

EXCAVATION MANAGEMENT PLAN

Proposed Hard Rock Quarry

Lot 800 Pruden Road, Whitby

Italia Stone Group

PART 1 - 2

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SUMMARY

- Location

Lot 800 lies approximately 950 metres from South Western Highway with the pit approximately 1 300 metres from the highway.

The pit is approximately 3 500 metres east from Mundijong townsite and approximately 1 500 from the Whitby Urban Area.

Lot 800 occupies the upper face of the Darling Scarp, but the valley of Manjedal Brook cuts the Scarp and provides a north facing slope on which the quarry will be located, facing into the ridge to the north and protected to the west.

The design of the pit takes into account the potential for visual impacts and is provided with a narrow north facing throat combined with a western bund to better manage any visual impact.

The quarry location is centred on

408 382 E and 6426 157 N

- History

Hard rock quarrying has been undertaken on land to the north east from many years, firstly on the Hanson Quarry site and later, by WA Bluemetal.

Lot 800 adjoins and touches the south western corner of the WA Bluemetal site.

Lot 800 was part of Yarrabah property that was subdivided some years ago and sold off as a number of parcels of land.

The hard rock resource on Lot 800 was first identified in the *Basic Raw Materials Policy of the mid 1980's* and listed this site "to be considered for hard rock quarrying".

Basic Raw Materials Policy of 1992 identified the site as lying within the buffer of the southern most hard rock quarry area.

In the *Department of Planning and Urban Development, 1993, Darling Range Regional park and Landscape Study* the site is listed as Site Number 29/19.

The Geological Survey of WA mapping which identifies Strategically Important Basic Raw Materials recognises the hard rock resources that touch the northern edge of Lot 800 and extends onto the north eastern corner of Lot 800 on the Fremantle – Jarrahdale Sheet Mapsheet. The nomination is the location of the proposed quarry.

In State Planning Policy 2.4 Basic Raw Materials, 2000, the site is adjacent to the Priority Hard Rock Resource number 29/28 which is listed as a Priority Resource but has since been dropped through a land swap. This land, being cleared, does not have the same environmental restrictions.

- Site

The vegetation is pasture that is used for cattle grazing with several Marri (*Corymbia/Eucalyptus calophylla*) trees.

Scattered *Eucalyptus rudis* occur along the lower slopes and along Manjedal Brook, although currently there is no riparian vegetation associated with the Brook at this location.

There is no understorey. The only understorey taxa observed was a few plants of *Cheilanthes austrotenuifolia* growing in cracks in the granite outcrops.

The pasture consists of common introduced agricultural pasture species.

Scattered Cotton Bush occur on site but are currently kept in check by the cattle grazing.

The access along Pruden Road consists of scattered Marri (*Corymbia/Eucalyptus calophylla*) trees in all but the western end of the road access.

The section of Pruden Road that may require clearing was assessed by Lindsay Stephens of Landform Research on 11 August 2016.

The western portion of the road access crosses vegetation associated with Yogannup Sands.

The road verge vegetation on the Yogannup Sands was assessed and found to be in Degraded to Good condition with a restricted number of remnant species (fifteen species).

The site lies south of Manjedal Brook. The Brook will be protected by buffers and setbacks of 50 metres that are already in place and are the same as used on other hard rock quarries on the Darling Scarp.

A small area of rocky rapids and waterfall lies to the west outside Lot 800. That feature will not be impacted, with water from the proposed quarry and processing area being retained in two large detention basins with a total capacity of 10 000 kL combined with a third sediment settlement basin, to provide final water management and sampling and release points.

The release point to Manjedal Brook is 300 metres upstream from the rapids – waterfall. There will be no additional placement of materials closer to the Brook than currently exists.

Proposal

The proposed hard rock quarry is to extract 50 000 to 100 000 tonnes of hard rock per year.

Rock will be extracted by drill and blast with an excavator. A 35 tonne haul truck will take the resource to the processing area where a mobile crushing plant will be used to produce a range of products and a number of stockpiles.

Access will use Pruden Road and then an access road along the western side of Lot 800.

Planning Approval of 20 years is sought to provide long term security, combined with an Extractive Industries Licence.

Italia Stone Group has researched and investigated the operational and environmental issues including the potential community environmental impacts and designed the proposed operation to minimise impacts wherever possible. The methods of extraction are to be similar to the Roeland Quarry which is operated by Italia Stone Group.

Italia makes commitments, continues to use the described procedures and management, and where necessary, changes the procedures when ongoing research or new methods suggest that there are better ways of doing things.

The proposal achieves the purpose of extracting a valuable resource in line with published Planning Policies.

Traffic Management is designed to comply with Best Practise, such as *Institute of Quarrying Australia/Queensland Government, Traffic Management*.

Greenfield Technical Services (Traffic Engineers) have been commissioned to assist with the traffic design requirements for the access road and the linkages to the normal road network of South Western Highway. See the discussions of transport in Appendix 6.

Greenfield Technical Services determined that access to South Western Highway was possible at the location of Pruden Road, because of the configuration of the roads and the speed limits on South Western Highway at that point. The speed limit is 90 kph at the intersection of the pit and South Western Highway.

Water management, blast management and operations are designed to be similar to other operating hard rock quarries.

An Acoustic Study has been completed by Herring Storer who found that the operations could be conducted in compliance with the Environmental Protection Noise Regulations.

An Environmental Risk Matrix has been completed using the EPA factors and is attached in the following pages.

All the EPA environmental factors, together with the other factors, are provided in the Environmental Risk Table to show that some are not relevant to this proposal. Leaving them out may lead to some uncertainty in a reviewer's mind.

The Environmental Risk Matrix was developed assessing the severity of the risks, and the likelihood of them occurring. The risk matrix e information is contained at the end of this summary and includes risk prior to mitigation and as a result of mitigation.

The Risk Table includes references to the various parts of the document to enable easy review and provides a summary of the project and its management.

From the Risk Analysis the main environmental risks are identified as;

- Dust Management
- Noise and Blast Management
- Visual Management
- Transport within, and to and from, operations.
- Water Management

Each of these environmental factors is addressed briefly in context throughout the Mining Proposal and in detail in separate Appendices. However as studies and a land survey are continuing the Mining Proposal is an interim document and will be updated when the additional information becomes available.

Buffers

The closest dwellings from the active pit lie to the south at distances of 770 to 1 470 metres. There are no other dwellings or sensitive premises as far as is known within 1.5 km.

The setbacks to sensitive premises comply with the EPA generic buffer Guidelines for all but three dwellings located at 77, 820 and 930 metres located behind landform and tree belts.

These buffers are better than those available to some other hard rock quarries on the Darling Scarp that have sensitive premises much closer, for example Boral Orange Grove in Perth (Licensed for 2 million tonnes per year) which has a number of dwellings very close to the operations and less than 500 metres buffer, Hanson, Gelorup and Bunbury Quarries and Holcim Gelorup Quarry which have many dwellings within the Gelorup Urban area within 500 metres of the quarries.

Visual

The quarry footprint was selected to provide the maximum screening of operations. The pit is located behind a low spur which forms the western boundary and can be added to with bunding, and behind existing trees.

The potential visual impact will be minimal and consist of a temporary view of the top-most eastern bench from two premises east of South East Highway.

The access road is chosen to provide suitable gradient as well as being located behind existing trees on site.

The pit footprint has also been chosen behind the break of slope of a spur along the west of the site to provide visual and noise screening.

The direction of excavation and staging is then selected to provide maximum screening for noise visual, dust and all other potential environmental risks.

In addition a bund 4 metres high is proposed to be located along the western side of the pit with the pit cut deep behind the spur and screening bund.

This is the same design and management used at other hard rock quarries along the Darling Scarp.

The proposed quarry operation is set 1 km back from South Western Highway.

The proposal complies with the *Shire of Serpentine – Jarrahdale LPP8 Landscape Protection Policy*.

With the excavations unlikely to be visible from most of South Western Highway, the setback from Jarrahdale Road and the short nature of the operations, it is considered that whilst there may be some short term conflict with the intent of the policy the use of the hard rock for the community provides substantial environmental offsets.

Community Engagement

A community consultation and engagement program is proposed. The local neighbours will be contacted during the assessment and advertising process through the Local Authority.

Project Summary

ASPECT	CURRENT DISTURBANCE	DISTURBANCE
Area of excavation	Nil	7.0 hectares pit and 4.0 hectares of processing and stockpiles year 2017 – 2040 Potential final pit and size 12.0 hectares at 2080.
Processing Infrastructure. Product stockpiles, laydown and related areas	Nil	4.0 hectares
Roads, dams and related infrastructure etc	Nil	2.5 hectares
Revegetation	Nil	3.0 hectares at 20 years
Hard Rock extraction	Nil	50 000 – 100 000 tonnes per year, initially, potentially rising to 200 000 tonnes at 5 years.
Estimated reserve		3 million cubic metres based on the concept quarry plan.
Life of project		60 years
Dewatering requirements		Nil
Maximum depth of excavations	Nil	60 metres

MANAGEMENT OF THE OPERATIONS

The excavation, processing and environmental management proposed has been designed to reflect best practice and utilises Commonwealth and State Guidelines.

Safety Management

All quarries operate under the provisions of the *Mines Safety and Inspection Act 1994 and Regulations 1995*. These are administered by the Department of Mines and Petroleum.

The regulation is achieved through the DMP Safety Regulations and Reporting Systems (SRS).

All quarries on commencement are required to register with the SRS system. As part of the registration a Project Management Plan is required to be produced and lodged online after all planning approvals are in place and prior to commencement.

The Project Management Plan will use some material from this Management Plan and concentrate on the onsite operations as they relate to health and safety.

Officers from the Safety Division of the DMP will regularly inspect the operations in relation to health and safety.

Regulatory Controls Available

The following approvals are required and are capable of providing effective control of the proposed quarrying operation. These controls are used for other quarries.

Regulatory Authority	Legislation	Controls available
Shire of Serpentine - Jarrahdale	<i>Shire of Serpentine – Jarrahdale Town Planning Scheme 2</i>	- The Shire provides development approval that is issued with conditions. - The conditions relate to all aspects of quarrying, such as Noise, Dust, Water, setbacks, transport, visual management, length of approval, rehabilitation etc. - The Shire provides the conditions and oversees their action. - Annual reporting is normally required. - A performance bond is normally required.
	<i>Shire of Serpentine – Jarrahdale Extractive Industry Local Law</i>	The Shire has an Extractive Industry Local Law which is normally issued every 1 to 3 years subject to satisfactory performance and compliance with the operational conditions.
Department of Environment Regulation	<i>Part V of the Environmental Protection Act 1986.</i>	- The quarry will be classified as a Prescribed Premises. - This approval relates to potential environmental impacts such as water quality, noise, blasting, dust, crushing and screening - The DER will provide a Works Approval for the construction and then issue a Licence for 1 – 5 years. Conditions and limits are imposed - Annual reporting is required.
Environmental Protection Authority – Minister for the Environment	<i>Part IV of the Environmental Protection Act 1986.</i>	- The proposal is assessed under Part IV of the EP ACT to determine whether formal assessment is warranted based on the potential environmental impacts. - Conditions of approval are issued if the proposal is formally assessed. Those conditions are normally overseen by the DER.
Shire of Serpentine Jarrahdale and the Department of Environment Regulation.	<i>Environmental Protection (Noise) Regulations 1997</i>	The Noise Regulations are overseen by the Shire of Serpentine – Jarrahdale and the DER concurrently with the other approvals
Department of Water		Department of Water provides advice which is normally incorporated into the conditions imposed by the approvals and Licences issued by the Local Authority and DER.
Department of Environment Regulation	<i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004.</i>	- A Clearing Permit will be required, issued for a limited time. The permit normally contains conditions relating to clearing and rehabilitation. - Flora and fauna including Threatened and Priority species are considered during the assessment processes.
Commonwealth of Australia	<i>EPBC Act 1999</i>	The Bilateral Agreement between the State and the Commonwealth allow the State to consider matters that may trigger the EPBC Act 1999 through the Clearing

		Approval or Formal Assessment processes.
Department of Mines and Petroleum	Mines Safety and Inspection Act 1994.	• The quarry will be registered under the DMP – SRS safety system that controls all aspects of on site safety. • Various other legislation is administered, such as the Dangerous Goods Safety Act 2004. • Conditions are imposed as required, Quarry Managers required to be appointed and regular inspections are made. • Regular testing such as occupational dust and noise measurements are made several times per year.

Environmental Management

Environmental Management is normally controlled through conditions imposed by Planning Approval under the Local Authority Town Planning Scheme, approval under a Local Authority Local Law, WAPC approval under a Regional Planning Scheme and any other conditions imposed by other approvals such as a Clearing Permit or Licensing through the Department of Environment Regulation or Water Licence through the Department of Water.

Management is also achieved through the design and site procedures relating to the operations and commitments made by the proponent which are reflected in this Management Plan.

The environmental management is designed to reflect best practise, outlined in particular in;

Department of Resources, Energy and Tourism (Commonwealth), 2011, *A Guide to Leading Practice Sustainable Development in Mining*, and guidelines produced by Environmental Protection Authority, Department of Environment Regulation, Department of Water, Department of Mines and Petroleum, Western Australia Planning Commission and the Local Authority.

An Environmental Risk Assessment has been developed based on the EPA Environmental Factors which have been identified by the EPA as the factors to be considered when reviewing environmental impact and outcomes in Western Australia.

The EPA Factors have been used and added to in the following table. The table illustrates the environmental risk if it is not mitigated or managed, and the assessed environmental risk when the proposed design and management procedures are effectively implemented.

All the EPA environmental factors, together with the other factors, are provided in the Environmental Risk Table to show that some are not relevant to this proposal. Leaving them out may lead to some uncertainty in a reviewer's mind.

The Environmental Risk Matrix was developed to the principles of AS/NZS ISO 14001:2004 (Environmental Management Systems) and AS/NZS ISO 19011:2014 (Guidelines for auditing Management Systems). The principles of AS/NZS 31000:2009 (Risk Management Guidelines) are also used when considering any risks.

The Risk Table includes references to the various parts of the document to enable easy review and provides a summary of the project and its management.

The risk assessment table also forms the basis of an auditable matrix.

ENVIRONMENTAL RISK ASSESSMENT MATRIX

Hard Rock Extraction, Lot 800 Pruden Road Whitby

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Environmental Factor	Environmental Objective	Identified Issues and Commitments	Proposed Management	References	Environment Risk	
					Innate Risk - Unmanaged	Risk when Managed
LAND						
FLORA and VEGETATION	To maintain representation, diversity, viability and ecological function at the species, population and community level.	Vegetation communities and/or biodiversity may be significantly impacted by clearing, and degradation by weeds and dieback.	There is little vegetation apart from scattered native trees of <i>Corymbia calophylla</i> and occasional <i>Eucalyptus rudis</i> . Most is regrowth and is not large enough to provide nesting or roosting habitat trees for Black Cockatoos. The ground is open pasture with no native understory or ground covers.	2.8.1 Flora Attachment 6	Low	Low
		Threatened Communities may be impacted by inadvertent impacts.	Nil		NA	
		Priority species may be affected by clearing, disturbance, weeds, dieback and other impacts.	Nil		NA	
		Threatened Species may be impacted by inadvertent impacts.	Nil		NA	
		Weeds may become established and impact on the local and on site biodiversity	A weed management program is proposed .	Weed Management Plan in Attachment 6	Low	Low
		Dieback disease may be present and impact on the local and onsite vegetation.	Dieback management procedures are in place.	Dieback Management Plan in Attachment 6	Low	Low
		The developments may fragment communities, biodiversity and ecological linkages.	No further fragmentation will occur.		Nil	
Landforms	To maintain the variety, integrity, ecological functions and environmental values of landforms and soils.	The local landform may be altered to a form that is not compatible with the surrounding geomorphology.	The pit has been selected and designed to not significantly alter the Darling Scarp or the values of the Darling Scarp.	Figures Attachment 1 Attachment 4	Low	Low
		The final land surface should be fit for its required end use.	Then end use is to return to sloping vegetated hillside landform and vegetation	Attachment 6	Low	Low
		The development and final landform will not lead to significant visual impacts,	The pit has been selected and designed to not significantly alter the Darling Scarp or the values of the Darling Scarp. The design has been developed to minimise	Visual management Attachment 4 5.7.3 Visual	Low	Low

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			visual impacts and restrict it to one very small area and the top of the eastern face visible temporarily from two sensitive premises. A visual analysis and mitigation has been developed. This quarry will be much less visible than the other four other main quarries on the Darling Scarp and with the proposed mitigation should not be visible after the first rehabilitation.			
		The final landform and soils may be subject to erosion by wind, water or other processes.	The excavation operations are designed to minimise erosion.	Attached Water Management Plan Attachment 2 and Rehabilitation Plan in Attachment 6	Low	Low
		The project has been assessed for karst features and has been designed to mitigate impacts on known and features that may potentially be present.	There is no karst.		NA	
Subterranean Fauna	To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.	The development may have an impact on an isolated population of subterranean fauna.	The proposed quarry lies in an area of widespread massive granite outcrops. The proposal will not fragment that or significantly disrupt corridors and at the end of excavation the site will be revegetation to local native vegetation on rocky outcrops and completed slopes, increasing the potential habitats.		Low	Low
		The development may fragment subterranean communities.	See above		NA	
		The diversity of subterranean fauna may be reduced at a population or assemblage level.	See above		NA	
		The final formed structures may not support continued subterranean fauna and their ecological functions.	There will be similar regolith to the pre-excavation environment.		NA	

