

EXCAVATION – REHABILITATION MANAGEMENT PLAN

CONTINUATION OF LIMESTONE EXCAVATION
AND RECONSTITUTED LIMESTONE BLOCK
MANUFACTURE

LOT 6, WESCO ROAD,
NOWERGUP

METEOR STONE

City of Wanneroo

August 2014



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NOWERGUP

METEOR STONE



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Summary

This application seeks an extension to the Planning Consent and Extractive Industries License for Lot 6 Wesco Road, Nowergup.

This Excavation Management Plan forms the application for an extension to the existing Planning Approval and Extractive Industries Licence that has enabled the extraction of limestone from Lot 6 Wesco Road, Nowergup continuously for over 25 years.

There are no proposed changes to the methods of operation or the volumes produced. Over the next ten years there will a small area of additional ground opened to the south of the existing operations, whereby the land surface in that location will be progressively lowered to continue to provide limestone for reconstituted block manufacture.

The site is accessed from Wesco Road via the current access road and cross over designed.

No land use changes have occurred in the area within the past 10 years that will have an impact on excavation.

This Excavation and Rehabilitation Management Plan has been updated from the previously approved plans however all commitments and management are retained within the Plan.

Hours of operation applied for are to remain from 6.00 am to 5.00 pm six days per week (Monday to Saturday inclusive) in line with most quarries.

The operation of the excavation in recent years has demonstrated that it has little impact on other land users and activities in the area. No complaints are known from the past five years.

The site lies within the Priority Limestone Resource area as listed in State Planning Policy 2.4 and forms a vital community limestone resource.

PROJECT SUMMARY

ASPECT	PROPOSAL CHARACTERISTIC
EXCAVATION	
Area of Existing Disturbance	Existing pit 3.0 ha Processing area 2.3 ha Roads office and facilities 1.0 ha TOTAL 6.3 hectares
Area of Proposed Excavation	Future excavation 4.0 ha encompassing the existing processing area which will move to the pit floor as excavation proceeds. TOTAL at 10 years 8.0 hectares
Limestone extraction	Approximately 50 000 tonnes per year
Total estimated resource	600 000 tonnes
Life of project	10 plus years
Area opened per year	0.2 ha on average
Dewatering requirements	None
Maximum depth of excavations	15 metres
PROCESSING	
Limestone	Up to 50 000 tonnes per year
Water requirements	5000 kL in summer
Water supply source	Licensed bore on property
INFRASTRUCTURE	
Total area of plant and stock	Located within excavation footprint adjoining
Area of settling ponds	Not required
Fuel storage	A bunded fuel storage is present. Mobile fuel tankers are used as necessary.
TRANSPORT	
Truck movements	Variable but approximately 10 laden trucks per day maximum. Some traffic will travel north across Wesco Road to the operations on Lots 1, 11 and 12 which are subject to separate approval.
Access	Existing limestone access road from Wesco Road.
WORKFORCE	
Construction	Not applicable as it is an operating pit
Operation	No change; 4 – 6 depending on the contracts and nature of the operations which will change from time to time.
Hours of operation	Monday - Saturday 6.00 am to 5.00 pm excluding public holidays.

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1.0 INTRODUCTION

1.1 Proposal

This application seeks an extension to the Planning Consent and Extractive Industries Licence for Lot 6 Wesco Road, Nowergup.

Over the next ten years there will a small area of additional ground opened to the south of the existing operations, whereby the land surface in that location will be progressively lowered to continue to provide limestone for reconstituted block manufacture.

This Excavation Management Plan forms the application for renewal of the existing Planning Approval and Extractive Industries Licence that has enabled the extraction of limestone from Lot 6 for over 25 years.

Excavation has been carried out to the licence conditions and the Excavation Management Plan from 2007.

The site has over the years been a valuable source of dimension stone and limestone rubble for reconstituted limestone blocks. The market for these materials continues, dominated by the need to supply the developing north west corridor.

As far as is known Meteor Stone has no records of complaints during the past 5 years.

In the past 10 years there have been minimal to no changes to the surrounding land uses, which continue to be market garden, poultry operations and limestone extraction. The only new activity has been the adjoining sand extraction that has operated for some ten plus years.

The subject land is little changed.

1.2 Existing Approvals

Approvals currently exist from the Western Australian Planning Commission and the City of Wanneroo.

The management plan is prepared to comply with the conditions listed in the existing approvals.

1.3 Importance and Rationale

Quarries are needed because the community demands limestone products for development. Limestone from these operations are used for reconstituted limestone blocks and cut dimension stone.

The importance of the site is recognised by the Western Australian Planning Commission in State Planning Policy 2.4, Basic Raw Materials (SPP 2.4).

The whole of the subject land lies within the Priority Limestone Resource area (Neerabup – Nowergup).

Wanneroo continues to be one of the fastest growing population centres in the state, with a need for limestone for development projects. Limestone suitable for extraction with minimal community interruption is in short supply in the Northern Perth Metropolitan Region because of restrictions imposed by Conservation nomination of land, and difficulties with obtaining clearing permits in other areas and even within the Priority Limestone Area.

Limestone north of Perth is highly constrained by the conservation estate created by Neerabup National Park, Yanchep National Park and highlighted extensions, Bush Forever and various other reserves and State Forest, small rural subdivisions and urban development.

The DMP has prepared, in 2012, updated mapping of the limestone to the north of Perth. The limestone on this site is include within the Regionally Significant Basic Raw Materials area.

There is no other limestone of high grade as shown in a number of publications such as Western Australian Geological Survey Record 1987/5 and Mineral Resources Bulletin 18.

Key Points

Basic Raw Materials including limestone are of State significance.

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

- Every dwelling uses limestone directly through cement and limestone retaining walls and indirectly through road base and other products.
- Every road on the Swan Coastal Plain is constructed from limestone.
- All subdivisions use reconstituted limestone blocks to prepare the sites to AS 2870 Site Class A.
- All harbour developments use limestone or hard rock to construct the port.

For example 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 Outlook also forecasts that there will be almost 10 000 dwellings constructed in the North West Sector of the Metropolitan Area between 2011/2012 and 2019/2020. All of the dwellings need limestone.

The Chamber of Commerce and Industry estimated in 2008 that each dwelling required 155 tonnes of limestone.

For the proposed dwellings in the North West Precinct for the next 7 years that is 1.55 million tonnes limestone for that area alone. This does not take into account the requirements for retaining walls and reconstituted blocks. It is believed the figure would be well over 2 million tonnes.

The actual requirements for other Precincts is many times that amount. This is an essential part of the assessment of the need for clearing but is ignored.

The limestone north of Perth is of State significance and is identified in all State Planning Policies, particularly SPP 2.4 and Department of Mines and Petroleum Mapping as a Strategic Resource.

Meteor Stone Pty Ltd is a major supplier of reconstituted limestone blocks that are used to form each housing lot. See Figure 2 where the ridges between each lot are walls of reconstituted limestone blocks.

The Department of Mines and Petroleum and Department of Planning are currently investigating limestone and sand resources south of Perth and have recognised the shortage and will have contacted the City of Wanneroo with respect to the future needs for limestone and sand.

They are remapping the resources and updating State Planning Policy 2.4.

Some consideration of the basic raw materials 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.

Limestone is only extracted for the community benefit, and utilised as a manufactured building product. If there was no community demand for limestone 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.

The resource is strategically located and has the potential to provide raw materials for the manufacturing and construction industry for 20 plus years although only ten years is applied for at this time.

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

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

If the resource is not taken from this site it will have to be taken from another site where similar or more land clearing is required.

1.4 Requested Planning Approval

It is proposed to continue limestone extraction from Lot 6 Wesco Road, Nowergup for a period in excess of ten years.

The proposal is seen as a temporary land use during which valuable basic raw materials are extracted and at a later stage the land is developed. This is a wise use of resources, the principle of which is supported by the Western Australian Planning Commission in their State Planning Policy SPP 2.4, Basic Raw Materials Policy.

1.5 Proponent

The proponent is Meteor Stone, a large dimension stone cutting operation that supplies much of the domestic market for limestone blocks, facing and paving stones.

Stone sold to the markets ranges from large structural and wall blocks down to small thin paving and wall tiles.

Contact can be made through

Manager
Meteor Stone
14 Furniss Road
Landsdale WA 6065

Phone 9309 4577

1.6 Location and Ownership

The land is described as;

LOT	ROAD	LOCATION	VOLUME	FOLIO	DIAGRAM
6	Wesco Road, Nowergup	2739	1500	124	34734

1.7 Description of the Resource

Scattered limestone outcrops occur across the site between deeper covering sand. The limestone has been indurated on the outcrops raising the calcium carbonate content to between 70% and 80%. As the calcium carbonate content drops the stone becomes less suitable for dimension stone.

The degree of lithification (hardness) changes both vertically and horizontally over the site and determines the use to which each type of limestone can be put. For example pits which start off with good product may become sub-grade as excavation proceeds. Similarly the lateral extent of the higher quality material can terminate quickly. These variations in grade require a number of excavations to be worked concurrently.

Although the resource extends to depth, extraction will be limited by the quality of stone encountered at depth.

Limestone occurs as several low ridges on the site and underlies the whole site. The limestone is of variable grade and the quality changes both laterally and vertically.

1.8 Aims of the Proposal

Quarries are needed because the community demands limestone products for development. Limestone from this site is used for both cut dimension stone and reconstituted block manufacture.

The aims of the project are to;

- Continue to provide limestone products in the Northern Perth and wider region to meet future demand in this rapidly developing region.
- Reduce the potential for future limestone shortages within the City of Wanneroo and surrounding areas for construction, housing and development.
- Continue to provide competition in the region, which will have the effect of containing prices for products essential to the construction and development industries.
- Continue to extract limestone from a site with large buffers and lower potential impact on nearby residents.
- Utilise essential basic raw material resources before they are sterilised by development, either on the site or by encroachment from outside, in line with the policies of the Western Australian Planning Commission.
- Rehabilitate the existing pits.

2.0 EXISTING ENVIRONMENT

2.1 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 average 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. 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.

2.2 Geology and Geomorphology

The site lies on the eastern of two main ridges of limestone that extend inland from the west coast separated by a line of wetlands and lakes. The land rises from the western margin with a swale through the centre and rising again to a ridge in the east.

Elevation is around 81 metres AHD with the existing production floor being at 69 metres AHD. It is proposed to lower the resource area down to 69 metres to match the existing production floor.

The limestone is an aeolian calcarenite (formed from wind blown calcareous sands) derived from beach sands and categorised as the Tamala Limestone. Calcrete formation has occurred on top of the ridge as calcium carbonate has been dissolved and re-precipitated. This has formed a hard cap rock of higher calcium carbonate content and has resulted in minor pinnacle formation and solution structures.

Some of the solution structures follow old tree roots and are filled with sand to shallow depth as the calcium carbonate has been dissolved by slightly acidic soil moisture. See Perth Environmental Geology 1 : 50 000 Series, Yanchep and Perth maps, (Gozzard 1982 and 1986).

The Tamala Limestone extends from Exmouth in the north to, and along the south coast. Its age is late Pleistocene and based on dates of between 100 000 and 25 000 years which have been obtained for limestone elsewhere. It consists of foraminifer, shell fragments and quartz grains.

2.3 Soils and Regolith

Soil coverage is naturally thin with shallow yellow brown sands over abundant limestone outcrop. They are classified as Cottesloe soils; Uc1.23 (Northcote).

The proposed extraction area is disturbed land with some overburden dumps located on it and does not therefore have soil remaining on it apart from soil and overburden stored in small dumps at the edges of the existing disturbance.

2.4 Acid Sulfate

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

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

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

The site has been visited by Lindsay Stephens of Landform Research on a number of occasions, and the faces and limestone observed.

On this site the sandy soils and limestone are highly oxidised, hence the presence of the yellow brown goethite coatings. The base of the pit is at an elevation is >33 metres above the groundwater under the site, and demonstrates the oxidised conditions present.

The other factor is that limestone of this type is used to neutralise acidic soils conditions as it contains high CaCO₃ and has a high neutralising value.

No peat or organic matter has been intersected in the pit, is present in the faces or floor, and none is likely as the existing excavation at around 33 metres above the water table is located in the wrong geological environment.

2.5 Hydrogeology

Elevation of the land surface grades from 75 metres AHD in the west of the proposal area to 83 metres AHD in the east. The western boundary is at 36.4 metres AHD.

The site is underlain by a sequence of limestone and sand of the Tamala Limestone. It is a highly porous sequence with fast vertical movement of water to the ground water table and then slower lateral flow of groundwater to the west.

Elevation of the water table is 21 to 23 metres AHD.

That is, there is a separation to the water table of over 45 metres.

The water table drops further to Lake Nowergup west of Gibbs Road. The lake has a permanent body of water that is significant for a large waterbird population. In recent years it has been artificially maintained at a level of near 17 metres AHD.

A licensed bore is located on site with water pumped to a small tank and then gravity fed to the operations. No changes are proposed to this arrangement or water use.

2.6 Karst

The site has been reviewed by Lindsay Stephens of Landform Research on a number of occasions over the years. No evidence from past excavation shows any karst formation or caves.

The northern and eastern faces are vertical with no evidence of caves or cavities as shown in the photographs provided of the site.

The northern face is an excavated face which does not show any evidence of cavities and, considering the depth to the water table, would be unlikely to do so.

In fact the presence of cavities significantly reduce the quality of the stone for use as dimension stone. The site lies outside the Karst Risk Area in Csaky 2003.

The site lies outside the Risk Area identified City of Wanneroo Local Planning Policy 4.13, Caves and Karstic Features. Pit 5 lies outside the Medium Risk.

The risks east of Lake Nowergup are actually very low based on field assessments and with the separation to the water table.

A summary of the karst issues is attached as Appendix 2. In summary the main points are;

- There is no risk from karst, being at the eastern edge of the karst risk zone with the very deep water tables and shallow excavation. No excavation will extend past the existing floors.

- There is no risk of karst being uncovered with such separation taking into account the water table depth, historic levels, potential for cavities at the water table or historic water table, source of the water through limestone flowing west which will result in any acidic conditions being neutralised prior to flowing to the site.
- There is no evidence of “cave” karst on site or nearby, there are no dolines, cavities or any such features and no original Tuart trees. That is there are no indicators of karst apart from a very broadly drawn line on a plan which shows the site is near the edge of the Medium Risk karst zone.

With such separation the City is able to exercise their discretion to wave the requirement for any further consideration of karst.

2.7 Flora

No native vegetation is proposed to be cleared with the progress of excavation onto pasture land and pine plantation.

The vegetation was assessed by Lindsay Stephens of Landform Research on 27 August 2014.

2.8 Fauna

The proposal is to continue to operate the existing pits on site.

As no clearing is proposed significant impacts on fauna are not anticipated.

2.9 Wetlands

There are no wetlands on site. The closest wetland is Lake Nowergup which lies west of Gibbs Road.

Lake Nowergup is classified as a Conservation Category Wetland that is recognised in System Six.

The lake has a permanent body of water that is significant for a large waterbird population. In recent years it has been artificially maintained at a level of near 17 metres AHD.

2.10 Aboriginal Sites

The site of the proposed quarry is cleared and has been farmed for many years. No evidence of aboriginal occupation has been found on the property.

There is no record of a site on the Department of Indigenous Affairs database.

The database of the Sites Department of the Department of Aboriginal Affairs has no record of any aboriginal sites in the area. It is unlikely that any sites will be found as no new ground that is not already disturbed is to be opened.

3.0 PLANNING ISSUES

3.1 Current Land use

Lot 6 has been variously used for agricultural activities of grazing, cropping, market garden, limestone and sand extraction and intensive livestock over the past several decades.

Limestone and sand extraction from the subject land has been undertaken for the past 25 years.

Processing and reconstituted block manufacture has been used on site for many years.

There is a small support facility and office.

The facilities are to be upgraded with the movement of the processing plant and building from north of Wesco Road to Lot 6, to the western end of the current block production floor.

The limestone is used for cut dimension stone, reconstituted block manufacture and a number of other minor uses such as a source of calcium carbonate.

In the general area limestone has been extracted from the Wesco Road area for many years and there are old and current quarries to the south, west and north. There are old and heritage listed lime kilns south of Wesco Road and on the limestone ridges to the north and west.

There does not appear to have been any change to the nearby dwellings in the local area in recent years. See 5.1 Surrounding Landuse and Buffers. A recent aerial photograph is attached as Figure 1.

3.2 Land Zonings and Policies

State Planning Policies

The State Planning Policy Framework provides for the implementation of a planning framework through the recognition and implementation of Regional Planning Policies above Local Planning Schemes and Policies.

Within each layer of planning, there are a number of key policies and strategies to provide guidance to planning and development to enable sustainable communities to develop, expand and prosper without compromising the environment and future generations.

Planning is governed under the *Planning and Development Act 2005*. This Act enables Government to introduce State and Regional Planning Schemes, Policies and Strategies to provide direction for future planning. The State and Regional Schemes sit above Town Planning Schemes and Strategies introduced by Local Government.

Strategies and Policies provide guidance on how planning is to be undertaken and how proposed developments are to be considered. These Strategies and Policies are at the State, Regional and Local levels.

Schemes are gazetted documents that provide for consideration and approval of proposed developments. These are normally at the Regional and Local Level.

In addition to the documents produced under the *Planning and Development Act 2005*, the *Local Government Act 1995* provides Local Governments with a mechanism to prepare Local Laws to manage issues of local significance.

As noted above the policies have little relevance over mining tenements on Crown Land in State Forest, but they do have relevance to the local roads, and the recognition of the need for limestone for dwellings, roads and construction.

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.

- ***State Planning Policy 2.0, Environment and Natural Resources Policy***

This policy provides for the protection of all natural resources under a number of sections;

- 5.1 General Measures
- 5.2 Water Quality including stormwater and wetlands
- 5.3 Air Quality
- 5.4 Soil and Land Quality
- 5.5 Biodiversity
- 5.6 Agricultural Land and Rangelands
- 5.7 Minerals Petroleum and Basic Raw Materials
- 5.8 Marine Resources and Aquaculture
- 5.9 Landscape
- 5.10 Greenhouse Gas Emissions and Energy Efficiency.

