
Ph: (08) 9226 3166
Email: info@mbsenvironmental.com.au
Web: www.mbsenvironmental.com.au


MBS ENVIRONMENTAL

MARTINICK BOSCH SELL PTY LTD
ABN 60 102 614 479
MBS ENVIRONMENTAL
environmental and geoscience consultants

# LOT 393 LOWRIE ROAD GWINDINUP
# NATIVE VEGETATION REHABILITATION PLAN REV1

**Distribution List:**

| Company | Contact name | Copies | Date |
|---|---|---|---|
| MGM Bulk Pty Ltd | Craig Carbone Quarry Manager | [01] electronic | 29 March 2019 |

**Document Control for Job Number: MGML393**

| Document Status | Author | Reviewer/Signatory | Date |
|---|---|---|---|
| Draft Report | Kirsi Kauhanen | Kristy Sell | 12 March 2018 |
| Draft Report | Kirsi Kauhanen | Kristy Sell | 23 April 2018 |
| Final Report | Kirsi Kauhanen | Kristy Sell | 20 June 2018 |
| Rev1 Report | Kirsi Kauhanen | Kristy Sell | 29 March 2019 |

# TABLE OF CONTENTS



# TABLES

# FIGURES



# APPENDICES

# 1. INTRODUCTION

## 1.1 BACKGROUND AND SCOPE

Mario Michele Giacci is the owner of Lot 393 (Deposited Plan 159607) Lowrie Road in Gwindinup (Figure 1). Mr Giacci has a current Development Approval and Extractive Industry Licence (EIL) from the Shire of Capel for extraction of sand and gravel on the property but due to a proposed change in the extraction area is also applying for new EIL and modified Development Approval. The existing EIL is subject to conditions including following:

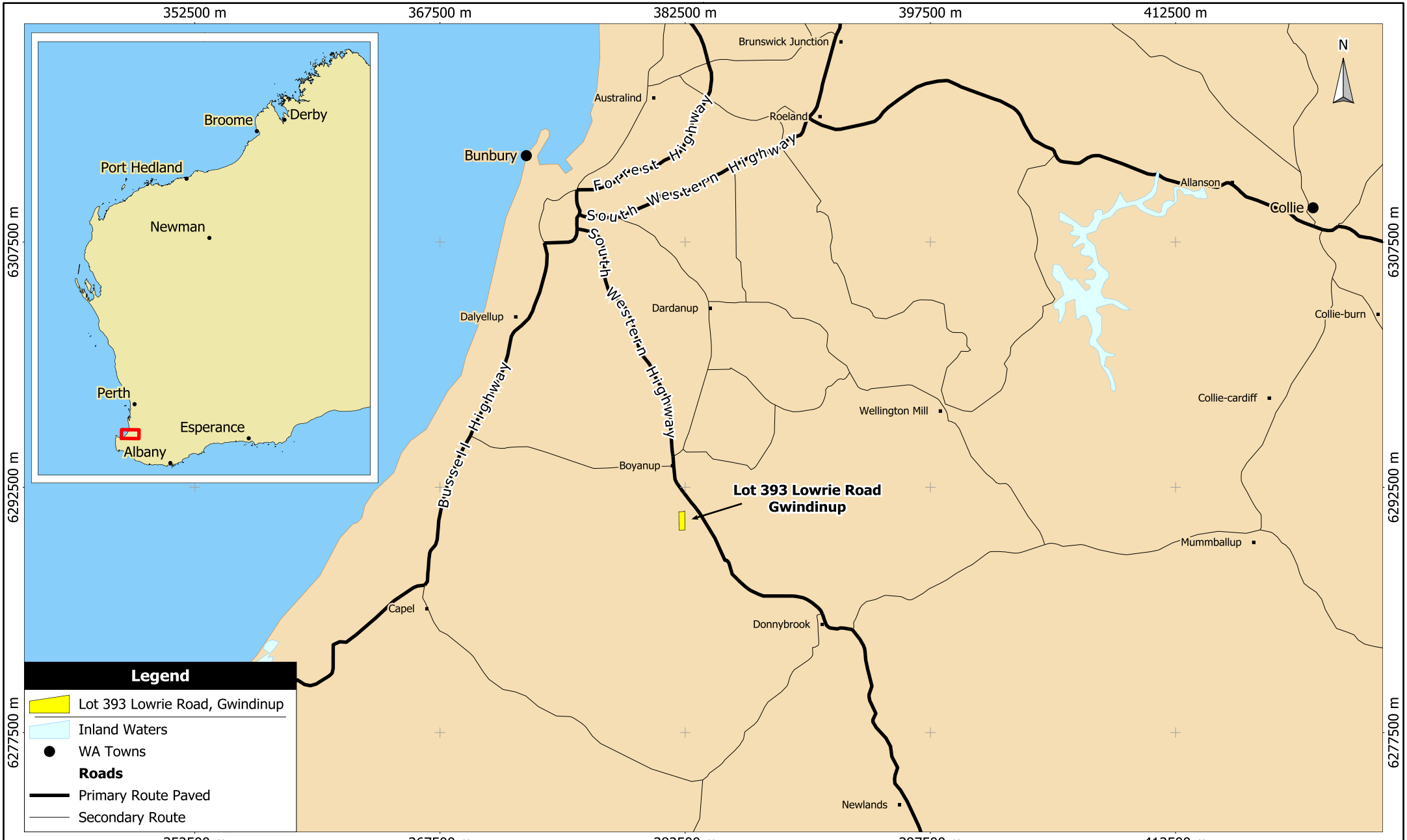
> *Prior to commencement of development, a modified Rehabilitation and Decommissioning Programme is to be submitted for endorsement by the Shire and must include:*
> *i. Rehabilitation back to native vegetation of 150 m strip on the northern boundary and 300 m of the southern boundary. Species suitable as a wildlife corridor and habitat to be used to allow free movement of wildlife across Lot 393 to make a continuous corridor from boundary to boundary.*
> *ii. Any native vegetation removed is to be mulched, stockpiled and used for site rehabilitation.*
> *iii. A native vegetation rehabilitation plan in consultation with Department of Biodiversity, Conservation and Attractions (DBCA); and*
> *iv. Implementation in accordance with the approved plan to the satisfaction of the Shire of Capel.*

