



Our ref: TP1576 / EI 32  
15 August 2013

Environmental Protection Authority  
Locked Bag 10,  
East Perth Western Australia 6892

Attention: Teresa Bryant (Senior Environmental Officer)

Dear Sir / Madam,

Office of the Environmental Protection Authority	File: .....	19 AUG 2013	For Information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	A:								

**RE: PROPOSED EXTRACTIVE INDUSTRY – LOTS 1001 AND 1002 PRESTON BEACH ROAD NORTH, PRESTON BEACH.**

Council, as a decision making authority, is referring the above mentioned proposal to the Environmental Protection Authority under section 38(5) of the Environmental Protection Act 1986.

Comments on the subject proposal can be submitted in writing, electronically, or by fax. Comments can be submitted by any of the following three formats:

Written comments: Chief Executive Officer  
Shire of Waroona  
PO Box 20  
WAROONA WA 6215

Electronic comments: [warshire@waroona.wa.gov.au](mailto:warshire@waroona.wa.gov.au)

Fax: (08) 9733 1883

If you have any queries relating to the matter please don't hesitate to contact the Town Planner, Greg Delahunty, undersigned on 97337800.

Regards,  
  
LOUIS FOUCHÉ  
DIRECTOR PLANNING AND DEVELOPMENT SERVICES

Enc. Completed referral under Section 38(5) of the Environmental Protection Act 1986 Form  
Site Location Plan  
CD containing proposal



# Environmental Protection Authority

**EPA REFERRAL  
FORM  
DMA**

## Referral of a Proposal by a Decision-making authority to the Environmental Protection Authority under Section 38(5) of the Environmental Protection Act 1986

### PURPOSE OF THIS FORM

Section 38(5) of the *Environmental Protection Act 1986* (the EP Act) provides that a decision-making authority that has notice of a proposal that appears to it to be a significant proposal or a proposal of a prescribed class is to refer the proposal the Environmental Protection Authority (EPA) for a decision on whether or not it requires assessment under the EP Act. This form sets out the information requirements for the referral of a proposal by a decision-making authority.

Before completing this form, decision-making authorities are encouraged to familiarise themselves with the EPA's *General Guide on Referral of Proposals* [see Environmental Impact Assessment/Referral of Proposals and Schemes].

A referral under section 38(5) by a decision-making authority must be made on this form. This form will be treated as a referral provided all required information is included to the extent that it is pertinent to the proposal being referred. Referral documents are to be submitted in two formats – hard copy and electronic copy. The electronic copy of the referral will be provided for public comment for a period of 7 days, prior to the EPA making its decision on whether or not to assess the proposal.

### CHECKLIST

Before you submit this form, have you

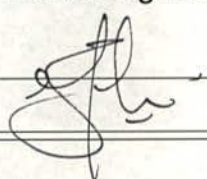
	Yes	No
Completed all applicable questions	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Included Attachment 1 – location maps	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Included Attachment 2 – Supporting information (if applicable)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Enclosed the CD of all referral information, including spatial data and contextual mapping.	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Following a review of the information presented in this form, please consider the following question. (A response is Optional)

DO YOU CONSIDER THE PROPOSAL REQUIRES FORMAL ENVIRONMENTAL IMPACT ASSESSMENT?		
<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	<input type="checkbox"/> NOT SURE
IF YES, WHAT LEVEL OF ASSESSMENT?		
<input type="checkbox"/> ASSESSMENT ON PROPONENT INFORMATION		
<input checked="" type="checkbox"/> PUBLIC ENVIRONMENTAL REVIEW		

**REFERROR'S DECLARATION**

I, Louis Fouché, (full name) submit this referral to the Environmental Protection Authority for consideration of the environmental significance of its impacts.

Signature:	LOUIS FOUCHÉ 
Director Planning and Development Services	SHIRE OF WAROONA
Date: 15-08-2013	

## 1. DMA, PROPOSAL, PROPONENT AND LOCATION INFORMATION

### 1.1 REFERRING DMA

Name	Shire of Waroona
Postal Address	PO Box 20, WAROONA, WA 6215
DMA contact for the proposal <ul style="list-style-type: none"><li>• Name</li><li>• Phone</li><li>• Email</li></ul>	Greg Delahunty (Town Planner) (08) 97337800 tp2@waroona.wa.gov.au

### 1.2 PROPONENT

Name of person/entity proposing to implement the proposal	Doyles Lime Service PTY LTD
Joint Venture parties (if applicable)	
Postal Address	PO Box 133 CAPEL WA 6271
Key proponent contact for the proposal <ul style="list-style-type: none"><li>• Name</li><li>• Address</li><li>• Phone</li><li>• Email</li></ul>	Lindsay Stephens 25 Heather Road Roleystone WA 6111 (08) 93975145 landform@iinet.net.au

### 1.3 PROPOSAL

Title	Application for Planning Consent and application an Extractive Industry Licence for limestone and sand excavation.
Description	Extraction of 40,000 - 100,000 tonnes of limestone per year and 10,000 tonnes of sand per year Total estimated resource: Limestone - approximately 1 000 000 tonnes and 200 000 tonnes in future pit. Sand - 150 000 tonnes but with potential to expand.

## 1.4 LOCATION

Name of the Shire in which the proposal is located	Shire of Waroona
For urban areas – <ul style="list-style-type: none"> <li>street address</li> <li>lot number</li> <li>suburb</li> <li>nearest road intersection</li> </ul>	Preston Beach Road North Lots 1001 and 1002 Preston Beach Preston Beach Road North and Preston Beach Road
For remote localities – <ul style="list-style-type: none"> <li>nearest town</li> <li>distance and direction from that town to the proposal site</li> </ul>	Preston Beach Approximately 4.5km North of the Preston Beach townsite.
Electronic spatial data - GIS or CAD on CD, geo-referenced and conforming to the following parameters: <ul style="list-style-type: none"> <li>GIS: polygons representing all activities and named</li> <li>CAD: simple closed polygons representing all activities and named</li> <li>datum: GDA94</li> <li>projection: Geographic (latitude/longitude) or Map Grid of Australia (MGA)</li> <li>format: Arcview shapefile, Arcinfo coverages, Microstation or AutoCAD</li> </ul>	Enclosed: Yes <input checked="" type="radio"/> No

## 2. APPROVALS/CONTROL MECHANISMS

What approval(s) is (are) required from you as a Decision Making Authority?	Planning Consent (Shire of Waroona Town Planning Scheme No. 7) Extractive Industry Licence (Shire of Waroona Extractive Industry local Law)
Is an amendment to a planning scheme proposed or required to enable implementation of the proposal?  If yes, please provide details.	No
Have you sought comments from a State Government Agency or Local Authority regarding this proposal?  If yes, name all agencies and Local Authorities contacted.	Yes  Department of Parks and Wildlife; Department of Environmental Regulation; Department of Water; Department of Fire and Emergency Services; Main Roads WA; and Department of Mines and Petroleum.

What conditions can you place on the proposal to manage environmental impacts?	Implementation of and compliance with submitted 'Excavation and Rehabilitation Management Plan' Conditions recommended by Environmental Agencies.
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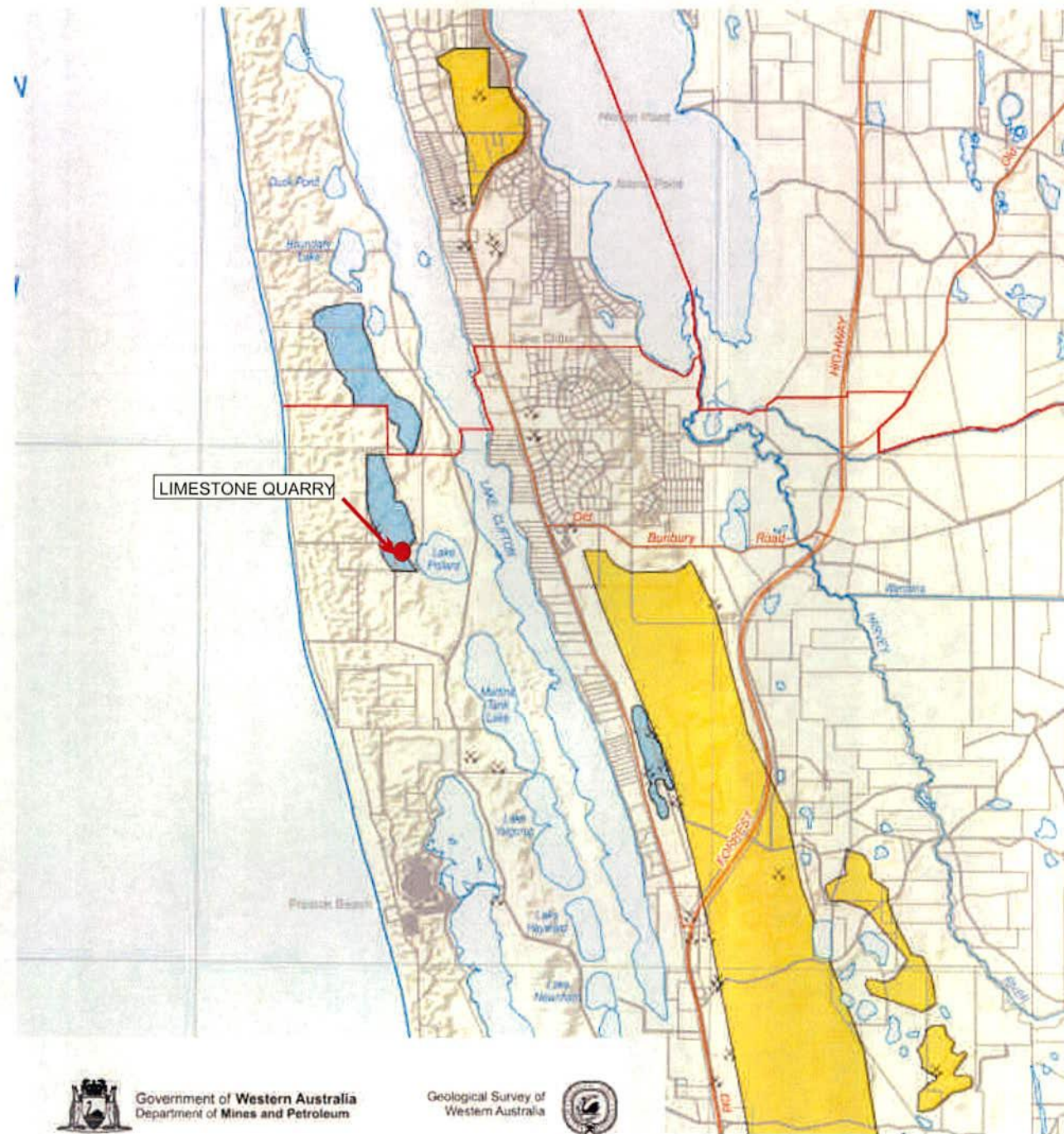
**3. ENVIRONMENTAL CONSIDERATIONS**

In what ways do you consider the proposal may have a significant effect on the environment and warrant referral to the EPA?	Impact on the adjoining Peel-Yalgorup Wetland system which is classified as a Ramsar Wetland Site.
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**4. SUPPORTING INFORMATION**

Please attach copies of relevant information you have received or can provide on the proposal and list documents below.

Document	Description/Title
1.	CD containing proposal
2.	
3.	



Government of Western Australia  
Department of Mines and Petroleum

Geological Survey of Western Australia

Scale 1:100,000

UNIVERSAL TRANSVERSE MERCATOR PROJECTION  
HORIZONTAL DATUM: GEODETIC DATUM OF AUSTRALIA 1984  
Grid Line Address: 11 930 metre interval of the Map Grid Australia Zone 50

GDA

THE MAP GRID ADDRESS (MGA) IS BASED ON THE GEODETIC DATUM OF AUSTRALIA 1984 (GDA84).  
GDA84 POSITIONS ARE COMPATIBLE WITH ANY MAPS OF THE GDA84 ZONE POSITIONS.

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**GEOLOGICAL SURVEY OF WESTERN AUSTRALIA**  
**RESOURCE POTENTIAL FOR LAND USE PLANNING**  
**REGIONALLY SIGNIFICANT BASIC RAW MATERIALS**

**PINJARRA**

SHEET 2032: FIRST EDITION 2012  
Issue 1.5 - Nov 2012

Figure 1

DOYLES LIME SERVICE – PRESTON PIT	
LOCATION	
Landform Research	May 2013
Source NEARMAP	Scale See Plan

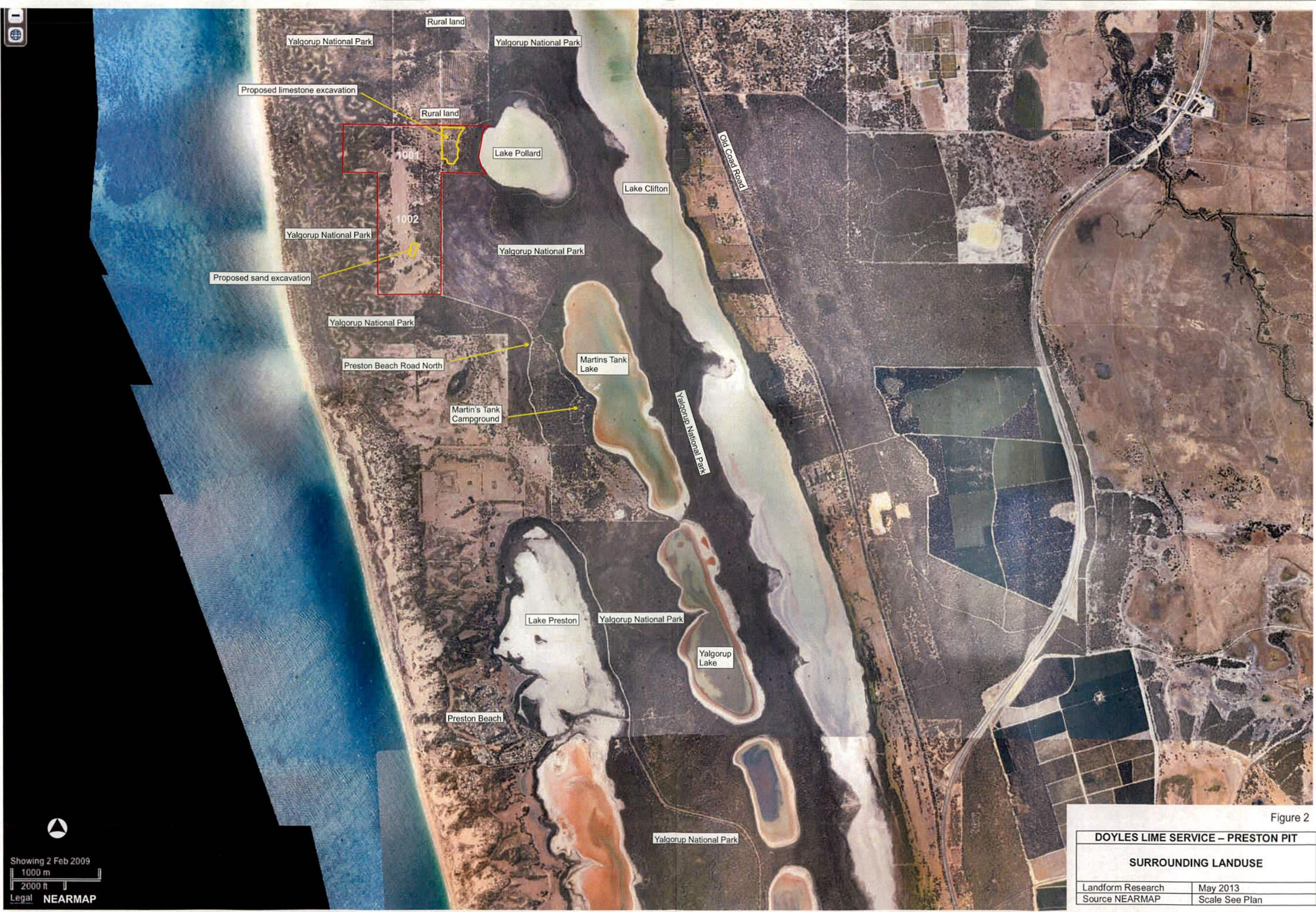


Figure 2

**DOYLES LIME SERVICE – PRESTON PIT**

**SURROUNDING LANDUSE**

Landform Research	May 2013
Source NEARMAP	Scale See Plan

Showing 2 Feb 2009  
 1000 m  
 2000 ft  
 Legal NEARMAP





# Excavation and Rehabilitation Management Plan

Lots 1001 and 1002  
Preston Beach Road North  
Preston Beach

**DOYLES LIME SERVICE**

May 2013

# Excavation and Rehabilitation Management Plan, Doyles Lime Service, Proposed Preston Beach Pit

Quarry Manager  
Doyles Lime Service  
P O Box 133,  
Capel WA 6271

Phone 042 708 4102



Prepared by Landform Research

## **SUMMARY**

A limestone resource lies on parts of Lots 1001 and 1002, Preston Beach North Road, Preston Beach.

The resource has been identified by the Geological Survey of Western Australia as a Regionally Significant Basic Raw Material – Limestone.

The material is of high grade and is suitable for the supply of agricultural lime and road bases

This proposal seeks Development Approval and an Extractive Industries Licence for the extraction of material from 7.5 hectares of Lot 1001, which represents just 9.3% of Lot 1001, and 4.3% of the landholding in Lots 1001 and the adjoining Lot 1002.

The limestone will be used to prevent soil acidification, which is a well recognised major environmental issue, highlighted in the various State of Environment Reports on Western Australia, where it is estimated that 55% of the agricultural land in Western Australia is susceptible to the problem. Soil acidification also causes stock toxicity from some metals (eg aluminium) which move into solution in acidic or low pH conditions.

The only mechanism to counteract the increasing acidity is the application of calcium carbonate. The sources of calcium carbonate are limesand and Tamala Coastal Limestone.

The proposal seeks to provide a continued resource of strategically located limestone, suited to a variety of end products. The majority of the lime from this pit will be used in the agricultural industry with lime being transported as far as Hyden in the east through Brookton - Wagin and Collie in the south. The northern limit of the limestone supply is north of Perth where the northern supplies of limesand have a transport cost advantage.

A small sand resource is proposed to provide fill sand for local projects such as Preston Beach.

The quarry is proposed to provide additional limestone materials for a stable long term supply of limestone products in the Mandurah - Bunbury and Peel Regions. It will help keep the prices of local limestone products at the lowest possible levels, by maintaining small transport distances and competition. This benefits the whole community. It will also comply with State Planning Policy No 2.5 which requires that basic raw materials should be taken prior to sterilisation of the area by development.

Rehabilitation is planned to progressively follow excavation to minimise the amount of land open at any time.

Excavation will take place on the floor of the quarry and will lower the hill to form a gentle rise at an elevation of around 14 metres AHD which will lower the ridge by between 0 – 14 metres.

The planned end use of the site is to restore a natural soil and return the ridge to native vegetation along the buffer to Lake Pollard, with pasture in the west, so there is no net loss of native vegetation and the buffer to Lake Pollard will be enhanced. Lake Pollard and the surrounding vegetation are included as part of the Yalgorup National Park. Setback to Lake Pollard is 200 metres.

40 000 to 100 000 tonnes of limestone could be extracted in one year, but when the number of contracts is less, smaller amounts of material can be expected to be taken. Actual quantities will depend on the type and size of contracts won, and it is possible that when supplying large contracts tonnages in excess of these figures will be removed from the site.

Perimeter fences and locked gates will be maintained by the landholder and quarry operator.

The quarry is not visible from any road and, with the landform and trees between the quarry and public areas, is not expected to be visible.

The excavation footprint has been determined from Landgate contour mapping and detailed aerial photography. Prior to excavation commencing the site will be ground surveyed, the excavation footprint marked out and a 1 metre contour plan developed.

A 20 year Planning Consent and Extractive Industries Licence is requested.

The Excavation and Rehabilitation Management Plan addresses;

- Groundwater quality and quantity protection;
- Land surface stabilisation and interim rehabilitation, including erosion mitigation and topsoil management
- Waste management
- Dust management
- Dieback management
- Contours and final ground surface levels;
- Fire management;
- Site security

Environmental issues including dust, noise and traffic can be managed in such a way to minimise or eliminate any significant impact both on site and offsite. Dust and noise can be contained by the methods of extraction to be used and the control measures which will be put into place. Measures to protect the site and minimise the influence of dieback are addressed under Environmental Management.

Overall the proposed pit is well isolated from any sensitive premises, with none within 1 km.

### Project Summary

<b>ASPECT</b>	<b>PROPOSAL CHARACTERISTIC</b>
<b>EXCAVATION</b>	
Area of proposed new excavation	Proposed Pit – 7.5 hectares Future Pit – 2.5 ha
Limestone extraction	40 000 - 100,000 tonnes per year
Sand Extraction	10 000 tonnes per year
Total estimated resource	Limestone - approximately 1 000 000 tonnes and 200 000 tonnes in future pit. Sand 150 000 tonnes but with potential to expand
Life of project	20 years
Area cleared per year	Initially about 2 hectares and then 0.5 – 1.0 per year depending on the elevation of the ridge. Sand excavation can occur for the most part without the need to clear native vegetation.
Total area to be cleared	7.5 hectares in proposed pit The future pit of 2.5 ha will also require clearing when applied for and approved.
Area mined per year	0.5 – 1.0 hectares total
Dewatering requirements	None
Maximum depth of excavations	16 metres
<b>PROCESSING</b>	
Limestone	40 000 - 100 000 tonnes per year
Water requirements	Only required for dust suppression on road transport.
Water supply source	Existing sump for which application will be made to use 1 500 kL per year for commercial purposes.
<b>INFRASTRUCTURE</b>	
Total area of plant and stock	Located within excavation footprint or on adjoining cleared land. 2.0 ha
Area of settling ponds	Not required
Fuel storage	Not required, mobile tankers will be used
<b>TRANSPORT</b>	
Truck movements	Variable but approximately 10 laden trucks per day maximum
Access	Existing limestone Preston Beach North Road from the sealed Preston Beach Road.
<b>WORKFORCE</b>	
Construction	2 –3
Operation	2 - 3
Hours of operation	Monday - Friday 6.30 am to 5.00 pm excluding public holidays.

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Figures	Vegetation Limestone Pit						
	Vegetation Site Photographs						
	Vegetation Sand Pit						

## 1.0 INTRODUCTION

### 1.1 Background and Proposal

The limestone on Lots 1001 and 1002 is highly suitable for lime for agriculture and neutralisation of acidity.

Doyles Lime Service currently only operates in Myalup but wishes to expand to another operation closer to potential alternative markets.

#### Existing Approvals

There are no current approvals.

#### Proposal

This proposal seeks Development Approval and an Extractive Industries Licence for limestone from Lot 1001. An application for limestone extraction from Lot 1002 is not made at this time but it remains a future resource.

### 1.2 Importance and Rationale

The limestone is used for agricultural lime and to neutralise acidic soils.

The general geology and deposits have been reviewed by the Western Australian Geological Survey and summarised in Abeysinghe 1998, pages 48 – 50.

The significance of this resource is that there are only scattered deposits between Mandurah and Bunbury of very limited area and volume.

To be most effective limestone has to be of the highest grade and, whilst coastal calcareous dunes and limestone do contain calcium carbonate, the grades are often too low for efficient and economic use. For example using limestone at half the calcium carbonate content will require double the amount to be excavated, leading to additional land clearing, excavation and transport for no greater gain.

The other local factor is that much of the limestone and calcareous dunes are located within coastal Crown land and Reserves.

The importance of the local lime is recognised in the *Department of Agriculture and Food Bulletin 4660, Survey of Western Australia agricultural lime sources* which listed the limestone from this pit on page 70.

Crushed limestone and limesand is an essential resource to the State, for correcting soil acidity caused during normal farming operations through the use of nitrogenous fertilizer and legume crops. The need for crushed limestone for use as agricultural lime is recognised by the *Department of Agriculture and Food (Bulletin 4784)*.

The resource has been identified by the Geological Survey of Western Australia as a Regionally Significant Basic Raw Material – Limestone.



Acidification of soils is seen as one of the major impediments to continued viable farming in Western Australia. The *State Of the Environment Report Western Australia 2007* shows that about two thirds of the South West agricultural soils are at risk of acidification. When the acidity builds up essential nutrients become unavailable to plants and the crops reduce in vigour and eventually fail. In addition some other elements such as aluminium become soluble and lead to toxicity in stock and plants.

Lime from limesand is also used for remediation of acid sulfate conditions and a source of CaCO<sub>3</sub> for some industrial processes.

Typically the limesand has a calcium carbonate content of over 70%.

Some consideration of the use of limestone for agricultural lime and other purposes is shown in the following documents. The Chamber of Commerce and Industry are currently updating their assessments.

See;

- Abeysinghe P B, 1998, *Limestone and Limesand Resources of Western Australia*, Geological Survey of Western Australia, Mineral Resources Bulletin 18.
- Gozzard J R, 1987, *Limesand and Limestone Resources between Lancelin and Bunbury*, Geol Surv WA, Record 1987/5
- Western Australia, Western Australian Planning Commission, *Statement of Planning Policy 2.4, Basic Raw Materials*.
- Chamber of Commerce and Industry, 1995 and 1996, *Managing the Basic Raw Materials of Perth and the Outer Metropolitan Region*, Parts 1 and 2.
- Chamber of Commerce and Industry, 2008, *Basic Raw Materials Access and Availability*.
- Fetherston J M, 2007, *Dimension Stone in Western Australia*, Volume 1, Department of Mines and Petroleum, Mineral Resources Bulletin 23.

The reality is that the limestone is only extracted for the community benefit.

If there was no community demand for limestone as a building product and for agricultural use it would be unlikely that this natural resource would ever be utilised for any other purpose and would have no economic significance.

The resource is strategically located and has the potential to provide raw materials for the lime for 10 plus years.

The need for the resource is well known but is sometimes not given due weight in the assessment process.

Proposals such as this are often considered in isolation without reviewing the wider environmental impacts.

If the resource is not taken from this site it will have to be taken from another site where similar or more land clearing is required. The depth of sand on this site also minimises the area of farm land or vegetation that is likely to have to be cleared on an alternative site.

### **1.3 Proponent**

The proponent is Moresreel Pty Ltd.

Contact can be made through the Manager

Mr Eddie Doyle  
Doyles Lime Service

P O Box 133,  
Capel WA 6271

#### 1.4 Location and Ownership

E J Marchetti  
PO Box 238  
Waroona WA

Lots 1001 and 1002 lie on the western side of Lake Pollard and Martins Lake, Preston Beach, 6 km from Preston Beach townsite.

Lot	LOT 1001	LOT 1002
Volume	2515	2515
Folio	859	860
Plan	29652	29652
Area	56.811 plus 28.173	98.473 ha

#### 1.5 Description of the Resource

The site covers part of a limestone ridge that extends along the western side of Lake Pollard. It has several peaks to 30 plus metres, although on Lot 1001 the ridge rises to over 30 metres AHD on the southern and northern boundaries with a swale down to 14 metres AHD through the centre of the lot.

The limestone ridge is the closest limestone to Mandurah south of the Yalgorup National Park and therefore has regional value as a Basic Raw Material resource area. It is of such significance that it is identified by the Geological Survey of Western Australia as a Regionally Significant Basic Raw Material – Limestone.

The limestone ridges have harder, higher grade limestone near the surface, which is suitable for agricultural purposes, overlying softer limestone suitable for road making materials.

The limestone on site changes laterally and vertically through changes in the original dune morphology as does the degree of lithification (hardness). These changes determine the use to which each type of limestone can be put.

Although the resource extends to depth, extraction is likely to be limited to 13 - 14 metres AHD metres to provide an undulating and consistent final landform.

An estimated 20 plus years' limestone and sand resources are present, although this depends on the rate of community demand.

#### 1.6 Aims of the Proposal

A major and increasing environmental issue within Western Australian agriculture is the gradual, widespread and increasing levels of acidic soils, created through the use of nitrogenous fertiliser and the growth of leguminous crops. The agricultural industry of Western Australia is one of the most important to our economy through direct value, value added and employment.

Soil Acidification is a well recognised major environmental issue and is highlighted in the various State of Environment Reports on Western Australia, where it is estimated that 55% of the agricultural land in Western Australia is susceptible to the problem. Soil acidification also causes stock toxicity from some metals (eg aluminium) which move into solution in acidic or low pH conditions.

The trend towards acidification of the soils is unavoidable, because legume rotations are best practise farming, and nitrogen is essential for crop growth.

The only mechanism to counteract the increasing acidity is the application of calcium carbonate. The sources of calcium carbonate are limesand, Tamala Coastal Limestone, or other imported limestones, that have to be treated, or dredged lime/shell sand. Most coastal areas of Tamala Limestone are covered by remnant vegetation or are in areas where they are sterilised by increasing numbers of residents such as the Mandurah area.

The aims of the proposal are to;

- Provide reserves of strategically located limestone, suited to a variety of end products.
- Supply lime to the agricultural industry.
- Provide additional limestone materials for a stable long term supply of limestone products in the Mandurah - Bunbury and Peel Regions.
- Comply with State Planning Policy No 2.5 which requires that basic raw materials should be taken prior to sterilisation of the area by development.

## **2.0 EXISTING ENVIRONMENT**

### **2.1 Climate**

The climate of the area is classified as Mediterranean with warm to hot summers and cool wet winters.

Temperatures are between those of Mandurah and Bunbury, where the maximum temperatures in the summer months are 27 to 30 degrees Celsius. In winter the maxima are near 18 degrees Celsius with the minima dropping to an average of 9.0 degrees C in July.

Rainfall for the area is approximately 900 mm with more than 90% of the rain falling during the winter months April to October inclusive. Evaporation exceeds rainfall in all but the wettest winter months.

The wind direction is predominantly from the east in the morning and from the southwest in the afternoon during the summer months. During the winter months the directions are more variable and lighter but with a predominance of east - northeast in the morning and south west in the afternoon due to the presence of winter lows.

### **2.2 Geology and Geomorphology**

The site is a ridge of limestone rising to 32 metres AHD which is approximately 18 metres above the surrounding plain.

The limestone of the low ridge was formed as limesand dunes behind beach deposits. The limestone is a calc-arenite made from beach sand containing predominantly shell fragments with minor and variable quartz. The limestone has been lithified and recrystallised on the ridge tops to lift the percentage of calcium carbonate to over 70%.

It forms part of several lines of beach ridges that formed along the coast and when formed slowed the groundwater flow to form a series of parallel lakes between the ridges. (Lake Clifton in the east , Martins Lake – Lake Pollard and Lake Preston in the west.

The degree of lithification (hardness) changes over the property, and determines the use to which each type of limestone can be put.

It is ascribed to the Tamala Limestone although it may well be a younger sequence than Tamala Limestone in some other locations.

In other localities dates of between 25 000 and 100 000 years have been obtained for the Tamala Limestone.

The local Geology and geomorphology is expanded on in *Semeniuk V and C, 2009, Quaternary geology, landforms and wetlands between Dawesville and Binningup – Description, key features and geoheritage significance* prepared by the DEC.