In addition to recognising the importance of protecting air quality, soil and land quality, water and wetlands and landscapes, the importance of Basic Raw Materials to the community is identified with reference to *SPP 2.4 Basic Raw Materials, State Gravel Strategy 1998* and *State Lime Strategy 2001*. See Section 2.1 of this management plan.

Section 5.7 of SPP 2.0, deals with Minerals, Petroleum and Basic Raw Materials.

Part of Section 5.7 states;

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

Planning strategies, schemes and decision making should:

- ii. Identify and protect important basic raw materials and provide for their extraction and use in accordance with State Planning Policy No 10 (2.4); Basic Raw Materials.*
- iii. Support sequencing of uses where appropriate to maximise options and resultant benefits to community and the environment.*

The other factors of the natural environment are provided with the best protection possible, by this management plan, by selection of the site, operational staging and footprint and rehabilitation, bearing in mind the constraints of excavating and processing the resource.

SPP 2 Environmental and Natural Resources Policy

Section 5.7 deals with Minerals, Petroleum and Basic Raw Materials. Part of Section 5.7 states;

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

Planning strategies, schemes and decision making should:

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

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

- **State Planning Policy 2.4, Basic Raw Materials, 2000**

State Planning Policy 2.4 recognises the site as a Priority Limestone Resource. This is also recognised in the Metropolitan Rural Plan and The North West Structure Plan. Furthermore SPP 2.4 requires that resources be staged and taken prior to sterilisation by other land uses.

The need for limestone is also recognised by the Chamber of Commerce and Industry in their comprehensive summary of Basic Raw Materials, (*Managing the Basic Raw materials of the Perth and Outer Metropolitan Region, April 1996*).

The Western Australian Planning Commission State Planning Policy 2.4, was released in July 2000. This site would fall under the provisions of IX 6.1.1. Section IX 6.3 provides some planning protection for the existing limestone excavation by directing planning decisions to protect the resource.

The site is a very valuable community asset, as limestone can continue to be extracted with minimal community inconvenience in the local region.

SPP 2.4 supports the principle that basic raw materials should be taken before they become sterilised by development. It provides guidelines to local government to recognise the importance of not permitting conflicting land uses to impinge on the operation and enable the resource to be taken in a staged manner.

This policy makes many statements on the intent and actions which local authorities should use to protect and manage basic raw materials.

Section 3.4 is very specific in explaining that basic raw materials need identification and protection because of increased urban expansion and conservation measures, (3.4.1), (3.4.2) and (3.4.4). Sections 3.4.5 and 3.4.6 recognise that environmental and amenity matters need to be considered.

There are specific provisions in Section 6.2 Local Planning Scheme Provisions, such as;

No support for the prohibition of extractive industries in zones that permit broad rural land uses.

Providing an appropriate P, D or A use.

Not precluding the extraction of basic raw materials on land which is not identified as a Priority Resource Location, Key Extraction Area or Extraction Area (6.4.2).

The Western Australian Geological Survey has produced new mapping identifying Strategically Important Basic Raw Materials across private land and State Forest. The Geological Survey recognised the sand resources as a valuable community asset.

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

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

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

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

- **State Planning Policy No 4.1, State Industrial Buffer Policy**

SPP 4.1 discusses the need to consider adjoining land uses when locating buffers but does not prescribe set buffers for operations such as this. The development and processing of the resource has been designed to maintain maximum buffer distances. In situations where the buffers are less, actions such as the provision of perimeter bunding to provide visual and noise management, tree planting and operational procedures, are used to mitigate and reduce impacts.

This is discussed further in Section 5.1 Surrounding Landuses Buffers of this document.

- **State Planning Strategy, 1997**

The Western Australian Planning Commission (WAPC) released the *State Planning Strategy in 1997*. It comprises a range of strategies, actions, policies and plans to guide the planning and development of regional and local areas in Western Australia and assists in achieving a coordinated response to the planning challenges and issues of the future by State and Local Governments.

The State Planning Strategy contains the following five key principles. These are:

- Environment & resources: to protect and enhance the key natural and cultural assets of the State and to deliver to all Western Australians a high quality of life which is based on sound environmentally sustainable principles.
- Community: to respond to social changes and facilitate the creation of vibrant, accessible, safe and self-reliant communities.
- Economy: to actively assist in the creation of regional wealth, support the development of new industries and encourage economic activity in accordance with sustainable development principles.
- Infrastructure: to facilitate strategic development of regional Western Australia by taking account of the special assets and accommodating the individual requirements of each region.

- Regional Development: to assist the development of regional Western Australia by taking account of the special assets and accommodating the individual requirements of each region.

- **Directions 2031 and Beyond (WAPC 2010)**

Directions 2031 and Beyond provided data on the land uses and growth of the Perth Metropolitan and Peel areas over the 20 years to 2031.

- **Perth and Peel Development Outlook 2011/2012**

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

The Outlook also forecasts that there will be almost 10 000 dwellings constructed in the North West Sector of the Metropolitan Area between 2011/2012 and 2019/2020. All of the dwellings need limestone.

- **Metropolitan Region Scheme**

The Metropolitan region Scheme lies under the umbrella of the Planning and Development Act 2005. It provides overall direction to planning through the Metropolitan Region Scheme. Approvals are required under the Scheme but are normally delegated to the Local Authority. However in the case of Extractive Industries the delegated authority was revoked and all extractive industries are assessed by the Western Australian Planning Commission and issued with a separate and additional approval under the Metropolitan Region Scheme.

Local Government Planning Documents

- **City of Wanneroo District Planning Scheme 2**

The objectives of the Scheme are to support and protect intensive agriculture and horticulture and basic raw materials from incompatible land uses such as subdivision.

Section 3.17.1b of the City of Wanneroo District Planning Scheme has the objective; *“protect from incompatible uses or subdivision, basic raw materials priority areas and basic raw materials key extraction areas”*.

Section 3.17.3f commences” There is a presumption in favour of applications for the extraction for basic raw materials in the basic raw materials resource areas

- **City of Wanneroo Basic Raw Materials Policy**

The City of Wanneroo Basic Raw Materials Policy provides direction to Council on Basic Raw Materials and their control.

Extractive Industries are normally issued with Planning Consent and an Extractive Industries Licence

A review of the City of Wanneroo Basic Raw Materials policy is currently being advertised.

3.3 End Use – Sequential Planning

The extraction of dimension stone is seen as an interim use of the land prior to utilisation of the area by the current land holder.

The final rehabilitated surface will be returned to pasture the same landuse prior to excavation and the landuse compatible with the current land zoning.

No sequential land planning can be made because the intentions of the landowner are not known. Any land use other than rural uses and extractive industry will require rezoning of the land.

At this stage the most appropriate end use is to restore the surface to be visually compatible with the surrounding rural land surface and rehabilitate the site with pasture species with clumps of local indigenous trees.

The vertical face to the north was excavated many years ago with the intention that excavation would always extend onto Lot 7 owned by Adelaide Brighton Cement Ltd adjoining to the north. The vertical face will be modified when excavation of Lot 7 commences by Adelaide Brighton Cement Ltd at some point in the future.

Prior to that time the face will continue to be made safe by the retention of a fence on top of the face and appropriate signage. There is little risk of public incursion to the face because the vegetation and soils on Lot 7 are very rough and do not readily permit foot or vehicle travel.

3.4 Social Impacts

There are no proposed changes to the scale and nature of the excavations for the next few years.

A complaints register is in place as part of Meteor Stone normal operational procedure. As far as is known there have been no complaints within the last five years.

3.5 Responsible Authorities

A number of local and state government authorities are responsible for overseeing the safety and environmental management of quarries in the area. These include;

City of Wanneroo

- Provides input to the Planning Consent process conducted by the Western Australian Planning Commission.
- Issues Planning Consent and the Extractive Industries Licence for the quarry.

- Regulates land zonings and planning in conjunction with the Western Australian Planning Commission
- Controls the measures used to prevent bush fires.
- Issues approvals for transport vehicle owners to apply to MRWA (Main Roads) for permits to utilise oversize vehicles on specific roads.

Department of Mines and Petroleum

- Controls the safety and methods of excavation and covers the health and safety of the workers through the Mines Safety and Inspection Act 1994 and Regulations 1995.
- Currently undertaking a survey of the limestone resources in the Perth metropolitan Area.
- A Project Management Plan is in place and the operations are approved under the Department of Mines and Petroleum SRS System.

Department of Environment Regulation

- Issues Licences for crushing and processing if required.
- Oversees the *Environmental Protection (Noise) Regulations 1997*.
- Issues Clearing Permits.

Department of Parks and Wildlife

- Overseas flora and fauna issues.
- Overseas land uses and the health of Lake Nowergup.

Department of Water

- Has input into the use and maintenance of Lake Nowergup and groundwater through guidelines.
- Issues Water Licences

Main Roads

- Has input into the use of highways and issues extra mass permits for road transport vehicles.

Department of Aboriginal Affairs

- Maintains records of aboriginal sites and administers the *WA Aboriginal Heritage Act 1972*.

Western Australian Planning Commission

- Responsible for the Metropolitan Region Scheme.
- Responsible for long term regional planning
- Determines Planning Consent for Extractive Industries under the Metropolitan Region Scheme.
- Responsible for State Planning Policy 2.4, Basic Raw Material Strategy.

Department of Planning

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

4.0 PROJECT DESCRIPTION

4.1 Extraction and Processing

Controls

Excavation will be conducted to conform to the *Mines Safety and Inspection Act (1994) and Regulations (1995)*.

The operations are managed by a licensed Quarry Manager and are regularly inspected by the District Inspector of Resources Safety, Department of Mines and Petroleum.

A Project Management Plan is in place and the operations are approved under the Department of Mines and Petroleum SRS System.

The excavation and rehabilitation of the limestone pit will continue to be conducted in accordance with this Excavation – Rehabilitation Management Plan.

Background

- The methods of extraction will remain the same as those currently used on site.
- Traffic will continue to exit directly to Wesco Road using the current crossover.
- Excavation will continue to proceed in a manner that will allow the final surface to be reformed and rehabilitated as the extraction progresses.
- There are no changes to the buffers to existing sensitive premises, with none known to have been constructed closer than the existing closest premises, based on aerial photograph interpretation.

PROJECT SUMMARY

ASPECT	PROPOSAL CHARACTERISTIC
EXCAVATION	
Area of Existing Disturbance	Existing pit 3.0 ha Processing area 2.3 ha Roads office and facilities 1.0 ha TOTAL 6.3 hectares
Area of Proposed Excavation	Future excavation 4.0 ha encompassing the existing processing area which will move to the pit floor as excavation proceeds. TOTAL at 10 years 8.0 hectares
Limestone extraction	Approximately 50 000 tonnes per year
Total estimated resource	600 000 tonnes
Life of project	10 plus years
Area opened per year	0.2 ha on average
Dewatering requirements	None

Maximum depth of excavations	15 metres
PROCESSING	
Limestone	Up to 50 000 tonnes per year
Water requirements	5000 kL in summer
Water supply source	Licensed bore on property
INFRASTRUCTURE	
Total area of plant and stock	Located within excavation footprint adjoining
Area of settling ponds	Not required
Fuel storage	A bunded fuel storage is present. Mobile fuel tankers are used as necessary.
TRANSPORT	
Truck movements	Variable but approximately 10 laden trucks per day maximum. Some traffic will travel north across Wesco Road to the operations on Lots 1, 11 and 12 which are subject to separate approval.
Access	Existing limestone access road from Wesco Road.
WORKFORCE	
Construction	Not applicable as it is an operating pit
Operation	No change; 4 – 6 depending on the contracts and nature of the operations which will change from time to time.
Hours of operation	Monday - Saturday 6.00 am to 5.00 pm excluding public holidays.

Excavation Procedures

The steps in the excavation are unchanged. The amount of open ground will increase slightly by some 2 hectares as the ground to the south is opened.

The steps in excavation will continue to be;

Limestone Rubble

1. Excavation will be carried out as a sequence.
2. During excavation the limestone will be deep ripped with a bulldozer pushing down a sloping face below the elevation of the perimeter bunding.
3. In the process the limestone is track rolled as the bulldozer pushes, and this crushes the limestone.
4. Rubble produced will be pushed into a stockpile from which it is loaded directly into road trucks for taking offsite for use as roadbase or raw feed for crushing.
5. To produce various sized products for road bases the rubble may need to be crushed and screened. A loader will take material from the rubble stockpile created by the bulldozer and will then load it into a mobile crusher for reduction to the required size.
6. Water will be used for dust suppression, to reduce the potential for dust generation from the movement of machinery and the effect of wind.

7. Blasting is not part of the normal operations to produce road base but may be used to produce armour or core stone/rock.
8. Depending on the depth of the resource, the nature and grade of the resource and its thickness, benches may be required to differentiate product and assist safety.
9. As the excavation area is disturbed by previous excavation and land uses, no clearing of native vegetation will be required.
10. The existing infrastructure on the subject land will continue to be used with no expansion planned.
11. Limestone overburden or interburden of suitable quality, if encountered, will be used for reconstituted block manufacture where possible. If the overburden and interburden is sub-grade, it will be pushed into screening bunds on the southern side of the cutting floor, separate from the top soil, for later use in re-contouring the land surface at the conclusion of excavation.
12. A bull dozer will be used to remove the cap rock and surface limestone, to produce rubble for crushing to enable the production of reconstituted limestone blocks.
13. Limestone for reconstituted block manufacture will be broken out using a bulldozer through pushing and track rolling.

Dimension Stone

1. Where dimension stone is cut, the cutting area will be graded level and formed to accept portable rails for the small block cutting machines. The machines run across the floor at an edge, cutting a line of blocks in each run until the floor is lowered by one block. For each run the rails are moved across one block width.
2. The next set of blocks will be cut by the re-installation of the rails and cutting machines on the lowered floor and the process repeated. This method of excavation means that the cutting floor is gradually lowered below the land surface. The cutting saws are electric, using air cooling for the blades.
3. Cut blocks will be removed by bobcat or similar and stacked and palleted for transport from site.
4. Water is used for dust suppression, to reduce the potential for dust generation from the movement of machinery and the effect of wind.
5. All static and other equipment such as cutting machines, block making machinery, or screens, will continue to be located on the floor of the quarry or screened by earth bunds where possible to provide visual and acoustic screening. There is currently no proposal to change the location of the existing facilities on site.
6. Limestone will be excavated down to 69 metres AHD which provides for at least 45 metre separation to the highest known water table.

7. Blasting is not part of the operations.
8. At the end of excavation the floor of the quarry will be deep ripped, covered by a layer of overburden and top soil and rehabilitated with pasture and clumps of indigenous tree/shrub species.
9. As noted above, subgrade material not used in reconstituted block manufacture will normally be stored in the bunds around the perimeter of the pit and then used to recontour the completed pit as the first stage of rehabilitation,
10. After mining through of the faces the final slopes are to be levelled with some bunds and batters at 1 : 4 or between 1 : 6 vertical to horizontal in compliance with the *Mines Safety and Inspection Act (1994) and Regulations (1995)*. NOTE this excludes the northern face which is considered under Section 4.3 Final Contours.
11. The final slopes and land surface will be reviewed in the light of any future changes to the end use and where possible will be formed to that future end use.
12. Rehabilitation will progressively follow mining, with completed areas of the excavation being revegetated as soon as practicable.

Limestone Processing

1. A mobile plant will continue to be used to prepare limestone roadbase and other products. It will normally consist of a mobile crusher together with screens, and stackers to sort the products into various sizes. The units fit together linked by conveyors. A DER Licence will be applied for with respect to any crushing or screening operations prior to commencement of crushing or prior to exceeding the trigger limit for a Licence.
2. The crusher will be fed by a loader, which will collect the raw materials from the face and will also load road trucks.
3. The mobile plant will be located near the floor of the pit, just below natural ground level.
4. All crushers, screens and stockpiles are to be equipped with water sprays, sprayed, enclosed or the stockpiles wetted down depending on the nature of the materials to be processed. This is the same management as for the approved extractive industry.
5. Water used in production is to be recycled if possible, although this is not normally possible because of the porous nature of the ground.

4.2 Staging and Timing

The rate of extraction has largely remained the same during the past ten years.

The volume and rate of excavation is, of course determined by the sales orders for the various contracts.

To enable access to the resource an additional area of about 2.0 hectares of limestone, currently disturbed and covered by limestone rubble and overburden, will be excavated.

The active floor on which reconstituted blocks are manufactured will remain.

Currently the amount of active open ground is approximately 6.3 hectares.

In ten years the area will be 8.0 hectares of total disturbance.

During the life of the excavation, progressive rehabilitation will be used wherever possible, reducing the amount of ground open at any one time.

4.3 Final Contours

At this stage the final contours are in concept only and will be determined by the final requirements of the land. These are shown in the attached plans.

Batter slopes will be pushed down to 1 : 3 to enable a suitable end landform to be achieved for the remainder of the land which will be at 1 : 6 vertical to horizontal or less.

No decision on sequential land planning can be made because the intentions of the landowner are not known. Any land use other than rural uses and extractive industry will require rezoning of the land.

At this stage the most appropriate end use is to restore the surface to be visually compatible with the surrounding rural land surface and rehabilitate the site with pasture species with clumps of local indigenous trees.

The vertical face to the north was excavated many years ago with the intention that excavation would always extend onto Lot 7 owned by Adelaide Brighton Cement Ltd adjoining to the north. The vertical face will be modified when excavation of Lot 7 commences by Adelaide Brighton Cement Ltd at some point in the future.

Prior to that time the face will continue to be made safe by the retention of a fence on top of the face and appropriate signage. There is little risk of public incursion to the face because the vegetation and soils on Lot 7 are very rough and do not readily permit foot or vehicle travel.