This Native Vegetation Rehabilitation Plan (NVRP) has been prepared to address conditions of the EIL. The original version (June 2018) was developed in consultation with DBCA and then approved by Shire of Capel. This NVRP Rev1 (April 2019) has been prepared to address a change in the clearing and extraction area. The areas on Lot 393 that are subject to this NVRP Rev1 are shown in Figure 2 and total 12.8 ha (northern 4.3 ha, southern 8.5 ha). Other parts of the extraction area will be rehabilitated to pasture.

The project is subject to Clearing Permit (CPS 7171/1) approving the clearing of up to 31.5 ha of native vegetation. An application has been submitted to modify the location of the approved clearing area to match the EIL area shown in Figure 2. This would not impact on the maximum area to be cleared (31.5 ha). CPS 7171/1 requires rehabilitation to re-establish the existing native vegetation that varies from completely cleared to highly degraded 'parkland cleared' type native vegetation, however does not require preparation of a rehabilitation plan or consultation with DBCA. Consequently this NVRP has not been prepared to address CPS 7171/1. An application has been submitted to modify CPS 7171/1 so that its rehabilitation requirements match this NVRP.

## 1.2 OBJECTIVE

The objective of the rehabilitation described in this NVRP is to establish self-sustaining native vegetation that is suitable for the purpose of a 'wildlife corridor' as described in the EIL conditions. This corridor is also designed to provide future nesting and foraging habitat for black cockatoos including Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) and Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) and potentially also the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*). The corridor will enhance connectivity between areas of good quality remnant native vegetation on the surrounding properties. Following completion of sand and gravel extraction, Lot 393 will continue to be used for rural pursuits.




Scale: 1:300000
Original Size: A4
Grid: MGA94(50)

0 10 km

Mario Michele Giacci
Lot 393 Lowrie Road, Gwindinup

**Figure 1**

**Project Location**

4 Cook St
West Perth WA 6005
Ph: (08) 9226 3166
Fax: (08) 9226 3177
info@mbsenvironmental.com.au
www.mbsenvironmental.com.au

C:\Users\kkauhanen\Documents\MGM\Lowrie Rd\Drawings\Native Rehab Plan\Location Plan.map 28/02/2018 F1 Project Location Layout


Scale: 1:6000
Original Size: A4
Air Photo Date: Unknown
Grid: MGA94(50)
0 100 m

Mario Michele Giacci
Lot 393 Lowrie Road
Gwindinup

**Figure 2**

**Native Vegetation Rehabilitation Areas**

Martinick Bosch Sell Pty Ltd
4 Cook St
West Perth WA 6005
Ph: (08) 9226 3166
Fax: (08) 9226 3177
info@mbsenvironmental.com.au
www.mbsenvironmental.com.au

MBS ENVIRONMENTAL

E:\Kirsi\PROJECTS\MGM\Lowrie Rd\Drawings\Native Rehab Plan\Rev1\Lot 393 - Native veg rehab plan.map 26/03/2019 F2 Native Veg Rehab Areas Layout

