

MINE CLOSURE PLAN

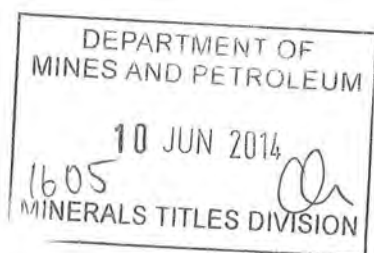
M70/1325
Pigeon - Haddrill Roads
Yanchep

Extraction of Sand

M70/1325 is held by Carew Nominees Pty and Ceptre Nominees Pty Ltd.
M70/1325 is to be operated under authority by, and proposed by,
Carew Nominees Pty Ltd and Ceptre Nominees Pty Ltd Pty Ltd trading as WA
Limestone.

The documentation is provided under the heading of WA Limestone

WA LIMESTONE



10 June 2014



WA LIMESTONE

Address WA LIMESTONE
401 Spearwood Avenue
Bibra Lake WA 6065

PO Box 1404
Bibra Lake WA 6965

Phone 08 9434 7777

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No	Mine Closure Plan (MCP) checklist	Y/N NA	Page No.	Comments
1	Has the Checklist been endorsed by a senior representative within the tenement holder/operating company? (See bottom of checklist)	Y		
2	How many copies were submitted to DMP?	Hard Copies = 1 Electronic = 1		
Cover Page, Table of Contents				
3	Does the cover page include: <ul style="list-style-type: none">• Project Title;• Company Name;• Contact Details (including telephone numbers and email addresses);• Document ID and version number;• Date of submission (needs to match the date of this checklist).	Y		
4	Has a Table of Contents been provided?	Y		
Scope and Project Summary				
5	State why the MCP is submitted (as part of a Mining Proposal of a reviewed MCP or to fulfill other legal requirements)	Y		Part of ongoing mine management
6	Does the project summary include: <ul style="list-style-type: none">• Land ownership details;• Location of the project;• Comprehensive site plan(s);• Background information on the history and status of the project.	Y		Section 2.0
Legal Obligations and Commitments				
7	Has a consolidated summary or register of closure obligations and commitments been included?	Y		Section 3.0
Data Collection and Analysis				
8	Has information relevant to mine closure been collected for each domain or feature (including pre-mining baseline studies, environmental and other data)?	Y		Section 4.0
9	Has a gap analysis been conducted to determine if further information is required in relation to closure of each domain or feature?	Y		Section 6.1
Stakeholder Consultation				
10	Have all stakeholders involved in closure been identified?	Y		Section 5.0
11	Has a summary or register of stakeholder consultation been provided, with details as to who has been consulted and the outcomes?	Y		Section 5.0
Final and use(s) and Closure Objectives				
12	Does the MCP include agreed post-mining land use(s), closure objectives and conceptual landform design diagram?	Y		Section 6.2

13	Does the MCP identify all potential (or pre-existing) environmental legacies, which may restrict the post mining land use (including contaminated sites)?	Y		Section 7.0
Identification and Management of Closure Issues				
14	Does the MCP identify all key issues impacting mine closure objectives and outcomes?	Y		Section 7.0 - 8.0
15	Does the MCP include proposed management or mitigation options to deal with these issues?	Y		Section 10.2 - 10.4
16	Have the process, methodology, and rationale been provided to justify identification and management of the issues?	Y		Section 10.2
Closure Criteria				
17	Does the MCP include an appropriate set of specific closure criteria and closure performance indicators?	Y		Section 8.0
Closure Financial Provisioning				
18	Does the MCP include costing methodology, assumptions and financial provision to resource closure implementation and monitoring?	Y		Section 9.0
19	Does the MCP include a process for regular review of the financial provision?	Y		Section 9.0
Closure Implementation				
20	Does the reviewed MCP include a summary of closure implementation strategies and activities for the proposed operations or for the whole site?	Y		Section 10.0
21	Does the MCP include a closure work program for each domain or feature?	Y		Section 10.0
22	Have site layout plans been provided to clearly show each type of disturbance?	Y		Figures
23	Does the MCP contain a schedule of research and trial activities?	Y		Section 6.1
24	Does the MCP contain a schedule of progressive rehabilitation activities?	Y		Section 10.1 – 10.3
25	Does the MCP include details of how unexpected closure and care and maintenance will be handled?	Y		Sections 10.4
26	Does the MCP contain a schedule of decommissioning activities?	Y		Section 10.4
27	Does the MCP contain a schedule of closure performance monitoring and maintenance activities?	Y		Section 11.0
Closure Monitoring and Maintenance				
28	Does the MCP contain a framework, including methodology, quality control and remedial strategy for closure performance monitoring including post-closure monitoring and maintenance?	Y		Section 11.0
Closure Information and Data Management				
29	Does the mine closure plan contain a description of management strategies including systems, and processes for the retention of mine records?	Y		Section 12.0
30	Confidentiality	N/A		

CORPORATE ENDORSEMENT:

I hereby certify that to the best of my knowledge, the information within this Mine Closure Plan and checklist is true and correct and addresses all the requirements of the Guidelines for the Preparation of a Mine Closure Plan approved by the Director General of Mines.

M70/1325 is held by Carew Nominees Pty and Ceptre Nominees Pty Ltd.

M70/1325 is to be operated under authority by, and proposed by, Carew Nominees Pty Ltd and Ceptre Nominees Pty Ltd Pty Ltd trading as WA Limestone.

The documentation is provided under the heading of WA Limestone

See attached letter of authority.

Mining Tenement/s M70/1325 – Pigeon - Haddrill Roads, Yanchep

Name: _____

Position: _____

Signed: _____

Date: _____

(NB: the corporate endorsement must be given by tenement holder (s) or a senior representative authorised by the tenement holder (s), such as a Registered Manager or Company Director.



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FIGURES

The figures are taken from the Mining Proposal. To avoid confusion the same Figure Numbers have been retained. Only the figures relevant to the Mine Closure Plan are listed. For the remainder, see the Mining Proposal.

- Figure 1 Vegetation Communities
- Figures 2 – 3 Existing Vegetation – See Mining Proposal Figures 1 and 2
- Figure 4 Location

Figure 5	Proposed Excavation Footprint
Figure 6A	Existing Contours
Figure 6B	Concept Final Contour Plan
Figure 7	Typical Limestone and Sand Excavations
Figure 8	Proposed Excavation Methods
Figure 9	Aerial Photograph

SUPPORTING INFORMATION

See Mining Proposal M70/1326 Attachments

- 1 Mine Closure Plan
- 2 Flora Study – Mattiske Consulting
- 3 Fauna Study - Western Wildlife
- 4 Cockatoo Survey – Tony Kirkby
- 5 Department of Aboriginal Affairs Database Search
- 6 Concept Offset Plan – CO₂ Australia
- 7 Dust Management Plan
- 8 Water Management Plan
- 9 Minutes of Discussions with CALM (DPaW) and DMP.



Prepared by

Lindsay Stephens BSc Geology), MSc (Plant Ecology)
Mem Aus Geomechanics Soc – MEIANZ – FIQA

25 Heather Road Roleystone WA 6111
Tel 9397 5145, landform@iinet.net.au

1.0 SCOPE AND PURPOSE

This Mine Closure Plan is submitted in support of a Mining Proposal for M70/1325.

It should be read in conjunction with the Mining Proposal dated May 2014.

2.0 PROJECT OVERVIEW

WA Limestone proposes to extract sand from M70/1325.

M70/1325 and M70/1326 are held by Carew Nominees Pty and Ceptre Nominees Pty Ltd.

M70/1325 is to be operated under authority by, and proposed by, Carew Nominees Pty Ltd and Ceptre Nominees Pty Ltd Pty Ltd trading as WA Limestone.

The operator will be WA Limestone who will act on behalf of the tenement holders and has full authority with respect to excavation.

WA Limestone has prepared the Mining Proposal and Mine Closure Plan for M70/1325.

The tenement represents the only sand resource held by WA Limestone Group of Companies in the northern Perth Metropolitan area that will form essential resource for the Group for many years. The sand is mainly to supply fill and concrete sand to the company.

If these resources are not retained and utilised for the benefit of the State they are likely to be sterilised by conservation.

Carew Nominees Pty Ltd and Ceptre Nominees Pty Ltd are mindful of the conservation values of this area and, in relinquishing E70/1437, they have retained only a small portion of the tenement at the southern edge of the area identified by Department of Parks and Wildlife (DPAW) as potentially being added to the Yanchep National Park. On M70/1325 the only ground pegged was old pine plantation.

Originally 48.6 km² were held before being relinquished into tenement M70/1326, with an area of only 368.54 hectares in addition to 82.63 hectares on M70/1325, which is the subject of this Closure Plan in support of a Mining Proposal.

An integral part of the objectives is to progressively restore the excavated areas to local native vegetation as excavation progresses.

CONTACTS

The holder of M70/1325 is Carew Nominees Pty Ltd and Ceptre Nominees Pty Ltd Pty Ltd.

Contact General Manager

Address Carew Nominees Pty Ltd and Ceptre Nominees Pty Ltd
C/- WA LESTONE
401 Spearwood Avenue

Bibra Lake WA 6065
PO Box 1404
Bibra Lake WA 6965
Phone 08 9434 7777

LOCATION

The mining tenement is bounded by Haddrill, Pigeon and Frog Roads, located off Haddrill Road, Yanchep, commonly known as “The Ridges” in the northern Perth Metropolitan area, and centered on 31 degrees 33 minutes S and 115 degrees 44 minutes E.

The site is part of the State Forest 65, approximately 5 km south-east from Yanchep.

The resource lies on Geological Survey of Western Australia, Perth 1 : 250 000 geological mapsheet; SH 50 14.

2.1 Resource Sought

Basic Raw Materials, including the resources on site of sand.

Uses of the Sand

Basic raw materials are essential for the construction and maintenance of all developments; such as roads, subdivisions, buildings, bridges, ports and rail lines.

M70/1325 is required to help provide sufficient resources for WA Limestone Group of Companies for the next 50 plus years of development in the Perth and near areas.

The sand on M70/1325 is a vital resource to WA Limestone, the largest supplier of limestone and a large producer of hard rock and concrete.

- Almost every house on the Swan Coastal Plain is constructed using significant amounts of construction materials including sand for concrete and fill.
- All subdivisions use sand fill to prepare the sites to AS 2870 Site Class A.
- Sand from the Spearwood Land System enables several product types to be produced: yellow fill sand, earthy yellow sand for maximisation of phosphate retention, brickies sand and white sand.

Significance of the Sand

The *Perth and Peel Development Outlook 2011/2012* has determined that the Metropolitan Area will grow by 524 400 people between 2012 and 2026.

The Chamber of Commerce and Industry estimated in 2008 that each dwelling required 155 tonnes of limestone, which includes roads, and 255 tonnes of sand. Dwellings in low lying areas requiring fill can require significantly more sand.

The resource is identified as a Regionally Significant Basic Raw Material (sand and limestone) by the WA Geological Survey 2012, on the Perth-Wooroloo Sheet.

The sand is recognised in the *State Planning Policy 2.4 Basic Raw Materials 2000*, and has been recognised in previous documents such as availability of *Basic Raw Materials Perth Metropolitan Region*, Metropolitan Region Planning Authority 1983.

The need for basic raw materials such as sand have been discussed in many documents and in particular Chamber of Commerce and Industry, 1995 and 1996, *Managing the Basic Raw Materials of Perth and the Outer Metropolitan Region*, Parts 1 and 2 and Chamber of Commerce and Industry, 2008, *Basic Raw Materials Access and Availability*.

Whilst there are large resources of sand in the Northern Perth Metropolitan Area, they are held by other companies. M70/1325 is to provide a secure resource for Carew Nominees Pty Ltd and Ceptre Nominees Pty Ltd/WA Limestone.

Additional Sources of Information

Further information on the need for sand is shown in the following documents. The Chamber of Commerce and Industry are currently updating their assessments.

See;

- Abeyasinghe 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.

Sand is only extracted for the community benefit, and utilised as a manufactured building product. If there was no community demand for sand as a building product it would be unlikely that this natural resource would ever be utilised for any other purpose and would have no economic significance.

2.2 Site Layout

Excavation will be staged, commencing in the north adjacent to Pigeon Road.

At any one time, when operating, about 6 hectares is anticipated to be opened depending on the nature of the resource and market demands.

Stockpiles will not normally be required but if needed will be located near the processing area.

Support and administration will be located in a fenced secure compound in the north of the mining tenement adjacent to the access road as shown on the attached figures.

A portable site office/lunchroom is to be maintained on site for the management and security of small items during campaigns.

As the pit progresses the facility may be moved southwards to keep pace with the excavation to provide better supervision.

An equipment shed may be required to house vehicles, located in the compound. A sea container may also be used to secure equipment.

A weighbridge remains a possibility located within the fenced compound.

As the site facilities will move from time to time the location is shown on the plans as the initial location. In later phases of excavation those facilities are to be relocated as the face moves.

2.3 Mining Operations

An anticipated production of up to 100 000 tonnes per year of sand is proposed, depending on contracts won, rising to 300 000 tonnes per year.

It is anticipated that a larger tonnage will be taken in some years to fill large contracts such as major developments within the Northern Metropolitan Region. When larger contracts are being filled perhaps more than the nominated average amount of material tonnes may leave the site in a particular year.

Design of the Pit - Staging

The staging will minimise the disturbance of vegetation clearing by providing a staged clearing, excavation and rehabilitation program that will move across the site.

The anticipated rate of excavation is shown in the Activity Table.

The excavations are designed to remove the sand and the limestone to a depth of 5 to 15 metres depending on the thickness of the resource. In some locations, where specialty sand such as concrete or briki's sand descends to greater depths, excavation may go deeper provided the final land surface can complement the surrounding land.

Government Policies currently provide for a separation of 2 metres outside Priority 1 Groundwater Protection Areas. As the site is 20 plus metres to the water table that limitation is not anticipated to apply because excavation will not approach the water table.

The floor will be left undulating to match the surrounding landscape and assist revegetation.

The batter slopes would then rise gently up the existing natural land surface outside the excavation area at slopes of 1 : 6, no greater than horizontal to vertical, that will be suitable for the continued plantation activities.

Ground Preparation

1. A bulldozer or loader will be used to remove any vegetation by pushing it into windrows.
2. Any large native logs will be either recovered for useable purposes or to form barriers. All pine trash has to be burnt to remove the potential food supply to the European Wood Borer, a pest of pine wood.
3. Smaller vegetation will be track crushed and directly transferred to areas under rehabilitation to assist soil and habitat generation. The vegetation contains a significant seed source, because of the contained seed on many species. It is also a source of microbial material for soil formation, adds to habitat and assists in managing wind erosion.
4. The vegetation will also be used on the batters to minimise soil erosion and spreading on the final land surface as part of the final rehabilitation.
5. Topsoil will be pushed to one side and formed into low storage dumps for later use in rehabilitation using either a loader or bulldozer.
6. Overburden will then be pushed to the perimeters, normally by bulldozer, to form bunding around the active area.
7. The bunds will be up to 3 metres high depending on the surrounding landform and security requirements, to increase security and provide a barrier to define the operations.
8. This bunding will be extended along all perimeters prior to the commencement of excavation in a particular area. All stages of the pit excavation will be screened by formed bunds, which will be formed as required.

Excavation

1. Excavation will be carried out as a sequence.
2. The excavation will be similar to excavation on other local quarries.
3. Perimeter screening bunds are to be formed to elevations of approximately 3 metres to provide visual, dust and noise screening and assist security.
4. Overburden, as sub-grade sand and overburden, will be removed by pushing to the perimeter of the proposed pit to form perimeter bunding to the pit.
5. This bunding will be extended along all perimeters prior to the commencement of excavation in a particular area. All stages of the pit excavation will be screened by formed bunds, which will be formed as required.