4.4 Hours of Operation

Hours of operation will be 6.00 am to 5.00 pm Monday to Saturday inclusive, excluding public holidays. This is similar to the operations of nearby quarries in the local area.

Transporting material on Saturday should not present a problem because of the high traffic volumes using Wesco Road. Saturday is a day of normal commercial trading.

There are not anticipated to be any changes to the number of truck movements or the routes taken.

4.5 Access and Transport

Access will continue to be along the access road to Wesco Road and then east or west.

Many vehicle movements will be between the Meteor Stone operations north of Wesco Road and Lot 6 south of Wesco Road. The crossover to Wesco Road is sealed.

Gibbs Road will not be used and all traffic west will use Nowergup Road to Wanneroo Road.

Locked gates and perimeter fences are maintained at all times when the site is not manned as required by the Department of Mines and Petroleum and the City of Wanneroo.

Meteor Stone uses semi-trailer truck transport for its blocks, with an average of 9 laden vehicle movements per day.

4.6 Equipment

The existing facilities on site, will be maintained. The site has a site office, toilet, bore, and servicing area. A telephone is located on site for emergencies.

A Licensed bore is located on site.

The facilities, power lines, water and telephone lines on site are shown in the attached Figures.

The following equipment will continue on site;

Site office/lunchroom	Site offices and lunchroom located to the west of the pit.
Toilet system	A septic system is installed on site.
Processing Shed	To be located in the base of the pit
Bore	A bore is located on site and will continue to be used as a source of water.
Fenced compound	Currently there is no fenced compound on site but this may be required for future security reasons. If required it will be located on site for the storage of mobile plant.
Blade sharpening shed	A small limestone shed is located on site where the blades of the cutting saws are sharpened and for minor maintenance.
Workshop	A workshop installed with concrete floors and bunded lined water trapping facilities, located at the operations north of Wesco Road, is currently used.
Bulldozer	Opening new ground and movement of limestone as required and for use in land restoration. This comes to the site occasionally as required to push up limestone.
Mobile crushing and screening plant	Located in the south eastern corner to prepare material for reconstituted block manufacture.
Block manufacturing	This will continue to be located on the old cutting floor. A limestone batching plant is used to prepare the raw feed to the reconstituted block manufacture.

Block cutting equipment	Currently there are no block cutting machines on site, but their use remains a possibility. If used they will be electric or diesel block cutting machines operate on the cutting floor of the pit.
Water tanker	Used for dust suppression on the access roads and working floors as required. Alternatively a tank with sprinklers can be used for dust suppression. There are two sets of water tanks for dust suppression and cooling of mobile plant.
Power lines - phone	These have been located on the attached updated plans. There are no changes to these services. On site there is one power line and one telephone line. Some of these are mobile and can be moved.
Loader and bobcat	Loading and handling blocks and other products. The loader will be used for the movement of limestone. Bobcats and loaders are used for the stacking and loading of dimension stone.
Fuel Storage	Fuel tank is present on site. It is bunded and any contaminated limestone is periodically removed from site. Fuel is also supplied from mobile tankers.

In line with current practice, static and operational equipment will operate on the quarry floor or behind bunds of overburden where possible, to provide maximum sound and visual screening where possible.

Loading and Transport

Meteor Stone uses semi-trailer truck transport for its blocks, with an average of 9 laden vehicle movements per day.

The number of truck movements is not expected to change.

Much of the vehicle movement is between this site and the operations north of Wesco Road.

4.7 Workforce

The workforce will vary, depending on the level of operation and market demands, but usually 4 - 6 persons can be expected to be working on site at any one time; the same as is currently used.

4.8 Water Use

Water is mainly used for dust suppression and cooling of the saw blades.

Water will continue to be drawn from the licensed bore located on site next to the site office.

Any cutting floor will be installed with an enclosed tank on the upper edge of the perimeter bunding and the water gravity fed to the cutting machines.

Potable water is collected from the roof of the site office or brought to the site as needed.

4.9 Safety

The deepest excavation is 5 - 8 metres below natural ground level. No slope will be left at an angle greater than 1 : 2 vertical to horizontal at times when the site is unattended. Signs required by the Department of Mines and Petroleum are in place.

Perimeter fencing is in place and locked gates are used when the site is not manned.

Excavation safety

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

In late 2012 and regularly the Department of Mines and Petroleum assessed the site from a safety point of view and determined that the methods of operation are safe and in compliance.

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

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

Where applicable Safe Operating Procedure Sheets are prepared and made available for hazards. Workers and staff on all sites are trained in the use of the procedures and all employees provided with site induction and training as necessary prior to commencing work on the site.

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

Emergency

The site is within mobile phone contact.

Safety management and operating procedures are in place.

Fire

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

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

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

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

There are a number of management actions that can be taken in quarries to minimise fire risk and these are used wherever possible. The actions are used where applicable and as the opportunity presents to minimise fire risk.

- Restrict vehicles to operational area, particularly on high fire risk days
- Use diesel rather than petrol powered vehicles
- Maintain perimeter fire breaks as required
- Ensure fire risk is addressed and maintained through the Safety Management Plan.
- Provide an emergency muster area, communications and worker induction and training
- Maintain the site radio contact procedures
- Provide fire extinguishers to vehicles
- Establish on site water supplies for potential use in extinguishing fire
- Secure the site from unauthorised access
- Maintain fire breaks
- Water is available from the existing tanks and bore
- The safety of workers is managed through a Safety Management Plan.

Fire Management - Applicable Legislation / Policies
<ul style="list-style-type: none">• <i>Bush Fires Act 1954.</i>• <i>City of Wanneroo Bylaws.</i>
Commitments to Fire Management
<ul style="list-style-type: none">• Meteor Stone will ensure the quarry operates to the standards in the <i>Mines Safety and Inspection Act 1994 and Regulations 1995</i>.• Meteor Stone will ensure the quarry complies with the local fire safety

requirements and operates in compliance with normal rural fire practise and restrictions and the Fire Management Plan.

- Operations will cease at times when a vehicle movement ban in paddocks is in place.

4.10 Complaints Procedures

No complaints are known from the past five years.

The following complaints mechanism is used.

- A complaints book is provided and maintained by the Meteor Stoner.
- Upon receipt of a complaint Meteor Stone will investigate and action the complaint.
- When a complaint is found to be legitimate, Meteor Stone will, where possible, undertake any reasonable actions to mitigate the cause of the complaint and, where possible, take reasonable steps to prevent a recurrence of the situation in the future.
- Details of any complaints, the date and time, means by which the complaint was made, the nature of the complaint, the complainant, investigations and any resulting actions and the reasons, will be recorded in the Complaints Book.
- The City of Wanneroo will be informed of any complaint or any other report provided to a Government Department within 3 working days.

The complaints book will be made available for viewing or details made available to the City of Wanneroo upon request.

5.0 ENVIRONMENTAL IMPACTS AND MANAGEMENT

The aims of the Environmental Management Program are to minimise the effects of limestone excavation on the local environment and return the area to a landform compatible with the surrounding area.

5.1 Surrounding Land uses and Buffers

There are generally no changes to the separations between dwellings and the excavation.

There are no proposed changes to the operations which will bring them closer to the nearest dwellings.

Limestone has been extracted through the years from the Wesco Road area and there are old and current quarries on the ridge to the south, west and north.

A sand and limestone quarry and composting facility is located to the west on Lot 6 closer to the nearest dwellings and also to the south.

A poultry? facility in sheds is located to the south also on Lot 6

State Planning Policy No 2.5, Agricultural and Rural Land Use Planning, makes provision for the extraction of basic raw materials. SPP 2.5 in Point 9 states that "The location of rural residential and rural small holdings should avoid unacceptable impacts on, or sterilisation of natural primary resources including prospective areas for mineralisation and basic raw materials".

The issue of appropriate buffers is a matter of the distance and protection measures to prevent impact on adjoining land users. This applies mainly to noise, dust and visual impact, all of which are treated separately.

A number of Government Policies relate to buffer distances and the protection of basic raw materials. *State Planning Policy No 4.1, State Industrial Buffer Policy*, (1997) discusses the need to consider adjoining land uses when locating buffers but does not prescribe set buffers for operations such as this. A draft updated policy (draft July 2004) reinforces these principles.

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

EPA guidance "Separation Distances between Industrial and Sensitive Land Uses", June 2005 lists the generic buffers for limestone pits as 300 - 500 metres depending on the extent of processing. A generic buffer relates to the distance at which there are unlikely to be any problems without some further investigations and does not mean that smaller buffers are not acceptable. See pages 8 and 9 of that document.

No new dwellings appear to have been constructed near the operations within the past ten years.

The closest dwellings are 1000 metres to the west.

The excavation will be worked from the floor of the pit with the landform and remnant vegetation assisting visual management.

5.2 Aesthetics

There are no changes to the aesthetics and visual management on site.

The site does not lie within a Landscape Enhancement Area in the City of Wanneroo Policy.

From site observations and examination of contour plans and sight lines the current and proposed operations cannot be seen from Wesco Road.

There may be glimpse from Wanneroo Road, at a distance of over 2.5 km from which some of the upper excavations and other local excavations have been visible for some years.

It does not appear that the Meteor Stone excavations and facilities can be seen from Gibbs Road. It is possible that other operations can be seen from Gibbs Road.

The proposed additional excavations will not be visible and there will no additional contribution to a reduction in visual amenity by the proposed continuation of operations.

The cutting and processing shed to be moved from north of Wesco Road will be located on the floor of the pit below natural ground level.

There are no new dwellings locally that will be impacted by continued excavation.

Meteor Stone has a policy of recycling. They will keep a tidy site and remove rubbish from the site to an approved waste disposal facility as required.

The final land surface will be consistent with the pre excavation land use and surrounding land uses.

Light Overspill

It is not proposed that the facility will operate at night. The only lighting that might be required at night could be security lighting. Security lighting is located to minimise light visibility from roads and neighbours.

There are no proposed changes to the lighting and operational times.

BEST PRACTISE OPERATIONAL PROCEDURES	COMMITMENTS ON ACTIVITIES CONDUCTED ON SITE
Locate exposed features behind natural barriers and landform.	The current operations are visually well protected and the proposed continuation will not add, reduce, or alter the visual amenity as it will not be visible.
Operate from the floor of the pit below natural ground level.	The main operational floor is at 69 metres AHD, below natural ground level.
Avoid breaks in the skyline due to workings and haul roads.	There are no proposed changes to the operational methods. The proposed continuation of extraction will not alter the skyline from normal viewpoints.
Push overburden and interburden dumps into positions where they will not be seen or can form screening barriers.	Perimeter bunding is in place and will be pushed further out as more subgrade material becomes available and the extension is opened.
Construct screening bunds and plant tree and shrub screens to reduce visual impact.	See above.
Stage workings and progressive rehabilitation to provide visual protection of later activities.	The excavations are to progress south away from Wesco Road and at a similar distance to the closest dwellings roads/ and the dwellings.
Cover barriers and landscaping with forms, colours and textures compatible with the natural environment.	Natural regrowth visually assists on the bunding. There is no potential to vegetate the buffers to the south and west because the operations will gradually move in that direction. The natural vegetated hill to the north effectively screens the operations from that direction.
Adopt good house cleaning practices such as orderly storage and removal of disused equipment or waste.	Meteor Stone maintains a tidy work environment. Any wastes generated will continue to be regularly removed off site to an approved waste facility. Where possible useable materials will be recycled.
Provide progressive rehabilitation of all completed or disturbed areas.	This is proposed. The amount of open ground is not proposed to change significantly within the next ten years.
Minimise the amount of ground used at any one time.	See above. See also the summary on the Project Summary at the front of the report.
Install fences and gates which are compatible with the style of the area.	Gates and fences, with remnant perimeter vegetation, are already in place.
Minimise offsite impacts of night lighting.	Night operations are not used.
Paint and maintain buildings exposed, plant and equipment with low impact colours.	Only temporary – mobile facilities are used. Some natural limestone facilities are present facing west.
Locate roads and access to prevent direct views into the site	There will be no change to the access road, which exits to Wesco Road.
Locate buildings, plant and	All plant will continue to be located on the floor

stockpiles in areas of low visual impact and maintain appropriate size.	of the pit and in areas of less visual impact.
Provide temporary revegetation of road embankments and disturbed areas as soon as practicable.	The perimeter vegetation to the north will be retained. Natural regrowth visually assists on the bunding. There is no potential to vegetate the buffers to the south and west because the operations will gradually move in that direction. The natural vegetated hill to the north effectively screens the operations from that direction.
Control weeds and maintain amenity planting.	A weed control program is in place associated with normal farm maintenance.
Ensure transport vehicles do not spill material on public roads and ensure prompt cleanup if it occurs.	Drivers are instructed to be responsible for their loads.

Visual Management - Applicable Legislation / Policies

- City of Wanneroo Town Planning Scheme, Rural Resource Zoning.

Commitments to Visual Management

- Meteor Stone is committed to the management of visual impact and will implement the measures outlined.
- There have been no significant changes within the last 10 years.

5.3 Noise Management Plan

General Noise Regulation

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

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

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

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

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

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

Influencing factors that raise the allowable noise levels are activities such as external industrial noise, some nearby land uses and busy roads. These are not relevant currently for this site, although the quarry itself and the whole of Lot 6 are classified as Industrial under the Noise Regulations Schedule 1 Section 5.

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

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

Meteor Stone continues to comply with the *Environmental Protection (Noise) Regulations 1997*.

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

These actions are routinely used by Meteor Stone where applicable and as the opportunity presents to minimise noise on the site.

In addition to using the noise management techniques listed above wherever practicable, Meteor Stone has site specific management procedures that are outlined below.

As the operations are 1 km from the closest dwellings, which is much greater than the generic EPA Buffer Guidelines of 300 – 500 metres, there are other extractive industries between the dwellings and Meteor Stone and there are no proposed additional noise impacts, the noise levels will not change.

The operations comply with *EPA guidance "Separation Distances between Industrial and Sensitive Land Uses", June 2005* for buffers without the need for supporting information.

There are no changes proposed to the recent past levels of activity on site.

Occupational Noise

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

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

As part of its commitments, Meteor Stone continues to be pro-active with its worker safety awareness;

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

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

The DMP conducts inspections of the site, which have been found to be in compliance.

Warning signs are used to identify areas of potential noise.

Drilling and Blasting

No drilling and blasting has been used or is proposed.

Crushing and Screening Rock

There are no proposed changes to the processing on site.

The noise suppression measures on the crushing and screening plants are closely monitored, and appropriate signage is posted.

Crushing and screening is conducted on the south eastern corner of Lot 6. Limestone is processed and formed into reconstituted limestone blocks.

If the volume of materials exceeds the licence requirements a licence will be obtained from the DER under the *Environmental Protection Regulations 1987*, Prescribed Premises Category 12, (Screening 50 000 tonnes or more annually) or Category 70, Screening of between 5 000 to 50 000 tonnes annually).

Like all parts of the operations the processing has to operate under the *Environmental Protection (Noise) Regulations 1997*.

Truck Movements

Trucks enter directly from Wesco Road. There are no proposed changes to the transport routes or level of truck movements.

Transport on Public Roads is exempt from the Noise Regulations.

OPERATIONAL PROCEDURES	COMMITMENTS ON ACTIVITIES CONDUCTED ON SITE
Comply with the <i>Environmental Protection (Noise) Regulations 1997</i> .	Meteor Stone will maintain compliance. The operations comply with <i>EPA guidance "Separation Distances between Industrial and Sensitive Land Uses", June 2005</i> for buffers without the need for supporting information.
Comply with the provisions of the <i>Mines Safety and Inspection Act 1994 and Regulations 1995</i> .	Meteor Stone is registered on the DMP SRS system and is inspected by the DMP.
Maintain adequate buffers to sensitive premises.	No changes to the buffers have occurred within the past 10 years and there are no proposed changes to the buffer distances within the next 10 years. The proposed excavation is to progress slightly south and no closer to dwellings or roads. The closest dwellings are 1000 metres west with other quarries between the pit and the dwellings.
Locate exposed features behind natural barriers and landform.	Vegetated screening bunds are already in place around the operations to the north Bunds and landform are in place to the west.
Operate from the floor of the pit below natural ground level.	This is used and will continue.
Push overburden and interburden dumps into positions where they can form screening barriers.	This is done and will be continued.
Design site operations to maximise the separation and protection from sensitive premises.	No changes to the buffers have occurred within the past 10 years and there are no proposed changes to the buffer distances within the next 10 years. The proposed excavation is to progress slightly south and no closer to dwellings or roads. The closest dwellings are 1000 metres west with other quarries between the pit and the dwellings
Maintain all plant in good condition with efficient mufflers and noise shielding.	Meteor Stone has modern equipment that is maintained in good condition and replaced from time to time.
Maintain haul road and hardstand surfaces in good condition (free of potholes, rills and product spillages) and with suitable grades.	The access road and crossover will continue to be maintained in good condition.
Implement a site code outlining requirements for operators and drivers.	Meteor Stone maintains site induction and training for all personnel.
Shut down equipment when not in use.	This is normal policy.
Scheduling activities to minimise the likelihood of noise nuisance.	There are no changes proposed to the normal operational hours, which have not resulted in any complaints in recent years. No complaints with regard to noise are known for the past five years.

Fit warning lights, rather than audible sirens or beepers, on mobile equipment wherever possible.	Lights or low frequency beepers are to be used rather than beepers. The design and shape of the pit maximise noise screening.
Use transport routes that minimise community disruption.	There are no proposed changes to the transport routes.
Avoid the use of engine braking on product delivery trucks in built up areas.	Airbrakes are unlikely to be required. Drivers are instructed not to use air brakes under normal situations when exiting along the access road.
Minimise and conduct at the least disruptive times, non day to day activities such as vegetation, topsoil or overburden stripping on exposed ridgelines.	There are no changes proposed to the operational hours, which have not resulted in any complaints in recent years for noise.
Provide a complaints recording, investigation, action and reporting procedure.	A complaints recording procedure is proposed to cover all site activities.
Conduct training programs on noise minimisation practices.	Meteor Stone conducts site induction and training to all personnel.
Provide all workers with efficient noise protection equipment.	All noise protection personal equipment is provided to staff.