# 2. EXISTING ENVIRONMENT

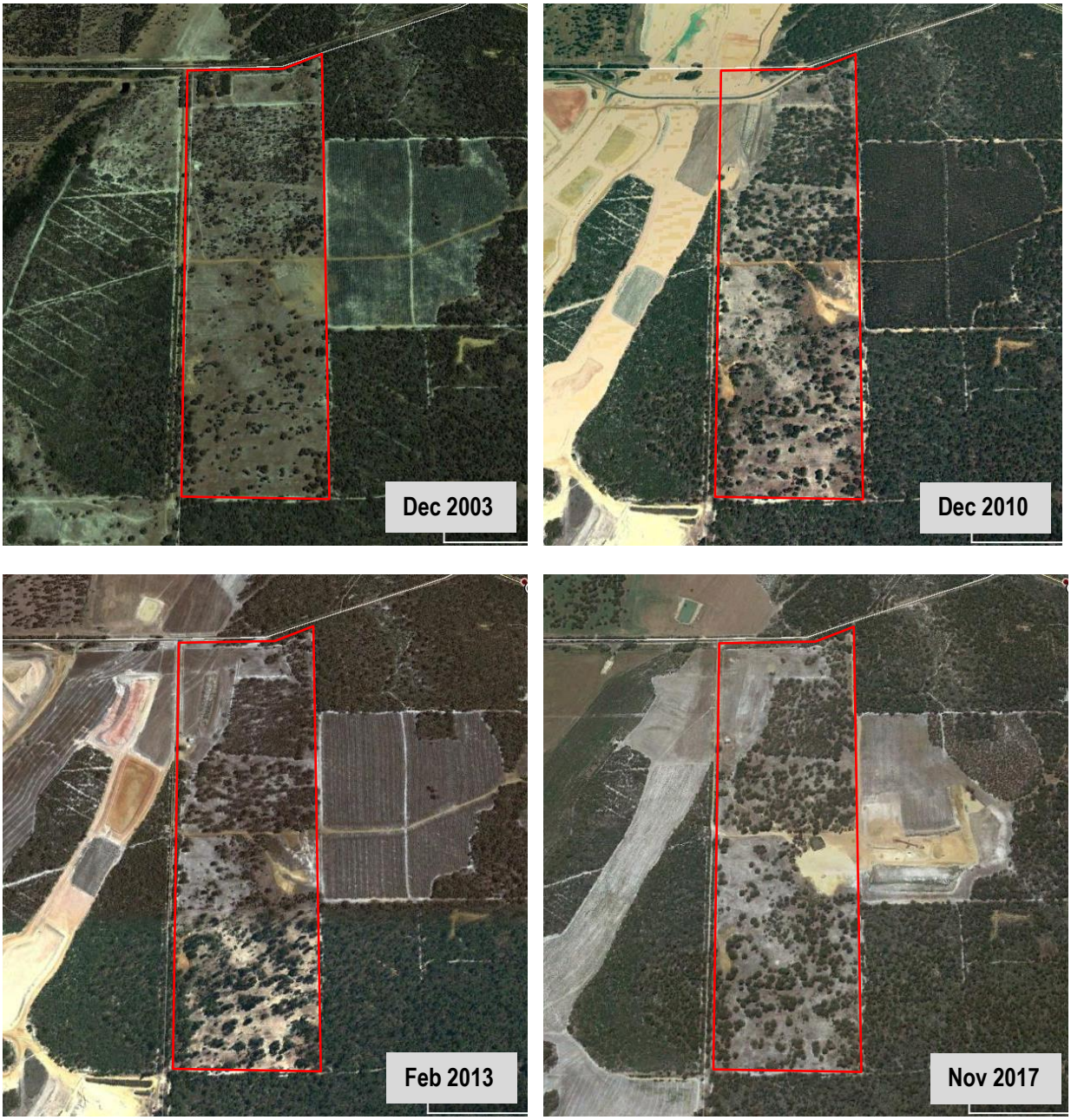
## 2.1 LANDUSE

Lot 393 is zoned 'Rural'. Historical clearing (more than 20 years ago) removed most of native vegetation on the property and blue gums were subsequently planted across most of the property. The north west corner of the property formed part of a mineral sands mine and has been rehabilitated to pasture (rehabilitation signed off by Department of Mines, Industry Regulation and Safety).

Landuse on surrounding properties includes sand and gravel extraction, blue gum plantation, mineral sands mining rehabilitation, residential dwellings on 'Rural' zoning and reserves zoned for 'Public Purposes and Recreation'. Large portions of surrounding land support good quality remnant native vegetation.

Changes in landuse on Lot 393 and surrounding properties over recent past are illustrated in Plate 1.

**Plate 1: Change in Vegetation Cover and Landuse of Lot 393 Between 2003 and 2017 (Source: Google Earth).**




## 2.2 VEGETATION AND FLORA

Two Beard vegetation associations (Shepherd et al. 2001) are mapped within Lot 393:

- 968: Medium woodland; jarrah, marri and wandoo.
- 1181: Medium woodland; jarrah and *Corymbia haematoxylon* (Whicher Range).

Two Mattiske vegetation complexes (Mattiske and Havel 1998) are mapped within the application area:

- Whicher (WA): Open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* on escarpment with some *Corymbia haematoxylon*, *Banksia attenuata* and *Xylomelum occidentale* in the humid zone; and
- Cartis (CSs): Low open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* - *Corymbia haematoxylon* with some *Banksia attenuata* and *Xylomelum occidentale* on slopes of escarpment in the humid zone.

According to the CPS 7171 decision report, vegetation condition on the property ranged from Completely Degraded to Degraded following Keighery (1994). This condition assessment was based on site visit by the former Department of Environment Regulation in 2016 that also described the application area as comprising mainly non-native Eucalyptus species with scattered native trees over weeds. A survey of Whicher Scarp in 2008 recorded that the application area did not retain remnant native vegetation (Keighery et al. 2008).

The great majority of vegetation visible on Lot 393 in aerial photographs comprises planted blue gums (*Eucalyptus saligna*, native to eastern states of Australia), especially in the northern half of the property. A reconnaissance survey of the property by Senior Environmental Scientist Kirsi Kauhanen on 12 April 2018 found that density of remnant native vegetation was so low that random test quadrats of 25 m by 25 m quadrats (each 625 $m^2$ in area) struggled to identify any native plants and further quadrat sampling was not undertaken because it was not going to provide an accurate estimate of the scattered remnant vegetation. Existing vegetation was characterised through photo points presented in Appendix 1. There was no native groundcover and the ground was bare or covered in weeds. Scattered native tree and shrub species recorded on the property on 12 April 2018 are listed in Table 1. The blue gums on Lot 393 were harvested in late 2018.

