

REVEGETATION PLAN

LOT 4 LUDLOW ROAD, MYALUP

SHIRE OF HARVEY



REPORT PREPARED BY
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Lot 4 Ludlow Road, Myalup

Revegetation Plan

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Front cover image: *Eucalyptus gomphocephala* woodland

CONTENTS

1	INTRODUCTION	1
1.1	Background	1
1.1.1	Location, Ownership and Tenure	1
1.1.2	VEGETATION	1
1.1.3	SOIL TYPES, LANDFORMS, TOPOGRAPHY AND DRAINAGE.....	4
1.1.4	FAUNA	4
2	REVEGETATION.....	5
2.1	REVEGETATION AREAS.....	5
2.2	REVEGETATION GOALS	5
2.2.1	Completion criteria.....	5
2.3	BEST PRACTICE METHODS	5
2.3.1	Collection of seed prior to clearing and use of cleared vegetative material.....	5
2.3.2	Landform reshaping and alleviation of compaction.....	6
2.3.3	Topsoil management.....	6
2.3.4	Weed management.....	6
2.3.5	Revegetation Methodology.....	6
2.3.6	REVEGETATION SCHEDULE.....	7
2.3.7	MONITORING AND MAINTENANCE.....	8
2.3.8	Measuring success against completion criteria.....	11
2.3.9	Maintenance and contingency measures.....	11
2.3.10	Cost schedule	12
3	REFERENCES	13
4	FIGURES	14

LIST OF TABLES

Table 1. Schedule of Rehabilitation Activities associated with the Limestone Extraction at Lot 4 Ludlow Road, Myalup.....	10
Table 2: Closure criteria, objectives and interim targets.....	11
Table 3: Estimates of costs associated with native vegetation rehabilitation of Lot 4 Ludlow Road	12

LIST OF FIGURES

Figure 1.	Locality Plan
Figure 2.	Revegetation and Offsets Areas for CPS 8057/1
Figure 3.	Photo Points for the Revegetation Areas

LIST OF ANNEXURES

Annexure 1.	List of Tubestock Species suitable for Revegetation
Annexure 2.	List of Species suitable for Seedmix

GLOSSARY

BAM Act	<i>Biosecurity and Agriculture Management Act 2007</i> (Western Australian Government)
DBCA	Department of Biodiversity, Conservation and Attractions (Western Australian Government)
DEC	Department of Environment and Conservation – superseded, now DBCA (Western Australian Government)
DEE	Department of the Environment and Energy (Australian Government)
DWER	Department of Water and Environmental Regulation (Western Australian Government)
EP Act	<i>Environmental Protection Act 1986</i> (Western Australian Government)
ESA	Environmentally Sensitive Area
LEC	Lundstrom Environmental Consultants
TEC	Threatened Ecological Community

1 INTRODUCTION

1.1 BACKGROUND

Lundstrom Environmental Consultants Pty Ltd was engaged by B&J Catalano Pty Ltd to prepare a Planning Consent and Extractive Industries Licence Application for an area at Lot 4 Ludlow Road Myalup, Western Australia for the purposes of limestone extraction.

As part of this process, a clearing permit application (CPS 8057/1) was submitted to the Department of Water and Environmental Regulation (DWER) for an area of 12.9 ha of remnant vegetation on the property. Since the original application, the area proposed to be cleared has been reduced to 8.3 ha to avoid potential cockatoo habitat trees.

The requirement of the DWER in this regard is that an area of 10.6 ha of degraded land rated as having a condition of 1, must be restored to a good condition (condition rating of 5). In addition, the 8.3ha area of clearing to be extracted will be revegetated to a good condition once extraction within the area is complete, thereby effectively mitigating the residual impacts of the proposed clearing. This calculation has been undertaken using the Department of Environment and Energy Commonwealth Offsets Calculator.

This plan will set out methodologies and standards for rehabilitation of this area according to best management practices. It will be used by B&J Catalano Pty Ltd and/or contractors engaged by them to undertake the revegetation activities.

This report has been compiled by Lundstrom Environmental Consultants Pty Ltd. The document "Checklist for a Revegetation Plan" provided by DWER, was used as a guideline in the preparation of this document.

1.1.1 Location, Ownership and Tenure

The property is situated west of Forrest Highway, approximately 50km north of Bunbury. Lots 4 and 5 are bounded by Lake Preston to the west, Lot 2 to the north, Lot 17 to the east and Lot 18 to the south (Figure 1).

The area is zoned as "General Farming" according to the Shire of Harvey Town Planning Scheme No.1 and is also classified as a "Rural" zone under the Greater Bunbury Region Scheme.

Address: Lot 4 and Lot 5 on Deposited Plan 15419, Ludlow Road, Myalup, Shire of Harvey

Volume: 1884

Folio: 210

Area: Lot 4 – 81.115ha; Lot 5 - 62.030ha

Ownership: G Pearson

1.1.2 VEGETATION

The property is situated in the Southwest Botanical Province of Western Australia (Beard 1990), and within the Swan Coastal Plain bioregion (Perth subregion) as described by the Interim Biogeographic Region of Western Australia (DoEE 2018). At a regional level, the property occurs within the Cottesloe-Central and South vegetation complex which is described as a mosaic of woodland of *Eucalyptus gomphocephala* (Tuart) and open forest of *Eucalyptus gomphocephala* - *Eucalyptus marginata* (Jarrah) - *Corymbia calophylla* (Marri); closed heath on the Limestone outcrops. The Cottesloe Complex-Central and South has 32.2% of the pre-European extent remaining on the Swan Coastal Plain and

41.8% remaining within the Shire of Harvey (DBCA 2017) which meets the EPA's Natural Area Strategy objective of retention of at least 30% of the pre-clearing extent on the Swan Coastal Plain.