### 2.3 Soils

Soils on the site consist predominantly of brown to yellow brown sands over limestone at depth. The soils are classified as Cottesloe soils.

The Tamala Limestone is covered by shallow, yellow brown, calcareous loamy sands that have originated as a result of weathering of the limestone on the central ridge. Deeper sand occurs in the swale in the west and to the east.

Approximately 0 - 100 mm of brown sandy soils of the Cottesloe type overly the limestone, although on the ridge top there is very little soil material.

A typical soil profile from the limestone ridge is:

Soil Horizon	Depth	Description
O-A	0 -10 mm	Weakly developed, leaf litter and decomposing organic matter
B	10 - 500 mm	Dark brown siliceous sandy soils that become lighter with depth. In some locations the soils can be 2 metres deep but in others only 100 mm.
C	> 500	Cream recrystallised limestone

### 2.4 Hydrology

There is no surface drainage due to the porosity and permeability of the limestone, with precipitation draining to the water table. It has been estimated that perhaps <10 - 20 % of the rainfall will reach the water table.

The site lies 200 metres west from the Lake Pollard. However shallow groundwater on the site is fresh, sitting as a layer overlying the saline ground water. The groundwater is exposed in a sump in the south western corner of Lot 1002. (Figures 3 and 7).

From evidence of the soils, the sump and vegetation, the water table lies at about 1 metre AHD. See Figure 3 in Deeney (undated). Figure 6.

Limestone excavation does not affect the quality of water in the shallow ground water system because the only chemicals used are normal fuels and lubricants; a fact that is recognised by the Department of Environment and Conservation who permit extractive industries in Priority Groundwater areas.

## 2.5 Flora

The vegetation was reviewed by Lindsay Stephens of Landform Research on 23 May 2012. Regional vegetation and flora assessments were made by Freeman, K, Be Keighery, G Keighery, V Longman, A Black and S Molloy, 2009, *Flora and Vegetation of the Dawesville to Binningup Region (Swan Coastal Plain)*, prepared for the DEC.

g

It has been strip cleared in the past and intensively grazed and in part seeded with pasture species.

In spite of extensive searches only 10 native species were found, of which two were found as only one plant. Effectively there are only eight species present, which is very low for this type of vegetation over an area of 12 hectares. The vegetation is dominated by *Trachyandra divaricata* an exotic species.

The local vegetation is originally Cottesloe Complex, Central and South, as identified by Hedde et al, 1980, *Vegetation Complexes of the Darling System, Western Australia in Atlas of Natural Resources, Darling System, Western Australia*, Department of Conservation and Environment.

Remnant and regrowth limestone heathland of *Melaleuca systema*, *Dryandra sessilis* (*Banksia sessilis*), *Templetonia retusa*, and *Hibbertia cuneiformis* over exotic pasture and weed groundcovers occur on the resource area of Lot 1001. *Eucalyptus decipiens* occurs around the edges and on the southern boundary with *Agonis flexuosa* on the lower slopes.

See attached Flora and Vegetation Assessment.

Being significantly reduced in species no sample plots were completed because it would not provide any additional useful information.

For comparison, Bush Forever lists the species richness of the original vegetation community prior to clearing, Community Type 26b, "Woodlands and mallees on limestone" as an average of 49.8 species per 100 m<sup>2</sup> plots. The comparison of 8 and 10 native species on site shows the degraded level of the vegetation.

EPA Guidance 10 *Level of assessment for proposals affecting natural areas within the System 6 region and Swan Coastal Plain portion of the System 1 Region* lists Cottesloe Complex - Central and South as having 41.1% of the pre-European area still occurring and 8.8% in secure tenure. The Quindalup System is listed as having 47% of the pre-European area still occurring and 5% in secure tenure.

Whilst there exists greater than 30% of this Complex it is not well reserved. The Clearing Regulations provide a higher level of protection than was previously available, and the same vegetation complex is included in the Yalgorup National Park.

The assessments within the Flora and Vegetation Assessment attached, found that the proposed clearing will have little overall effect on flora and fauna within the local area, with most of the effect relating to the final end use, and that appears to have been the case.

- **Vegetation Condition**

The area covered by the proposal will require a Clearing Permit CPS. It has been strip cleared in the past as shown on the existing aerial photography.

There will be no clearing of the native vegetation unless a New Clearing Permit is approved.

The remnant vegetation is listed as Good with Degraded to Completely Degraded strips, using Bush Forever and Kaesehagen 1995 as described in Appendix 1.

- **Rare and Priority Species**

No Declared Rare or Priority species were recorded. No Threatened Ecological Community was noted.

## 2.6 Fauna

A fauna study was not conducted because the resource area is cleared and will be returned to native vegetation.

Fauna has been studied in the assessments for the Dawesville Binningup region on behalf of the DEC.

The studies are

*Dell and Hyder 2009, An Assessment of the Avifauna of the area between Dawesville and Binningup, Southern Swan Coastal Plain prepared for the DEC.*

*Dell and Hyder 2009, Summary of the Vertebrate Values of the area between Dawesville and Binningup, Southern Swan Coastal Plain prepared for the DEC.*

*Dell and Hyder (1) 2009, An Assessment of the Non-Volant mammal Fauna of the area between Dawesville and Binningup, Southern Swan Coastal Plain prepared for the DEC.*

*Bat Call 2009, Echolocation Survey of Bat Activity in the Lake Clifton and Lake Preston Localities on the Swan Coastal Plain.*

The studies recorded 22 species of animals (not including bats) occurring in the Dawesville – Binningup area of which 6 species were exotic. There are many species of bird which range across the Dawesville Binningup area with 174 species listed by Dell and Hyder.

With the degraded nature of the vegetation and the species present it is unlikely that *Calyptorhynchus latirostris* and *Calyptorhynchus baudinii*, which are listed on State and EPBC conservation databases, would nest or use the site for feeding. The flora species are not regarded as significant habitat species. They are not used for roosting or nesting.

The few *Hakea* and *Dryandra* plants do provide some limited food supply but are not classified as a significant impact on the habitat of the Black Cockatoos or one that would trigger referral under the *EPBC Act 1999*.

The Graceful Sunmoth will not occur because of the lack of habitat, with no *Lomandra* spp being recorded.

Western Australian Museum (undated) lists *Calyptorhynchus latirostris* as visiting pine plantations, parks and gardens and Proteaceae shrubs, especially *Dryandra sessilis*, *Banksia menziesii*, *B. attenuata* and *B. grandis* in the area from March to September. These species are not present on site.

It may be possible for possums and even the Western Ringtail Possum *Pseudocheirus occidentalis* to occur in areas such as this. They are more likely to live in the peppermint trees on the eastern edge of the excavation. These will not generally be impacted on. Peppermint trees *Agonis flexuosa* will be included in the rehabilitation. Preston Beach was a release site for this species. Dell and Hyder (1) 2009. The Western Brushtail Possum is common.

Some other species of Conservation Significance have been recorded on some databases such as Chuditch which according to Dell and Hyder (1) 2009 has been recorded from north east of Lake Clifton and may occur locally. This is a mobile species that is unlikely to be impacted by a small limestone quarry.

The Short beaked Echidna has been recorded at Martins Tank and may occur. It is also unlikely to be impacted by a pit that is small in relation to the amount of habitat available.

The Brush Tailed Phascogale has been recorded at Lake Clifton in 1991. Its status is not currently known.

Dell and Hyder (1) 2009 list the Quokka as still possibly occurring associated with thickets around Lake Clifton. No low elevation thickets are to be impacted.

The Western Grey Kangaroo is common and is advantaged by pasture and additional water supply of pasture land.

Other species of conservation significance (Dell and Hyder (1) 2009) are the Quenda and Western Brush Wallaby.

The Quenda is likely to be present and is known to be thriving near human habitation which increases food and water supply. The Western Brush Wallaby may be present but is a relatively large and mobile animal that is unlikely to be affected by excavation.

Other fauna are related to the preservation of habitat. Returning the excavated surface to native vegetation will assist in providing long term habitat for fauna. Considering the relatively small size of the limestone pit in relation to the area of remnant vegetation, the disturbed nature of the vegetation on site and the high quality habitat associated with the lake system it is unlikely that fauna species will be significantly impacted.

See Wetlands below for consideration of species associated with the lake systems.

### **Stygofauna and Troglifauna**

EPA Guidance 54, concentrates on Stygofauna, which occur in caves and “are aquatic subterranean animals, found in a variety of groundwater systems”. Environmental Protection Authority, 2013, *Consideration of subterranean fauna in environmental impact assessment in Western Australia* relates to the level of survey. On the limestone ridge a reconnaissance survey was completed by Lindsay Stephens of Landform Research during the site inspection.

The limestone ridge is not an isolated habitat, but joins similar limestone regolith north and south. The main change will be modification of the two ends of the ridge at an existing swale. Limestone will remain to depth at the end of excavation.

“Troglifauna occur in air chambers in underground caves or smaller voids”.

The issues of these organisms is best addressed on a risks basis, because the water table is not proposed to be impacted on.

Stygofauna relate particularly to Root Mat Communities, which are listed as Endangered Communities. Root mat communities occur in locations where groundwater flows quickly and where Tuart Trees are present because their roots can access the water table. No Tuarts occur on the resource area of Lot 1001. The base of the excavation at 1 to 14 metres AHD is over 10 metres above the highest known water table. The low lying swales between the ridges on Lot 1001 and 1002 drop down to 3 – 4 metres AHD well below the proposed floor of the pit.

Root Mat Communities are briefly considered in conjunction with the Flora Assessment in Appendix 1 under Endangered Communities on page 11 of that report. None of the risk factors listed in Guidance 54 are likely to occur. The limestone is too young for cave development and even if they did occur under this site they will not be impacted on.

For Troglifauna, which may occur in air chambers in underground caves or smaller voids, it will be difficult to undertake any meaningful sampling of these. Any crevices or fissures in the adjoining quarries will probably have been contaminated by surface or near surface invertebrate fauna. The existing soils are sands with occasional limestone pinnacles and not rocky outcrops.

The limestone ridge is joined to the north and south of Lot 1001 and is therefore not an isolated feature. Any troglifauna are therefore likely to inhabit the whole ridge and are unlikely to be locally rare. South of Lot 1001 and west and east of the ridge extension to the north the limestone ridge lies within the Yalgorup National park and is therefore afforded protection.

## **2.7 Wetlands**

Lake Pollard lies 200 metres from the proposed extraction area, with the eastern boundary of Lot 1001 running to near the lake water's edge. Lake Pollard, is a recognised EPP wetland with a similar status to Lake Clifton to the east. It forms part of the Ramsar listed wetlands that have been classified as the boundary of the Yalgorup National Park. A small area up to approximately 50 metres wide on the north eastern corner of Lot 1001 is listed as a Wetland of National Importance. (Figure 2 and Figure 3).

The Ramsar wetlands including Lake Pollard are listed on the Commonwealth EPBC database.

The dune systems within Yalgorup National Park that adjoins Lot 1001 are the result of coastal deposition at a time of sea level changes. The limestone rocks and soils that can be seen at the surface inland from the coast are derived from the older Spearwood system, Superimposed over the Spearwood system, for up to two kilometres from the beach, are the sand dunes of the Quindalup Dune System, which have been blown in from the sea or washed ashore over the last 10,000 years.

The lakes that characterise the area lie in the depressions between a series of coastal dunes within the Spearwood system. The lakes form three distinctive lines parallel to the coast. Lake Preston is extremely elongated and lies closest to the coast. The lakes behind the next ridge are far more broken, comprising (from north to south): Swan Pond, Duck Pond, Boundary Lake, Lake Pollard, Martins Tank Lake, Lake Yalgorup, Lake Hayward and Newnham Lake. Lake Clifton is the furthest from the coast and the nearest to the Old Coast Road. It too is extremely elongated. (Modified from DEC website).

Lake Clifton is some 2 km up groundwater gradient from the proposed excavation. Lot 1001 lies outside the Lake Clifton catchment, (*EPA Guidance No 28, Protection of the Lake Clifton Catchment 1998*).

Rock-like structures known as thrombolites can be seen on the edge of Lake Clifton. The thrombolite-building micro-organisms of Lake Clifton appear to be associated with upwellings of fresh groundwater that are high in calcium carbonate entering from the east and therefore not related to, and environmentally/hydrogeologically isolated from, Lot 1001 or the proposed excavation. The micro-organisms living in this shallow lake environment are able to precipitate calcium carbonate from the waters as they photosynthesise, forming the mineralised structure that is the thrombolite. (Modified from DEC website).

The Yalgorup lake system is significant for waterbirds and is recognised under the international Ramsar Convention.



The lakes provide important habitat for the international transequatorial waders that migrate from the northern hemisphere. These waders include the bar-tailed godwit, red-necked stint, greenshank, red knot, whimbrel and three species of sandpiper. Other waterbirds that use the lakes include the banded and black-winged stilts, red-necked avocet, hooded and red-capped plovers, Australian pelican and coot.

The quacking frog, turtle frog and slender tree frog are among the eight frog species that inhabit the park and the long-necked oblong tortoise is present in Lake Clifton.

Surveys carried out in south-western Australia between 1988 and 1992, showed that the Yalgorup lakes consistently supported the high numbers of musk ducks, Pacific black ducks, black swans and shelduck.

Black swans also live in high numbers at Lake Pollard, where they graze on extensive growths of stoneworts (musk grasses). The Shire of Waroona has in place a walking trail that runs from well to the south at Martin's Tank to Lake Pollard where a bird hide is located.

Lake Pollard is saline and used to be known as Salt Lake prior to it being renamed officially some years ago. Between October and March large numbers of Black Swan utilise Lake Pollard.

### **3.0 PLANNING ISSUES**

#### **3.1 Current Land use**

Most of Lots 1001 and 1002 have been parkland cleared and grazed for many years. The site was used for intense winter grazing by cattle.

A road reserve runs along the eastern boundary of Lot 1002 and cuts Lot 1001.

Lot 1002 was used as an airstrip for the aerial spreading of fertiliser and seed on local farming properties.

The remaining remnant vegetation has previously been strip cleared and intensively grazed to increase the returns from grazing.

The Yalgorup National Park surrounds the land. The Yalgorup National Park in this location is used for conservation and there is effectively no public access and no roads, parking or facilities.

#### **3.2 Land Zonings and Policies**

##### **SPP 2 Environmental and Natural Resources Policy**

Section 5.7 deals with Minerals, Petroleum and Basic Raw Materials.

Part of Section 5.7 states;

Basic raw materials include sand, clay, hard rock, limestone and gravel together with other construction and road building requirements. A ready supply of basic raw materials close to development areas is required in order to keep down the cost of land development and the price of housing.

Planning strategies, schemes and decision making should:

- ii. Identify and protect important basic raw materials and provide for their extraction and use in accordance with State Planning Policy No 10 (2.5); Basic Raw Materials.
- iii. Support sequencing of uses where appropriate to maximise options and resultant benefits to community and the environment.

State Planning Policies are also required to be considered under the Local Authority Town Planning Schemes.

### **SPP 2.5 – Agricultural and Rural Land Use Planning**

*State Planning Policy No 2.5, Agricultural and Rural Land Use Planning*, makes provision for the extraction of basic raw materials.

SPP 2.5 in Point 9 states that "The location of rural residential and rural small holdings should avoid unacceptable impacts on, or sterilisation, of natural primary resources including prospective areas for mineralisation and basic raw materials .....".

State Planning Policies are required to be considered under the Local Authority Town Planning Schemes as are the "identification and protection" for staged use of basic raw materials.

### **Inner Peel Region Structure Plan 1997**

The Inner Peel Region Structure Plan 1997, lists Lots 1001 and 1002 as Rural – Broadacre.

### **Coastal and Lakelands Planning Strategy 1999**

This Policy recognises the location as being in the Coastal precinct, being suitable for low density development and tourism. The Policy also recognises the need for Resource Extraction Activities and their location, as being determined by the "location of the resource". The Geological Survey of WA recognises the significance of limestone in this location. (Figure 1).

The Policy recommends taking the resource from areas that are covered by remnant vegetation. The location of the proposed limestone pit is determined by the resource being located on a ridge. However the selection has taken into account the generally degraded nature of the site. (Attached Flora and Vegetation Assessment)

### **Peel Region Scheme 2002**

The Peel Region Scheme overrides the *Town Planning Scheme (Planning and Development Act 2005 Part 9 123 (1 – 3))*. The Town Planning Scheme must be made consistent with the Peel Region Scheme (*Town Planning Scheme (Planning and Development Act 2005 Part 9 123 (1 – 3))*).

Lots 1001 and 1002 will fall under the *Peel Region Scheme Strategic Minerals and Basic Raw Materials Resource Policy* dated October 2002. Section 5.0 of that Policy requires the town planning schemes to be consistent with the *Peel Region Scheme Strategic Minerals and Basic Raw Materials Resource Policy*.

Section 4.0 Objectives of the *Peel Region Scheme Strategic Minerals and Basic Raw Materials Resource Policy* direct; to identify land within the Peel Region that contains basic raw materials of State or Regional Significance and to prevent them from being sterilised by incompatible development and land uses.

Lots 1001 and 1002 are listed as Rural under the Peel Region Scheme.

The resource has been identified by the Geological Survey of Western Australia as a Regionally Significant Basic Raw Material – Limestone and therefore it should be used in a staged manner as proposed.

### **Shire of Waroona Town Planning Scheme No 7 (1996 – last updated 2012)**

The site is zoned Rural in the Shire of Waroona Town Planning Scheme No 7. There does appear to be a discrepancy between the Legend and the Scheme Text. The Scheme Text lists the zone as 13A Rural Coastal, whereas the legend that accompanies the Zoning Plans lists the site as 3A Coastal.

The Zoning Table lists the site as 13A but the Scheme Text on page 30 lists the zone as 3A. Whilst this creates some confusion it is fairly clear what the intention of the zone is and what its name is.

Extractive Industries are an AA use in the Zone, which means that Council using its discretion may approve an Extractive Industry.

The relevant sections of the Rural Coastal Zone, seeks to ensure that appropriate rural activities are consistent with the protection of the coastal environment and the ecology of Yalgorup National Park. It also permits Council to approve the “establishment of commercial uses in accordance with the Zoning Table.

The text requires satisfactory advice from Department of Environment and Conservation and the Environmental Protection Authority to ensure that the proposed use does not detrimentally impact on the Yalgorup National Park.

Preston Beach North Road reserve runs across the southern end of Lot 1002 and an unnamed road runs along the eastern boundary of Lot 1002 and cuts through Lot 1001.

### **Shire of Waroona Local Planning Strategy 2009**

Section 14 of the Shire of Waroona Local Planning Strategy recognises the importance of basic raw materials and recommends that Industry – Extractive to be a permitted use in all Rural zones. Lots 1001 and 1002 lie within the Coastal Precinct and within the Rural Zone.

The Strategy recommends that extraction occur “where clearing of significant vegetation is not required and where the operations can be undertaken without unreasonable impact on the locality and environment. Extensive rehabilitation to be undertaken on a cell by cell basis on all extraction sites upon completion of extraction in that cell.”

The location of the pit is determined by the location of the limestone resource. However an area of partially degraded vegetation has been selected for extraction. Only 10 plant taxa are present within the extraction area which is low and indicates the level of disturbance and grazing.

Excavation is proposed to be progressively followed by rehabilitation. The proposal has been designed to minimise impact on the local environment and the tourism and conservation values of the local area.

### **Shire of Waroona Extractive Industries Local Law 1999**

The proposed excavation has been designed to comply with the Local Law.

### **3.3 End Use**

The planned end use of the site is to restore a natural soil and return the ridge to native vegetation along the buffer to Lake Pollard and on the steeper southern and northern slopes with pasture in the west so there is no net loss of native vegetation and the buffer to Lake Pollard will be enhanced. (Figure 10).

### **3.4 Responsible Authorities**

A number of state and local government authorities are responsible for overseeing the safety and management of the proposed quarry. Other authorities have an interest in the proposal but may not hold any responsibility.

#### **Shire of Waroona**

- Provides Planning Consent.
- Issues the Extractives Industries Licence for the quarry.
- Regulates land zonings in conjunction with the Western Australian Planning Commission.
- Has control over local roads.

#### **Main Roads**

- Has an interest in the transport routes and controls major roads.

#### **Department of Water**

- Issues guidelines for water quality management for extractive industries.
- Oversees protection of groundwater and water courses.

#### **Department of Environment and Conservation**

- Oversees all aspects of environmental impact and management.
- Issues licences for crushing and screening plants.
- Has an interest in the flora and fauna of the area, particularly Lake Preston.
- Provides Approval for clearing under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

#### **Western Australian Planning Commission**

- Responsible for structure plans.
- Responsible for State Planning Policies.
- Responsible with the Shire for land zoning.
- Responsible for State Planning Policy No 2.5, Agriculture and Rural Land Use Planning.

#### **Environmental Protection Authority**

- Oversees the potential for significant environmental impacts on environmental matters.

#### **Department of Mines and Petroleum**

- Controls the safety and methods of excavation through the *Mines Safety and Inspection Act 1994*.
- Responsible for overseeing the health and safety of the operations and the administration of the *Mines Safety and Inspection Act 1994 and Regulations 1995*.

#### **Department of Planning**

- Responsible, in conjunction with the Western Australian Planning Commission, for *Directions 2031 (2010)* and *Draft Industrial Land Strategy Perth and Peel (2009)*.

#### **Department of Indigenous Affairs**

- Oversees the Native Title Amendment Act and the *Aboriginal Heritage Act 1972 - 1980*.

#### **Commonwealth of Australia**

- Oversees the potential for impacts on matters listed under the *EPBC Act 1999*, including Lake Clifton and Black Cockatoos.

### **3.5 Social Impacts**

There main protential social impacts are to perceived local recreation values.

Lake Pollard lies within the Yalgorup National Park. There is no access to the lake from Lot 1001 which extends to the lake's edge. The Lake Pollard Walk Trail which runs from Martins Tank in the south extends to the bird hide on the eastern side of the lake with an extension running along the fire break south of Lot 1001 to the peak of the ridge which acts as an informal lookout.

The proposal has been designed to enable use of the lookout ton continue and with the setback of 75 metres in that location, the regrowth of native vegetation and the planting of a tree belt it is believed that the quarry will be hidden from view from Yalgorup National Park and Lake Pollard Walk Trail.

Whilst Saturday transport is desirable fro agricultural supply a compromise has been offered to restrict operations and transport to Monday to Friday excluding Public Holidays to minimise potential impacts on road traffic and tourism.

The operation of the pit is anticipated to be January to April annually, avoiding the busy spring and Holdiay tourist seasons. By Easter operations will be winding down.

#### 4.0 QUARRYING OPERATIONS

The proposed methods of excavation will be the same as those used on the existing pits on Lot 4, Ludlow Road, Myalup operated by Doyles Lime Service. The Myalup operation will be used to demonstrate the nature, size and scale of the proposed operations on Lot 1001. (Figures 4, 5 and 6).

The descriptions and photographs of the Myalup limestone pit that are used in this documentation will provide the information on the proposed operations.

Limestone will predominantly be used for agriculture, although road base and minor other products will be produced as the higher grade material becomes exhausted. The taking of road base is more likely to be a second phase of excavation by another operator after all the limestone suitable for agriculture has been taken.

The limestone is relatively soft and can be removed with an excavator or loader without the need for a bulldozer or blasting. It is then screened to produce products of the correct size. A small mobile crusher is required to prepare the correct grain size.

All screening and crushing equipment is portable and brought to the site as needed. The necessary Licences for the equipment will be obtained from the Department of Environment and Conservation for all plant used on site as required.

Quarry operations will be carried out under the *Mines Safety and Inspection Act 1994 and Regulations 1995*.

Environmental issues including dust, noise and traffic can be managed in such a way to minimise or eliminate any significant impact both on site and offsite. Dust and noise can be contained by the methods of extraction to be used and the control measures which will be put into place. Measures to protect the site and minimise the influence of dieback are addressed under Environmental Management.

Overall the proposed pit is well isolated from any sensitive premises with none within 1 km.

#### Project Summary

ASPECT	PROPOSAL CHARACTERISTIC
<b>EXCAVATION</b>	
Area of proposed new excavation	Proposed Pit – 7.5 hectares Future Pit – 2.5 ha
Limestone extraction	40 000 - 100,000 tonnes per year
Sand Extraction	10 000 tonnes per year
Total estimated resource	Limestone - approximately 1 000 000 tonnes and 200 000 tonnes in future pit. Sand 150 000 tonnes but with potential to expand
Life of project	20 years
Area cleared per year	Initially about 2 hectares and then 0.5 – 1.0 per year depending on the elevation of the ridge. Sand excavation can occur for the most part without the need to clear native vegetation.
Total area to be cleared	7.5 hectares in proposed pit The future pit of 2.5 ha will also require clearing when applied for and approved.
Area mined per year	0.5 – 1.0 hectares total
Dewatering requirements	None
Maximum depth of excavations	16 metres
<b>PROCESSING</b>	
Limestone	40 000 - 100 000 tonnes per year
Water requirements	Only required for dust suppression on road

	transport.
Water supply source	Existing sump for which application will be made to use 1 500 kL per year for commercial purposes.
<b>INFRASTRUCTURE</b>	
Total area of plant and stock	Located within excavation footprint or on adjoining cleared land. 2.0 ha
Area of settling ponds	Not required
Fuel storage	Not required, mobile tankers will be used
<b>TRANSPORT</b>	
Truck movements	Variable but approximately 10 laden trucks per day maximum
Access	Existing limestone Preston Beach North Road from the sealed Preston Beach Road.
<b>WORKFORCE</b>	
Construction	2 –3
Operation	2 - 3
Hours of operation	Monday - Friday 6.30 am to 5.00 pm excluding public holidays.

#### 4.1 Limestone Extraction

1. Any trees cleared will be utilised for firewood wherever possible. In general the Eucalypt trees around the base of the ridge and through the swale have been excluded from development because the land holder wishes to retain as many as possible. However the removal of some trees may be unavoidable. (Figures 4, 5 and 6).
2. An Application for Clearing is concurrently lodged with this application to cover the remaining remnant vegetation on site. A Clearing Permit will be applied for to cover the clearing of the proposal area.
3. The excavation footprint has been determined from Landgate contour mapping and detailed aerial photography. Prior to excavation commencing the site will be ground surveyed, the excavation footprint marked out and a 1 metre contour plan developed.
4. Remove the vegetation cover by pushing it into windrows for use on the batters to minimise soil erosion and assist spreading on the final land surface as part of the final rehabilitation.
5. Where practicable vegetation will be directly transferred to an area being rehabilitated. Smaller indigenous shrub material will be used in the rehabilitation process when available and suitable; for example on batter slopes of completed areas.
6. If direct transfer is not possible the vegetation will be stored in dumps, mulched or swapped with a nearby operator to try and ensure that the material is not wasted.
7. All topsoil will be removed for spreading directly onto areas to be revegetated and screening or perimeter bunds. If direct spreading is not possible the top soil will be stored in low dumps, for spreading at a later date. See 5.9.2 Rehabilitation Procedures. Unfortunately much of the topsoil has a high weed load of pasture species some of which are invasive. It may not always be possible to reuse this apart from creating pasture.
8. Soil and overburden, as yellow and brown sand and low grade limestone, will then be removed and either directly transferred to a rehabilitation area or stored in low dumps for later rehabilitation use. Where this is not used overburden will be stored in dumps for future use in rehabilitation or the creation of bunds.

9. Limestone interburden, if encountered, will be incorporated into the overburden dumps for later use in re-contouring the land surface at the conclusion of excavation.
10. A bulldozer will be used to rip and push the limestone down the excavation face and track roll the limestone in the process.
11. The preliminary crushed limestone will then be picked up by a rubber tyred loader and fed to the mobile crusher.
12. All static and other equipment, such as crushers and screens (where used), will be located on the floor of the quarry to provide visual and acoustic screening. Figures 3 and 4.
13. Excavation will commence on the western ridge and then move to the eastern ridge, working on the floor of the pit towards the edges to minimise the potential visual impact. The face and walls of the pit will act as noise barriers.
14. Upon completion of each section of quarry the section will be reformed and back filled, where subgrade material is available, to achieve the proposed final contours which are shown on the plan "Proposed Finished Contours".
15. It is not anticipated that blasting will be required.
16. At the end of excavation the floor of the quarry will be deep ripped, covered by overburden and top soil, and rehabilitated to a constructed soil. Details of the Rehabilitation are listed under 5.9 Rehabilitation.

#### **Sand Extraction**

17. Sand will be sourced by pushing the topsoil into perimeter bunds for later rehabilitation.
18. Sand will then be excavated with a loader, loading directly to a road truck.

#### **4.2 Staging and Timing**

The excavation footprint has been determined from Landgate contour mapping and detailed aerial photography. A staging plan is attached and shows indicative staging and the direction of excavation. (Figure 5).

A 75 metre boundary setback is proposed to the Crown land to the south of Lot 1001.

Prior to excavation commencing the site will be ground surveyed, the excavation footprint marked out and a 1 metre contour plan developed.

At this stage it is difficult to predict the speed of excavation because the amount of material extracted depends on market conditions.

40 000 to 100 000 tonnes of limestone may be extracted in a year. Limestone extraction will generally only be during the summer and autumn months for agricultural lime. Actual quantities will depend on the type and size of contracts won, and sales.

However it is expected that the quarry will progress by up to 0.5 to 1.0 hectare per year. Twenty years of resource is anticipated to be available of site.

The active area needs to be large to enable a range of limestone products to be available at all times, and to provide sufficient area for processing/screening and for stockpiles.



Wherever possible all completed ground will be rehabilitated as soon as possible to ensure that the amount of ground that is open at any one time is minimised. The nature of the excavation means that it will be difficult to commence rehabilitation of the floor of the quarry until the underlying limestone has been removed.

Sand extraction will be in the order of 5 000 to 10 000 tonnes per year. It is anticipated that it will be used predominantly for sand fill at Preston Beach and nearby.

#### **4.3 Hours of Operation**

Hours of operation will be 6.30 am to 5.00 pm Monday to Friday inclusive, excluding public holidays.

Transporting material on Saturday would be desirable but is not regulated by reduced truck speeds in order to minimise impact on visitor traffic along Preston Beach Road. Saturday transport is requested to enable frames to access lime in the autumn period prior to sowing their crops.

#### **4.4 Access, Transport and Security**

Access to the site will be along Preston Beach Road which is sealed, and then to Preston Beach North Road which is limestone and will need grading and maintenance.

Traffic volumes along Preston Beach Road are greater with most traffic associated with holiday times and on weekends. On the other hand there is little traffic along Preston Beach North Road which does not lead to any dwellings.

Preston Beach Road exits onto Old Coast Road at a long time established intersection.

Transport from the site is by a variety of trucks depending on the contractor and the type of product carried. In summer – autumn, when the majority of lime is sold, there will be an estimated maximum of 50 laden truck movements leaving the site in one week although this number will vary with market demand. At times when road making materials are being transported from the site the number of truck movements may be greater.