**Table 1: Flora Species Recorded on Lot 393 Lowrie Road in April 2018**

| Scientific Name | Common Name/s | Upper or Other Strata |
|---|---|---|
| *Acacia extensa* | Wiry Wattle | Other |
| *Acacia pulchella* | Prickly Moses | Other |
| *Agonis flexuosa* | Peppermint | Upper |
| *Banksia attenuata* | Slender Banksia | Upper |
| *Banksia grandis* | Bull Banksia | Upper |
| *Corymbia calophylla* | Marri | Upper |
| *Eucalyptus marginata* | Jarrah | Upper |
| *Jacksonia furcellata* | Grey Stinkwood | Other |
| *Kunzea ericifolia* | Spearwood | Other |
| *Melaleuca thymoides* | Sand Wattle-Myrtle | Other |
| *Nuytsia floribunda* | WA Christmas Tree | Upper |
| *Xanthorrhoea sp.* | Grass tree | Other |
| *Xylomelum occidentale* | Woody Pear | Upper |

## 2.3 HABITAT VALUES

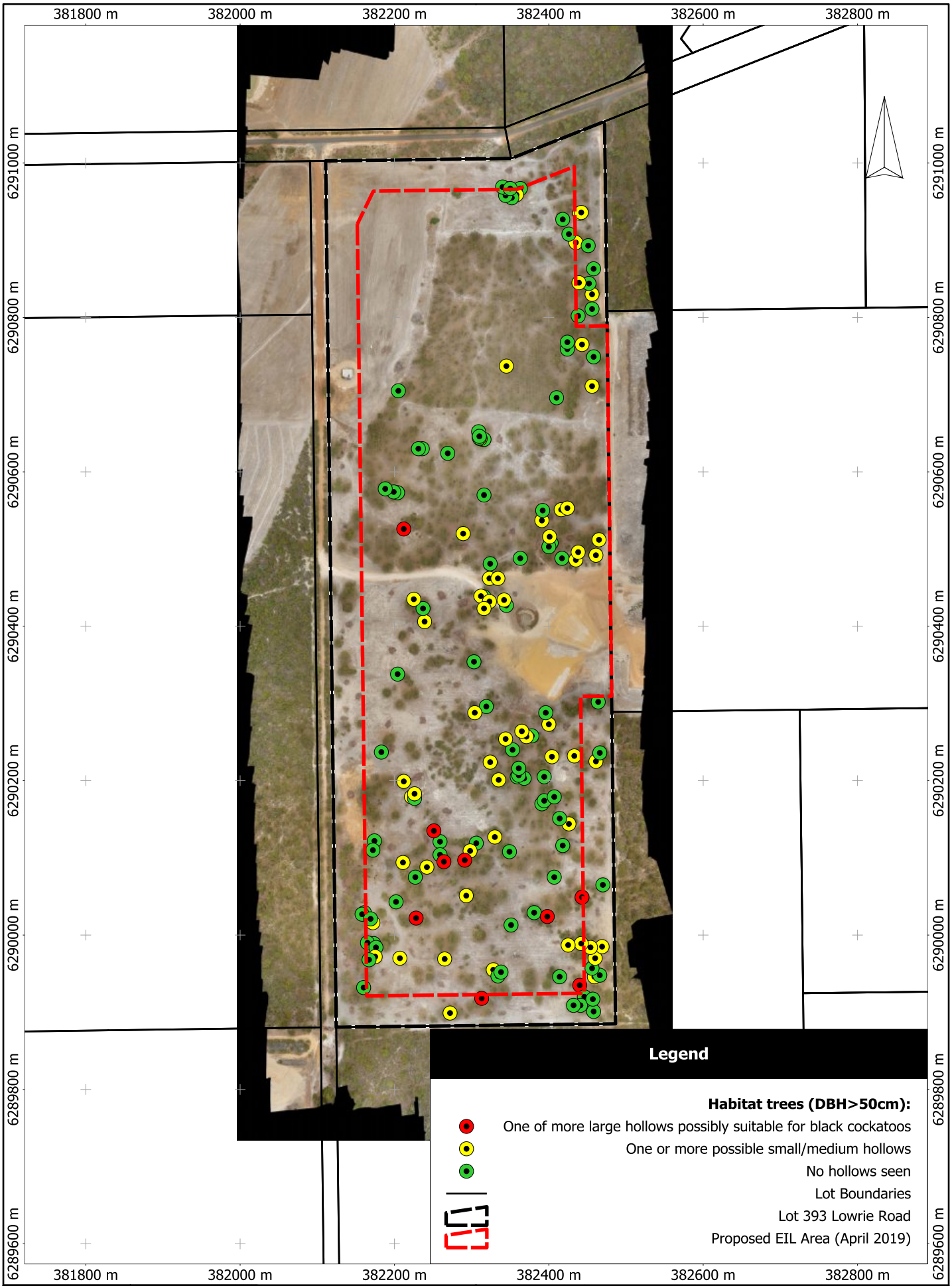
Considering the scattered nature of remnant native vegetation on Lot 393, habitat values for native fauna are limited. The main species of concern are black cockatoos, especially Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) and Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) as identified in the decision report for CPS 7171. A black cockatoo habitat assessment was undertaken on the property in November-December 2016 (Harewood 2016) covering the original EIL application area of 34.2 ha (subsequently reduced).

The survey found following (Figure 3):

- 156 trees within the survey area with a diameter at breast height (DBH) of >50cm.
- Most (147 –~94%) of these trees did not appear to contain hollows of any size or contained hollows that appeared unlikely to be suitable for black cockatoos to use for nesting.
- Nine trees (~6%) appeared to contain hollows possibly large enough for black cockatoos to use for nesting, though this assessment was based on the size of the entrance into an apparent hollow only. Eight of these apparent hollows showed no actual evidence of being used by black cockatoos for nesting (currently or previously).
- One tree contained an apparent large hollow with significant rub marks around its entrance. This evidence can be attributed to black cockatoos using the hollow for some purpose, possibly as a "drink" tree or possibly for nesting, in the recent past.
- The survey area was found to contain foraging habitat though evidence of use seems low given the paucity of Marri trees which are a favoured food source for all three species of black cockatoos. No evidence of black cockatoos roosting within the survey area was found.