An Environmentally Sensitive Area (ESA) is an area where the vegetation has high conservation value and cannot be cleared. ESAs are declared by the Minister in the Environmental Protection (Environmentally Sensitive Areas) Notice 55 (2005) under section 51B of the *Environmental Protection Act 1986* (EP Act). There is no ESA within the proposal area. Lake Preston is listed as an ESA and is located approximately 300m from the proposal area at its closest point.

No Department of Biodiversity Conservation and Attractions (DBCA) listed Threatened Ecological Communities (TECs) have been previously recorded within the proposal area. The closest recorded TEC is approximately 2km north of Lot 4 (Threatened Ecological Communities, DBCA-038). According to a map of potential EPBC Act listed TECs, 'Banksia Woodlands of the Swan Coastal Plain' may occur within the proposal area (DoEE 2018b).

The proposal area is not within the Bush Forever mapping area (DoP 2018). The proposal area lies within a Tuart Woodland, as mapped by CALM (2003) in the "Tuart Atlas", which maps and assesses data on tuart occurrence, overstorey density and understorey condition on the Swan Coastal Plain. The Atlas has classified the tuart woodland polygon within the proposal area as 10-19% canopy density and classified the visible native understorey condition as highly disturbed.

A reconnaissance vegetation assessment (LEC 2018) and a follow-up detailed flora and vegetation survey (Plant Ecology 2018) have been conducted at the proposal area. Results from these field assessments found that there were three main vegetation types within the proposal area:

- *Eucalyptus decipiens* open woodland on the shallow soils over limestone of the ridge crest and upper slopes;
- *Eucalyptus gomphocephala* woodland on the deeper soils of the lower slopes; and
- *Melaleuca systema* shrubland on shallow soils over limestone on the ridge crest and upper slopes.

These vegetation types were rated as being in a 'Completely Degraded' condition, as the native understorey was largely absent and replaced by weed species and the original structure has been almost entirely lost.

The crest and upper slopes also supported patches of *Melaleuca systema* shrubland, which was rated as being in a 'Degraded' condition. These patches supported more native species (mainly shrubs) than the woodland areas, but aggressive weed species such as **Gomphocarpus fruticosus* were prevalent.

1.1.2.1 Conservation significant vegetation

Desktop assessments found that the site may potentially support vegetation of Floristic Community Type (FCT) 26a '*Melaleuca huegelii* – *Melaleuca systema* shrublands of limestone ridges'. FCT 26a is listed as a state-based Threatened Ecological Community (TEC) with the rating of 'Endangered' under Western Australian criteria. FCT 26a occurs on skeletal soils of large limestone ridges to the north of Perth and to the south of Mandurah (Gibson et al. 1994).

Following two field assessments (LEC 2018 and Plant Ecology 2018), it was found that no Threatened or Priority Ecological Communities or Threatened or conservation significant flora or Priority flora (EPBC Act, WC Act or DBCA listed) were identified within the proposal area.

The vegetation within the site is highly unlikely to be part of FCT 26a. FCT 26a is a very distinct group within the SCP dataset with a high mean species richness (50.2 species per plot), and assignment of plots when present is normally quite clear. This result is supported by the description for FCT 26a as occurring on massive limestones with skeletal soil. Although all the Ludlow Rd plots included outcropping limestone, these areas mainly supported *Eucalyptus decipiens* Woodland, which does not form part of FCT 26a.

Assessment of the FCT on site found that it was most likely that the shrubland areas on the ridges are part of FCT 29a – ‘Coastal shrublands on shallow sands’. FCT 29a is a State-based Priority 3(i) Ecological Community under Western Australian criteria, which indicates this vegetation type, although poorly known, has several to many occurrences, a significant proportion of which is not under threat. This result is consistent with the description of FCT 29a as being mostly heaths of shallow soils over near coastal limestone from Yalgorup to Seabird on the Quindalup Dune System. This FCT has no consistent dominant species and is often quite weedy (Gibson et al. 1994).

The vegetation condition within the site ranged from ‘Degraded’ to ‘Completely Degraded’. This was reflected in the equivocal results of the cluster analysis for FCT assignment and is probably due to past use for stock grazing. A significant proportion of the taxa recorded were weeds, some of which were aggressive species such as **Gomphocarpus fruticosus*, **Euphorbia terracina* and **Ehrharta longiflora*. This condition compromises the botanical values of the site and it could not be returned to a more natural structure without the input of considerable resources.

In summary, the results of this survey and analysis indicate that the vegetation within the proposal area is most likely to belong to FCT 29a, which is a Priority 3(i) community under Western Australian criteria, but the ecological values of the site have been compromised by past land uses and the currently degraded condition.