6. Sand will be excavated using a loader, loading either directly to a road truck in which case there will be no need for stockpiles, or loading to a screening plant when stockpiles will be formed of the various products.
7. Water will be used for dust suppression, to reduce the potential for dust generation from the movement of machinery and the effect of wind.
8. Depending on the depth of the resource, the nature and grade of the resources and their thickness, benches may be required to differentiate product and assist safety.
9. Sand will be excavated to a minimum of 5 metres above the water table provided the grade remains sufficiently high.

Processing

Sand

Only specialty sand will require screening such as plasterers', concrete or filter sand.

It is possible that a wash plant may be installed at some point in the future, but it is not proposed now and would only be used on site if there was water from a site bore available.

1. The main processing of sand will be screening of some sand to produce even grainsize for special uses such as for use in concrete.
2. Fill sand is not processed and is not included in the tonnages of the DER Licence.
3. The sand may also be washed using a mobile wash plant that removes the fine clay and iron oxide from the grains, producing a high grade silica sand.
4. The batter slopes will be retained in a stable form to comply with the *Mines Safety and Inspection Act 1994* with slopes battered to 1 : 4 to 1 : 6 vertical to horizontal.

2.4 Disturbance Areas

The proposed total disturbance is shown in the table below.

PROPOSED DISTURBANCE M70/1325

	Current Disturbance (ha)	Total Disturbance (ha) at end of mining
Total Proposed disturbance	nil	74.6 ha
Total Existing disturbance	nil	
Undisturbed land	367.54 ha	8.03 ha
Tenement area	368.54 ha	82.63 ha

As excavation will be progressive, with land being cleared as new ground is opened, a progressive disturbance footprint is summarised in Activity Table below.

As excavation progresses westwards the open pit will in turn become the loading area, and then will be rehabilitated. The access road will be progressively constructed across the excavated areas. With such a high face of sand the top of the face will be near the western edge of the next stage to allow excavation from the floor of the pit.

Therefore the amount of open ground will be minimised through the life of the operations.

The pit will be staged to enable sequencing of clearing topsoil and restoring the land surface.

ACTIVITY TABLE M70/1326

	Current Activity (ha)		Proposed Activity (ha)		
		Year 5	Year 10	Year 20	Final
Open pit	nil	5.0 ha	5.0 ha	5.0 ha	nil
Cleared ahead of excavation	nil	nil	nil	nil	included
Access tracks	Minor forest tracks	0.5 ha	1.0	1.0	included
Processing	nil	In open pit	In open pit	In open pit	included
Stockpiles	nil	In pen pit	In open pit	In open pit	included
Waste dumps	nil	nil	nil	nil	included
Rehabilitated land	nil	nil	5.0 ha	15 ha	74.6
Land to be Rehabilitated	nil	5.5 ha	6.0 ha	6.0 ha	nil
Total Disturbed Ground	0	5.5 ha	11 ha	21.0 ha	74.6 ha
Undisturbed land	82.63 ha	77.13 ha	71.63 ha	66.63 ha	8.03 ha
Tenement area	82.63 ha	82.63 ha	82.63 ha	82.63 ha	82.63 ha

3.0 CLOSURE OBLIGATIONS AND COMMITMENTS

The site lies on part of State Forest 56, which is managed by the Department of Parks and Wildlife.

The closure obligations and commitments will need to be adjusted when Conditions are placed on the tenement. These conditions will be developed by a number of authorities during the application processes.

Currently there are no specific conditions applicable except under the original conditions relating to exploration on the previous E70/1437 from which M70/1325 has been derived.

Conditions are likely to be applied by the following authorities.

Department or Authority	Nature of Conditions	Comment
Department of Mines and Petroleum	General Conditions relating to Closure	Will be attached during the approval process for M70/1325.
Department of Mines and Petroleum	Commitments made in the Mine Closure Plan such as meeting completion criteria.	These cannot be made until DMP have approved the Mine Closure Plan.
Department of Mines and Petroleum	Conditions of Clearing Permit if required for the felled pine plantation.	Will be attached during the approval process for any clearing on M70/1325. Application cannot be made until granting of the tenement.
Department of Water	Conditions relating to Groundwater extraction.	These would be attached to any Water Licence, but may not relate to closure. Application cannot be made until granting of the tenement.
Commonwealth EPBC Act 1999	Unlikely to be assessed by the Commonwealth.	Application cannot be made until granting of the tenement.
Department of Parks and Wildlife	May have some requirements relating to rehabilitation that would be incorporated into conditions on the tenement or are included in an updated Mine Closure Plan.	The documentation for the application for the tenement will be sent to DEPAW.
Forest Products Commission	May have some requirements relating to the pine plantation that may either be imposed as conditions on the tenement or are included in an updated Mine Closure Plan. At this stage it is not clear whether the Forest Products Commission will require M70/1325 for pines or not. Present indications are that it will not be required.	The documentation for the application for the tenement will be sent to FPC.
Department of Environment Regulation	Conditions may be placed on any DER Licence. This would only be required if screening of sand was required.	A Licence cannot be applied for until granting of the tenement.

4.0 COLLECTION AND ANALYSIS OF DATA

EXISTING ENVIRONMENT – PRE MINING

4.1 Regional Setting

The site lies in an area of native vegetation developed on limestone and sand lying within State Forest 65.

The site lies to the east of the Yanchep National Park. The Red Book Report, October 1983, System 6 (M4), identified the area to the north of State Forest 65, generally north of Yeal Swamp Road and north of Pigeon Road, as the Ridges buffer area potentially to be added to the National Park.

Bush Forever 2000 recognised the Redbook classification and incorporated that into Bush Forever site 381, and extended site 381 south to Haddrill Road, over the top of the tenements held by the WA Limestone Group of Companies. M70/1325 does not lie within Bushforever Site 381 but touches it to the south.

Parks and reserves of Yanchep and Neerabup Management Plan 76 (2012) prepared in 2012 by the Department of Environment and Conservation (DPaW) and the Conservation Commission identified the location as being outside the proposed eastern extension of the Yanchep National Park.

The location is strategically placed at the northern end of the Perth Metropolitan area in a situation ideally located to supply basic raw materials to the growing city.

The site is currently cleared pine plantation that the Forests Product Commission is to return to *Banksia* Woodland.

Currently (2013 – 2014) the State and Commonwealth Governments are developing a Strategic Assessment with respect to providing for sufficient basic raw materials including limestone. As part of that assessment all mining tenements and resources are being considered and assessed against conservation values and the need for resources for the next 30 to 100 plus years.

M70/1325 is anticipated to be included in that process and therefore the outcome of the assessment and the proposed final nomination of the land will have a significant determining influence on the end use of the land.

4.2 Geology – Geomorphology

The dune ridges formed as aeolian dune deposits behind a shoreline during the Pleistocene. The sands are ascribed to the Spearwood Land System of Soils close to the boundary with the Bassendean Land System.

It lies on Geological Survey of Western Australia, Perth 1 : 250 000 geological mapsheet; SH 50 14.

The geology is also shown on the Geological Survey of Western Australia 1 : 50 000 Environmental Geology Series, Perth and Muchea Sheets.

The resource is essentially a ridge of sand extending to depth and sitting on top of Mesozoic sediments.

The sand is quartz sand containing small amounts of clay and iron oxide staining.

The land surface is located in a swale of sand ridges dropping from 70 metres AHD on the eastern boundary and 60 metres AHD on the southern boundary down to just below 50 metres in the central part of M70/1325.

4.3 Soils and Soil profiles

Soils were recorded by Lindsay Stephens of Landform Research from site observation and the published soil and geological maps, for example Geological Survey of Western Australia 1 : 50 000 Environmental Geology Series, Perth and Muchea Sheets, where the soils are classified as S7 sands.

They are part of the Spearwood Land System.

The sands become progressively deeper around the perimeter of the mining tenement.

The sands typically have a grey surface topsoil underlain by white sand grading to yellow and dark yellow earthy sand.

The nature of the sand relates to small amounts of 1 to 3% clay present within the sand. The colour relates to the species and intensity of iron oxide present.

Generally the upper horizons of topsoil are grey, grading to white sand, then pale yellow and darker yellow sands with depth. The amount of leaching increases towards the east where the sands are lighter and whiter.

All soils are natural and contain no adverse minerals or conditions such as acidity or potential acidity that will impede surface restoration.

The proposed excavation only utilises natural materials and will bottom on yellow earthy sand.

Topsoil will be recovered and spread across the restored surface.

The completion criteria for vegetation must be developed taking into account the nature of the substrate at the end of mining.

The pre-mined surface is leached white and pale yellow sand, whilst that post mined surface will be lower and have darker earthy sands and some ferricrete materials. Therefore the soils will change from eastern Spearwood/near Bassendean to Western Spearwood and lower elevation Bassendean Soils.

4.4 Climate

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

The closest recording station is Beenyup (Wanneroo), although averages of only six years' data have been recorded. Other weather data must be taken from Perth.

The highest temperatures are in February with 30.0 maxima and the lowest are recorded in July with maxima of 18 degrees Celsius and 7.4 degrees C minima.

Rainfall for the area is slightly less than Perth at 722 mm compared to Perth's 869 mm of which more than 90% falls in the months April to October inclusive. Rainfall has also been recorded at Yanchep with an annual average of 755 mm per year. Evaporation is high and exceeds rainfall in all but the four wettest months, May to September.

The prevailing winds are from the south west, particularly in the afternoon. In summer the easterly in the mornings and the sea breeze in the afternoon can be quite strong. At 3.00 pm wind speeds exceed 10 kph for 80 % of the time in summer but only 30 % to 40 % in winter. At other times the wind speed is calm for 30 % of the time in winter at 9.00 am and 10 % in summer with 40 % of the time exceeding 10 kph in summer and 20 % in excess of 10 kph in winter.

4.5 Hydrology

Surface Water

There is no surface drainage due to the porosity and permeability of the limestone, with precipitation draining to the water table. There are no watercourses and no wetlands.

Groundwater

There are two Department of Water monitoring bores relevant to the location, one (4927) located south of M70/1325 and one well to the south west (4936) near Haddrill Road/Old Yanchep Road.

The bores have been monitored since 1975 and show a drop of some five metres in that time.

The water table in bore 4927 was 18.279 m AHD in 1975 and was 13.35 m AHD in October 2013. Bore 4936 had a standing water elevation of 24.4 m AHD in 1977 and at May 2014 the water level was 19.33 m AHD. Therefore there is a drop in groundwater elevation across the site, from north east to south west by approximately 8 metres.

The depth to the water table is therefore approximately 20 plus metres.

With such depths to the groundwater it is estimated that 5% of the rainfall will currently reach the water table based on the depth of the water table and the rainfall.

Groundwater is confined to the underlying sands and these have high lateral transmissivity.

Sand 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 Water who permit extractive industries in Priority Groundwater areas.

A Water Management Plan has been prepared which addresses the risk to groundwater. See Attached document.

4.6 Flora & Fauna

Flora

Mattiske Consulting Pty Ltd was commissioned in May 2014 by WA Limestone to undertake a Level 2 flora and vegetation survey of the Yanchep Ridges survey area. The flora and vegetation report is attached as Appendix 2.

All the information on flora is taken from Mattiske Consulting 2014.

Previous surveys relevant to this survey area include:

- Botanical Survey Proposed Prospecting Lease Ridges Area - Yanchep, Unpublished Report prepared by Mattiske Consulting Pty Ltd for WA Limestone, 1996).
- Spring Flora Survey and Significant Tree Survey, 2010, Unpublished draft report prepared by GHD for Landcorp 2010).

The information below on Flora is taken from Mattiske 2014.

The survey area consists of two distinctly different sections: the northern polygon, comprised of a rehabilitated pine plantation (referred to as the rehabilitated section) and now covered by M70/1325, the subject of this document, and the southern polygon, comprised of native bush (referred to as the intact area) covered by M70/1326. Across the two sites a total of 36 permanent and 12 relevé survey sites were surveyed.

A total of 207 vascular plant taxa which are representative of 122 plant genera and 46 plant families were recorded within the Yanchep Ridges survey area. The majority of the taxa recorded were representative of the Fabaceae (22 taxa), Proteaceae (22 taxa) and Myrtaceae (21 taxa) families. Of the 207 plant taxa recorded within the survey area, 170 (82.1%) were perennials, 30 (14.5%) were annuals and 7 (3.4%) were site dependent or short lived perennials.

On M70/1325 the number of taxa is significantly reduced to scattered plants. Many of the taxa listed in Mattiske 2014 do not relate to M70/1325 but relate to M70/1326 located on remnant vegetation on a limestone ridge to the south.

There are scattered shrubs regenerating on M70/1325.

Plant Communities

M70/1325 is part of State Forest 65 referred to as “The Ridges” an area with long-standing recommendations to be added to Yanchep National Park (Department of Conservation and Environment 2012).

The site lies in the Swan Coastal Plain Unit of the Drummond Botanical Subdistrict, part of the greater South-West Botanical District (Beard 1990).

More recently, the vegetation of Western Australia has been assigned to bioregions and subregions under the Interim Biogeographic Regionalisation for Australia (IBRA), with the project area being within the Swan Coastal Plain subregion.

The Drummond Botanical Subdistrict is characterised by low *Banksia* woodlands on leached sands *Melaleuca swamps* on poorly-drained depressions, and *Eucalyptus gomphocephala* (tuart), *Eucalyptus marginata* (jarrah) and *Corymbia calophylla* (marri) woodlands on less leached soils (Beard 1990). The Drummond Botanical Subdistrict comprises twelve physiographic units (systems), with the survey area situated within the Spearwood System (Figure 3).

The Spearwood System comprises shore-line parallel calcarenite ridges mantled with yellow sands which gradually become more bleached and less calcareous to the east of the system. This system is characterised by two dominant overstorey associations namely *Eucalyptus gomphocephala* woodlands and *E. gomphocephala* -*Eucalyptus marginata* mixed woodlands. Outside these two, major overstorey transition zones occur in the form of *Banksia-Calothamnus* heaths, *Agonis flexuosa* low woodlands and *Melaleuca preissiana*, *Melaleuca raphiophylla* and/or *Banksia littoralis* in low lying and/or swampy areas.

Five vegetation communities were delineated and mapped within the survey area across both M70/1325 and M70/1326.

The whole of M70/1325 is classified as Community E, See Figure 2 Regenerating vegetation on felled pine plantation. The communities listed above may have occurred prior to clearing for pines but do not now occur on site.