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Terrestrial Environment Quality	To maintain the quality of land and soils so that the environment values, both ecological and social, are protected.	At the end of excavation the created soils should be deep enough or of sufficient quality to be sustainable to meet the long term end use or ecological values.	Proven measures to rehabilitate hard rock quarries are proposed. Landform Research and Italia are experienced in the rehabilitation of hard rock quarries.	Mine Closure Plan in Attachment 6 Visual Management in Attachment 4	Low to moderate	Low
		The area of potential impacts will not impact on essential or desirable land uses.	The end use will change from pasture to local native vegetation.	Mine Closure Plan in Attachment 6.	Low	Low
		The development will not adversely impact an area identified as having high agricultural or community values.	The only values are steep grazing with reduced agricultural capability. The site will be returned to native vegetation so a small area of 16 hectares will be lost from agriculture but the habitat for native flora and fauna will be correspondingly increased.		NA	
		Acid soils are not exposed or are managed to ensure that there are no long term adverse effects.	There is no evidence of acid sulfate conditions. The site is elevated in oxidised soils with no prospect of sulfides in the soils.	Attachment 2, Water Management Plan Attachment 1, Geotechnical assessment	NA	
Terrestrial Fauna	To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.	Communities and fauna and/or biodiversity may be significantly impacted by clearing, and degradation by weeds and dieback.	The site is parkland pasture that is to be returned to native vegetation. The area of native habitat on the Darling Scarp will increase at the end of excavation.	Mine Closure Plan in Attachment 6	Low	Low
		Threatened Faunal Communities may be impacted by inadvertent impacts.	NA			
		Priority Fauna species may be affected by clearing, disturbance, weeds	NA			
		Threatened Fauna Species may be impacted by inadvertent impacts.	NA The habitat for Black Cockatoos will ultimately increase. This and any impacts of clearing will be dealt with through the Clearing Permit process. The end soils will be rocky granite soils covered by local native vegetation of trees and shrubs.	Mine Closure Plan in Attachment 6	Low	Low
WATER						
Hydrological Processes	To maintain the hydrological regimes of groundwater and surface	The ecological functions of watercourses are to be maintained.	Manjedal Brook that runs north of the site will be retained during and following excavation and provided with a 50 metre setback that will	Attachment 2 Water Management Plan	Low	Low

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	water so that existing and potential uses, including ecosystem maintenance, are protected.		be revegetated to local native and riparian vegetation, from the existing pasture. Extensive water management and sediment trapping facilities will be provided and the collected water used for dust suppression. There should be little water released to the Brook.			
		Groundwater may be impacted by changes to recharge, over-pumping, alterations to flow paths or lead to significant evaporation and water loss.	No adverse impacts on water are recorded from the existing operations on the Darling Scarp and none are likely. The project complies with the DOW Guidelines for Extractive Industries. Extensive fuel and fluid management is used and will be continued.	Attachment 2 Water Management	Low to moderate	Low
		Wetlands may be altered by draining or flooding, potentially changing their ecological functions and biodiversity.	The only wetland is Manjedal Brook which has been excluded and provided with a 50 metre setback. That setback is currently pasture and will be restored to local native vegetation including riparian vegetation. There is currently no wetland dependent vegetation associated with the drainage line apart from several <i>Eucalyptus rudis</i> . Also see above	Attachment 2 Water Management Plan Attachment 1 Geotechnical Assessment	Low	Low
Inland Waters Environmental Quality	To maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.	Hydrocarbons, fuels and other chemicals are stored in a manner that they pose no risk to the environment.	Extensive fuel and hydrocarbon management programs are proposed. A Waste inventory found no potentially adverse materials. The proposed operations are the same as other hard rock quarries but much smaller. This quarry is proposed to produce 50 000 tonnes per year rising to 200 000 tonnes per year in the future. That compares to other hard rock quarries on the Darling Scarp Licensed for 2 million tonnes production per year. Comprehensive sediment and water retention features are proposed	Attached Water Management Plan	Low to moderate	Low
		Runoff from operations is contained and all water is either retained or treated to removed sediment and any deleterious materials.	All water is retained on site in the base of the pit or the detention basins on site prior to release. There may be some release of water during winter. The volume and design of the three basins will provide for effective sediment settlement. A	Attachment 2 Water Management Plan.	Low to moderate	Low

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			fourth basin/ sump will be provided in the base of the pit when the floor becomes large enough.			
		Water quality during and after development and operations is not adversely affected or altered.	See above	Attachment 2 Water Management Plan. Attachment 1 Geotechnical Assessment for contour plans.	Low	Low
AIR						
Air Quality	To maintain air quality for the protection of the environment and human health and amenity.	Dust emissions are minimised or controlled to ensure that the local amenity is protected.	The proposed hard rock excavation will use the same procedures as other hard rock quarries on the Darling Scarp. The operations comply with the EPA generic buffers. A Dust Management Plan is provided. A DER Licence will be required for crushing and screening if used.	Dust Management in attached Offsite Impacts Management Plan. Attachment 3	Low	Low
		Dust emissions will not significantly impact on local and on site personnel health or quality of life.	Hard rock quarrying must comply with the <i>Mines Safety and Inspection Act</i> for Health and Safety. Officers from the DMP will regularly inspect the site and the site must be registered under the DMP SRS system.	Dust Management in attached Offsite Impacts Management Plan. Attachment 3	Moderate to high for worker impact. Low for local amenity impact.	Low
		Noise levels will comply with the <i>Environmental Protection (Noise) Regulations 1997</i> .	Noise levels will comply with <i>Environmental Protection (Noise) Regulations 1997</i> . The operations are designed to minimise on site noise and the potential for offsite noise. There are few dwellings with only two sensitive premises to the north west likely to require design management actions. The actions proposed such as bunding, location of the processing plant and the pit operations will ensure compliance. A noise assessment has been completed by Herring Storer and the pit and operations are designed to comply with the requirements of that assessment.	Noise Management in attached Offsite Impacts Management Plan Attachment 3. 5.7.2 Noise	Moderate to High for local amenity.	Low
		Noise levels and operational procedures will be used to protect on site personnel	Hard rock quarrying must comply with the <i>Mines Safety and Inspection Act</i> for Health and Safety. Officers from the DMP will regularly	Noise Management in attached Offsite Impacts Management Plan	Moderate to high for worker	Low

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		health and safety.	inspect the site and the site must be registered under the DMP SRS system.		impact.	
		Emissions gases and other materials potentially adverse to human health will not be used or will be managed.	There are no gaseous or other potential harmful emissions from the operations.		Low	Low
		Potential impacts from blasting will comply with the <i>Environmental Protection (Noise) Regulations 1997</i> and guidelines for ground vibration.	Blasting is an integral part of hard rock quarrying. The number and size of blasts will be restricted to approximately 4 blasts per year with additional small blasts during setup and construction. 50 000 rising gradually to 200 000 tonnes of material is to be removed annually. All blasts will be designed and monitored.	Blast Management in attached Offsite Impacts Management Plan Attachment 3.	Moderate	Low
		Employ procedures and design the operations to minimise the risk of excessive greenhouse emissions.	The operations are designed to minimise fuel use and transport routes.		Low	Low
Heritage	To ensure that historical and cultural associations are not adversely affected.	Known aboriginal heritage sites will be protected.	There are no known aboriginal sites on the DAA database. A commitment is made to stop and assess any site if uncovered. Heritage sites uncovered during operations will be independently assessed and managed through communication with the community, Government and traditional owners.	6.5 Heritage	Low	Low
		Sites of European heritage will be protected.	None known on Lot 800.		Low	Low
Human Health Amenity	To ensure that human health is not adversely affected.	Human health is protected from adverse impacts of dust, noise, other emissions and chemicals.	Hard rock quarrying must comply with the <i>Mines Safety and Inspection Act</i> for Health and Safety. Officers from the DMP will regularly inspect the site and the site must be registered under the DMP SRS system.		Moderate to high for worker impact.	Low
	Transport routes and operations are designed to minimise local impacts	Transport may impact on local, and regional roads or school bus routes.	Transport is along a proposed access road on the western side of Lot 800, behind natural tree screening and then to Pruden Road. Pruden Road will have to be upgraded and modified to reduce the slopes for trucks. The construction of Pruden Road will be through consultation with the Shire of Serpentine – Jarrahdale and a local residents	3.4.9 Transportation Corridors Attachment 5 Transport Assessment	Moderate	Low

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			consultation group that is to be formed. The number of truck movements will be determined by the number permitted under the Noise Regulations. The intersection with South West Highway will be formed to provide left turn out only. The speed limit on the highway at that point is 90 kph.			
	Local Amenity – Visual Impact	The operations have been designed to provide sufficient buffers and visual protection.	The pit has been selected and designed to not significantly alter the Darling Scarp or the values of the Darling Scarp. The design has been developed to minimise visual impacts and restrict it to one very small area and the top of the eastern face visible temporarily from two sensitive premises. A visual analysis and mitigation has been developed. This quarry will be much less visible than the other four other main quarries on the Darling Scarp and with the proposed mitigation should not be visible after the first rehabilitation. The top bench will be revegetated as a priority The operations comply with the EPA Buffer Guidelines. The operations are designed to minimise visual impact.	Visual Management Attachment 4 5.7.3 Visual	Moderate to High	Low to Moderate
INTEGRATING FACTORS						
Offsets	To counterbalance any significant residual environmental impacts or uncertainty through the application of offsets	Offsets are provided as necessary to reduce or mitigate the impacts on the development and operation of the project.	The operations are proposed to be small compared to other quarries with 50 000 tonnes rising eventually to 200 000 tonnes per year, compared to the licensed quarries on the Darling Scarp which are licensed for up to 2 million tonnes annual production. The site is located in pasture with minor number of trees and will be returned to native vegetation so there will eventually be an increase in native vegetation. The rehabilitation of the screening bunds and the setback to Manjedal Brook will provide many more trees than those proposed to be cleared.	Not required	NA	
		Offsets are used to enhance	See above	Not required	NA	

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		the local environment, habitats, biodiversity and other identified factors.	No additional offsets are required because of the compensation of restoration of the setback to Manjedal Brook, the planting of many more trees than are proposed to be cleared and the ultimate conversion of 16 hectares of pasture into local native vegetation.			
Rehabilitation and Closure	To ensure that premises are closed, decommissioned and rehabilitated in an ecologically sustainable manner, consistent with agreed outcomes and land uses, and without unacceptable liability to the State	All infrastructure, roads, hardstand, non natural materials are to be removed from site progressively when not required and all removed at the end of the project.	The site is open and located in pasture with minor number of trees and will be returned to native vegetation.	Mine Closure Plan in Attachment 6.	Moderate to high	Low
		No materials are to be left on site that may cause long term detrimental outcomes in terms of impacts to soils, water, heritage, vegetation health or other factors.	Italia will remove all materials, equipment and plant associated with their operations at the end of excavation.	Mine Closure Plan in Attachment 6.	Moderate	Low
		All contaminated materials are to be removed from site prior to closure.	There are no contaminating materials apart from fuel and lubricants. Commitments are made to do this. Contingencies are in place. Extensive fuel and hydrocarbon management programs are proposed. A Waste inventory found no potentially adverse materials.	Mine Closure Plan in Attachment 6. Water Management Plan at Attachment 2. 3.4.6 Waste Rock and Tailings.	Low to moderate	Low
		Landforms and other geomorphological features are to be compatible with the local area and end use and be sustainable in the long term.	The operations are small. The site is already open and located in pasture with minor number of trees and will be returned to native vegetation. The end use will be sloping native vegetation. Soils will be reformed to a sustainable structure.	Mine Closure Plan in Attachment 6.	Low - moderate	Low
		Soils are reconstructed to be able to sustain an ecological sustainable vegetation or other cover consistent with the end use and long term proposal for the site.	The operations are small. The site is located in pasture with minor number of trees and will be returned to pasture and native vegetation. The end use will be native vegetation. Soils will be reformed to a sustainable structure.	Mine Closure Plan in Attachment 6.	Low	Low
		Weed levels are not to cause significant impacts on	Managed during excavation and then taken over by the normal farm operations.	Weed Management Plan Mine Closure Plan in	Low	Low

ENVIRONMENTAL RISK ASSESSMENT MATRIX

Hard Rock Extraction, Lot 800 Pruden Road Whitby

Italia Stone Group

		revegetation.		Attachment 6.		
		Ongoing monitoring of the rehabilitation will be conducted to ensure that any areas not meeting completion criteria are added to or replaced as necessary to enable the relevant criteria to be met.	This is proposed.	Mine Closure Plan in Attachment 6.	Low - moderate	Low
OTHER FACTORS						
Resource Requirements	Basic Raw Materials are required for continued use by the community and for future developments.	There is significant basic raw material on site that is suitable for community resources.	The hard rock resource on Lot 800 was first identified in the <i>Basic Raw Materials Policy of the mid 1980's</i> as a site listed to be considered for hard rock quarrying. <i>Basic Raw Materials Policy of 1992</i> identified the site as lying within the buffer of the southern most hard rock quarry area. In the <i>Department of Planning and Urban Development, 1993, Darling Range Regional park and Landscape Study</i> the site is listed as Site Number 29/19 The Geological Survey of WA mapping which identifies Strategically Important Basic Raw Materials recognises the hard rock resources that touch the northern edge of Lot 800 and extends onto the north eastern corner of Lot 800 on the Fremantle – Jarrahdale Sheet Mapsheet. The nomination is the location of the proposed quarry. In State Planning Policy 2.4 Basic Raw Materials, 2000, the site is adjacent to the Priority Hard Rock Resource number 29/28 which is listed as a Priority Resource but has since been dropped through a land swap. This land being cleared does not have the same environmental restrictions.	1.8 Planning Policies and Zonings	Low	Low
Planning Compliance	To comply with Government Policy, planning zones and procedures.	The project is designed to comply with State and Local Planning requirements.	The site complies with or is designed to comply with all planning requirements.	1.8 Planning Policies and Zonings	Low	Low

ENVIRONMENTAL RISK ASSESSMENT MATRIX

Hard Rock Extraction, Lot 800 Pruden Road Whitby

Italia Stone Group

Community Consultation	To provide a community consultation process commensurate with the size nature and time line of the project.	Community consultation will be handled by community input within the application and assessment phases, as through direct community consultation as required and contact numbers being displayed at the entrance. An "Open Door Policy" is used to enable ongoing dialogue between the operator and the community.	Italia Stone Group will notify local residents of the proposed quarry, and prior to construction commencing will establish a community reference group to enable a forum for the discussion of the proposed operations. It is proposed to hold regular meetings with the adjoining landholders and Shire during construction and at least annually after that.	6.7 Stakeholder Consultation	Low	Low
		An effective complaints procedure is provided, combined with effective remedial procedures.	A complaints procedure is proposed. Italia Stone Group will notify local residents of the proposed quarry, and prior to construction commencing will establish a community reference group to enable a forum for the discussion of the proposed operations. It is proposed to hold regular meetings with the adjoining landholders and Shire during construction and at least annually after that.	6.7 Stakeholder Consultation	Low	Low
Safety	To ensure that the project provides high levels of safety to on site personnel and the community	Ensure that the project provides high levels of safety to on site personnel.	Hard rock quarrying must comply with the <i>Mines Safety and Inspection Act</i> for Health and Safety. Officers from the DMP will regularly inspect the site and the site must be registered under the DMP SRS system. The operations are required to be registered under the DMP SRS system. Italia propose extensive fire and safety management systems under the Project Management Plan.		Low	Low
		Ensure that potential impacts are retained on site and do not cause significant risk of safety to the local and wider community.	The site is fenced and is already installed with locked gates. The proposed quarry is designed to minimise potential local and offsite impacts.		Low	Low
		Have in place a transport policy to ensure that transport along public roads is conducted in a safe manner.	Italia will work with the Shire of Serpentine – Jarrahdale to ensure a safe access facility that will cause minimal impacts on local residents.	3.4.9 Transportation Corridors	Low	Low

ENVIRONMENTAL RISK ASSESSMENT MATRIX

Hard Rock Extraction, Lot 800 Pruden Road Whitby

Italia Stone Group

Geotechnical Integrity	To ensure that all ground and geological materials is safe commensurate with the operations and final land surface.	The operational and final land surfaces will be made safe and not subject to subsidence, slippage or other adverse conditions.	The operations are designed to comply and operate to the <i>Mines Safety and Inspection Act 1994</i> . The methods of excavation are similar to those used in other hard rock quarries.	Attachment 1 Geotechnical Assessment Final Contours Mine Closure Plan in Attachment 6.	Low	Low
		The quarry and operations will comply with the <i>Mines Safety and Inspection Act 1994</i> .	Italia is committed to complying with the relevant Acts and Regulations. The pit is regularly inspected by officers from the DMP Safety Division.		Low	Low
		The operational and final surfaces and features are designed to be not affected by extreme climate events.	Detention basins are proposed to slow the 1 : 10 year 2 hour event and regulate the flow of greater storm events. No impact from extreme weather events result on the pit or to the pit or rehabilitated surface. Granite is very stable and strong. It is not readily eroded.	Mine Closure Plan in Attachment 6. Attachment 2 Water Management Plan	Low	Low
		The operational and final surfaces and features are designed to be sustainable not significantly impacted by climate change or extreme weather events.	The site is to drain through detention basins. No impact from climate change is likely in the pit or to the pit or rehabilitated surface. Hard Rock is very stable and strong. It is not readily eroded.	Attachment 2 Water Management Plan	Low	Low

ENVIRONMENTAL AUDIT SYSTEM

Hard Rock Extraction, Lot 800 Pruden Road, Whitby

Italia Stone Group

Environmental Factor	Environmental Objective	Identified Issues and Commitments	Environmental Outcome	Performance Criteria	Monitoring
Legal	Maintain legal compliance.	A number of conditions and requirements will be placed on the operations through different legislation	Comply with all legal requirements.	Comply with all legal requirements	As Required.
Flora and Vegetation	To maintain representation, diversity, viability and ecological function at the species, population and community level.	Vegetation communities and/or biodiversity may be significantly impacted by clearing, and degradation by weeds and dieback.	A Clearing Permit will be applied for under the <i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004</i>	Apply for a Clearing Permit prior to moving into new ground. Comply with any Clearing Permit	Regular visual monitoring
		Weeds may become established and impact on the local and on site biodiversity	Weeds will not significantly impact on revegetation. Declared or significant Environmental Weeds will be treated and or removed	Comply with the Weed Management Plan. Absence of Declared or Environmental weeds that could compromise the success of revegetation. Exotic species to be no greater richness or density than adjoining vegetation.	Regular monitoring at least twice per year.
		Dieback disease may be present and impact on the local and onsite vegetation.	Dieback management procedures being used. No additional dieback introduction or spread is to occur as a result of operational activities.	Comply with the Dieback Management Plan.	Monthly visual review of operations when active and every 12 months when not active.
Landforms	To maintain the variety, integrity, ecological functions and environmental values of landforms and soils.	The local landform may be altered to a form that is not compatible with the surrounding geomorphology.	The pit will be rehabilitated to simulate and be compatible with the local surrounding landform.	The landform will be compatible with the local surrounding landform.	Completion of rehabilitation earthworks.
		The development and final landform will not lead to significant visual impacts,	The proposed pit and operations will comply with the quarry footprints and the Screening and Rehabilitation Plans. The pit and disturbance areas will be revegetated with local species to visually match the local native vegetation as soon as practicable.	Visual management will be regularly assessed and steps taken where possible to mitigate any visual impacts. The revegetation will visually match local vegetation.	Annual monitoring of rehabilitation. Annual monitoring of visual impacts with photographic records.
		The final landform and soils may be subject to erosion by wind, water or other processes.	The excavation operations will be subject to minimal erosion risk.	Slopes will be resistant to erosion through effective revegetation and water management	Annual monitoring of rehabilitation. Regular monitoring of operations and disturbance areas.