1.1.2.2 Condition (weeds and dieback)

As mentioned previously, the vegetation quality is generally degraded with no native ground cover and a prevalence of weed species due to cattle grazing across the site. Of the weed species recorded within the proposal area, two species, **Gomphocarpus fruticosus* (narrow leaf cottonbush) and **Solanaum linneanum* (Apple of Sodom) are listed as Declared Plant species in Western Australia pursuant to Section 22 of the *Biosecurity and Agriculture Management Act 2007* (BAM Act).

There was no evidence of dieback infestations at the site based on the apparent health of dieback susceptible species (i.e. Banksia species).

1.1.2.3 Conservation significant flora

The site is located on a limestone ridge between the active quarry and Lake Preston. DWER advised that three priority taxa could potentially occur within the location of the proposal area:

- *Pterostylis frenchii* (P2). This species occurs in tuart and peppermint coastal woodland over limestone (Brundrett 2014);
- *Alyogyne sp.* Rockingham (P2). This taxon is a perennial shrub of the coastal region south of Perth, mainly occurring on soils with limestone nodules; and
- *Hibbertia spicata* subsp. *leptotheca* (P3). This taxon is a perennial shrub and occurs in sand on near coastal limestone ridges and cliffs.

Desktop assessments of the area found no Threatened and/or Priority Flora previously recorded within the proposal area, with Priority flora (P3) recorded approximately 1km north and 2km north east of the proposal area (Threatened and Priority Flora, DBCA-036).

Two follow-up field assessments at the site, including a targeted search for conservation significant flora species, recorded no priority or Threatened flora within the proposal area (LEC 2018; Plant Ecology 2018).

1.1.3 SOIL TYPES, LANDFORMS, TOPOGRAPHY AND DRAINAGE

1.1.3.1 Topography and drainage

The broad drainage pattern across the surrounding unaltered land surface is east to west towards Lake Preston. There are no surface drainage lines within the extraction area. Instead, rainfall infiltrates into the permeable substrate.

The proposed excavation area is partially situated over a north-south trending ridge of dune/karstic topography with a maximum elevation of 23 mAHD. The western extent of the proposed excavation has an elevation of approximately 12 mAHD. The property contains some hills near the extraction area that reach an elevation of 35 mAHD. From these hills to the eastern boundary of the property, the elevation decreases to approximately 15 mAHD.

The property lies in the Harvey Diversion Catchment within the Harvey River Basin and does not fall within a Public Drinking Water Source Area. The property lies within a *Rights in Water and Irrigation Act 1914* (RIWI Act) Groundwater Proclamation Area (South West Coastal Groundwater Area) but does not fall within a RIWI Act Surface Water Proclamation Area (Landgate 2018).

Lots 4 and 5 adjoin the eastern boundary of Lake Preston, which is listed as a conservation wetland, a Ramsar wetland, an Environment Protection Policy (EPP) Lake, and is included in the Department of Parks and Wildlife (DPaW) managed lands and waters.

1.1.3.2 Geology and soils

The proposal area lies within the Swan Coastal Plain, which is characterised as a low-lying coastal plain, often swampy, with sand hills consisting mainly sandy, yellow soils (Beard 1990).

The soils are mapped within the Perth Coastal Soil Landscape Zone (211), which is described as coastal sand dunes of calcareous and siliceous sands and calcarenite, of late Pleistocene to Recent age (Purdie et al. 2004).

The Perth Coastal soil landscape is further divided into subsystems, of which the proposal area sits within the Spearwood S1a Phase (211Sp__S1a) subsystem. The Spearwood S1a subsystem is described as dune ridges with shallow to moderately deep siliceous yellow-brown sands, very common limestone outcrop and slopes up to 15% (Purdie et al. 2004).

The area is described as having a shallow, sandy topsoil that overlies inter-bedded limestone, calcarenite, marl and shell beds of the Tamala Formation. Previous work by Commander (1988) shows that the limestone is approximately 20m to 25m thick and unconformably overlies sands, shales and siltstones of the Leederville Formation.

The westernmost third of Lots 4 and 5 has a covering of calcitic caprock which is up to one metre thick, whilst further east, the limestone is covered by 0.5 to 1m of sand.

1.1.4 FAUNA

There is a potential for impact to fauna habitat from the clearing of native vegetation. In the case of cockatoos, whilst the native vegetation to be cleared could serve as foraging ground, the trees are generally not large enough to be suitable for nesting.

2 REVEGETATION

2.1 REVEGETATION AREAS

An area of 8.3ha within the total 13.5ha extraction area will be revegetated with native species on completion of extraction (Figure 2). This native species revegetation will occur on the embankments of the completed extraction pit, with the remainder of the area being returned to pastures.

The area to be revegetated with native vegetation to offset the impacts of clearing 8.3 ha within Lot 4 is also shown on Figure 2. This area is located in the adjacent Lot 17 and is 10.6 ha in size and has previously been cleared for grazing and is considered to be 'completely degraded' (Keighery 1994) in terms of vegetation condition.