Noise Management - Applicable Legislation / Policies

- *Environmental Protection (Noise) Regulations 1997.*
- *Mines Safety and Inspection Act 1994 and Regulations 1995.*

Commitments to Noise Management

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

5.4 Dust Management Plan

Environmental and Occupational Dust

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

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

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

A separate Dust Management Plan is attached which summarises the actions that Meteor Stone uses to manage dust on site.

Meteor Stone provides induction and protective equipment for all persons on site.

The effectiveness of the dust management is shown by no complaints regarding dust normally being received. No complaints are known relating to dust within the past five years.

Dust Management - Applicable Legislation / Policies

- *Guidance for the Assessment of Environmental Factors, EPA, March 2000.*
- *Land development sites and impacts on air quality, DEP, 1996.*
- *Department of Environmental Protection Guidelines, November 1996 and DEC 2008, A guideline for the development and implementation of a dust management plan*

Commitments to Dust Management

- Meteor Stone will take the necessary steps to manage and contain dust by implementing and maintaining the Dust Management Plan (attached).

5.5 Water Management Plan

All details of water management are provided in the separate plan attached as an appendix.

Elevation of the land surface grades from 75 metres AHD in the west of the proposal area to 83 metres AHD in the east. The western boundary is at 36.4 metres AHD.

The site is underlain by a sequence of limestone and sand of the Tamala Limestone. It is a highly porous sequence with fast vertical movement of water to the ground water table and then slower lateral flow of groundwater to the west.

Elevation of the water table is 21 to 23 metres AHD.

A licensed bore is located on site next to the administration and pumped to a small tank and then gravity fed to the operations. No changes are proposed to this arrangement or water use.

There are no wetlands on site. The closest wetland is Lake Nowergup which lies 700 metres to the west of the current and proposed excavation.

Groundwater flow is east to west.

Lake Nowergup is classified as a Conservation Category Wetland that is recognised in System Six.

The lake has a permanent body of water that is significant for a large waterbird population. In recent years it has been artificially maintained at a level of near 17 metres AHD.

Limestone Extraction

Limestone excavation is a clean industry that has the potential to release only small amounts of oils and fuels from isolated leakages of machinery. Small leakages such as these are readily broken down by soil bacteria.

It is no different to sand excavation from an environmental risk, and excavation of basic raw materials is one of the few developments permitted to operate in Priority 1 Groundwater Areas (*Department of Environment and Conservation in Priority 1 Public Drinking Water Source Areas*) and sand and limestone can be excavated to within 3 metres of the water table. On this site excavation of the proposed floor is at an elevation of 45 metres above the highest known water table.

The pit areas are internally draining to their base. There is no runoff or drainage. All stormwater is contained on site.

Limestone is very porous and runoff does not occur as is the case with all limestone and sand pits.

Refueling and Waste Management

All earth moving equipment is fuelled from a dedicated fuel and oil dispensing vehicle, which visits the site as required. No oil or fuel is stored on the property. Meteor Stone operations are consistent with *DEC (WRC) – DMP Water Quality Protection Guidelines 2000*.

The main risk of contamination comes from tank or hose rupture on earth moving machines. A spill kit containing absorbent granules is located on site for emergency use. A commitment is made to notify Department of Environment Regulation and the City of Wanneroo of any spill greater than 5 litres. Limestone contaminated by large spills will be removed from the site to an approved disposal area.

Minor servicing is conducted on site. However all major servicing is conducted off site.

All spills are to be cleaned up in accordance with the summarised procedures following.

Documents specific to the fuel and maintenance are the DER – DMP Water Quality Protection Guidelines for Mining and Mineral Processing

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

A Fuel Spill Management Plan is in place.

Water Management - Applicable Legislation / Policies

DER – DMP Water Quality Protection Guidelines for Mining and Mineral Processing

- *Overview*
- *Minesite water quality monitoring*
- *Minesite stormwater*

- *WQPN 28 Mechanical servicing and workshop (2006)*
- *Mine dewatering*
- *WQPN Landuse Compatibility in Public Drinking Water Source Areas (2004)*
- *WQPN 15 Extractive Industries near sensitive water resources. (Not strictly relevant to the site but the methodology is useful).*
- *Health Act 1911*

Commitments to Water Management

- Meteor Stone has in place a site code outlining requirements for operators and drivers.
- Meteor Stone conducts training programs on pollution minimisation practices.
- The proposed operations comply with all Government Policies.
- See attached Water Management Plan.

5.6 Biodiversity Management

Flora

The vegetation of the area has been assessed during site visits over the past 20 years by Lindsay Stephens of Landform Research.

The existing pits are cleared. No further clearing is proposed.

There are no Tuarts on the proposed excavation area on the basis of site examination and DPaW Tuart Atlas 2012.

Fauna

The amount of fauna is dependent on the amount and quality of the habitat. The site of the quarry is cleared. Therefore fauna can be expected to be restricted.

The vegetation on the proposed excavation areas is classified as “Completely Degraded” under Bush Forever Condition Score. EPA Guidance 54 does not apply in that case (EPA Guidance 54 Table 3). Therefore no fauna survey is required and is not appropriate.

The proposal is no different to ploughing land by the landholder

Wetlands

There are no wetlands on site. The closest wetland is Lake Nowergup which lies well to the north west of the current and proposed excavation.

Groundwater flow is east to west.

Lake Nowergup is classified as a Conservation Category Wetland that is recognised in System Six. The lake has a permanent body of water that is significant for a large waterbird population. In recent years it has been artificially maintained at a level of near 17 metres AHD.

As there will be no clearing, and the amount of ground to be opened will match the amount of ground to be closed within the next ten years, there will be no impacts on Lake Nowergup from recharge changes.

A groundwater and fuel management plan is proposed to minimise and mitigate risk of liquids entering the system. See Section 5.5 Water Management Plan.

Biodiversity - Applicable Legislation / Policies <ul style="list-style-type: none">• <i>Nil</i>
Commitments to Biodiversity Management <ul style="list-style-type: none">• The excavation areas are cleared.• Meteor Stone will not impact on the adjoining remnant native vegetation by the proposed excavation.

5.7 Dieback Management Plan

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

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

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 however other plant diseases caused by fungus such as *Armillaria* that can cause dieback symptoms.

The Draft Tuart Conservation and Management Strategy also recognises that Tuart is resistant to *Phytophthora cinamomi* and *Armillaria luteobubalina*. The recent impacts on local Tuarts are also not thought to be due to Medulla Yellows by the Strategy.

Dieback of vegetation is often attributed to *Phytophthora cinamomi* even though there are other *Phytophthora* species and other diseases such as *Armillaria* that can cause dieback like symptoms.

In most cases dieback 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 Dieback is essentially related to plant hygiene when coming onto a site and within a site.

Jarrah Dieback (*Phytophthora cinnamomi*) is widespread throughout this part of the State, but in many cases such as this site the vegetation is not interpretable because of the levels of disturbance.

It is not really a matter of preventing dieback from spreading because infection most likely already occurs there, but rather adopting policies and practices that minimise the spread or introduction of dieback *Phytophthora* spp or other diseases from quarrying or transport activities into State Forest to the east.

There are several guides to the management of Dieback.

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

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

The general principles that Meteor Stone uses, as the opportunities are presented, are listed below

How these activities are incorporated into dieback management on this site is outlined below.

- Dieback diseases are more likely to be transported under moist soil conditions.
- All vehicles and equipment to be used during land clearing or land reinstatement are to be clean and free from soil or plant material prior to arriving at a site.
- Vehicles and earth moving equipment are cleaned prior to entering the site if they originate from a dieback affected area.
- No soil and vegetation is brought to the site apart from that to be used in rehabilitation.
- Plants to be used in rehabilitation are obtained from dieback free sources.
- Vegetated areas ahead of excavation are quarantined to onsite access tracks
- Access to vegetated areas is discouraged through a lack of tracks and external fencing
- Rehabilitated surfaces are free draining and do not contain wet or waterlogged conditions.
- Illegally dumped rubbish is removed promptly.
- No contaminated or suspect soil or plant material is to be brought onto the site.
- When clearing land or firebreaks vehicles work from dieback free areas towards dieback identified or at risk areas.
- Roads are free draining and hard surfaced

Quarry traffic is restricted to the designated access roads, pit and stockpile areas apart from clearing land and maintaining fire breaks.

Normally transport trucks run along the bitumen roads to their destination and return. This run is considered low risk for dieback and trucks will not require cleaning during the transport phase.

The site is secured from unwanted access with fencing, gates and perimeter bunding. A hygienic site is maintained by not bringing any soil or plant material onto the site except for rehabilitation purposes or from known dieback free areas. All plants, seeds, and other materials used in rehabilitation, are sourced from dieback free areas.

Illegally dumped rubbish or material is not normally an issue, but if it is dumped the materials are promptly removed from site.

Significant numbers of species known to be resistant to Jarrah Dieback are included on the landscape bank plantings.

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

5.8 Weed Management Plan

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

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

Generally if the actions taken for Dieback are applied they will also control weeds. Not all potential impacts will apply all the time and the main impacts affecting this site are also listed.

The following general management actions are used wherever possible.

- All vehicles and equipment to be used during land clearing or land reinstatement, are clean and free from soil or plant material when arriving at a site.
- No soil and vegetation is brought to the site apart from that to be used in rehabilitation.
- Plants to be used in rehabilitation are free from weeds.
- Vegetated areas ahead of excavation are effectively quarantined to onsite access
- Unwanted access to vegetated areas is discouraged through a lack of tracks and external fencing
- Weed affected topsoils may need to be taken offsite, used in weed affected areas, buried by 500 mm soil/overburden or taken offsite
- Illegally dumped rubbish is the major source of weeds and is removed promptly.
- No weed contaminated or suspect soil or plant material is brought onto the site.
- When clearing land or firebreaks in weed affected areas, vehicles work in conjunction with dieback principles and push from dieback free/disturbed areas towards dieback areas.
- Weeds are sprayed with broad spectrum spray prior to planting or seeding in weed affected soils.
- Grasses are sprayed with grass selective spray prior to seeding or rehabilitation
- Weed management normally works from least affected areas to most affected.
- Declared weeds are treated promptly by digging out or spraying as outlined below.
- Ongoing monitoring of weeds is undertaken at least annually in autumn, prior to winter rains.
- Normally weed management is from the least weed affected areas to the most weed affected, which therefore gives a smaller area to treat with spray or earthworks.
- Weed affected soils are not used for rehabilitation but are buried or used in pasture areas where better control is possible.

Regular inspections conducted by Meteor Stone staff and the landholder monitor the presence and introduction of weeds on a bi-annual or more frequent basis. On identification of significant weeds, they are either removed, buried or sprayed with a herbicide.

A program of spraying and manually removing declared weeds is used on site combined with normal farm management.

Weed - Applicable Legislation / Policies

- | |
|---|
| <ul style="list-style-type: none">• <i>Agriculture and Related Resources Protection Act 1976.</i> |
|---|

Commitments to Weed Management

- | |
|--|
| <ul style="list-style-type: none">• Meteor Stone will continue to use the weed policy to try and prevent the introduction of Declared, Environmental or other weeds to the site. |
|--|

5.9 Rehabilitation and Closure Plan

Background

Currently 6.3 hectares of open ground is associated with excavation as summarised in the Project Summary at the start of this Management Plan. At 10 years there is anticipated to be 8.0 hectares open.

At this stage the final contours are in concept only and will be determined by the final requirements of the land. These are shown in the attached plans.

Batter slopes will be pushed down to 1 : 3 to enable a suitable end landform to be achieved for pasture. The floor will be a 1 : 6 or less slope.

No sequential land planning can be made because the intentions of the landowner are not known. Any land use other than rural uses and extractive industry will require rezoning of the land.

At this stage the most appropriate end use is to restore the surface to be visually compatible with the surrounding rural land surface and rehabilitate the site with pasture species with clumps of local indigenous trees.

The vertical face to the north was excavated many years ago with the intention that excavation would always extend onto Lot 7 owned by Adelaide Brighton Cement Ltd adjoining to the north. The vertical face will be modified when excavation of Lot 7 commences by Adelaide Brighton Cement Ltd at some point in the future.

Prior to that time the face will continue to be made safe by the retention of a fence on top of the face and appropriate signage. There is little risk of public incursion to the face because the vegetation and soils on Lot 7 are very rough and do not readily permit foot or vehicle travel.

Aims of the rehabilitation program

Rehabilitation will depend on the ultimate use of the pit. Currently the site is zoned Rural Resource which has the objective of supporting extractive industry and intensive agricultural land uses.

It is possible that eventually Rural Residential or some other use may be supported by planning policies.

Therefore restoration of the site will be to a land surface, similar to that existing, that is capable of supporting a range of end uses.

When the final planning and design decisions are made developments can be located around the rehabilitation.

The Aims are therefore;

- Reform the land surface to complement the adjoining pre-excavation surface for slope and landform. The landform will comply with *Mines Safety and Inspection Act 1994* and Department of Mines and Petroleum Guidelines for the Abandonment of Excavations.
- Provide a self sustaining cover of pasture on already cleared areas and pit floors and native vegetation on any steeper slopes and bunding.

Completion criteria

- The land surface is to be non eroding and stable in compliance with the *Mines Safety and Inspection Act 1994* and Department of Mines and Petroleum Guidelines for the Abandonment of Excavations.
- Slopes of the floor of the pit at 1 : 6 vertical to horizontal. Slopes of bunds and batter slopes will be up to 1 : 4 vertical to horizontal.
- Cover of pasture species that is capable of holding the soil and preventing wind erosion problems or excessive fire hazard on pasture areas.
- Native trees and shrubs on the steeper slopes at 1000 per hectare

Vegetation Clearing

1. The only excavation will occur on already cleared and disturbed areas.

Topsoil and Overburden Removal

1. Where possible topsoil and overburden is directly transferred from an area being cleared to an area to be rehabilitated. Where this is not possible the topsoil is stored in low dumps (0.5 m high for topsoil) for future use in rehabilitation.

In pasture areas this will include the grass and topsoil.

2. Where possible soil movement and reconstruction is undertaken in wetter months.

Landform Reconstruction and Contouring

1. All buildings equipment and machinery will be removed from site.
2. The land surface will be re-contoured to match the concept contour plans.
3. Steep slopes will be pushed down and smoothed to 1 : 6 vertical to horizontal apart from any steeper bunds and batter slopes which may be left at 1 : 4.
4. The landform will comply with *Mines Safety and Inspection Act 1994* and Department of Mines and Petroleum Guidelines for the Abandonment of Excavations.
5. Overburden, if available, will be spread over the surface to a minimum depth of 300 mm. Along contour furrows and undulations will be used on slopes to assist water penetration and minimise surface water run off on sloping ground.
6. Topsoil from the clearing operations will be spread directly onto the overburden to maintain seed viability. Storage of top soil leads to a reduction of seed viability over time.

Vegetation Establishment

Pasture areas

1. The preferred method of revegetation is to use the pasture seed from existing topsoil on pasture areas. However this may be deficient and additional seed is likely to be required.
2. Meteor Stone, in conjunction with the landowner, will spread topsoil to increase the total organic carbon fraction, improving soil properties such as resistance to water and wind erosion and moisture retention.
3. 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).
4. However if sufficient seed is not available or does not germinate then additional seed will be added. The establishment of pasture, including the selection of the pasture species is appended to this Management Plan. The documentation is produced by the Department of Agriculture and Food.
5. For pasture land in this situation it is essential that the species are matched to the soil types and rainfall. The location falls into the “High Rainfall Coastal” planting regime with sandy to loamy gravel soils. Suitable perennial legumes include Birdsfoot trefoil, Lucerne, Strawberry Clover, and Sulla. Perennial pasture includes Perennial Ryegrass, Phalaris, Cocksfoot, and Summer Active Tall Fescue, Kikuyu and Rhodes Grass. Annual pasture species include Italian Ryegrass, Serradella, subterranean clover.
6. The actual species used will be determined by the individual season, nature of the rainfall in the preceding months and stocking/hay production proposed by the landholder which may change from time to time.

7. Seeding rates are 2 – 5 kg/ha depending on the species used; for example Ryegrass is seeded at 3 kg/ha whereas Rhodes Grass is seeded at 4 kg/ha.
8. Studies have shown that topsoil stripping and placement is best undertaken in summer for maximum germination, but this raises the potential for additional dust generation from the fine humus particles.
9. Any weeds likely to significantly impact on the rehabilitation are to be sprayed with Roundup or similar herbicide or grubbed out, depending on the species involved. Generally this has not been required in the past because the weed load is low. Pasture species may need to be sprayed with a grass specific spray such as Fusilade or a broad spectrum spray such as Glyphosate to reduce the competition with the revegetation.
10. If sufficient vegetation does not germinate from the respread top soil, the area will be seeded in early Autumn with a mixture of pasture species. The species will be selected on advice from a consultant or the Department of Agriculture and Food.
11. See 5.0 Weed Management.

Revegetation to native vegetation – steeper slopes

1. Rehabilitation is to be carried out progressively during the first available winter months following the final restoration earth works. Leaving the completed earth works for one season reduces the success of rehabilitation by at least 50%, due to compaction effects.
2. Weed control will be used prior to planting.
3. A combination of seed and tube plants will be used.
4. Trees will be planted as tube plants in winter, (June to August) and installed with 10 g fertiliser tree tablet next to each plant.
5. Seeding will be completed either in Autumn or Spring. Legume seeds will be scarified. The rate of seeding will depend on the quality of the topsoil available, but will normally be in the range of 500 g per hectare.
6. Rehabilitation will be progressive, with completed excavation areas revegetated as soon as practicable on a progressive basis.
7. Tube plants will be established in low undulations and not on the high points of furrowed soil. The planting rate is to be an average of 1000 stems per hectare.
8. Over succeeding years the rehabilitation will be assessed to determine its success and establish the requirements for further seeding and planting.