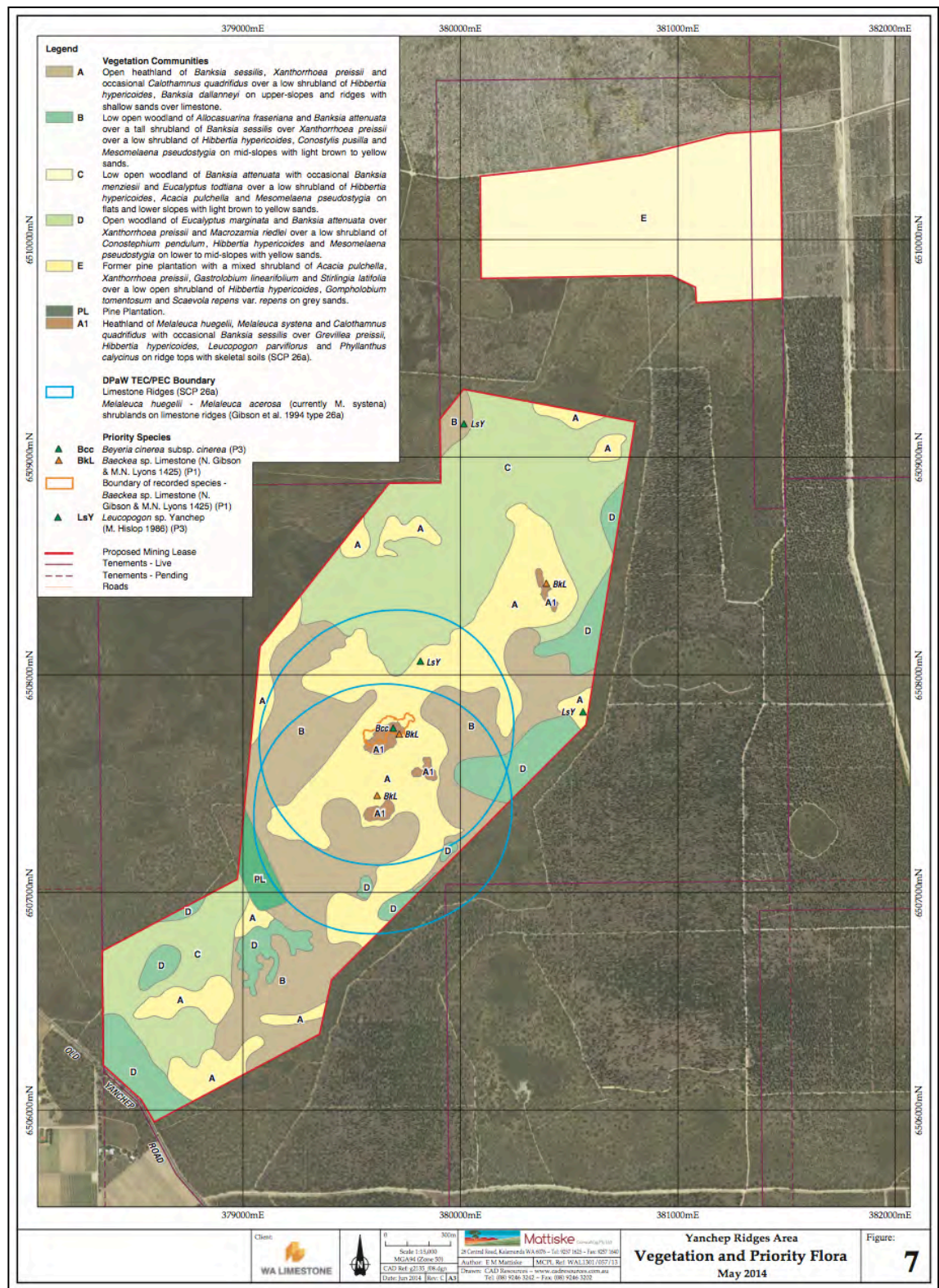


Figure 1 Vegetation Communities

M70/1325 is the rectangular area shown in the north east corner which is old pine plantation listed by Mattiske 2014 as being in Degraded Condition.

Two broad Pre-European vegetation associations occurred within the survey area, namely Spearwood_949 and to a lesser extent Spearwood_6. With respect to the current proposal, representation of Spearwood_949 and Spearwood_6 vegetation associations across the Swan Coastal Plain Bioregion would be reduced by 3.8% and 0.76%, respectively. (Mattiske 2013).

Two System 6 vegetation complexes occurred within the survey area, namely the Cottesloe Complex (north) and the Cottesloe Complex (central and south). With respect to the proposal, current representation of the Cottesloe Complex (north) would be reduced across the Swan Coastal Plain IBRA Region by 1.4% and 0.2%, respectively. (Mattiske 2013)

Significant Flora

Taxa

The mapped data is taken from Mattiske 2014 and relates to both M70/1325 and M70/1326.

Figure 1 above is copied from Mattiske 2014 and show all the significant vegetation for both tenements. Notice that there is no vegetation or taxa of significant Conservation status shown for M70/1325.

No Declared Threatened Flora species were recorded within the survey area.

Three Priority Flora species were recorded within the survey area, namely *Baeckea* sp. Limestone (N. Gibson & M.N. Lyons 1425) (P1), *Beyeria cinerea* subsp. *cinerea* (P3) and *Leucopogon* sp. Yanchep (M. Hislop 1986) (P3).

Communities

Figure 1 above is from Mattiske 2014 and shows all the significant vegetation for both tenements. Notice that there is no vegetation communities of significant Conservation status shown for M70/1325.

Vegetation Condition

The whole of M70/1325 was pine plantation that has been felled is listed as Degraded by Mattiske 2014.

While various forms of disturbances were evident, the structure and composition of the vegetation communities was generally intact. Disturbances included weed invasion, walking tracks, dumping of refuse and possibly dieback. Appropriate weed and exclusion management procedures should be developed and implemented to maintain vegetation condition across the project area, and mitigate potential impacts (e.g. spread of weeds) to adjacent bushland.

Of the 207 plant taxa recorded within the survey area, 26 species were introduced (exotic). Of these, one taxon, **Asparagus asparagoides* (Bridal Creeper) is a Declared Pest throughout the state.

The incidence of weeds was widespread throughout the survey area but weed density was generally higher near roads, tracks, clearings and illegally dumped refuse.

Fauna

Survey Methods

WA Limestone commissioned Western Wildlife to undertake a Level 1 fauna survey of the proposed quarry area during December 2013. A copy of the survey report is attached as Appendix 3 of the Mining Proposal.

All the information on fauna is taken from Western Wildlife 2014.

The aims of the fauna survey were to identify the fauna habitats present in the study area and the vertebrate fauna that potentially occur in the study area. Additionally, species of conservation significance, or habitats of particular importance for fauna, would be identified and any potential impacts of the proposed quarry would be identified, with recommendations for minimising the potential impacts.

In addition a separate study of cockatoo habitat and breeding sites was conducted by Tony Kirkby to determine the potential for Black Cockatoos.

Summary of the Fauna

Overall, the study area may support up to five species of frog, 47 species of reptile, 94 species of birds and 22 (17 native) species of mammal. There are no frogs of conservation significance likely to occur, but there are nine reptiles, 41 birds, six mammals and one invertebrate of conservation significance that may occur.

M70/1325 is likely to support a partial assemblage of native fauna due to the site being used for pine plantation that has been felled in recent years.

As with the flora study, the fauna study included both M70/1325 and M70/1326.

Overall, the study area may support up to five species of frog, 47 species of reptile, 94 species of birds and 22 (17 native) species of mammal. Twenty-three species of bird, two reptiles and one native mammal were recorded during the December 2013 site visit. It is noted that many of these will not be potentially present on M70/1325 because of the pine trash and past clearing

Amphibians

There are five species of frog that have the potential to occur on the site. No frogs were recorded during the site visit and there are no wetlands on the site. However, there are wetlands within 4km, including Loch McNess in Yanchep National Park. The frog species listed in Table 4 are those that use terrestrial habitats in addition to wetland habitats.

The Turtle Frog (*Myobatrachus gouldii*) inhabits sandy soil, potentially occurring in *Banksia* woodland which used to occur on M70/1325 and will be returned through rehabilitation. This species is entirely terrestrial and does not require open water for breeding.

Other species of frog, such as the Moaning Frog (*Heleioporus eyrei*) and Pobblebonk Frog (*Limnodynastes dorsalis*), may be found considerable distances from wetlands. These species may breed in wetlands nearby and move into the site during the non-breeding season.

Reptiles

There are 47 species of reptile that have the potential to occur in the study area, of which two were recorded opportunistically during the site visit. The majority of reptile species in the study area are likely to occupy native bushland, and the *Banksia* woodland and limestone heath are likely to support a relatively intact reptile community.

The re-growth shrubland (M70/1325) is likely to support a less diverse community, due to past disturbance, and the pine plantation is likely to support only a few species. Western Wildlife 2014.

Many small reptile species shelter and forage under leaf litter and fallen timber. Other species, particularly geckoes, are likely to shelter under bark or in rock crevices. Some species also use artificial shelter such as old tin, sheds or rubbish. Semi-arboreal species, such as the Carpet Python (*Morelia spilota imbricata*) or Black-tailed Tree Goanna (*Varanus tristis*), may shelter in trees or in roof spaces. Generalist species, such as the Dwarf Skink (*Menetia greyii*) and Fence Skink (*Cryptoblepharus buechananii*) may live in more degraded areas, as well as in other habitats.

Birds

There are 94 species of bird that have the potential to occur on the site, of which 23 were observed during site visit. Most birds in the study area are likely to rely on bushland for all or most of their needs, but many species will also use re-growth shrubland, particularly species that usually inhabit dense understorey, or birds that forage on the open ground between patches.

The list of potential species provided by Western Wildlife is extensive and they note, "however not all species are likely to occur on the site, as the site is relatively small. It is difficult to say with certainty which species will and will not occur on the site as they all occur in the general area. Waterbirds have been excluded from the list as the site does not contain waterbird habitat, nor is it adjacent to waterbird habitat".

A separate study of the breeding and roosting of Carnaby's Black Cockatoos was conducted by Tony Kirkby on 25 February and 3 March 2014. The report is attached as Appendix 4 of the Mining Proposal. Whilst Cockatoos most likely used the plantation when present there are no species or trees now present that provide habitat on M70/1325, for the birds

Mammals

There are 22 species of mammal that potentially occur in the study area, of which 17 are native and five introduced. One native mammal was recorded opportunistically during the site visit, the Western Grey Kangaroo (*Macropus fuliginosus*). Two introduced species, the Fox (*Vulpes vulpes*) and Rabbit (*Oryctolagus cuniculus*), were also recorded. As the site is continuous, with surrounding native vegetation, most native mammals still extant on the Swan Coastal Plain are likely to be present.

Mammals that use hollows in trees will not be present on M70/1325. For example the Common Brush-tail Possum (*Trichosurus vulpecula*) and bats.

Invertebrates

In general, invertebrate fauna is far less well known than the vertebrate fauna, whilst being far more numerous. Two invertebrates of conservation significance were found to be listed on DPAW's Threatened and Priority Fauna Database for the area by Western Wildlife. The Freshwater Mussel (*Westralunio carteri*) is not likely to occur due to lack of suitable habitat.

The Graceful Sun-moth is now listed as a Priority 4 fauna. It is known to inhabit coastal dunes and *Banksia* woodlands (DEC 2011). Populations in coastal dunes are usually more numerous and dense than those in *Banksia* woodlands (DEC 2011). It occurs in more coastal situations than this but may return if the site is revegetated to *Banksia* Woodland.

Conservation Status of the Fauna

There are a number of species of Conservation Significance that may occur on M70/1325. These are less likely but some may return if they are locally present when *Banksia* Woodland is established on the site.

These are the:

- Carpet Python (*Morelia spilota imbricata*) – WC Act (Schedule 4)
- Peregrine Falcon (*Falco peregrinus*) – WC Act (Schedule 4)
- Carnaby's Black-Cockatoo (*Calyptrorhynchus latirostris*) – EPBC Act (Endangered), WC Act (Schedule 1)
- Fork-tailed Swift (*Apus pacificus*) – EPBC Act (migratory)
- Rainbow Bee-eater (*Merops ornatus*) – EPBC Act (migratory) Of these Carnaby's Black-Cockatoo is unlikely not now occur but will return if *Banksia* Woodland is created.
- Black-striped Snake (*Neelaps calonotos*) – Priority 3
- Masked Owl (*Tyto novaehollandiae*) – Priority 3
- Quenda / Southern Brown Bandicoot (*Isodon obesulus*) – Priority 5
- Western Brush Wallaby (*Macropus irma*) – Priority 4
- Western False Pipistrelle (*Falsistrellus mackenziei*) – Priority 4 This taxa is unlikely because they are associated with Tuart trees that are not present.
- Graceful Sun-moth (*Synemon gratiosa*) – Priority 4

Of these, all but the Masked Owl potentially occur in the *Banksia* woodland, and Western False Pipistrelle may roost in hollow Tuarts which are not locally present.

The Masked Owl is very rare and has only a low likelihood of being present.

Western Wildlife found 47 species of conservation significance 3, that may be present are mainly locally significant bird species, but also include reptiles and small mammals that are generally scarce on the Swan Coastal Plain, or are at the limit of their distribution in the area.

Wetlands

There are no nearby wetlands or wetlands on site.

The water balance of the proposed excavation, and lowering the ground surface, is discussed later.

Potential Offset Package

Even though M70/1325 is located on cleared pine plantation a comprehensive preliminary offset program has been developed by CO₂ in conjunction with M70/1326. This is attached as Appendix 6. See also 4.1 Land Clearing.

The concept offset package will include portion of Lot 1 Nowergup Road Nowergup owned by WA Limestone, Lot 100 McCormick Street Seabird owned by WA Limestone and the creation of a restored vegetation linkage joining Yanchep National Park with Yeal Nature Reserve. The full extent of the offsets would not be applied if M70/1326 was not also approved for mining.

The northern portion of Lot 1 could be protected by Covenant or ceded to the State to add to the Neerabup National Park. The offset would potentially save the State up to \$2 million in not having to provide compensation for the portion of Lot 1 north of Nowergup Road.

Lot 100 McCormick Road, Seabird has an area of 303.75 hectares and has the potential to form an offset equivalent to 170 hectares of Carnaby's foraging habitat.

The potential wildlife corridor to link Yanchep National Park to Yeal Nature Reserve would convert pine plantation to Proteaceous feeding habitat suitable for Carnaby's Black Cockatoo. A preliminary estimate of the cost of providing this offset is \$3 250 - \$4 500 per hectare over an area of approximately 320 hectares.

This is in addition to the return of M70/1325 to local native vegetation which will result in a temporary reduction in habitat and Carnaby's Black Cockatoo feeding habitat but not a total loss.

The amount of ground open at any one time is anticipated to be around 6 hectares. With rehabilitation to *Banksia* Woodland habitat for Black Cockatoos and other fauna will increase progressively.

4.7 Social Environment

The land is located in State Forest 65. At the end of excavation the surface will be rehabilitated to *Banksia* Woodland to match the adjoining lands.

Yanchep National Park

It is proposed that the rehabilitation will be sufficiently good for the excavated site to be added to the conservation estate as a buffer to or part of an extended Yanchep National Park. This however depends on the wishes of the Forest Products Commission which may determine that M70/1325 is required to be returned to pine..

The location could be used as an area accessible to the public and assist in minimising public access pressure on the more significant core areas of the Ridges.

This will minimise the long term impacts on biodiversity and public use of the State Forest.

The conversion of pine plantation to *Banksia* Woodland will increase the are of habitat of *Banksia* Woodland and help restore water balance and biodiversity values that were reduced through the original clearing of this portion of State Forest 65 for planting to pines. If M70/1325 is returned to pines then there will be no change to the previous vegetation on site and the pines will be available to the community.

Heritage

The State *Aboriginal Heritage Act 1972* and *Heritage of Western Australia Act 1990*, and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, have been considered within this proposal.

A search of the Department of Aboriginal Affairs database shows that there are no registered sites on or near the tenement.

WA Limestone has a good working relationship with the local Traditional Owners in other locations and liaises with the traditional owners, and will do so on this site.

The tenement will be referred to the Traditional Owners during the application for the Mining Lease. The results of that referral and any discussions and actions will be undertaken as required or committed to.

WA Limestone will liaise with the traditional owners with respect to the potential for sites to be present and the need for any archeological or ethnographic research on site.

5.0 STAKEHOLDER CONSULTATION

State Planning Policies

Even though they are implemented under the *Planning and Development Act 2005*, over which the *Mining Act 1978* prevails, the policies have some relevance in providing guidance on the provision of basic raw materials for the community. They also have relevance in that the Department of Mines and Petroleum seeks advice from the Local Authority when assessing mining proposals.