2.2 REVEGETATION GOALS

The revegetation goals proposed for this area include:

- restoring native vegetation within the identified degraded area, to a condition considered to be good according to Keighery (1994).
- creating a landform that is stable, erosion resistant, aesthetically pleasing and safe for humans and animals, both on and surrounding the site
- encouraging rapid re-colonisation of the mined area by native fauna and to provide an ecological linkage between the remnant vegetation to the north and south of the revegetated area

2.2.1 Completion criteria

- Revegetation of the area will be deemed successful according to the following criteria:
- A planted seedling (tubestock) or germinant (direct seeding) survival rate in year 5 of 60% or more representing at least 75% of the intended species diversity (as per the species lists included in Annexure 1) will constitute success for this project. If mortality rates are higher than this, supplementary planting will be required in the subsequent year(s) until such time as the target rate is achieved.
- Weed cover within the revegetated areas is less than 20%
- No erosion scars are present within the rehabilitation areas
- Native fauna are utilising vegetation within the rehabilitation areas

2.3 BEST PRACTICE METHODS

B & J Catalano intends to use best practice methods to achieve revegetation on this site. The specific strategies that will be implemented to achieve the restoration goals are discussed below.

2.3.1 Collection of seed prior to clearing and use of cleared vegetative material.

Remnant vegetation to be cleared within the extraction area is a valuable source of seed and vegetative material to assist in future rehabilitation of the site. Prior to clearing, the vegetation should be assessed by revegetation personnel and any viable seed of appropriate species collected, if required. Cleared vegetation will be retained for windrow/mulching, seed harvesting (if required), erosion management and habitat replacement. Large logs should be strategically placed throughout the sit, during rehabilitation, to create habitat for reptiles, small mammals and invertebrates.

2.3.2 Landform reshaping and alleviation of compaction

After extraction is complete, the land will be reshaped into a stable landform with gradients no greater than 1 in 6. During this stage and prior to topsoil respreading, the pit floor will be ripped at six metre centres, to a depth of approximately one metre, using a tyne to alleviate compaction.

2.3.3 Topsoil management

Once the area has been shaped and ripped, stockpiled topsoil will be spread onto the prepared surface of the previously mined area at an average depth of 50 mm.

2.3.4 Weed management

As the proposed offset revegetation area is under pasture grasses, it will be essential to eliminate the pasture species and any other weed species, prior to revegetating with native species, to reduce the competition for moisture and nutrients.

Effective ongoing weed management in this area will be necessary to maintain a low weed burden. The most appropriate form of weed management will be applied in response to the level of infestation that actually occurs on the revegetation site. This is most likely to be a combination of mechanical, manual and chemical measures.

The success of any revegetation program is dependent on weed control. The two main aims of the weed control program are:

- To prevent weed seed set
- To reduce competition for water and nutrients between weeds and the emerging/planted seedlings.

Weed control during the operational, extraction phase will be undertaken to minimise weed seed set within and around the proposed revegetation area and any associated topsoil stockpiles. It is important that sufficient attention is directed to the management of weeds during all stages of the project to minimise disruptions to revegetation timeframes.

A suitably qualified weed management contractor will be engaged to undertake this weed management.

2.3.5 Revegetation Methodology

Direct seeding and tubestock planting will be undertaken both the offset and extraction revegetation areas to ensure successful revegetation within a reasonable timeframe. The seedmix and tubestock for these areas will consist of species which provide the best results for soil stabilisation and out-competing of weed species (Annexure 1).

The target structure of the revegetated area as proposed in the species list is as follows:

- Trees – 70%
- Mid-storey – 20%
- Understorey – 10%

2.3.5.1 Tubestock (seedling) plantings

Tubestock grown from local provenance seed or plant material will be sourced from local nurseries. Seedling orders will need to be submitted by November 30 in the year preceding the proposed plantings to enable sufficient time for nursery staff to collect and propagate the necessary seeds to ensure tubestock is of reasonable size for planting.

Seedlings will be planted at a density of 500 plants/ha throughout the revegetation areas. A recommended species list and required quantities is included in Annexure 1.

2.3.5.2 Direct seeding

Seed of local provenance will be purchased from, or collected by, a local seed supplier and seeded by hand at a rate of approximately 2 kg/ha. The species to be used in the seed mix have been identified as those occurring within and adjacent to the proposed extraction site and are summarised in Annexure 1. These species are typical of those found on the limestone soils of the Swan Coastal Plain. Seeding should occur after the first rain of the season.

2.3.5.3 Erosion control

The following erosion control measures will be implemented at the commencement of mining and continue through to the end of the monitoring period:

- Prior to planting of tubestock and seeds, the re-topsoiled surface will be ripped at 1.5m centres to create mounds.
- A polymer may be applied to the soil surface in areas where wind erosion may be a problem. Spreading of cleared vegetation material in windrows or the use of wind fences are additional options if erosion in the vegetated areas is a problem.

2.3.5.4 Herbivore control

Kangaroo activity onsite should be monitored during the extraction phase. If kangaroo numbers are high, the area to be revegetated will need to be fenced to limit damage by predation.

If rabbits are present on site, the use of '1080' oat baits and ripping of the rabbit warrens have proven to be effective control methods.

2.3.6 REVEGETATION SCHEDULE

The proposed revegetation of the 10.6 ha degraded offset area in Lot 17, will commence as soon as approval for extraction in the new area has been granted.

Revegetation within the 13.5ha extraction area will commence as soon as extraction within the area is complete.