On any week day the number of trucks is anticipated to be 10 to 15 laden trucks which will be 1 to 1.5 per hour. On Saturday the number of laden movements is from the experience at Myalup, expected to be less with less than one laden truck per hour.

The destination of the lime is normally in the Wheatbelt and any truck will normally only access the site once on any day.

The access and internal roads will be limestone based and watered as needed in the drier months to suppress dust.

The existing perimeter fences and gates will be maintained. Warning signs will be maintained as required by the Department of Mines and Petroleum and the Shire of Waroona.

#### **4.5 Equipment**

All static and operational equipment will work on the quarry floor to provide maximum sound and visual screening.

Site office	A caravan is proposed to serve as a site office.
Toilet system	Portable serviced system will be used
Bulldozer	Removal of limestone rubble and road base, track crushing of limestone as required and pushing down the resource.
Excavator	May be used to remove limestone.
Portable crushing plant	Preparation of road base and agricultural lime.
Screening plant	Preparation of limestone for road base.
Water tanker	Used for dust suppression on the access roads and working floors as necessary.
Loader	Loading and handling materials from the stockpiles.
Fuel Storage	Refuelling will either undertaken using potable tankers or from fuel stored as part of the normal farm activities.  If required, fuel will be stored in an above ground tank with a capacity of approximately 5 000 litres, appropriately located on the floor of the pit to Department of Environment and Conservation and Department of Mines and Petroleum Guidelines. Fuel storage will be located in a bunded area lined with an impermeable membrane.

### Excavation

During excavation a bulldozer and loader or excavator will be used to move the topsoil, clay resource and overburden.

The loader will then pick up the freed resource and feeds it to the mobile crushing plant.

### Loading and Transport

Lime products are to be transported from this site for about three months through late summer and autumn (January to April).

Road transport use a variety of trucks such as semi-trailers or rigid (8) wheeler trucks to a 5 axle dog trailer.

## 4.6 Final Contours

The slope of the final contours of the proposed pit is an undulating surface at around 11 – 14 metres AHD which is consistent with the adjoining land. (Figures 7 and 9)

The slopes are proposed to vary, rising up from about 11 - 14 metres AHD to the lot boundaries at the setbacks to the Crown land south and the private land to the north.

Slopes of the batters at the end of excavation will be retained at 1 : 4 vertical to horizontal.

Sand excavation will cut to an elevation of 4 metres AHD because the resource is thin. That retains 3 metres to the water table post mining which complies with all development or rural guidelines.

See Attached Concept Final Contour Plans. (Figures 8 and 9 and Figure 4).

## 4.7 Workforce

The workforce will vary, depending on the level of operation and market demands, but usually 2 to 3 persons can be expected to be working on site.

#### **4.8 Water Usage**

Water will only be required for dust suppression, which will be carried out as required during drier weather. A water tanker will be used to water the access road and the pit floor whenever necessary to minimise dust generation from transport and during crushing. Normally only small volumes of water will be used for a quarry of this type. A quarry could be expected to require less than 5 000 kL per year with 1 500 kL per year being anticipated.

Water will be drawn from a sump located to the west of Lot 1001. A licence from Department of Water will be applied for to enable the taking of 1 500 kL water per year for dust suppression.

Potable water will be brought to the site as required.

#### **4.9 Safety**

Excavation will be conducted to *Mines Safety and Inspection Act 1994 and Regulations 1995*. Excavation practices, and operations procedures will be in compliance with the Act. Health and safety issues are overseen by the Department of Mines and Petroleum.

Regular inspections and audits will be carried out by officers of the Department of Mines and Petroleum to inspect safety, operational procedures and workplace health such as dust and noise.

Doyles Lime Services has procedures in place to manage safety, health, environmental impact, site completion and rehabilitation. All workers are required to wear full protective safety and high visibility gear when on site.

They have in place Safety Management Plans and a site specific Emergency Response Plan to cover operational procedures, which include workforce induction and training to ensure that all employees involved are made aware of the environmental and safety implications associated with all stages of the mining activities.

Workers and staff on all sites are trained in the use of the procedures and all employees provided with site induction and training as necessary prior to commencing work on the site.

All vehicles have two way radio capability. No light vehicles are permitted on site without registering with mobile plant on site. Full personal protection is required for all persons on site at all times.

The site is registered under the Department of Mines and Petroleum SRS reporting system for minesites and quarries.

It is anticipated that the deepest excavation will be a maximum of approximately 16 metres below natural ground level. Where possible no slope will be left at an angle greater than 1: 2 vertical to horizontal at times when the site is unattended. There may be times when this is not possible or desirable.

At all times excavation will be in compliance with the *Mines Safety and Inspection Act 1994 and Regulations 1995*.

Fencing, locked gates and warning signs will be maintained.

The batter slopes of the pit will be dozed down at between 1 : 1 and 1 : 2 which will prevent any fall situations. A fence will be constructed around the top of the pit installed with warning signs. The fence will be approximately 1.2 metres high and of wire farm construction.

The edge of the pit will be located 75 metres from the informal lookout on the southern ridge, separated by remnant vegetation on private land and two fences.

### Emergency

The site is within mobile phone contact and all vehicles will be equipped with two way radios. Safety management and operating procedures will be in place.

### Fire

Fire risk is less than the risk from general farming. The open area of excavation will form a natural firebreak and will be used for the emergency muster area.

Fire Safety is incorporated into safety management for the site.

The site is within mobile telephone range which will assist in fire safety.

Earth moving vehicles, and the water tanker when on site during excavation, will be available for fire fighting if required. Operators are trained in the use of fire extinguishers for all types of fire.

Perimeter fire breaks will be maintained.

Final contours of the batter slopes will be 1: 2 vertical to horizontal with the floor of the excavation left as gently undulating around 13 to 14 metres AHD.

<b>SAFETY</b>			
<b>Potential Impact</b>	<b>Management</b>	<b>Outcome Commitments</b>	<b>Action Required</b>
Operational Safety	<p><i>Mines Safety and Inspection Act 1994 and Regulations 1995.</i></p> <ul style="list-style-type: none"> <li>▪ The site is within mobile and landline telephone contact.</li> <li>▪ Safety Management procedures will be implemented prior to commencement.</li> <li>▪ All workers will be provided with site induction and necessary training prior to entering the site.</li> </ul>	Doyles Lime Service are committed to maintaining a safe working environment and have standard Safety Management Plans for their operations.	<p>Compliance with <i>Mines Safety and Inspection Act 1994 and Regulations 1995.</i></p> <p>Ongoing</p>
Adjoining properties	<p><i>Mines Safety and Inspection Act 1994 and Regulations 1995.</i></p> <ul style="list-style-type: none"> <li>• Warning signs are erected around the operating area.</li> <li>• Locked gates and fences will be maintained on site.</li> </ul>	Doyles Lime Service are committed to maintaining a safe working environment and have standard Safety Management Plans for their operations.	<p>Compliance with <i>Mines Safety and Inspection Act 1994 and Regulations 1995</i></p> <p>Compliance operating conditions</p>

## **5.0 ENVIRONMENTAL IMPACTS AND MANAGEMENT**

### **5.1 Surrounding Landuses and Buffers**

The site has been used for agriculture and grazing for many years.

A number of Government Policies relate to buffer distances and the protection of basic raw materials. State Planning Policy No 4.1, State Industrial Buffer Policy, (draft July 2004) discusses the need to consider adjoining land uses when locating buffers but does not prescribe set buffers for operations such as this. (Figures 1 and 2).

Generic buffer requirements were developed by the Victorian Government and used by the Environmental Protection Authority as the basis for a Draft guideline on recommended buffer distances. These formed the basis of EPA Guidance Statement Number 3, Separation Distance between Industrial and Sensitive Land Uses, June 2005.

The Environmental Protection Authority of South Australia recommends a 300 metre separation for a Quarry - Non Blasting.

EPA guidance "Separation Distances between Industrial and Sensitive Land Uses", June 2005 lists the generic buffers for sand and limestone pits as 300 - 500 metres depending on the extent of processing. A generic buffer relates to the distance at which there are unlikely to be any problems without some further investigations and does not mean that smaller buffers are not acceptable. EPA Guidance for the Assessment of Environmental Factors 3 June 2005 provides for a case by case separation, based on the potential impacts.

For limestone extraction a generic buffer is suggested of 300 to 500 metres with case by case assessment where grinding and milling are used.

These are generic buffers and can be varied on the basis of environmental and management studies.

The same type of quarrying therefore has very different generic buffers developed by State Environmental Protection Authorities, illustrating the need to consider separations on on-site environmental impact and not theoretical or generic buffers.

The main issues are the potential generation of dust and noise, which are addressed later.

The excavation of limestone from the site complies with these policies.

As far as is known there are no dwellings within 1000 metres of the proposed excavation and no new dwellings in the nearby area. The closest dwellings are 2.8 km away to the east of Lake Clifton

The site is set back 200 metres from Lake Pollard and 75 metres 75 metres from the informal lookout on the southern ridge, separated by remnant vegetation on private land and two fences.

### **5.2 Aesthetics**

Visual impact can occur in a number of circumstances, by the operation being set too high in the landscape, by being too close to neighbours and by insufficient visual protection.

The limestone will be extracted from a ridge and will result in the ends of the two dunes being reshaped down to the elevation of the intervening swale. The ridge line will be modified but maintained. (Figures 5, 8A and 8B).

For sand excavation the thin resource and low elevation requires cutting to 4 metres AHD, 3 metres above the water table in compliance with DOW guidelines and matching nearby and adjoining swales.

There are a number of management actions that can be taken in quarries to minimise visual impact and these will be used wherever possible.

The general management actions are summarised below together with the visual impact issues that relate to this site. The actions will be used where applicable and as the opportunity presents to minimise visual impact.

The main risk of view is from the east, east of Lake Clifton. Excavation will commence in the west and move east with the hill of non excavated material always between the operations and the east.

It is felt that the operations are unlikely to be seen from any location.

Below is a list of ideal visual management activities with a simple compliance audit for the operations.

<b>IDEAL OPERATIONAL PROCEDURES</b>	<b>COMMITMENTS ON ACTIVITIES CONDUCTED ON SITE</b>
<ul style="list-style-type: none"> <li>• Locate exposed features behind natural barriers and landform.</li> </ul>	<ul style="list-style-type: none"> <li>• The quarry and processing facilities are to be worked from the west behind the ridge of material being excavated.</li> <li>• The limit of the pit is set back 200 metres from Lake Pollard and there is intervening vegetation between the pit and Lake Pollard. (Figure 3).</li> </ul>
<ul style="list-style-type: none"> <li>• Operate from the floor of the pit below natural ground level.</li> </ul>	<ul style="list-style-type: none"> <li>• The pit is to be worked from the inside below natural ground level via an internal haul road.</li> <li>• The processing area is to be located on the floor of the pit to the west, in the most efficient location. (Figure 5).</li> </ul>
<ul style="list-style-type: none"> <li>• Avoid breaks in the skyline due to workings and haul roads.</li> </ul>	<ul style="list-style-type: none"> <li>• Excavation will come from the west. The ridge will be lowered and the skyline will locally change across Lot 1001, but from east of Lake Clifton the other ridges of similar elevation to the west of the pit should minimise any impact at that longer distance. (Figures 5, 8 and 9).</li> <li>• There are no sensitive premises or locations from which people are likely to see the pit from the east or south.</li> <li>• At all times the pit will be operated behind a face of natural vegetation.</li> <li>• Based on the site contours and the proposed excavation methods operations are not anticipated to be seen from Old Coast Road. It may just be possible that the northern batter face and the southern batter face will be visible from the south east and north east as small glimpse from east of Lake Clifton, but as these will be rehabilitated these views are anticipated to be covered within two years of excavation of that part of the pit.</li> </ul>
<ul style="list-style-type: none"> <li>• Push overburden and interburden dumps into positions</li> </ul>	<ul style="list-style-type: none"> <li>• Perimeter bunds of overburden and natural face are to be used when material becomes available,</li> </ul>

where they will not be seen or can form screening barriers.	but largely in the west and just ahead of excavation to increase the potential screening.
<ul style="list-style-type: none"> <li>Construct screening bunds and plant tree and shrub screens to reduce visual impact.</li> </ul>	<ul style="list-style-type: none"> <li>Some screening bunds and natural vegetation are already in place around the perimeter.</li> <li>The bunds will be used as overburden becomes available.</li> <li>A screening belt of trees will be used on the southern edge of the pit.</li> <li>A separation of 75 metres will be maintained to the lookout on the fire break in the Yalgorup National Park. (Figure 3).</li> <li>The remnant vegetation on the 75 metre setback will be allowed to regrow and form a dense visual screen.</li> <li>It is not anticipated that the quarry will be able to be seen from the Yalgorup National Park or Lake Pollard Walk Trail because of the design of the operations to minimise visual impact and the visual management procedures and actions proposed. (Figure 3).</li> </ul>
<ul style="list-style-type: none"> <li>Stage workings and progressive rehabilitation to provide visual protection of later activities.</li> </ul>	<ul style="list-style-type: none"> <li>The staging of the pit footprint is designed to minimise visual impact with special attention concentrating on the eastern sightlines.</li> <li>The pit will be excavated from west to east. (Figure 5).</li> </ul>
<ul style="list-style-type: none"> <li>Cover barriers and landscaping with forms, colours and textures compatible with the natural environment.</li> </ul>	<ul style="list-style-type: none"> <li>Natural vegetation will be retained around the perimeter.</li> </ul>
<ul style="list-style-type: none"> <li>Adopt good house cleaning practices such as orderly storage and removal of disused equipment or waste.</li> </ul>	<ul style="list-style-type: none"> <li>Doyle Lime Service maintains a tidy work environment at all their sites. Waste is regularly removed off site to an approved waste facility.</li> <li>Where possible usable materials will be recycled which is part of normal operational procedures.</li> </ul>
<ul style="list-style-type: none"> <li>Provide progressive rehabilitation of all completed or disturbed areas.</li> </ul>	<ul style="list-style-type: none"> <li>This has always been used at other pits and is proposed.</li> <li>Areas not required will be revegetated when each part of the site has reached its final form.</li> </ul>
<ul style="list-style-type: none"> <li>Minimise the amount of ground used at any one time.</li> </ul>	<ul style="list-style-type: none"> <li>The amount of ground used will be minimised to that needed for current and future operations and fluctuations.</li> </ul>

### Light Overspill

No night activities are proposed.

<p><b>Visual Management - Applicable Legislation / Policies</b></p> <ul style="list-style-type: none"> <li>None applicable</li> </ul>
<p><b>Commitments to Visual Management</b></p> <ul style="list-style-type: none"> <li>Doyles Lime Service is committed to management of visual impact and will implement the measures outlined.</li> <li>Every effort will be made to minimise the visual impact using appropriate methods from those listed above.</li> </ul>

### 5.3 Noise

Offsite noise is governed by the *Environmental Protection (Noise) Regulations 1997*.

The *Environmental Protection (Noise) Regulations 1997*, require that sensitive premises including dwellings in non industrial and rural areas, are not subjected to general noise levels (excluding blasting), during the hours 7.00 am to 7.00 pm Monday to Saturday that exceed 45 dBA. Allowable noise to 55 dBA is permitted for up to 10% of the time and to 65 dBA for 1% of the time. Noise levels are not to exceed 65 dBA during normal working hours.

Between 9.00 am and 7.00 pm on Sundays and Public Holidays and between 7.00 pm and 10.00 pm on all days the base level is 40 dBA.

At night, between 10.00 pm and 7.00 am Mondays to Saturday, and before 9.00 am on Sundays and Public Holidays, the permitted level drops to 35 dBA.

The 10% and 1% “time above” allowances apply at night and on Sundays and Public Holidays as well.

There are penalties for tonality of 5 dB, modulation 5 dB and 10 dB for impulsiveness, that are added to the permitted levels. That is, if the noise is tonal or modulated the permitted levels drop by 5 dB. Impulsiveness is not likely to be relevant for the quarry under normal circumstances.

Influencing factors of external noise and nearby land uses such as busy roads, and industrial properties are not applicable to this site.

At a distance greater than 15 metres from the sensitive premises (eg dwelling), and commercial premises a base level of 60 dBA applies at all times with the 10% time permitted to be up to 75 dBA and the 1% permitted to be up to 80 dBA. For Industrial premises the base level is 65 dBA at all times with the 10% time permitted to be up to 80 dBA and the 1% permitted to be up to 90 dBA.

Noise can originate from a number of operations and may impact on onsite workers, or travel offsite and impact on external sensitive premises. Both potential noise impacts are addressed by reducing the noise generated from the quarrying and processing operations.

There are a number of management actions that can be taken in quarries to minimise noise generation or travel .

These actions are routinely used by Doyles Lime Service where applicable and as the opportunity presents to minimise noise on site.

Doyles Limes Service will comply with the *Environmental Protection (Noise) Regulations 1997*.

There are no known sensitive premises within 1 km with the closest dwellings being 2.8 km away across Lake Pollard and Lake Clifton.

#### **Occupational Noise**

Occupational noise associated with the quarrying processes falls under the *Mines Safety and Inspection Act 1994 and Regulations 1995*.



The management of occupational noise is normally handled by providing all necessary hearing protection, as well as conducting worker inductions and educational programs for all staff. Regular site audits of quarry and mining operations are normally conducted by the Department of Mines and Petroleum.

As part of its commitments, Doyles Lime Service continues to be pro-active with its worker safety awareness;

- by providing all necessary safety equipment such as ear protection,
- identifying sections of the plant where hearing protection is required, as well as,
- conducting induction and educational programs for its staff.

The operating noise levels around the site are regularly monitored by independent consultants in accordance with the *Mines Safety and Inspection Act 1994*, and the results communicated to the Department of Mines and Petroleum (DMP). All staff are provided with comprehensive ongoing training on noise protection as part of Doyles' commitment to occupational health and safety.

The DMP conducts Occupational Noise Audits of the Operations, on their existing operations, which have been found to be in compliance.

Warning signs are to be used to identify areas of potential noise for workers.

All static and processing equipment will be located to provide maximum noise screening, behind bunds if sufficient overburden is available. Excavation will be staged from the west, behind the eastern ridge which will provide continuous noise screening.

Not all equipment operates at the same time. Similarly not all resources will be worked at the same time.

Warning signs are to be to identify areas of potential noise.

<b>IDEAL OPERATIONAL PROCEDURES</b>	<b>COMMITMENTS ON ACTIVITIES CONDUCTED ON SITE</b>
<ul style="list-style-type: none"> <li>• Comply with the <i>Environmental Protection (Noise) Regulations 1997</i>.</li> </ul>	<ul style="list-style-type: none"> <li>• Doyle Lime Service will continue with similar operations to their existing sites. There will be no increase in the scale or intensity of excavation.</li> </ul>
<ul style="list-style-type: none"> <li>• Comply with the provisions of the <i>Mines Safety and Inspection Act 1994 and Regulations 1995</i>.</li> </ul>	<ul style="list-style-type: none"> <li>• Doyles Lime Service, like any quarry, is regularly inspected by officers of the DMP.</li> </ul>
<ul style="list-style-type: none"> <li>• Maintain adequate buffers to sensitive premises.</li> </ul>	<ul style="list-style-type: none"> <li>• The quarry complies with the Generic EPA Buffer Guidelines.</li> <li>• There are no dwellings within 1000 metres.</li> </ul>
<ul style="list-style-type: none"> <li>• Locate exposed features behind natural barriers and landform.</li> </ul>	<ul style="list-style-type: none"> <li>• The eastern and southern faces of the pit provide hard screening of the operations which are located on the floor of the pit.</li> </ul>
<ul style="list-style-type: none"> <li>• Operate from the floor of the pit below natural ground level.</li> </ul>	<ul style="list-style-type: none"> <li>• This will be used.</li> </ul>
<ul style="list-style-type: none"> <li>• Push overburden and interburden dumps into positions where they can form screening barriers.</li> </ul>	<ul style="list-style-type: none"> <li>• Perimeter faces, overburden dumps and natural vegetation are proposed where possible.</li> </ul>
<ul style="list-style-type: none"> <li>• Design site operations to maximise the separation and protection from</li> </ul>	<ul style="list-style-type: none"> <li>• The shape of the pit, setbacks and method of operation have been</li> </ul>

sensitive premises.	designed to ensure landform protection is maximised and will continue.
<ul style="list-style-type: none"> <li>Maintain all plant in good condition with efficient mufflers and noise shielding.</li> </ul>	<ul style="list-style-type: none"> <li>Doyles Lime Service has efficient equipment that is maintained in good condition and replaced from time to time.</li> </ul>
<ul style="list-style-type: none"> <li>Maintain haul road and hardstand surfaces in good condition (free of potholes, rills and product spillages) and with suitable grades.</li> </ul>	<ul style="list-style-type: none"> <li>The access road will be maintained in good condition in conjunction with the landholder's access road.</li> </ul>
<ul style="list-style-type: none"> <li>Implement a site code outlining requirements for operators and drivers.</li> </ul>	<ul style="list-style-type: none"> <li>A site induction and training program for all personnel is to be implemented and maintained.</li> </ul>
<ul style="list-style-type: none"> <li>Shut down equipment when not in use.</li> </ul>	<ul style="list-style-type: none"> <li>This is normal policy.</li> </ul>
<ul style="list-style-type: none"> <li>Scheduling activities to minimise the likelihood of noise nuisance.</li> </ul>	<ul style="list-style-type: none"> <li>Activities are proposed to minimize impacts on the local community.</li> </ul>
<ul style="list-style-type: none"> <li>Fit warning lights, rather than audible sirens or beepers, on mobile equipment wherever possible.</li> </ul>	<ul style="list-style-type: none"> <li>Lights or low frequency beepers are to be used rather than beepers.</li> <li>The design and shape of the pit will maximise noise screening.</li> </ul>
<ul style="list-style-type: none"> <li>Use transport routes that minimise community disruption.</li> </ul>	<ul style="list-style-type: none"> <li>There is only one road to access the site, so trucks will be specifically instructed not to interrupt holiday makers on Preston Beach Road.</li> </ul>
<ul style="list-style-type: none"> <li>Avoid the use of engine braking on product delivery trucks in built up areas.</li> </ul>	<ul style="list-style-type: none"> <li>The surrounding area on Old Coast Road is generally flat with reduced gradients.</li> <li>Air brakes are unlikely to be required. Drivers are to be instructed not to use air brakes under normal situations when exiting along the access road.</li> </ul>
<ul style="list-style-type: none"> <li>Minimise and conduct at the least disruptive times, non day to day activities such as vegetation, topsoil or overburden stripping on exposed ridgelines.</li> </ul>	<ul style="list-style-type: none"> <li>The hours proposed are designed to minimise impact.</li> </ul>
<ul style="list-style-type: none"> <li>Provide a complaints recording, investigation, action and reporting procedure.</li> </ul>	<ul style="list-style-type: none"> <li>A complaints recording procedure is proposed to cover all site activities.</li> </ul>
<ul style="list-style-type: none"> <li>Conduct training programs on noise minimisation practices.</li> </ul>	<ul style="list-style-type: none"> <li>Doyles Lime Service conducts site induction and training to all personnel.</li> </ul>
<ul style="list-style-type: none"> <li>Provide all workers with efficient noise protection equipment.</li> </ul>	<ul style="list-style-type: none"> <li>All noise protection personal equipment will be provided to staff.</li> </ul>

<ul style="list-style-type: none"> <li><b>Noise Management - Applicable Legislation / Policies</b></li> <li><i>Environmental Protection (Noise) Regulations 1997.</i></li> <li><i>Mines Safety and Inspection Act 1994 and Regulations 1995.</i></li> <li><i>Australian Standard AS 2187.</i></li> <li>DEC Licence L7421/1995/9</li> </ul>
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**Commitments to Noise Management**

- Doyles Lime Service is committed to minimising noise emissions and will implement the measures outlined above.
- Doyles Lime Service will comply with the *Environmental Protection (Noise) Regulations 1997*.

**5.4 Dust**

**Environmental Dust**

Dust has the potential to be generated during most phases of the quarrying and crushing operation, particularly during summer. In winter the frequent rains greatly reduce the potential dust emissions. The main risk is from the crushing and tipping processes and from vehicle movements. Occasional one off dust is produced from blasting approximately once per month.

Dust may impact on onsite workers. Dust also has the potential to be visually intrusive and travel to adjoining properties if not managed.

Dust management has been an integral part of the extraction and processing of limestone. Facilities and procedures are updated as better technology becomes available.

Dust emissions fall under the *Guidance for the Assessment of Environmental Factors, EPA, March 2000*.

Assessments of the potential dust risk are normally made using the Land development sites and impacts on air quality, *Department of Environmental Protection and Conservation Guidelines, November 1996*. These are still in place but are incorporated into the *DEC 2011 Guideline for Managing the Impacts of Dust and Associated Contaminants from Land Development Sites, Contaminated Sites Remediation and other Related Activities*.

The aim of dust management is to;

- Manage the potential for the generation of dust.
- Continually visually assess dust levels and take steps to reduce the potential impact of dust on occupational and environmental aspects of the operation and local area.

The site is 2.8 km from any sensitive premises negating any dust impacts on the closest sensitive premises.

The category of dust risk is included in *DEC 2011 Guideline for Managing the Impacts of Dust and Associated Contaminants from Land Development Sites, Contaminated Sites Remediation and other Related Activities*. This document is not really applicable to mining because it is to be used to assess the mitigation required based on no mitigation.

However the document can also be used to determine the risk of potential dust impacts of earthworks such as clearing and the removal of overburden and rehabilitation which, only occurs about once per year. The document does not apply or take account of separation distances as great as available on site.

### Yalgorup National Park

It is impossible to think that dust will travel over 2 km and have any significant or noticeable impact on any sensitive premises or Lake Clifton. With a buffer of 200 metres with intervening vegetation it is also considered most unlikely that any dust will impact on Lake Pollard. Limestone is predominantly calcium carbonate with some sand grains. It is an integral part of the local environment. Calcium carbonate is an integral substance in the waters and sediments of Lake Clifton and Lake Pollard and is essential for the development of most life within those systems, including the Thrombolites which incorporate it into their structures. (Figure 2).

The Guidelines which include the Department of Health guidelines for spray drift, and studies conducted at Emerald in Queensland that are used by the Department of Health, all suggest that a tree buffer of 20 metres width will provide an effective buffer for fine particulates. The site has a 200 metre tree buffer to Lake Pollard. (*Department of Health, 2012, Guidelines for Separation of Agricultural and Residential Land uses*).

Primary Industries Standing Committee 2002, *Spray Drift Management*, SCARM, Report 82. Whilst this study involves droplets and not particulates, the size of the particles and their density show similarities and it indicates the effectiveness of vegetation and windbreaks.

Wind breaks are well researched and contained in many documents, for example DAFWA Farmnote 35/96, 67/2002, 38/2000/2005, 21/2994/2005 and 48/1986 all available from the DAFWA website.

A 20 metre buffer of vegetation is to be retained to the north and south of the excavation area to the adjoining land of Yalgorup National Park in the south. Any dust falling on vegetation will have minimal impact. Any dust is readily washed from leaves by even very small amounts of rainfall. The potential impacts are minimal, and adjacent to gravel roads there is almost always no discernible impacts on the growth and success of native vegetation.

The potential for dust to deposit on the adjoining vegetation is less than for a gravel road because the on site activities will be set back further than the vegetation which can be as close as 3 metres along a roadside.

The information in the summary table below also operates in a similar manner by determining the risk of dust without, and then with, management procedures in place.

Activity	Calculated Score	Allocated Risk of Dust
Land clearing and excavation, when effective dust management is used.	98	Negligible

### Occupational Dust

Occupational dust associated with the quarrying processes falls under the *Mines Safety and Inspection Act 1994 and Regulations 1995* overseen by the Department of Mines and Petroleum.

Limestone is predominantly calcium carbonate with some sand grains. There are no known health impacts from calcium carbonate and the material is the major component of bones and is essential for human health. It is also an integral part of the local environment.

A personal (occupational) dust monitoring program will be used as per Department of Mines and Petroleum specifications.

High Impact Audits of occupational dust will be completed by Department of Mines and Petroleum from time to time.

Doyles Lime Service provides induction and protective equipment for all persons on sites.