Some policies do have relevance such as the State Industrial Buffer Policy and Basic Raw Materials Policy.

With respect to the supply of sand and limestone, the overarching document is the;

- State Planning Policy 1.0 State Planning Framework.

Complementing this are a number of Relevant State Policies;

- State Planning Policy 2.0, Environment and Natural Resources Policy
- State Planning Policy 2.4, Basic Raw Materials
- State Planning Policy 4.1, State Industrial Buffer Policy
- State Planning Policy 2.8, Bushland Policy for the Perth Metropolitan Region.

The policies and their implications are discussed in Section 5.2 Land Use and Community in the Mining Proposal.

There has been extensive consultation over the years between the Department of Parks and Wildlife, under the various previous names of the department such as CALM, DEC, and with the Department of Mines and Petroleum and the various old names.

The discussions have been ongoing intermittently since 1995 in relation to the ground to be pegged, the type of tenements and the final tenement footprint. There has also been discussions with respect to the flora and vegetation, conservation and mining.

The discussions will continue, and copies of the Mining Proposal will be forwarded to the relevant departments as listed below.

The list will be updated as required as additional consultation is needed prior to and during operations.

Preliminary Stakeholder Consultation Table

Date	Description of consultation	Stakeholder	Stakeholder comment/issue	WA Limestone Response	Stakeholder Response
Prior to excavation commencing and then annually	Past consultations through previous versions of the DPaW. The Mining Proposal will be sent to DPaW for comment.	Department of Parks and Wildlife	DPaW approved exploration activities on the tenements.	WA Limestone seeks to have the tenement granted and return the excavated site to local <i>Banksia</i> Woodland subject to Forest Products Commission requirements.	
Prior to excavation commencing and then annually	The Mining Proposal will be sent to Conservation Commission for comment with respect to State Forest 65.	Conservation Commission	No comments are available.		
As required	A Clearing Permit will be applied for if	DER/DMP through delegated	No comments. The application has not been lodged	The revegetation of the disturbed land is to be in	

	required.	authority.		compliance with the guidelines of the Management Plan. Comply with the Clearing Permit.	
Prior to commencement	DOW response to the Mining Proposal.	Department of Water	DOW had no objection to the proposal and offered comments.	Responses to the comments of DOW have been incorporated into the updated Mining Proposal.	
Prior to commencement	Main Roads response to Mining Proposal	Main Roads	No comments are available.		
Prior to commencement, as part of the due diligence for Mining Tenement Applications.	Notification of traditional owners	Department of Aboriginal Affairs and traditional land holders	No comments are available.	There are no known registered sites on M70/1325.	
Prior to commencement	Discussions to determine the end use of the site	Forest Products Commission	Currently it appears that the FPC – DPaW will continue the process to covert the pine plantations to <i>Banksia</i> Woodland. This needs to be confirmed.		
Prior to commencement as part of the liaison with respect to application for M70/1325.	Referral of Mining Proposal to EPA under Part V of the Environmental Protection Act 1984.	EPA	No comments are available.		
Prior to commencement and annually	Consultation	DMP Resources Safety Division	A Project Management Plan will be submitted after grant of the tenement and prior to commencement. No comments are currently available.		
Annually	Consultation	DMP	No conditions currently in place.	Comply with tenement conditions	

6.0 POST MINING LANDUSE AND CLOSURE OBJECTIVES

6.1 Post Mining Landuse and Closure Planning

M70/1325 lies within State Forest 65.

Current Government Policy indications are that M70/1325 will be required to returned to local native vegetation – *Banksia* Woodland.

It is possible that the Forest Products Commission may wish the site to be returned to plantation. This appears unlikely bearing in mind Government Policy relating to the pines in this location. However discussions will be held with FPC to determine their requirements for the site.

On the basis that the site will be rehabilitated to *Banksia* Woodland, WA Limestone will work with Department of Parks and Wildlife and the Forest Products Commission to ensure that the end use is to local native limestone vegetation to match the existing vegetation on site and adjoining.

The methods described in the Closure Planning relate to rehabilitation to *Banksia* Woodland although the potential for plantation end use is flagged.

The excavated land surface will be contoured to a similar landform to that in the pre – excavation situation except that the landform will be some 5 to 15 metres lower.

The land will rise from approximately 40 metres in the central north of M70/1325 to near 60 - 70 metres in the south and east.

Areas excavated close to existing native vegetation will be gently battered to that vegetation at slopes of 1 to 4 vertical to horizontal.

Species selected in the rehabilitation will be designed to match the pre-excavation communities of *Banksia* Woodland.

If the site is to be prepared for planting to pines, WA Limestone will work with the Forest Products Commission to reform the soils to enable pine plantation. At Myalup on pending tenements M70/1319 and M70/1320 WA Limestone is working with the Forest Products Commission to enable sand to be extracted during the rotations of the planation silviculture. The State has reserved sand at Myalup and proposes to allow similar sand excavation.

Even though M70/1319 and M70/1320 are currently under application, the excavation of sand between the harvest rotations has been approved in principle by the Forest Products Commission. Excavation prior to a return to pines benefits the growth of the pines by increasing the soil capability by removing the more leached sand.

If pines are to be returned on M70/1325 then the same approved methods will be used, although, for this closure planning a return to *Banksia* Woodland is more likely and is proposed and described. An alternative end use can be dealt with through updated mine closure planning.

6.2 Disturbance

Currently there are no of disturbed areas related to excavation. The disturbance results from old plantation, none has been rehabilitated.

Over the next 20 plus years about 21 hectares are proposed to be opened. As ground is opened and excavated the excavated areas will progressively be rehabilitated. At any one time there is anticipated to be approximately 6 hectares of open ground. See Activity Table under 2.4 Disturbance Areas.

Rehabilitation will utilise best practice and be directed towards achieving a sustainable cover of local native vegetation that is capable of forming a similar species richness and diversity to the vegetation that occurs in adjoining vegetation.

There will be no introduced or existing adverse materials on site as a result of excavation. All materials on site are natural. There are no hazardous materials, waste materials, ponds, diversity or other such issues.

The site is set back from all roads apart from Pigeon Road and is less likely to be visible from that road. The faces produced will require rehabilitation to local native species to return the biodiversity values and prevent any visual impacts.

6.3 Closure Objectives

The rehabilitation will be directed towards a cover of local native vegetation as *Banksia* Woodland, on limestone that will match the adjoining and local vegetation.

The final excavation will be designed to maintain the profiles and form of the local sand ridges as an undulating landscape similar to that which exists today.

The post mined land surface is proposed to have a similar habitat and ecological function as the pre-mined habitat.

Rehabilitation will use best practice and be directed towards achieving a sustainable cover of local native vegetation that is capable of forming a similar species richness and diversity to the vegetation that was previously cleared prior to plantations.

7.0 IDENTIFICATION AND MANAGEMENT OF CLOSURE ISSUES

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 planning good native vegetation or tree belts if they are to be immediately cleared for an alternative land use. On the other hand it is often beneficial to establish fast growing native vegetation as interim soil cover.

The species to be chosen, and the planting densities, should match pre-excavation vegetation, adjoining vegetation, soil conditions and function of each site. For example when revegetating land within a National Park or Reserve a higher level of species richness and plant density might be expected than on a visual screening bund.

The species will therefore need to be selected to match the local plant communities or a restricted number of fast growing species may be used. The species to be used in rehabilitation may be different to that which originally occurred on site, because the land surface might be much lower and have higher levels of soil moisture, or the soil conditions may be different.

Rehabilitation will contain Dieback and Weed Management in addition to monitoring and replanting failed areas. There should also be a completion criteria against which the revegetation should be compared.

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.

The site specific issues that relate to this site are also listed to explain how this site compares to the general rehabilitation guidelines.

The aim of the rehabilitation program is to provide an ecologically stable community as close as possible to the original native vegetation.

Revegetation activities will be integrated into the excavation and land clearing process. The process of collecting local seed and the direct return of topsoils for use in rehabilitation will be pursued wherever possible in order to maintain vegetation provenance. Because of the nature of the timing of the operation there may be a need to liaise with nearby operators to swap topsoil if there are no on site areas to directly place the topsoil.

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

7.1 Research

The ground open at any one time will be 6 hectares with an anticipated disturbance of 27 hectares within the next 20 years.

A Level 2 Flora and Vegetation Study has been completed and is appended to the Mining Proposal.

A Level 1 Fauna Study has been completed and is appended to the Mining Proposal.

A Black Cockatoo Habitat Survey has been undertaken. See the attachments to the Mining Proposal.

CO² has completed a study of the potential for offsets and that is attached to the Mining Proposal.

Ongoing research will generally take the form of assessing the methods of rehabilitation and the success against the completion criteria. Observations and new rehabilitation procedures will be tried and used as required to achieve a final cover of self sustaining vegetation of local species.

Sample plots will be used to assess the vegetation across the site. The size of the plots will depend on the parameter being measured. Species richness and plant density are normally measured using multiple 10 m² or 100 m² plots. The number of trees/larger shrubs per hectare are often measured by traverses.

WA Limestone have excavated sand and limestone, gravel and hard rock, from pits in the Perth Metropolitan area for over 40 years and whilst much of that land has ended up as sequential land uses for other purposes, WA Limestone has developed significant knowledge and expertise in rehabilitation. For example their Pickering Brook operation on M70/733 is regarded by DMP as being of high quality. DMP have referred other companies, including large multinational companies, to review the results and methodology and has taken visiting dignitaries from overseas to review the operations.

In other locations on limestone and sand such as this, where excavation has occurred, rehabilitation has demonstrated that the excavated substrate is capable of supporting local species.

8.0 DEVELOPMENT OF COMPLETION CRITERIA

The site is currently felled pine plantation covered by pine trash with some scattered native plant regrowth.

Currently (2013 – 2014) the State and Commonwealth Governments are developing a Strategic Assessment with respect to providing for sufficient basic raw materials including sand. As part of that assessment all mining tenements and resources are being considered and assessed against conservation values and the need for resources for the next 30 to 100 plus years.

M70/1325 will be included in that process and therefore the outcome of the assessment and the proposal final nomination of the land will have a significant determining influence on the end use of the land.

In light of the above it is proposed to return the site to local native vegetation with high quality rehabilitation suitable for habitat as *Banksia* Woodland.

The post mined land surface is proposed to have a form that is compatible with the surrounding geomorphology, the ridges to the east and the general landform.

The rehabilitated surface is proposed to provide a similar habitat and ecological function to the pre- mined habitat.

Local native species will be used in the restoration of the rehabilitation and final vegetation cover.

A number of objectives relating to rehabilitation and closure are identified above in Section 6.3 Closure Objectives.

From these, Completion Criteria have been developed to provide auditable and measurable closure devices.

The best means of revegetation is to use;

- Vegetation and topsoil recovered from clearing.

- Brush cut from adjoining vegetation.
- Planting tube plants.
- Providing some seed of local provenance species.

New ground will be opened at the commencement of each campaign and the completed ground closed at the end of each campaign to minimise the amount of land open at any one time.

Over time the pit will progress across the resource and at any one time there will only be the current pit and hardstand and access road open. This is expected to total between 6 hectares of ground requiring rehabilitation at any one time.

The completion criteria must be developed taking into account the nature of the substrate at the end of mining. The pre-mined surface is leached white and pale yellow sand, whilst the post mined surface will be lower and have darker earthy sands and some ferricrete materials. Therefore the soils will change from eastern Spearwood/near Bassendean to Western Spearwood and lower elevation Bassendean Soils.

Therefore the plant species will need to be adjusted accordingly with some species added that may not currently adjoin M70/1325. For example species such as *Banksia grandis*, *Banksia ilicifolia*, *Banksia prionotes*, *Corymbia (Eucalyptus) calophylla*, *Eucalyptus tottiana*, *Eucalyptus marginata* (sandplain) *Hakea prostrata*, *Actinostrobilus pyramidalis*, *Acacia saligna*, and *Hypocalymma angustifolium* may need to be added.

Research on other sites has found that direct transfer of topsoil normally does not return sufficient Proteaceae or Eucalyptus. These are normally added as tube plants or additional seed.

The Completion Criteria in terms of species richness and plant density will be developed prior to the issue of Approval to Mine once the Conditions on the Tenement are known, and during the life of the operations when additional prescription will lead to better environmental outcomes. This will be completed through referral to the Department of Parks and Wildlife/Forest Products Commission after granting of the tenement and prior to the Approval to Mine.

The Completion Criteria will be adjusted as necessary during the life of the project based on stakeholder input, data collected on the existing environment and the continued success of the rehabilitation.

All Completion Criteria will be monitored and adjusted as necessary during the life of the project based on stakeholder input, data collected on the existing environment, the results of research, and any implications that arise from excavation.

The revegetation will be progressively monitored to ensure the Completion Criteria is met.

The proposed operations, when combined with good revegetation of all disturbed land, are consistent with the Management Plan. In general the management requires weed, plant disease and effective rehabilitation of disturbed land, which is proposed.

Completion Criteria

The Completion Criteria are identified below as auditable tasks developed from the Closure Objectives. The completion criteria are then transferred to the closure and monitoring tables in Sections 10 and 11.

These will be adjusted as necessary during the life of the project based on stakeholder input, data collected on the existing environment and the continued success of the rehabilitation as the Mine Closure Plan is reviewed.

- **Assessment of species and success.**

The Completion Criteria will be commented on by the relevant authorities such as Department of Parks and Wildlife and Forest Products Commission. The comments may result in some changes to the completion criteria.

The completion criteria may also be adjusted when the Mine Closure Plan is updated as a result of field research. The following completion criteria are at 3 years.

- All species used in rehabilitation are to be local provenance species suited to *Banksia* Woodland.
- On pine plantation areas plant density is to be 1 plant per 5 m².
- Species richness of 5 species per 100 m² in all areas.
- *Banksia* trees minimum 200 stems per hectare at 3 years.
- *Eucalyptus* stems at a minimum of 10 per hectare.