2.3.6.1 Extraction Area

Activities to be undertaken to prepare the extraction area for revegetation include:

- Engage seed contractor at least 12 – 24 months in advance of the proposed revegetation works
- Once extraction has been completed, grade and contour the site and rip the area to a depth of approximately one metre using a tyne to relieve compaction
- Return stockpiled topsoil to the area to be revegetated (usually in autumn)
- Establish photo monitoring points
- Undertake necessary weed control
- Broadcast of native seed mix following winter rains in the year of planting

- Plant out seedlings once the winter has commenced proper (ie. following good rains after the break of season), usually around June. Providing there is good winter rainfall, planting can be undertaken until the end of August.
- Fence off area to prevent cattle entering

2.3.6.2 Offset Area

For the offset area which has previously been sown with pasture species, the ground will need to be ripped to alleviate any compaction and the pasture will need to be sprayed off to reduce competition for nutrients and moisture. Once the pasture species have been killed off the following activities will be undertaken:

- Broadcast of native seed mix following winter rains in the year of planting
- Plant out seedlings once the winter has commenced proper (ie. following good rains after the break of season), usually around June. Providing there is good winter rainfall, planting can be undertaken until the end of August.
- Establish photo monitoring points

A preliminary timetable of actions for the area to be revegetated is summarised in Table 1.

2.3.7 MONITORING AND MAINTENANCE

Monitoring is important as it provides a measure of the effectiveness of revegetation actions and identifies if maintenance and contingency actions such as follow-up planting or weed control are required.

2.3.7.1 Photo points and relevès

Five photo points will be established across the two revegetated areas to provide a record of vegetation growth and success over the years. The locations of these photo points are shown on Figure 3.

The photo points will be marked and recorded using the following procedure:

- 900mm white-tipped jarrah stakes flagged with pink tape and labelled with the respective monitoring point name and number on the side from which the photograph is taken will be hammered into the ground at each photo point.
- GPS coordinates and compass bearings will be recorded for each photo point.
- Photos will be taken from behind the photo point, from as far back as necessary to include the peg in the bottom centre of the photo.
- In order to assess the structure of replanted vegetation, for this project, photos will also be taken directly in front of the photo point marker from 50cm above the ground.

In order to further assess vegetation structure within the revegetation areas, a relevè (5m x 5m) will be set up within an area captured in each photo point. The relevès will be marked using the following procedure:

- the centre of the relevè point will be marked with a 900mm white-tipped jarrah stake flagged with yellow tape and labelled with the respective monitoring point name and number.

Vegetation structure of each relevè will be measured using the structural classification of Keighery (1994).

The following records will be obtained for each relevè:

- Native species composition (stems per hectare per structure level)
- Species diversity (species per hectare)
- Weed density or cover and weed species present
- Record success of additional control actions (e.g. rabbit control, fences)

Monitoring of vegetation establishment and structure will be undertaken on an annual basis in spring for a period of five years as a minimum, to ensure success and to account for differences in annual rainfall. Thereafter, providing revegetation has been successful by the end of Year 5, monitoring will be undertaken every second year until ten years after planting to ensure targets set in the completion criteria have been met.

A summary of the rehabilitation activities undertaken each year and the monitoring results will be presented in the Annual Clearing Permit Audit Report.

Table 1. Schedule of Rehabilitation Activities associated with the Limestone Extraction at Lot 4 Ludlow Road, Myalup

Year	1				2				3				4				5				6				7				8				9				10				11				12				13				14				15				16			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
NEW AREA TO BE EXTRACTED (8.3ha of vegetation within 13.5ha extraction area)																																																																
Clear 8.3 ha vegetation in extraction area																																																																
Strip topsoil and stockpile																																																																
Extract limestone from area																																																																
Landform reshaping and deep ripping once area has been extracted																																																																
Replace topsoil from stockpiles																																																																
Seeding and planting																																																																
Weed management																																																																
OFFSET AREA FOR CLEARED AREA WITHIN NEW EXTRACTION AREA (10.6 ha)																																																																
Spray off pasture grasses and weeds																																																																
Prepare ground for seeding and planting																																																																
Seeding and planting																																																																
Weed Management																																																																
MONITORING AND MAINTENANCE OF ALL REHABILITATED AREAS																																																																

2.3.8 Measuring success against completion criteria

Completion criteria must be sufficiently stringent to ensure that the overall objectives of the rehabilitation have been met. These criteria must also be designed to allow effective reporting and auditing to define an endpoint for the rehabilitation activities

Regular monitoring against set completion criteria will be undertaken and appropriate actions implemented where necessary. Monitoring will continue until the completion criteria presented in Table 2 have been fulfilled.

Table 2: Closure criteria, objectives and interim targets

Closure Criteria	Objective	Interim target
Revegetation	Survival rates 60% or higher by end Year 5	75% survival of planted tubestock / germinants at the end of Year 1
	Species diversity 75% or higher by end Year 5	85% of planted/seeded species diversity remaining at the end of Year 1
	Rehabilitated areas blend into the surrounding area by end Year 5	Achievement of the above 'revegetation' objectives will ensure that this objective is met.
Weeds	Weed cover 20% or less by end Year 5	No more than 20% weeds at any time throughout rehabilitation process
Erosion/soil stability	Site hydrology does not prevent the establishment of desired vegetation. No erosion scars by end Year 5	Stormwater is retained within the site Identification and mitigation of potential erosion scars during rehabilitation Direct autumn return of topsoil in areas to be revegetated
Fauna	Native fauna are using rehabilitation areas by end Year 5	Some fauna using rehabilitation areas. It is likely that ants and then reptiles will be the first to recolonise the site. Evidence through observation of individuals, scats and tracks
Pest animals	Grazing by herbivores, including macropods, affects no more than 10% of rehabilitation by end Year 5	Herbivore grazing affects no more than 10% of rehabilitation at any time throughout the rehabilitation process

2.3.9 Maintenance and contingency measures

Revegetation areas will need to be inspected and managed after initial planting/seeding as initial success is often compromised by weeds, feral animals, human activities, fire and drought.