## 2.4 DIEBACK DISEASE OCCURRENCE

A dieback occurrence survey on Lot 393 was undertaken in November 2017 (Bark Environmental 2017). Due to the significant disturbance and paucity of native vegetation across the property, the entire Lot 393 was assessed as 'Excluded'. This means that the presence or absence of dieback in the area cannot be determined.




Scale: 1:6500
Original Size: A4
Air Photo Date: Unknown
Grid: MGA94(50)
0 100 m

Mario Michele Giacci
Lot 393 Lowrie Road
Gwindinup

**Figure 3**

**Black Cockatoo Habitat Trees (DBH > 50 cm)**

Martinick Bosch Sell Pty Ltd
4 Cook St
West Perth WA 6005
Ph: (08) 9226 3166
Fax: (08) 9226 3177
info@mbsenvironmental.com.au
www.mbsenvironmental.com.au

MBS ENVIRONMENTAL

E:\Kirsi\PROJECTS\MGM\Lowrie Rd\Drawings\Cockatoo trees\Lot 393 Lowrie Rd Gwindinup.map 27/03/2019 F3 A4P

# 3. PLANNED OPERATIONS

## 3.1 VEGETATION CLEARING AND EXTRACTION

Following plans are attached to this NVRP and have been submitted to Shire of Capel for approval:

- Proposed Works and Excavation Plan (Appendix 2).
- Proposed Finished Development Plan (Appendix 3).

Clearing of native vegetation and extraction of sand and gravel will be undertaken gradually in stages as shown in Appendix 2. Clearing will not be undertaken between 1 July and 28 February each year in accordance with CPS 7171, to avoid any disturbing potential black cockatoo breeding.

## 3.2 MULCHING AND OTHER VEGETATIVE MATERIAL

Some of the cleared vegetation, such as canopy material and smaller branches, will be mulched. As far as possible, mulching will be undertaken during or immediately after vegetation clearing, with a minimal stockpiling period, followed by direct transfer to rehabilitation areas. When necessary, mulch will be stockpiled for later use. Other plant matter, such as larger branches and tree trunks removed from the clearing areas will be transferred to the rehabilitation areas to create microhabitats and assist with topsoil retention.

## 3.3 TOPSOIL MANAGEMENT

Following vegetation clearing, topsoil will be removed. As far as possible, stripped topsoil will be directly transferred into rehabilitation areas and spread across finalised land surfaces to avoid stockpiling thus maximising seed and microbial benefits. When necessary, topsoil will be stockpiled for later use.

## 3.4 LANDFORM AND RIPPING

Following completion of sand and gravel extraction, the final landform will be established as per Appendix 3. Ripping along the contour will be undertaken to remove soil compaction, improve runoff infiltration and root penetration. Topsoil will be respread following ripping.

## 3.5 DIEBACK MANAGEMENT

Dieback management will be undertaken in accordance with the management plan section of the dieback assessment report (Bark Environmental 2017). As dieback presence or absence on the property cannot be confirmed, the key management measures include:

- Surface water drainage will be contained within the property.
- Signage will be installed informing that the site may contain dieback.
- Topsoil will be re-spread close to source and rehabilitation will focus on non-susceptible species.

## 3.6 BLACK COCKATOO MANAGEMENT

As part of assessing the EIL application, the Shire of Capel obtained feedback from DBCA. On the basis of this feedback the Shire of Capel increased setbacks along eastern and southern property boundaries from 20 m to 40 m. This contributed to a reduction in EIL area from original 34.2 ha to current 31.4 ha.

The reduction in the EIL area reduced the impacts of the project on black cockatoos by reducing the number of potential habitat trees cleared. In total, the clearing of 28 potential habitat trees with DBH > 50cm (18% of the originally mapped trees) was avoided (Figure 3), including one of the nine trees with hollows potentially large enough for black cockatoos and 13 trees with smaller hollows.

Through the EIL conditions, the proponent has also committed to following:

- "For each tree removed with a cockatoo nesting hollow as per the Habitat Tree assessment, two "Cockatube" Black Cockatoo nesting boxes are to be placed in remaining trees".

This condition is assumed to apply to the eight trees to be removed that have large hollows possibly suitable for black cockatoos, as none of the hollows were actually inspected on the inside to determine whether they are being used for nesting.

The proponent considers that the above measures together with the revegetation of 12.8 ha as part of this NVRP (to a much higher quality black cockatoo habitat than currently present on the property) are sufficient measures to offset the impacts of clearing native vegetation within CPS 7171.

# 4. REHABILITATION

## 4.1 SPECIES MIXTURE

A selection of common flora species recorded on site and in neighbouring Nature Reserves is presented in Table 2. Information is also provided regarding which species are considered dieback resistant or susceptible. These species are a selection of those that are available through local nurseries. Native regrowth from topsoil and mulch may return these or other species. Any native species known to occur locally will be counted towards the rehabilitation completion criteria.

Active rehabilitation efforts (planting/seeding), where necessary, will focus on dieback resistant species (see Table 2) as the occurrence of dieback on Lot 393 cannot be ruled out (Bark Environmental 2017) and dieback is known to occur in the general area. Other native species not currently listed in Table 2 may also be planted/seeded as long as these are known to occur in the local area. Any seedlings and seed used as part of the rehabilitation works will be of local provenance and sourced from reputable nurseries and seed collectors.