Terrestrial Fauna	To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.	Communities and fauna and/or biodiversity may be significantly impacted by clearing, and degradation by weeds and dieback.	Revegetation will be sufficiently rich and dense to support local fauna habitats.	Habitat values that are capable of increasing with time, measured by soil development, soil litter increases, increased plant matter, cover, vegetation, structure and habitat niches.	Annual monitoring of rehabilitation.
Hydrological Processes	To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected.	The ecological functions of watercourses are to be maintained.	Manjedal Brook Brook will be provided with a 50 metre setback that will be revegetated with local native and riparian vegetation. Slopes are to drain to detention basins to allow water to settle prior to any release to Manjedal Brook.	The ecological values of Manjedal Brook will be maintained and enhanced. Slopes are to be stable and free from erosion.	Annual monitoring of rehabilitation. Annual monitoring of water quality. Regular monitoring of operations and disturbance areas.
		Groundwater may be impacted by changes to recharge, over-pumping, alterations to flow paths or lead to significant evaporation and water loss.	No adverse impacts on ground water are present or are likely.	Potential risks to water quality will be minimised through water protection measures.	Regular monitoring of operations and disturbance areas.
Inland Waters Environmental Quality	To maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.	Hydrocarbons, fuels and other chemicals are stored in a manner that they pose no risk to the environment.	Water quality in Manjedal Brook is to be similar downstream and upstream, for TDS and TSS.	Sample water quality when flowing in winter. Downstream water quality < 20 mg/L greater than upstream, for TDS and TSS	One annual water sample in winter.
		Runoff from operations is contained and all water is either retained or treated to removed sediment and any deleterious materials.	All water is to be detained in the base of the pit and the detention basins on site prior to release. The volume of the basins will provide for effective sediment settlement.	No significant adverse sediment loading is to occur to Manjedal Brook	Annual monitoring of rehabilitation. Regular monitoring of operations and disturbance areas.
Air Quality	To maintain air quality for the protection of the environment and human health and amenity.	Dust emissions are minimised or controlled to ensure that the local amenity is protected.	Dust emissions are not to impact on local sensitive premises or significantly on adjoining land.	Compliance with the Dust Management Plan.	Regular visual monitoring of operational areas when active.
		Dust emissions will not significantly impact on local and on site personnel health or quality of life.	Hard rock quarrying must comply with the <i>Mines Safety and Inspection Act</i> for Health and Safety.	Comply with the <i>Mines Safety and Inspection Act</i> .	As determined by DMP and the legislation.
		Noise levels will comply with the <i>Environmental Protection</i>	The operations are designed to minimise on site noise and the potential for offsite noise.	Noise levels will comply with <i>Environmental</i>	Compliance with the recommendations of any

		<i>(Noise) Regulations 1997.</i>	A noise assessment has been completed by Herring Storer and the pit and operations are designed to comply with the requirements of that assessment.	<i>Protection (Noise) Regulations 1997.</i> Comply with the recommendations of any noise assessment or modeling. Comply with the Noise Management Plan.	noise assessment or modeling by visual observations daily.
		Noise levels and operational procedures will be used to protect on site personnel health and safety.	Hard rock quarrying must comply with the <i>Mines Safety and Inspection Act</i> for Health and Safety. Officers from the DMP will regularly inspect the site and the site must be registered under the DMP SRS system.	Comply with the <i>Mines Safety and Inspection Act</i>	
		Potential impacts from blasting will comply with the <i>Environmental Protection (Noise) Regulations 1997</i> and guidelines for ground vibration.	All blasts will be designed and monitored to minimise local impacts.	Comply with the Blast Management Plan. Airblast and ground vibration for each blast are to comply with the regulations/guidelines/ Licence	Monitor every blast.
Heritage	To ensure that historical and cultural associations are not adversely affected.	Known heritage sites will be protected.	Heritage sites uncovered during operations will be independently assessed and managed through communication with the community, Government and traditional owners.	Disturbance to known heritage sites is to be minimised until assessed.	As required if a site is identified.
Human Health Amenity	To ensure that human health is not adversely affected.	Human health is protected from adverse impacts of dust, noise, other emissions and chemicals.	Hard rock quarrying must comply with the <i>Mines Safety and Inspection Act</i> for Health and Safety.	Comply with the <i>Mines Safety and Inspection Act</i> .	
	Transport routes and operations are designed to minimise local impacts	Transport may impact on local, and regional roads or school bus routes.	The number of truck movements will be determined by the number permitted under the Noise Regulations. Minimise transport impacts on local residents.	Maintain liaison with the local residents along the transport route.	Normal operations and as required.
	Local Amenity – Visual Impact	The operations have been designed to provide sufficient buffers and visual protection.	Minimise visual impacts outside the disturbance footprint. Rehabilitate the top bench as soon as practicable during operations. Comply with the Screening and Rehabilitation Plan.	Lay back and rehabilitate the top bench on the eastern side as soon as practicable.	Annual monitoring of rehabilitation. Annual monitoring of visual impacts with photographic records.

Rehabilitation and Closure	To ensure that premises are closed, decommissioned and rehabilitated in an ecologically sustainable manner, consistent with agreed outcomes and land uses, and without unacceptable liability to the State	All infrastructure, roads, hardstand, non natural materials are to be removed from site progressively when not required and all removed at the end of the project.	No non natural structures will be retained on site. All hardstand and road making materials and non natural inert materials are to be removed or buried. All non inert materials are to be removed from site. All ground once occupied by structures is deep ripped and soils reconstructed.	All disturbances are to be removed or rehabilitated. When practicable, following closure.	Annual monitoring of rehabilitation. Annual monitoring of visual impacts with photographic records.
		All contaminated materials are to be removed from site prior to closure.	No potentially contaminating materials will be retained on site on closure.	No potentially contaminating materials will be retained on site.	Annual monitoring of operations. Internal regular monitoring of all operations. Annual monitoring of impacts with photographic records.
		At the end of excavation the created soils should be deep enough or of sufficient quality to be sustainable to meet the long term end use or ecological values.	Topsoil or overburden suitable for native plant growth will be spread across restored areas, ready for revegetation.	Sufficient substrates suitable for native plant growth are used in site restoration. The soils are to be constructed from overburden overlain by topsoil where available, leaf litter, vegetation fragments as available in areas of native vegetation.	Annual monitoring of rehabilitation.
		Native revegetation is to be compatible with local native vegetation in species and form.	Native revegetation is to be compatible with local native vegetation in species and form.	All species used in rehabilitation are to be local provenance species suited to local loam soils and sloping sites. A plant density that is variable but with an average plant density of 20 plants per 100m ² . Species richness of 5 species per 100 m ² .	At three years. Annual monitoring of rehabilitation.
Community Consultation	To provide a community consultation process commensurate with the size nature and time line of	Community consultation will be handled by community input within the application and assessment phases,	Maintain a line of communication to local residents.	A line of communication is available to local residents.	During operations with public meetings at least once per year.

	the project.	through direct community consultation as required and contact numbers being displayed at the entrance. An "Open Door Policy" is used to enable ongoing dialogue between the operator and the community.			
		An effective complaints procedure is provided, combined with effective remedial procedures.	A complaints procedure is proposed.	Maintain and action a complaints procedure.	As required.
Safety	To ensure that the project provides high levels of safety to on site personnel and the community	Ensure that the project provides high levels of safety to on site personnel.	Quarries operate under a number of safety requirements.	Comply with the Mines Safety and Inspection Act and other relevant legislation. Comply with the Project Management Plan and DMP reporting.	During operations and as required.
Geotechnical Integrity	To ensure that all ground and geological materials is safe commensurate with the operations and final land surface.	The operational and final land surfaces will be made safe and not subject to subsidence, slippage or other adverse conditions.	The operations are designed to comply and operate to the <i>Mines Safety and Inspection Act 1994</i> . Faces and the landform are to comply with DMP Guidelines and be safe and stable for the long term. The land surface is to have a stepped landform with some rocky outcrops and similar to the natural form.	The faces and landform restoration are to be geotechnically safe.	On closure of each section of the face and on completion of earthworks.
		The operational and final surfaces and features are designed be sustainable not significantly impacted by climate change or extreme weather events.	The site is to drain through detention basins No impact from climate change is likely in the pit or to the pit or rehabilitated surface. The site is to be stable under extreme weather conditions.	The landform is constructed to withstand adverse weather and climate events.	On closure of each section of the face and on completion of earthworks.

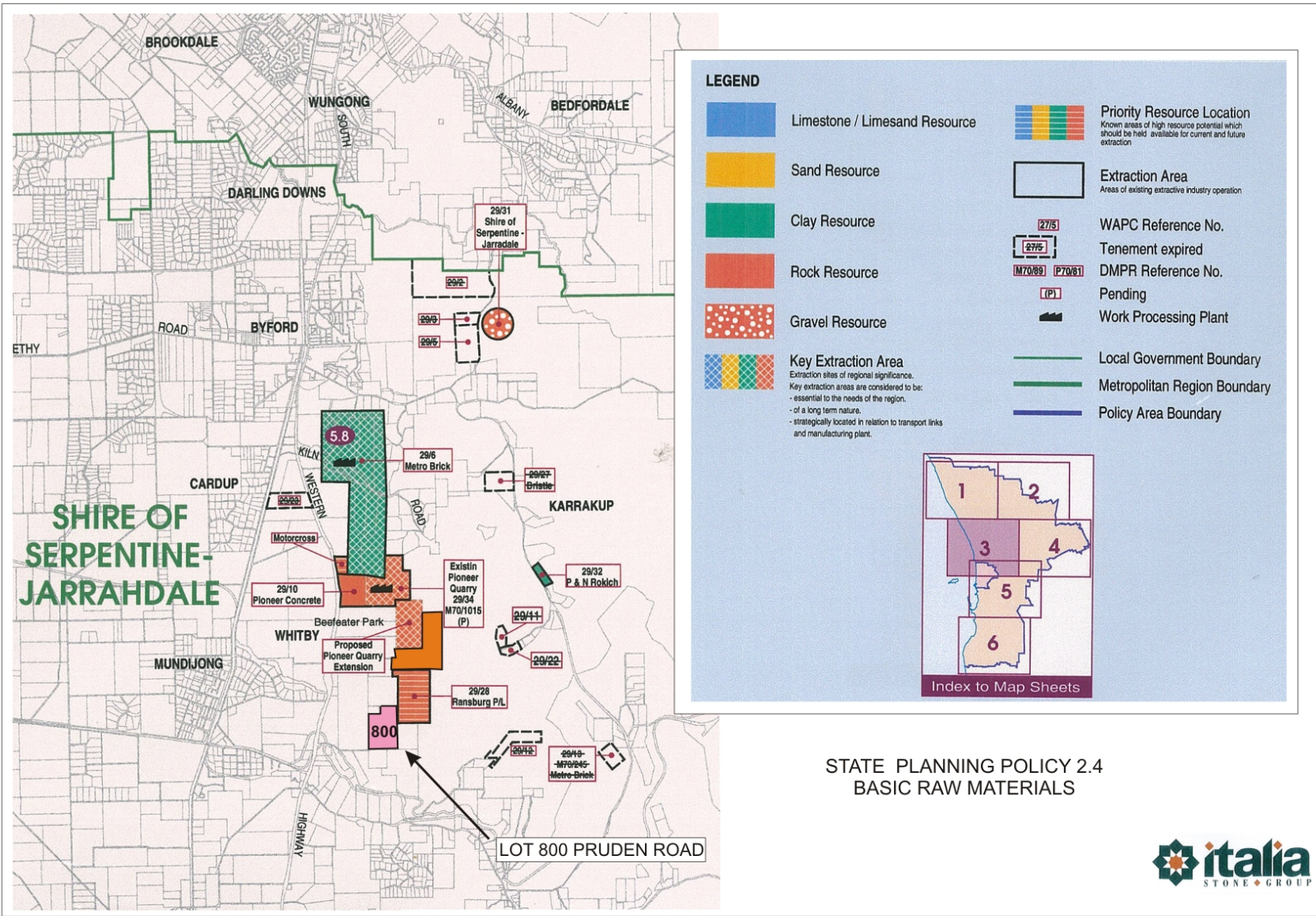


Figure 1 Location



Figure 2 Aerial photograph of the local area

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1.0 BACKGROUND INFORMATION

1.1 Ownership

Lot 800 is owned the proponents.

1.2 Proponent

The proponent is Italia Stone Group.

Contact can be made through;

Manager
Italia Stone Group
55 Miguel Road,
Bibra Lake WA 6163

Phone 9418 1437

Existing Approvals

There are no existing approvals on Lot 800.

1.3 History

Hard rock quarrying has been undertaken on land to the north east for many years, firstly on the Hanson Quarry site and later, by WA Bluemetal.

Lot 800 adjoins and touches the south western corner of the WA Bluemetal site.

Lot 800 was part of Yarrabah property that was subdivided some years ago and sold off as a number of parcels of land.

The hard rock resource on Lot 800 was first identified in the *Basic Raw Materials Policy of the mid 1980's*. This is a site listed "to be considered for hard rock quarrying".

Basic Raw Materials Policy of 1992 identified the site as lying within the buffer of the southern most hard rock quarry area.

In the *Department of Planning and Urban Development, 1993, Darling Range Regional park and Landscape Study* the site is listed as Site Number 29/19

The Geological Survey of WA mapping which identifies Strategically Important Basic Raw Materials recognises the hard rock resources that touch the northern edge of Lot 800 and extends onto the north eastern corner of Lot 800 on the Fremantle – Jarrahdale Sheet Mapsheet. The nomination is the location of the proposed quarry.

In State Planning Policy 2.4 Basic Raw Materials, 2000, the site is adjacent to the Priority Hard Rock Resource number 29/28 which is listed as a Priority Resource but has since been dropped through a land swap. This land, being cleared, does not have the same environmental restrictions.

1.4 Location

Lot 800 lies approximately 950 metres from South Western Highway with the pit approximately 1 300 metres from the highway.

The pit is approximately 3 500 metres east from Mundijong townsite and approximately 1 500 from the Whitby Urban Area.

Lot 800 occupies the upper face of the Darling Scarp, but the valley of Manjedal Brook cuts the Scarp and provides a north facing slope on which the quarry will be located, facing into the ridge to the north and protected to the west.

The design of the pit takes into account the potential for visual impacts and is provided with a narrow north facing throat combined with a western bund to better manage any visual impact.

The quarry location is centred on

408 382 E and 6426 157 N

1.5 Project Objectives

The quarry is proposed to be used by Italia in a relatively limited way to produce rock for coastal work.

The land is not listed by the Geological Survey of WA mapping as a Strategically Important Basic Raw Material because of its small size.

The quarry is granite and is capable of producing large blocks of rock for coastal work which can weigh up to 15 tonnes each and be several metres in size.

The faces will be operated and closed in accordance with Department of Mines and Petroleum; *"Guidelines on Safety Bund walls around Abandoned Open Pits"*, January 1997 and best practice guidelines such as Read and Stacey, 2009, *Guidelines for Open Pit Design*, CSIRO Publishing and Beale and Read, 2013, *Guidelines for Evaluating Water in Pit Slope Stability*, CSIRO Publishing.

The rock will be broken out of the quarry in pieces suitable for coastal construction.

A small amount of rock unsuitable for coastal work will be crushed and processed in campaigns to provide a range of hard rock products.