Maintenance procedures will be carried out where necessary and may include:

- Repair of any erosion damage
- Replanting/seeding areas in subsequent years that may not have established
- Weed control – weed inspections should be undertaken in autumn, spring and summer by a suitably qualified contractor and appropriate treatment undertaken when required.

2.3.10 Cost schedule

Based on specifications outlined in this plan, Table 3 summarises the costs associated with the revegetation within the extracted area as well as the degraded offset revegetation area at Lot 4 Ludlow Road. Revegetation will cost in the order of \$12,000 per hectare.

Note this figure excludes costs associated with earthworks.

Table 3: Estimates of costs associated with native vegetation rehabilitation of Lot 4 Ludlow Road

Item	Cost Estimate (Ex GST)
Direct seeding of offset area and extraction area (including seed supply, broadcasting, monitoring) (\$2500/ha)	\$47,250
Seedling supply offset area and extraction area (incl. 30% infill planting @500 plants/ha) ~ 12,285 seedlings @ \$1.50 each)	\$18,500
Planting labour @ \$1.50 per plant	\$18,500
20g Fertiliser tablet per plant (supply and install) (0.45/tab)	\$5500
Weed control (10 years) 250/ha/year	\$40,000
Pest animal control (10 years,)	\$10,000
Monitoring (10 years)	\$80,000
TOTAL	\$219,750