Table 2 includes species of particular value for Baudin's and Carnaby's Black Cockatoos (foraging and/or nesting habitat) including in particular *Eucalyptus marginata*, *Corymbia* spp., *Banksia* spp. and *Hakea* spp.

Extraction will remove some of the current soil profile. Depth to groundwater will also decrease, but the post-extraction land surface is still expected to remain approximately 3 metres above the groundwater level (refer to EIL application for further details). These changes may impact on re-establishment of some species currently occurring on the site; however the scale of this impact is difficult to estimate at this stage. Should monitoring indicate issues in this regard the species mixture may need to be revised.

**Table 2: Common Local Native Flora Species Available at Nurseries**

| Scientific Name | Common Name/s | Upper or Other Strata | Dieback Status | | |
|---|---|---|---|---|---|
| | | | Resistant | Susceptible | Unknown |
| *Acacia extensa* | Wiry Wattle | Other | x | | |
| *Acacia nervosa* | Rib Wattle | Other | x | | |
| *Acacia pulchella* | Prickly Moses | Other | x | | |
| *Acacia stenoptera* | Narrow Winged Wattle | Other | | x | |
| *Adenanthos meisneri* | Woolly Bush | Other | | x | |
| *Agonis flexuosa* | Peppermint | Upper | x | | |
| *Allocasuarina humilis* | Scrub Sheoak | Other | x | | |
| *Anigozanthos manglesii* | Red and Green Kangaroo Paw | Other | x | | |
| *Banksia attenuata* | Slender Banksia | Upper | | x | |
| *Banksia grandis* | Bull Banksia | Upper | | x | |
| *Bossiaea eriocarpa* | Brown Pea | Other | | x | |
| *Calothamnus sanguineus* | Pindak, Silky-leaved Blood Flower | Other | x | | |
| *Conostylis candicans* | Grey Cottonheads | Other | x | | |
| *Corymbia calophylla* | Marri | Upper | x | | |
| *Corymbia haematoxylon* | Mountain Marri | Upper | | | x |
| *Eremaea pauciflora* | | Other | | | x |
| *Eucalyptus marginata* | Jarrah | Upper | | x | |
| *Hakea amplexicaulis* | Prickly Hakea | Other | x | | |

| Scientific Name | Common Name/s | Upper or Other Strata | Dieback Status | | |
|---|---|---|---|---|---|
| | | | Resistant | Susceptible | Unknown |
| *Hakea lissocarpha* | Honey Bush | Other | x | | |
| *Hardenbergia comptoniana* | Native Wisteria | Other | x | | |
| *Hemiandra pungens* | Snake Bush | Other | x | | |
| *Hypocalymma angustifolium* | White Myrtle | Other | x | | |
| *Jacksonia furcellata* | Grey Stinkwood | Other | | x | |
| *Kunzea ericifolia* | Spearwood | Other | | x | |
| *Kunzea recurva* | | Other | x | | |
| *Melaleuca thymoides* | Sand Wattle-Myrtle | Other | | x | |
| *Olearia axillaris* | Coastal Daisy Bush | Other | x | | |
| *Patersonia occidentalis* | Native Iris | Other | | x | |
| *Xylomelum occidentale* | Woody Pear | Upper | | x | |

*Sources: Centre for Phytophthora Science & Management (2018), Jennings and Pearce (Year unknown), Western Australian Herbarium (2018).*

## 4.2 NATURAL REGROWTH

Natural re-growth of native vegetation is expected to occur from the seed store in the re-spread topsoil and mulch. Over time, seed will also be imported by wind and wildlife. The rate of germination of native species from topsoil is uncertain; however it is considered unlikely that this natural regrowth alone would be sufficient to achieve the completion criteria specified in this plan.

Native regrowth will be encouraged through appropriate handling of topsoil and mulch (see Section 2) and weed control (see Section 5.1).

Natural regrowth will be monitored to determine the emerging species composition and density and this information will be used to determine the degree to which other revegetation methods will be necessary.

## 4.3 PLANTING SEEDLINGS

Local provenance seedlings will be planted to support native re-growth where necessary, so that the completion criteria stated in this plan are achieved.

The number of seedlings to be planted will be determined after considering the outcomes of rehabilitation monitoring, specifically the amount of natural regrowth occurring and the gap between this and the stated completion criteria.

Planting of seedlings will be undertaken between late autumn and mid-winter (May-July), depending on the onset of significant winter rains.

## 4.4 SEEDING

Seeding will be considered as a complementary measure to natural regrowth and seedling planting depending on the success of the other revegetation measures. If seeding is considered necessary, an experienced seed contractor will be engaged to undertake collection, storage, treatment and application of seed. Application of mycorrhiza for enhanced germination, survival and growth will be considered.

# 5. MAINTENANCE

## 5.1 WEED CONTROL

Weed control will be undertaken on an as needs basis to control any Declared Pest plants (as per listing by Department of Primary Industries and Regional Development, Agriculture and Food Branch) and any other weeds with potential to outcompete native revegetation.

The type and timing of weed control will be tailored for purpose. Broad-scale application of non-selective herbicides is unlikely to be suitable due to the anticipated presence of native seedlings. Spot spraying and selective herbicides are likely to be more appropriate.