Erosion Control

1. Wind erosion is possible on the finished surface if it is sandy, until a vegetation cover is achieved because of the sandy nature of the reconstructed soils.
2. The best means of avoiding wind erosion is to undertake earthworks in the wetter months and to maintain a cover of self sustaining vegetation throughout the year.
3. Water erosion control measures are minimal because of the porosity of the limestone.
4. The gently contoured surface will be internally draining in most instances to retain all surface water runoff.

Monitoring

1. During late summer an assessment of the success of the rehabilitation is 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, as follows;
 - plant density and growth of the clumps of trees / linkages on pasture
 - Plant density and growth on areas of native vegetation
 - plant deaths
 - pasture establishment
 - weed infestation
3. As necessary steps are taken to correct any deficiencies in the vegetation.
4. Rehabilitation of each stage is to be monitored and replanted or seeded for a period of three years to ensure that the revegetation meets the completion criteria of providing self sustaining indigenous shrub vegetation.

Hardened tube plants from the following indigenous species will be used for the revegetation of any strategic vegetation areas identified from urban land use planning for the site. These species have been selected because they occur on local limestone soils.

The same species can be used to provide seed.

T Indicates suitability for use as tube stock, suitable for planting in clumps on the excavated floor.

<i>Acacia latericola</i>		
<i>Acacia pulchella</i>		Prickly Moses
<i>Acacia saligna</i>	T	Golden Wreath Wattle
<i>Acacia rostellifera</i>	T	
<i>Acacia xanthina</i>	T	White Stemmed wattle
<i>Acanthocarpus preissii</i>		
<i>Allocasuarina fraseriana</i>		Forest Sheoak
<i>Allocasuarina huegelii</i>		
<i>Calothamnus quadrifidus</i>	T	Netbush

<i>Dryandra (Basnksia) sessilis</i>	T	
<i>Eucalyptus decipiens</i>	T	
<i>Eucalyptus foecunda</i>	T	
<i>Eucalyptus gomphocephala</i>	T	Tuart
<i>Eucalyptus petrensis</i>	T	
<i>Dodonea aptera</i>		Coastal Hop Bush
<i>Hardenbergia comptoniana</i>		
<i>Melaleuca lanceolata</i>	T	Rottnest Is. Tea Tree
<i>Melaleuca huegeliana</i>		
<i>Melaleuca systema</i>		
<i>Templetonia retusa</i>		

Temporary Closure

1. If for any reason the site is closed on a temporary basis for any period of time the following will be implemented.
2. The faces will be made safe or protected by bunds and/or fencing with signs in compliance with the *Mines Safety and Inspection Act 1994*.
3. All fluids, liquids and other materials that could leak over time, change or potentially impact on the environment will be removed from site, or stored in a manner that will not permit any environmental impact.
4. Mobile and other plant will be removed from site in compliance with the *Mines Safety and Inspection Act 1994*.
5. Perimeter fencing and locked gates will be maintained. This particularly applies to the fencing above the vertical eastern and western faces.
6. Perimeter signage will be maintained.
7. The site will be monitored for weeds and interim rehabilitation success twice per year.
8. Regular site inspections will be made to ensure compliance with the *Mines Safety and Inspection Act 1994* and that the site is compliant and environmentally sound.

Rehabilitation - Applicable Legislation / Policies
<ul style="list-style-type: none"> • <i>EPA, Guidance 6, Rehabilitation of Terrestrial Ecosystems</i>
Commitments to Rehabilitation
<ul style="list-style-type: none"> • Meteor Stone will ensure the completed land surface is formed to the standards in the <i>Mines Safety and Inspection Act 1994 and Regulations 1995</i>. • Meteor Stone will rehabilitate the surface as outlined above and monitor the revegetation and ensure it meets the completion criteria at three years after planting each section of the rehabilitation.

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LOTS 6 and 11, and Sublease 1, ML70/138, WESCO, ROAD and LOTS 1 and 2 GIBBS ROAD NOWERGUP	
LOCATION OF WESCO ROAD OPERATIONS	
Basemap NEARMAP	Landform Research
Scale See Map	JULY 2014

LAKE
NOWERGUP

Dwelling on Lot 1

Rehabilitated

4

5

LOT 1

LOT 12

3

LOT 11

1

2

LOT 6

SUBLEASE 1 -
M70/138

LOT 6

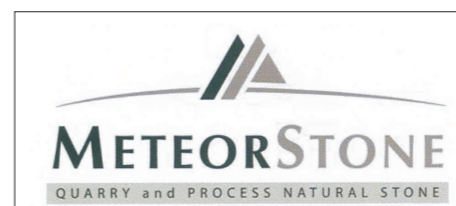
Closest dwelling



FIGURE 1



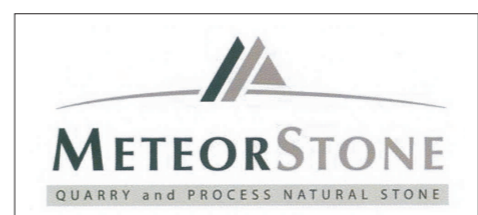
FIGURE 2



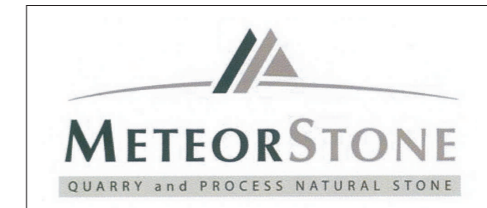
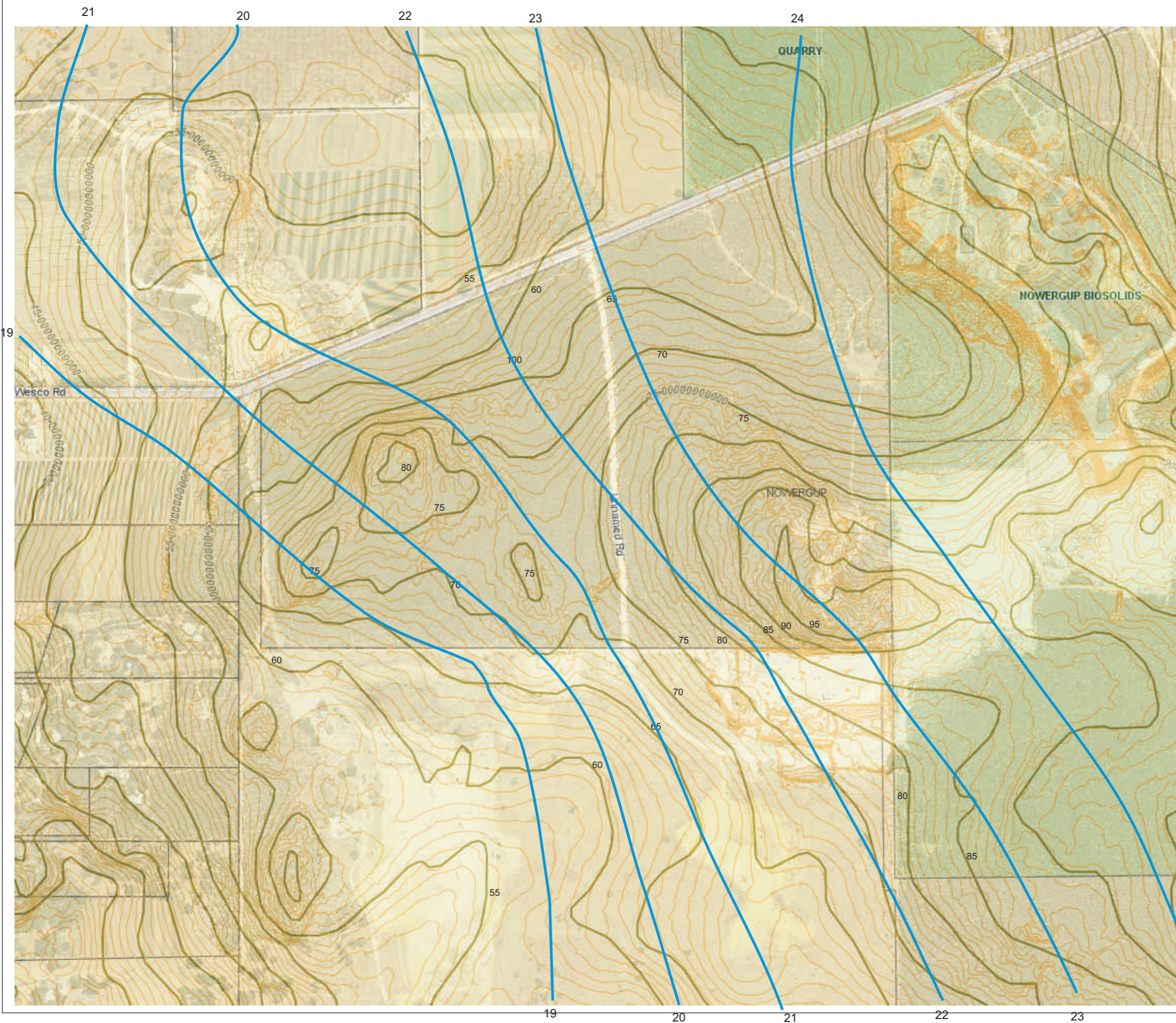
METEOR STONE LOT 6, WESCO ROAD NOWERGUP	
LIMESTONE EXTRACTION SURROUNDING LAND USES	
Basemap NEARMAP	Landform Research
Scale See Map	July 2014



Figure 3



METEOR STONE LOT 6, WESCO ROAD NOWERGUP	
LOCATION OF SERVICES AND FACILITIES	
Basemap NEARMAP	Landform Research
Scale See Map	July 2014



Source
 City of Wanneroo Intramapping
 Department of Water Groundwater Atlas



METEOR STONE LOT 6	
WATER TABLE CONTOURS	
SCALE See Plan	March 2014
Landform Research	FIGURE 4

24



Northern face with electrical facilities



Northern face



Water tank and eastern face



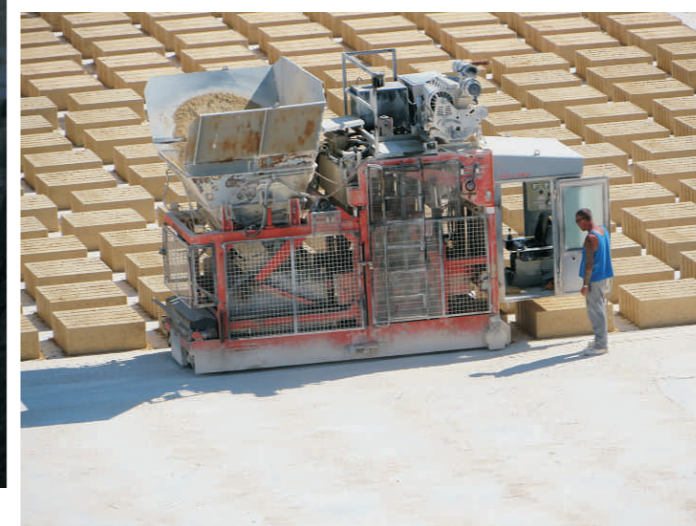
Overview of Lot 6 towards the west across the reconstituted block manufacture floor



Mobile crusher and batching plant

LOT 6 WESCO ROAD
METEOR STONE

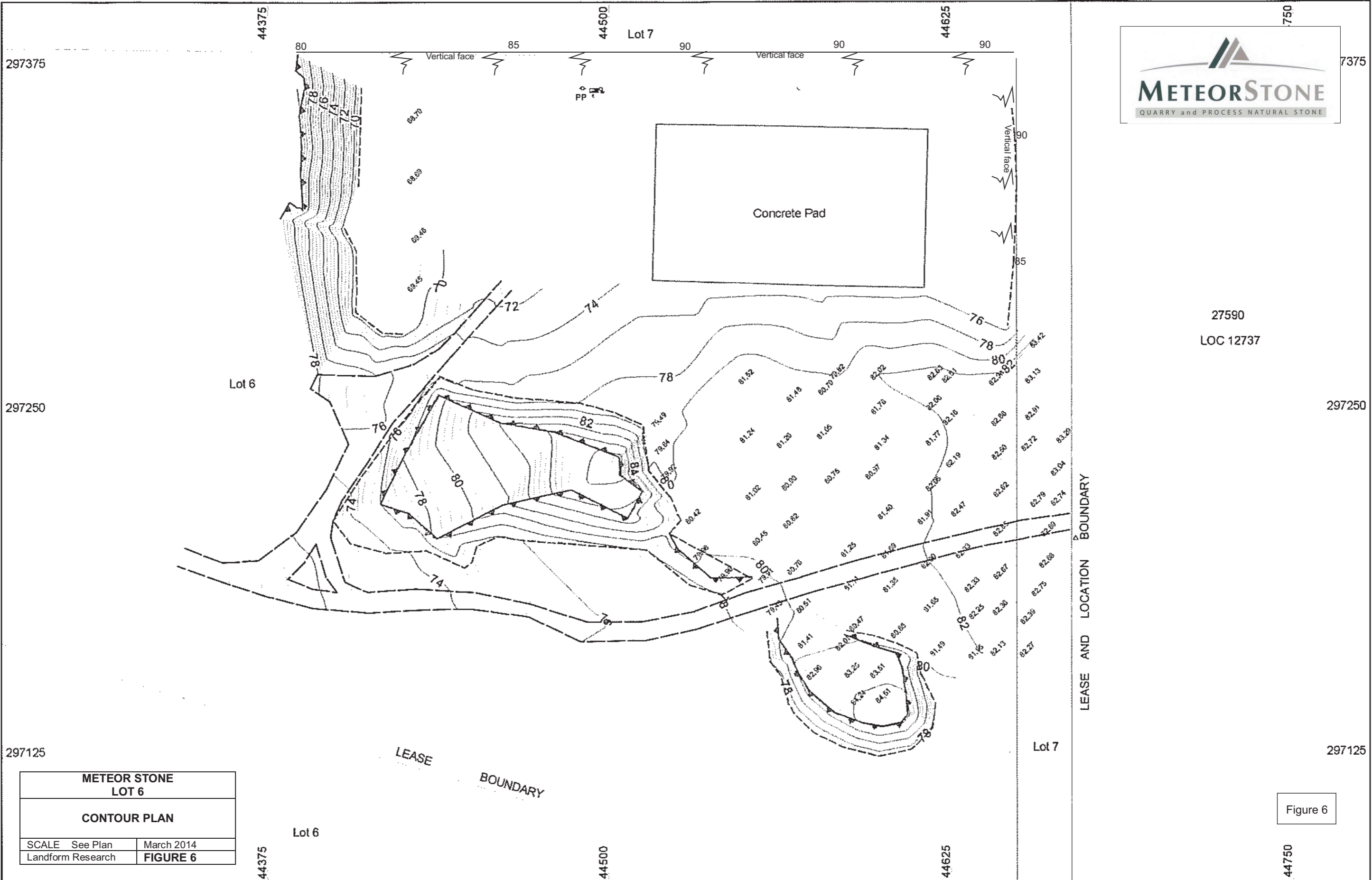
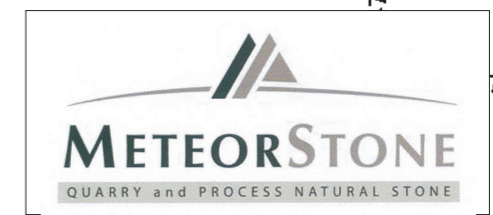
Figure 5



Block making plant



Batch plant and and block making

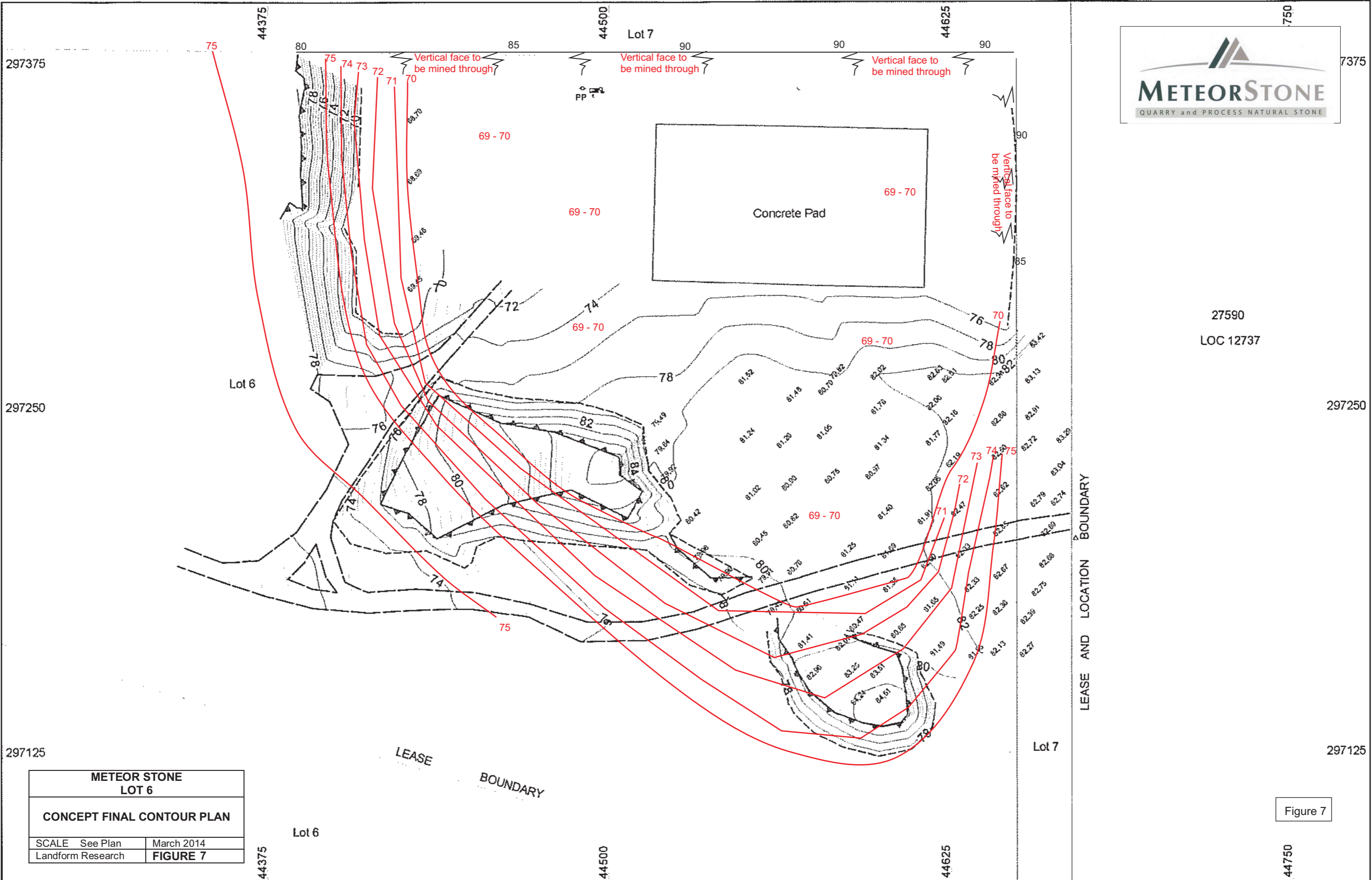
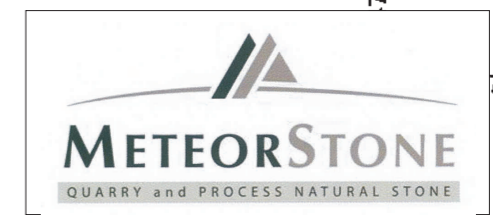