Closure Objective	Indicative Completion Criteria	Completion Criteria	Measurement Tool and Assessment activities
All legally binding conditions and commitments relevant to mine closure and rehabilitation will be met.	Comply with all legally binding conditions.	<ul style="list-style-type: none"> • All conditions of approval from any agency will be complied with. 	<ul style="list-style-type: none"> • Review the latest documentation and assess compliance. • Visually audit against all conditions.
Comply with the conditions of the Mining Tenement.	Comply with the requirements of the Mining Tenement.	<ul style="list-style-type: none"> • Closure and rehabilitation is consistent with all conditions of the tenement. 	<ul style="list-style-type: none"> • Review the latest documentation and assess compliance. • Compile an audit table of all conditions and commitments that relate to closure and conduct an audit of those items upon the completion of each stage of

			rehabilitation and annually until sign off.
All plant, foreign materials, buildings and other matter associated with mining will be removed from the completed areas.	The site will be cleaned, structures and non natural materials will be removed	<ul style="list-style-type: none"> No non natural structures will be retained on site. All hardstand and road making materials to be removed and buried. All ground once occupied by structures are deep ripped and soils reconstructed. 	<ul style="list-style-type: none"> Audit of completed ground, to verify compliance.
The disturbed land will be made safe and in compliance with the <i>Mines Safety and Inspection Act 1994</i> and <i>DMP Mine Closure Guidelines</i> .	<p>Surfaces will be formed to DMP Guidelines and match natural ground.</p> <p>Holes, sumps drains, ditches and the like will be filled and removed.</p>	<ul style="list-style-type: none"> Faces and the landform are to comply with DMP Guidelines and be stable for the long term. The land surface is to have a landform similar to the natural form. 	<ul style="list-style-type: none"> Audit of completed ground, to verify compliance. Visual observations of the landforms.
The reformed land surface will be internally draining and draining to small infiltration basins and pools.	Drainage will be internal or the ground sufficiently permeable to minimise or negate runoff.	<ul style="list-style-type: none"> Slopes are to drain to areas of internal drainage and infiltration basins formed from sand and limestone. 	<ul style="list-style-type: none"> Audit of completed ground, to verify compliance. Visual observations of the landforms.
The land surface will be resistant to wind and water erosion.	Slopes are to be stable and free from erosion.	<ul style="list-style-type: none"> Slopes are to be stable and free from erosion. Slopes on the floor are to be undulating and no greater than 1 : 5 vertical to horizontal. Some batter slopes may be up to 1 : 3 to match pre-mined steeper ridges. 	<ul style="list-style-type: none"> Visual observations of the landforms.
Rehabilitation vegetation will be a sparse cover of local native vegetation on the perimeter dunes and islands to match the pre-excavation habitat.	The vegetation composition of the perimeter dunes and islands is to be representative of the pre excavation form in those locations, in species, diversity and structure.	<ul style="list-style-type: none"> All species used in rehabilitation are to be local provenance species. On pine plantation areas plant density is to be 1 plant per 5 m². Species richness of 5 species per 100 m². <i>Banksia</i> trees minimum 200 stems per hectare at 3 	<ul style="list-style-type: none"> Conduct an on site audit of completed rehabilitation for species richness, diversity and structure using standard 100m² plots of rehabilitation and adjoining vegetation. Conduct audits of

		<p>years.</p> <ul style="list-style-type: none"> <i>Eucalyptus</i> stems at a minimum of 10 per hectare. 	<p>the completion criteria upon the completion of each stage of rehabilitation and annually until sign off.</p> <ul style="list-style-type: none"> Maintain ongoing records.
Rehabilitated areas will form a sustainable habitat that will be capable of improving with time as vegetation growth continues.	Over time there will be an increase in habitat values.	<ul style="list-style-type: none"> Habitat values increase with time, measured by soil development, soil litter increases, increased plant matter, cover, vegetation, structure and habitat niches. 	<ul style="list-style-type: none"> Conduct audits of the key indicators upon the completion of each stage of rehabilitation and annually until sign off, using lists and photographic records. Maintain ongoing records.
The rehabilitated vegetation will have similar resilience to the adjoining local vegetation.	The rehabilitated vegetation will be resilient to fire impacts, seasonal changes and longer term variable weather impacts.	<ul style="list-style-type: none"> The vegetation is to include a mixture of species that grow in local, limestone substrates and be resilient to fire or readily regenerate following fire. 	<ul style="list-style-type: none"> Annually conduct an on site audit of completed rehabilitation for species richness, resilience. Inspect revegetation to determine its long term survival from environmental and fire impacts. Until sign off inspect vegetation re-establishment following fire.
Soil properties will be appropriate to sustaining revegetated local native species.	Soil properties will be appropriate to sustaining revegetated local native species.	<ul style="list-style-type: none"> The soils are to be constructed from overburden overlain by topsoil, leaf litter, vegetation fragments as available in areas of native vegetation. In old pine plantations soils may be constructed from overburden where topsoil is too weed impacted. 	<ul style="list-style-type: none"> Prior to rehabilitating land before vacating. Annually check rehabilitated areas. Undertake to mitigate rehabilitation areas that are deficient or not capable of becoming compliant with the completion criteria.
Revegetation will be free from Declared or Environmental weeds that could	Revegetation will be free from Declared or Environmental weeds that could compromise the success of the	<ul style="list-style-type: none"> Absence of Declared or Environmental weeds that could compromise the success of 	<ul style="list-style-type: none"> Provide annual inspections at the appropriate time of the year.

compromise the success of the revegetation or spread into adjoining native vegetation.	revegetation or spread into adjoining native vegetation.	revegetation. <ul style="list-style-type: none"> • Exotic species to be no greater richness or density than adjoining vegetation. 	
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9.0 FINANCIAL PROVISION FOR CLOSURE

Financial provisioning at this time can only be indicative. Costs will change over the life of the operations, and costs outlined now will have to take account of inflation and other potential changes.

In addition the active term of operations will also affect the costs. The greater the length of time the greater the cost of rehabilitation.

On the other hand, as rehabilitation will be progressive, a total cost at the end of excavation is unlikely to be required on a staged operation such as this. Officers from DMP will regularly inspect the site.

With only around six hectares open at any one time, and completed ground restored at the end of each campaign there will be only a relatively small amount of ground to rehabilitate.

Costings for rehabilitation work for a quarry excavation over a 6 ha area are typically (if it had to be completed in one operation).

Action to be completed for closure	Estimated Cost
Bulldozer or loader to reform faces, push down to form batter slopes, deep rip the floor. Hardstand and the access road will be deep ripped with tyne attached to a loader, grader or bulldozer but only at the completion of all excavation Sourced from WA Limestone mobile plant.	\$ 20 000
Spreading overburden followed by topsoil by loader.	\$ 5 000
Environmental consultant to provide input to the species and methods to be used for rehabilitation. Includes travel from Perth. A consultant will be used who operates in the local area.	\$ 5 000
Seed collection by a local collector and tube plants sourced from a local supplier. Preparation of tube plants. Growth of tube plants. Purchase of local provenance seed and tube plants to supplement as required.	\$ 15 000
Spreading seed and planting tube plants.	\$ 10 000
Monitoring of the rehabilitation, weed management and ongoing assessment using WA Limestone staff, additional replanting and rehabilitation as required. Weed control, using mechanical removal, hand pulling and glyphosate/Fusilade control.	\$ 10 000
Accommodation, travel and other contingencies	\$ 5 000
Annual inspections and tasks by local contractor	\$ 5 000
TOTAL	\$ 75 000

The operations, when combined with good revegetation of all disturbed land, are consistent with the Management Plan. In general the management requires weed, plant disease and effective rehabilitation of disturbed land, which is proposed.

10.0 CLOSURE IMPLEMENTATION

10.1 Land Restoration and Rehabilitation

The closure planning will be updated between the “Grant of Tenure” and “Approval to Mine” procedures.

During excavation, closure planning will be updated from time to time as the excavation progresses forwards.

The following procedures will be used for final closure and rehabilitation.

Unplanned or temporary closure is addressed under 10.4 Temporary Closure.

The revegetation will be progressively undertaken to ensure the Completion Criteria is met.

The best means of revegetation is to use;

- Vegetation and topsoil recovered from clearing.
- Brush cut from adjoining vegetation.
- Planting tube plants.
- Providing some seed of local provenance species.

The closure planning will be updated from time to time as the excavation progresses forwards. This will include both anticipated costs and procedures.

The following procedures will be used for final closure and rehabilitation.

Unplanned or temporary closure is addressed under 10.4 Temporary Closure.

Land Clearing

1. A Clearing Permit will be required for areas of native vegetation to be cleared under Section 46 of the *Environmental Protection Act 1984*.
2. Dieback management will be undertaken as outlined in the Dieback Management Plan.
3. The pine stumps will be pushed out by loader or similar.

4. The pine trash will be pushed with a rake in front of a loader into windrows for burning to remove the risk of European Wood Borer.
5. Essentially all topsoil, vegetation fragments and any overburden will be recovered from cleared areas and retained for use in rehabilitation where weed impacts are low or can be managed. The vegetation will be stored with the topsoil in low dumps <1 metre high around the perimeter of the pit. Severely weed impacted topsoil will be buried.
6. Topsoil clearing will be progressive and minimised to that required for each stage of excavation.
7. A bulldozer or loader will be used to remove any native vegetation by pushing it into windrows.
8. Any large native logs will be either recovered for useable purposes or to form barriers.
9. Smaller native vegetation will be track crushed and directly transferred to areas under rehabilitation to assist soil and habitat generation. The native vegetation contains a significant seed source, because of the contained seed on many species, it is also a source of microbial material for soil formation, adds to habitat and assists in managing wind erosion.
10. The vegetation will also be used on the batters to minimise soil erosion and spreading on the final land surface as part of the final rehabilitation.
11. If direct transfer is not possible the vegetation will be stored in low dumps to 1 metre high or swapped with a nearby operator to try and ensure that the material is not wasted.
12. Topsoil will be pushed to one side and formed into low storage dumps for later use for rehabilitation using either a loader or bulldozer.
13. Overburden, as yellow and brown sand and low grade limestone, will then be pushed to the perimeters, normally by bulldozer, to form bunding around the active area.
14. The creation of hardstand from local natural limestone will be formed on the existing excavated limestone and will not require separate clearing apart from an initial trim of 1 metre from each side of the existing 100 metres of access road.

Land Restoration

1. The following procedures have been selected from observation of other existing operations and experience in the rehabilitation of other sand quarries by Landform Research.
2. At any one time it is anticipated that only 6 hectares of ground will require rehabilitation. Progressive rehabilitation of completed land will have taken place previously.

3. Rehabilitation is to occur as soon as possible following the end of excavation on each stage of pit floor and batter slope. This is to be completed progressively by the normal plant that operates on site during campaigns. A loader will be able to undertake this.
4. Land restoration and rehabilitation of any completed areas will be conducted prior to the site being vacated following the yearly excavation campaign at the end of autumn which is an appropriate time for rehabilitation.
5. All buildings, plant and any other foreign materials will be removed from site.
6. The land surface will be formed to the requirements of the *Mines Safety and Inspection Act 1994 and Regulations 1995* as a final land surface.
7. The final land surface will be smoothed to be compatible with the existing natural landform of the area.
8. Slopes are to be stable and free from erosion. Slopes on the floor are to be undulating and no greater than 1 : 5 vertical to horizontal. Some batter slopes may be up to 1 : 4 to match pre-mined steeper ridges.
9. The sand floor and batter slopes will be deep ripped at intervals of 1 – 2 metre intervals along contour.
10. A minimum of 300 mm of overburden will be spread over the surface where available to provide a substrate for revegetation.
11. Experience by Landform Research on limestone shows that good revegetation can be achieved by seeding into soft overburden and deep ripped limestone floor, if suitable local species are used.
12. As the sand is porous there will be no need for upslope contour or diversion banks to prevent water entering the void. Similarly there will be no need for drainage works on the floor of the void. The floor will however be formed to drain to low points to manage storm events.
13. Where possible any disturbed areas that are no longer required will be rehabilitated using the methods described above within 12 months of becoming available.

Revegetation

1. Native and low weed impacted topsoil and vegetation fragments will be transferred directly from an area being cleared and spread across the surface to provide seed sources and habitats wherever possible. If direct transfer is not possible, any material stored in dumps will be respread.
2. Larger vegetation will be formed into occasional piles for habitat creation on the lower elevations.
3. Topsoil will be re-distributed in rehabilitated areas to depths of 50 mm where available.

4. Native topsoil provides a useful source of seed for rehabilitation 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 weed affected topsoil can create additional issues and may not be used.
5. Studies have shown that topsoil stripping and placement is best undertaken in summer for maximum germination and this will be done, but this raises the potential for additional dust generation from the fine humus particles.
6. Topsoil will be spread directly from an area being cleared where possible, otherwise reclaimed from a topsoil dump.
7. Pre-seeding weed control is only likely to be required where topsoils are used that contain weed species.
8. In May, after the first autumn rains, check for weed germination.
9. 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. Fusilade will be used where grasses present an impediment to rehabilitation. Weed affected topsoil and overburden will be buried.
10. Methods of sourcing seed will be;
 - Direct transfer of topsoil.
 - Brushing by cutting branches of adjoining and suitable local vegetation. For example branches of *Melaleuca* hold their seed and provide a good seed source when placed across the land surface.
 - Sourcing and planting additional tube plants as required as a result of site trials.
 - Collecting and/or purchasing local provenance seed at the rate of about 500g/ha. Additional species that do not readily germinate from topsoil are Proteaceous and *Eucalyptus* species which will be overseeded or tube planted. Species can also be taken from Mattiske 2013.
 - Local leguminous species will be over seeded at the rate of 500 g per hectare to mimic the regeneration following fire.
 - Being old pine plantations, where seed is less available, seeds of indigenous species will be scattered during late summer at the rate of approximately 1 - 2 kg seeds per hectare as required and determined from trial plots.
11. 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.

12. Local provenance seed will be used wherever possible, selected for its ability to not impede the proposed final end use. A species list is attached.
13. In order to preserve as much local flora as possible, the topsoil will be saved and used in rehabilitation. As excavation progresses, followed by rehabilitation, there is an opportunity to collect seeds from the site for use in rehabilitation. This particularly applies to local uncommon species such as *Eucalyptus* and other species, which have readily collectable seeds and are the most vulnerable, eg *Eucalyptus marginata* (Sandplain) and *Eucalyptus tottiana*.
14. 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.
15. 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.
16. 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 50 kg/hectare, applied to rehabilitation areas in the year of planting. Nitrogen is provided by using leguminous seed in the seed mix.

Weeds

1. The Weed Management Plan (attached) 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.

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 sand 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. If wind erosion and soil stability become an issue measures will be taken to stabilise the soils. These could include but not be limited to fence wind breaks, spray mulching, cover crops, interim native vegetation or spreading mulch and vegetation.
6. For rehabilitation areas, interim revegetation will take place as soon as possible following landform and soil reconstruction.
7. Control of wind erosion potential will be assisted by spreading brush and vegetation across the topsoil on the batter slopes and reconstructed soils where local native vegetation is to be established.

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 rehabilitation and restoration using 100 m² plots as follows;
 - plant density
 - plant growth
 - plant deaths
 - regeneration
 - weed infestation
3. As necessary steps will be taken to correct any deficiencies in the vegetation.
4. 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 indigenous shrub vegetation.
5. If rabbit damage is detected either place guards around the tube stock or bait using commercial baits laid under low concrete slabs. Kangaroos are difficult to control other than by culling but this is not desired. Normally impact from kangaroos is regarded as acceptable damage.
6. Provide ongoing weed management to identify and treat significant environmental weeds or weeds likely to impact on the rehabilitation.
7. Plants that have not survived are to be assessed to determine the number of replacement plants required. To this is to be added the number of additional plants required to be installed in the following winter to bring any deficiencies up to the completion criteria.

8. 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,
- planting additional tube plants,
- additional use of fresh topsoil.

Weed and Plant Disease Management Plans are in place in the Mining Proposal and are attached.

10.2 Dieback and Weed Management

This section is taken from the Mining Proposal

Dieback Management

The site is covered by felled pine plantation.

Therefore there is the potential for plant pathogens to be spread with the movement of soil and plant materials, so good plant hygiene is desirable.

In the wetter parts of Western Australia, such as the south west, vegetation hygiene mainly relates to *Phytophthora cinamomi* even though there are other *Phytophthora* species and other diseases such as *Armillaria* that can cause dieback like symptoms. The same conclusions are made in the DER/DPaW Management Plans.

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

The hygiene principles are proposed as part of good site management of potential plant pathogens.

CALM 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.

There are several guides to the management of plant hygiene (Dieback).

- Department of Environment and Conservation CALM (DPaW) *Dieback Hygiene Manual 1992* is a practical guide to Dieback management.
- Department of Environment and Conservation CALM (DPaW) *Best Practice Guidelines for the Management of Phytophthora cinamomi*, draft 2004.
- Dieback Working Group 2005, *Management of Phytophthora Dieback in Extractive Industries*.
- Dieback Working Group 2009, *Managing Phytophthora Dieback in Bushland*.

As the location of the project is within native vegetation, which will be progressively cleared and rehabilitated, and adjoins native vegetation to the south and west, it is important that dieback management principles are used, and these are proposed.

Plant pathogens are only likely to be an issue when equipment is brought to the site from an affected area either through vehicles or plant and soil materials.