### Dust Management Actions

ACTIVITY	POSSIBLE RISK SEVERITY and FREQUENCY	IDEAL OPERATIONAL PROCEDURES	COMMITMENTS ON ACTIVITIES CONDUCTED ON SITE	RISK AFTER MANAGE MENT
<b>GENERAL</b>				
Legislation	----	<ul style="list-style-type: none"> <li>Comply with the provisions of the <i>Mines Safety and Inspection Act 1994 and Regulations 1995</i>.</li> </ul>	<ul style="list-style-type: none"> <li>Doyles Limes Service will comply with the Act and Regulations and the other Conditions.</li> </ul>	----
Buffers	----	<ul style="list-style-type: none"> <li>Maintain adequate buffers to sensitive premises.</li> </ul>	<ul style="list-style-type: none"> <li>The buffers to the nearest residences are 2.8 km and not anticipated to change within the next 20 years.</li> </ul>	----
Landform	----	<ul style="list-style-type: none"> <li>Locate activities behind natural barriers, landform and vegetation.</li> </ul>	<ul style="list-style-type: none"> <li>The design of the pit and staging has been selected to provide the best screening. That is excavation from west to east.</li> <li>Excavation will be conducted below the land surface.</li> <li>The processing and stockpile facilities are to be located on the pit floor to the west of the excavation.</li> </ul>	----
Landform	----	<ul style="list-style-type: none"> <li>Work below natural ground level.</li> </ul>	<ul style="list-style-type: none"> <li>This proposed.</li> </ul>	----
		<ul style="list-style-type: none"> <li>Push overburden and interburden dumps into positions where they can form screening barriers.</li> </ul>	<ul style="list-style-type: none"> <li>This is to be used where overburden is available in combination with the adjoining vegetation.</li> </ul>	----
Staging	----	<ul style="list-style-type: none"> <li>Design operational procedures and staging, to maximise the separation to sensitive premises.</li> </ul>	<ul style="list-style-type: none"> <li>There are no dwellings within 1000 metres of the operations.</li> </ul>	----
Pit design	----	<ul style="list-style-type: none"> <li>Design the excavation to provide enhanced landform and constructed dust screening.</li> </ul>	<ul style="list-style-type: none"> <li>See above.</li> </ul>	----
Screening/ Vegetation	----	<ul style="list-style-type: none"> <li>Use landscape screening, wind breaks and tree belts.</li> </ul>	<ul style="list-style-type: none"> <li>The perimeter vegetation assists in dust mitigation and complies with the Department of Health Guidelines on the use of tree belts in the <i>DOH 2012</i></li> </ul>	----

			<i>Separation of Agricultural and Residential Land Uses</i> which has some relevance to dust on sites such as this.	
<b>MANAGEMENT</b>				
Occupation	----	<ul style="list-style-type: none"> <li>Provide air conditioned closed cabins on plant</li> </ul>	<ul style="list-style-type: none"> <li>These are used at all sites for operational mobile plant.</li> </ul>	----
Monitoring	----	<ul style="list-style-type: none"> <li>Provide monitoring and supervision of the processing and other practices on site.</li> </ul>	<ul style="list-style-type: none"> <li>A monitoring system is proposed. see below “Trigger Conditions”.</li> </ul>	----
Trigger conditions	----	<ul style="list-style-type: none"> <li>Trigger conditions are used to determine when additional dust management is required.</li> </ul>	<ul style="list-style-type: none"> <li>Most dust generated from processing and vehicle movements has a very large visible component. Lesser risks emanate from excavation and land clearing.</li> <li>The trigger for dust management is the generation of visual dust.</li> <li>The quarry manager and leading hands are ultimately responsible for site supervision of dust.</li> <li>They will travel around the operations and pit frequently and be in two way radio contact with all mobile plant.</li> <li>All operators on site will be instructed to be vigilant to dust generation and management and report any excessive dust or potential dust management issues.</li> <li>When trigger conditions are detected and/or alerted, relevant action is to be taken. This can include additional water suppression, modification of procedure, delay until more favourable conditions are present, use of alternative equipment etc.</li> </ul>	----
Adverse weather	Moderate - Uncommon	<ul style="list-style-type: none"> <li>When winds are sufficiently strong, or other weather conditions are unacceptable, to negate the effects of dust management, operations will cease until conditions improve and compliance can be achieved.</li> </ul>	<ul style="list-style-type: none"> <li>Rare adverse conditions are more likely to occur on summer mornings and sometimes on summer afternoons with strong sea breezes. In winter, stronger winds are normally associated with rain and therefore carry a reduced dust risk.</li> <li>This policy will be used to minimise impact on adjoining land, particularly the Yalgorup National Park.</li> <li>Limestone is predominantly calcium carbonate with some</li> </ul>	Low

			<p>sand grains. There are no known health impacts from calcium carbonate and the material is the major component of bones and is essential for human health. It is also an integral part of the local environment.</p>	
Equipment failure	Low - Uncommon	<ul style="list-style-type: none"> <li>In the event of dust management not being able to be achieved through equipment failure operations will cease until full capability is restored.</li> </ul>	<ul style="list-style-type: none"> <li>This will be used on site and is committed to.</li> </ul>	Low
Training	----	<ul style="list-style-type: none"> <li>Conduct training programs on dust minimisation practices.</li> </ul>	<ul style="list-style-type: none"> <li>Doyles Lime Service uses on site induction and training to inform all personnel of the dust risk and management.</li> </ul>	----
Complaints	----	<ul style="list-style-type: none"> <li>Provide a complaints recording, investigation, action and reporting procedure such as Appendix 3 of Land development sites and impacts on air quality, Department of Environmental Protection Guidelines, November 1996.</li> </ul>	<ul style="list-style-type: none"> <li>A record of all dust complaints is to be maintained together with the mitigation measures to be used to reduce the dust impacts.</li> <li>All complaints relating to dust are to be investigated immediately.</li> </ul>	
Monitoring	----	<ul style="list-style-type: none"> <li>Provide a Monitoring procedure to minimise dust generation.</li> </ul>	<ul style="list-style-type: none"> <li>Visual dust monitoring is to be conducted on site at all times by all operators and the quarry manager. This response is instantaneous and does not rely on monitoring equipment which normally has time delays associated with it.</li> <li>The amount and source of dust is observed before any dust monitoring could trigger. Treatment is therefore more effective and targeted.</li> <li>When a significant source of dust is noticed it will be dealt with by temporary or permanent changes to procedures and equipment or treatment using water.</li> </ul>	----
<b>EARTHWORKS</b>				
Land Clearing	Low - Once	<ul style="list-style-type: none"> <li>Schedule activities such as vegetation removal or topsoil stripping on exposed ridgelines at times</li> </ul>	<ul style="list-style-type: none"> <li>Normally the stripping of overburden and topsoil and their subsequent use in rehabilitation is undertaken in the drier months when the soils are still</li> </ul>	Low

		when the materials are less likely to blow or during suitable wind conditions.	moist enough to suppress dust but not wet. <ul style="list-style-type: none"> <li>Completed sections of the quarry are to be rehabilitated as soon as practical to reduce the area of open ground.</li> <li>No clearing will take place unless a Clearing Permit is in place.</li> </ul>	
Overburden removal	Low - Once	<ul style="list-style-type: none"> <li>Schedule activities such as overburden stripping on exposed ridgelines at times when the materials are less likely to blow or during suitable wind conditions.</li> </ul>	<ul style="list-style-type: none"> <li>See above.</li> </ul>	Low
Land restoration	Low - Once per year	<ul style="list-style-type: none"> <li>Schedule activities such as ripping, overburden and topsoil spreading on exposed ridgelines at times when the materials are less likely to blow or during suitable wind conditions.</li> </ul>	<ul style="list-style-type: none"> <li>See Land Clearing above.</li> </ul>	Low
<b>EXCAVATION</b>				
Excavation	Low - Low level campaign activity	<ul style="list-style-type: none"> <li>Excavate from the face using techniques that minimise the crushing of dry matter.</li> </ul>	<ul style="list-style-type: none"> <li>The floor of the pit will be formed on limestone that crusts in winter but is broken by traffic in summer.</li> <li>The application of water will be used as required to wet down the loading and traffic areas.</li> </ul>	Low
Loading at Face	Low - Low level campaign activity	<ul style="list-style-type: none"> <li>Ensure that products to be loaded are moist and that the hardstand on which the loading occurs is wetted down or moist.</li> </ul>	<ul style="list-style-type: none"> <li>This will be conducted concurrently with excavation using a loader.</li> <li>The limestone will then be carried by the loader to the mobile crusher.</li> </ul>	Low
Haulage	Moderate - Medium level campaign activity	<ul style="list-style-type: none"> <li>Maintain haul road and hardstand surfaces in good condition (free of potholes, rills and product spillages) and with suitable grades.</li> </ul>	<ul style="list-style-type: none"> <li>No internal haul roads are proposed.</li> <li>The application of water will be used as required to wet down the loading and traffic areas.</li> </ul>	Low
		<ul style="list-style-type: none"> <li>Reduce the length of the internal roads by maximising internal servicing efficiency.</li> </ul>	<ul style="list-style-type: none"> <li>The operations are to be designed to mitigate the use of haul roads by locating the stockpiles and crusher close to each other.</li> </ul>	



		<ul style="list-style-type: none"> <li>Providing speed management on hardstand and the road network.</li> </ul>	<ul style="list-style-type: none"> <li>This is to be used for pit traffic.</li> </ul>	
		<ul style="list-style-type: none"> <li>Provide air conditioned closed cabins on plant.</li> </ul>	<ul style="list-style-type: none"> <li>All vehicles are to be air conditioned.</li> </ul>	
		<ul style="list-style-type: none"> <li>Treat access roads, hardstand and stockpile transport and loading areas with dust suppression sealant, water or seal coat.</li> </ul>	<ul style="list-style-type: none"> <li>Methods of water based dust suppression are to be maintained on site during the summer months, such as road watering facilities.</li> </ul>	
<b>PLANT - PROCESSING</b>				
Hardstand traffic	Low - Medium in campaigns	<ul style="list-style-type: none"> <li>Maintain hardstand surfaces in good condition (free of potholes, rills and product spillages) and with suitable grades</li> </ul>	<ul style="list-style-type: none"> <li>Hard stand areas are limited in area but are able to be watered by the dedicated truck as required.</li> </ul>	Low
Processing	Moderate - Campaigns	<ul style="list-style-type: none"> <li>Treat processing areas with water sprays, shields and dust extraction.</li> </ul>	<ul style="list-style-type: none"> <li>Crushing operations are to be watered as required to suppress dust.</li> <li>Dust covers and equipment shields are to be maintained on all static plant.</li> <li>Continuous visual monitoring of dust will be used.</li> <li>Regular emptying of any dust collection devices and the renewal of any filter devices will be programmed.</li> </ul>	Low
Mobile and static plant Operation	Moderate - Campaigns	<ul style="list-style-type: none"> <li>Maintain all plant in good condition.</li> <li>Ensure mobile and static plant is provided with dust extraction, shielding or filtration systems or wetting down as appropriate.</li> </ul>	<ul style="list-style-type: none"> <li>Doyles Lime Service uses well maintained equipment that includes where possible dust minimisation measures.</li> <li>Faults are repaired promptly.</li> <li>Operators will be instructed to visually monitor dust, report and treat any visible dust.</li> <li>Regular emptying of any dust collection devices and the renewal of any filter devices is programmed.</li> <li>Dust management and monitoring forms part of the site induction programs.</li> <li>See Processing above.</li> </ul>	Low
Loading and Stockpile Creation	Moderate - Continuous	<ul style="list-style-type: none"> <li>Shut down equipment when not in use.</li> </ul>	<ul style="list-style-type: none"> <li>Doyles Lime Service uses this policy to save fuel and maintenance costs in addition to noise minimisation.</li> </ul>	Low

		<ul style="list-style-type: none"> <li>Limit drop heights from conveyors and dump trucks.</li> </ul>	<ul style="list-style-type: none"> <li>This is to be used. It is a good safety and site management procedure.</li> <li>Fixed and mobile stackers are to be used. The use of stackers will minimise road traffic.</li> </ul>	
<b>TRANSPORT</b>				
Road condition	Low - Medium transport risk in campaigns	<ul style="list-style-type: none"> <li>Maintain access roads in good condition (free of potholes, rills and product spillages).</li> </ul>	<ul style="list-style-type: none"> <li>The access road will be maintained to repair impacts caused by trucks.</li> <li>Doyles Lime Service maintains speed restrictions for safety and site management on all their access roads.</li> </ul>	Low
		<ul style="list-style-type: none"> <li>Water and/or treat access roads and paved areas using a water tanker or sprinkler system.</li> </ul>	<ul style="list-style-type: none"> <li>See above.</li> <li>Where possible management will be used to minimise dust such as maintenance and the use of water when dust lift off is a potential hazard.</li> </ul>	
Road Transport	Low - Medium transport risk in campaigns	<ul style="list-style-type: none"> <li>Wet down or cover loads on trucks that are likely to blow during transport.</li> </ul>	<ul style="list-style-type: none"> <li>Trucks will be covered or wetted down prior to exiting the site when product is likely to blow.</li> </ul>	Low
		<ul style="list-style-type: none"> <li>Implement a site code outlining requirements for operators and drivers.</li> </ul>	<ul style="list-style-type: none"> <li>A site code and induction system is to be used.</li> </ul>	
		<ul style="list-style-type: none"> <li>Maintain road trucks in a clean condition.</li> </ul>	<ul style="list-style-type: none"> <li>Doyles Lime Service has a policy of encouraging transport to maintain their vehicles in a clean condition.</li> </ul>	
		<ul style="list-style-type: none"> <li>Avoid spillages on roads and clean up promptly.</li> </ul>	<ul style="list-style-type: none"> <li>Trucks will be covered or wetted down prior to exiting the site when product is likely to blow.</li> </ul>	Low
		<ul style="list-style-type: none"> <li>Ensure that during loading, product does not become lodged on the sides of trucks from where it can fall off during transport.</li> </ul>	<ul style="list-style-type: none"> <li>This forms part of proposed normal operational procedures.</li> </ul>	
		<ul style="list-style-type: none"> <li>Drivers are to inspect trucks prior to leaving site. Any product not correctly located and secured is to be removed prior to exit from the site.</li> </ul>	<ul style="list-style-type: none"> <li>This forms part of proposed normal operational procedures.</li> </ul>	
<b>STOCKPILES</b>				
Stockpiles	Moderate - Frequent during campaigns	<ul style="list-style-type: none"> <li>Wet down stockpiles using water canon or sprinklers as required.</li> </ul>	<ul style="list-style-type: none"> <li>Limestone is normally moist when stacked and readily crusts after rain. Where possible stockpiles are low in elevation and less than 2 metres in height.</li> </ul>	Low

	<ul style="list-style-type: none"> <li>Locate stockpiles behind bunds/ windbreaks or other screening barriers</li> </ul>	<ul style="list-style-type: none"> <li>The stockpiles will be located on the floor of the pit to provide better site screening.</li> <li>The stockpile area has some windbreak protection from trees and bunding from strong winds.</li> </ul>	
	<ul style="list-style-type: none"> <li>Reduce the height of stockpiles. Low flat stockpiles are less likely to be disturbed by wind than high conical ones.</li> </ul>	<ul style="list-style-type: none"> <li>The height of stockpiles will be maintained at manageable levels that remain sheltered from the prevailing winds. Normally stockpiles are maintained at less than 2 metres in elevation.</li> </ul>	
	<ul style="list-style-type: none"> <li>Locate coarser products around fine materials to assist wind protection of the finer products that are more likely to blow or contain greater amounts of dust.</li> </ul>	<ul style="list-style-type: none"> <li>This will be undertaken when required but is not normally necessary.</li> <li>Limestone is normally moist when stacked and readily crusts after rain.</li> </ul>	
	<ul style="list-style-type: none"> <li>Provide bunding, fencing and windbreaks around stockpiles and along the tops of bunds.</li> </ul>	<ul style="list-style-type: none"> <li>This is not normally required because of the landscape screening. Tree belts and bunds will be used around the western edge of the pit to reduce wind and provide visual screening.</li> </ul>	

### Greenhouse Gas

The development of agriculture in the local area, near wheatbelt, Peel and Bunbury Regions generates the need for lime products for soil neutralisation on farms and developments. There is also a need for rosadbase although this will not normally be produced at this pit.

Over the years trucks have become more efficient with respect to greenhouse gas emissions, particularly with the use of truck and trailer and road train configurations.

Doyles Lime Service continually seeks ways to reduce the amount of fossil fuels used, and has obtained more efficient mobile plant and equipment when this has become economically available.

### Dust Monitoring

The most effective dust monitoring is through visual diligence. This is instantaneous and any issues can be observed and acted upon before they become a problem.

No other form of monitoring is so immediate, as other measures are either on property boundaries or have significant time delays.

Visual dust monitoring will be conducted on site at all times by all operators and the quarry manager.

The amount and source of dust will be observed before any dust monitoring could trigger. Treatment is therefore more effective and targeted.

When a significant source of dust is noticed it will be dealt with by temporary or permanent changes to procedures and equipment or treatment using water.

A personal (occupational) dust monitoring program will be used as per Department of Mines and Petroleum specifications.

High Impact Audits of occupational dust will be completed by Department of Mines and Petroleum from time to time.

Doyles Lime Service provides induction and protective equipment for all persons on site.

<b>Dust Management - Applicable Legislation / Policies</b>
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- |   |
|---|
| <ul style="list-style-type: none"><li>• <i>Guidance for the Assessment of Environmental Factors, EPA, March 2000.</i></li><li>• <i>Land development sites and impacts on air quality, DEP, 1996.</i></li><li>• <i>Department of Environmental Protection Guidelines, November 1996 and DEC 2008, A guideline for the development and implementation of a dust management plan</i></li></ul> |
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<b>Commitments to Dust Management</b>
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| <ul style="list-style-type: none"><li>• Doyles Lime Service will take the necessary steps to manage and contain dust by implementing and maintaining the Dust Management Plan.</li></ul> |
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## 5.5 Water Quality

- **Background**

Limestone excavation is a clean operation similar to sand excavation in the nature of the risk to groundwater. No chemicals are used apart from normal lubricants, which is similar to sand excavation, and sand excavation is one of the few industries that are permitted to operate in a Priority 1 Public Drinking Water Source Area, indicating the clean nature of the activity. See Department of Water *Land Use Compatibility in Public Drinking Water Source Areas*.

The protection of water, whether groundwater or surface water, is an important part of the management of quarries.

The main Environmental Objective relating to water management is;

- Minimise the impact on surface and ground water quality.

The limestone pit site lies on a ridge that is well elevated and not subject to any wetland or other such water management risks.

Guidance on the quality of water can be found in;

- *Western Australian Water Quality Guidelines for Fresh and Marine Waters, EPA Bulletin 711, 1993.*
- *ANZECC, 1992, Australian Water Quality Guidelines for Fresh and Marine Waters.*

A number of documents provide guidance on the management and disposal of surface water that can lead to waterways, wetlands and undergroundwater systems. These mainly apply to urban development but the methods are also applicable to the quarrying industry.

- *Engineers Australia 2003, Australian Runoff Quality, National Committee on Water Engineering.*
- *Stormwater Management Manual for Western Australia, Department of Environment WA, 2004.*

- *Guidelines for Groundwater Protection in Australia, ARMCANZ, ANZECC, September 1995.*
- *Environmental Protection Authority Victoria Melbourne Water, undated, Urban Stormwater, Best Practice Environmental Management Guidelines*
- *Water and Rivers Commission, 1998, Manual for Managing Urban Stormwater Quality in Western Australia.*

Documents specific to the mining and quarrying operations are the DEC – DMP Water Quality Protection Guidelines for Mining and Mineral Processing

- *1 Overview*
- *Minestite water quality monitoring*
- *Minesite stormwater*
- *Mechanical servicing and workshop facilities*
- *10 Above-ground fuel and chemical storage*
- *11 Mine dewatering*

Potable water will be brought in from scheme supply and used to fill a tank at the site office.

The management actions considered in the above documents will be incorporated into the onsite management procedures where appropriate.

The procedures as applicable in the above documents will be used by Doyles Lime Supplies as the opportunity presents to maintain quality of the groundwater.

A serviced portable waste water system will be used when the site is operated.

- **Local Hydrology**

The site lies 200 metres west from the saline Lake Pollard. (Figures 2, 3 and 7).

Shallow groundwater on Lots 1001 and 1002 is fresh, sitting as a layer overlying the saline ground water. A sump is present in the north of Lot 1002 that is used for stock.

From evidence of the soils and vegetation to the east the water table lies at about 0 - 1 metres AHD. See Figure 3 in Deeney (undated). Figure 6. Additional information is also contained in *Rockwater 2009, Dawesville to Binningup Technical Environmental Studies, Hydrogeology Study*, prepared for the DEC.

Bore B2 hydrographs in *Water Authority, 1989 South West Coastal groundwater Area Groundwater Management Review* show the water elevation at 0 – 1 metres AH with only minor seasonal variations of less than 1 metre. The water quality of Bore B2 is less than 500 mm/L salt.

Based on the landform the alignment of the lakes and ridges groundwater flow will be to the west to the ocean.

There is no surface drainage due to the porosity and permeability of the limestone, with precipitation draining to the water table. There is no surface water runoff, with all surface water being retained within the pit.

- **Groundwater Protection and Water Use**

The site lies within the Coastal Subarea of the South West Coastal Groundwater Area.

Water will be sourced from the property by way of the use of a sump that is also used for stock. A Licence from the DOW may be required for the anticipated 1 500 kL of water likely to be required for the management of dust.

For Limestone extraction, the water table will be a minimum of 10 metres below the final land surface at 0 - 1 metres AHD, well in excess of the minimum of 2 metres separation specified in Government Policies and Guidelines.

The base of the pit, at 11 - 14 metres AHD, will be well above the groundwater elevation of 0 – 1 metres AHD.

For sand excavation the thin resource and low elevation requires cutting to 4 metres AHD, 3 metres above the water table in compliance with DOW guidelines and matching nearby and adjoining swales.

- **Salinity**

There is no known salinity in the locality. Bore water is used locally to irrigate agriculture. Groundwater is fresh. *Water Authority, 1989 South West Coastal groundwater Area Groundwater Management Review* does generally show the water quality of the superficial horizon as being in the order of less than 500 mg/L in the upper horizon going above 1 000 mg/L at depths of around minus 10 metres AHD .

- **Recharge and Water use**

Water is to be mainly used for dust suppression. Normally only small volumes of water are used for a quarry of this type. The quarry can be expected to require less than 5 000 kL per year and in the order of 1 500 kL because of seasonal activities.

Water will be drawn from a sump or bore located to the west on Lot 1002. A licence from Department of Water will be obtained if required for the commercial purpose.

Little water for dust suppression will be required in winter.

There will be no significant changes to the water balance. Recharge to groundwater will increase slightly and will compensate for evaporation from dust suppression actions.

The area has no surface drainage because of the permeable and porous nature of the sand and limestone. There is no surface drainage from the excavation site. All excess water will infiltrate the permeable limestone. There will be no dewatering.

There will be no alteration to drainage lines or groundwater. On closure the surface will continue to be free draining to the water table.

The nature of limestone extraction is that excavation is conducted dry, with water being used as a dust suppressant. There is no potential for water recycling or reuse as the limestone is so porous, and this will not be undertaken.

As the limestone is so porous the only potential runoff is minimal surface water during heavy storm events. Therefore the only requirement for stormwater treatment is the direction of stormwater away from hard surfaces towards infiltration areas which will normally be broad areas of infiltration adjacent to the roads and hard stand.

Recharge from parkland pasture is anticipated currently to be near 20% based on the vegetation and elevation above the water table. Recharge on excavated areas will increase to perhaps 30% because of smaller separations to the water table and removal of the vegetation. (Environmental Protection Authority Bulletins 512, 788, 821 and 818). This will result in a slight increase in recharge with excavation, which will reduce as rehabilitation grows.

It must be remembered that until a few decades ago the land was densely vegetated and the recharge has increased as a result of clearing of the land. In turn rainfall has reduced since the 1930's and the additions will have helped compensate for this.

Experience shows that dust control only needs to be applied to the limestone roads, and normally takes in the order of 1 500 kL per year. This is similar to the amount of water used by the cattle when grazing on site, which according to Department of Agriculture and Food data consume 15 to 20 kL per year per head.

There will be a net gain in recharge during the life of the quarry, reducing as revegetation grows followed by a slight increase when the site is subdivided and developed. The difference between stock and water used for dust suppression is minimal.

The proposed final land surface will be an undulating low ridge.

All rainfall will be retained within the excavated area and on the site because of the highly porous ground, the same as currently occurs on the much steeper ridge that currently occurs on site. The water table is not anticipated to change and, with the proposed final landform, the flow directions are also not anticipated to be affected.

Assessment of the proposal against EPA Bulletin 864 and EPA Guidance 28 shows that Extractive Industries are not listed as a landuse requiring management with respect to Lake Clifton. This includes the potential for impacts from quarries which have been actively conducted in the catchment for many years, long before the documents were published.

The EPA conducted a number of assessments in the catchment, EPA Bulletins 512, 788, 821 and 818. These and the additional notes show that the greatest change to recharge will depend on the density of the vegetation on the final land surface. The quarry will actually slightly increase recharge, but a return to native trees and shrubs will reduce recharge.

Quarrying will therefore not have any significant impact on the groundwater in terms of volumes. Revegetation to tree cover will reduce the recharge to the local groundwater.

- **Surface Water, Dewatering and Drainage**

Limestone is very porous and direct infiltration of rainfall is normal without any detention basins or other collection systems.

Dewatering of the pit will not be necessary because of the porous nature of the limestone base.

There are no watercourses on site or nearby and therefore surface water will not be altered or impacted on.

There is no need for defined detention basins. There will be no dewatering.

- **Acid Sulfate Risk**

There has been an increased interest in acid sulfate soils since the release of WAPC Planning Bulletin 64.

However the interest has been over-reactive with assessments sought and risk applied in many areas where there is no geological risk or evidence of acid sulfate potential or actual conditions.

The most definitive survey procedure was produced by the Acid Sulfate Soil Management Advisory Committee NSW, 1998, in their *Acid Sulfate Manual*. This Manual forms the basis for much of the assessment procedures in Australia, including those adopted by the Western Australian Planning Commission and the Department of Environment and Conservation. The *Acid Sulfate Manual* adopts the procedure of reviewing the published data followed up by field assessment, which has been completed for this site. If a geological risk is determined, then a Preliminary Acid Sulfate Assessment is conducted.

The site is shown as buff coloured, Low to No Risk of acid sulfate conditions at depths of > 3 metres, in WAPC Planning Bulletin 64.

A geological examination of the site by Lindsay Stephens of Landform Research in May 2012 showed that the site has no risk of containing acid sulfate conditions in the proposed depths of excavation. No evidence of acidic or reducing conditions have been encountered in any of the nearby quarries and none would be expected.

For example the resource of limestone is high in the landscape, highly oxidised and alkaline. The same limestone is in fact used for neutralisation of acid soil conditions and the resource is to be used for agricultural lime which is used to neutralise soil acidity.

- **Waste Rock and Tailings Management**

There will be no washing of limestone or products. Subgrade materials will be incorporated into the bunding to be used above the faces to protect against unauthorised intrusions.

- **Waste Materials**

The potential for rubbish to be dumped relates mainly to unauthorised access and is low as the site is set back from roads. The site is currently fenced. Gates will be locked at all times when the site is unmanned and equipment is retained on site. Fences will be maintained.

Wastes generated will be recycled wherever possible and periodically disposed of at an approved landfill site. Any illegally dumped materials are to be removed promptly to an approved landfill or other suitable site, depending on the nature of the material.

All solid domestic and light industrial wastes will be removed to an approved landfill facility. There will be no waste disposal onsite.

Any waste chemicals derived during routine maintenance activities will be stored in appropriate sealed containers within a designated storage area or taken from site and disposed of at an approved facility.

There is not proposed to be any wash down of mechanical equipment.

A serviced portable toilet is proposed to be in place while the site is operating.

- **Refuelling**

Hydrocarbon is managed in accordance with the procedures specific to fuel and maintenance in the DEC – DMP Water Quality Protection Guidelines for Mining and Mineral Processing.



- *Mechanical servicing and workshop facilities*
- *Above-ground fuel and chemical storage*

Fuel storage is to be used in conjunction and refuelling from a mobile tanker the same as used in many farms, mine sites and quarries. All equipment is mobile and will move across the site as excavation proceeds.

Doyles Lime Service has in place safety and pollution management procedures for all their operations.

Loaders, bulldozers and other equipment will continue to be refuelled on site.

If a fuel tank is used on site it will be a 5 000 litre tank contained to Department of Environment and Conservation and Department of Mines and Petroleum requirements. Liners are normally used for static tanks which include trailer mounted tanks such as those outlined in Water Quality Protection Note "Temporary Trailer Mounted Mobile Fuel Transfer in Public Drinking Water Source Areas".

### **Fuel Spill Management Plan**

The following activities and management will be used on site.

- Fuel and maintenance will be conducted in accordance with the DEC – DMP Water Quality Protection Guidelines for Mining and Mineral Processing, *Mechanical servicing and workshop facilities* and *Above-ground fuel and chemical storage*.
- If a diesel fuel tank is retained on site it will be located in a bunded, lined facility.
- Soils and limestone hardstand such as those on this site are adsorptive. The main risk of contamination is the minor drips that occur during the removal of hoses etc. Minor spills are quickly degraded by soil microbial matter.
- Refuelling and lubricating activities will only take place in designated areas. Equipment for the containment and cleanup of spills is to be provided or in these areas.
- Any spills will be contained by the excavation or processing area. A fluid spill emergency response kit will be used. For larger spills soil and resource will quickly be placed around the spill to contain it in as small an area as possible. When contained, the contaminated limestone soils will be scooped up and removed to an approved landfill or other approved site.
- Spillage will be contained in plant and working areas by shutting down plant or equipment if the plant or equipment is the source of the spill (provided it is safe to do so).
- All significant adverse incidents (such as a fuel spill of >5 litres) in one dump, will be recorded, investigated and remediated. A record is to be kept of incidents and the Local Authority and Department of Environment and Conservation notified within 24 hours.
- The only other risk is from a tank rupture, but tanks are designed to manage this eventuality. A commitment is made to notify Department of Environment and Conservation/Department of Water and Shire of Waroona of any spill greater than 5 litres in one dump. Soil contaminated by large spills will be removed from the site to an approved disposal area.
- Fuel spill emergencies are included within on site training and inductions.

- **Dangerous Goods and Hazardous Substances**

There will be no transport, storage or handling of hazardous materials involved in limestone extraction.

- **Servicing and Maintenance**

Soils such as those on this site are highly porous and adsorptive. The main risk of contamination is the minor drips that occur during the removal of hoses etc. Minor spills are quickly degraded by soil microbial matter.

No potential chemical pollutants, fuel or oils will be stored on site. Minor servicing will be conducted onsite by mobile service vehicles, or offsite. Major servicing of large machinery will be conducted offsite.

All major servicing of vehicles will be conducted off site. Wastes generated from excavation and processing activities will be collected and removed off site weekly to an approved landfill site. Regular inspections (at least weekly) will be conducted to ensure no wastes, litter and the like are present in or around the excavation area.

Vehicle washdown is not proposed.

Waste oil and other fluids derived from the routine maintenance of mobile machinery, will be transported off site and disposed off at an approved landfill site. Grease canisters, fuel filters, oil filters and top-up oils will be stored in appropriate containers in a shed or brought to the site as required.

The following activities and management will be used on site.

- Regular inspections and maintenance of fuel, oil and hydraulic fluids in storages and lines are to be carried out for wear or faults.
- Servicing plant and equipment is to be maintained in accordance with a maintenance schedule.
- Major servicing is to be undertaken offsite.
- Only minor servicing and lubrication is to be conducted on site such as in the pit using mobile facilities.
- Any waste chemicals derived during routine maintenance activities are to be stored in appropriate sealed containers within a designated storage area or taken from site and will be disposed of at an approved facility.
- Grease canisters, fuel filters, oil filters and top-up oils are to be stored in appropriate containers in a shed or brought to the site as required.
- Waste oil and other fluids derived from the routine maintenance of mobile machinery, is to be transported off site and recycled. Materials that cannot be recycled are disposed off at an approved landfill site.
- No wash down of mechanical equipment is proposed.
- Mobile drum storage is to be located on an impermeable liner capable of holding 110% of the volume contained. All storage facilities for lubricants and oils comply with requirements of AS1940.

- Accidental spill containment and cleanup protocol is in place.
- The site will be maintained in a tidy manner.

<p><b>Water Management - Applicable Legislation / Policies</b></p> <p><i>DEC – DMP Water Quality Protection Guidelines for Mining and Mineral Processing</i></p> <ul style="list-style-type: none"><li>• <i>Overview</i></li><li>• <i>Minesite water quality monitoring</i></li><li>• <i>Minesite stormwater</i></li><li>• <i>Mechanical servicing and workshop facilities</i></li><li>• <i>Mine dewatering</i></li><li>• <i>Health Act 1911</i></li></ul>
<p><b>Commitments to Water Management</b></p> <ul style="list-style-type: none"><li>• The site complies with Department of Environment and Conservation Guidelines for separation to groundwater.</li><li>• The nature of the operation and the depth to groundwater will minimise any risk to groundwater systems.</li><li>• Management procedures outlined above are committed to, to protect water quality.</li><li>• There will be no alteration to surface water flows or groundwater levels.</li><li>• Doyles Lime Service has in place a site code outlining requirements for operators and drivers.</li><li>• Doyles Lime Service conducts training programs on pollution minimisation practices.</li><li>• Doyles Lime Service conducts regular water sampling and maintains the water quality protection measures listed above.</li></ul>

## 5.6 Biodiversity Management

### 5.6.1 Vegetation and Flora

The vegetation was reviewed by Lindsay Stephens of Landform Research on 23 May 2012. (See attached Flora and Vegetation Assessment).