27590
LOC 12737

METEOR STONE LOT 6	
CONTOUR PLAN	
SCALE See Plan	March 2014
Landform Research	FIGURE 6

Figure 6

<p>SCALE 1:1250 @ A3</p> <p>125 0 250</p> <p>ALL DISTANCES ARE IN METRES</p>				<p>NORTH</p>		<p>The boundaries depicted on this plan were not re-established as part of this survey, therefore this plan does not guarantee their accuracy. Re-establishment of the cadastral boundaries recommended for any proposed works on or near existing boundaries.</p>				<p>METEOR STONE LOT 6 WESCO ROAD NOWERGUP APRIL 2007 QUARRY SURVEY</p>																			
<p>Site 11 2 Hardy St South Perth WA 6151</p>		<p>PO Box 117 South Perth WA 6151 Australia</p>		<p>Tel: (08) 6436 1599 Fax: (08) 6436 1500 maps@mapsurvey.com.au www.mapsurvey.com.au</p>		<p>McMullen Nolan and Partners Surveyors Pty Ltd ABN 50 009 261 311</p>		<p>McMULLENOLAN SURVEYORS</p>		<table border="1"> <tr> <td>Scale</td> <td>1:1250 @ A3</td> <td>Date</td> <td>15/03/2007</td> </tr> <tr> <td>Drawn</td> <td>CJS</td> <td>Check</td> <td>SP</td> </tr> <tr> <td>Survey</td> <td>SP</td> <td>Drawn</td> <td>SP</td> </tr> <tr> <td>Surveyed</td> <td>05/04/2007</td> <td>Reason</td> <td>A</td> </tr> </table>		Scale	1:1250 @ A3	Date	15/03/2007	Drawn	CJS	Check	SP	Survey	SP	Drawn	SP	Surveyed	05/04/2007	Reason	A	<p>Land Survey, Mapping and Survey 20 Year Training 20 Year Education Mining, Geotechnical, Hydro, Geomatics, GIS</p>	
Scale	1:1250 @ A3	Date	15/03/2007																										
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Surveyed	05/04/2007	Reason	A																										



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LEASE AND LOCATION BOUNDARY

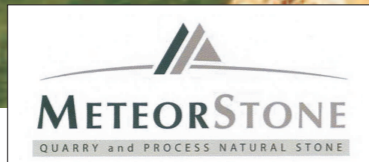
METEOR STONE LOT 6	
CONCEPT FINAL CONTOUR PLAN	
SCALE See Plan	March 2014
Landform Research	FIGURE 7

Figure 7

	<p>SCALE 1:1250 @ A3</p> <p>ALL DISTANCES ARE IN METRES</p>	<p>NORTH</p>	<p>The boundaries depicted on this plan were not re-established as part of this survey, therefore this plan does not guarantee their accuracy. Re-establishment of the cadastral boundaries recommended for any proposed works on or near existing boundaries.</p>	<p>METEOR STONE LOT 6 WESCO ROAD NOWERGUP APRIL 2007 QUARRY SURVEY</p>																		
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Rev</th> <th>Description</th> <th>Drawn</th> <th>Date</th> <th>Checked</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Rev	Description	Drawn	Date	Checked						<p>The accuracy of this plan is guaranteed only if used in accordance with the conditions of the plan survey by contacting McMillennolan and Partners Surveyors.</p>	<p>FILES Survey: D:\wsc\CCAD 91385X Plan No: 91380 de-4279</p>	<p>Suite 11 2 Hardy St South Perth WA 6151 Australia</p> <p>Tel: (08) 6436 1599 Fax: (08) 6436 1500 mmap@mmapsurvey.com.au www.mmapsurvey.com.au</p> <p>McMillennolan and Partners Surveyors Pty Ltd ABN 90 009 261 311</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Drawn</th> <th>Scale</th> <th>Date</th> <th>Checked</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p>McMULLENNOLAN Land Survey, Mining and Survey, 20 Year Training, 20+ Years of Mining, Gold, Iron, Nickel, Coal, and other O&G</p>	Drawn	Scale	Date	Checked				
Rev	Description	Drawn	Date	Checked																		
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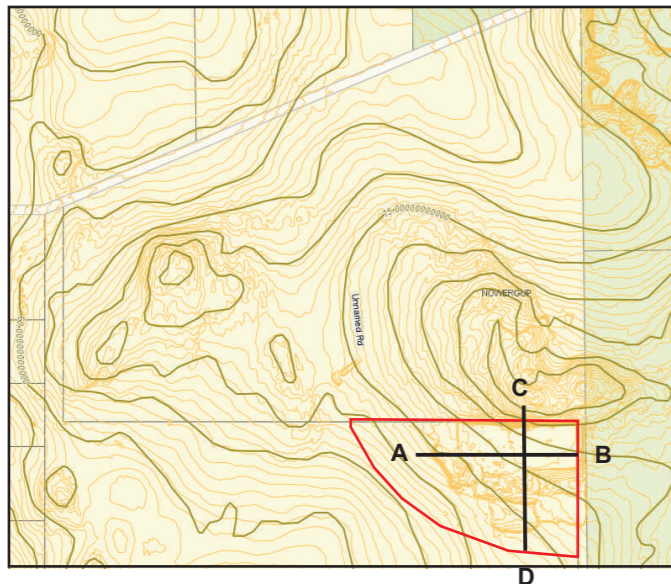
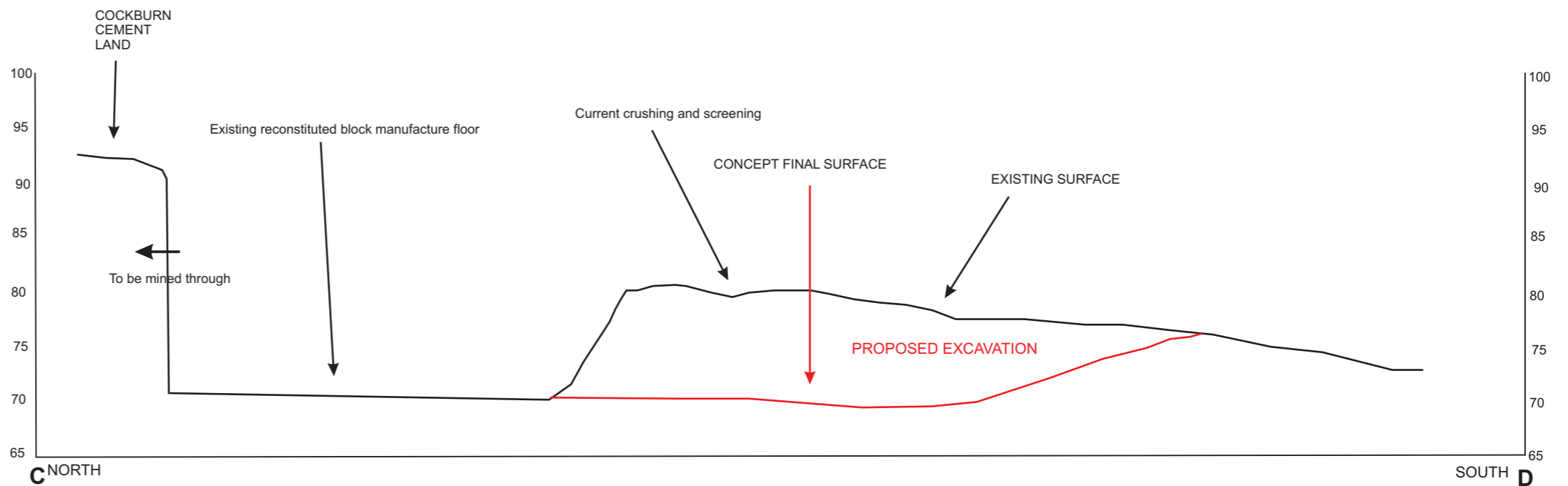
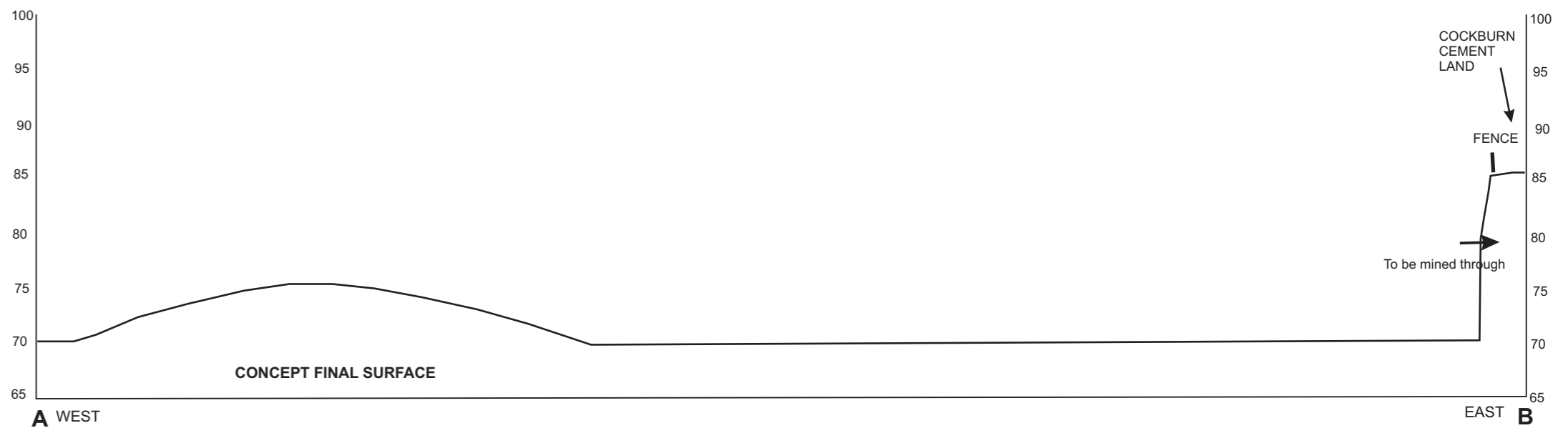
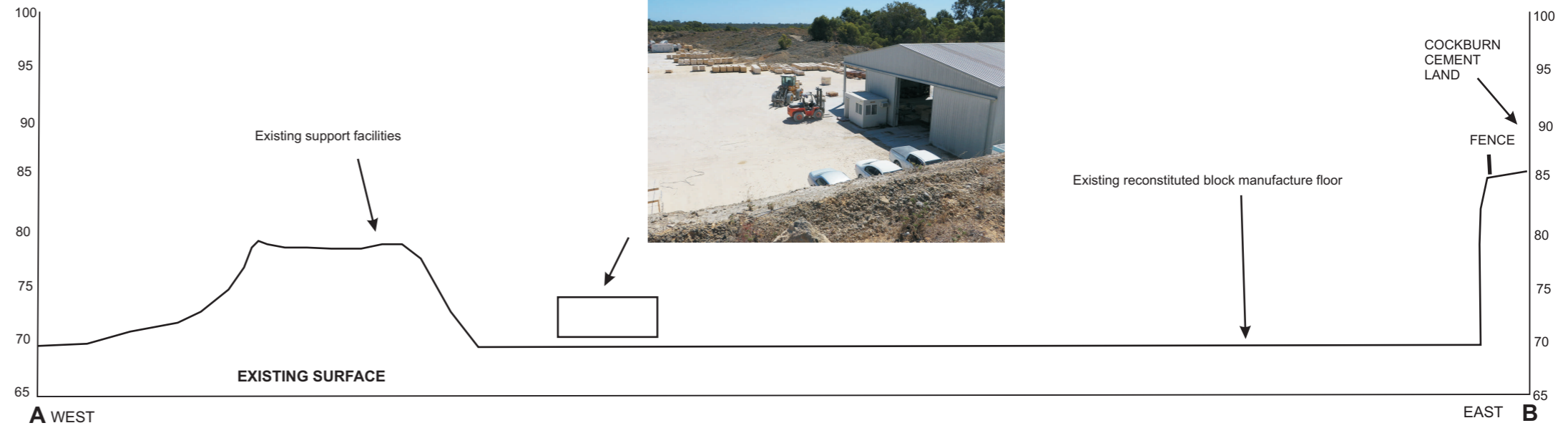


METEOR STONE LOT 6	
OBLIQUE AERIAL PHOTOGRAPH	
NEARMAP	May 2014
Landform Research	FIGURE 8





Updated sharpening and maintenance shed similar to this



METEOR STONE LOT 6	
SECTION LINES	
NEARMAP	May 2014
Landform Research	FIGURE 9

DUST MANAGEMENT PLAN CONTINUED LIMESTONE EXCAVATION LOT 6 WESCO ROAD, NOWERGUP

JULY 2014

1.0 Environmental Dust

1.1 Dust Risk

Excessive dust has the potential to impact on both the workers and the adjoining land.

Dust can originate from a number of operations and may impact on onsite workers, or travel offsite. Potential dust impacts are addressed by reducing the dust generated from the quarrying, processing and transport operations.

The main risk from dust is not the sand, but rather the fine organic particles that are generated during land clearing and reinstatement, and most importantly the fine particles generated by transport along limestone access roads and traffic areas.

Dust from some materials such as ground limestone can form smaller particles that are capable of blowing further or even becoming so fine that they become invisible.

1. Mining (predominantly coal) has been shown *by NSW Health* to have the characteristics listed below. These values are not necessarily applicable to sand and limestone extraction because of the high amounts of clay within the shales associated with coal and the fine particles that can be generated by the coal itself. Sand and limestone extraction will have less of the fine particles.

- PM <2.5 microns as 2 – 5% of emissions
- PM 2.5 – PM10 microns as 15 – 45%
- PM>10 microns as 50 – 70%.

(One micron is 1 / 1000 of 1 mm).

2. PM< 2.5 are invisible and called “fine particles”. They are the main health issue and are caused by vehicle emissions whether they are along roads or on private land. Vehicle emissions will not occur at night or at other times when the site is not active.
3. Modern vehicles are increasingly designed to minimise the fine particulates of carbon through the use of fuel efficiencies, particulate fixtures and hybrid technologies where electrical motors are used to assist operation of the plant from recovered energy.

These particles are also diluted by surrounding air mass and, in a situation such as this with little nearby activity, dilution factors are significant.

4. PM 10 are invisible and called “coarse particles”. They can be breathed in, but are removed by alveoli and mucous. (*NSW Health*). This dust may be generated when land is cleared and topsoil disturbed or the site is subject to traffic in summer. For limestone extraction this can include calcium carbonate which is innocuous to health and is the main component of antacid treatments.

5. PM₁₀ is visible dust and will, based on the resource, be the vast majority of the particles.
6. Sand particles are normally >50 microns. DEC (DER) 2011 (below) lists particle sizes of >50 um as not normally becoming airborne. That is the sand grains which move by saltation (bouncing) and are retained by the wall of the pit. The sand grains within the limestone are bound and are not known to below significantly.

Sources of Dust

There are no proposed changes to the scale or intensity of the operations. The operations will not move any closer to dwellings within the next ten years.

As all sizes of dust are likely to be generated together, there will be visible dust being generated when invisible dust is being formed. Therefore any visible dust present is a good sign and early indicator of a dust risk.

The main risk is therefore from the fine organic matter in the topsoil, any clay within the sand and limestone or calcium carbonate that is broken down through tyre impacts or disturbance. There is also the risk from the crushing and tipping processes of dry products.

Limestone is formed from sand grains bound together by grains of calcium carbonate held together by calcium carbonate cement.

Being softer than the sand grains the calcium carbonate is readily ground very fine from disturbance particularly in dry conditions from actions such as vehicle movements. The sand grains within the limestone are hard and are not normally reduced in size even by traffic movements.

When dry there is some minor dust from the wheels and associated ground calcium carbonate of the limestone and tiny amounts of clay with the dark yellow sands.

Water is used to manage dust and Meteor Stone have a dedicated water truck on site, with water storage tanks located at the western and eastern corners of the operations to provide water for dust suppression. The access road is watered as required.

Calcium carbonate is an innocuous material that is a major component of bones and is required by all living organisms for their health and growth.