The general principles to be used as the opportunities are presented, are listed below.

- Plant diseases are more likely to be transported under moist soil conditions.
- All vehicles and equipment to be used during excavation or land reinstatement are to be clean and free from soil or plant material prior to arriving at a site. Normally the only vehicle used is the loader that is retained on site.
- Vehicles and earth moving equipment are required to be clean prior to entering the site if they originate from another site. This is conducted offsite, independent of the tenement, by either brushing or washing. No dirty vehicle will be permitted onto the tenement.
- No soil and vegetation is to be brought to the site.
- Excavation vehicles are restricted to the excavation area apart from clearing land.
- Unwanted access to vegetated areas is discouraged through reduced tracks, signage, site marking and/or fencing, as appropriate.
- A split operation is to be worked where practicable, where the road transport vehicles only access one side of the stockpile or processing area and excavation vehicles operate on the other side of the stockpiles and processing, reducing the risk of contamination from road transport.
- The site is to be secured from unwanted access with signs, fencing and other low impact measures as required.
- The Weed Management Policy will be complied with.
- Rehabilitated surfaces are free draining and do not contain wet or waterlogged conditions apart from dedicated sump and soakage areas.
- Illegally dumped rubbish is to be removed promptly.
- Roads are to be maintained as free draining and hard surfaced. All road vehicles will be confined to the dedicated roads.

Weed Management

Exotic and weeds species are common and widespread across the tenements. (Mattiske 2014).

Mattiske 2014, recorded a total of 25 introduced (exotic) taxa within the Yanchep Ridges survey area. One of these taxon; **Asparagus asparagoides* is a Declared Pest throughout the state. **Asparagus asparagoides* (Bridal Creeper) is a rhizomatous and tuberous, perennial herb and climber growing to 5 m high. It produces white flowers from August to September and has been recorded growing in sand, loam, clay and granite (Mattiske 2014).

Introduced species accounted for approximately 12.1% of taxa recorded within the survey area across M70/1325 and M70/1326, with most likely to be found on M70/1325. The incidence of weeds was widespread throughout the survey area but weed density was generally higher near roads, tracks, clearings and illegally dumped refuse.

Therefore weed management is to be used to minimise impact on site, remnant vegetation and on adjoining properties. Good management practices are to be used as part of the ongoing normal quarry operations.

The management of weeds therefore is to ensure that weeds are controlled, that there are no Declared or Significant environmental weeds that compromise the existing vegetation and the rehabilitated native vegetation, and that weed levels are not sufficient to impede future conservation land uses.

**Asparagus asparagoides* (Bridal Creeper) is of particular significance. In other locations the Department of Agriculture and Food has released a biological control predator which is reducing the incidence and severity of the species. The Department of Agriculture and Food will be consulted during the operations to provide the best means of control of Bridal Creeper.

Weeds are most likely to impact on;

- Disturbed areas such as overburden dumps, topsoil stockpiles
- Edges of access roads
- Parking and amenity areas
- Locations accessible to the public on which rubbish is dumped.

The main sources of weeds are;

- Naturally occurring in soils. It is possible for remnant vegetation to contain a weed load that is not apparent in the natural vegetation.
- When disturbed during land clearing or road works it is not uncommon for weeds to germinate from topsoil and be carried to site on vehicles.

Ongoing visual assessment needs to be made on the type of weeds and the potential impact of each species. This provides a guidance on the methods of treatment.

- Weeds from edge effects from access roads and disturbed areas that may be carried to site.

- Gradual creep of weeds along access roads.
- Rubbish dumped by the public.
- Materials or waste brought to site by employees.
- Soil and seeds from vehicles arriving at site. This often applies to trucks that have carried something else such as grain, or vehicles to be used in earthworks.
- Wind blown or seed from outside the site.
- Birds and other vectors. This is more common than is often given credit for. eg *Solanum* species.

Any weed management is to utilise the most appropriate on ground measures to minimise the risk of spread of Declared and Environmental weeds such as **Asparagus asparagoides* (Bridal Creeper).

The information provided here summarises the key points of the on ground weed management.

- The Plant Disease Management Actions are to be used to assist weed management.
- Inspections are to be conducted to monitor the presence and introduction of Environmental and Declared Weeds twice per year.
- On identification of Declared and Environmental weeds, a method and timing is to be agreed on to treat the weeds. This will either be removal, burial to a minimum of 500 mm, or spray with a herbicide. There are two main type of spray, grass selective such as Fusilade or general such as Roundup.
- Large plants are to be grubbed out or spot sprayed with a herbicide.
- All vehicles and equipment used during land clearing or land reinstatement, are to be clean and free from soil or plant material when arriving at site.
- Vegetated areas ahead of excavation are quarantined to excavation vehicles until required.
- Access to vegetated areas of the disturbed areas is to be discouraged through signage, marking, log barriers and a lack of tracks and the like as required.
- Illegally dumped rubbish is the major source of weeds and will 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 will work in conjunction with dieback principles and push from areas of better vegetation towards areas of lower quality vegetation.
- Weed management will work best from the least affected areas to most affected.

10.3 Temporary Closure

The nature of the temporary closure will depend on the circumstances and the time frame when activity is proposed to recommence.

Seasonal Closure and Campaign Closure

Completion Criteria	Seasonal or Campaign Closure Less than 12 months Prior to closure for each campaign	Care and Maintenance Greater than 12 months
		Activity
<ul style="list-style-type: none"> All conditions of approval from any agency will be complied with. 	Prior to undertaking temporary closure. <ul style="list-style-type: none"> Review the latest documentation. Assess compliance with the conditions and commitments. 	Prior to undertaking temporary closure. <ul style="list-style-type: none"> Review the latest documentation. Assess compliance with the conditions and commitments.
<ul style="list-style-type: none"> Closure and rehabilitation is consistent with all conditions of the tenement. 	Prior to undertaking temporary closure. <ul style="list-style-type: none"> Review the latest documentation and assess compliance in conjunction with the tenement conditions. 	Prior to undertaking temporary closure. <ul style="list-style-type: none"> Review the latest documentation and assess compliance in conjunction with the tenement conditions.
<ul style="list-style-type: none"> No non natural structures will be retained on site. All hardstand and road making materials to be removed and buried. All ground once occupied by structures are deep ripped and soils reconstructed. 	Prior to vacating; <ul style="list-style-type: none"> Secure the site and any plant or structures to be left. Remove all hydrocarbons and other fluids and other potential pollutants. 	Prior to vacating; <ul style="list-style-type: none"> Secure the site and any plant or structures to be left. Remove all hydrocarbons and other fluids. Remove any plant susceptible to combustion, stealing or movement.
<ul style="list-style-type: none"> Faces and the landform are to comply with DMP Guidelines and be stable for the long term. The land surface is to have a landform similar to the natural form. 	Prior to vacating; <ul style="list-style-type: none"> Complete activities to make the site safe. Provide fences, bunding and warning signs above faces as required. Provide locked gates or log access restraints as required. 	Prior to vacating; <ul style="list-style-type: none"> Complete activities to make the site safe. Provide fences, bunding and warning signs above faces as required . Provide locked gates or access restraints as required.
<ul style="list-style-type: none"> Slopes are to drain to areas of internal drainage and infiltration basins formed from sand and limestone. 	Prior to vacating; <ul style="list-style-type: none"> Inspect batter slopes, pools and other features and inspect drainage and provide infiltration areas as necessary. 	Prior to vacating; <ul style="list-style-type: none"> Inspect batter slopes, pools and other features and inspect drainage and provide infiltration areas as necessary.
<ul style="list-style-type: none"> Slopes are to be stable and free from erosion. 	Prior to vacating; <ul style="list-style-type: none"> Inspect all areas and ensure the 	Prior to vacating and during audits; <ul style="list-style-type: none"> Inspect all areas and ensure the

<ul style="list-style-type: none"> Slopes on the floor are to be undulating and no greater than 1 : 5 vertical to horizontal. Some batter slopes may be up to 1 : 3 to match premined steeper ridges. 	<p>land surfaces are stable to erosion from wind and water.</p>	<p>land surfaces are stable to erosion from wind and water.</p>
<ul style="list-style-type: none"> All species used in rehabilitation are to be local provenance species suited to limestone ridges. On pine plantation areas plant density is to be 1 plant per 5 m². Species richness of 5 species per 100 m². <i>Banksia</i> trees minimum 200 stems per hectare at 3 years. <i>Eucalyptus</i> stems at a minimum of 10 per hectare. 	<p>Prior to vacating;</p> <p>Rehabilitate any areas that are no longer required.</p> <p>Prior to vacating and during audits;</p> <ul style="list-style-type: none"> Inspect revegetation to determine its long term survival from environmental and fire impacts. Check species diversity and composition for next excavation campaign. 	<p>Prior to vacating;</p> <ul style="list-style-type: none"> Ensure rehabilitation is conducted at a suitable time to achieve success. If timing is not suitable undertake remediation earthworks such as re-ripping. <p>Check annually. If rehabilitated areas are deficient;</p> <ul style="list-style-type: none"> Provide additional topsoil or seed to increase the number and diversity of plants. Spread vegetation fragments or harvested branches capable of providing seed sources from brushing.
<ul style="list-style-type: none"> The vegetation is to include a mixture of species that grow in local, limestone substrates and be resilient to fire or readily regenerate following fire. 		
<ul style="list-style-type: none"> Habitat values increase with time, measured by soil development, soil litter increases, increased plant matter, cover, vegetation, structure and habitat niches. 	<p>Revegetation of the completed areas prior to vacating.</p> <ul style="list-style-type: none"> Inspect the area to be rehabilitated and the rehabilitated areas to determine what is required during the next excavation campaign. 	<p>Revegetation of completed areas prior to vacating.</p> <ul style="list-style-type: none"> Provide specific fauna habitat, such as logs, uneven land surface and recovered vegetation to provide a habitat suitable for local native fauna. Improve existing rehabilitated areas as necessary.
<ul style="list-style-type: none"> The soils are to be constructed from overburden overlain by topsoil, leaf litter, vegetation fragments as available in areas of native vegetation. In old pine plantations soils may be constructed from overburden where topsoil is too 	<p>Prior to vacating and during audits;</p> <p>Inspect revegetation to determine its long term survival from environmental and fire impacts.</p>	<p>Check annually. If rehabilitated areas are deficient;</p> <ul style="list-style-type: none"> Provide additional topsoil or seed to increase the number and diversity of plants. Spread vegetation fragments or harvested branches capable of providing seed sources from brushing.

weed impacted.		
<ul style="list-style-type: none"> Closure and rehabilitation is consistent with all conditions of the tenement, commitments and other conditions. 	<p>Prior to rehabilitating land before vacating to determine the nature of any future work required.</p>	<p>Prior to rehabilitating land before vacating. Annually check rehabilitated areas;</p> <ul style="list-style-type: none"> Undertake to mitigate rehabilitation areas that are deficient or not capable of becoming compliant with the completion criteria.
<ul style="list-style-type: none"> Absence of Declared or Environmental weeds that could compromise the success of revegetation. Exotic species to be no greater richness or density than adjoining vegetation. 	<p>Prior to vacating and during audits;</p> <ul style="list-style-type: none"> Inspect the site for environmental and declared weeds. If found, inspect adjoining native vegetation for edge effects. Inspect rehabilitation and the edges of access roads. 	<p>Annually;</p> <ul style="list-style-type: none"> Remove or spray environmental or declared weeds. Provide annual follow up inspections and treatment at the appropriate time of the year.

10.4 Permanent Closure

The closure of completed areas of the operations will be progressive with closure of all remaining ground at the end of operations.

Maintenance and monitoring will be conducted until completion criteria is met.

Unexpected or early closure will be completed in the same way as permanent closure below but the full rehabilitation will be completed as one operation.

A maximum of 6 hectares is anticipated to be open at any one time.

Progressive Closure of completed Stages of the Pit

Completion Criteria	Activity
	<i>To be completed as soon as site activities have been completed on any area and that area will not be required for future operations.</i>
<ul style="list-style-type: none"> All conditions of approval from any agency will be complied with. 	<p>Prior to undertaking permanent closure.</p> <ul style="list-style-type: none"> Review the latest documentation and assess compliance requirements. Design the rehabilitation to comply with and be able to achieve the completion criteria and commitments. Review the latest documentation and assess compliance. Visually audit against all conditions.
<ul style="list-style-type: none"> Closure and rehabilitation is consistent with all conditions of the tenement. 	<p>Prior to undertaking permanent closure.</p> <ul style="list-style-type: none"> Review the latest tenement conditions and design the rehabilitation to comply with all conditions relating to closure. Review the latest documentation and assess compliance. Compile an audit table of all conditions and commitments that relate to closure and conduct an audit of those items upon the completion of each stage of rehabilitation and annually until sign off.
<ul style="list-style-type: none"> No non natural structures will be retained on site. All hardstand and road making materials to be removed and buried. All ground once occupied by structures are deep ripped and soils reconstructed. 	<p>Prior to earthworks and rehabilitation;</p> <ul style="list-style-type: none"> Remove any plant or non natural materials and structures. Remove all hydrocarbons and other fluids. Audit of completed ground, to verify compliance.
<ul style="list-style-type: none"> Faces and the landform are to comply with DMP Guidelines and be stable for the long term. The land surface is to have a landform similar to the natural form. 	<p>Prior to rehabilitation;</p> <ul style="list-style-type: none"> Complete activities to make the site safe. Ensure that the batters are formed to comply with the requirements. Ensure the floor is completed and formed to the proposed final contours. Match the landform to the adjoining excavated and non excavated surfaces. Deep rip the floors and batter slopes along contour. Spread the overburden followed by topsoil. Spread any local native vegetation removed from ahead of excavation. Provide fences, bunding and warning signs above faces as required. Provide locked gates or access restraints as required.