This is the same method used by Roadstone (Part of the Italia Stone Group) during excavation and rehabilitation of the hard rock quarry in Esperance in 2000 - 2003. The removal of material from the Esperance Pit combined with the reduction in angles of the face and rehabilitation completely transformed the quarry location in Esperance, and the same methods will be used here.

For their efforts on rehabilitation the Port of Esperance/Roadstone Quarries were a joint winner of the Golden Gecko Award for Environmental Excellence and a winner of the State and National Case Earth Awards for best practice and innovation in Environmental Management and civil construction.

1.6 Existing Facilities

The only activities on site are the existing dwelling and an access road.

1.7 Resource Sought

Larger granite rock for coastal construction, sized according to the requirements for coastal developments such as breakwaters, groynes and other coastal protection will be excavated.

Undersize and waste rock will be crushed and used for hard rock products such as minor roadbase and aggregates.

As noted under 1.3 History, the site has been identified as a possible hard rock quarry and continues to be identified.

1.8 Planning Policies and Land Zonings

The application will be referred to the Shire of Serpentine Jarrahdale who will determine the application under the Town Planning Scheme.

Approval will also be required from the Western Australian Planning Commission under the Perth Region Scheme and when those approvals are in place the Shire will issue an Extractive Industry Licence.

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.

With respect to the supply of hard rock, the overarching document is the;

- State Planning Policy 1.0 State Planning Framework.

A number of Regional Policies and Schemes are applicable to this location and may be referred to when advice on planning issues is provided by Government Departments and the Shire of Serpentine - Jarrahdale.

A summary of each of the relevant policies, strategies and schemes is provided below.

1.8.1 State Government Policies and Planning Schemes

STATE PLANNING POLICY 1.0, STATE PLANNING FRAMEWORK POLICY

A number of State Policies have been released under the State Planning Framework Policy.

- *State Planning Policy 2.0, Environment and Natural Resources Policy*
- *State Planning Policy 2.4, Basic Raw Materials*
- *State Planning Policy No 2.5, Agricultural and Rural Land Use Planning,*
- *State Planning Policy No 4.1, State Industrial Buffer Policy,*

These are considered in turn.

- *State Planning Strategy, 1997*

- ***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.

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 managed through the proposed operation of the hard rock quarry considering the constraints of excavating and processing the resource.

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

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).

Currently the Department of Planning and Department of Mines and Petroleum are reviewing and updating the basic raw materials policy over the whole Swan Coastal Plain and near areas and onto the Darling Scarp.

State Planning Policy No 2.4, Basic Raw Materials, makes provision for the extraction of basic raw materials. SPP 2.4. It states in Section 6.3.2 that before determining an application within 1000 metres of a sensitive land use *"the Commission or Local Government must consider the following as appropriate.*

An application may require referral to the Department of Environment Protection,

The significance of the resources in terms of whether it is a key extraction area, priority resource area or extraction area;

The likely effects of vehicular traffic, noise blasting, dust, vibration arising from the extractive industry on the proposed land use or development."

SPP 2.4 goes on to state in Section 6.4.1

Applications for extractive industry operations are to be accompanied by a management plan and report which:

Demonstrates that sensitive land uses within 1 000 m of the proposal will not be adversely affected by the extractive industry operations;

Identifies appropriate buffer distances, being those distances required for extraction that are needed to buffer the impact of operations to adjacent land users.

Provides details of the proposed use, development and management of the site including the environmental and water resource management standards, quarry areas, stockpiles, machinery maintenance areas, processing plants, fuel storage and on site access roads, parking of cars and other vehicles used on the site and proposals for landscaping to screen activity on the site;

Describes arrangements for access to the site, including the roads which it proposes will be the main vehicular access and likely traffic flows; and

Sets out proposals for the progressive and ultimate rehabilitation for its intended use.

All the potential impacts on nearby residences have been considered and addressed within this documentation for the quarry proposal.

- **State Planning Policy No 2.5, Agricultural and Rural Land Use Planning,**

SPP 2.5 Agricultural and Rural land Use Planning predominantly deals with the continued rural use of suitable land and its protection for the future. The policy deals with recognising significant agricultural land, land fragmentation and land use through zonings, and Special Control Areas.

It does not apply to the area covered by the Metropolitan Region Scheme but applies to all planning outside the Perth and Peel Region Scheme Areas and therefore can be used to provide guidance.

Even though the policy mainly relates to planning areas outside the Metropolitan Region Scheme Area, the principles have applicability. A draft new policy has been released which provides for even greater recognition and protection of basic raw materials.

The location is already compromised as an agricultural area because the quarry and transport route is already developed.

However SPP 2.5 is relevant because Section 5 Policy Measures, (5.1)(i)(d) states “*identify and protect key natural resources, including water and its dependent ecosystem, vegetation, minerals and basic raw materials*”.

The Policy Objectives provide for the “*prevention of land and environmental degradation during the extraction of basic raw materials*” (Section 4(4)(d)).

The position is clearly put in Section 5.4.3 Mineral and Basic Raw Material Resource Areas.

- i. *Town Planning schemes should make provisions for the protection of basic raw materials, mineral and energy resources identified in the local planning strategy.*
- ii. *Town planning schemes should include provisions for the extraction of basic raw materials, mineral and energy resources. These provisions should include the development of appropriate local policies and requirements, particularly buffer requirements, that the extraction industries will be subject to: sequential land use proposals; and environmental management activities.*
- iii. *These activities should be regarded as generally acceptable, subject to assessment on their individual merits in rural areas.*

A draft updated policy was released in 2015 that strengthens the need to protect Basic Raw Materials even more than the gazetted policy.

- **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 proposed.

SPP 4.1 discusses the need to buffers both on site and offsite with respect to industry, including extractive industries. It does not however specify any distance for the buffer, but notes that site specific studies should be prepared that will demonstrate that the extractive industry can operate in a manner compatible with nearby sensitive premises.

The State Industrial Policy 4.1 does not specify a set buffer distance, but notes that buffers are to be based on “scientific study” and are flexible. It further specifies the buffers by reference to other documentation such as the Environmental Protection Policies, EPA and DEP standards and DEP Generic Industrial Buffer Guidelines; that is the EPA 1 000 metre generic buffer used in SPP 2.4 and SPP 2.5 that is used in the absence of supporting or scientific studies and information.

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.

The provision of granite hard rock suitable for coastal construction assists with the future development of the port facilities of the Perth Region and other coastal areas.

The resource is strategically located as close as possible to the coast and therefore provides for reduced transport costs, impacts and greenhouse gas emissions.

The environmental management of the quarry has been developed to minimise short and long term impacts on the local community and environment.

- **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.

The Western Australian Planning Commission will issue a separate Planning Consent for this application.

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

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

- ***Perth and Peel @ 3.5 million***

Perth and Peel @ 3.5million, developed by the Western Australian Planning Commission has determined that the Metropolitan Area will grow significantly between 2012 and 2050 by around 650 000 dwellings.

The Outlook also forecasts that there will be many new dwellings south of the Swan River.

The construction of dwellings needs products for roads, in particular locally the Perth – Darwin Highway, in addition to concrete and other construction products.

- ***Perth and Peel @ 3.5 million EPA advice to the Minister for the Environment***

Perth and Peel @ 3.5 million EPA advice to the Minister for the Environment 2015 provides strong support for the need for basic raw materials for the growth of Perth.

- ***Perth and Peel Green Growth Plan for 3.5 million***

Perth and Peel Green Growth Plan 2015, prepared by the Office of Premier Plan D Basic Raw Materials identifies the areas proposed for excavation.

Lot 800 is not identified as a Class of Action within the Green Growth Plan.

However the quarry footprint has been identified to the Green Growth Committee and a request made by Italia Stone Group for the footprint to be included in the Basic Raw Materials Class of Action as a Green Colour.

Geological Survey of Western Australia

The Geological Survey of WA mapping which identifies Strategically Important Basic Raw Materials recognises the hard rock resources that touch the northern edge of Lot 800 but does not extend onto Lot 800 on the Fremantle – Jarrahdale Mapsheet.

A verbal comment from the Geological Survey noted that Lot 800 was not included because DMP did not believe that a large hard rock quarry could be located on the lot.

The Geological Survey did however draw the significant hard rock resource as extending onto the north eastern corner of Lot 800 which is where the pit is proposed to be located.

The proposed hard rock quarry is a small quarry that is designed to have a narrow access throat which is different from most other quarries.

Darling Scarp Range Regional Park and Landscape Study 1993

The *Department of Planning and Urban Development, 1993, Darling Scarp Range Regional Park and Landscape Study* in Section 4.7 Quarrying listed the site as Site 27. The Darling Escarpment Aggregate Resources Committee (DEAR Committee) identified a total of 29 sites of potential hard rock resource. This site is shown as Site 27 and is given the nomination of 29/19.

For various reasons eight sites were identified but only four listed in the Basic Raw Materials Policy of 1992 with the other four requiring additional work to prove their suitability. The proposed pit lies within the buffer of the southern most hard rock quarry area.

The site has therefore been earmarked and identified as a potential quarry site for many years.

Basic Raw Materials Policy of 1992

The site is listed in the Basic Raw Materials Policy of 1992 as lying within the buffer of the southern-most hard rock quarry area.

In the Basic Raw Materials Policy of the mid 1980's this site is listed to be considered for hard rock quarrying.

1.8.2 Local Government Policies and Planning Schemes

- Shire of Serpentine Jarrahdale Town Planning Scheme 2 lists the zoning of Lot 800 as "Rural".

"Industry Extractive" is an AA use in the Rural Zone which means that Council, at its discretion, may permit the use of an extractive industry.

The intent and purpose of the Rural Zone is to "allocate land and to accommodate the full range of rural pursuits and associated activities. Quarrying is not a rural pursuit in name but is increasingly being considered as such in planning policies such as the draft SPP 2.5.

The Shire of Serpentine – Jarrahdale has a number of policies that are relevant;

Local Planning Policy No 67 – Landscape and Vegetation

The proposed quarry has been designed to comply with this policy where possible. The Policy Objectives have been considered and incorporated into the proposal.

Local Planning Policy No 68 – Sustainability Assessment

The principles and objectives of sustainability have been incorporated into the quarry operations. The opening of the quarry is related to sustainability of the Perth Metropolitan Area with respect to the sourcing of basic raw materials.

Even so sustainability has been incorporated into the proposal by way of reducing the footprints and impacts.

The Shire has an Extractive Industry Local Law.

Even though Planning Consent will be provided by the Shire, the Shire normally also provides an Extractive Industry Licence prior to commencement.

The proposed quarry is designed to be compliant with the Local Law.

2.0 EXISTING ENVIRONMENT

2.1 Regional Setting

The site lies on the western side of the Yilgarn Plateau just back from the edge of the Darling Scarp, but protected by a spur running north south. The location of the pit and operations has been selected to be located behind a small spur which will be raised in elevation by the formation of bunding and dense tree planting.

The Darling Scarp plateau at this point consists of portion of dissected Darling Scarp drained by Manjedal Brook to the north, which drains to the Swan Coastal Plain.

2.2 Geology – Geomorphology

The quarry is located on the brow of the Darling Scarp, rising from 105 metres at the western edge of Lot 800 to over 225 metres on the eastern side of Lot 800. The pit and processing area face north into the hill occupied by the WA BLuemetall hard rock quarry.

The rock of the quarry forms the western edge of the Western Gneiss Terrane just east from the Darling Fault, which separates the older eastern hard rock from the deep sediments of the Perth Basin. The younger Proterozoic aged Cardup Group of sediments occur just west of the pit but do not outcrop. These are steeply dipping shales and sandstones that dip west.

A small west trending fault is interpreted to cut the Scarp at this point and has resulted in the development of the small valley along which Manjedal Brook runs. The fault appears to have slightly shifted the rock sequences west, north of the fault.

Another fracture or structure appears to run north along the western side of the proposed pit, where the rock appears softer and more weathered. This rock is proposed to be cut out to form the flat processing area and bunding, providing for an easier commencement.

The geology can be seen in Western Australian Geological Survey mapping, for example the 1 : 50 000 Perth and Environs Mapping Serpentine Sheet.

The pit is wholly located within the Gneiss Terrane. The rock in the pit is felsic to intermediate gneisses which have been intruded by multiple veins and dykes of granites and minor diorite/dolerite dykes.

Above this is a shallow soil profile capped by laterite gravel and duricrust to the east in State Forest outside Lot 800.

Additional notes on the geotechnical aspects of the rock, operations and closure are shown in Attachment 1.

2.3 Description of the Resource

Felsic to intermediate gneisses and diorite/dolerite dykes provide the hard rock resource.

The diorite/dolerite dykes are relatively small and it is not normally economical to extract that material separately. They can make hard rock products of different characteristics when economically extracted.

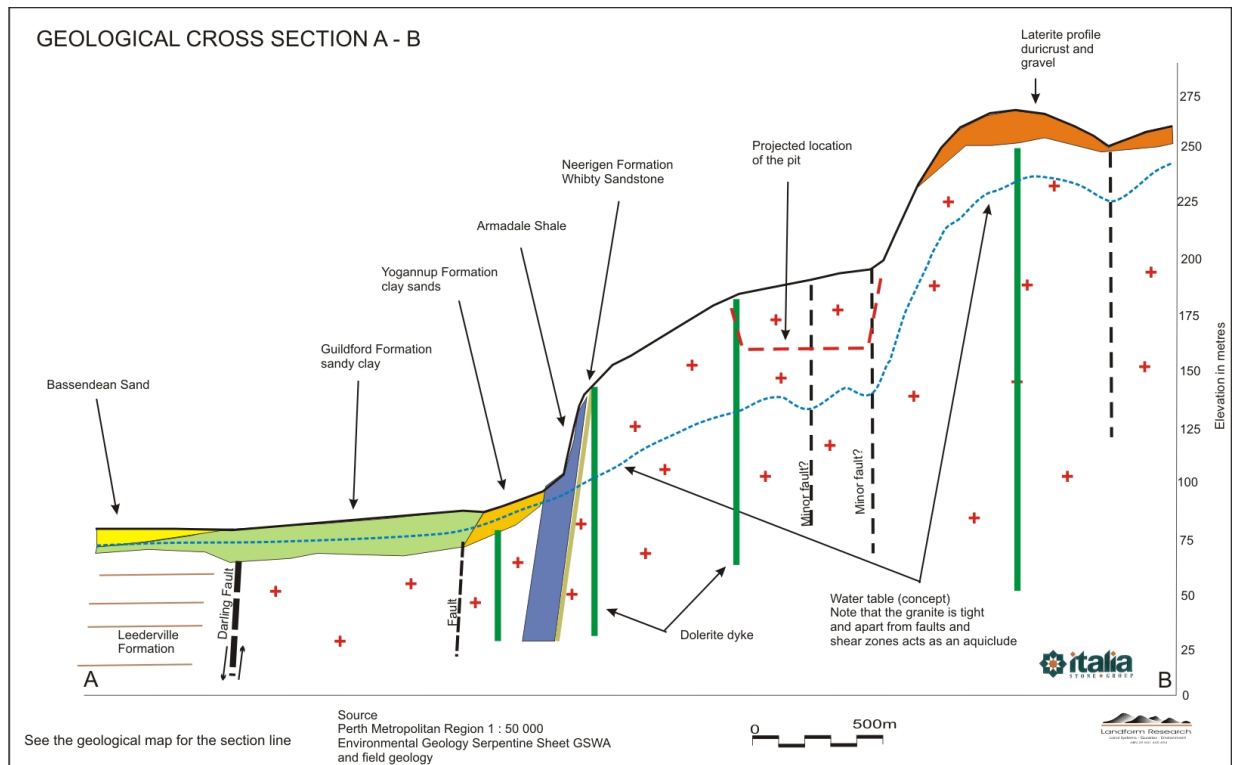


Figure 3 Section

The hard rock varies from very fractured, and in localised places sheared rock, through to areas where there are less joints and the rock is more massive. The resource continues to depth and is only limited by the design of the quarry and the width that can be achieved within the constraints of the land holding.

The resource must be removed by blasting which is designed to suit the level of natural fracturing.



Figure 4 Granite resource outcropping

2.4 Visual Landscape

The operation is located just back from the brow of the Darling Scarp protected by a north south spur along the western side of the proposed pit.

An analysis of the visual impact is considered in the attached Offsite Impacts Management Plan and demonstrates that the operations are unlikely to be able to be visible from South Western Highway because of the landform, design of the pit and trees along South Western Highway.

It is possible that the rear face of the pit may be visible in the early stages of excavation from a point to the north west on South Western Highway and from a further distance on the Swan Coastal Plain, however analysis suggests that this will be temporary until the top benches are rehabilitated.

The visual management is therefore similar to that used for other hard rock quarries on the Darling Scarp although the visual impacts are assessed to be less than some other quarries.

There are several dwellings at a distance to the south, but these are visually protected by the design of the quarry. Similarly the sensitive premises to the north west is protected by the design of the pit and the proposed screening bund.

It is proposed to rehabilitate the top face as soon as practicable to reduce the visual impacts.

WAPC 2007, *Visual Landscape Planning in Western Australia* has been viewed and the project considered against that document. The relevant section is Part Three, pages 144 to 152 of the Guideline and the site has been assessed against the Guideline in the attached Visual Impact Management Plan Attachment 4.

2.5 Soils and Soil profiles

The soils overlying the weathered granite with some dolerite are generally thin brown loam soils over light coloured and mottled local clay and clay subsoils.

There is no evidence of soil salinity and none would be expected on this site with high winter rainfall and drainage.

The soils are deeper on the dolerite dyke and this is to be used to open the quarry and gain material to construct the processing and stockpile area, by providing the access cut to form the relatively flat hard stand for processing and stockpiling.