It has been strip cleared in the past and intensively grazed and in part seeded with pasture species.

In spite of extensive searches only 10 native species were found, of which two were found as only one plant. Effectively there are only nine species, present, which is very low for this type of vegetation over an area of 7.5 hectares. The vegetation is dominated by *Trachyandra divaricata* an exotic species. The sand resource can be taken with no clearing.

The local vegetation is originally Cottesloe Complex, Central and South, as identified by Hedde et al, 1980, *Vegetation Complexes of the Darling System, Western Australia in Atlas of Natural Resources, Darling System, Western Australia*, Department of Conservation and Environment.

Remnant and regrowth limestone heathland of *Melaleuca systema*, *Dryandra sessilis* (*Banksia sessilis*), *Templetonia retusa*, and *Hibbertia cuneiformis* over exotic pasture and weed groundcovers occur on the resource area of Lot 1001. *Eucalyptus decipiens* occurs around the edges and on the southern boundary with *Agonis flexuosa* on the lower slopes.

See Appendix 1.

Being significantly reduced in species no sample plots were completed because it would not provide any additional useful information.

For comparison, Bush Forever lists the species richness of the original vegetation community prior to clearing, Community Type 26b, "Woodlands and mallees on limestone" as an average of 49.8 species per 100 m<sup>2</sup> plots. The comparison of 8 and 10 native species on site shows the degraded level of the vegetation.

EPA Guidance 10 *Level of assessment for proposals affecting natural areas within the System 6 region and Swan Coastal Plain portion of the System 1 Region* lists Cottesloe Complex - Central and South as having 41.1% of the pre-European area still occurring and 8.8% in secure tenure.

Whilst there exists greater than 30% of this Complex it is not well reserved. The clearing Regulations provide a higher level of protection than was previously available, and the same vegetation complex is included in the Yalgorup National Park.

The assessments within the Flora and Vegetation Assessment attached, found that the proposed clearing will have little overall effect on flora and fauna within the local area, with most of the effect relating to the final end use, and that appears to have been the case.

- **Vegetation Condition**

The area covered by the proposal will require a Clearing Permit CPS. It has been strip cleared in the past as shown on the existing aerial photography.

There will be no clearing of the native vegetation unless a New Clearing Permit is approved.

The remnant vegetation is listed as Good with Degraded to Completely Degraded strips using Bush Forever and Kaesehagen 1995 as described in Appendix 1.

- **Rare and Priority Species**

No Declared Rare or Priority species were recorded. No Threatened Ecological Community was noted.

### 5.6.2 Vegetation Clearing

*Clearing is controlled under the **Environmental Protection (Clearing of Native Vegetation) Regulations 2004**. These regulations provide for a number of principles against which clearing is assessed.*

	<b>CLEARING PRINCIPLE</b> <i>(Schedule 5 Environmental Protection Amendment Act, 1986)</i>
1a	<i>High Level of diversity</i>
1b	<i>Significant fauna habitat</i>
1c	<i>Necessary to existence of Rare flora</i>

1d	<i>Threatened Ecological Community</i>
1e	<i>Significant area of vegetation in an area that has been extensively cleared</i>
1f	<i>Wetland or watercourse</i>
1g	<i>Land degradation</i>
1h	<i>Impact on adjacent or nearby conservation areas</i>
1i	<i>Deterioration of underground water</i>
1j	<i>Increase flooding</i>

Although the Clearing Principles consider Biodiversity and other conservation issues, they do not specifically address the issues of the metropolitan area or resource needs. Therefore some additional principles need to be added when considering the need for Basic Raw Materials.

The *Environmental Protection Act 1986 Section 51O* states that the “CEO” may take into account other matters that the “CEO considers relevant” (*EP ACT 1986 Section 51O*). Therefore Section 51O of the *Environmental Protection Act 1986* allows the CEO to take planning matters into account when making clearing decisions, such as a State Planning Policy and community need.

A separate Flora and Vegetation Assessment and Report is prepared for the site and is attached.

The procedures used for vegetation clearing are documented in 5.9.2 Rehabilitation. These were used and are included here in case a small area of additional clearing is applied for to the immediate north of the existing permitted area.

Topsoil and overburden treatment is covered in 5.9 Rehabilitation. All suitable materials will be retained for rehabilitation and directly transferred where possible.

### **5.6.3 Fauna**

A fauna study was not conducted because the site is significantly altered native vegetation that is subject to grazing. Fauna do not seem to have been impacted on by the past clearing and continued excavation.

A summary of the fauna on site is included in 2.6 fauna. Some data on the wetlands of the Yalgorup National Park is provided in 2.7 Wetlands.

The survival and disturbance to fauna depends on the end use of the site. The site is to be cleared progressively and returned progressively to local native vegetation in order to minimise impacts on fauna.

The re-establishment of local native flora species and habitats, with the various commitments to that achievement, will provide a mechanism for a return of fauna.

With the degraded nature of the vegetation and the species present it is unlikely that *Calyptorhynchus latirostris* and *Calyptorhynchus baudinii*, which are listed on State and EPBC conservation databases, would nest or use the site for feeding. The flora species are not regarded as significant habitat species. They are not used for roosting or nesting.

Considering the proposed disturbance and the small number of suitable food species, referral to the Commonwealth under the *EPBC Act 1999* would not be triggered.

The fauna that may potentially occur are listed in 2.6 Fauna and in particular Dell and Hyder (1) 2009.

The key issues are the fauna associated with elevated remnant vegetation and those associated with the lakes.

The dry land fauna will be little impacted. The area proposed to be cleared and progressively rehabilitated is only 12 hectares over 20 years. This is very small in relation to the total area of habitat that remains and is protected by the Yalgorup National Park status. There has been no change to that vegetation in recent years with no additional clearing.

In fact with regrowth on pasture habitat will be increasing. Some species such as kangaroos have been advantaged by permanent water soaks on pasture and the introduction of grassland.

The potential for dust to deposit on the adjoining vegetation is less than for a gravel road because the on site activities will be set back further than the vegetation which can be as close as 3 metres along a roadside.

Any risks associated with the potential for Root Mat Communities and stygofauna are regarded as low and if present are unlikely to occur or to be impacted on.

The limestone is too young, there is no evidence of stream caves or notching at wetlands and no Tuart trees are present. The base of the excavation is proposed to be in the order of 20 metres AHD, 20 metres above the water table.

Troglofauna may occur in cracks and crevices of the rocks and limestone, but no evidence of such occurrences have been noted in previous excavations.

The removal of limestone will be progressive and followed by rehabilitation. The limestone will be excavated to a limestone floor and batter slopes that will also contain similar small cracks and joints, which will help replicate any potential habitats that currently exist. Some of the rehabilitated area will be left with limestone rock and boulders scattered on the surface to provide additional habitat. Rehabilitation will be to native vegetation.

All of the above measures will minimise the risk to any troglofauna should they currently occur.

#### **5.6.4 Wetlands**

##### **Lake Clifton**

It is impossible to think that dust will travel over 2 km and have any significant or noticeable impact on any sensitive premises or Lake Clifton. With a buffer of 200 metres, with intervening vegetation, it is also considered most unlikely that any dust will impact on Lake Pollard. Limestone is predominantly calcium carbonate with some sand grains. It is an integral part of the local environment. Calcium carbonate is an integral substance in the waters and sediments of Lake Clifton and Lake Pollard and is essential for the development of most life within those systems, including the Thrombolites which incorporate it into their structures. (Figures 2 and 3).

Assessment of the proposal against EPA Bulletin 864 and EPA Guidance 28 shows that Extractive Industries are not listed as a landuse requiring management with respect to Lake Clifton. This includes the potential for impacts from quarries which have been actively conducted in the catchment for many years, long before the documents were published.

### **Lake Pollard**

The Guidelines which include the Department of Health guidelines for spray drift and studies conducted at Emerald in Queensland that are used by the Department of Health all suggest that a tree buffer of 20 metres width will provide an effective buffer for fine particulates. The site has a 200 metre tree buffer to Lake Pollard. (*Department of Health, 2012, Guidelines for Separation of Agricultural and Residential Land uses*).

A 20 metre buffer of vegetation is to be retained to the north and 75 metres south of the excavation area to the adjoining land of Yalgorup National Park in the south. Any dust falling on vegetation will have minimal impact. Any dust is readily washed from leaves by even very small amounts of rainfall. The potential impacts are minimal and adjacent to gravel roads there is almost always no discernible impacts on the growth and success of native vegetation. (Figures 2 and 3).

Fauna associated with the Lake system such as the low elevation thickets will be excluded from the proposed development.

A 200 metre buffer will be included to Lake Pollard. When rehabilitated an additional 200 metres of local native vegetation will be planted on the rehabilitated land surface adjacent to the buffer to the lake at the completion of excavation which will widen the area of native vegetation around Lake Pollard. (Figure 3).

Therefore it is unlikely that fauna species associated with the wetland will be impacted.

The bird life on Lake Pollard will be protected because of the 200 metre setback to the lake. It is shown in many locations that some activity set back from lakes does not impact on bird life. For example the Peel Harvey Estuary, Lake Clifton and the Coorong in South Australia still have significant amounts of birdlife even though clearing and human activity occurs in close proximity to the water bodies in some locations.

### **Lake Pollard Walking Trail**

The lake Pollard Walking Trail runs from Martins Well in the south towards Lake Pollard, It skirts the southern end of the lake and runs to a Bird Hide located on the eastern side of the lake one km from the proposed excavation. (Figure 3).

This portion of the walk trail will no be impacted by the proposed excavation. One part of the walk trail directs walkers to the southern boundary of Lot 1001 to walk up the fire break in the Yalgorup National Park to the hill on the ridge immediately south of the proposed excavation. The excavation will not impede the views of the lake but it may be possible to see the pit from the top of the ridge even with an expanded setback of 75 metres combined with a planted tree belt and natural regrowth of the native vegetation.

It is anticipated that the quarry should not be visible from the Lake Pollard Walk Trail.

Operational times are restricted to the summer an autumn months on Monday to Saturday excluding Public holidays.

<b>Biodiversity - Applicable Legislation / Policies</b> <ul style="list-style-type: none"><li>• DEC Clearing Permit CPS 2430/1</li></ul>
<b>Commitments to Biodiversity Management</b> <ul style="list-style-type: none"><li>• The excavation areas are cleared.</li><li>• The level of bushland disturbance and the use of the site for grazing reduces the potential</li></ul>

for significant fauna to be present.

- The site will be progressively cleared and rehabilitated.

### 5.6.5 Dieback Management Plan

Dieback of vegetation is often attributed to *Phytophthora cinamomi* even though there are other *Phytophthora* species and other diseases such as *Armillaria* that can cause dieback like symptoms. Microscopic soil-borne fungi of the genus *Phytophthora* kill a wide range of native plants and can cause severe damage to many vegetation types, particularly those from the families Proteaceae, Epacridaceae, Xanthorrhoeaceae and Myrtaceae.

In most cases dieback is caused by a pathogen which infests the plant and causes it to lose vigour, with leaves dying, and overtime may kill the plant. As such the management of Dieback is essentially related to plant hygiene when coming onto a site and within a site.

There are several guides to the management of Dieback.

- Department of Environment and Conservation CALM Dieback Hygiene Manual 1992 is a practical guide to Dieback management.
- Department of Environment and Conservation CALM Best Practice Guidelines for the Management of *Phytophthora cinamomi*, draft 2004.
- Dieback Working Group 2005, Management of *Phytophthora* Dieback in Extractive Industries.

The Department of Environment and Conservation generally recognises that Dieback is less likely to impact on vegetation on limestone and Spearwood/Cottesloe Land Systems, Podger F D and K R Vear, 1998, *Management of Phytophthora and disease caused by it, IN Phytophthora cinnamomi and the disease caused by it - protocol for identifying protectable areas and their priority for management*, EPA 2000. The same is noted in DEC 2009.

Dieback is only likely to be an issue when equipment is brought to the site from a dieback affected area either through vehicles or plant and soil materials, therefore the following general principles are applied to Dieback management.

Not all potential impacts will apply to all parts of the proposed quarry operations.

- Excavation will be undertaken using practices recommended by DEC. See *CALM Dieback Hygiene Manual 1992* which is more practical and *CALM Best Practice Guidelines for the Management of *Phytophthora cinamomi*, draft 2004*. See also *Dieback Working Group 2005, Management of *Phytophthora* Dieback in Extractive Industries*.
- Dieback diseases are more likely to be transported under moist soil conditions.
- All vehicles and equipment to be used during land clearing or land reinstatement, should be clean and free from soil or plant material when arriving at site.
- Washdown of vehicles and equipment should be prior to arriving on site and to the procedures in CALM Guidelines for Dieback Management.
- No soil and vegetation should be brought to the site apart from that to be used in rehabilitation.
- Plants to be used in rehabilitation should be from dieback free sources.
- Vegetated areas ahead of excavation should be quarantined to onsite access
- Unwanted access to vegetated areas is to be discouraged through a lack of tracks and external fencing.
- Excavation vehicles will be restricted to the excavation area apart from clearing land.
- Rehabilitated surfaces are to be free draining and not contain wet or waterlogged conditions.



- Illegally dumped rubbish is to be removed promptly.
- No contaminated or suspect soil or plant material is to be brought onto the site.
- When clearing land or firebreaks vehicles are to work from dieback free areas towards dieback areas; or, in situations where dieback interpretation is not possible, from areas of higher quality vegetation to areas of lower quality vegetation.
- Roads should be free draining and hard surfaced.
- A hygienic site is to be maintained by not bringing any soil or plant material onto the site except for rehabilitation purposes or from known dieback free areas.
- All plants, seeds and other materials used in rehabilitation will be sourced from dieback free areas.
- Compliance with the Weed Management Policy.

Dieback principles will be followed even though there is a reduced risk of spread on calcareous soils such as this. (Podger F D and K R Vear, 1998).

The proposed access road will be the limestone road.

The aim of dieback management during excavation is to minimise the risk of entry of dieback into the site. The calcareous soils of the remnant vegetation are unlikely to allow *Phytophthora* to spread but there may be other pathogens such as *Armillaria*.

In many ways the management of the site for dieback is similar to that for the management of weeds, and the two management practices should be considered together.

The other management is to ensure that all excavation equipment and road transport vehicles are clean and free from soil and vegetable matter prior to entering the operations.

Vehicles are to be prohibited from entering vegetation ahead of excavation, apart from normal travel along made firebreaks and roads for normal security and farm maintenance activities.

Topsoil will be cleared according to 5.9.2 Rehabilitation Procedures.

<p><b>Dieback - Applicable Legislation / Policies</b></p> <ul style="list-style-type: none"><li>• DEC (CALM) <i>Dieback Hygiene Manual 1992</i>.</li><li>• DEC (CALM) <i>Best Practice Guidelines for the Management of <u>Phytophthora cinamomi</u>, draft 2004</i>.</li><li>• Dieback Working Group 2005, <i>Management of Phytophthora Dieback in Extractive Industries</i>.</li></ul>
<p><b>Commitments to Dieback Management</b></p> <ul style="list-style-type: none"><li>• Doyles Lime Service will not impact on the adjoining remnant vegetation by the proposed excavation.</li><li>• Doyles Lime Service maintain the Dieback Management Policy to reduce the spread of Plant Pathogens.</li></ul>

### 5.6.6 Weed Management Plan

The management of weeds is essentially similar to that for plant diseases. The impact of weeds is really the impact within the local area and the more they are controlled the better. It is desirable that the site does not become a haven for environmental weeds and therefore a management and control program is warranted at all sites.

Weeds can be declared under the *Agriculture and Related Resources Protection Act 1976* which requires that Declared Weeds are eradicated. Other weeds are not Declared but may be classified as Environmental Weeds because they are well known for impacting on vegetation.

Generally if the actions taken for Dieback are applied they will also control weeds.

Weed management is an integral part of normal farming operations on Lots 1001 and 1002. However the pasture land has on the limestone resource, much *Trachyandra divaricata*, a weed that is noted by DEC 2009 as being invasive, but is mostly invasive on pasture and on the limestone resource area occurs on the cleared strips.

- All vehicles and equipment to be used during land clearing or land reinstatement, should be clean and free from soil or plant material when arriving at site.
- No soil and vegetation should be brought to the site apart from that to be used in rehabilitation.
- Plants to be used in rehabilitation should be free from weeds.
- Vegetated areas ahead of excavation should be quarantined to excavation vehicles until required.
- Unwanted access to vegetated areas is to be discouraged through a lack of tracks and external fencing.
- Weed affected top soils may need to be taken offsite, used in weed affected areas, buried by 500 mm soil/overburden or taken offsite or sprayed to minimise the weed impact.
- Illegally dumped rubbish is the major source of weeds and is to be removed promptly.
- No weed contaminated or suspect soil or plant material is to be brought onto the site.
- When clearing land or firebreaks vehicles are to work in conjunction with dieback principles and push from areas of better vegetation towards areas of lower quality vegetation.
- Weeds should be sprayed with broad spectrum spray prior to planting or seeding in weed affected soils.
- Unwanted grasses should be sprayed with grass selective spray prior to seeding or rehabilitation.
- Weed management should work from least affected areas to most affected.
- Declared weeds should be treated promptly by digging out or spraying.
- Weeds will be treated promptly no matter how few there are.
- Ongoing monitoring of weeds should be undertaken at least annually in autumn, prior to winter rains.

The Dieback Management actions will also be used to assist weed management.

Inspections should be conducted to monitor the presence and introduction of weeds on an annual or more frequent basis. On identification, introduced weeds will either be removed, buried, or sprayed with a herbicide.

<b>Weed - Applicable Legislation / Policies</b> <ul style="list-style-type: none"><li>• <i>Agriculture and Related Resources Protection Act 1976.</i></li></ul>
<b>Commitments to Weed Management</b> <ul style="list-style-type: none"><li>• Doyles Lime Service will use the weed policy to try and prevent the introduction of Declared, Environmental or other weeds to the site.</li></ul>

## 5.7 Fire Protection

The excavation area will form a natural firebreak; the access road will also assist. Water available on site can be used for fire fighting.

Normal rural firebreaks will be maintained.

The safety of workers is managed through a Safety Management Plan developed through *the Mines Safety and Inspection Act 1994 and Regulations 1995*.

There are a number of management actions that can be taken in quarries to minimise fire risk and these will be used wherever possible. The general management actions are summarised below, together with the potential issues that relate to this site. The actions will be used where applicable and as the opportunity presents to minimise fire risk.

- Restrict vehicles to the operational area, particularly on high fire risk days.
- Use diesel rather than petrol powered vehicles.
- Maintain perimeter fire breaks as required.
- Ensure fire risk is addressed and maintained through the site Safety Management Procedures.
- Provide an emergency muster area, communications and worker induction and training.
- Establish on site water supplies for potential use in extinguishing fire.
- Secure the site from unauthorised access.
- Maintain normal farm fire breaks and fire prevention procedures.

There is less potential fire risk from quarries than other land uses because quarries clear land, and vehicles are restricted to cleared access roads, the pit floor, processing and stockpile areas.

These cleared areas form a natural firebreak. The main risk comes from an external fire in the surrounding vegetation, impacting on the quarry. As such the fire risk is no greater than a rural property.

Fire risk is normally controlled through the *Bush Fires Act 1954* and local authority bylaws.

Perimeter firebreaks will be maintained.

<b>Fire Management - Applicable Legislation / Policies</b> <ul style="list-style-type: none"><li>• <i>Bush Fires Act 1954.</i></li><li>• <i>Shire of Waroona Bylaws.</i></li></ul>
<b>Commitments to Fire Management</b> <ul style="list-style-type: none"><li>• Doyles Lime Service will ensure the quarry operates to the standards in the <i>Mines Safety and Inspection Act 1994 and Regulations 1995.</i></li><li>• Doyles Lime Service will ensure the quarry complies with the local fire safety requirements and operates in compliance with normal rural fire practise and restrictions.</li></ul>

## 5.8 Aboriginal Sites

A search of the Department of Indigenous Affairs database does not reveal any aboriginal sites on the subject land. The land has been significantly disturbed over many years.

<b>Aboriginal Sites</b> <ul style="list-style-type: none"><li>• <i>Aboriginal Heritage Act 1972-1980</i></li></ul>
<b>Commitments to Fire Management</b> <ul style="list-style-type: none"><li>• Should any evidence of early aboriginal occupation be uncovered during the operation of the quarry, development will be stopped pending an assessment by a recognised consultant.</li><li>• If the site is confirmed as a site under the provisions of Section 15 of the Aboriginal Heritage Act 1972-1980 and Amendments, the proponent will comply with the provisions of the Act, relating to development in areas of recognised aboriginal sites.</li></ul>

## 5.9 Rehabilitation

### 5.9.1 Background

The area is currently used for agricultural activities. The excavation site has been cleared in strips and grazed.

It therefore varies between Completely Degraded strips to Degraded to Good strips of vegetation.

- **Land Use Policies**

The land is zoned Rural and is currently used as a grazing property.

- **End Use**

The extraction of limestone and sand is seen as an interim use of the land prior to utilisation of the area by the current land holder.

The eastern 20 metres of pit and northern and southern slopes on Lot 1001 will be rehabilitated to local native vegetation. The remainder will be pasture with a minimum of 200 trees in clumps which will compensate for the land to be cleared. (Figure 10).

The remainder, including the sand resource, will be returned to pasture to enable the agricultural productivity of the land to be maintained.

The final contours are shown on the attached Concept Contour Plans.

- **Mine Closure Considerations**

Rehabilitation will be directed towards the final end land use. In general it should be aimed at the highest level of rehabilitation, however there is no point planting good native vegetation or tree belts if they are to be immediately cleared for an alternative land use.

Rehabilitation will contain Dieback and Weed Management in addition to monitoring and replanting failed areas.

Appropriate topsoil management is seen to be an important element in achieving successful rehabilitation and plant re-establishment on the restored surface.

- **Rehabilitation Objectives and End Use**

There are a number of management actions that can be taken in quarries to maximise rehabilitation effort and these will be used wherever possible. The general management actions are summarised below and will be used where applicable and as the opportunity presents.

- **Completion criteria – Interim Final Landuse**

The aim of the rehabilitation is to stabilise the finished floor pending decisions to be made on the end use of the site.

- Stable post-mining landscape, and the minimisation of wind erosion.
- Provide for the protection of the local groundwater resource in terms of both quality and quantity.
- Achieve weed species at levels not likely to threaten the vegetation.
- Provide a self sustaining cover of local native plants at a minimum of 1200 native plant stems per hectare at 3 years for the eastern 20 metre strip of land close to Lake Pollard and on the steeper northern and southern slopes. (Figure 10).
- Sustainable pasture for the remainder of the excavated area with a minimum of 200 trees in clumps. (Figure 10)

## **5.9.2 Rehabilitation Procedures**

- **Vegetation Clearing – Recovery**

1. Vegetation clearing will be progressive, subject to a Clearing Permit being granted. The sand resource can be extracted without clearing for much of the resource.

2. Useful timber will be taken for firewood, if feasible and subject to liabilities and site safety.
3. Where practicable vegetation will be directly transferred to a batter slope or bund being rehabilitated. Smaller indigenous shrub material will be used in the rehabilitation process when available and suitable. Vegetation fragments will be laid on re-formed slopes to reduce wind and water erosion as well as provide a source of seeds for revegetation.
4. If direct transfer is not possible the vegetation will be stored in low dumps for later spreading.

- **Landform Reconstruction and Contouring**

1. All buildings, equipment and machinery will be removed from site.
2. The final landform will be formed to the interim final concept plan.
3. The land surface will be a gently undulating floor as shown on the attached Final Concept Plans with sloping batters at less than 1 : 4 vertical to horizontal and some at 1 : 2 at the steeper northern and southern edges of the ridge.
4. The land surface will be formed to the requirements of the *Mines Safety and Inspection Act 1994 and Regulations 1995* pending decisions to be made on the final end use.
5. Limestone floor will be deep ripped in two directions. The width between rip lines will be 1 metre intervals.
6. A minimum of 300 mm of overburden will be spread over the surface where available to provide a substrate for revegetation.
7. Experience by Landform Research on limestone rehabilitation on mining leases north of Wesco Road is that good revegetation can be achieved by planting into soft overburden and deep ripped limestone floor, if suitable local species are used.

- **Topsoil and Overburden Recovery and Reuse**

1. Where possible topsoil and overburden will be directly transferred from an area being cleared to an area to be rehabilitated.
2. Overburden, as yellow and brown sand and low grade limestone, will be pushed to the perimeters of the excavation, particularly the western edges, to assist with visual and noise screening. From there it can be used for the rehabilitation process.
3. Studies have shown that topsoil stripping and placement is best undertaken in summer for maximum germination, but this raises the potential for additional dust generation from the fine humus particles.
4. Topsoil will be spread directly from an area being cleared where possible, otherwise reclaimed from a topsoil dump.
5. Topsoil will be spread at depths of 5 cm and should be spread during summer, preferably by the end of February.

- **Pre - Vegetation Establishment**

1. Pre-seeding weed control is only likely to be required where topsoils are used that contain weed species.
2. If required this is normally only conducted after overburden and topsoil have been spread and any seeds have been allowed to germinate. Broad-scale weed treatment can be detrimental to the germination and growth of native and some pasture species but may be required if the weed load is to be reduced.
3. Any weeds likely to significantly impact on the rehabilitation will be sprayed with Roundup or similar herbicide or grubbed out, depending on the species involved. Weed affected topsoil and overburden will be buried. The Weed Management Plan will form the basis of weed treatment. Depending on the nature of the planting substrate, a broad spectrum spraying program may be used. In areas where grass only is a potential problem grass specific sprays will be used. In some areas where topsoil from cleared native vegetation is available no spraying may be required.

- **Revegetation**

1. Doyles Limes Service will spread any native vegetation, plus leaf, root and organic matter collected from the land clearing procedures. This will increase the total organic carbon fraction, improving soil properties such as resistance to water and wind erosion and moisture retention. The difference in properties between existing topsoil and subsoils is not considered a major impediment to rehabilitation of native species in the area.
2. Topsoil will be re-distributed in rehabilitated areas to depths of 50 mm where available. Whilst burning is not always practicable the mixing of topsoil with ash and charcoal from burnt vegetation has shown a demonstrated improvement in the germination of local native species by triggering some species that do not readily germinate and by increasing germination rates. (Landform Research at Pickering Brook Gravel Quarry).
3. Topsoil provides a useful source of seed for rehabilitation of Limestone Heathlands, when the correct handling of the topsoil is used; stripped and replaced dry (autumn direct return). Maximum depth of 50 mm can be used to optimise revegetation of species-rich plant communities. However this needs to be balanced against the weed load as described under Weed Management.
4. Studies have shown that topsoil stripping and placement is best undertaken in summer for maximum germination, but this raises the potential for additional dust generation from the fine humus particles.
5. Topsoil will be spread directly from an area being cleared where possible, otherwise reclaimed from a topsoil dump.
6. Topsoil will be spread at depths of 50 mm and should be spread during summer, preferably by the end of February.
7. Rehabilitation will take place during the first winter months following the restoration earth works of each particular section of quarry. Leaving the completed earth works for one season will reduce the success of rehabilitation by at least 50 %, due to compaction effects.
8. Local provenance seed will be collected from the site or purchased from commercial seed collectors. Tube plants are also desirable because they reduce the risk of failure by providing a third method of establishment;

- topsoil spreading
- seed spreading
- tube plants

A species list is attached.

9. A combination of the three methods is always preferred by Landform Research and has proven to be the most versatile and successful. The amount and species of additional seed and tube stock depends on the quality and seed store within the topsoil, and may vary from stage to stage.
10. Seeds of indigenous species will be scattered during late summer at the rate of approximately 1 kg seeds per hectare if required.
11. Seeding conducted in summer will use scarified leguminous seeds that have been “dry smoked”. Seeding conducted in July to August will have the leguminous seeds heat treated and all seeds will be smoke treated by soaking in “smoke water” for 24 hours prior to seeding.
12. Seed spreading will be achieved either using mechanical seed dispersal equipment or using manual methods. Bulking with a spreading agent such as sawdust, vermiculite or sand is desirable.
13. Plant an additional 500 tube plants of local native species per hectare, in June. Alternatively establish the vegetation wholly through the use of tube stock.
14. Use a 10 g tree tablet or small handful of fertiliser beside each tube plant.
15. Rehabilitation will progressively follow mining with completed areas of the excavation being revegetated as soon as practicable.

- **Fertiliser**

1. Fertiliser is not always required and will add nutrients to the ground water. If used a fertiliser containing low nitrogen, phosphorous and potassium, and trace elements, is recommended to be spread at rates of up to 30 - 50 kg/hectare, applied to rehabilitation areas in the year of planting.
2. Further investigation will be needed to determine suitable rates and the timing of fertilisation. It may be possible to integrate seed dispersal and fertilisation into a single pass. The fertiliser will need to supply macro-nutrients, phosphorus, nitrogen and potassium, and other micro-nutrients.

- **Irrigation**

1. Experience by Landform Research in rehabilitation of quarries in limestone has shown that when completed well there is no need for irrigation of the rehabilitation.

- **Erosion Control**

1. Soil erosion occurs when soil is exposed and disturbed by wind or water. Erosion involves soil particles being detached from areas not adequately protected by vegetation, and moved down-slope. This is not normally a significant problem in limestone, which crusts after the first winter.



2. The soils are very permeable and runoff is normally minimal unless surface materials become non-wetting. Even so experience shows that there is minimal non wetting and surface particle movement under such conditions.
3. Water erosion on the batter slopes can be avoided by the permeability of the materials and by leaving the surface soft, rough and undulating, with the undulations running along contour. The final machinery run should be along contour and not down slope.
4. Wind erosion will be controlled by rehabilitating the disturbed ground as soon as practicable.
5. The interim pasture cover will stabilise the soils pending decisions on the end use of the finished floor.
6. For rehabilitation areas, revegetation will take place as soon as possible following landform and soil reconstruction.

- **Monitoring**

1. During late summer an assessment of the success of the rehabilitation will be made to determine the rehabilitation requirements for the following winter.
2. Monitoring includes visual assessments and, where necessary, counts to determine the success of the soil stabilisation.
3. Native vegetation cover and soil stability will be assessed and corrected if found to be non compliant.
4. As necessary steps will be taken to correct any deficiencies in the vegetation.
5. Rehabilitation of each stage will be monitored for a period of three years to ensure that the revegetation meets the completion criteria of providing self sustaining vegetation cover.
6. In areas of rehabilitation that do not meet the completion criteria measures are to be taken to increase the stem density to achieve the completion criteria. This could include but not be limited to additional seeding or planting.

### **Temporary Closure**

1. If for any reason the site is closed on a temporary basis for any period of time the following will be implemented.
2. The faces will be made safe or protected by bunds and/or fencing with signs in compliance with the *Mines Safety and Inspection Act 1994*.
3. All fluids, liquids and other materials that could leak over time, change or potentially impact on the environment will be removed from site, or stored in a manner that will not permit any environmental impact.
4. Mobile and other plant will be made safe or removed from site in compliance with the *Mines Safety and Inspection Act 1994*.
5. Fencing will be maintained to make the pit safe.
6. Perimeter signage will be maintained.