	<ul style="list-style-type: none"> Audit of completed ground, to verify compliance. Visual observations of the landforms.
<ul style="list-style-type: none"> Slopes are to drain to areas of internal drainage and infiltration basins formed from sand and limestone. 	<p>Prior to rehabilitation and during audits;</p> <ul style="list-style-type: none"> Inspect batter slopes, pools and other features and inspect drainage and provide infiltration areas as necessary. Form small internal sumps and detention basins to ensure all water is retained on site. Provide specific fauna habitat, such as logs, uneven land surface and recovered vegetation to provide a habitat suitable for local native fauna. Audit of completed ground, to verify compliance. Visual observations of the landforms.
<ul style="list-style-type: none"> Slopes are to be stable and free from erosion. Slopes on the floor are to be undulating and no greater than 1 : 5 vertical to horizontal. Some batter slopes may be up to 1 : 3 to match pre-mined steeper ridges. 	<p>Prior to rehabilitation and during audits;</p> <ul style="list-style-type: none"> Inspect all areas and ensure the land surfaces are stable to erosion from wind and water. Check the slope angles for compliance. Visual observations of the landforms.
<ul style="list-style-type: none"> The soils are to be constructed from overburden overlain by topsoil, leaf litter, vegetation fragments as available in areas of native vegetation. In old pine plantations soils may be constructed from overburden where topsoil is too weed impacted. 	<p>Prior to rehabilitation;</p> <ul style="list-style-type: none"> Provide additional topsoil or seed to increase the number and diversity of plants. Spread vegetation fragments or harvested branches capable of providing seed sources from brushing.
<ul style="list-style-type: none"> All species used in rehabilitation are to be local provenance species suited to limestone ridges. On pine plantation areas plant density is to be 1 plant per 5 m². Species richness of 5 species per 100 m². <i>Banksia</i> trees minimum 200 stems per hectare at 3 years. <i>Eucalyptus</i> stems at a minimum of 10 per hectare. 	<p>During rehabilitation;</p> <ul style="list-style-type: none"> Ensure rehabilitation is conducted at a suitable time to achieve success. If timing is not suitable undertake remediation earthworks such as re-ripping. Use Dieback and Weed prevention methods. Collect seeds from native vegetation well in advance and retain for rehabilitation or grow to tube plants. Complete pre-rehabilitation weed control, normally in autumn. Undertake rehabilitation within the first year following ground preparation (Normally within 6 months). Determine the replanting and seed rates that are likely to achieve the Completion Criteria with an allowance for deaths (Normally 20%). Determine whether plant protection devices are required and install as necessary. Provide additional topsoil or seed to increase the number and diversity of plants. Spread vegetation fragments or harvested branches capable of providing seed sources from brushing. Add additional species as tube plants or seed for those that do not germinate readily from top soil such as Proteaceous and <i>Eucalyptus</i> species. Conduct an on site audit of completed rehabilitation for species richness,

	<p>diversity and structure using standard 100m² plots of rehabilitation and adjoining vegetation.</p> <ul style="list-style-type: none"> • Conduct audits of the completion criteria upon the completion of each stage of rehabilitation and annually until sign off. • Maintain ongoing records.
<ul style="list-style-type: none"> • The vegetation is to include a mixture of species that grow in local, limestone substrates and be resilient to fire or readily regenerate following fire. 	<p>Prior to and During Rehabilitation;</p> <ul style="list-style-type: none"> • Ensure that the species selected and rehabilitation techniques are chosen to provide species that are suitable for the soil conditions and will in time be able to regenerate after fire and become self sustaining. • Adjust species and rehabilitation methods to enable the completion criteria to be reached.
<ul style="list-style-type: none"> • Habitat values increase with time, measured by soil development, soil litter increases, increased plant matter, cover, vegetation, structure and habitat niches. 	<p>Prior to vacating and during annual inspections.</p> <ul style="list-style-type: none"> • Conduct an on site audit of completed rehabilitation for species richness, diversity and structure using standard 100m² plots of rehabilitation and adjoining vegetation. • Conduct audits of the key indicators upon the completion of each stage of rehabilitation and annually until sign off, using lists and photographic records. • Maintain ongoing records. • Improve existing rehabilitated areas as necessary using additional seeding, tube planting and weed control. • Check fencing and damage by predators or disease and take remedial action. • Maintain ongoing records.
<ul style="list-style-type: none"> • Absence of Declared or Environmental weeds that could compromise the success of revegetation. • Exotic species to be no greater richness or density than adjoining vegetation. 	<p>Annually;</p> <ul style="list-style-type: none"> • Remove or spray environmental or declared weeds. • Provide annual inspections at the appropriate time of the year. • Provide annual follow up inspections and treatment at the appropriate time of the year.

11.0 CLOSURE MONITORING AND MAINTENANCE

Monitoring of the rehabilitation is to continue to be undertaken at least prior to the wet season and following the wet season.

A weed monitoring and management program will be continued annually during operations and following closure to identify and control significant environmental weeds.

The revegetation will be monitored for 3 – 10 years post closure of each part of the pit or until completion criteria are achieved.

Completion Criteria	Measurement Tool and Assessment activities	Timing	Remediation Techniques to be Used if Required.
<ul style="list-style-type: none"> All conditions of approval from any agency will be complied with. 	<ul style="list-style-type: none"> Review the latest documentation and assess compliance. Visually audit against all conditions. 	Prior to land restoration activities and on completion of rehabilitation.	<ul style="list-style-type: none"> Undertake liaison and adjust the land reconstruction and rehabilitation to bring into compliance. Repeat or undertake required activities.
<ul style="list-style-type: none"> Closure and rehabilitation is consistent with all conditions of the tenement. 	<ul style="list-style-type: none"> Review the latest documentation and assess compliance. Compile an audit table of all conditions and commitments that relate to closure and conduct an audit of those items upon the completion of each stage of rehabilitation and annually until sign off. 	Prior to land restoration activities and on completion of rehabilitation.	<ul style="list-style-type: none"> Undertake liaison and adjust the land reconstruction and rehabilitation to bring into compliance. Repeat or undertake required activities.
<ul style="list-style-type: none"> No non natural structures will be retained on site. All hardstand and road making materials to be removed and buried. All ground once occupied by structures are deep ripped and soils reconstructed. 	<ul style="list-style-type: none"> Audit of completed ground, to verify compliance. 	Prior to spreading with topsoil.	<ul style="list-style-type: none"> Remove any foreign or other non natural materials. Deep rip any areas that have not been adequately prepared. Check that all hardstand and roads that are no longer required are closed and prepared for rehabilitation.
<ul style="list-style-type: none"> Faces and the landform are to comply with DMP Guidelines and be stable for the long term. The land surface is to have a landform similar to the natural form. 	<ul style="list-style-type: none"> Audit of completed ground, to verify compliance. Visual observations of the landforms. 	Prior to spreading with topsoil.	<ul style="list-style-type: none"> Complete remediation earthworks. Undertake any earthworks required to bring the land surfaces into compliance with the end use and completion criteria. Smooth out any non natural looking slopes and features.

			<ul style="list-style-type: none"> Make any non compliant faces safe and in compliance to DMP Guidelines.
<ul style="list-style-type: none"> Slopes are to drain to areas of internal drainage and infiltration basins formed from sand and limestone. 	<ul style="list-style-type: none"> Audit of completed ground, to verify compliance. Visual observations of the landforms. 	Prior to spreading overburden and topsoil.	<ul style="list-style-type: none"> Complete or revise the remediation earthworks. Ensure the ground is free draining and the sumps can contain the predicted rainfall events
<ul style="list-style-type: none"> Slopes are to be stable and free from erosion. Slopes on the floor are to be undulating and no greater than 1 : 5 vertical to horizontal. Some batter slopes may be up to 1 : 3 to match pre-mined steeper ridges. 	<ul style="list-style-type: none"> Visual observations of the landforms. 	Annually	<ul style="list-style-type: none"> Undertake additional planting or seeding. Provide additional earthworks or brushing. Provide temporary wind breaks. Bring any non compliant faces into compliance by backfill, or pushing down.
<ul style="list-style-type: none"> All species used in rehabilitation are to be local provenance species suited to limestone ridges. On pine plantation areas plant density is to be 1 plant per 5 m². Species richness of 5 species per 100 m². <i>Banksia</i> trees minimum 200 stems per hectare at 3 years. <i>Eucalyptus</i> stems at a minimum of 10 per hectare. 	<ul style="list-style-type: none"> Conduct an on site audit of completed rehabilitation for species richness, diversity and structure using standard 100m² plots of rehabilitation and adjoining vegetation. Conduct audits of the completion criteria upon the completion of each stage of rehabilitation and annually until sign off. Maintain ongoing records. 	During site audits.	<ul style="list-style-type: none"> Ensure rehabilitation is conducted at a suitable time to achieve success. If timing is not suitable undertake remediation earthworks such as re-ripping. Program additional rehabilitation work and ensure that it is implemented. Undertake any non complying or neglected steps in the rehabilitation program. Add tube plants, topsoil or seeds as required to increase the species richness and density.
<ul style="list-style-type: none"> The soils are to be constructed from overburden overlain by topsoil, leaf litter, vegetation fragments as available in areas of native vegetation. In old pine plantations soils may be constructed from overburden where topsoil is too weed impacted. 	<ul style="list-style-type: none"> Conduct audits of the key indicators upon the completion of each stage of rehabilitation and annually until sign off, using lists and photographic records. Maintain ongoing records. 	Annually Continue monitoring for 3 – 10 years until signed off.	<ul style="list-style-type: none"> Complete revegetation of completed areas prior to vacating. Provide specific fauna habitat, such as logs, uneven land surface and recovered vegetation to provide a habitat suitable for local native fauna. Improve existing rehabilitated areas as necessary.
<ul style="list-style-type: none"> Absence of Declared or Environmental weeds that could compromise the 	<ul style="list-style-type: none"> Annually conduct an on site audit of completed rehabilitation for species richness, 	Annually Continue monitoring for 3 – 10 years until	<ul style="list-style-type: none"> Undertake additional weed control measures using spray or mechanical means.

<p>success of revegetation.</p> <ul style="list-style-type: none"> Exotic species to be no greater richness or density than adjoining vegetation. 	<p>resilience.</p> <ul style="list-style-type: none"> Inspect revegetation to determine its long term survival from environmental and fire impacts. Until sign off inspect vegetation re-establishment following fire. 	<p>signed off.</p> <p>Inspect vegetation re-establishment following fire.</p>	<ul style="list-style-type: none"> Treat grass impacts with Fusilade and general weeds with glyphosate or similar. Treat when appropriate.
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12.0 MANAGEMENT OF INFORMATION AND DATA

All data relating to the operations will be retained as hard copies and electronic copies by Carew Nominees Pty Ltd and Ceptre Nominees Pty Ltd Pty Ltd. The data will include all materials relating to the project and include updated aerial and ground photography.

An annual environmental report will be prepared and submitted to the Department of Mines and Petroleum in accordance with the tenement conditions.

The Mine Closure Plan will be reviewed every three years or as required by the Department of Mines and Petroleum.

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M70/1325

Created 3 Jun 2014



Scale: 1:108,424

Description

- 1325 Mining Tenement
- 408 Bush Forever Site

Map Projection: MGA 94 Zone 50
(Eastings/Northings)

Datum: Geocentric Datum of Australia
1994

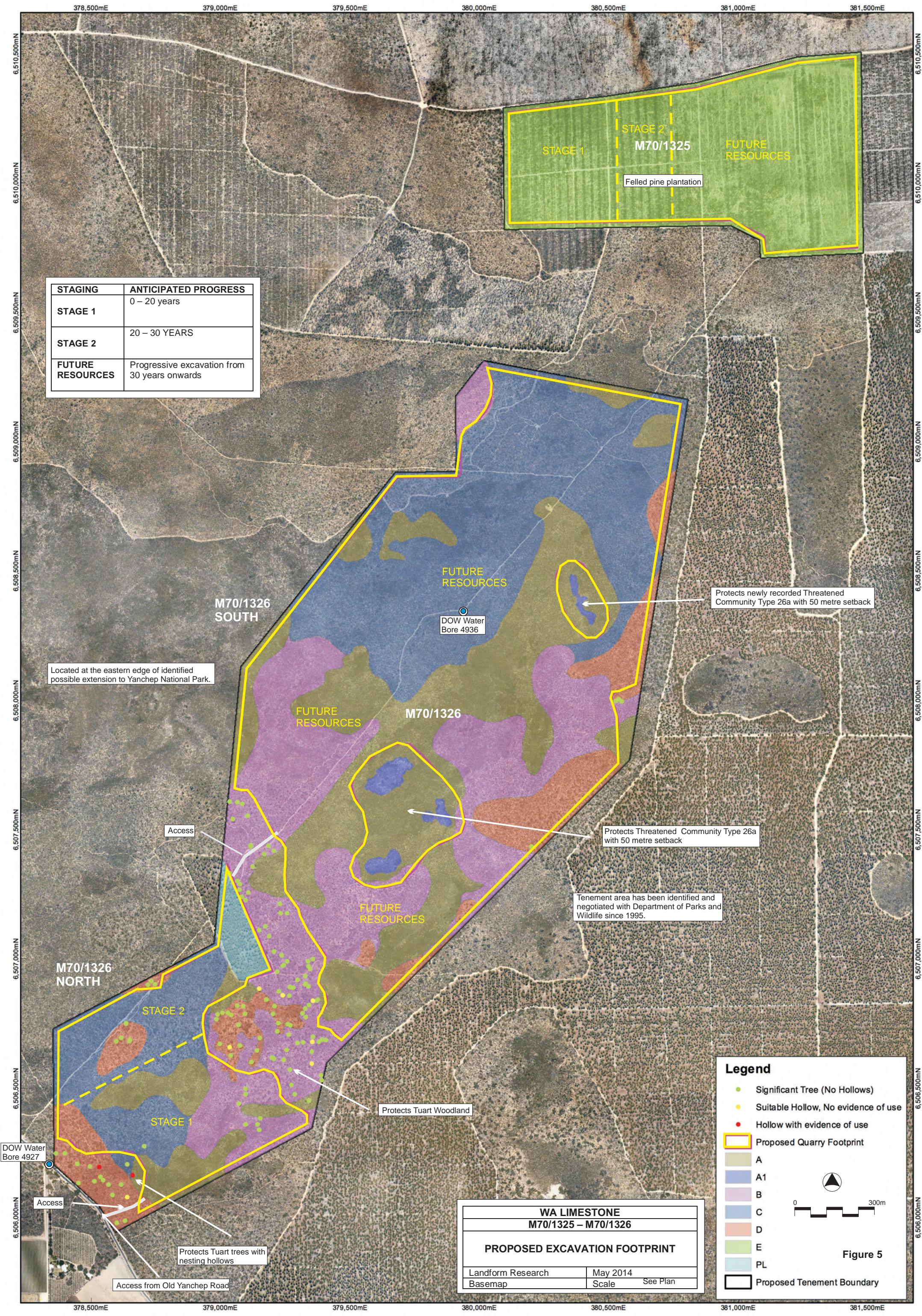
1 Midland Square
Midland WA 6056
(08) 9273 7341
customerservice@landgate.wa.gov.au
www.landgate.wa.gov.au



Landgate

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Figure 4



STAGING	ANTICIPATED PROGRESS
STAGE 1	0 – 20 years
STAGE 2	20 – 30 YEARS
FUTURE RESOURCES	Progressive excavation from 30 years onwards

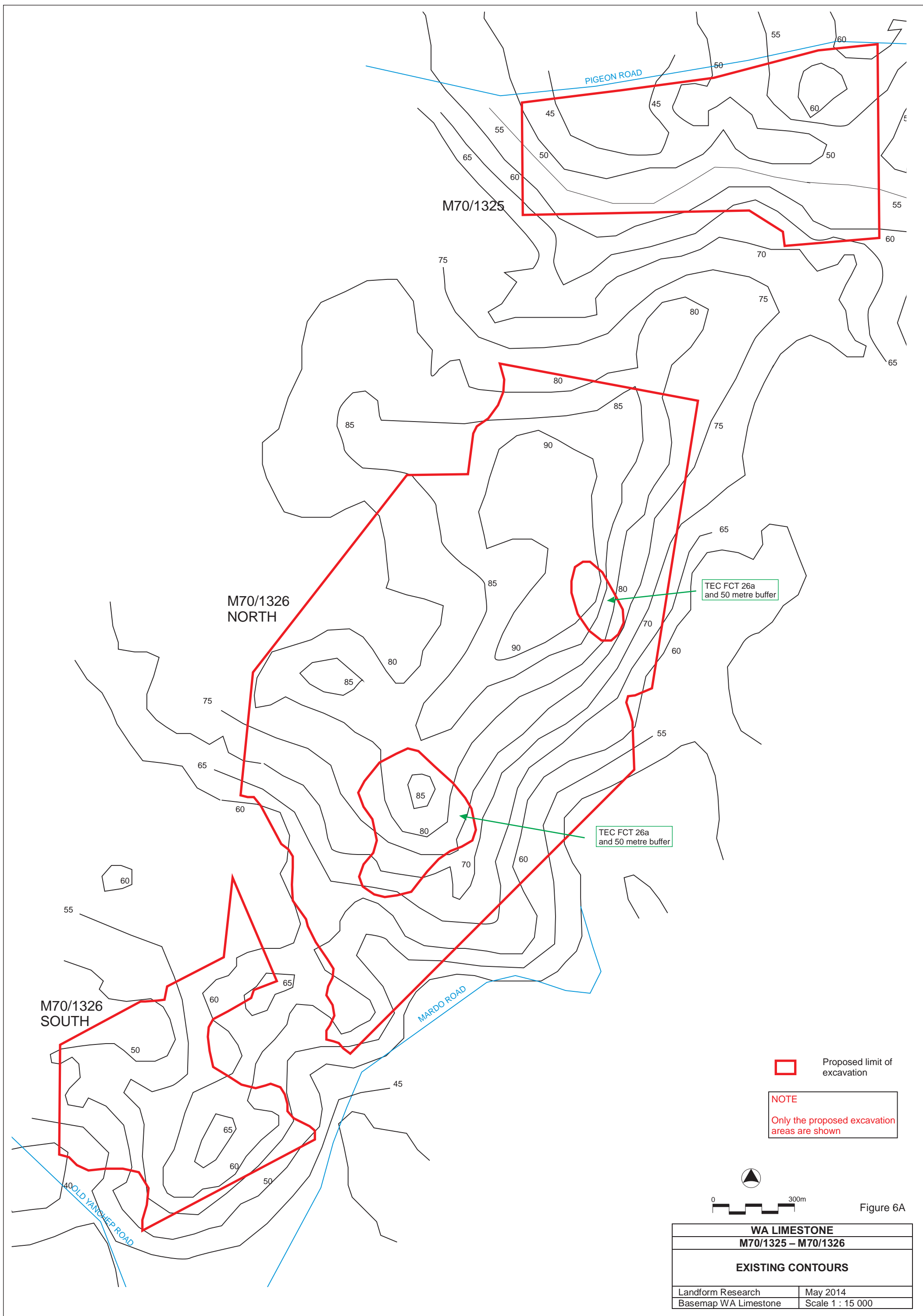
WA LIMESTONE		
M70/1325 – M70/1326		
PROPOSED EXCAVATION FOOTPRINT		
Landform Research	May 2014	
Basemap	Scale	See Plan