The soils and overburden from the remainder of the site will be stripped off to form the 4 metre western bund and the processing and stockpile area.

Material from the two 5 000 kL dams will be used to form the dam walls and additional hardstand area.

King PD and MR Wells 1990, Darling Range Rural Land Capability Study, Western Australian Department of Agriculture Land Resources Series No 3 listed the quarry site as Ma2, "*Gentle to moderately inclined lower side slopes*". Other parts of Lot 800 are shown as DS1, Ma1 and Mm1.

The field examination of the site shows the site should actually be classified as Ma1 "*Moderately steep to steep valley side slopes and narrow incised valley floors*".

Acid Sulfate Conditions

Acid Sulfate Soils can potentially form under reducing conditions when there is a source of carbon and a source of sulfur (normally from sea or saline water). Micro-organisms are thought to play an important role in reducing the sulfates within the sediments to form the iron sulfide. It is a natural phenomena, that can be exacerbated by disturbance.

Potential acid sulfate conditions most commonly form under current or past estuarine conditions, peaty conditions, and may also result from weathering of some geological formations and situations which contain sulfides.

Overall, at risk areas are geologically a minor occurrence, but in some situations can be important, and lead to acidic polluting conditions developing.

Acid conditions can form if soils containing pyrite are exposed to the air, allowing sulfuric acid to be formed. The soils most at risk are normally saline/estuarine soils, gley soils, peat and some organoferricretes.

There has been an increased interest in acid sulfate soils since the release of WAPC Planning Bulletin 64. WAPC conducted mapping of mainly coastal parts of south western, Western Australia. Lot 800 lies outside the WAPC mapping.

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.

Acid Sulfate Soils can potentially form under reducing conditions when there is a source of carbon and a source of sulfur (normally from sea or saline water). Micro-organisms are thought to play an important role in reducing the sulfates within the sediments to form the iron sulfide. It is a natural phenomena, that can be exacerbated by disturbance.

Potential acid sulfate conditions most commonly form under reducing conditions, under current or past estuarine conditions, peaty conditions, some organoferricretes, and may also result from weathering of some geological formations and situations which contain sulfides. Carbon is normally required and a lack of oxygen is always required to create the reducing conditions.

Materials at risk under reducing conditions are normally grey in colour or have been grey with no brown or red brown iron oxides. Where exposed to the atmosphere there is a change to brown iron oxides, with yellow jarosite and other alteration minerals that are distinctive.

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 several occasions, lastly in 2015 and 2016.

The site is elevated and the soils oxidised with no evidence of reducing conditions or other risk factors and none would be expected in this geological environment.

The main risk will come from the potential for sulfides to be present in the hard rock. Sulfides weather to very characteristic stainings and bodies such as gossans. No evidence of sulfides or their weathered products are found in the surface rocks or the existing earlier excavations. The presence of sulfides can negatively impact on hard rock aggregates so such rocks are not used.

No peat or organic matter is intersected in the pit, or is present in the faces or floor.

Therefore the risk of acid sulfate conditions is minimal to nil and would only occur if significant sulfides were exposed during excavations. That situation does not occur in other hard rock quarries, cuttings and other such rocks in the south west. Such situations only occur in mines where the sulfides form extractable ores for base or other metals.

2.4 Climate

Climate is a typically Mediterranean climate with hot dry Summers and cool wet Winters.

Rain falls mainly in Winter with 80% falling in the five months May to September inclusive. Mean annual rainfall at Whitby Falls is 975 mm. Evaporation exceeds rainfall in all but the four wettest months May to August.

In Summer the prevailing winds are easterly in the morning and south westerly in the afternoon. In Winter the dominant wind direction is less distinct. Of particular significance are the strong katabatic easterly air flows occurring on summer mornings which can add additional dust management issues.

Temperature inversions can occur on still winter mornings and may influence the distance noise is transmitted. Data from Perth Airport shows that 90% of inversions are broken up by solar heating alone by 12.30 pm, and 100% by 2.00 pm.

Of local significance are the katabatic winds that blow from the Scarp on summer mornings. At Kelmscott the katabatic winds blow from midnight to midday, with the strongest winds between 4.00 and 6.00 am. Katabatic winds are strong and are commonly over 20 kph but can exceed 50 kph at Guildford (Mitchell 1979). Similar winds can be expected at Byford - Whitby, based on local experience.

Accordingly the study area is characterised by hot dry summers with strong easterly winds in summer.

The perimeter bunds and vegetation provide effective wind breaks and wind screening. Winds crossing the site are slowed by the perimeter tree and shrub vegetation. 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.

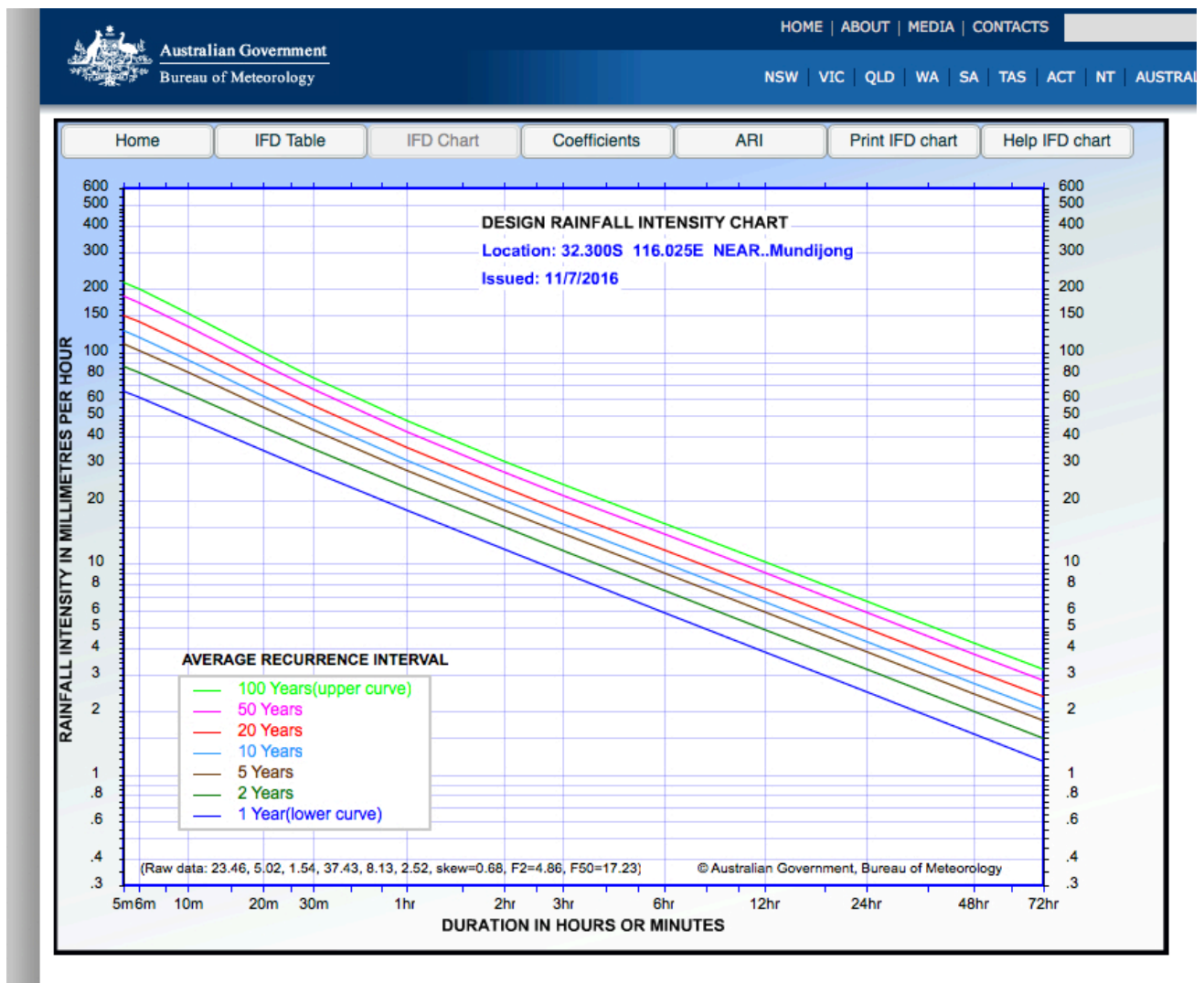


Figure 5 Rainfall Intensity Chart

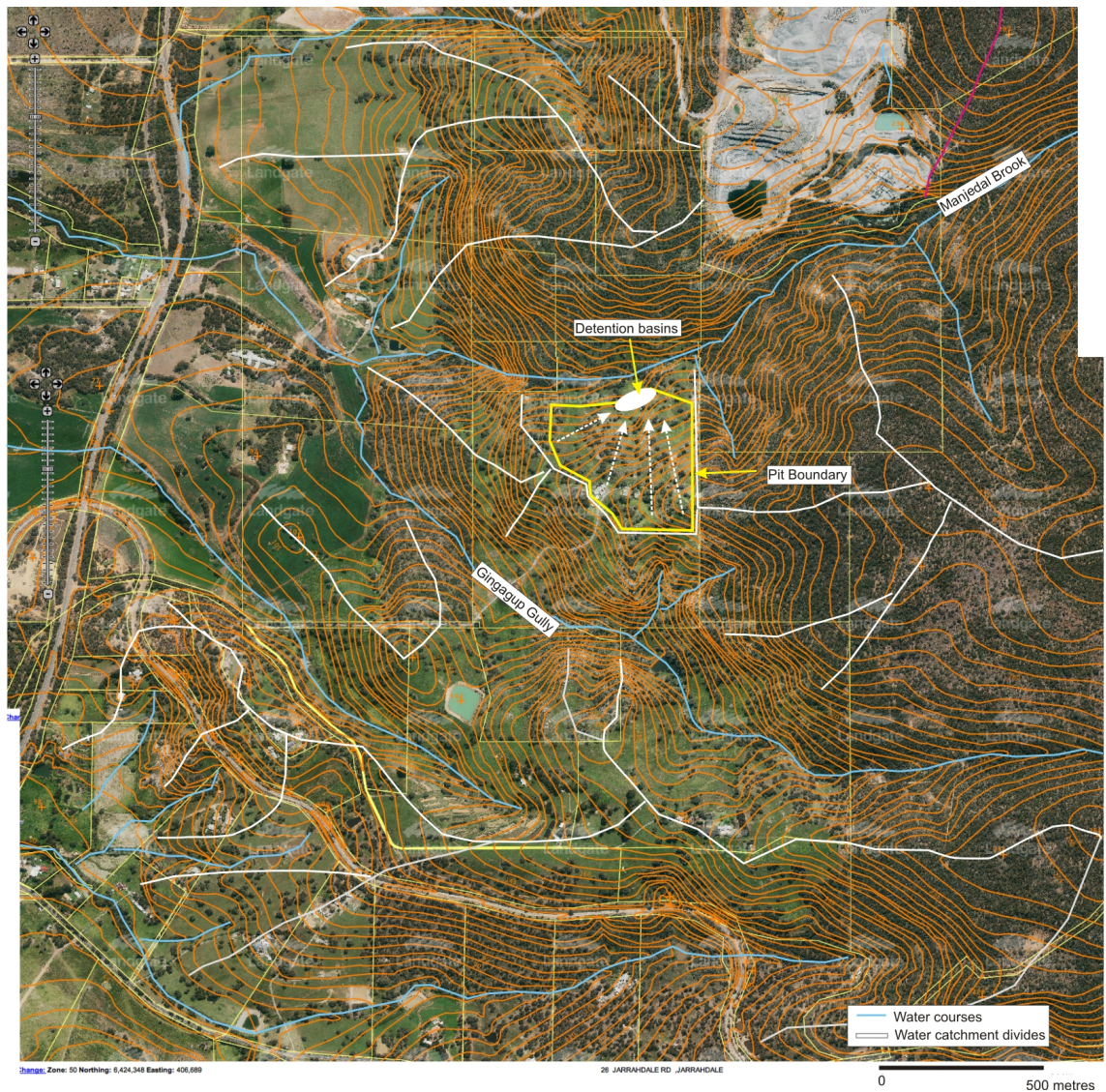


Figure 6 Location and Contour Plan

2.5 Hydrology

See the attached Water Management Plan Attachment 2

Surface Water

The pit lies on the southern valley side of Manjedal Brook that drains west to the Swan Coastal Plain.

A 50 metre setback from Manjedal Brook is proposed in line with other Hard Rock Quarries on the Darling Scarp. There is no apparent impact on the Brook from the past excavation and the disturbances are already in place from historical excavation.

Other hard rock quarries have been excavated near watercourses with no impacts on the water quality through the use of detention basins, bunding and water management. Hanson Red Hill Quarry sits near Susannah Brook and has been approved with a 50 metre setback to the Brook, although the pit does not approach as close as that.

A small area of rocky rapids and waterfall lies to the west outside Lot 800. That feature will not be impacted with water from the proposed quarry and processing area being retained in two large detention basins with a total capacity of 20 000 kL combined with a third sediment settlement basin, to provide final water management and sampling and release points.

The release point to Manjedal Brook is 300 metres upstream from the rapids – waterfall. There will be no additional placement of materials closer to the Brook than currently exists.

The fringing and riparian vegetation along Manjedal Brook is in reasonable condition and will be retained. The 50 metre buffer to the Brook will be replanted and re-established to local riparian and forest species matching habitat to species choice, to re-form the original community types.

Manjedal Brook peters out west of South Western Highway on the Swan Coastal Plain where the water infiltrates into the sediments of the plain.

A small tributary of Manjedal Brook crosses the south western corner of Lot 800, where it has been dammed by a farm dam.

Boral Orange Grove Pit has a creek to the north which is also provided with a setback of 50 metres. A drainage line runs through the approved pit and stockpile areas and drains to a constructed detention basin before release of excess water downstream.

WA Bluemetal Quarry at Whitby also lies near a significant watercourse. Water collects in the pit and processing area, is directed to three detention basins with the overflow directed to Manjedal Brook. A setback of approximately 100 metres is applied to Manjedal Brook from WA Bluemetal operations.

The proposed pit complies with the setbacks used for other hard rock quarries.

There are no water courses that will be impacted on by the pit or proposed processing area.

Hard rock is tight and has some fractures. The elevation of the proposed pit is well above creek elevation so the water table will not be intersected. There may be some minor perched or trapped water occurring in fractures of the hard rock.

Groundwater

Groundwater is deep below the proposed pit. The basement granite is tight and there is no evidence of seepages on the quarry site or in that location towards Manjedal Brook.

Like the other hard rock quarries on the Darling Scarp, when opened the tight rock prevents drainage and seepage inflow leaving the pits dry.

The water table will be at the elevation of Manjedal Brook as is normal for creeklines of this nature, that is at an elevation of 140 – 150 metres AHD. Some hard rock quarries on the Darling Scarp are excavated below (Hanson Red Hill) or well below (Boral Maddington) the existing nearby creek lines without evidence of groundwater seepage or inflow.

The base of the proposed operations is proposed to be 155 metres AHD.

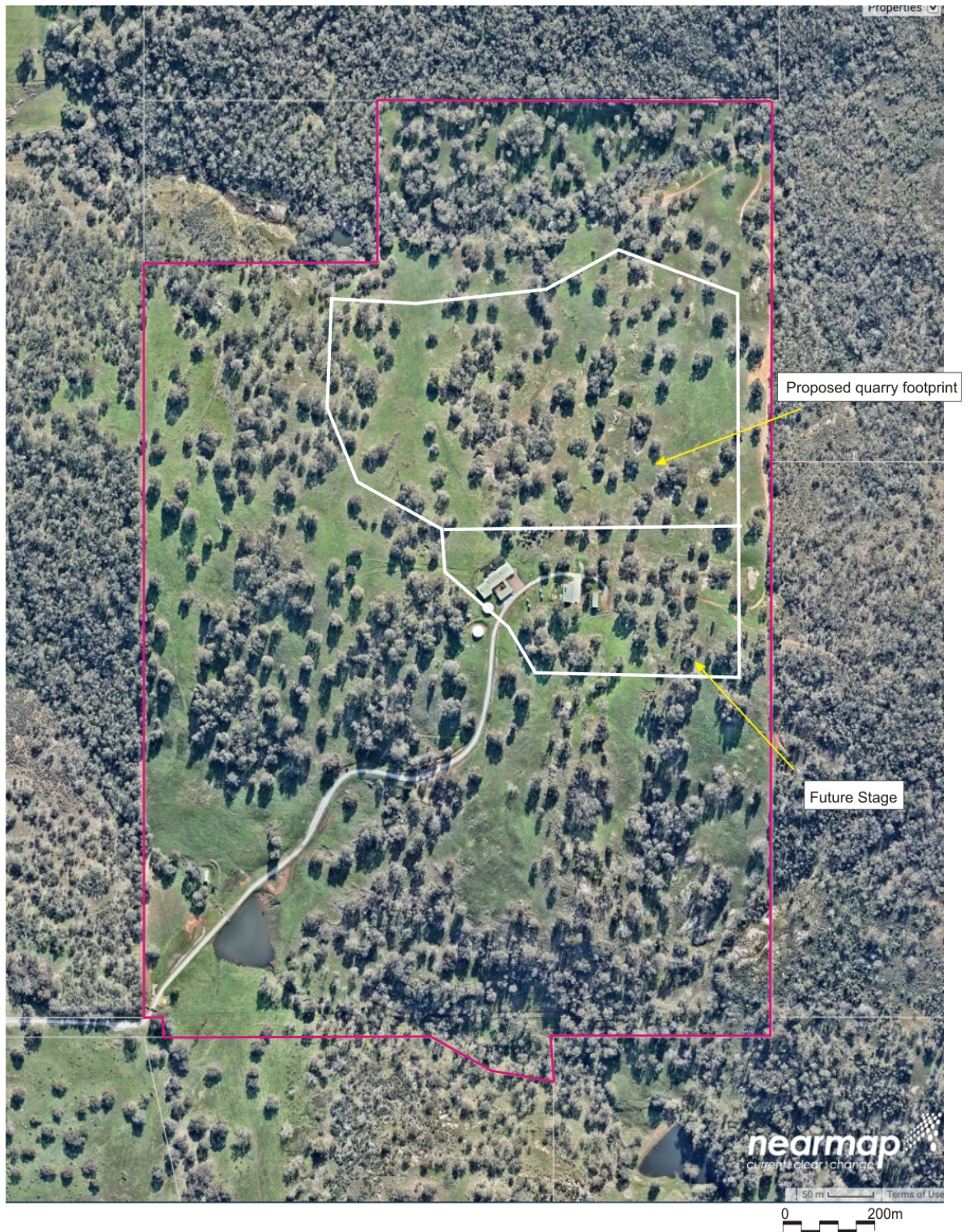


Figure 7 Aerial photograph

2.6 Biodiversity

Biodiversity is considered in the Biodiversity Management Rehabilitation and Closure Plan appended as Attachment 6

2.6.1 Flora

Community Types

The original vegetation type is not possible to determine but was either a Marri Forest or Jarrah Marri Forest. No Jarrah trees are now present.