7. The site will be monitored for weeds and interim rehabilitation success twice per year.
8. Regular site inspections will be made to ensure compliance with the *Mines Safety and Inspection Act 1994*, and any other actions that are required to make the site compliant or environmentally sound will be made as the need arises.

<b>Rehabilitation - Applicable Legislation / Policies</b> <ul style="list-style-type: none"><li>• <i>EPA, Guidance 6, Rehabilitation of Terrestrial Ecosystems</i></li></ul>
<b>Commitments to Rehabilitation</b> <ul style="list-style-type: none"><li>• Doyles Lime Service will ensure the completed land surface is formed to the standards in the <i>Mines Safety and Inspection Act 1994 and Regulations 1995</i>.</li><li>• Doyles Lime Service will rehabilitate the surface as outlined above and monitor the revegetation as described above.</li></ul>

**Tree and Shrub Species to be used in rehabilitation for native vegetation and the trees in parkland pasture.**

Tree and tall shrub species to be used for rehabilitation occur locally and will include; (Tree or large shrub is listed T)

*Acacia cyclops* (T)  
*Acacia lasiocarpa*  
*Acacia saligna* (T)  
*Acacia truncata*  
*Agonis flexuosa* (T)  
*Dryandra lindleyana* var *lineleyana* (*Banksia dallanneyi*)  
*Dryandra* (*Banksia*) *sessilis*  
*Eremaea glabra*  
*Eucalyptus decipiens* (T)  
*Eucalyptus foecunda* (T)  
*Eucalyptus gomphocephala* (T)  
*Eucalyptus petrensis* (T)  
*Grevillea vestita*  
*Hakea lissocarpa*  
*Hakea prostrata*  
*Hakea trifurcata*  
*Hardenbergia comptoniana*  
*Kennedia prostrata*  
*Kunzea glabrescens*  
*Melaleuca huegelii* (shrub)  
*Melaleuca lanceolata* (T)  
*Melaleuca systema* (shrub)  
*Myoporum insulare*  
*Olearia axillaris*  
*Templetonia retusa*

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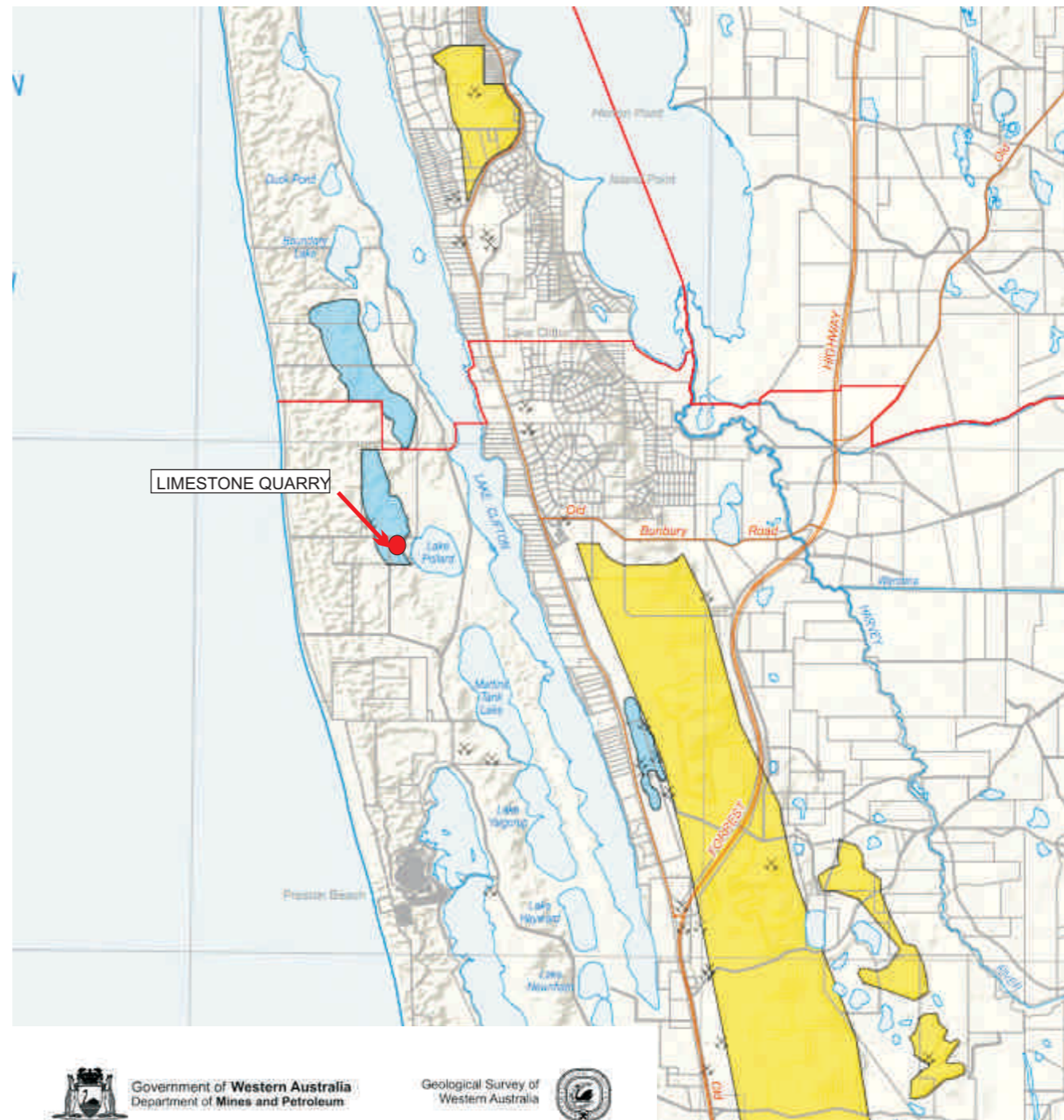
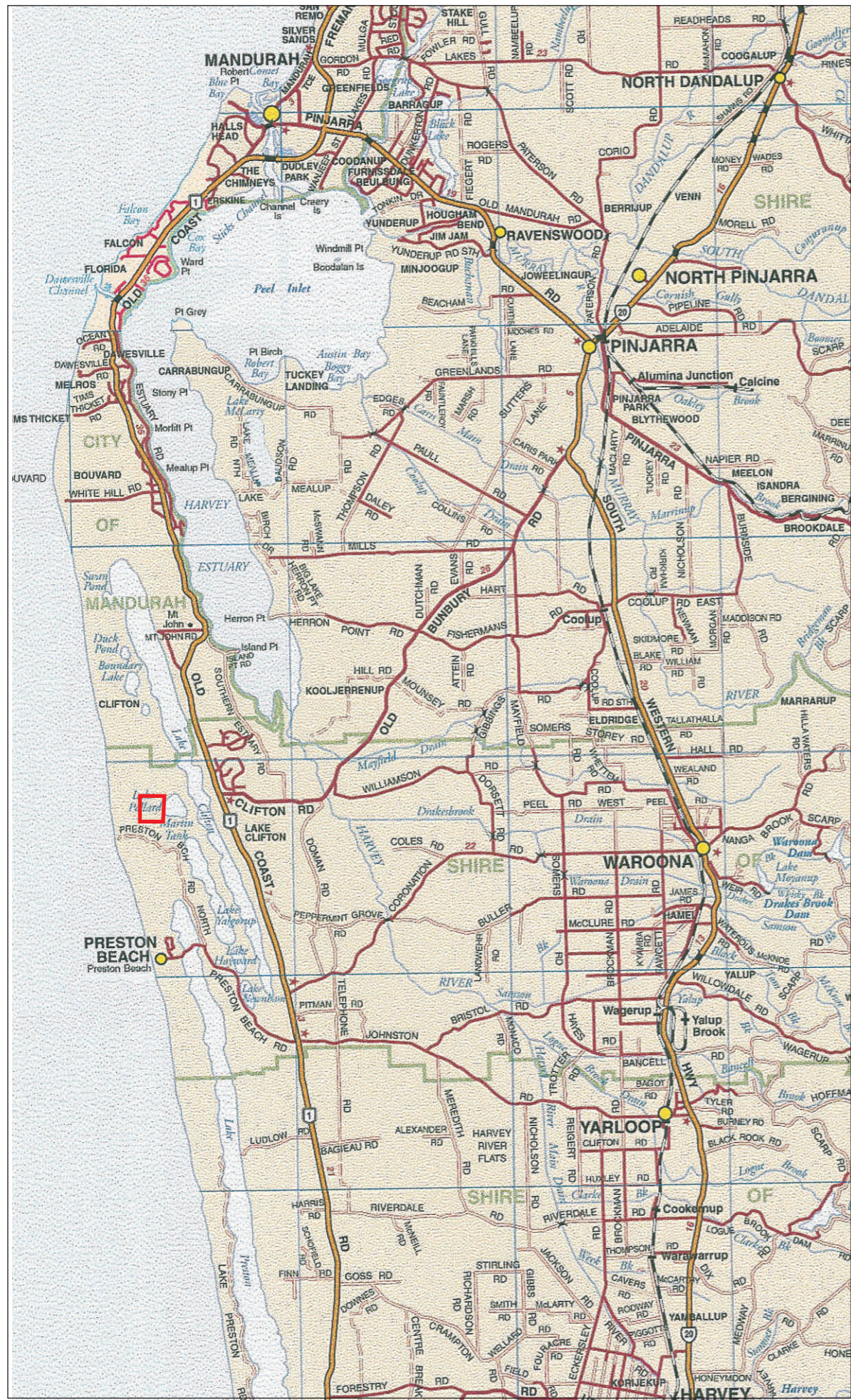
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Government of Western Australia  
Department of Mines and Petroleum

Geological Survey of Western Australia

Scale 1:100,000

UNIVERSAL TRANSVERSE MERCATOR PROJECTION  
HORIZONTAL DATUM: GEOCENTRIC DATUM OF AUSTRALIA 1984  
Grid lines indicate 10,000 metre intervals of the Map Grid Australia Zone 50

The Map Grid Australia (MGA) is based on the Geocentric Datum of Australia 1984 (GDA84).  
GDA84 positions are compatible within one metre of the datum WGS84 positions.

**GEOLOGICAL SURVEY OF WESTERN AUSTRALIA**  
**RESOURCE POTENTIAL FOR LAND USE PLANNING**  
**REGIONALLY SIGNIFICANT BASIC RAW MATERIALS**  
**PINJARRA**

SHEET 2032 FIRST EDITION 2012  
Season 1.0 - May 2012

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Figure 1

DOYLES LIME SERVICE – PRESTON PIT	
LOCATION	
Landform Research	May 2013
Source NEARMAP	Scale See Plan

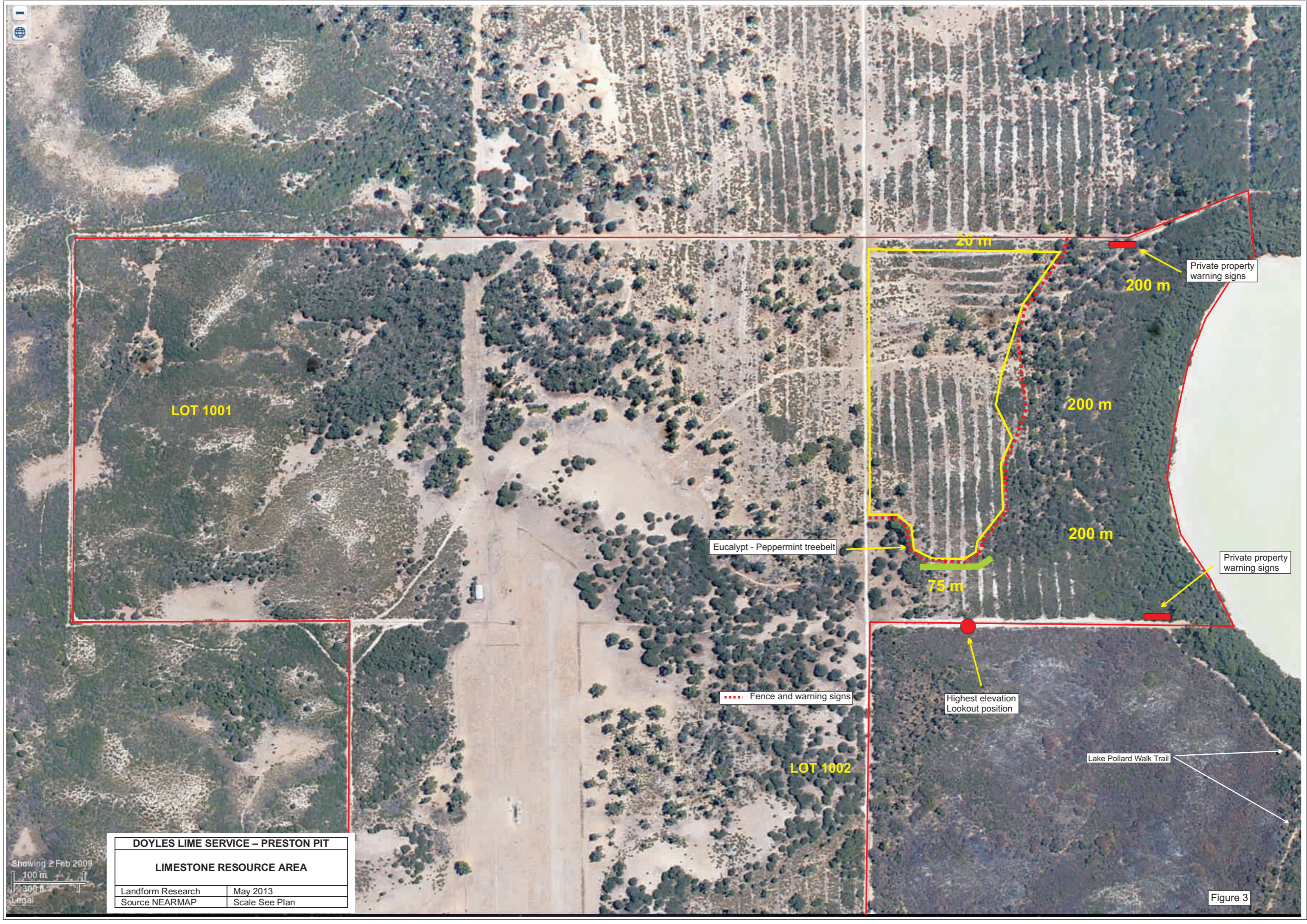


Figure 2

<b>DOYLES LIME SERVICE - PRESTON PIT</b>	
<b>SURROUNDING LANDUSE</b>	
Landform Research	May 2013
Source NEARMAP	Scale See Plan

Showing 2 Feb 2009  
 1000 m  
 2000 ft  
 Legal NEARMAP





LOT 1001

LOT 1002

Eucalypt - Peppermint treebelt

..... Fence and warning signs

20 m

200 m

200 m

200 m

75 m

Highest elevation  
Lookout position

Private property  
warning signs

Private property  
warning signs

Lake Pollard Walk Trail

DOYLES LIME SERVICE – PRESTON PIT	
LIMESTONE RESOURCE AREA	
Landform Research	May 2013
Source NEARMAP	Scale See Plan

Showing 2 Feb 2009  
100 m  
300 ft  
Legal

Figure 3



Storage facility

Bulldozer

Limestone resource area

Limestone resource area

Crusher and screen

Loader

Limestone resource area

Lime stockpile

Showing 6 Feb 2013  
10 m  
40 ft  
Legal

Figure 4

DOYLES LIME SERVICE – PRESTON PIT	
MYALUP PIT SHOWING TYPICAL SITE LAYOUT	
Landform Research	May 2013
Source NEARMAP	Scale See Plan

RESOURCE EXCAVATION

WEST

STAGING

EAST

Loader takes resource from dump to load the crusher. Loader operates on floor of pit, behind dumps, to reduce dust and noise.

Limestone is ripped and pushed into a resource dump by a bull dozer. Operating behind the eastern face on the floor of the pit.

STAGE 1

STAGE 2

STAGE 3

STAGE 4

Lake Pollard



WEST

EAST

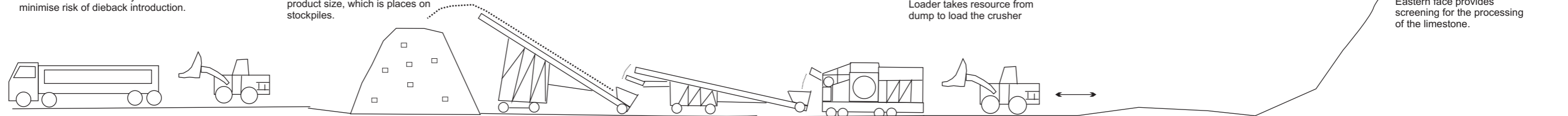
Product is loaded from stockpiles to road trucks. Road traffic is isolated from excavation for safety and to minimise risk of dieback introduction.

Screening plant to obtain correct product size, which is places on stockpiles.

Electric primary and secondary crushers powered by self contained diesel generator. Operating plant is located on the floor of the pit screened by the eastern face to provide noise and dust screening.

Loader takes resource from dump to load the crusher

Eastern face provides screening for the processing of the limestone.



LAND RESTORATION AND REHABILITATION

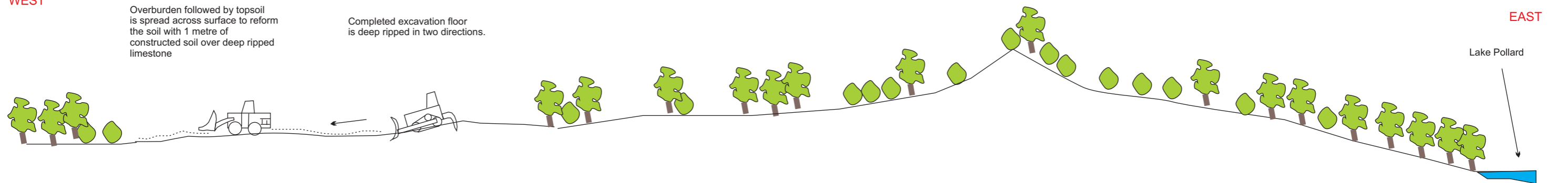
WEST

EAST

Overburden followed by topsoil is spread across surface to reform the soil with 1 metre of constructed soil over deep ripped limestone

Completed excavation floor is deep ripped in two directions.

Lake Pollard



PROCESSING



PROPOSED OPERATIONS - LIMESTONE OPERATIONS - PRESTON  
SKETCH SECTIONS AND STAGING

See Figures 4 and 6 for sections and aerial view of typical and proposed operations.



Doyles Lime typical operations at Myalup pit. Operations will be similar at the proposed Preston pit.



Cleared land on the resource colonised by Dune Onion Weed *Trachyandra divaricata* with regrowth limestone community



View of Lake Pollard from the top of the resource. Excavation will take place from the left, behind the ridge which will hide the quarry from the ;Lake and surrounding area.



Typical crushed lime resource showing working behind a face as proposed



Loader used to move materials around the operations.

See Figures 4 and 5 for sections and aerial view of typical and proposed operations.



Processing at Myalup showing the face used for visual, noise and dust screening



Screening vegetation to Lake Pollard

Figure 6

<b>DOYLES LIME SERVICE – PRESTON PIT</b>	
<b>OPERATIONAL PHOTOGRAPHS</b>	
Landform Research	May 2013

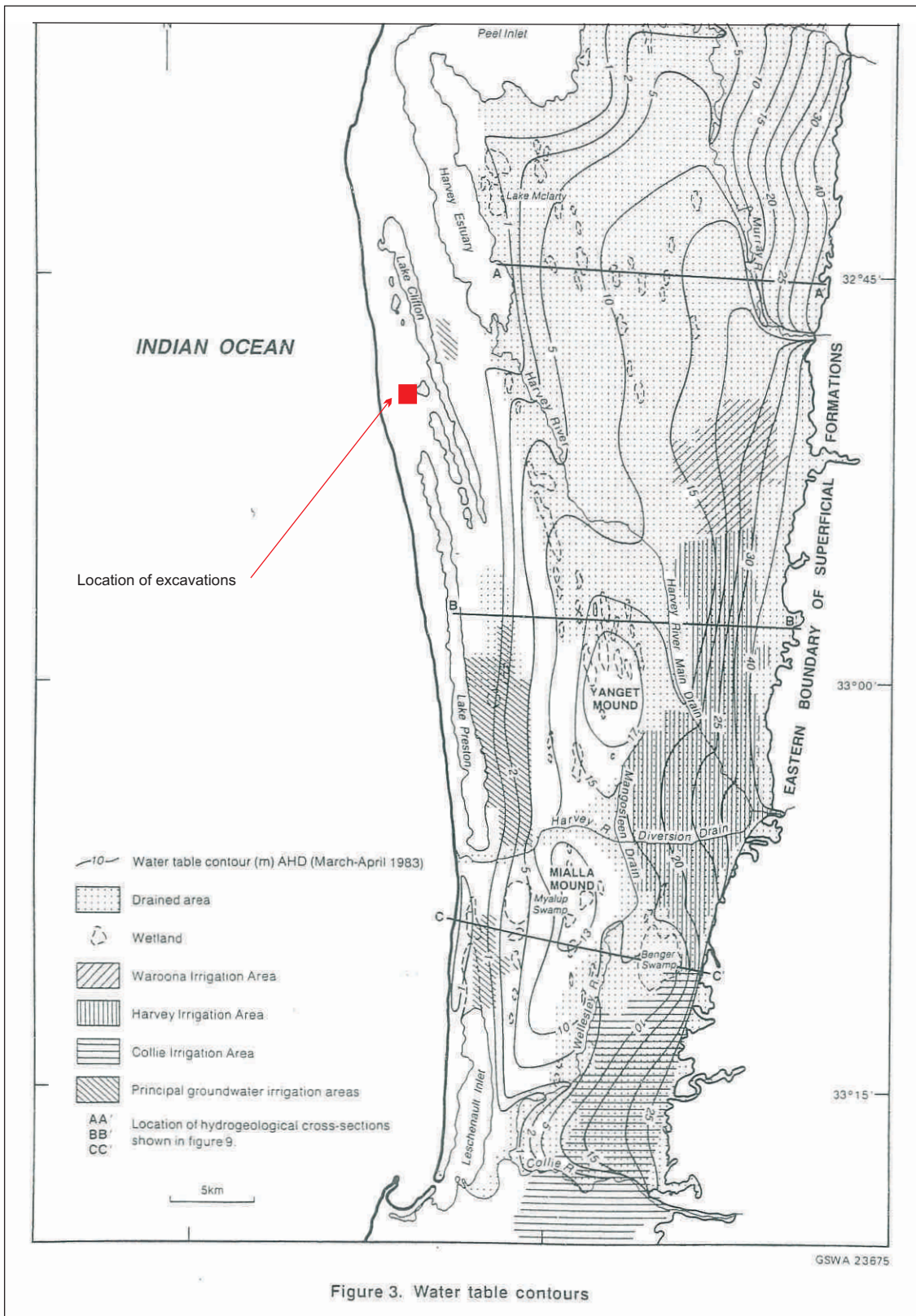
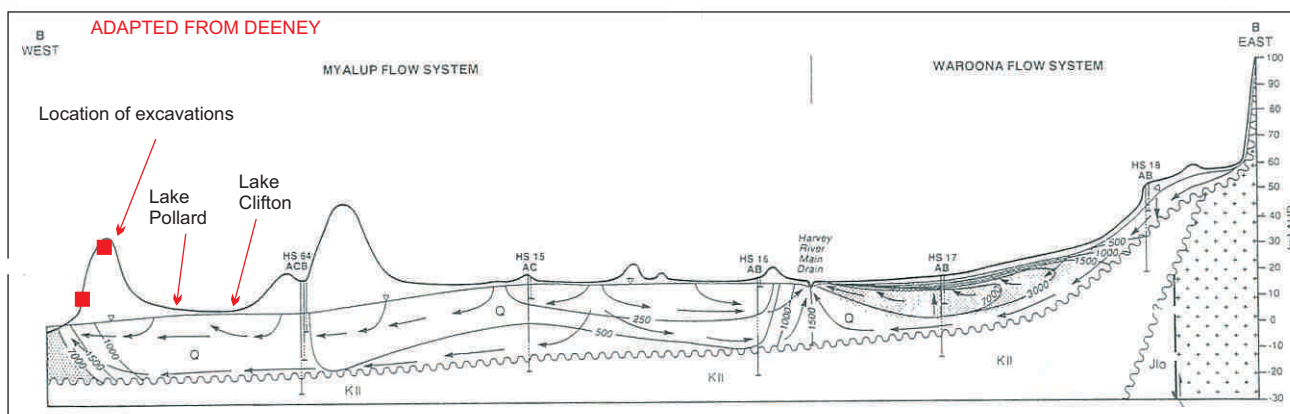
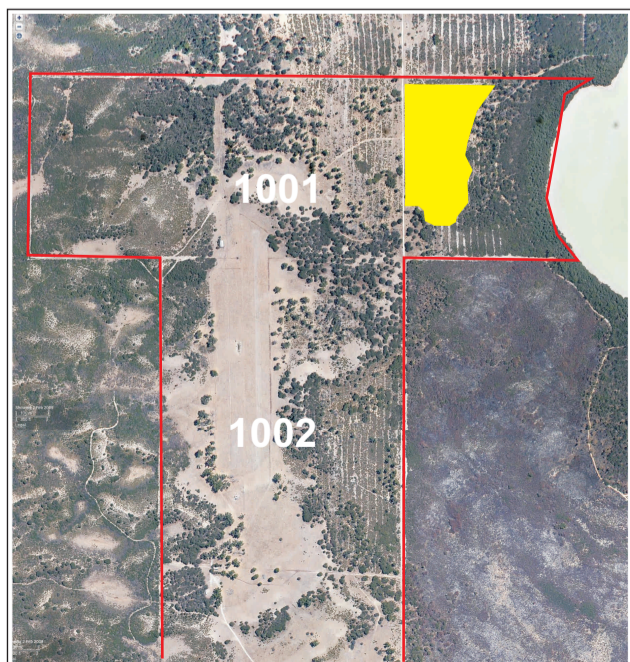
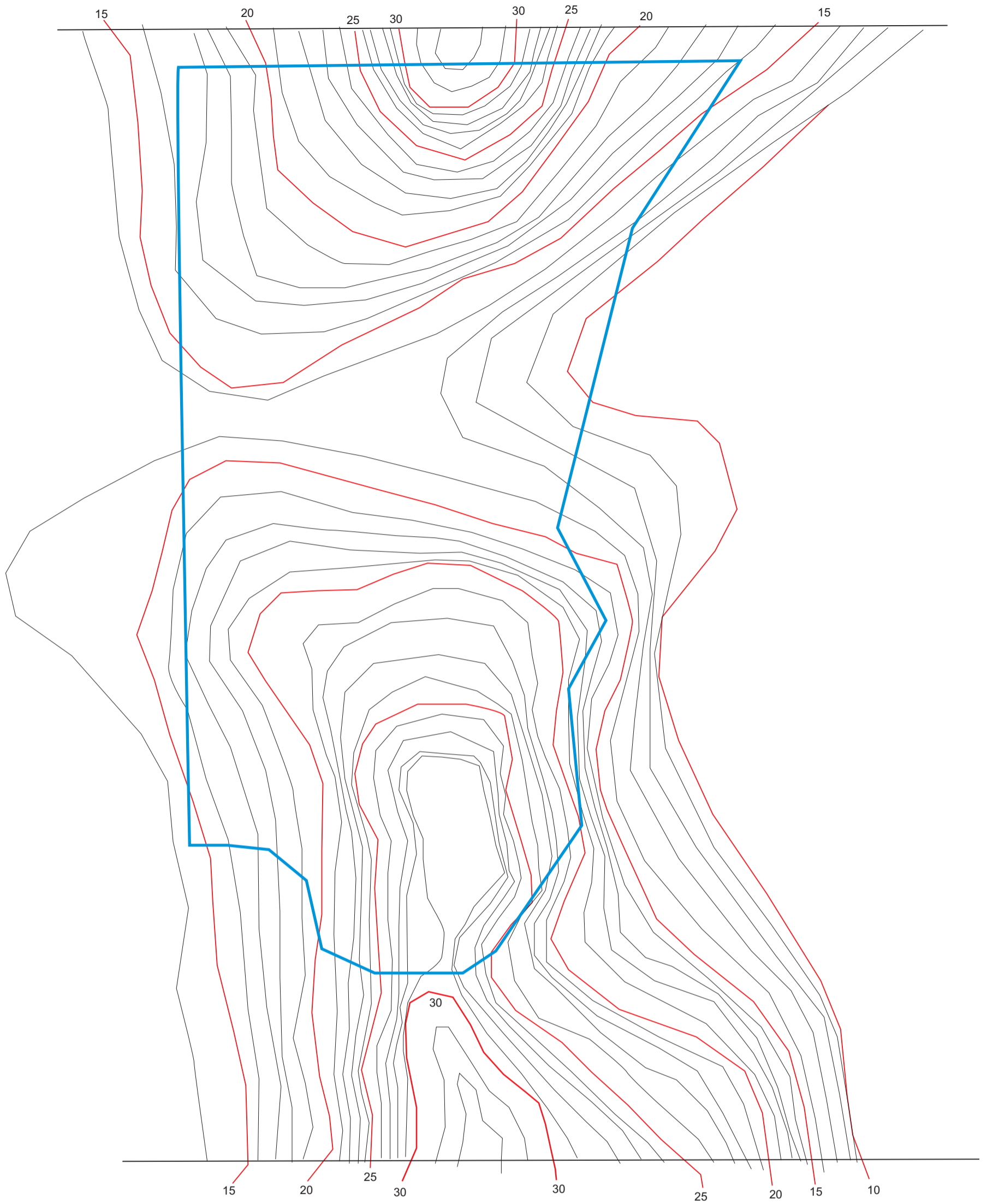