## 5.2 HERBIVORE CONTROL

The property is fenced to keep out livestock that may be present on neighbouring properties. This fencing will not prevent access by kangaroos or rabbits and both species have potential to negatively impact on revegetation. The level of grazing pressure by these two species is currently unknown. Corflute type tree guards will be used to protect young seedlings from grazing impact. Construction of a kangaroo and rabbit proof fence around the native vegetation rehabilitation areas is not feasible during the extractive operations due to the staged progression of the extraction and subsequent gradual rehabilitation. The need for such a fence will be reconsidered later depending on rehabilitation success.

## 5.3 INFILL PLANTING AND/OR SEEDING

Infill planting and/or seeding will be undertaken as necessary so that the completion criteria stated in this plan are achieved. The need for infill planting/seeding will be determined on the basis of results of rehabilitation monitoring described in Section 7.

Infill planting numbers will take into consideration likely seedling mortality rates of 50 - 75% over first two summers without watering (higher if not using tree guards).

## 5.4 WATERING

No watering of the revegetation is proposed at this stage. The mulch that will be spread will improve moisture retention of the soil.

# 6. COMPLETION CRITERIA

Completion criteria including final objectives and interim targets are presented in Table 3. Final objectives will be assessed for each rehabilitation area separately. It is expected that the southern rehabilitation area will be signed off before the northern one due to the timing of works.

**Table 3: Completion Criteria**

| Criteria | Final Objectives | Interim Targets |
|---|---|---|
| Landform | Final landform is in accordance with the final contour plan (that may change over time subject to Shire of Capel approval). | Final landform is established and contour ripping undertaken within nine months of completing extraction in a particular extraction cell. Maximum slopes 1:10. |
| Soil Profile | Topsoil has been replaced in all rehabilitation areas. | Topsoil is replaced within 12 months of completing extraction in a particular extraction cell. |
| Vegetation – Species Composition | Minimum 15 locally occurring native flora species present in each rehabilitation area, with 10 species in each 20 m by 20 m monitoring quadrat. | Planting/seeding undertaken within three years of re-spreading topsoil if monitoring indicates species composition is not on track to meet objective. |
| Vegetation – Density | On average 2,000 stems per hectare present in each rehabilitation area (including approximately 750 upper and 1,250 other strata plants).<br>No bare patches (lacking vegetation) larger than 20 m by 20 m. | Planting/seeding undertaken within three years of re-spreading topsoil if monitoring indicates plant density is not on track to meet objective. |
| Vegetation – Condition | Vegetation is self-sustaining. | Potential threats to establishing self-sustaining vegetation are identified and mitigated. |
| Vegetation – Extent | Revegetation covers the areas specified in Figure 2 (northern 4.3 ha, southern 8.5 ha). | Progressive rehabilitation follows gradual completion of extraction. |

# 7. MONITORING AND MITIGATION

Monitoring and mitigation measures to be undertaken are presented in Table 4.

Vegetation monitoring referred to in Table 4 will be undertaken as follows:

- Mixture of permanent and random quadrats (20 m by 20 m each, minimum two per hectare).
- Vegetation monitoring survey will be undertaken once per year in spring until completion criteria are met.
- During each survey the following will be recorded for each quadrat:
  - Number, species, height, % foliage cover and health of native plants.
  - Species and live % foliage cover of weeds.
  - Quadrats will also be photographed during each monitoring round.

**Table 4: Monitoring and Mitigation**

| Item | Monitoring | Frequency | Mitigation |
|---|---|---|---|
| Landform | Licenced surveyor will confirm that the final landform is in accordance with the final contour plan. | Once finalised, prior to spreading of topsoil. | Corrective works as necessary. |
| Soil Profile | Photographic monitoring will be undertaken to show that topsoil has been respread. | Once per extraction block following spreading of topsoil. | Corrective works as necessary. |
| Erosion | Rehabilitation areas will be monitored for landform stability and signs of erosion. | Every six months. | Corrective works as necessary. |
| Vegetation – Species Composition | Vegetation monitoring will be undertaken in rehabilitation areas and will include recording of species composition. | Once per year per extraction block in spring until completion criteria met. | Supplementary planting of seedlings or seeding if species composition is not on track to meet completion criteria. |
| Vegetation – Density | Vegetation monitoring will be undertaken in rehabilitation areas and will include recording of stem density. | Once per year per extraction block in spring until completion criteria met. | Supplementary planting of seedlings or seeding if vegetation density is not on track to meet completion criteria. |
| Vegetation – Condition | Vegetation monitoring will be undertaken in rehabilitation areas and will include recording of the vegetation condition. | Once per year per extraction block in spring until completion criteria met. | Any observed risks to vegetation condition addressed as far as practicable. |
| Vegetation – Extent | Vegetation extent will be monitored with aerial photographs, surveyor's reports and/or vegetation monitoring data. | Once per year until completion criteria meet. | Any delay in progress of rehabilitation (vegetation extent) addressed as appropriate. |
| Weed Management | Weed status will be monitored by the site operator and also included in the vegetation monitoring. | Every six months.<br>Vegetation monitoring once per year per extraction block in spring until completion criteria met. | Declared Pest plants are regularly controlled.<br>Other weeds are treated as necessary to prevent them from compromising completion criteria. |
| Grazing by pest animals | Grazing impact (kangaroos, rabbits) will be monitored by site operator and also included in the vegetation monitoring. | Every six months.<br>Vegetation monitoring once per year per extraction block in spring until completion criteria met. | Installation of additional tree guards as necessary.<br>Review cost-benefit of different grazing control options (e.g. tree guards, fencing, baiting). |

# 8. REPORTING AND REVIEW

## 8.1 REPORTING

A progress report will be submitted to the Shire of Capel and the Department of Biodiversity, Conservation and Attractions South West Region (Bunbury office) every two years detailing progress towards the rehabilitation completion criteria and interim targets. This will be submitted by the end of January following the spring vegetation survey the previous year. This report will be in addition to any other reporting provided to the Shire of Capel in regards to the progress of the extractive operations.