3 REFERENCES

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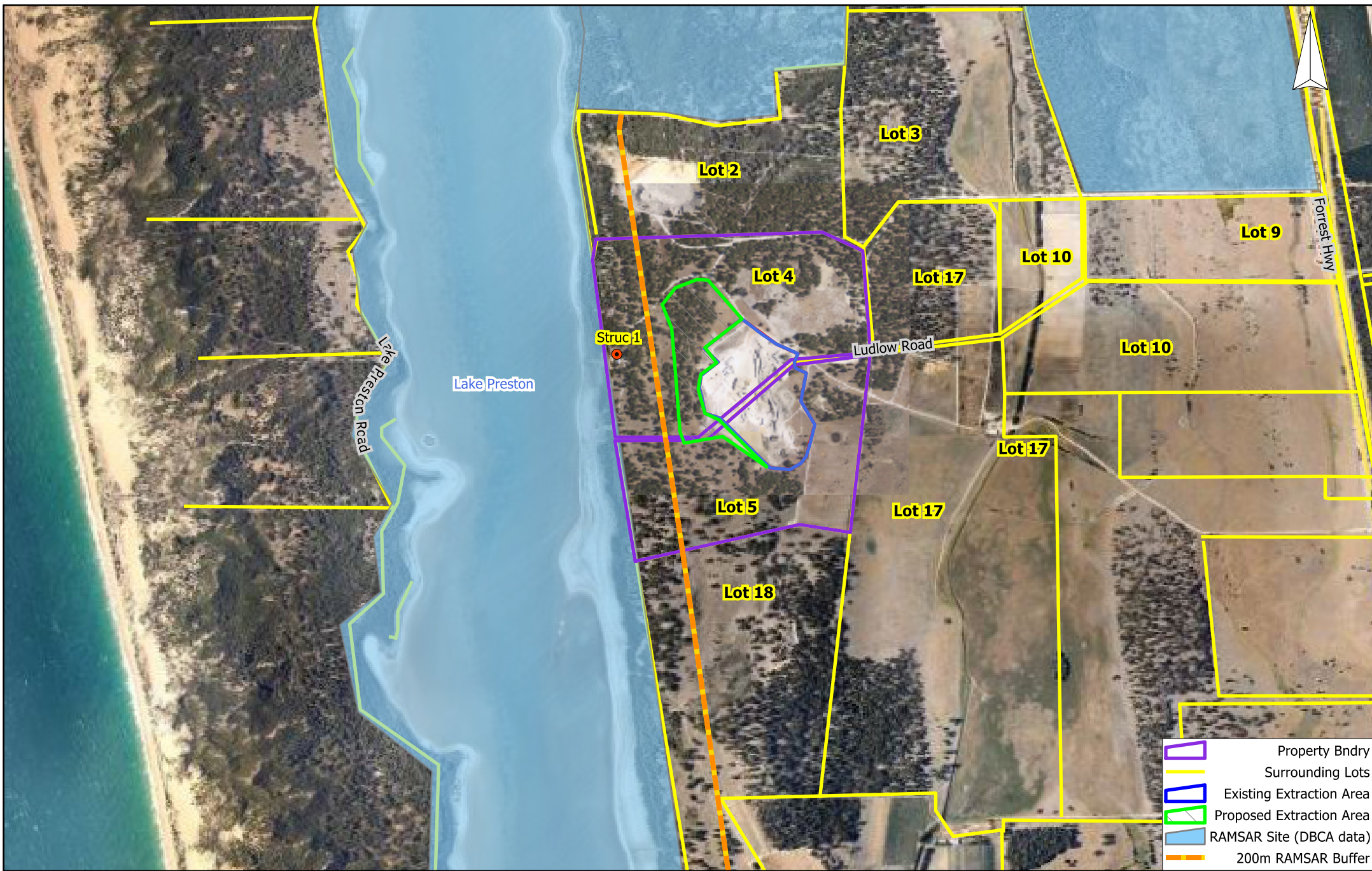
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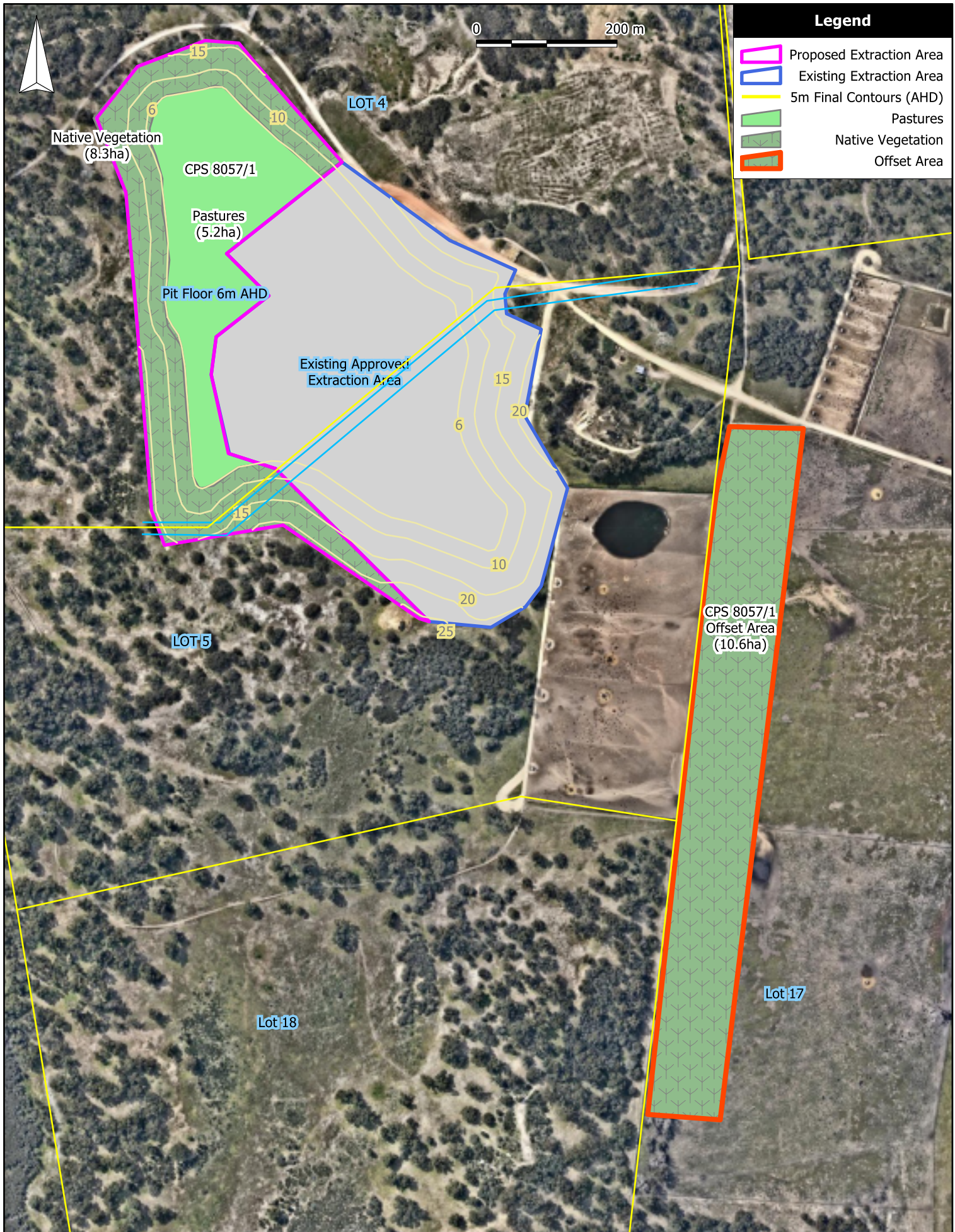
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mikelund1@bigpond.com
0417934863

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Datum: Australian Geocentric 1994 (GDA94)

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Lots 4 & 5 Ludlow Rd
Limestone Extraction**