Figure 3. Water table contours

HYDROLOGY - Copied from Deeney (undated) Figures 3 and 9) Figure 7





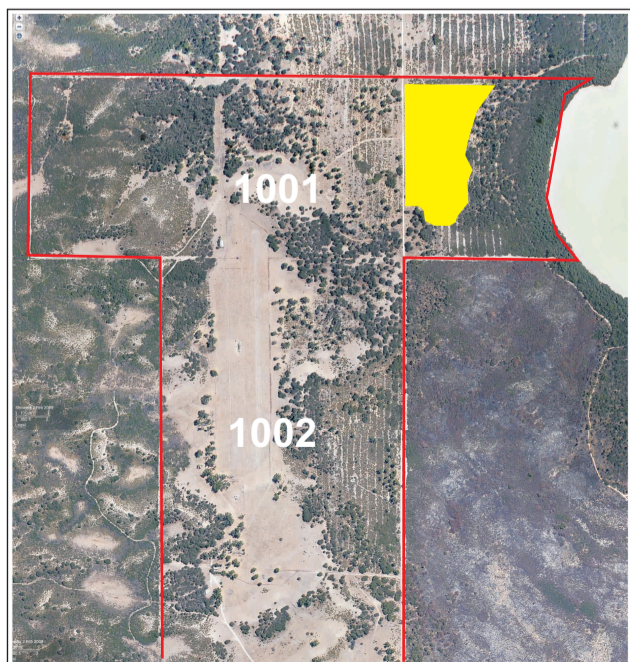
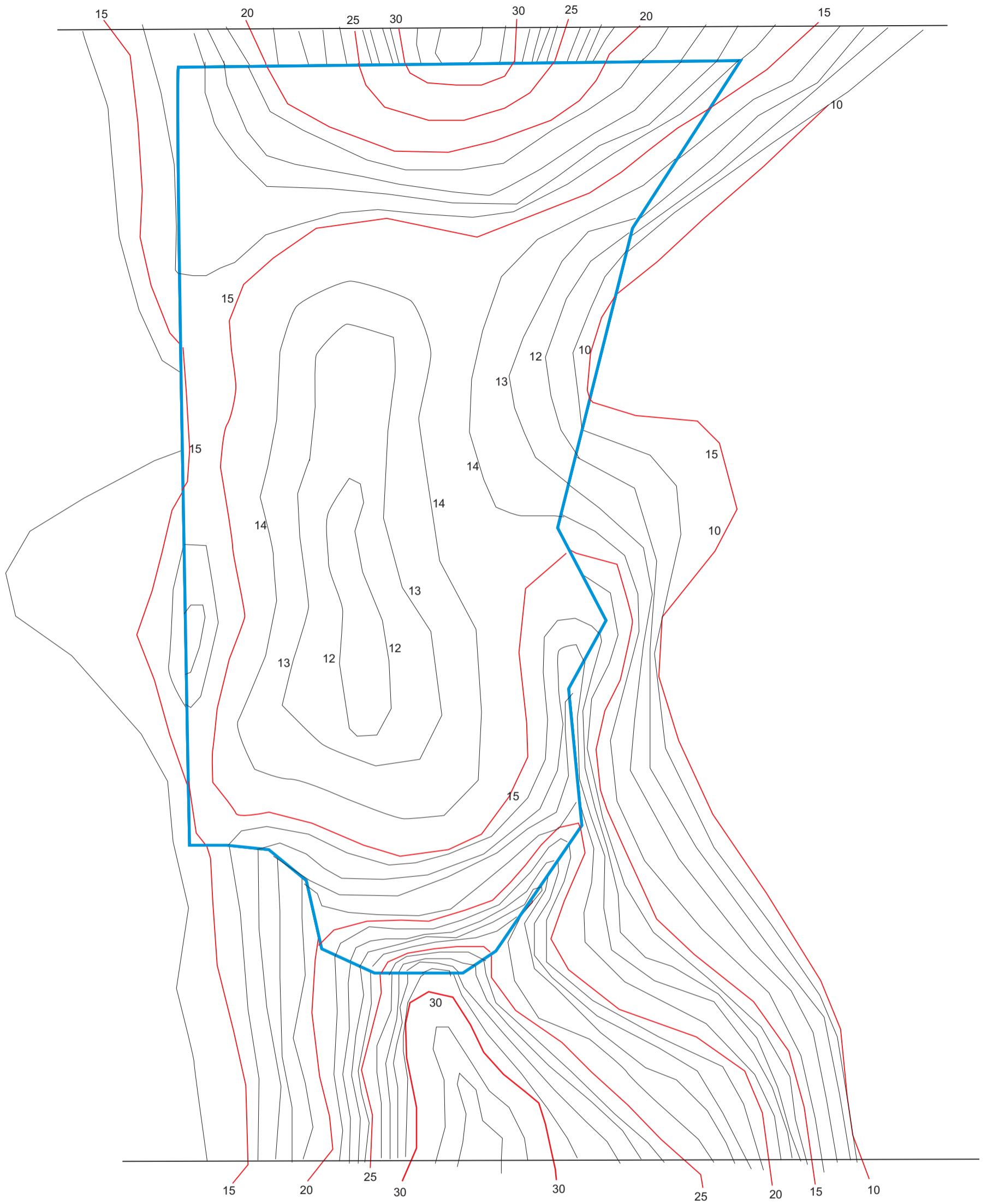
0 50m



Proposed pit

Figure 8A

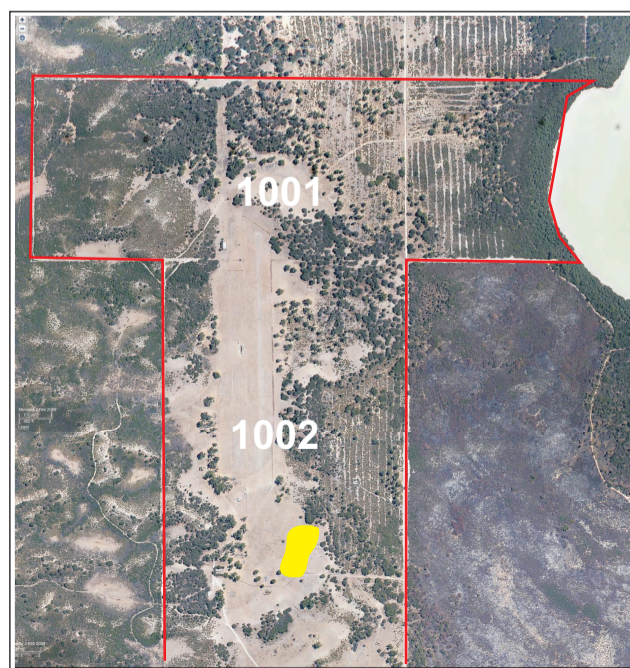
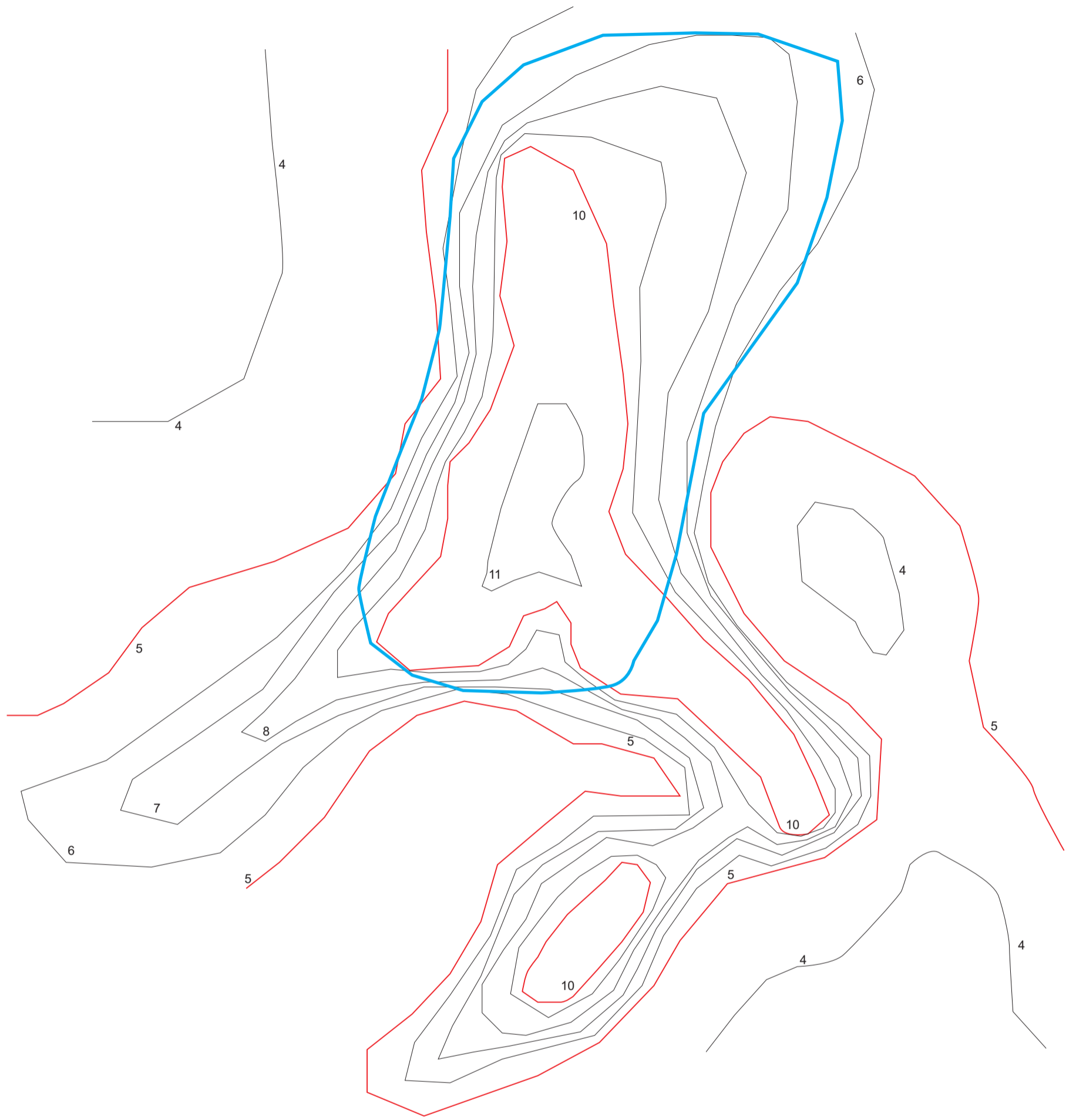
<b>DOYLES LIME SERVICE – PRESTON PIT</b>	
<b>LIMESTONE PIT EXISTING CONTOURS</b>	
Landform Research	May 2013
Source LANDGATE	Scale 1 : 2000 at A3



Proposed pit

Figure 8B

<b>DOYLES LIME SERVICE – PRESTON PIT</b>	
<b>LIMESTONE PIT CONCEPT FINAL CONTOURS</b>	
Landform Research	May 2013
Source LANDGATE	Scale 1 : 2000 at A3

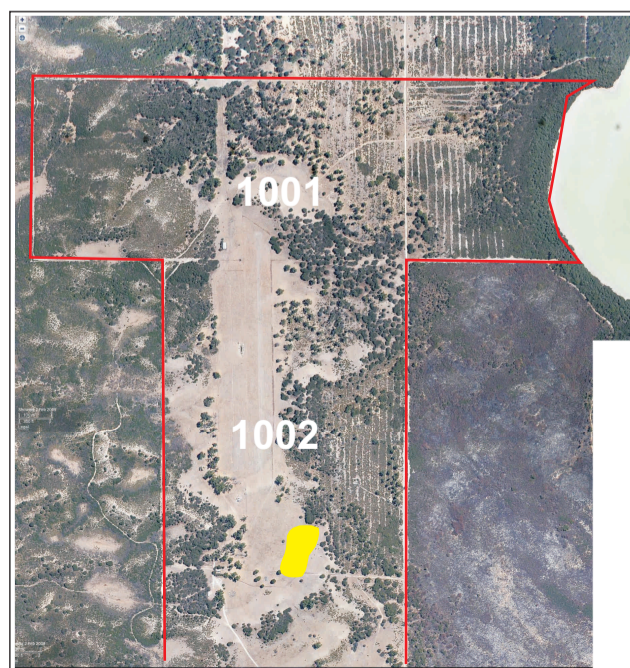


Proposed pit

Figure 9A

DOYLES LIME SERVICE – PRESTON PIT	
SAND PIT EXISTING CONTOURS	
Landform Research	May 2013
Source LANDGATE	Scale 1 : 2000 at A3





0 50m



Proposed pit

Figure 9B

<b>DOYLES LIME SERVICE – PRESTON PIT</b>	
<b>SAND PIT CONCEPT FINAL CONTOURS</b>	
Landform Research	May 2013
Source LANDGATE	Scale 1 : 2000 at A3

## Vegetation and Flora Assessment, Lot 1001, Preston Beach North Road, Preston Beach.

March 2013

### 1.0 INTRODUCTION

Doyles Lime Service proposes to open a limestone quarry on 12 hectares of a limestone ridge on Lot 1001, Preston Beach North Road, Preston Beach.

The limestone is to be used for increasing the pH of agricultural land throughout the south west and local area to counteract the trend to acidification due to nitrogenous fertiliser and legume production.

The limestone is essential to the local agricultural industry, but is restricted in distribution and grade south of Perth and the South West. Whilst limestone is more common a significant part lies within the Conservation Estate. Much of the limestone and calcareous dunes are located within coastal Crown land and Reserves.

The importance of the local lime is recognised in the *Department of Agriculture and Food Bulletin 4660, Survey of Western Australia agricultural lime sources*.

Crushed limestone and limesand is an essential resource to the State, for correcting soil acidity caused during normal farming operations through the use of nitrogenous fertilizer and legume crops. The need for crushed limestone for use as agricultural lime is recognised by the *Department of Agriculture and Food (Bulletin 4784)*.

To be most effective limestone has to be of the highest grade and, whilst coastal calcareous dunes and limestone do contain calcium carbonate the grades are often too low for efficient and economic use. For example using limestone at half the calcium carbonate content will require double the amount to be excavated, leading to additional land clearing, excavation and transport for no greater gain.

Acidification of soils is seen as one of the major impediments to continued viable farming in Western Australia. The *State Of the Environment Report Western Australia 2007* shows that about two thirds of the South West agricultural soils are at risk of acidification. When the acidity builds up essential nutrients become unavailable to plants and the crops reduce in vigour and eventually fail. In addition some other elements such as aluminium become soluble and lead to toxicity in stock and plants.

Lime from limesand is also used for remediation of acid sulfate conditions and a source of  $\text{CaCO}_3$  for some industrial processes.

Typically the limesand has a calcium carbonate content of over 70%.

Currently limestone is sent from coastal limestone quarries mainly around the Myalup area, east to the agricultural areas. The limestone in the Myalup area is running out and a new source of limestone is required. The Lake Preston North area is identified by the Department of Mines and Petroleum as a Regionally Significant Limestone Resource. See Figure 1 of the main report.

The general geology and deposits have also been reviewed by the Western Australian Geological Survey and summarised in Abeysinghe 1998, pages 48 – 50. The significance of this resource is that there are only scattered available deposits between Mandurah and Bunbury of very limited area and volume.

Therefore an Application for Planning Consent and Extractive Industries Licence is being applied for by Doyles Lime Service for a limestone pit on Lot 1001.

A Clearing Permit will be required, and this vegetation assessment provides the background for that application. This document should be read in conjunction with the Excavation and Rehabilitation Management Plan, Lots 1001 and 1002, Preston Beach Road, North, Preston Beach dated May 2013.

The Application for Clearing Approval relates only to the resource area which is the subject of this flora and vegetation assessment. The vegetation in the surrounding vegetation was not assessed.

## **2.0 METHODOLOGY**

### **Aims of the Survey**

The aims of the survey were to assess the vegetation in terms of plant communities, vegetation condition, plant species and the potential for Rare and Priority Species to be present on this site.

The study was undertaken to comply with Environmental Protection Authority (2004) Guidance Statement, *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia*, No 5,1 June 2004.

The quality of the vegetation is not high and therefore only a Class 1 study is required.

### **Methodology**

Lindsay Stephens of Landform Research conducted a vegetation assessment. The site was assessed on 23 May 2012 by extensive walking and traverses across the resource area.

No sample plots were conducted because of the paucity of the vegetation.

During that inspection the whole of the ridge was traversed at intervals of approximately 20 metres. The traverses were generally in straight lines but varied where different plants of vegetation were noticed, in order to detect all species. In the better or more visually significant vegetation traverse intervals down to 10 - 20 metres or less were used. All native species noted during the traverses were recorded.

Exotic species were also recorded.

The results are shown in Tables 2 and 3. This data was compared to data in Gibson et al 2004, as outlined below, to confirm the community type and vegetation complex to which the vegetation is most closely aligned.

The DEC Threatened and Priority Flora database was searched. The Commonwealth EPBC databases were also searched.

The main references for plant identification were knowledge of the assessor, published texts, and Florabase, including as necessary comparison to the WA Herbarium Reference Collection.

Determinations and inferences on the Vegetation Complexes and Floristic Community Types were made in a number of ways, relating to comparisons to published floristics and geomorphic and regolith matching.

- Bush Forever used the same methodology based on comparisons to published floristics and geographic information, Bush Forever 2000, Volume 2 page 487.
- Comparisons were made to published boundaries of Vegetation Complexes in Heddle et al, 1980.
- Comparisons of species were made to the descriptions of Floristic Community Types in Gibson et al 1994, pages 29 to 45.
- Comparisons of species were made to the sorted table in Gibson et al 1994, Table 12, which shows the species frequency within each Floristic Community Type. Weston 2004 states that Neil Gibson noted that such comparisons are possible.
- Comparisons were made to the descriptions of the Floristic Community Types and maps in Appendix 1 of Gibson et al 2004.
- Examination of *DEC 2009, The documentation in The Flora and Vegetation of the Dawesville to Binningup Region (Swan Coastal Plain)*.
- Comparison to regolith maps such as the 1 : 50 000 Lake Clifton - Hamel Environmental Geology Map Sheets produced by the Western Australian Geological Survey.
- Comparisons were made to published boundaries of Landforms and Soils in Churchward and McArthur, 1980.
- Soil and regolith mapping and assessment of the geomorphology by Lindsay Stephens at the time of the site inspections. Soil and regolith mapping has been found to be very closely aligned to species composition through extensive field mapping by Landform Research, with small changes to the clay or sesqui-oxide content being related to the introduction and deletion of a particular indicator.
- Comparisons to databases of Regolith and Vegetation Communities held by Landform Research and the field experience of Lindsay Stephens.

### **Limitations**

The current study of the site was conducted to EPA (2004) Guidance Statement, *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia*, No 5,1 June 2004.

The timing of the study as in Autumn but considering the amount of disturbance to the vegetation, this was considered acceptable.

Using traverses and no plots was also considered acceptable and not limiting because of the history of strip clearing, fertilising and grazing which has lead to a paucity of taxa being present.

### 3.0 PHYSICAL ENVIRONMENT

#### 3.1 Site Description

The site is a ridge of limestone rising to 3 metres AHD which is approximately 14 metres above the surrounding plain.

The limestone of the low ridge was formed as limesand dunes behind beach deposits that now lie inland from the coast due to accretion of the coast between Mandurah and Bunbury. The limestone is a calc-arenite made from beach sand containing predominantly shell fragments with minor and variable quartz. The limestone has been lithified and recrystallised on the ridge tops to lift the percentage of calcium carbonate to over 70%.

It forms part of several lines of beach ridges that formed along the coast and when formed slowed the groundwater flow to form a series of parallel lakes between the ridges. (Lake Clifton in the east, Martins Lake – Lake Pollard and Lake Preston in the west.

The degree of lithification (hardness) changes over the property, and determines the use to which each type of limestone can be put.

It is ascribed to the Tamala Limestone although it may well be a younger sequence than Tamala Limestone in some other locations.

In other localities dates of between 25 000 and 100 000 years have been obtained for the Tamala Limestone.

The local Geology and geomorphology is expanded on in *Semeniuk V and C, 2009, Quaternary geology, landforms and wetlands between Dawesville and Binningup – Description, key features and geoheritage significance* prepared by the DEC.

#### 2.3 Soils

Soils on the site consist predominantly of brown to yellow brown sands over limestone at depth. The soils are classified as Cottesloe soils.

The Tamala Limestone is covered by shallow, yellow brown, calcareous loamy sands that have originated as a result of weathering of the limestone on the central ridge. Deeper sand occurs in the swale in the west and to the east.

Approximately 0 - 100 mm of brown sandy soils of the Cottesloe type overly the limestone, although on the ridge top there is very little soil material.

A typical soil profile from the limestone ridge is:

Soil Horizon	Depth	Description
O-A	0 -10 mm	Weakly developed, leaf litter and decomposing organic matter
B	10 - 500 mm	Dark brown siliceous sandy soils that become lighter with depth. In some locations the soils can be 2 metres deep but in others only 100 mm.
C	> 500	Cream recrystallised limestone

## 4.0 VEGETATION

### 4.1 Community Types

#### Previous Work

As far as is known no past work has been conducted on site. Extensive assessments were conducted during the Flora and Vegetation Studies conducted for the Dawesville to Binningup research, including the vegetation in the adjoining Yalgorup National Park would have been considered

#### Current Study

The resource area that comprises 12 hectares has been strip cleared in the past and intensively grazed and in part seeded with pasture species.

The whole site is designated Cottesloe Complex, Central and South, as identified by Hedde et al, 1980, *Vegetation Complexes of the Darling System, Western Australia in Atlas of Natural Resources, Darling System, Western Australia*, Department of Conservation and Environment. This designation also includes the more sandy areas.

Cottesloe Complex, Central and South, "*Mosaic of woodland of Eucalyptus gomphocephala, and open forest of Eucalyptus gomphocephala – Eucalyptus marginata – Eucalyptus calophylla; closed heath on limestone outcrops.*"

Community Types were isolated by Gibson et al, 1994, *A Floristic Survey of the Southern Swan Coastal Plain*, Unpublished Report for the Australian Heritage Commission, prepared by Department of Conservation and Land Management and the Conservation Council of Western Australia.

Only one type of vegetation is present on the proposed excavation area. With disturbance this may have been slightly altered.

#### Limestone Shrubland Regrowth

Remnant and regrowth limestone heathland of *Melaleuca systema*, *Templetonia retusa*, over exotic groundcovers.

In common with degraded, grazed and previously cleared areas there are often species that are represented by just a few plants or occur as a scatter of plants in one location. This tends to increase the total number of native species present, but in reality the 100 m<sup>2</sup> plot provides a good representation of the quality of the vegetation and the ratio of native to exotic species across the site.

Based on comparisons with Gibson et al 1990, this community is best related to Community Type 26b, "Woodlands and mallees on limestone". The absence of trees is related to them dropping out of the vegetation on the limestone ridge.

On the other hand even though the dunes are classified as Quindalup, Community Type 26b is not listed for the dunes in the *Dawesville to Binningup Region* flora and vegetation survey.

#### Eucalypt Regrowth Shrubland.

Round the base of the ridge the vegetation picks up *Agonis flexuosa* which appears to be natural and regrowth.

Downslop of that *Eucalyptus decipiens* remnant and regrowth shrub layer of native species with pasture and exotic species groundcover .

Based on comparisons with Gibson et al 1990, this community is best related to Community Type 26b, "Woodlands and mallees on limestone".

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EPA Guidance 10 *Level of assessment for proposals affecting natural areas within the System 6 region and Swan Coastal Plain portion of the System 1 Region* lists Cottesloe Complex - Central and South as having 41.1% of the pre-European area still occurring and 8.8% in secure tenure.

Whilst there exists greater than 30% of this Complex it is not well reserved. The clearing Regulations provide a higher level of protection than was previously available, and the same vegetation complex is included in the Yalgorup National park.

The assessments within the Flora and Vegetation Assessment attached, found that the proposed clearing will have little overall effect on flora and fauna within the local area, with most of the effect relating to the final end use, and that appears to have been the case.

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- **Vegetation Condition**

The area covered by the proposal will require a Clearing Permit CPS. It has been strip cleared in the past as shown on the existing aerial photography.

The remnant vegetation is listed as Good with Degraded to Completely Degraded strips using Bush Forever and Kaesehagen 1995 as described in Appendix 1.

- **Rare and Priority Species**

No Declared Rare or Priority species were recorded. No Threatened Ecological Community was noted.

#### **4.2 Species List – Species Richness and Plant Density**

The species recorded during the site investigation are listed in Tables 1 and 2.

In spite of extensive searches only 10 native species were found, of which two were found as only one plant. Effectively there are only eight species present. which is very low for this type of vegetation over an area of 12 hectares. The vegetation is dominated by *Trachyandra divaricata* an exotic species.

Bush Forever lists the species richness of Community Type 26b, "Woodlands and mallees on limestone" as 49.8 species per 100 m<sup>2</sup> plots. The comparison of 8 and 10 native species on site shows the degraded level of the vegetation.

**Table 1 Species List**

- X Denotes common species.  
 XXX Denotes a dominant widespread species  
 <10 Indicates present as between 1 and 10 plants in the surveyed area.  
 1 Indicates a single plant observed or the total number of plants of that species observed.

FAMILY	GENUS - SPECIES	North of excavation 23 May 2012
Cyperaceae	<i>Lepidosperma costale</i>	1
Dilleniaceae	<i>Hibbertia cuneiformis</i>	X
Epacridaceae	<i>Leucopogon parviflorus</i>	1
Myrtaceae	<i>Agonis flexuosa</i>	X
	<i>Eucalyptus decipiens</i>	X
	<i>Melaleuca systema</i>	X
Papilionaceae	<i>Templetonia retusa</i>	X
Proteaceae	<i>Dryandra sessilis</i>	X
	<i>Hakea prostrata</i>	X
Xanthorrhoeaceae	<i>Xanthorrhoea preissii</i>	X
<b>TOTAL SPECIES</b>		<b>10 species</b>

**Table 2 Vegetation Survey Exotic Plants**

- X Denotes common species.  
 XXX Denotes a dominant widespread species  
 <10 Indicates present as between 1 and 10 plants in the surveyed area.  
 1 Indicates a single plant observed or the total number of plants of that species observed.

FAMILY	GENUS - SPECIES	Predominant y on the Western Ridge Prior to clearing	Predominant y on the Eastern Ridge Prior to clearing	North of excavation 27 January 2011
Asclepiadaceae	<i>Gomphocarpus fruticosus</i>	X	X	X
Asteraceae	<i>Hypochoeris sp</i>		X	
	<i>Sonchus oleraceus</i>	X	X	
Euphorbaceae	<i>Euphorbia terracina</i>		X	
Fabaceae	<i>Lupinus albus</i>		X	
	<i>Lupinus cosentinii</i>	X	X	
	<i>Trifolium sp</i>	X	X	
Iridaceae	<i>Tritonia crocata</i>	X		
Onagraceae	<i>Oenothera jamesii</i>	X		
Orobanchaceae	<i>Orobanche minor</i>	X		
Polygalaceae	<i>Acetosella vulgaris?</i>	X		
Poaceae	<i>Avena barbata</i>	X		
	<i>Briza maxima</i>	X		
	<i>Bromus madritensis</i>	X		
	<i>Ehrarta calycina</i>	X	X	
	<i>Lagurus ovatus</i>	X		
	<i>Lolium rigidum</i>	X	X	
	<i>Vulpa sp</i>		X	



Primulaceae	<i>Anagallis arvensis</i> var <i>caerulea</i>	X		
Solanaceae	<i>Solanum linnaenum</i>	1		X
<b>TOTAL EXOTIC SPECIES</b>		<b>19 species</b>		<b>2 species</b>

### 4.3 Rare, Priority and Significant Flora

Flora can be significant on the basis of features of the taxa, its distribution and rarity. Flora as a vegetation community or complex can also be significant based on similar principles. The most commonly used determinants of significance are listed below.

A number of flora are regarded as significant even though they may not be listed as Declared Rare or Priority species. "Significant flora" and "Significant vegetation" are defined in Environmental Protection Authority (2004) Guidance Statement, Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia, No 51, June 2004.

#### **SIGNIFICANT FLORA**

Species, subspecies, varieties, hybrids and ecotypes may be significant for a range of reasons, other than as Declared Rare Flora or Priority flora, and may include the following:

- a keystone role in a particular habitat for threatened species, or supporting large populations representing a significant proportion of the local regional population of a species;
- relic status;
- anomalous features that indicate a potential new discovery;
- being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- the presence of restricted subspecies, varieties, or naturally occurring hybrids;
- local endemism/a restricted distribution;
- being poorly reserved.

#### **SIGNIFICANT VEGETATION**

Vegetation may be significant for a range of reasons, other than a statutory listing as Threatened Ecological Communities or because the extent is below a threshold level, and may include the following reasons:

- scarcity;
- unusual species;
- novel combination of species;
- a role as a refuge;
- a role as a key habitat for threatened species or large populations representing a significant proportion of the local to regional total population of a species;
- being representative of the range of a unit (particularly, a good local and/or regional example of a unit in "prime" habitat, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- a restricted distribution.

#### **THREATENED ECOLOGICAL COMMUNITY**

Ecological communities that have been assessed through a procedure (coordinated by DEC) and assigned to one of the following categories related to the status of the threat to the community. (EPA Guidance Statement No 51 2004).

##### **Presumed Totally Destroyed**

##### **Critically Endangered**

<10% of the pre-European extent remains in an intact condition in the bioregion.

##### **Endangered**

10 – 30% of pre-European extent remains

### **Vulnerable**

*Declining and/or has declined in distribution and/or condition, and whose ultimate security is not yet assured (it could move into a category of higher threat in the near future if threatening processes continue)*

### **DECLARED RARE FLORA**

*Species specially protected under the Wildlife Conservation Act 1950, as identified in the current listing. Normally listed within a Wildlife Conservation (Rare Flora) Notice.*

**R:** *Declared Rare Flora – Extant Taxa*

*Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection and have been gazetted as such.*

**X:** *Declared Rare Flora – Presumed Extinct Taxa*

*Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.*

### **PRIORITY FLORA**

*Lists of plant taxa, maintained by the Department of Environment and Conservation that are either under consideration as threatened flora but are in need of further survey to adequately determine their status, or are adequately known but require monitoring to ensure their security does not decline.*

**1:** *Priority One – Poorly known taxa*

*Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, eg road verges, urban areas, farmland, active mineral leases, etc, or the plants are under threat, eg from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declarations as “rare flora”, but are in urgent need of further survey.*

**2:** *Priority two – Poorly known taxa*

*Taxa which are known from one or a few (generally <5) populations, at which some at least are not believed to be under immediate threat (ie currently not endangered). Such taxa are under consideration for declarations as “rare flora”, but are in urgent need of further survey.*

**3:** *Priority Three – Poorly known taxa*

*Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (ie not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declarations as “rare flora”, but are in urgent need of further survey.*

**4:** *Priority Four – Poorly known taxa*

*Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not in currently threatened by any identifiable factors. These taxa require monitoring every 5 – 10 years.*

## **COMMONWEALTH LEGISLATION**

Sometimes vegetation communities or plant taxa are listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

### **Previous Studies**

As far as is known no previous studies have been undertaken on Lot 4.

### **Current Study**

- **Endangered Communities**

Community Type 26a is listed as a Threatened Ecological Community, (Endangered), and is recorded in the wider Perth Metropolitan Area from Yanchep south.

The vegetation of the ridge cannot be classified as Community Type 26a, because the limestone does not have the recalcified pinnacle formation on which Community Type 26a occurs and has only several *Melaleuca huegelii* on the ridge. The combination of *Melaleuca systema* – *Melaleuca huegelii* is one of the key indicators of this community. The dense combination does not occur on this site.

The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 database lists Aquatic Root Mat Communities in Caves of the Swan Coastal Plain and Sedgeland in Holocene dune swales of the southern Swan Coastal Plain. The Holocene dune swales do not occur on site, being restricted to the Holocene Dune sequences.

The limestone ridge is to the west of the Tamala sequence of dunes and is too young for cave development. Even deep quarries nearby to the west have no evidence of karst or cave development. Clumps of large Tuart trees are indicators of potential cavity development and none occur on or adjacent to the ridge.