Figure 8 Typical existing vegetation cover

Vegetation on Site

- ***Lot 800 – Disturbance Footprint***

The vegetation is pasture that is used for cattle grazing with several Marri (*Corymbia/Eucalyptus calophylla*) trees.

Scattered *Eucalyptus rudis* occur along the lower slopes and along Manjedal Brook, although currently there is no riparian vegetation associated with the Brook at this location.

There is no understorey. The only understorey taxa observed was a few plants of *Cheilanthes austrotenuifolia* growing in cracks in the granite outcrops.

The pasture consists of common introduced agricultural pasture species.

Scattered Cotton Bush occur on site but are currently kept in check by the cattle grazing.

- **Pruden Road Access**

The section of Pruden Road that may require clearing was assessed by Lindsay Stephens of Landform Research on 11 August 2016.

The access along Pruden Road consists of scattered Marri (*Corymbia/Eucalyptus calophylla*) trees in all but the western end of the road access.

The western portion of the road access crosses vegetation associated with Yogannup Sands.

The road verge vegetation on the Yogannup Sands was assessed and a species list provided below. It appears that there may have been some rehabilitation or tree planting along that portion of the access based on the species present, such as two small trees of *Eucalyptus accedens*.

FAMILY	GENUS - SPECIES	Western end of Pruden Road Between the old rail line and South Western Highway
Cyperaceae	<i>Mesomelaena tetragona</i>	x
Euphorbiaceae	<i>Phyllanthus calycinus</i>	x
Fabaceae	<i>Acacia pulchella</i>	x
	<i>Acacia saligna</i>	x
	<i>Acacia urophylla</i>	x
Haemodoraceae	<i>Haemodorum sp</i>	x
Hemerocallidaceae	<i>Dianella revoluta var divaricata</i>	x
Myrtaceae	<i>Eucalyptus accedens</i>	x
	<i>Eucalyptus (Corymbia) calophylla</i>	x
	<i>Hypocalymma robustum</i>	x
Proteaceae	<i>Banksia grandis</i>	x
	<i>Hakea cristata</i>	x
	<i>Hakea lissocarpha</i>	x
	<i>Jacksonia sternbergiana</i>	x
Zamiaceae	<i>Macrozamia fraseri</i>	x
TOTAL NATIVE SPECIES		15

The number of species is very restricted, indicating how degraded the road verge of Pruden Road is. The remainder of the species are exotic and include the invasive Love Grass.

The structure of the vegetation, where it occurs on the pit and processing site, is summarised in the table below.

VEGETATION STRUCTURE	HEIGHT	MARRI PARKLAND PASTURE
Overstorey	> 4 m	Degraded to Good
Tall Shrub layer	2 – 4 m	Absent
Lower Shrub Layer	0.5 – 2 m	Absent
Ground Cover	<0.5 m	Absent

		Dominated by pasture and exotic species.
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Significant Vegetation

No Declared Threatened, Priority Species, Significant flora or vegetation communities were identified during the site inspections.

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

Vegetation on site will be providing some habitats for birds and other small fauna, but the absence of any understorey will restrict the number of fauna species.

Vegetation Representation

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

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

The vegetation on site is classified as parkland pasture and therefore does not have applicability with respect to vegetation representation.

The vegetation does have value from an aesthetic perspective and as an interface between the State Forest to the east and being located on the Darling Scarp.

The quarry will lead to the clearing of the parkland pasture gradually over a period of many years.

This will be offset by the planting of the upper portion of the eastern face as soon as practicable during excavation and the reinstatement of the riparian vegetation along Mandjedal Brook.

2.6.2 Fauna

Macrofauna

The reduced vegetation, with a predominance of pasture, will result in a reduction in the number of fauna. The shrubs and trees will be providing some habitat.

Whilst no specific fauna study has been conducted, the native vegetation and the fauna associated with that vegetation have been considered. Native fauna will be living in or using the Marri Trees and other vegetation.

The amount of fauna is anticipated to be limited because of past continuous grazing on site. The return of the disturbed areas to local native vegetation will compensate for the small amount of clearing to be required to make the pit safe and lay back the face for rehabilitation.

See the quarry restoration conducted by Roadstone (part of the Italia Stone Group) conducted in restoration of the Esperance Port Quarry contained under visual management in the Offsite Impacts Management Plan.

The main fauna to be considered will be the potential for a family of possums and feeding habitat for Black Cockatoos, mainly Carnaby's in this location. Fauna will be assessed by the Department of Environment Regulation as part of the Clearing Permit Application.

Short Range Endemics

The widespread scarp landform of which this site forms a part is continuous and significantly disturbed by conversion to pasture and retention to Jarrah Marri Forest.

Two hard rock quarries are located nearby, Hanson Byford Quarry and WA Bluemetal Whitby Quarry.

The proposed quarry has the advantage in that it is located wholly on pasture – parkland pasture that is classified as Completely Degraded under Bush Forever Vegetation Condition whilst the other nearby quarries are located on Jarrah – Marri Forest that is required to be cleared.



Figure 9 Manjedal Brook

2.6.3 Wetlands and Riparian Communities

Some frogs and other wetland species will be present associated with the drainage line of Manjedal Brook, although currently there is no riparian vegetation. The pasture goes to the edge of the Brook.

The Brook will be protected by buffers and setbacks of 50 metres that are already in place and are the same as used on other hard rock quarries on the Darling Scarp.

A small area of rocky rapids and waterfall lies to the west outside Lot 800. That feature will not be impacted with water from the proposed quarry and processing area, being retained in two large detention basins with a total capacity of 10 000 kL combined with a third sediment settlement basin, to provide final water management and sampling and release points.

The release point to Manjedal Brook is 300 metres upstream from the rapids – waterfall. There will be no additional placement of materials closer to the Brook than currently exists.

The fringing and riparian vegetation along Manjedal Brook is in reasonable condition and will be retained. The 50 metre buffer to the Brook will be replanted and re-established to local riparian and forest species matching habitat to species choice, to re-form the original community types.



Figure 10 Typical small scale quarry of a similar size and equipment

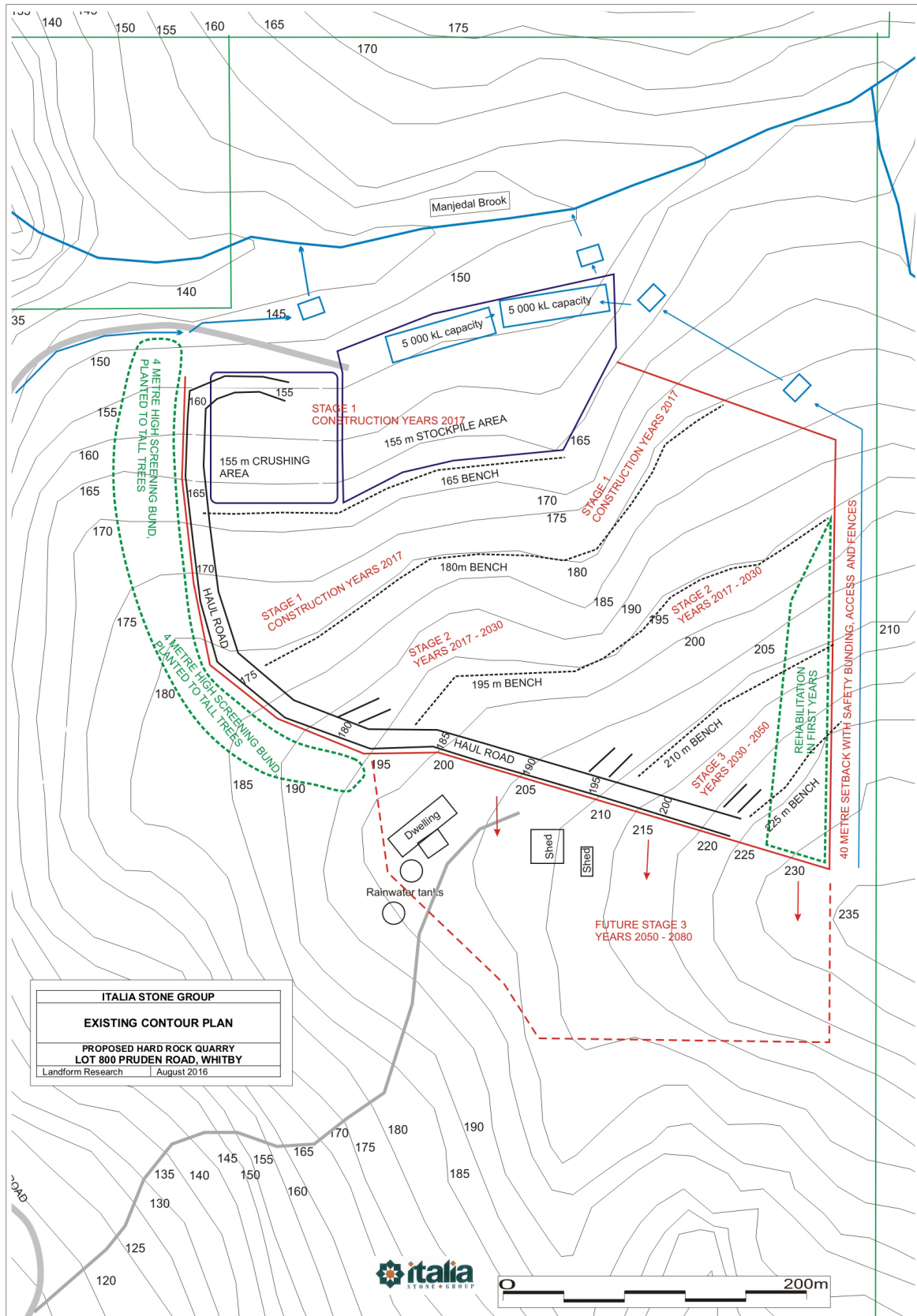


Figure 11 Plan of Operations

3.0 PROJECT DESCRIPTION

3.1 Site Layout

See the plan following.

3.2 Existing Facilities

The only activities on site are the dwelling with its associated sheds and tanks.

Proposed facilities

As the quarry will be operated in campaigns it is anticipated that there will be no permanent plant on site, but rather mobile and transportable plant will be brought to site as required as described in Section 3.2.7 Support Facilities.

3.3 Disturbance Table

Project Summary

ASPECT	CURRENT DISTURBANCE	DISTURBANCE
Area of excavation	Nil	7.0 hectares pit and 4.0 hectares of processing and stockpiles year 2017 – 2040 Potential final pit and size 12.0 hectares at 2080.
Processing Infrastructure. Product stockpiles, laydown and related areas	Nil	4.0 hectares
Roads, dams and related infrastructure etc	Nil	2.5 hectares
Revegetation	Nil	3.0 hectares at 20 years
Hard Rock extraction	Nil	50 000 – 100 000 tonnes per year, initially, potentially rising to 200 000 tonnes at 5 years.
Estimated reserve		3 million cubic metres based on the concept quarry plan.
Life of project		60 years
Dewatering requirements		Nil
Depth of excavations	Nil	60 metres

3.4 Mining Operations

3.4.1 Supervision

All mining will be carried out in accordance within any Conditions, Commitments and Mines Safety and Inspection Requirements.

A Mine Manager will be appointed by Italia Stone Group from their staff and registered under the Safety Division of the Department of Mines and Petroleum as required under the Mines Safety and Inspection Act 1994.

A Project Management Plan will be prepared following approvals for the proposed operations.

Much of the material prepared in this documentation will form apart of the Project Management Plan.

The quarry will be registered under the DMP Safety Regulation System.

Italia Stone Group General Manager, will be responsible for all operations.

During excavation the Quarry Manager will be located at Bibra lake and on site, visiting the site daily as a minimum to provide the required supervision.

3.4.2 Excavation Methods

The methods of extraction will be the same as any hard rock quarry on the Darling Scarp. The main difference will be that the proposed pit will be largely for coastal rock and other construction stone and will therefore produce lower volumes of rock and larger sized rock.

This will mean less crushing than some other pits.

Production is anticipated to be 50 000 – 100 000 tonnes per year initially, rising to 200 000 tonnes at 5 years.

Other hard rock quarries on the Darling Scarp (Boral and Hanson Red Hill) are licensed for an annual production of 2 million tonnes.

Hanson Byford Quarry is licensed for an annual production of up to 700 000 tonnes.

Selection of the pit footprint

Prior to construction, as part of the Works Approval Process, the site will be surveyed to 1 metre contours to inform the design of the facilities.

The quarry is located on a north facing slope on the southern side of the Manjedal Brook, facing along the Scarp, rather than west to the Swan Coastal Plain.

The location has been chosen to minimise or mitigate the visual impacts from the Swan Coastal Plain and sensitive premises. A visual analysis shows that the site is not visible from South Western Highway because of the extensive tree growth along the road verge of the highway.

The only location where the top of the upper eastern slope of the pit footprint will be visible through two small windows where Manjedal Brook crosses South Western Highway. These two small windows are so small in a 110 kph zone that it is doubtful anyone would be able to see the top of the eastern face of the pit. The visible section will be rehabilitated at the earliest opportunity during construction and operation. See Attachment 3, Visual Management.

The pit is located behind a low spur which forms the western boundary and can be added to with bunding, and behind existing trees.

The access road is chosen to provide suitable gradient as well as being located behind existing trees on site.

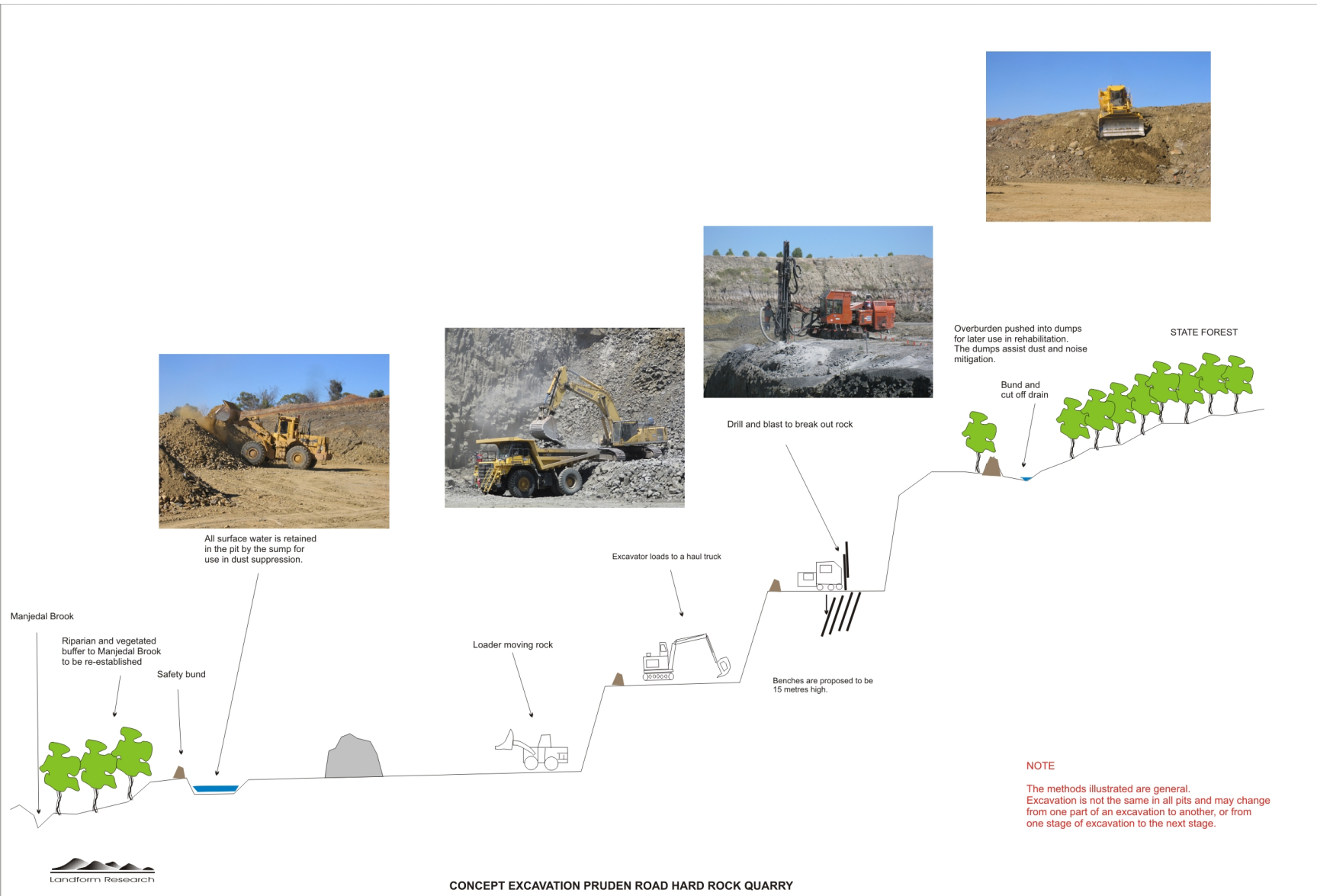


Figure 12 Concept and sketch section

The pit footprint has also been chosen behind the break of slope of a spur along the west of the site to provide visual and noise screening.