What makes calcium carbonate unique is that it is readily dissolved to calcium hydrogen carbonate by weak acids in rainfall and water applied to the site. Once dissolved, the calcium hydrogen carbonate readily precipitates to calcium carbonate as the water is evaporated. The calcium carbonate deposits on the surface of the land and any exposed limestone, readily forming a crust that stabilizes the surface and is not liable to any dust lift off unless disturbed by vehicle movements. Limestone which has been left even for a week or so becomes crusted and stabilised, with the crust thickening over time. This process can even occur from dew.

Limestone also stays moist as noted below, and the main dust risk is also traffic on roads and hardstand. When excavating using a bulldozer there is very little dust even in summer.

When dry there is some minor dust from the wheels and associated ground calcium carbonate of the limestone and tiny amounts of clay with the dark yellow sands.

1.2 Climate and Soil Conditions

Through the winter months of May to September inclusive, there is little dust risk because rainfall exceeds evaporation. The rainfall is sufficient to wet the whole limestone profile to depth, with excess water reaching the water table.

In summer, when evaporation exceeds rainfall, the limestone roads dry when exposed to the sunlight and atmosphere and are susceptible to crushing and grinding by vehicles.

Limestone prior to excavation retains its moisture if there are no tree roots to extract moisture from depth. Without tree roots the moisture in the limestone can only be lost by capillary action and so stays moist to below 0.5 and 1 metre depth right through summer. The same applies to sand.

On active areas such as roads and hardstand that dry out, the dust can readily be generated. Normal practice is to treat this with water, which maintains the moisture content of the soil and limestone and mitigates dust generation.

1.3 Wind directions

Wind data is not recorded at many sites. The most comparable wind data is taken from Fremantle. These show that the prevailing wind is from the north east and east at 9.00 am and the south west at 3.00 pm.

For the summer months, where February is a typical month, the wind directions are more variable at 9.00 am ranging from east through south. At 3.00 pm in February the winds are almost solely from the south west. The morning data shows that on some days the south westerly sea breeze is blowing at 9.00 am in February.

In July the predominant winter wind direction at 9.00 am is from the north east with 3.00 pm winds more variable and spread from north through south west.

The wind roses for Fremantle are included in this attachment.

These winds predominantly blow away from the closest premises at 400 metres to the south west but becoming increasingly further away as excavation progresses.

Proposed perimeter bunds and vegetation, such as the pines and vegetation to the west of the resource, provide effective wind breaks and wind screening. Winds crossing the site are slowed by any nearby trees. This reduces the speed of the winds across the floor of the pit.

When winds exit the pit or cross out of the pit they have to travel across a vegetated buffer that slows the speed of the wind and allows the coarser particles to drop from suspension.

1.4 Assessment of Dust Risk

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

Dust emissions fall under the *Guidance for the Assessment of Environmental Factors, EPA, March 2000*. Assessments of the potential dust risk are normally made using the Land development sites and impacts on air quality, *Department of Environmental Protection and Conservation Guidelines, November 1996*. These are still in place but are incorporated into the *DEC 2011 Guideline for Managing the Impacts of Dust and Associated Contaminants from Land Development Sites, Contaminated Sites Remediation and other Related Activities*.

The *DEC (DER) in 2008* released a *draft Guideline for the Development and Implementation of a Dust Management Plan*.

The key Environmental Objectives for the operations are;

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

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

When making the assessments using the DEC (DER) Guideline there are four key points;

The prevailing winds blow from the south west to south on summer afternoons and from the east on summer mornings.

- Dust risk is generally only in the dry summer months
- The limestone readily crusts and is stabilised. It is only trafficked areas of limestone that develop fine dust from the grinding of wheels.
- The perimeter bunds and vegetation provide effective wind breaks and wind screening.
- Effective water treatment of the limestone is used to wet down and manage dust risk.

However the document can also be used to determine the risk of potential dust impacts of earthworks such as opening new ground and the removal of overburden and rehabilitation, which only occurs about once per year when the pit is being expanded or moving forward. These risks are summarised under the Table titled Dust Management Actions below.

Activity	Calculated Score	Allocated Risk of Dust
Operation of and processing Without dust suppression	147	Classification 1 Negligible Risk
Operation of and processing With effective dust suppression	119	Classification 1 Negligible Risk

Dust mitigation measures are maintained on a regular basis and updated as necessary.

The management of environmental and occupational dust requires the same techniques and actions. If occupational dust is managed, then there will be minimal risk of dust impacting on the external or onsite environment.

The success of dust management is evidenced by the lack of any complaints in relation to dust during the past 5 years of operations.

Dust mitigation measures are maintained on a regular basis and updated as necessary.

The management of environmental and occupational dust requires the same techniques and actions. If occupational dust is managed, then there will be minimal risk of dust impacting on the external or onsite environment.

2.0 Dust

Environmental Dust

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

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

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

The aim of dust management is to;

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

The site is 1000 metres from any sensitive premises negating any dust impacts on the closest sensitive premises.

Occupational Dust

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

Limestone is predominantly calcium carbonate with some sand grains. There are no known health impacts from calcium carbonate and the material is the major component of bones and is essential for human health. It is also an integral part of the local environment. The sand grains are too large to cause a health issue if ingested.

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

3.0 Dust Management

3.1 Issues and Management

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

On this site, with Negligible Dust Risk with normal dust management, many of the operational procedures will not be required.

A dedicated water truck is to be retained on site for the wetting down of roads and other dust suppression activities. In addition the access road is sealed and maintained.

Loads on trucks that have the potential to generate dust are required to be covered or wetted down. Most trucks leaving the site carry reconstituted blocks that are solid and do not generate dust.

Dust generated from earthworks is closely monitored and managed.

Actions that can be used to prevent or mitigate dust are standard quarry best practice. Some methods are taken from the DEC (DER) 2011 Appendix 2 and others from quarry best practice.

Methods that are available, and will be selected from, are listed below. The most effective by far is the use of water management from a water truck, sprinklers, water canon or other such mechanism.

DESIGN AND SITE

1. Minimising the amount of ground open.
2. Minimising the amount of ground being subject to traffic.
3. Locating access roads away from sensitive premises.
4. Design of the pit to reduce wind speed and potential dust lift off.
5. Maintaining effective setbacks.
6. Constructing perimeter bunds to reduce wind speed.
7. Maintaining tree buffers such as pines and their replanting.
8. Providing wind break fencing generally and on top of bunds as required.
9. Maintaining a secure, fenced site, to prevent illegal access.
10. Rehabilitate and stabilise all completed areas as soon as practicable.
11. Clearing and replacing topsoil and overburden during wetter times; April to October.

OPERATIONS

12. Locate active areas away from windy locations.
13. Locate active areas away from sensitive premises.
14. Working on the floor of the pit.
15. Operate some parts of the pit only when conditions are suitable.
16. Locating mobile plant and stockpiles in sheltered areas.
17. Design staging to minimise dust risk.
18. Conduct higher dust risk operations such as topsoil clearing and placement during more favourable conditions.
19. Shut down equipment that is not required.

ACCESS AND HARDSTAND

20. Constructing the access roads from hard materials that resist dust generation.
21. Maintaining a water truck on site for road and other wetting down.
22. Using a sealant such as a polymer, chemical or emulsified oil or bitumen on the access road to reduce water use.
23. Using sprinklers and water canon on roads, traffic areas and stockpiles.

PROCESSING

24. Applying water sprays and additives to crushing and screening cycles.
25. Providing screening and shielding of mobile plant.
26. Use and maintain filters on all suitable plant.
27. Ensure regular appropriate emptying of filter collection devices.
28. Face hoppers away from prevailing winds.
29. Maintain reduced pressure in plant, hoppers and bins to prevent loss of dusty air.

STOCKPILES

30. Minimise the number of stockpiles.
31. Maintain stockpiles in sheltered areas.
32. Reduce the elevation of stockpiles.
33. Limit the drop height to stockpiles and loading.
34. Locate finer products inside or screened by stockpiles of coarse materials.

TRANSPORT

35. Cover all loads.
36. Ensure all trucks are dust free and not carrying pebbles and other materials outside the tray.
37. Choose the best transport routes.
38. Wet down or sweep the cross over and access roads.

HEALTH AND COMMUNITY

39. Maintain air conditioned cabins on all vehicles.
40. Provide a readily auditable trigger of no visible dust to cross the property boundary in line with DER Licence and best practice in WA.
41. Conduct effective site induction and awareness training for all staff.
42. Training should include observation and mitigation where possible of all dust emissions.
43. Providing a complaints investigation, mitigation and recording procedure.
44. Liaising with the owners/operators of nearby sensitive premises.
45. Ceasing operations when conditions are not favourable or when visible dust is crossing the boundary.
46. Obtain the latest weather conditions to increase the awareness of dust risk.
47. Cease operations during adverse weather conditions.
48. Operate during wetter months or when the soils are moist.

Completed or sections of the quarry that are not required are stabilised and not subject to traffic as soon as practical to reduce the area of open ground and help reduce wind speed.

In the event of dust management not being able to be achieved, and to minimise impact on adjoining land holders, the dust generating activities will be stopped until conditions improve.

A record of all dust complaints will be retained together with the mitigation measures used to reduce the dust impacts.

3.2 Tree Belt - Buffers

Dust is readily stopped by tree belts and distance, with which the site complies with, *Planning Guidelines Separating Agricultural and Residential Land Uses, Department of Natural Resources Queensland 1997(Pages 65 – 111) and Department of Health WA, 2012, Guidelines for Separation of Agricultural and Residential Land Uses which uses the same criteria (Pages 112 – 118).*

The Queensland Guidelines predominantly relate to agricultural spray drift, but, based on particle size, also relate to dust.

The Guidelines provide for a buffer of 300 metres for open agricultural land, dropping down to 40 metres where an effective tree belt is in place. The Western Australian Department of Health also uses the same guidelines.

The Guidelines are based on field studies and demonstrate the effectiveness of tree belts in providing screening against particulate travel.

The excavation has adequate buffers and design that will minimise any potential dust impacts and complies with the guidelines by Department of Health 2012 by way of separation distances.

3.3 Dust Management Actions

ACTIVITY	POSSIBLE RISK SEVERITY and FREQUENCY	OPERATIONAL PROCEDURES	COMMITMENTS ON ACTIVITIES CONDUCTED ON SITE	RISK AFTER MANAGEMENT
GENERAL				
Legislation	----	Comply with the provisions of the <i>Mines Safety and Inspection Act 1994 and Regulations 1995</i> .	Meteor Stone will continue to comply with the Act and Regulations and the other Conditions imposed on the Operations.	----
Buffers	----	Maintain adequate buffers to sensitive premises.	The buffers to the nearest residences have not changed within the past 10 years and will not change within the next 5 years. The proposed excavation is to progress further away from roads and dwellings. The closest dwellings are 1000 metres west.	----
Landform	----	Locate activities behind natural barriers, landform and vegetation.	The design of the pit and staging has been selected to provide the best screening. Excavation is conducted below the land surface. The processing and stockpile facilities are located towards the south of the site.	----
Landform	----	Work below natural ground level.	This is used and will continue.	----
		Push overburden and interburden dumps into positions where they can form screening barriers.	This will be used where overburden is available to form extensions to the bunding.	----
Staging	----	Design operational procedures and staging, to maximise the separation to sensitive premises.	The design of the pit and staging has been selected to provide the best screening.	----
Pit design	----	Design the excavation to provide enhanced landform and constructed dust screening.	See above	----
Screening/ Vegetation	----	Use landscape screening, wind breaks and tree belts.	Vegetation is planted on perimeter bunding. This will continue.	----
MANAGEMENT				
Occupation	----	Provide air conditioned closed cabins on plant	These are used on site for operational mobile plant.	----
Monitoring	----	Provide monitoring and supervision of the processing and other practices on site.	A monitoring system is proposed. see below "Trigger Conditions".	----
Trigger conditions	----	Trigger conditions are used to determine when additional dust management is required.	Most dust generated from processing and vehicle movements has a very large visible component. Lesser risks emanate from excavation and opening new ground.. The trigger for dust management is the generation of visual dust. The quarry manager and leading hands are ultimately responsible for site supervision of dust. They travel around the operations and pit frequently and are in two way radio contact with all mobile plant. All operators on site are instructed to be	----

			vigilant to dust generation and management and report any excessive dust or potential dust management issues. When trigger conditions are detected and/or alerted relevant action is taken. This can include additional water suppression, modification of procedure, delay until more favourable conditions are present, use of alternative equipment etc.	
Adverse weather	Moderate - Uncommon	When winds are sufficiently strong, or other weather conditions are unacceptable, to negate the effects of dust management, operations will cease until conditions improve and compliance can be achieved.	Rare adverse conditions are more likely to occur on summer mornings. In winter, stronger winds are normally associated with rain and therefore carry a reduced dust risk. This policy is used to minimise impact on adjoining land holders.	Low
Equipment failure	Low - Uncommon	In the event of dust management not being able to be achieved through equipment failure operations will cease until full capability is restored.	This is used on site and is committed to.	Low
Training	----	Conduct training programs on dust minimisation practices.	Meteor Stone use on site induction and training to inform all personnel of the dust risk and management.	----
Complaints	----	Provide a complaints recording, investigation, action and reporting procedure such as Appendix 3 of Land development sites and impacts on air quality, Department of Environmental Protection Guidelines, November 1996.	A record of all dust complaints is maintained together with the mitigation measures to be used to reduce the dust impacts. All complaints relating to dust are to be investigated immediately. A record of complaints is maintained. There have been no complaints relating to dust in the past 5 years.	
Monitoring	----	Provide a Monitoring procedure to minimise dust generation.	Dust monitoring is predominantly conducted on site at all times by all operators and the quarry manager. This response is instantaneous and does not rely on monitoring equipment, which normally has time delays associated with it. The amount and source of dust is observed before any dust monitoring could trigger. Treatment is therefore more effective and targeted. When a significant source of dust is noticed it is dealt with by temporary or permanent changes to procedures and equipment or the treatment using water.	----
EARTHWORKS				
Land Clearing	Low - Once per year.	Schedule activities such as vegetation removal or topsoil stripping on exposed ridgelines at times when the materials are less likely to blow or during suitable wind conditions.	Normally the opening of new ground and the subsequent use in rehabilitation is undertaken in the drier months when the soils are still moist enough to suppress dust but not wet. This is necessary to minimise the risk of dust generation and the spread of dieback spores if present. Completed sections of the quarry are to be rehabilitated as soon as practical to reduce the area of open ground.	Low
Overburden removal	Low - Once per year	Schedule activities such as overburden stripping	See above.	Low

		on exposed ridgelines at times when the materials are less likely to blow or during suitable wind conditions.		
Land restoration	Low - Once per year.	Schedule activities such as ripping, overburden and topsoil spreading on exposed ridgelines at times when the materials are less likely to blow or during suitable wind conditions.	See Land Clearing above.	Low
EXCAVATION				
Excavation	Low - Low level continuous activity	Excavate from the face using techniques that minimise the crushing of dry matter.	The floor of the pit is formed on hard limestone with less fines that does not generate as significant dust. A water truck is used as required to wet down the loading areas. Water sprays are used on all block cutting machines at all times to cool the blades and suppress dust when used.	Low
Loading at Face	Low - Low level continuous activity	Ensure that products to be loaded are moist and that the hardstand on which the loading occurs is wetted down or moist.	The main product loaded is dimension stone that is in solid blocks and limestone rubble that is loaded to a truck using a loader.	Low
Haulage	Moderate - Medium level continuous activity	Maintain haul road and hardstand surfaces in good condition (free of potholes, rills and product spillages) and with suitable grades.	The haul roads are maintained in good condition. They are regularly graded and continuously watered by dedicated water truck as required in the drier months.	Low
		Reduce the length of the internal roads by maximising internal servicing efficiency.	The haul roads are designed to reduce travel distance to save maintenance costs and time and to maintain efficiency and minimize greenhouse gas emissions.	
		Providing speed management on hardstand and the road network.	This is used.	
		Provide air conditioned closed cabins on plant.	All vehicles are air conditioned.	
		Treat access roads, hardstand and stockpile transport and loading areas with dust suppression sealant, water or seal coat.	A dedicated water truck is maintained on site and used as required during the drier months.	
PLANT - PROCESSING				
Hardstand traffic	Low - Low key ongoing activities	Maintain hardstand surfaces in good condition (free of potholes, rills and product spillages) and with suitable grades	The hard stand areas are limited in area but are able to be watered by the dedicated truck as required.	Low

Processing	Moderate - Continuous	Treat processing areas with water sprays, shields and dust extraction.	Crushing operations are restricted and will be watered as required to suppress dust. Cutting of blocks will be conducted in the proposed relocated shed in the base of the pit and controlled by water. Dust covers and equipment shields are maintained on all static plant where they are practicable. Continuous visual monitoring of dust is used. Regular emptying of any dust collection devices and the renewal of any filter devices is programmed in site operations.	Low
Mobile and static plant Operation	Moderate - Continuous	Maintain all plant in good condition.	Meteor Stone uses modern equipment that is maintained in good condition including the maintenance of dust minimisation measures. Faults are to be repaired promptly.	Low
		Ensure mobile and static plant is provided with dust extraction, shielding or filtration systems or wetting down as appropriate.	Operators are instructed to visually monitor dust, report and treat any visible dust. Regular emptying of any dust collection devices and the renewal of any filter devices is programmed. Dust management and monitoring forms part of the site induction programs. See Processing above.	
Loading and Stockpile Creation	Moderate - Continuous	Shut down equipment when not in use.	Meteor Stone uses this policy to save fuel and maintenance costs in addition to noise minimisation.	Low
		Limit drop heights from conveyors and dump trucks.	This is used. It is a good safety and site management procedure.	
TRANSPORT				
Road condition	Low - Moderate	Maintain access roads in good condition (free of potholes, rills and product spillages).	The access road from Wesco Road is maintained. Meteor Stone maintains speed restrictions for safety and site management both on the haul roads and access road.	Low
		Water and/or treat access roads and paved areas using a water tanker or sprinkler system.	See above. Internal roads are regularly watered as often as necessary to minimize dust generation. A dedicated water truck is retained on site and used when dust lift off is a potential hazard.	
Road Transport	Low - Frequent	Wet down or cover loads on trucks that are likely to blow during transport.	Trucks are covered or wetted down prior to exiting the site as required when transporting sandy and other materials that can blow.	Low
		Implement a site code outlining requirements for operators and drivers.	A site code and induction system is used.	
		Maintain road trucks in a clean condition.	Meteor Stone road trucks are new and are maintained in a clean condition. Individual contractors are required to do likewise.	
		Avoid spillages on roads and clean up promptly.	Meteor Stone has a policy of covering or wetting down loads as required and instructs drivers to report and clean up spillages.	Low

		Ensure that during loading, product does not become lodged on the sides of trucks from where it can fall off during transport.	This forms part of proposed normal operational procedures.	
		Drivers are to inspect trucks prior to leaving site. Any product not correctly located and secured is to be removed prior to exit from the site.	This forms part of proposed normal operational procedures.	
STOCKPILES				
Stockpiles	Moderate - On lot 6 only	Wet down stockpiles using water canon or sprinklers as required.	Minimal stockpiles are used on site.	Low
		Locate stockpiles behind bunds/ windbreaks or other screening barriers	On Lot 6 the stockpiles are located away from the roads behind the perimeter vegetated screening bunds.	
		Reduce the height of stockpiles. Low flat stockpiles are less likely to be disturbed by wind than high conical ones.	On Lot 6 the height of stockpiles is maintained at manageable levels that remain sheltered from the prevailing winds.	
		Wash crushed products where necessary.	The limestone products do not need washing as they are solid blocks.	
		Provide bunding, fencing and windbreaks around stockpiles and along the tops of bunds.	The stockpile area on Lot 6 is well protected by the landform.	