EPA Guidance 54, concentrates on Stygofauna, which occur in caves and “are aquatic subterranean animals, found in a variety of groundwater systems”.

“Troglifauna occur in air chambers in underground caves or smaller voids”.

The issues of these organisms is best addressed on a risks basis, because the water table is not proposed to be impacted on. As the issue of stygofauna relates to the groundwater system, it is understood that groundwater management is of significance in order to minimise any risk to stygofauna if they occurred.

The risks approach is used in Guidance 54, on page 4 for proposals that are likely to have a potentially significant impact, and relate to;

- “lowering the water table”,
- “artificially changing water tables”,
- “changing water quality”
- “destroying or damaging caves.”

These factors apply to root mat communities as well as stygofauna. None of the risk factors listed in Guidance 54 are likely to occur on site, as outlined below.

Dr Brenton Knott at the University of Western Australia was contacted in relation to projects north of Perth. Dr Knott stated that the conditions for root mat communities are well known and covered by Jasinke E J, 1997.

Jasinke 1997, lists all of the following criteria to be necessary for the development of root mat communities;

- cavities in limestone or other rocks at the water table,
- presence of underground stream systems,
- permanent water in streams or pools
- an arid cave environment
- a land surface with Eucalypts and the water table at relatively shallow depth but less than a maximum of 30 metres
- or a land surface of shrubs and the water table within 3.5 metres of the surface

Dr Knott made the point that the known communities all relate to stream caves and this is also stated in Australian Government, Department of Environment and Heritage, 2000 under Critical Habitat.

The potential for root mat communities to occur on site is regarded as very low because the limestone is too young, and there is no evidence of stream caves or notching at wetlands and no Tuart trees are present. Even if they did occur they would not be disturbed as the water table is not proposed to be intersected. The base of the excavation is proposed to be in the order of 20 metres AHD, 20 metres above the water table.

- **Declared Rare, Priority and Significant Species.**

The vegetation and flora surveys did not locate any Declared Rare or Significant Taxa. Prior to the site inspection the DEC Rare and Priority Flora database was searched. The Commonwealth EPBC databases were also searched.

No listed species were encountered on site.

*Grevillea thelmaniana* is listed on some DEC databases, but it is believed that it should be delisted for limestone as it is now listed in error. *Grevillea thelmaniana* used to include *Grevillea preissii* which was separated into a new species and is not listed as Significant or as a Priority species. *Grevillea thelmaniana* remains listed as a P4 species but is restricted to clay pans on the eastern side of the Swan Coastal Plain and does not occur in limestone dunes. *Grevilla preissii* is not listed as a priority species.

Over the years there has been extensive searching for *Eucalyptus argutifolia*, by a number of persons including Lindsay Stephens, but none was observed on site.

No Priority species were recorded on site.

No plant communities or taxa are listed as a Threatened Ecological Community or taxa under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*.

One taxa listed in Bush Forever 2000 as "Significant", (Volume 2, pages 297 – 298) occurs on site. This is *Eucalyptus foecunda*

*Eucalyptus foecunda* occurs as a few trees in the swale between the two ridges. These will be retained. *Eucalyptus foecunda* is not listed as a Priority species and is only listed in Bush Forever as endemic to the Swan Coastal Plain and poorly reserved. *Eucalyptus foecunda* can be used in rehabilitation.

None of the taxa identified on site is listed as a Priority species. Even the lowest level of Priority Taxa P4 are listed as “Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5 – 10 years.”

The *Tuart Conservation and Management Strategy (draft December 2004)*, prepared by the Tuart Response Group on behalf of the Government of Western Australia, addresses the protection of Tuart Woodlands. There are no Tuart trees near the vegetation of the ridges.

The Draft Tuart Conservation and Management Strategy provides for offsets in Section 1.6.7 and again in Section 2 as a means of ensuring no net loss of Tuart Woodland by providing compensatory habitat. To this end Tuart Trees can also be included in the revegetation of the site. This will therefore comply with the intent of the Draft Tuart Conservation and Management Strategy.

#### 4.4 Vegetation Condition

##### VEGETATION CONDITION

The vegetation condition mapping used is that used by the Department of Environment and Conservation and is taken from *Bush Forever 2000*.

##### Vegetation Condition Scale reproduced from page 48 (*Bush Forever 2000*).

Condition Score	Vegetation Condition	Vegetation Descriptors
1	<b>Pristine</b>	<i>Pristine or nearly so, no obvious signs of disturbance</i>
2	<b>Excellent</b>	<i>Vegetation structure intact, disturbance affecting individual species, and weeds are non aggressive species.</i>
3	<b>Very Good</b>	<i>Vegetation structure altered, obvious signs of disturbance. For example disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.</i>
4	<b>Good</b>	<i>Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.</i>
5	<b>Degraded</b>	<i>Basic structure of the vegetation severely impacted on by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.</i>

<b>6</b>	<b>Completely Degraded</b>	<i>The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as "parkland cleared" with the flora comprising weed or crop species with isolated native trees or shrubs.</i>
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*This condition scale uses a scale that can distort the public perception of middle vegetation condition when compared to previous vegetation studies. In previous studies the word "Good" would have been a lower classification such as "Poor" as shown in Bush Forever 2000, page 48. The scale Good also does not seem to match the vegetation description provided on page 48. The Bush Forever 2000 Condition Score is possibly better related to the potential for regeneration of remnant vegetation rather being a descriptor of its current condition. See Attachment 2.*

*Another approach is to use the number of remaining species as an indicator of vegetation condition. This provides for a less subjective assessment of the vegetation condition. Kaesehagen, 1995, Bushland Condition Mapping, IN Invasive Weeds and Regenerating Ecosystems in Western Australia, Proceedings of Conference held at Murdoch University, July 1994, Institute for Science and Technology Policy, Murdoch University, 1995, A copy of the Kaesehagen 1995 vegetation condition table is shown below.*

<b>Descriptor</b>	<b>Percentage of species remaining</b>	<b>Comments</b>
<b>Very Good - Excellent</b>	<b>80 – 100%</b>	<ul style="list-style-type: none"> <li>• Vegetation structure intact or nearly so.</li> <li>• Cover / abundance of weeds less than 5%.</li> <li>• No or minimal signs of disturbance.</li> </ul>
<b>Fair - Good</b>	<b>50 – 80%</b>	<ul style="list-style-type: none"> <li>• Vegetation structure modified.</li> <li>• Cover / abundance of weed 5 – 20%, any number of individuals.</li> <li>• Minor signs of disturbance</li> </ul>
<b>Poor</b>	<b>20 – 50%</b>	<ul style="list-style-type: none"> <li>• Vegetation structure completely modified.</li> <li>• Cover / abundance of weeds 20 – 60% any number of individuals.</li> <li>• Disturbance incidence high</li> </ul>
<b>Very Poor</b>	<b>0 – 20%</b>	<ul style="list-style-type: none"> <li>• Vegetation structure disappeared.</li> <li>• Cover / abundance of weeds 60 – 100% cover, any number of individuals.</li> <li>• Disturbance incidence very high.</li> </ul>

### **Previous Work**

No previous work has been undertaken on site.

### **2008 Study – prior to clearing**

The vegetation has been subjected to past clearing, significant grazing and seeding with pasture species. There is significant exotic plant load in the ground cover.

For example there are 19 exotic species recorded for the site, and in the 100 m<sup>2</sup> sample plots the number of exotic species at 10 was equal to or above the native species of 8 and 10.

Another way of looking at vegetation condition is to use a structure condition approach as shown in the table below. This can provide a better understanding of the vegetation than using the subjective visual descriptors of Bush Forever 2000 which can distort the true picture of the condition.

VEGETATION STRUCTURE	HEIGHT	CONDITION (Modified from Bush Forever 2000)	COMMENTS
Overstorey	> 4 m	Nil	No trees occur on the limestone ridge. Trees occur in the swale which will not be excavated. Scattered Eucalypts may have occurred on the ridges in the past or they may have always been absent.
Tall Shrub layer	2 – 4 m	Degraded	Minor regrowth of <i>Agonis flexuosa</i> around the edges.
Lower Shrub Layer	0.5 – 2 m	Good	Scattered regrowth
Ground Cover	< 0.5 m	Degraded	Dominated by exotic pasture species and weeds with occasional indigenous ground cover species

Bush Forever lists the species richness of the two communities as Community Type 26b, "Woodlands and mallees on limestone" 49.8 species per 100 m<sup>2</sup> plots.

The vegetation is generally in Good to Degraded Condition (Bush Forever 2000 Scale). However this vegetation conditions scale is subjective and descriptor based.

The vegetation is significantly degraded and modified, and according to Kaesehagen 1995, would fall into the Poor Vegetation Condition after allowing for some annual species not having been detected for a number of reasons. Kaesehagen 1995, is a valid system based solely on species presence compared to high quality vegetation communities. It therefore often has more scientific validity than Bush Forever 2000. The other issue with the vegetation score used in Bush Forever 2000 is that it is at variance with other botanists for the "Good" category, (Bush Forever Volume 2, Page 48).

Based on the published condition scales the vegetation is therefore rated as significantly affected and on the low side of quality at Poor or Degraded even though Bush Forever may suggest the better sounding category of "Good to Degraded".

## 2011 Study

The area of vegetation to the north of the open ground has sparse understorey under low trees. The plant density is estimated as 1 plant per 3 m<sup>2</sup> which would be classified as Degraded.

## 5.0 SIGNIFICANCE OF THE FLORA

### SIGNIFICANCE OF FLORA

*The significance of the flora depends on a number of issues.*

- *Rare, Priority or Significant species may be present.*
- *A Threatened Ecological Community may be present.*
- *The development may take the area of the particularly vegetation community or complex below desirable levels or guidelines.*
- *There may be an aspect of the flora that may be listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.*



*EPA Position Statement No 2, December 2000, Environmental Protection of Native Vegetation in Western Australia, specifically targets the retention of native vegetation in the Agricultural Areas in 4.1, Clearing in the agricultural areas for agricultural purposes. In 4.3, Clearing in other areas of Western Australia, it is unclear what "other areas" refers to, but may refer to retention of a 30% threshold in non agricultural areas.*

*Section 4.3 Clearing in other areas of Western Australia, (EPA Position Statement No 2, December 2000) expects that clearing will not take vegetation types below the 30% of the pre-clearing vegetation as recommended by ANZECC, 1999, National Framework for the Management and Monitoring of Australia's Native Vegetation. The National Objectives and Targets for Biodiversity Conservation 2001 - 2005 (Commonwealth of Australia 2001) also recognise 30% as the trigger value.*

*For the Perth Metropolitan Area and the Greater Bunbury Area the minimum retention figure is 10%.*

### **Previous and Current Studies**

All remnant vegetation has significance however a compromise is required between community needs for basic raw materials and the maintenance of vegetation. The reason these areas remain as remnant vegetation is because the land was not cleared due to its limited agricultural potential.

No Declared Rare, or Priority Species was identified during the vegetation assessments. One taxa is listed as "Significant" in Bush Forever 2000 (pages 297 – 298) but is not listed as a Priority species and is proposed to be retained and included in the rehabilitation. It is therefore not regarded as being under significant threat.

No Threatened Ecological Communities occur and no Taxa or plant communities listed under Commonwealth Legislation were observed or are likely to occur.

The quality of the limestone and its high grade nature were examined in a number of studies and identified as being of high priority for staged community use.  
See;

- Western Australia, Western Australian Planning Commission, *Statement of Planning Policy 2.4, Basic Raw Materials*.
- Chamber of Commerce and Industry, 1995 and 1996, *Managing the Basic Raw Materials of Perth and the Outer Metropolitan Region*, Parts 1 and 2, currently being revised.
- Gozzard J R, 1987, *Limesand and Limestone Resources between Lancelin and Bunbury*, Geol Surv WA, Record 1987/5.

At the end of the quarry life the land will be recontoured and have a base of limestone covered by overburden and respread topsoil. It is, however, likely to be reused at some point in the future as a source of road base. Any rehabilitated surface can be planted with clumps of local tree species to replace those removed, including Tuarts *Eucalyptus gomphocephala* and *Eucalyptus foecunda* and other local species.

The reality is that the limestone is needed by the community and that is the only reason it has been excavated. Therefore an examination of the significance of the flora and its value cannot be divorced from a consideration of the community needs for limestone.

The vegetation is designated Cottesloe Complex, Central and South, as identified by Heddle et al, 1980, *Vegetation Complexes of the Darling System, Western Australia in Atlas of Natural Resources, Darling System, Western Australia*, Department of Conservation and Environment.

EPA Guidance 10 *Level of assessment for proposals affecting natural areas within the System 6 region and Swan Coastal Plain portion of the System 1 Region* lists Cottesloe Complex - Central and South as having 41.1% of the pre-European area still occurring and 8.8% in secure tenure.

EPA Position Statement No 2, December 2000, *Environmental Protection of Native Vegetation in Western Australia*, specifically targets the retention of native vegetation in the Agricultural Areas in 4.1, *Clearing in the agricultural area for agricultural purposes*. In 4.3, *Clearing in other areas of Western Australia*, it is unclear what "other areas" refers to, but may refer to retention of a 30% threshold in non agricultural areas.

Section 4.3 *Clearing in other areas of Western Australia*, (EPA Position Statement No 2, December 2000) expects that clearing will not take vegetation types below the 30% of the pre-clearing vegetation as recommended by ANZECC, 1999, *National Framework for the Management and Monitoring of Australia's Native Vegetation*. The National Objectives and Targets for Biodiversity Conservation 2001 - 2005 (Commonwealth of Australia 2001) also recognise 30% as the trigger value.

The clearing restrictions introduced under the *Environmental Protection Act 1986*, through the 2004 Regulations, provide for significant protection for remnant vegetation. Therefore level of preservation of the vegetation complex, although not approaching the required levels in secure reserves, are provided with adequate protection.

Cottesloe Complex, Central and occurs in the Yalgarup National Park which provides for significant local protection.

## 6.0 FAUNA HABITATS AND IMPACTS

The site is significantly altered native vegetation that is subject to grazing as it is unfenced.

The survival and disturbance to fauna depends on the end use of the site. The site is to be cleared progressively and returned progressively to local native vegetation in order to minimise impacts on fauna. See main report.

The re-establishment of local native flora species and habitats, with the various commitments to that achievement, will provide a mechanism for a return of fauna.

With the degraded nature of the vegetation and the species present it is unlikely that the listed taxa *Calyptorhynchus latirostris* and *Calyptorhynchus baudinii* which are listed on State and EPBC conservation databases would nest or use the site for feeding.

Western Australian Museum (undated) lists *Calyptorhynchus latirostris* as visiting pine plantations, parks and gardens and proteaceae shrubs, especially *Dryandra sessilis*, *Banksia menziesii*, *B. attenuata* and *B. grandis* in the area from March to September. These species are not present on site.

Bamford Consulting Ecologists, in a personal communication, note that *Calyptorhynchus latirostris* occurs from Kalbarri to east of Esperance, generally breeding in the Wheatbelt but more recently also in large trees with suitable nesting hollows in coastal areas. The trees on the proposed excavation area are very small and sparse and not suitable for breeding, based on the published requirements for breeding trees and pers com Mike Bamford.

Other fauna are related to the preservation of habitat. Returning the excavated surface to native vegetation will assist in providing long term habitat for fauna.

The Western Ringtail Possum *Pseudocheirus occidentalis* could possibly occur in the *Agonis flexuosa* on site, although this will be almost all excluded from the excavation footprint. In addition *Agonis flexuosa* will be included in rehabilitation.

As listed above under Endangered Communities on page 12 the risks associated with the potential for Root Mat Communities and stygofauna are regarded as low and if present are unlikely to be impacted on. The limestone is too young, there is no evidence of stream caves or notching at wetlands and no Tuart trees are present. In addition the base of the excavation is proposed to be in the order of 20 metres AHD, 20 metres above the water table.

Troglofauna may occur in cracks and crevices of the rocks and limestone. The limestone ridges are separated but not isolated and join to ridge areas to the north west and north where limestone also outcrops. The limestone on site is normally relatively tight with few solution cavities because the age of the limestone is relatively young and too young to form significant karst. The limestone does however have minor cracks and joints.

For potential troglofauna, there will be removal of limestone, but this will be progressive and followed by rehabilitation. The limestone joins ridges to the north and north west and so is not isolated, therefore any troglofauna are also unlikely to be environmentally isolated. The limestone will be excavated to a limestone floor and batter slopes that will also contain similar small cracks and joints, which will help replicate any potential habitats that currently exist. Some of the rehabilitated area will be left with limestone rock and boulders scattered on the surface to provide additional habitat. Rehabilitation will be to native vegetation.

All of the above measures will minimise the risk to any troglofauna should they currently occur.

## 7.0 CLEARING PRINCIPLES

### Clearing Principles

Clearing is controlled under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. These regulations provide for a number of principles against which clearing is assessed.

	<b>CLEARING PRINCIPLE</b> <i>(Schedule 5 Environmental Protection Amendment Act, 1986)</i>
1a	<i>High Level of diversity</i>
1b	<i>Significant fauna habitat</i>
1c	<i>Necessary to existence of Rare flora</i>
1d	<i>Threatened Ecological Community</i>
1e	<i>Significant area of vegetation in an area that has been extensively cleared</i>
1f	<i>Wetland or watercourse</i>
1g	<i>Land degradation</i>
1h	<i>Impact on adjacent or nearby conservation areas</i>
1i	<i>Deterioration of underground water</i>
1j	<i>Increase flooding</i>

As well as considering Biodiversity and other conservation issues the Clearing Principles that have to be satisfied are apparently designed for rural regions and do not address the issues of the resource needs. Therefore some additional principles need to be added when considering the need for Basic Raw Materials. In an attempt to provide a better balance to the clearing principles those principles have been expanded as listed in the tables below.

Lot 4 including the local area has been used for limestone excavation for many years, with the limestone being used for agricultural lime on farming properties.

Section 51O of the *Environmental Protection Act 1986* allows the CEO to take planning matters into account when making clearing decisions, such as a State Planning Policy.

There are many quarries and resource areas that have been allocated for use by the community prior to the introduction of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. These approvals, or nominations in planning policies such as Statement of Planning Policy 2.4, were made to ensure a sufficient availability of resources for the community, and pre-date the Clearing Regulations.

The proposal therefore has been assessed under the Clearing Principles of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* and the additional considerations below to provide an assessment of the likely impacts of the proposal.

<b>ADDITIONAL CLEARING PRINCIPLES – EXTRACTIVE INDUSTRIES</b>	
<b>Environmental Protection Act 1984 Section 51O</b>	
<b>Planning Matters</b>	
1	Planning Matters
<b>Environmental Protection Act 1984 Section 51O</b>	
<b>Relevant Matters</b>	
2a	Need for the resource
2b	Classification of the resource and existing approvals
2c	Availability of alternative resources and the impact of their use
2d	Proposed final land use
2e	Offsite Environmental impacts if the resource is not used
2f	Sound environmental management and rehabilitation

<b>CLEARING PRINCIPLE</b> (Schedule 5, Environmental Protection Amendment Act, 1986).		<b>COMMENT</b>
1a	High Level of diversity	<ul style="list-style-type: none"> <li>The site has been assessed in the flora survey and found to have a significantly reduced level of native species diversity because of past clearing, grazing and sowing of pasture species..</li> <li>The majority of the more significant taxa <i>Eucalyptus foecunda</i> will be protected and excluded from excavation and can be included in the rehabilitation.</li> </ul>
1b	Significant fauna habitat	<ul style="list-style-type: none"> <li>The habitat is in reduced condition.</li> <li>Clearing will be progressive. The end use of the site is to be rehabilitated to native vegetation.</li> <li>A total of 4.84 hectares of significantly altered native vegetation is proposed to be cleared.</li> <li>Almost all trees including <i>Agonis flexuosa</i> will be retained so there will be potentially minimal or no impact on the Western Ringtail Possum. In addition, local tree species will be included in the rehabilitation.</li> </ul>
1c	Necessary to existence of Rare flora	<ul style="list-style-type: none"> <li>No Declared Rare Flora was found</li> </ul>
1d	Threatened Ecological Community	<ul style="list-style-type: none"> <li>The vegetation proposed to be cleared is not listed as a Threatened Ecological Community.</li> <li>There are no Tuart trees on site.</li> </ul>

1e	Significant area of vegetation in an area that has been extensively cleared	<ul style="list-style-type: none"> <li>EPA Guidance 10 <i>Level of assessment for proposals affecting natural areas within the System 6 region and Swan Coastal Plain portion of the System 1 Region</i> lists Cottesloe Complex - Central and South as having 41.1% of the pre-European area still occurring and 8.8% in secure tenure.</li> <li>Whilst there exists greater than 30% of this Complex it is not well reserved. The Clearing Regulations provide a higher level of protection than was previously available and the same vegetation complex is included in the Yalgorup National Park.</li> </ul>
1f	Wetland or watercourse	<ul style="list-style-type: none"> <li>No wetlands or watercourses occur on site.</li> </ul>
1g	Land degradation	<ul style="list-style-type: none"> <li>The excavation can be managed in a manner that does not lead to degradation of the soil and land integrity apart from normal development issues. These are discussed in the main body of the Excavation and Rehabilitation Management Plan prepared for the site.</li> </ul>
1h	Impact on adjacent or nearby conservation areas	<ul style="list-style-type: none"> <li>There are no nearby conservation areas, apart from Lake Preston which is well to the west and more likely to be impacted on by agricultural activities than limestone extraction.</li> </ul>
1i	Deterioration of underground water	<ul style="list-style-type: none"> <li>Excavation of limestone and sand is well known with respect to groundwater resources. Sand is extensively mined in the Gnarup Pine Plantation and Jandakot, and limestone and sand in the Hope Valley and Nowargup areas. These operations are managed in a manner to minimise any potential impact on groundwater.</li> <li>There will be a separation of 20 metres to the water table.</li> </ul>
1j	Increase in flooding	<ul style="list-style-type: none"> <li>The high permeability of the limestone and depth of 20 metres to the water table ensure that flooding will not occur.</li> <li>Recharge levels will increase slightly but not by significant amounts. Any increase will help compensate for reduced rainfall in recent years and pumping by land users to the east. As rehabilitation grows recharge will again reduce to current levels.</li> </ul>

ADDITIONAL CLEARING PRINCIPLES – EXTRACTIVE INDUSTRIES		COMMENT
<b><i>Environmental Protection Act 1984 Section 51O Planning Matters</i></b>		
1	<i>Planning Matters</i>	<ul style="list-style-type: none"> <li>The local area and Lot 4 have been used for limestone extraction for many years. Basic Raw Materials are required to be identified and retained for staged community use in State Planning Policies such as SPP 2.5.</li> <li>It is not known why the site was not listed in the Draft Greater Bunbury Region Scheme even though local quarries have operated for many years and the site is a valuable source of agricultural lime.</li> </ul>

<b>Environmental Protection Act 1984 Section 51O Relevant Matters</b>		
2a	<i>Need for the resource</i>	<ul style="list-style-type: none"> <li>The reality is that the limestone is only extracted for the community. If the community did not need the limestone there would be no extraction.</li> <li>The limestone is used for increasing the pH of agricultural land throughout the south west and local area to counteract the trend to acidification due to nitrogenous fertiliser and legume production. The limestone is essential to the local agricultural industry, but is locally restricted in distribution and grade.</li> <li>The existing resources to the south are nearing completion with the higher grade limestone suitable for agricultural lime becoming exhausted with only approximately six month's supply remaining. Some lower grade limestone occurs in the southern pit but this is only suitable for road base and is not suitable for the markets of Doyles Limestone Service. It may be suitable to another contractor for local road bases if blended or placed in a specified manner.</li> </ul>
2b	<i>Classification of the resource and existing approvals</i>	<ul style="list-style-type: none"> <li>Whilst the limestone is not identified in local planning policies the local quarries have operated for many years and the resource has high community value so it should be protected and used in a staged manner.</li> </ul>
2c	<i>Availability of alternative resources and the impact of their use</i>	<ul style="list-style-type: none"> <li>There are few alternative resources. Much limestone is already sterilised. There are no local alternatives apart from other local limestone in similar geomorphological and ecological situations.</li> <li>Limestone in the Mandurah – Bunbury area is severely restricted by rural living developments, market gardens and State Forest.</li> </ul>
2d	<i>Proposed final land use</i>	<ul style="list-style-type: none"> <li>The proposed final land use is to return the site to local native species which helps negate the impacts of clearing pending decisions on a second phase of excavation for roadbases.</li> </ul>
2e	<i>Offsite Environmental impacts if the resource is not used</i>	<ul style="list-style-type: none"> <li>Not taking the resource will result in additional greenhouse gas emissions and road impacts from the additional transport and processing of alternative products.</li> <li>If this resource is not taken limestone will have to be taken from another site resulting in land clearing on that site.</li> <li>The site is to be returned to native vegetation, therefore reducing the potential impacts of clearing.</li> </ul>
2f	<i>Sound environmental management and rehabilitation</i>	<ul style="list-style-type: none"> <li>Extensive environmental and rehabilitation management procedures are to be used to minimise any environmental impact.</li> <li>The site will be returned to native vegetation using local provenance species on an interim basis.</li> </ul>

## 8.0 DISCUSSION

A total of 30 native taxa were found plus 19 exotic species. The vegetation is significantly altered by previous limited clearing, grazing and seeding of pasture species. The condition is assessed as Good to Degraded on Bush Forever 2000 scale and Poor on Kaeshagen 1995.

No Declared Rare, or Priority species were recorded. No Threatened Ecological Communities occur.

The potential presence of Root Mat Communities is assessed as being very low to nil. Similarly the potential for Stygofauna is also regarded as very low to nil because the limestone is too young and the base of the excavation will be 20 metres above the water table. The potential for significant troglofauna is regarded as low and any risks will be minimised by progressive clearing, retention of limestone base, provision of rock and stone habitats and the existing linkage of the ridge to other ridges to the north and north west.

The proposed quarry is to be progressively rehabilitated to local native species, pending decisions on the possibility of the site being used for the excavation of limestone for roadbase.

Whilst there will be some loss of vegetation this will be temporary and, over time, rehabilitation will replace that which has been lost and therefore help to maintain habitat and flora and fauna corridors.

The taking of limestone from this portion of Lot 4 (Pits 3A and 3B) is seen as a reasonable compromise that can be undertaken without significant long term environmental impact.

The western ridge has an excavation area of 1.88 hectares that has to be cleared. The eastern ridge has an area of 2.96 hectares to be cleared. A further 1.5 hectares of limestone will be excavated but does not require clearing because it is an old quarry.

Lindsay Stephens

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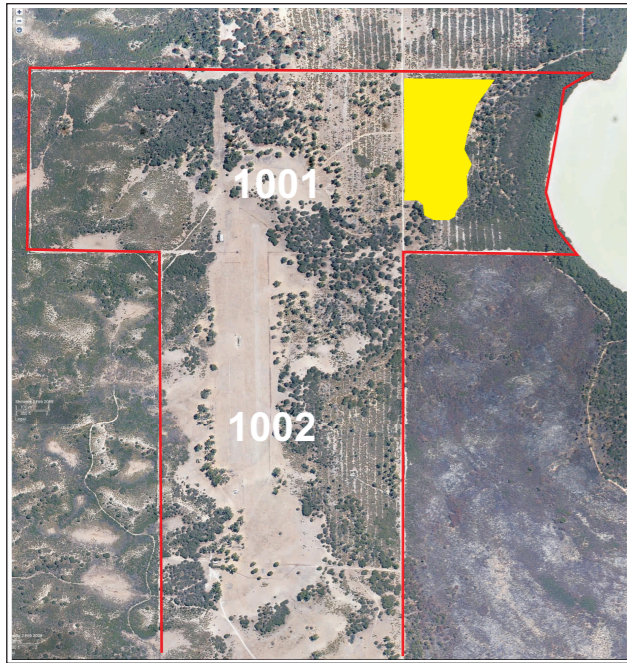
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Vegetation Condition Scale reproduced from page 48 (Bush Forever 2000).

Condition Score	Vegetation Condition	Vegetation Descriptors
1	Pristine	Pristine or nearly so, no obvious signs of disturbance
2	Excellent	Vegetation structure intact, disturbance affecting individual species, and weeds are non aggressive species.
3	Very Good	Vegetation structure altered, obvious signs of disturbance. For example disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
5	Degraded	Basic structure of the vegetation severely impacted on by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
6	Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as "parkland cleared" with the flora comprising weed or crop species with isolated native trees or shrubs.

<b>DOYLES LIME SERVICE – PRESTON PIT</b>	
<b>VEGETATION – LIMESTONE PIT</b>	
Landform Research	May 2013
Source NEARMAP	Scale See Plan

Showing 2 Feb 2009  
 50 m  
 200 ft  
 Legal



Resource are showing limestone and strip clearing. Pasture and exotic species occupy the cleared strips. Other vegetation has been grazed.



View of Lake Pollard from the top of the resource. Excavation will take place from the left, behind the ridge which will hide the quarry from the ;Lake and surrounding area.



Resource are showing limestone and strip clearing. Pasture and exotic species occupy the cleared strips. Other vegetation has been grazed.



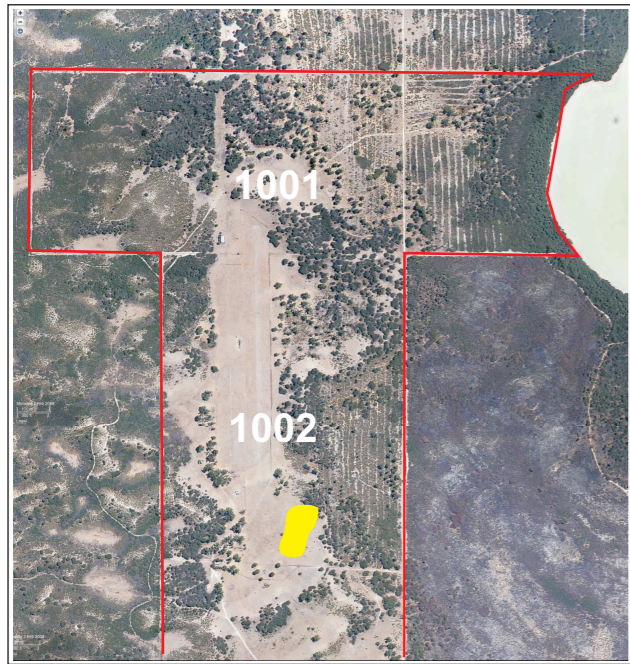
Screening vegetation to Lake Pollard



Cleared land on the resource colonised by Dune Onion Weed *Trachyandra divaricata*\* with regrowth limestone community



<b>DOYLES LIME SERVICE – PRESTON PIT</b>	
<b>VEGETATION – LIMESTONE PIT</b>	
Landform Research	May 2013
Source NEARMAP	Scale See Plan



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<b>DOYLES LIME SERVICE – PRESTON PIT</b>	
<b>VEGETATION – SAND PIT</b>	
Landform Research	May 2013
Source NEARMAP	Scale See Plan