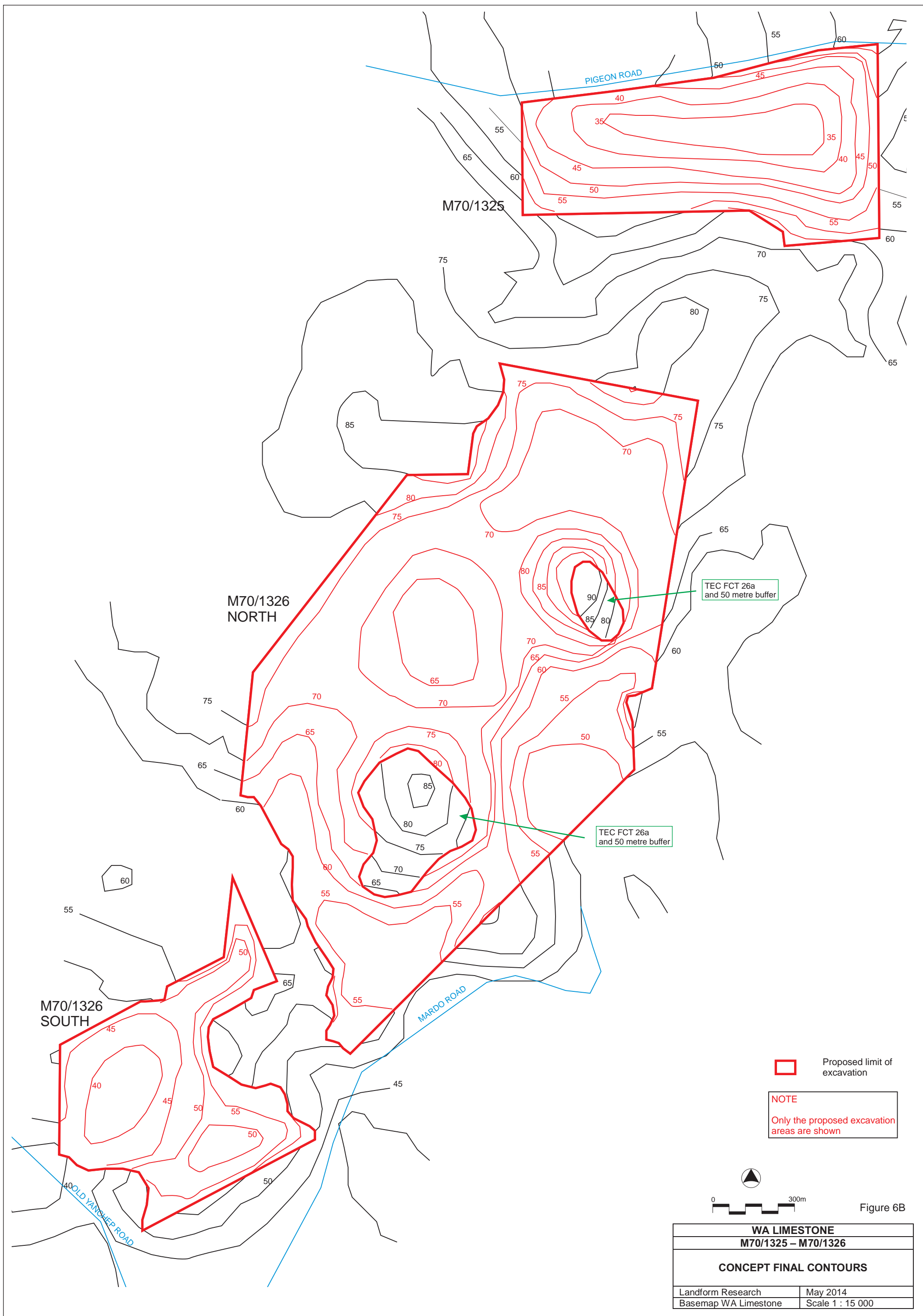
Legend

- Significant Tree (No Hollows)
- Suitable Hollow, No evidence of use
- Hollow with evidence of use
- Proposed Quarry Footprint
- A
- A1
- B
- C
- D
- E
- PL
- Proposed Tenement Boundary

0 300m

Figure 5







Typical sand pit and excavation

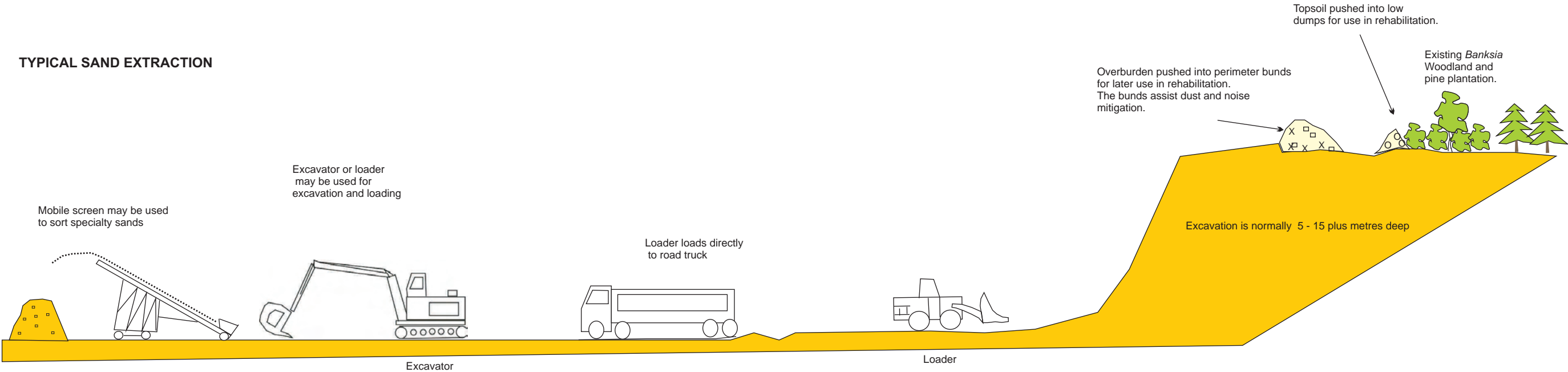


Excavating sand from a face similar to the proposed operation

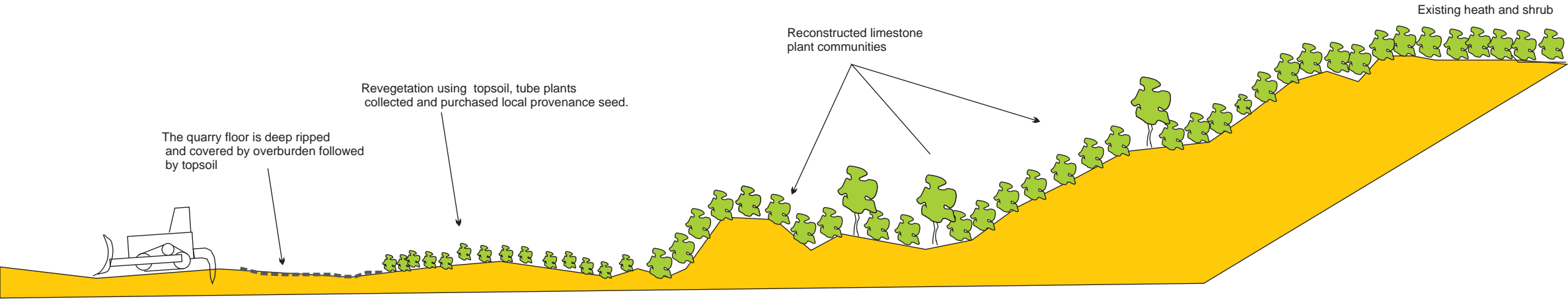
WA LIMESTONE	
M70/1325	
TYPICAL SAND EXCAVATIONS	
Landform Research	May 2014
Basemap	Scale

FIGURE 7

TYPICAL SAND EXTRACTION



PROPOSED REHABILITATION AND REVEGETATION



NOTE

At this stage Forest Products Commission have not indicated whether they wish to replant pines on M70/1325.

If FPC do not want pines, rehabilitation will be to *Banksia* Woodland which is proposed.

ALTERNATIVE REHABILITATION TO PINES IN ASSOCIATION WITH FOREST PRODUCT COMMISSION

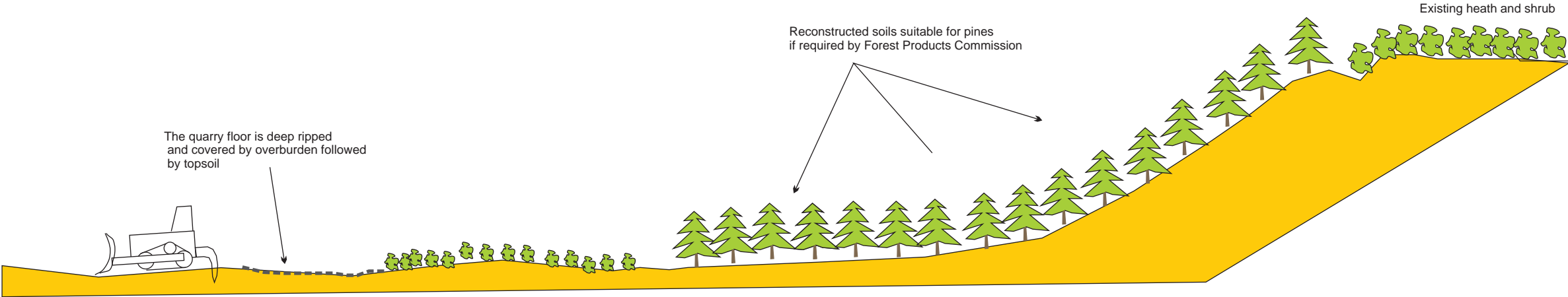


Figure 8

WA LIMESTONE	
M70/1325	
PROPOSED EXCAVATION METHODS	
Landform Research	May 2014
Basemap	Scale

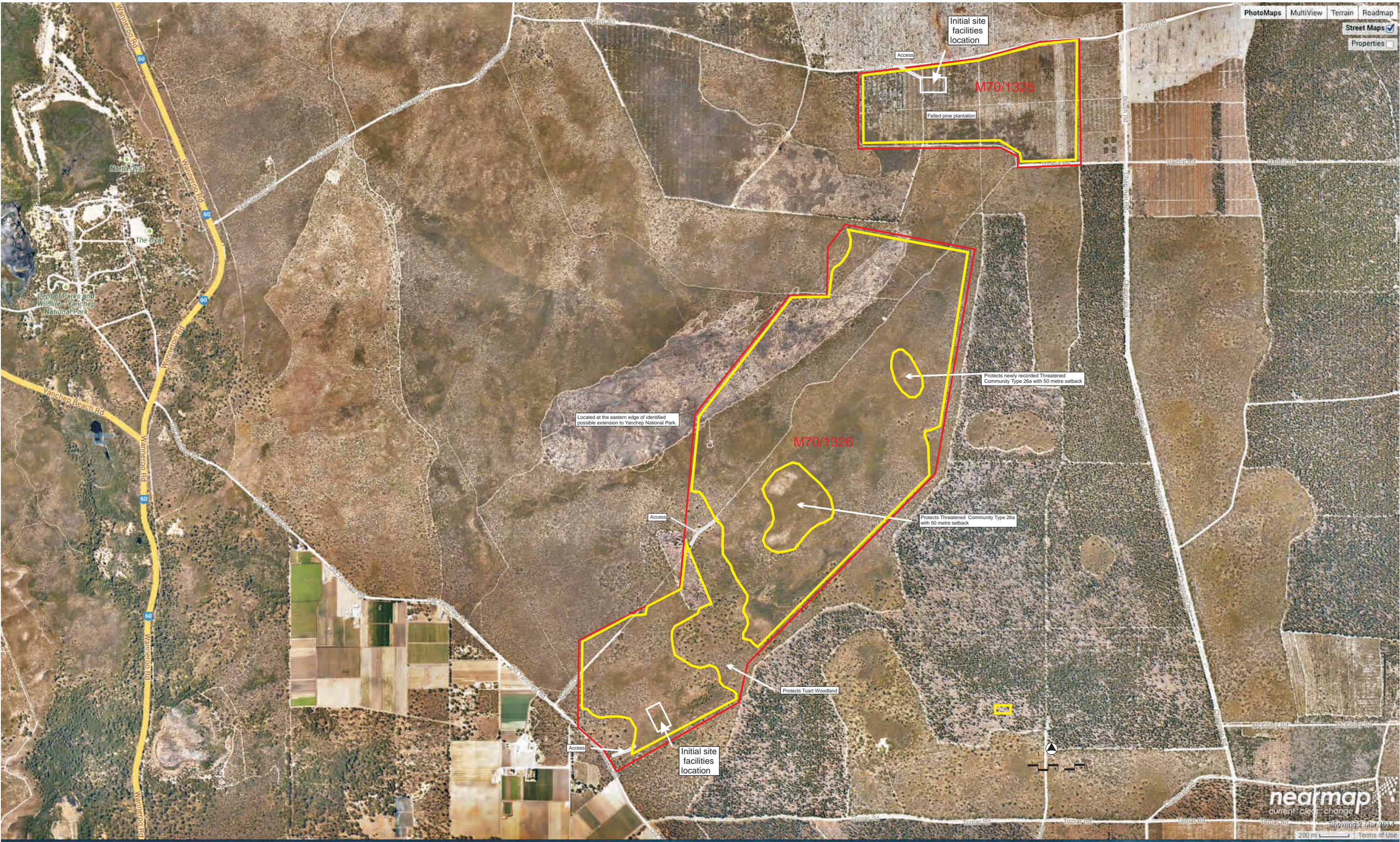


Figure 9

WA LIMESTONE	
M70/1325 – M70/1326	
AERIAL PHOTOGRAPH	
Landform Research	May 2014
Basemap WA Limestone	Scale 1 : 15 000