Greenhouse Gas

The development of the northern Perth Metropolitan Area has generated the need for limestone, and this cannot be obtained from this quarry it will be obtained from another.

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

Meteor Stone continues to seek ways to reduce the amount of fossil fuels used, and has obtained more efficient mobile plant and equipment when this has become economically available.

The internal design of the operations tries to minimise the haulage route to save energy use and potential impacts.

Dust Monitoring

The most effective dust monitoring is observing the generation of visible dust.

The auditable condition is visible dust crossing the boundary of the premises; the lot boundary. This is the condition used on Department of Environment Regulation Licences and all other sand, limestone and hard rock quarries in Western Australia.

It is also the method used by the Department of Mines and Petroleum to rapidly assess occupational dust on site.

Normal DER Licences state;

The licensee shall use all reasonable and practical measures to prevent and, where that is not practicable, to minimise dust emissions from the Premises.

The Licensee shall ensure that no visible dust generated by the activities of the Premises crosses the boundary of the Premises.

As invisible dust can be generated with the visible dust, recognising and dealing with visible dust is a very effective instantaneous method of recognizing excessive dust.

There are no nearby dwellings.

The potential risk of external dust impacts is regarded as very low. If any risk was generated from dust there would be an on site occupational situation that would have to be treated. Such treatment would normally mitigate any external dust risk.

- **Visual Dust Monitoring**

Most dust generated from processing and vehicle movements has a very large visible component. Lesser risks emanate from excavation and land clearing.

The trigger for dust management is the generation of visual dust. The quarry manager and leading hand are ultimately responsible for site supervision of dust. This is the method required by the DER in the licence applying to the operations.

They will travel around the operations and pit frequently and be in two way radio contact with all mobile plant.

All operators on site will be instructed to be vigilant to dust generation and management and report any excessive dust or potential dust management issues.

When trigger conditions are detected and/or alerted, relevant action will be taken. This can include additional water suppression, modification of procedure, delay until more favourable conditions are present, use of alternative equipment etc.

Human monitoring can detect potential dust risks prior, and take action prior, to the dust being generated. They also notice dust immediately such as from tyres, whereas machine monitoring has to rely on significant dust being generated, travelling to the boundaries of the premises and triggering an alarm. The operators would be negligent if they let the dust get to that level of impact prior to taking action.

Visual monitoring is even more effective when complemented by an extensive reporting and complaints process.

The photographs attached show how monitoring of visual dust is more effective than mechanical monitors located at the boundaries of a site.

Dust can be seen immediately it is generated, even if it is only a small amount. At that time it can be treated before it becomes a problem.

For dust to be detected by a mechanical monitor on the boundary, then there will have been large amounts of dust generated within the pit which will be unacceptable.

Notice how much dust would have to be generated for it to escape from the pits shown.

Meteor Stone provides induction and protective equipment for all persons on site.

The effectiveness of the dust management is shown by no complaints regarding dust normally being received. No complaints are known relating to dust within the past five years.

COMPLAINTS MECHANISM

A complaints mechanism is in place. See Section 4.10 of the Main Report.

WATER MANAGEMENT PLAN
CONTINUATION OF LIMESTONE QUARRY
LOT 6 WESCO ROAD, NOWERGUP

July 2014

Proposed Excavation

Limestone extraction and processing has taken place on Lot 6 for 30 years.

Limestone excavation is a clean industry that has the potential to release only small amounts of oils and fuels from isolated leakages of machinery. Small leakages such as these are readily broken down by soil bacteria.

It is no different to sand excavation from an environmental risk, and excavation of basic raw materials is one of the few developments permitted to operate in Priority 1 Groundwater Areas (*Department of Environment and Conservation in Priority 1 Public Drinking Water Source Areas*), sand and limestone can be excavated to within 3 metres of the water table. On this site excavation of the proposed floor is at an elevation of 45 metres above the highest known water table.

The facilities on site are summarised below

Site office/lunchroom	Site offices and lunchroom located to the west of the pit.
Toilet system	A septic is installed on site.
Processing Shed	To be located in the base of the pit
Bore	A bore is located on site and will continue to be used as a source of water.
Fenced compound	Currently there is no fenced compound on site but this may be required for future security reasons. If required it will be located on site for the storage of mobile plant.
Blade sharpening shed	A small limestone shed is located on site where the blades of the cutting saws are sharpened and for minor maintenance.
Workshop	A workshop installed with concrete floors and bunded lined water trapping facilities, located at the operations north of Wesco Road, is currently used.
Bulldozer	Opening new ground and movement of limestone as required and for use in land restoration. This comes to the site occasionally as required to push up limestone.
Mobile crushing and screening plant	Located in the south eastern corner to prepare material for reconstituted block manufacture.
Block manufacturing	This will continue to be located on the old cutting floor. A limestone batching plant supplies the raw feed to the

	reconstituted block manufacture.
Block cutting equipment	Currently there are no block cutting machines on site, but their use remains a possibility. If used they will be electric or diesel block cutting machines operate on the cutting floor of the pit.
Water tanker	Used for dust suppression on the access roads and working floors as required. Alternatively a tank with sprinklers can be used for dust suppression. There are two sets of water tanks for dust suppression and cooling of mobile plant.
Power lines - phone	These have been located on the attached updated plans. There are no changes to these services. On site there is one power line and one telephone line. Some of these are mobile and can be moved.
Loader and bobcat	Loading and handling blocks and other products. The loader will be used for the movement of limestone. Bobcats and loaders are used for the stacking and loading of dimension stone.
Fuel Storage	Fuel tank is present on site. It is bunded and any contaminated limestone is periodically removed from site. Fuel is also supplied from mobile tankers.

Water Supply

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

Potable water will be brought to the site as required.

Water Protection Policies

The protection of water, whether groundwater or surface water, is an important part of the management of quarries. Different types of quarries have different potential impacts which are listed below in general terms. Not all potential impacts will apply to this quarry and the main impacts affecting this site are also listed.

Guidance on the quality of water can be found in;

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

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

- *Engineers Australia 2003, Australian Runoff Quality, National Committee on Water Engineering.*
- *Stormwater Management Manual for Western Australia, Department of Environment WA, 2004.*
- *Guidelines for Groundwater Protection in Australia, ARMCANZ, ANZECC, September 1995.*

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

- *Overview*
- *Minesite water quality monitoring*
- *Minesite stormwater*
- *WQPN 28 Mechanical servicing and workshop (2006)*
- *Mine dewatering*
- *WQPN Landuse Compatibility in Public Drinking Water Source Areas (2004)*
- *WQPN 15 Extractive Industries near sensitive water resources.*

The limestone excavation complies with all the documents above. The most relevant document is *WQPN 15 Extractive Industries near sensitive water resources*. The location of the limestone and its proposed excavation complies with all Advice and recommendations, of the policy (Numbers 1 – 62).

Site Hydrogeology

Elevation of the land surface grades from 75 metres AHD in the west of the proposal area to 83 metres AHD in the east. The western boundary is at 36.4 metres AHD.

The site is underlain by a sequence of limestone and sand of the Tamala Limestone. It is a highly porous sequence with fast vertical movement of water to the ground water table and then slower lateral flow of groundwater to the west.

Elevation of the water table is 21 to 23 metres AHD.

A licensed bore is located on site next to the administration and pumped to small tanks and then gravity fed to site. No changes are proposed to this arrangement or water use.

There are no wetlands on site. The closest wetland is Lake Nowergup which lies well to the north west of the current and proposed excavation.

Groundwater flow is east to west.

Lake Nowergup is classified as a Conservation Category Wetland that is recognised in System Six.

The lake has a permanent body of water that is significant for a large waterbird population. In recent years it has been artificially maintained at a level of near 17 metres AHD.

Stormwater

The pit areas are internally draining to their base. There is no runoff or drainage. All stormwater is contained on site. Stormwater runoff from roads is directed to adjoining pasture which is common practice for roads that are not kerbed such as the local roads.

Limestone is very porous and runoff does not occur as is the case with all limestone and sand pits.

On site the only servicing is the sharpening of cutting blades.

The workshops located at the operations to the north of Wesco Road have concrete floors. All stormwater from those workshops is directed to a lined water retaining facility from which the water is pumped out as necessary by a licenced contractor who takes the waste water to an approved disposal site.

Stormwater from the workshop area is contained and able to be collected and removed from site.

Salinity

The groundwater obtained from the bore on site is fresh and there is no likelihood of significant or other salinity increases apart from minor evaporation, which is no different from any garden.

Acid Sulfate

See 2.2 Geology and Geomorphology.

The site is such that there is no observed risk of acid sulfate conditions on site.

The site is underlain by limestone which has a high calcium carbonate content and is used to neutralise acidic soil conditions.

No peat or organic matter has been intersected in the pit, is present in the faces or floor, and none is likely as the existing excavation at around 45 metres above the water table is located in the wrong geological environment.

Recharge and Water Use

The site lies up hydraulic gradient of Lake Nowergup.

Currently there is 6.3 hectares of open ground, and in ten years time there is anticipated to be 8.0 hectares open.

The area has no surface drainage because of the permeable and porous nature of the limestone. Drainage is to the water table, which comes to within about 45 metres of the base of the excavations at the lowest point.

Discussions of the recharge on limestone areas can be found in *Environmental Protection Authority in Bulletins 512, 788, 821 and 818*, and whilst these do not specifically refer to the extraction of basic raw materials they do consider the impact of clearing, planting trees and rural residential developments. The figure the EPA used for recharge from native vegetation was 10 – 15% rainfall, whereas cleared land had a recharge of 30 – 40 %. The floor of the quarry is also cleared and so there is not expected to be any reduction in recharge to the site.

As there will be no change to the amount of open ground no changes to recharge are anticipated and no calculations are therefore required. EPA Bulletins 512, 788, 821 and 818 can be referred to for explanations.

Water used from the bore is minimal in the context of the land holding, at less than 5000 kL per year, and is used for truck wet down and sprinklers near the entrance, although nowadays most trucks have covered loads, negating the need for wetting down.

Ground and surface water will be protected by the following;

- The extraction and processing of limestone is a chemically free operation with the only liquids used being lubricants and fuel for machinery.
- Excavation of the current floor is 45 metres above the known groundwater elevation.
- No potential chemical pollutants, fuel or oils are stored on site. Minor servicing will be conducted onsite by mobile service vehicles and all lubricant wastes transferred by vacuum pumps to a storage tank on the service vehicle and recycled at the Meteor Stone facilities.
- A workshop is located that the operations north of Wesco Road. That facility has stormwater and waste water collection facilities.
- The access road and resource area are installed with locked gates and fences when the site is unmanned to prevent illegal dumping of rubbish.
- Rubbish generated is recycled wherever possible and periodically disposed of at an approved landfill site. Any illegally dumped materials are removed promptly to an approved landfill or other suitable site, depending on the nature of the material.
- Refuelling is carried out using mobile tankers. This will normally take place on the floor of the pit or designated area where any spills will be contained.
- The Department of Environment Regulation, Department of Water and the City of Wanneroo will be notified of any fuel or oil spill greater than 5 litres. There have been no incidents since operations commenced.
- The same procedures will be used in the event of any fuel or hydrocarbon spill, including those in excess of 5 litres. Any spills will be contained by the excavation. Soil and resource will quickly be placed around the spill to contain it in as small an area as possible. When contained, the contaminated limestone will be scooped up and removed to an approved landfill or other approved site.

Refueling and Waste Management

Earth moving equipment is fuelled from a dedicated fuel and oil dispensing vehicle, which visits the site as required.

A minor amount of diesel fuel is stored on site in a bunded facility at the site maintenance facilities. Meteor Stone operations are consistent with *DEC (WRC) – DMP Water Quality Protection Guidelines 2000*.

Limestone around the facility, that is contaminated by leaks, is periodically scooped up and removed from site to an approved disposal area.

- **Dangerous Goods and Hazardous Substances**

Apart from fuel there will be no transport, storage or handling of hazardous materials involved in limestone extraction.

The only materials brought to site are cement and plasticisers for block manufacture which are the same materials used in all concrete product manufacture. These materials have been used for the whole time of the reconstituted block manufacture and no changes are proposed.

Fuel Management Plan

Limestone has high absorbency, and any lubricant spills are plainly visible as they remain on the surface and are easily isolated and contained.

- Fueling and maintenance will be carried out in accordance with the DOW– DMP Water Quality Protection Guidelines for Mining and Mineral Processing, Mechanical servicing and workshop facilities and Above-ground fuel and chemical storage.
- A bunded, lined fuel tank located near the workshop is used for small vehicles.
- Soils and hardstand such as those on this site are adsorptive. The main risk of contamination is the minor drips that occur during the removal of hoses etc. Any minor spills or leaks that are undetected at the working face will normally be picked up as the limestone is excavated and removed off site with the resource. Minor spills on the floor of the pit are broken down by soil microbial material in the same manner that soils contaminated by oil are remediated.
- Refuelling and lubricating activities are 45 metres above the perched seasonal water table, and equipment for the containment and cleanup of spills is to be provided.
- Spillage will be contained in plant and working areas by shutting down plant or equipment if the plant or equipment is the source of the spill (provided it is safe to do so).
- Limestone around the facility that is contaminated by leaks is periodically scooped up and removed from site to an approved disposal area.
- All significant adverse incidents (such as a fuel spill of >5 litres) in one dump, are to be recorded, investigated and remediated. A record is to be kept of incidents, and DER, DOW and City of Wanneroo notified within 24 hours of an incident.
- In the event of a spill or adverse incident, activities will be stopped in that area until the incident is resolved.

- Any spills will be contained by the excavation. Soil, sand or limestone and resource will quickly be placed around the spill to contain it in as small an area as possible. When contained, the contaminated material will be scooped up and removed to an approved landfill or other approved site.

Servicing and Maintenance

The main risk of contamination comes from tank or hose rupture on earth moving machines. A spill kit containing absorbent granules is located on site for emergency use. A commitment is made to notify Department of Environment Regulation and the City of Wanneroo of any spill greater than 5 litres. Limestone contaminated by large spills will be removed from the site to an approved disposal area.

Minor servicing is conducted on site. However all major servicing is conducted off site.

All waste products are either recycled or taken to an approved waste disposal site. Excavation of limestone is a chemically clean operation and does not use chemicals apart from lubrication materials and fuels.

All spills are to be cleaned up in accordance with the summarised procedures following.

Documents specific to the fuel and maintenance are the DER – DMP Water Quality Protection Guidelines for Mining and Mineral Processing

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

The following actions will be used where applicable and as the opportunity presents to maintain water quality on this site.

- All major servicing of vehicles will be conducted off site. Minor servicing will be conducted in dedicated areas on the natural land surface with a separation to the water table of 45 metres.
- Waste oil and other fluids derived from the routine maintenance of mobile machinery will be transported off site and disposed off at an approved landfill site. Grease canisters, fuel filters, oil filters and top-up oils will be stored in appropriate containers in a shed or brought to the site as required.
- A workshop is located that the operations north of Wesco Road. That facility has stormwater and waste water collection facilities.
- The workshops have concrete floors. All stormwater from the workshops is directed to a lined water retaining facility from which the water is pumped out as necessary by a licenced contractor who takes the waste water to an approved disposal site.
- Vehicle washdown is not used or proposed.
- Regular inspections and maintenance of fuel, oil and hydraulic fluids in storages and lines will be carried out for wear or faults.

- Servicing plant and equipment will be in accordance with a maintenance schedule.
- Accidental spill containment and cleanup protocol will be implemented. This will normally take the form of scooping up the contaminated material and removing offsite to an approved waste facility.
- Rubbish generated is to be recycled wherever possible and periodically disposed of at an approved landfill site.
- The site will be maintained in a tidy manner by removing all rubbish regularly offsite.

Waste Rock and Tailings Management

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

Waste Materials

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

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

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

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

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

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

Conclusions

The risk of groundwater pollution from Limestone extraction are the lowest of any extractive industry and lower than most almost other land uses. Extractive Industries are one of the few land uses permitted in Priority 1 Drinking Water Source Protection Areas

Therefore there will be no significant change to recharge or water flows to groundwater during excavation or as a result of excavation based on recharge calculations.