In addition a bund 4 metres high is proposed to be located along the western side of the pit with the pit cut deep behind the spur and screening bund.

This is the same design and management used at other hard rock quarries along the Darling Scarp.

The direction of excavation and staging is then selected to provide maximum screening for noise visual, dust and all other potential environmental risks.

The commencement point of the pit is selected as the weathered dolerite which will provide for the initial formation of the processing and stockpile area and screening bunds by providing more overburden and topsoil in the initial stages of the operations, during the construction phase.

Preparation of the pit

As noted above the pit has been carefully selected to minimise construction and operational impacts, in addition to providing the material required to progress the construction quickly with less blasting.

The best time to complete the construction earthworks will be during summer when the soils are still moist and the incidence of rain is reduced.

Initially the hardstand area will be formed to provide the stockpile and processing area, together with the haul road to access the top of the pit.

The water management basins will be formed at the commencement to protect Manjedal Brook from any sediment impacts during construction. Interim protection of Manjedal Brook will be used during construction to prevent sediment washing from the construction in the event of rainfall. See the attached Water Management Plan

The topsoil will be pushed from the pit footprint and stored separately. The overburden will then be pushed off to form the screening bunds and hardstand.

Once the hardstand area is formed the haul road will be formed to gain rock from the eastern top portion of the pit to enable rehabilitation of the top benches of the eastern face at the earliest opportunity.

1. The eastern side of the top bench is more potentially visible.
2. For other areas where the rock is to be exposed topsoil will be stripped from the area under development and where possible spread directly onto an area to be rehabilitated, or stored in a separate dump for later use. This is normally undertaken during drier months where possible to minimise soil and overburden sticking to mobile plant. The topsoil will be used to provide a substrate for rehabilitation.
3. Topsoil is relatively thin and in the order of 100 mm.
4. Overburden will then be stripped and used to form the screening bunds and hardstand operational areas along the south and east.
5. All constructed hardstand and bunds will have a core of hard rock to provide for stability. They will be set onto solid rock in situations where no underground water movements are possible that might destabilise the feature.

6. The features will be checked by geotechnical consultants once the ground has been prepared for the construction of the feature and prior to construction to ensure that potential under feature drainage issues are managed.
7. Construction of the hardstand, screening bund and haul road will use a core of hard rock, to the specifications and supervision of geotechnical consultants from the weathered materials and subsoils.
8. The subsoils across the pit and operational area will be included in the overburden as well as the substandard rock, as the pit is opened to expose the fresh hard rock. The subsoils vary from 1 – 5 metres. Weathered and subgrade rock varies from 1 to 3 metres in thickness.
9. A one metre high perimeter bund will be formed for safety purposes around the edge of the formed flat hardstand operational areas, and haul road.
10. The floor of all disturbed and operational area will be sloped to direct surface water to a collection area with associated detention basins.
11. The construction work will be completed using a bulldozer, excavator and loaders to extract and move overburden.
12. Some substandard rock is likely to have to be blasted to enable it to be moved to create an operational face of ten metres high.

Hard Rock Excavation and Design

The following development of the pit is conceptual as changes may need to be made when the pit is opened because of changes and patterns to the quality of the rock. These design changes will be completed using the expertise and advice of consulting mine planners and geotechnical engineers.

All operations on a quarry fall under the requirements of the *Mines Safety and Inspection Act 1994*, which determines the nature of the excavation, operations, faces, vehicles and all operational procedures. All designs and operations will comply with the Act.

A Registered Quarry Manager must be either on site or within easy reach of site and all work is under the supervision of that manager. The operations will be registered under the SRS safety system of the Department of Mines and Petroleum.

Like all operating mines and quarries, officers from the Department of Mines and Petroleum will inspect the site regularly to ensure compliance with the *Mines Safety and Inspection Act 1994*. The design of the pit is summarised below. The figures attached to the main report should be consulted in relation to the location and design of the pit.

Herring Storer Acoustics have been commissioned to provide advice on Noise impacts of the quarry and transport operations and have found that the quarry can comply with the Noise Regulations. See Attachment 3.

1. The pit will be operated with a series of north facing faces with benches 15 metre high. This configuration has been selected based on the rock type, configuration of the pit and landform.
2. The height of the benches will depend on the mobile plant used and is likely to eventually go to three x 15 metre benches at 165 m AHD, 180 metres AHD and 195 metres AHD. A small temporary top bench of 210 metres will be used to form the top of the eastern face and allow for its early rehabilitation.
3. The hardstand and processing area and sediment settlement basins will be located at 155 metres AHD.
4. The western perimeter screening bund will be 4 metres high.
5. The existing higher benches will be reformed to the benches described above.
6. The exact elevations will be determined from the survey plan.
7. A haul road will be formed to each bench and to the processing area/stockpile area, which will be relatively small for producing coastal armour rock but will need to be large enough to form the necessary stockpiles.
8. When limited crushing and screening is used to removed waste and undersize material the processing areas may need to be slightly larger.
9. Small bunds will be constructed on the tops of the faces at the edges of benches to prevent surface water run off into the pit and for safety in compliance with best practice. See Appendix 5, Quarry Design.
10. Blast holes will be drilled by a percussion drill fitted with dust extractor and collector systems.

11. The amount of drilling will depend on the frequency of blasts and can vary depending on the nature of the rock to be removed, and operational considerations for safety, product requirements and potential blast impacts.
12. Sequential blasting techniques are to be used to make each blast effectively a series of small explosions. This will be enabled through the use of millisecond delays on the blast pattern, which lifts and breaks the rock rather than throwing it.
13. The timing of each blast will depend on the nature of the rock to be removed, operational considerations for safety, product requirements and potential blast impacts, and the contracts won.
14. See the Blast Management Plan that is included in the Offsite Impacts Management Plan.
15. As granitoid and diorite rock is well jointed it is anticipated to readily break into small enough fragments for use without the need of further breaking. However there are some locations where the joint pattern is much wider spaced and these areas will require closer holes to break the rock to small enough sizes to form the raw feed to the crusher.
16. The rock broken by each blast will fall in a heap at the base of the face being excavated.
17. A front end loader or excavator will be used to load the broken rock into off-highway dump trucks for transport to the crusher along the haul road. Normally an excavator is used because it has a longer reach and can operate more safely on benches.
18. At times a rock breaker may be required to break oversize rock to enable it to be fed to the primary crusher. The rock breaker will be used in the pit, low down in the landscape to minimise noise generation and carry.
19. The processing area will be located low in the landscape on the benches with potential for an additional area to the north west where materials can be stockpiled.
20. A multi wheel drive haul truck will be used to take the rock from the face to the sorting/processing/stockpile areas down the proposed haul road.
21. The haul truck will have a capacity of 35 – 50 tonne or similar and transport the rock to the processing plant along the central dedicated haul road.
22. The haul road will remain unsealed so that it can be modified from time to time as quarrying progresses, and unsealed roads provide better grip for haul trucks.
23. The haul road gradient is to be retained to the lowest practical angle to reduce truck noise, fuel usage and increase safety. The road system will have edge bunding, rock barriers and marking with used tyres. The haul road gradient will be around 10 %.
24. All haulage routes and other roads are to be continually damped down in drier conditions when the quarry is being worked, as required, to minimise dust generation. A dedicated water truck will be retained for this purpose,
25. All vehicles on site and proposed for the hard rock operation will be fitted with efficient silencers and monitored to assess the noise levels. Low frequency reversing “frog” type beepers are to be used to reduce sound carry because they do not have the same potential to transmit noise over long distances. High frequency beepers will not be used.
26. All vehicles on site will be installed with flashing lights.

27. For rehabilitation, and following completion of any parts of the excavation, the faces are to be backfilled with overburden and the brow broken down.
28. The final profile of the benches/faces will be to *Mines Safety and Inspection Act 1994* as explained in documents such as *Guidelines on Safety Bund Walls Around Abandoned Open Pits (DMP 1991)*. Backfill and rehabilitation of any completed faces will continue progressively as each section of the quarry face is completed. See Appendix 5, Quarry Design.
29. Additional information on land clearing and reinstatement is contained in Section 7.0, Closure and Rehabilitation Program.
30. As the site will make water from rainfall and seepage, water management is an integral part of the excavation process. Water shed from the pit is to drain to detention basins prior to use for dust suppression and/or release to the natural drainage lines.

Processing area

1. The hard stand area to be used for processing will be formed at 155 metres AHD from overburden and subgrade rock extracted from the first stages of mining and clearing for the pit.
2. The hard stand will be installed with edge bunding for safety and water management and drain to the proposed detention basins.
3. The crushing and screening operation will be located on the western edge of the hard stand where it will be afforded maximum landform screening to mitigate noise.
4. Perimeter bunding approximately 1 metre high will be placed around the edge of the flat area for safety and water management. Surface water will be directed back to the detention basins.
5. As new technology becomes available it will be used to maximise efficiency, safety and minimise potential environmental impact.
6. The crushing plant consists of static primary, secondary and tertiary crushers together with screens, associated conveyor belts and stockpiles. These are located to the north west of the quarry. The plant is to be up to date and will be upgraded from time to time as part of normal maintenance and operational efficiency and repainted as required.
7. Crushing is used when making aggregate. When the quarry produces armour rock and core stone, the amount of crushing and other processing is reduced and related to breaking rocks to size.
8. A site office/weighbridge and service facilities are located at the end of the access road on the west of the processing and stockpile area.
9. All crushers, screens and stockpiles are either sprayed with water or are enclosed to reduce the emission of dust from all parts of the crushing plant.
10. Water used in production of washed aggregates is recycled.

3.4.3 Pit Design and Staging

1. The pit design is outlined above and in Attachment 1. The speed at which the pit progresses will depend on the contracts won.

2. The staging is therefore not certain at this stage, but is anticipated to be 50 000 – 100 000 tonnes of product per year initially rising to 200 000 tonnes.
3. The design of the pit means that there daylighting through a ridge is not possible.
4. The topmost bench will be made safe by laying back the face and using overburden to provide a substrate for rehabilitation.
5. As each bench is opened the batter slopes of any completed preceding stage will, when practicable, be rehabilitated depending on future land use, apart from working access roads and active floor and potentially benches. See Appendix 5.
6. At this stage the pit is anticipated to have a life to 2080 if all stages are excavated.
7. As each stage is opened the preceding stage will, when practicable, be rehabilitated depending on future land use, apart from working access roads and active floor and benches.

3.4.4 Geotechnical Issues and Final Contours

Geotechnical

The design and geotechnical aspects of the proposed pit are outlined in Appendix 5.

The upper face will be laid back to within 20 metres of the eastern boundary and provided with a safety bund and slopes that are safe, sustainable and compatible with the *“Guidelines on Safety Bund walls around Abandoned Open Pits”*, January 1997.

The guideline is old now and it is now more common in quarries to have vertical solid rock faces that are backfilled with overburden and weathered regolith. The backfill is then retained by a low perimeter bund with space left for access. Cut off drains or bunds will be used above the face to ensure stormwater does not flow into the pit or erode the dumped materials.

Contour banks and drains on the sloping weathered material retain water and reduce the potential for erosion. Bunding, or a drain at the base of the slopes of unweathered material, capture any materials that wash from the banks.

The backfill will provide a substrate for seeding. This method is most commonly used even in the large hard rock quarries in the south west of Western Australia.

For the sound rock, final slopes of up to 45 degrees, when combined with a small bench at the top, will be stable. Any backfill will be stable when placed at a stable face and bench as is completed at all hard rock quarries in the south west of Western Australia.

Proposed Final Contours

These are not available at this stage but a concept is provided that will be refined as a result of the site survey.

See Appendix 5.

3.4.5 Processing of the Resources

Processing

The main rock to be removed from the pit is for coastal construction. Blasting will be used to remove the rock and fracture to achieve the greatest amount of the correct sized material, which will range from rock of various sizes up to 12 tonnes down to small 300 mm size material for facings of coastal features.

This material will be sorted and stockpiled.

When rock for armour and other coastal protection is being produced, with it only be the subgrade material that will be processed. Either material that is too large and needs to be split by rock breaker and material that is too small and is to be crushed to form aggregates of various size.

At other times aggregates will be produced from crushing and screening.

1. Processing is to be located in the dedicated area both to the north west of the pit in the area previously used for stockpiles and on the floor of the pit.
2. As noted earlier the operation of the quarry will use mobile crushing plant that is brought to site as required and removed at the end of each campaign.
3. As new technology becomes available it will be used to maximise efficiency, safety and minimise potential environmental impact.
4. The processing cycle will use a primary mobile crusher together with secondary and tertiary crushers but these will be mobile, followed by sizing screens and product washing facilities as required to produce the various grades of aggregate.
5. The crushing plant will be licensed through the Department of Environment Regulation as required, depending on the volume of crushing and screening.
6. Blending of products may be undertaken during processing, enabling products to be mixed to order. This reduces the stockpiles by allowing products to be crushed on demand.
7. A weighbridge may be located on site in the future, but currently no plans are proposed for a weighbridge on site.
8. All crushers, screens and stockpiles will be sprayed with water or enclosed where possible to reduce the emission of dust from all parts of the crushing plant. Even with mobile crushing and processing plant, efficient dust suppression can be achieved, with mobile plant becoming increasingly common.
9. Water used in production of washed aggregates is to be recycled through sediment trapping facilities.

Stockpiles

The stockpiles and processing are to be located in the dedicated area both to the north of the pit in the area previously used for stockpiles and on the floor of the pit in the south.

The stockpiles will be located so that there is no potential conflict with haul trucks either through access routes or timing.

The stockpiles will mainly consist of various grades of rock suitable for coastal work and vary from rock of up to 12 tonnes down to small 300 mm size material for facings of coastal features.

In campaigns there will be some crushing and screening of material to remove excess unsuitable material.

This will be formed to aggregates of various sizes and stockpiled until sold offsite.

A rubber tyred loader will be used to load each road truck. The loads will either be covered or wetted down as required to prevent material from being dislodged during transport. Large material for coastal work is not subject to blowing from trucks

3.4.6 Waste Rock and Tailings – Waste Inventory

There is no waste material. The only materials remaining on site will be subgrade rock that cannot be used, some overburden of weathered rock and topsoil. All are natural products with no potential to cause pollution.

The rock has no, or only traces, of pyrite (iron sulfide), similar to all other hard rock quarries, at levels that cannot cause any deleterious effects.

Potential “at risk” Inventory

Type	Comment	Treatment	Reference
Saline surface water	Not present	Surface water is fresh, like all streams on the Darling Scarp.	
Saline ground water	Not present	All water on site is fresh.	
Acidic materials and drainage	Not present		
Sodic or dispersive materials	Not present	All water on site is fresh. The soils are not sodic or dispersive.	
Asbestos – asbestiform minerals	None present	The pit will be assessed regularly during operations by the quarry manager and consultants to determine the presence of asbestiform minerals and any action that needs to be taken to manage those materials.	
Radioactive materials	Not present	Granitic rock such as this contains such low levels of radioactive materials that no testing is required. The resource is similar to the other hard rock quarries on the Darling Scarp.	
Metallic or chemical materials	Not present		
Tailings storage	Not required	All crushed materials and fines will be used or used to form on site roads and backfill.	
Ablutions waste		The existing facilities at the dwelling will be used. If those become unavailable, if used as a caretaker’s residence, then	Water Management Plan – Attachment 2

		serviced portable facilities or an approved septic system will be used.	
Dangerous Goods and Hazardous Materials	None will remain on closure.	There are normally no hazardous materials used for hard rock quarrying, apart from fuel, blasting and servicing. The only other materials are for tasks such as weed management and are dealt with under those sections.	
	EXPLOSIVES None will be stored on site.	Explosives will be brought to site as required. None will be stored on site. See Blast Management Plan contained in the Offsite Risks Management Plan	Offsite Risks Management Plan – Attachment 3.
	FUEL The various plant will be refuelled from mobile tanker. None will remain on closure.	Any soil or other materials with drips and spills will be removed offsite to an approved waste site or location. Fuel is discussed in the Water Management Plan, Attachment 4.	Water Management Plan – Attachment 2.
	SERVICE MATERIALS Only minor lubrication will be conducted on site. All major servicing will be conducted offsite. None will remain on closure	Any wastes will be collected and removed from site promptly to an approved recycling or waste disposal area. Servicing is discussed in the Water Management Plan, Attachment 4.	Water Management Plan – Attachment 2.
General waste	None will remain on closure.	Regularly removed from site to an approved disposal area	Water Management Plan – Attachment 2.

3.4.7 Support Facilities

There are no permanent facilities currently on site associated with quarrying. There is a dwelling to be used as a caretaker's residence, sheds and associated water storage tanks.