## 8.2 REVIEW

This document will be reviewed on a needs basis and any changes will be subject to approval by Shire of Capel.

# 9. RESPONSIBILITIES

Quarry Manager will be responsible for ensuring that native vegetation rehabilitation is undertaken in accordance with this plan.

# 10. REFERENCES

Bark Environmental. 2017. A Phytophthora Dieback Assessment and Recommended Management Plan for Lot 393 Lowrie Road, Gwindinup, Shire of Capel.

Centre for Phytophthora Science & Management. 2018. Western Australian Native Plants Susceptible and Resistant to Phytophthora cinnamomi. http://www.cpsm-phytophthora.org/resources_supRes.php

Harewoods, G. 2016. Black Cockatoo Habitat Assessment of Proposed Clearing Area Lot 393 Morris Road. Prepared for Mario Giacci. December 2016.

Jennings, Anne and Pearce, Debra. Year unknown. Management Plan for the Gwindinup Reserves. Prepared for Capel Land Conservation District Committee.

Keighery, B. J. 1994. Bushland Plant Survey. A Guide to Plant Community Survey for the Community. Wildflower Society of Western Australia (Inc.), Nedlands, Western Australia.

Keighery, B. J., Keighery, G. J., Webb, A., Longman, V. M. and Griffin, E.A. 2008. A floristic survey of the Whicher Scarp. A report for the Department of Environment and Conservation as part of the Swan Bioplan Project. April 2008.

Mattiske, EM and Havel JJ 1998 Vegetation Mapping in the South West of Western Australia and Regional Forest Agreement vegetation complexes. Map sheets for Pemberton, Collie, Pinjarra, Busselton, Margaret River, Mt Barker, and Perth, Western Australia. Scale 1:250,000. Department of Conservation and Land Management, Perth.

Shepherd, D.P., Beeston, G. R. & Hopkins, A. J. M. 2001. Native Vegetation in Western Australia – Extent, Type and Status, Resource Management Technical Report 249, Perth, Department of Agriculture.

Western Australian Herbarium. 2018. FloraBase. https://florabase.dpaw.wa.gov.au/

# APPENDICES

# APPENDIX 1: EXISTING VEGETATION

Plate 1: Photo Point 1

North

East

South

West

Plate 2: Photo Point 2

North

East

South

West

Plate 3: Photo Point 3

North

East

South

West

Plate 4: Photo Point 4

North

East

South

West

Plate 5: Photo Point 5

North

East

South

West

Plate 6: Photo Point 6

North

East

South

West

Plate 7: Photo Point 7

North

East

South

West

Plate 8: Photo Point 8

North

East

South

West

Plate 9: Photo Point 9

North

East

South

West

Plate 10: Photo Point 10

North

East

South

West

Plate 11: Photo Point 11

North

East

South

West

Plate 12: Photo Point 12

North

East

South

West

Plate 13: Photo Point 13

North

East

South

West

# APPENDIX 2: PROPOSED WORKS AND EXCAVATION PLAN

382000 m 382200 m 382400 m 382600 m

N

6291000 m

6290800 m

6290600 m

6290400 m

6290200 m

6290000 m

Lowrie Road

Lot 393

Lot 477

Lot 287

Lot 101

Lot 107

17 18 16 15 14 13 12 3 11 10 9 8 7 6 5 4 2 1

**Legend**

- Proposed EIL Boundary
- Lot 393 Boundary
- Proposed Working Face
- Direction of Excavation
- Proposed Stage Boundary
- text — Proposed Stage Number
- Topsoil Stockpiles

382000 m 382200 m 382400 m 382600 m

Scale: 1:3500
Original Size: A3
Air Photo Date: 2017
Grid: MGA94(50)
0 100 m

Mario Michele Giacci
Lot 393 Lowrie Road, Gwindinup
EIL Application

**Figure 4**

**Works and Excavation**

Martinick Bosch Sell Pty Ltd
4 Cook St West Perth WA 6005
Australia

t:+61 8 9226 3166
info@mbsenvironmental.com.au
www.mbsenvironmental.com.au

MBS ENVIRONMENTAL

# APPENDIX 3: PROPOSED FINISHED DEVELOPMENT PLAN

381900 m 382100 m 382300 m 382500 m 382700 m

N

Lowrie Road

Lot 393

Lot 477

Lot 101

Lot 287

Lot 107

45 50 55 60 65 70 75 80 85 90

6291000 m
6290800 m
6290600 m
6290400 m
6290200 m
6290000 m

**Legend**

- Lot 393 Boundary
- Proposed EIL Boundary
- Proposed Finished Surface Contours
- Existing Contours
- Proposed Stage Boundary
- Permanent Retention Pond
- Rehabilitation to Native Vegetation
- Rehabilitation to Pasture

Scale: 1:3500
Original Size: A3
Air Photo Date: 2017
Grid: MGA94(50)
0 100 m

Mario Michele Giacci
Lot 393 Lowrie Road, Gwindinup
EIL Application

**Figure 5**

**Finished Development Plan**

Martinick Bosch Sell Pty Ltd
4 Cook St West Perth WA 6005
Australia
t:+61 8 9226 3166
info@mbsenvironmental.com.au
www.mbsenvironmental.com.au

MBS ENVIRONMENTAL