Property and Surrounds

Figure 1



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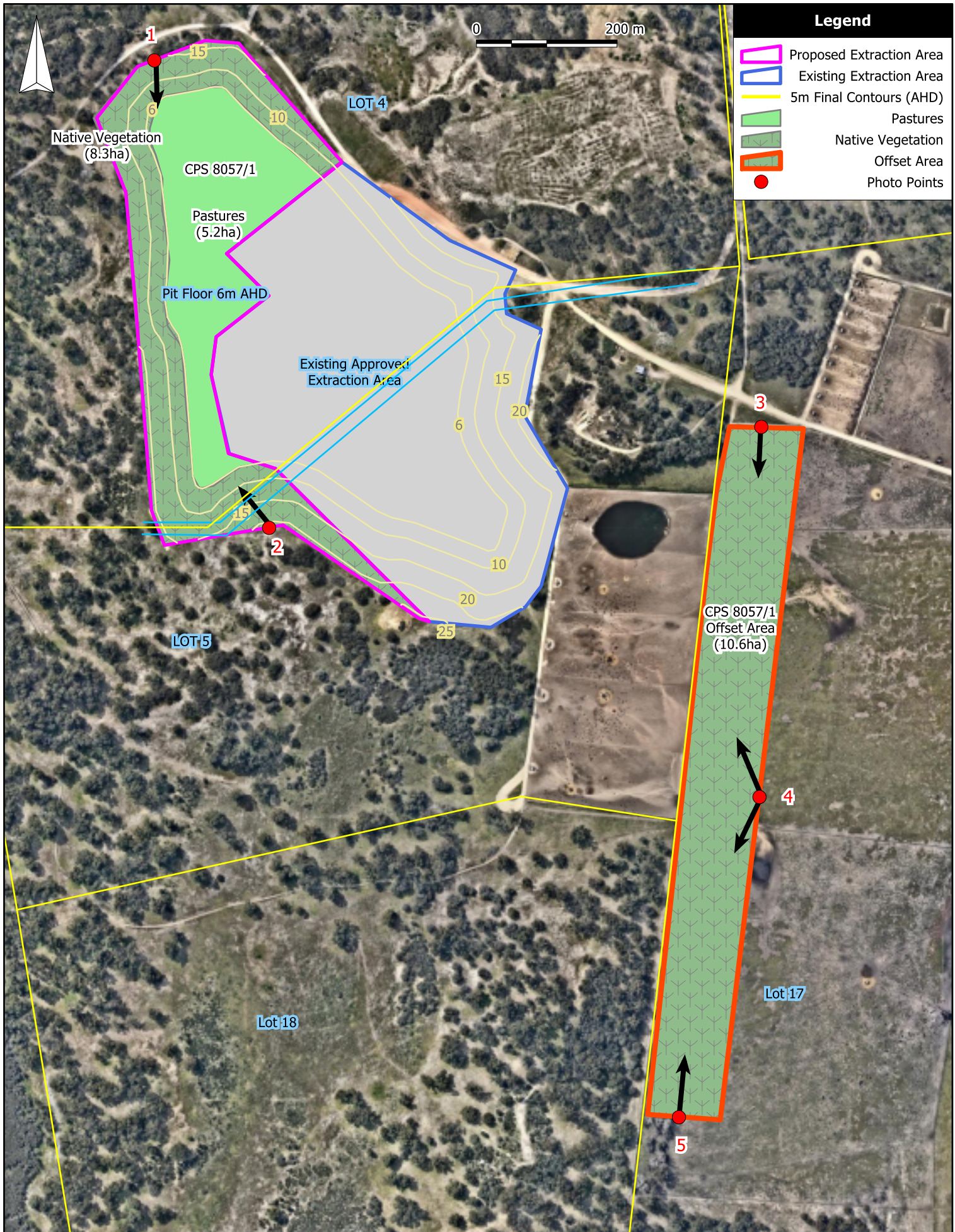
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 Mob 0417934863
 mikelund1@bigpond.com

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 Nearmap October 2019

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Revegetation and Offset Areas

Figure 2



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 Original Size: A4
 Datum: Australian Geocentric 1994 (GDA94)
 Nearmap October 2019

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Limestone Extraction

Photo Point Locations in
 Revegetation and
 Offset Areas

Figure 3

Annexure 1.

Plant species to be used in revegetation of areas at Ludlow Road.

PROPOSED PLANTS FOR LOT 4 LUDLOW ROAD, MYALUP	SEEDLINGS (PLANTS/HA)
Upper storey	
<i>Agonis flexuosa</i>	45
<i>Banksia attenuata</i>	45
<i>Banksia grandis</i>	45
<i>Banksia menziesii</i>	45
<i>Corymbia calophylla</i>	45
<i>Eucalyptus decipiens</i>	45
<i>Eucalyptus gomphocephala</i>	45
<i>Eucalyptus marginata</i>	45
Mid-storey	
<i>Hakea prostrata</i>	20
<i>Melaleuca huegelii</i>	20
<i>Melaleuca systema</i>	20
<i>Melaleuca viminea</i>	20
<i>Templetonia retusa</i>	20
Lower storey and Ground covers	
<i>Hibbertia hypericoides</i>	12
<i>Hibbertia racemosa</i>	12
<i>Lomandra micrantha</i>	12
<i>Phyllanthus calycinus</i>	12

Annexure 2.

Potential Flora Species to be used in the Seed Mix and applied at a rate of 1-2kg/ha

<i>Acacia rostellifera</i>	<i>Hardenbergia comptoniana</i>
<i>Banksia grandis</i>	<i>Hemiandra glabra</i>
<i>Conostylis aculeata</i>	<i>Jacksonia sternbergiana</i>
<i>Corymbia calophylla</i>	<i>Kennedia prostrata</i>
<i>Dampiera linearis</i>	<i>Melaleuca huegelii</i>
<i>Eucalyptus decipiens</i>	<i>Melaleuca systema</i>
<i>Eucalyptus gomphocephala</i>	<i>Patersonia occidentalis</i>
<i>Hakea prostrata</i>	<i>Scaevola canescens</i>
<i>Hakea trifurcata</i>	<i>Viminaria juncea</i>