During operations a mobile crushing and screening plant would be utilised on site.

The types of equipment proposed to be used are listed below. Not all plant will be on site at any one time.

Production of coastal rock, such as armour rock.

- Track mounted percussion drill and compressor.
- 20 tonne excavator or similar.

- Rubber tyred loader
- 35 – 50 tonne off-road dump truck for internal transport of rock from the pit to the crusher.
- 20 tonne water truck or similar for dust suppression.
- Self contained maintenance vehicle to attend site as required.

Processing of aggregates in campaigns as required.

- Mobile primary, secondary and tertiary crushers with related screens and conveyor belts. These will be moved across the site as excavation progresses.

Site office/lunchroom	A mobile site office/lunchroom is potentially to be maintained on site for the management and security of small items particularly during campaigns.
Toilet system	The facilities at the dwelling, approved serviced portable toilet system or septic system is to be installed when the site is manned. Serviced means they are pumped out by a licensed contractor as required.
Storage sheds	A storage shed may be used for the storage of maintenance items during excavation campaigns.
Fenced compound	A fenced compound may be used for the storage of mobile plant.
Weighbridge	At this stage a weighbridge is not proposed but may be installed at a later date near the stockpiles if required.
Fuel Storage	Vehicles will be refuelled from mobile tankers. It is anticipated that no fuel will be stored on site. However there remains the possibility that fuel might be stored for a short campaign, in approved containers to DMP and DOW Standards as outlined in the attached Water Management Plan. See Attachment 4.

3.4.8 Workforce

The site will typically be worked by 2 – 6 persons, depending on how busy the current situation is.

The operator will have radio contact with any vehicles and can contact to check in regularly during the working day although vehicles are mostly within view of each other.

Truck drivers will regularly arrive at the site throughout the working day.

Italia Stone Group have induction and training procedures in place and the site will be registered on the Department of Mines and Petroleum SRS safety management system.

3.4.9 Transportation Corridors

Access to Lot 800 will be along Pruden Road.

Traffic Management is designed to comply with Best Practise, such as *Institute of Quarrying Australia/Queensland Government, Traffic Management*.

Greenfield Technical Services (Traffic Engineers) have been commissioned to assist with the traffic design requirements for the access road and the linkages to the normal road network of South Western Highway. See the discussions of transport in Appendix 5.

Greenfield Technical Services determined that access to South Western Highway was possible at the location of Pruden Road, because of the configuration of the roads and the speed limits on South Western Highway at that point. The speed limit is 90 kph at the intersection of the pit and South Western Highway.

The road is wider on the western north bound lane where a passing lane terminates just to the north of the access point from South Western Highway.

Pruden Road is the only legal access to Lot 800 and will require some modification to reduce the slopes at the eastern end to enable truck transport to access the proposed pit. Some widening of Pruden Road may also be required.

The current access road is a single lane road along the old railway alignment, with some locations for passing. In places there are trees close to the road and the carriageway is not wide enough.

Any changes or upgrades to Pruden Road will be through extensive discussion with the Shire of Serpentine – Jarrahdale and the local residents who may potentially be affected.

A number of transport scenarios can be considered to ensure safe use of Pruden Road by all parties that can be achieved without significantly impacting on the amenity.

This discussions might include, but not be limited to;

- a) Upgrade of Pruden Road to provide wider safer carriageways for all users.
- b) Reforming of the road and alignment as required.
- c) Modification to the gradients on Pruden Road.
- d) Radio and other communications between trucks, the proposed operations.
- e) Left turn exit only onto South Western Highway for laden trucks.
- f) Modifications to the crossover with South Western Highway with slip lanes or turning pockets as required.
- g) A system of local traffic lights or flashing warning lights when a truck is present on Pruden Road to mitigate any potential conflicts with the local landholders who use Pruden Road.
- h) Offset tree planting and revegetation to mitigate clearing or other environmental impacts.
- i) Hours and types of operation.
- j) Formation of a public consultation group to provide input to the design, implementation and use of the access routes.

From Pruden Road the access road to the processing and stockpile area will run along the existing internal road alignment across the existing dam wall and then along the western edge of Lot 800 to the north western corner. It will be formed and sealed.

The access road will need to be widened. The main vegetation along the access road is scattered *Eucalyptus (Corymbia) calophylla* trees of which some will have to be taken to widen Pruden Road.

Extensive tree planting of local taller growing trees is proposed for the western edge of the access road to mitigate views of the truck, from the west or South Western Highway.

The Herring Storer Noise Study determined that the transport of products and the movement of road trucks will comply with the Noise Regulations (See Appendix 2C) if restricted to daylight hours and two truck movements prior to 7.00 am, which is acceptable to Italia Stone Group.

A lockable gate is maintained at the entrance to Lot 800.

Comments on the Type and Number of Trucks

A range of road trucks and trailers are to be used to transport rock from the site.

The number of trucks will be dependent on the contracts won but cannot exceed the permitted number based on the Noise Regulations.

During normal operations the truck traffic is anticipated to include;

- semi-trailer trucks with a load capacity of 20 – 25 tonnes,
- truck and dogs with a capacity of 40 – 50 tonnes may be used.

Which vehicles are used depends on the transport operator, the distance to the destination of the product and the nature of the contract that is being supplied.

A few points are relevant to truck transport and show that the use of smaller trucks does not necessarily benefit the community.

- Trucks are able to operate legally on the roads used and are regulated by Main Roads and the Shire on lesser roads.
- The transport of material is the greatest cost of product over longer distances with costs being 20 to 30 cents per tonne per kilometre travelled. The cheaper costs occur when larger trucks are used and all costs are reflected in the construction of developments and are ultimately borne by the community.
- Larger trucks are more fuel efficient per tonne of material carried, and therefore have significantly lower greenhouse gas emissions per tonne.

3.4.10 Hours of Operation

The quarry and processing operate to the *Environmental Protection (Noise) Regulations 1997*. Quarrying is normally restricted to daylight hours, with processing and transport during daylight and at other times as required.

Other ancillary activities such as maintenance are conducted outside these hours in line with normal industry practice. These are site restricted activities that are not likely to impact on the local community.

Wide operational hours are necessary to maximise operations and ensure that the full excavation, processing and transport times are available to satisfy community demands for products at certain times.

It is anticipated that the quarry will be worked in campaigns initially and then move to a full time operations.

The hours of operation will be determined by the Noise Assessments made by Herring Storer Acoustics. See Appendix 2C.

From the Noise Assessment Herring Storer have determined that the operational hours should not commence prior to 7.00 am for drilling, crushing and processing with limited transport of materials prior to 7.00 am.

Transport is proposed to be 6.00 – 6.00 pm six days per week, Monday to Saturday excluding Public Holidays. The number of truck movements prior to 7.00 am is restricted by the Noise Regulations. Prior to 7.00 am the number of truck movements permitted is 4 (2 inbound and two laden).

Crushing drilling and blasting is proposed to be 7.00 am to 5.00 pm Monday to Saturday exclusive of Public Holidays, to assist in compliance with the Noise Regulations.

Between the hours of 6.00 am to 7.00 am and 5.00 pm and 6.00 pm, the only work conducted on site will be low noise activities such as maintenance, preparation for site activities, and minor loading and tidying.

3.4.11 Water use

Water used in the pit and the processing areas for product washing and dust suppression will be sourced from the proposed sump in the north of the processing and hardstand area of the pit when available.

The use of this water is desirable as it reduces the potential for water to be released to Manjedal Brook.

This water, when used on the hardstand areas, will drain to the central drain along the access road to a sump and return to the sump and then detention dams as part of the recycling process. This will reduce the total volumes of water required and maintain the efficiency of production and environmental management.

Water is used for dust suppression and the washing of aggregates as required. As aggregates will only be produced in campaigns, where possible the campaigns will be timed to occur during wetter months to reduce water requirements.

Once sitting on site, product in stockpiles will be subject to rainfall, which will wash fines from the products.

Other water requirements will be brought to site as required via a road capable water truck or licensed water supply contractor.

Production of armour and other rock for coastal work will require little water use.

The access road is tree lined and shady and remains moist for most of the year with the local rainfall. As required the access will be watered to minimise the risk of dust generation.

During the construction phase water from the farm dam on site will be used. It is anticipated that construction will occur in either autumn or spring - early summer when rainfall is reduced but when the soils are sufficiently moist to be excavated and moved with reduced potential for dust generation.

3.4.12 Safety

All quarries operate under the provisions of the *Mines Safety and Inspection Act 1994 and Regulations 1995*. These are administered by the Department of Mines and Petroleum.

The regulation is achieved through the DMP Safety Regulations and Reporting Systems (SRS).

All quarries on commencement are required to register with the SRS system. As part of the registration a Project Management Plan is required to be produced and lodged online after all planning approvals are in place and prior to commencement.

The Project Management Plan will use some material from this Management Plan and concentrate on the onsite operations as they relate to health and safety.

Officers from the Safety Division of the DMP will regularly inspect the operations in relation to health and safety. This site will be under the supervision of the DMP

The site will operate to the *Mines Safety and Inspection Act 1994 and Regulations 1995*, which are administered by the Department of Mines and Petroleum. Inspectors visit the site regularly.

The proponent is committed to maintaining a safe working environment.

The site is fenced with farm style fencing and locked gate. It is remote from public access points.

Warning signs are installed to the Department of Mines and Petroleum specification, as approved by the district inspectors.

Completed faces will be left in a safe manner to the requirements of Department of Mines and Petroleum for the abandonment of small hard rock quarries.

Project Management Plans are used to cover operational procedures which include workforce induction and training to ensure that all employees involved in hard rock extraction are made aware of the environmental and safety implications associated with all stages of the mining activities.

Where applicable Safe Operating Procedure Sheets are in place and made available for hazards. Workers and staff will be 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.

The site is within mobile phone range.

Fire Management

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

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

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

- Fire extinguishers are provided at strategic positions and in the working vehicles.
- Emergency evacuation procedural drills are held regularly.
- 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 site Safety Management Procedures
- An emergency access route will be agreed to with a local landholder to enable access to either the north or south from the pit itself in the event of a fire on the access road.
- Provide an emergency muster area, communications and worker induction and training
- Establish on site water supplies for potential use in extinguishing fire
- Secure the site from unauthorised access
- Public access will not be permitted.
- Stop work and prevent the movement of vehicles on days deemed to be high – extreme fire risk days, in line with normal farm practise.
- Maintain perimeter fire breaks as required
- Provide an emergency muster area, communications and worker induction and training
- Establish on site water supplies for potential use in extinguishing fire
- If on site, the loader can be used to assist with emergency fire breaks.
- Compliance with the *Mines Safety and Inspection Act 1994 and Regulations 1995*.
- Fire risk is normally controlled through the *Bush Fires Act 1954* and local authority bylaws.

Flood

The site is elevated and the minor watercourses will not be able to impact on the operations. There is no potential flood risk.

4.0 COMPLIANCE WITH LEGISLATION AND APPROVALS

Depending on the size of the crushing operations a licence from the Department of Environment Regulation may be required.

A Clearing Permit will be required under *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

Relevant Legislation

Legislation	Comment	Action
<i>Aboriginal Heritage Act 1972</i>	No known site are listed on the DAA database.	Section 6.5 Heritage
<i>Environmental Protection Act 1986 Part IV - Assessment</i>	The EPA will determine whether the proposal requires assessment under Part V of the Act.	The proposal will be referred to the EPA.
<i>Environmental Protection Act 1986 Part V – DER Licence</i>	The approval will be conditional.	A DER Licence will be applied for crushing and screening as required concurrently with the application for Planning Consent.
<i>Environmental Protection (Noise) Regulations 1997</i>	A Noise Assessment completed by Herring Starer Acoustics demonstrated that the proposal can comply with the Regulations.	Comply with the Noise Regulations
<i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004</i>	The site is parkland pasture.	A Clearing Permit will be applied for once Planning Consent has been provided.
<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i>	No matters of significance requiring referral have been identified.	
<i>Contaminated Sites Act 2003</i>	No materials are present or to be used which would trigger this legislation.	Attached Water Management Plan. Section 3.4.6 Waste Rock and Tailings
<i>Wildlife Conservation Act 1950</i>	No matters of significance that would trigger this legislation have been identified.	
<i>Conservation and Land Management Act 1984</i>	No matters of significance that would trigger this legislation have been identified.	
<i>Heritage of Western Australia Act 1990</i>	No matters of significance that would trigger this legislation have been identified.	
<i>Health Act 1911</i>	No matters of significance that would trigger this legislation have been identified.	See attached Water Management Plan for ablutions waste overseen by the Shire of Serpentine – Jarrahdale.
<i>Planning and Development Act 2005</i>	The approval will be conditional.	The Local Authority will provide Planning Consent under their Town Planning Scheme.
<i>Metropolitan Region Scheme</i>	The Western Australian Planning Commission will assess the	Concurrent application with the Development application.

	project under the Metropolitan Region Scheme, concurrently with the application for Planning Consent. The approval will be conditional.	
<i>Shire of Serpentine Jarrahdale Extractive Industry Bylaw</i>	The Shire will assess the project under the Extractive Industry Bylaw, concurrently with the application for Planning Consent. The approval will be conditional.	The Shire Extractive Industry Licence will be issued once the Conditions of the Planning approval are met.
<i>Waterways Conservation Act 1976</i>	Not applicable as the site is not located on any waterway. DOW will oversee and provide advice on the riparian interface with Manjedal Brook.	
State Agreement Acts	Not applicable	
<i>Dangerous Goods Safety Act 2004</i>	Refers to fuel and explosives	See; Offsite Impacts Management Plan blasting - (attached) Water Management - Fuel Management Plan (attached)
<i>Rights in Water and Irrigation Act 1914</i>	Applies to Licensing of water use in proclaimed areas. Water will be sourced from water collected from the pit. The local catchments will not be impacted.	See; Water Management Plan (attached). A water Licence to use that collected water will be applied for if required.
<i>Country Areas Water Supply (CAWS) Act 1947</i>	The site does not lie in an identified site.	
<i>Mines Safety and Inspection Act 1994</i>	Safety of quarries is overseen by the Safety Division of the DMP under the Act and Regulations	The site will be registered under the SRS and a Project Management Plan submitted, approved by DMP and implemented.

Specific Site Conditions

Legal Requirement	Conditions	Discussion
<i>Mines Safety and Inspection Act 1994</i>	DMP Quarry Inspection Report dated 24 October 2014	The actions required are included in the Mining Proposal and Mine Closure Plan.
<i>Mining Act 1978</i>	No tenement conditions	
Clearing Permit	Clearing permit cannot be applied for until approval to mine is granted.	
Mining Proposal	The Mining Proposal is yet to be accepted.	

5.0 ENVIRONMENTAL IMPACTS AND MANAGEMENT

5.1 Water Management

A separate Water Management Plan is attached (Attachment 4). The plan is currently being revised and will be finalised when a site survey is available and the mine planning completed.

Guidance on the quality of water that is aimed for 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.

These documents are used in the development of the water management plan that is attached. The following documents are general to water management and help direct water planning.

- *Engineers Australia 2003, Australian Runoff Quality, National Committee on Water Engineering.*
- *Stormwater Management Manual for Western Australia, Department of Environment WA, 2004.*
- *Guidelines for Groundwater Protection in Australia, ARMCANZ, ANZECC, September 1995.*
- *Environmental Protection Authority Victoria/Melbourne Water, undated, Urban Stormwater, Best Practice Environmental Management Guidelines*
- *Water and Rivers Commission, 1998, Manual for Managing Urban Stormwater Quality in Western Australia.*

The following documents specific to the mining and quarrying operations are the DOW – DMP Water Quality Protection Guidelines for Mining and Mineral Processing. They are used to form the basis of the Water Planning.

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

The pit lies on the southern valley side of Manjedal Brook that drains west to the Swan Coastal Plain. Manjedal Brook peters out west of South Western Highway on the Swan Coastal Plain where the water infiltrates into the sediments of the plain.

A 50 metre setback from Manjedal Brook is proposed, which matches the other Hard Rock Quarries on the Darling Scarp. For those other quarries that have been operating for many years there is no apparent impact on the Brook from the past excavation, and disturbances are already in place from historical excavation, based on site observations by Lindsay Stephens of Landform Research.

Other hard rock quarries have been excavated near watercourses with no impacts on the water quality through the use of detention basins, bunding and water management. Hanson Red Hill Quarry sits near Susannah Brook and has been approved with a 50 metre setback to the brook, although the pit does not approach as close as that.

The small area of rocky rapids and waterfall lies to the west outside Lot 800 but will not be impacted with water from the proposed quarry and processing area, being retained in two large detention basins with a total capacity of 20 000 kL combined with a third sediment settlement basin, to provide final water management and sampling and release points.

The release point to Manjedal Brook is 350 metres upstream from the rapids – waterfall. There will be no additional placement of materials closer to the Brook than currently exists.

The fringing and riparian vegetation along Manjedal Brook is in reasonable condition and will be retained. The 50 metre buffer to the Brook will be replanted and re-established to local riparian and forest species matching habitat to species choice, to re-form the original community types.

There are no water courses that will be impacted on by the pit or proposed processing area.

Groundwater

Hard rock is tight and has some fractures. The elevation of the proposed pit is well above creek elevation so the water table will not be intersected. There may be some minor perched or trapped water occurring in fractures of the hard rock.

Groundwater is deep below the proposed pit. The basement granite is tight and there is no evidence of seepages on the quarry site or in that location towards Manjedal Brook.

Like the other hard rock quarries on the Darling Scarp, when opened the tight rock prevents drainage and seepage inflow leaving the pits dry.

The water table will be at the elevation of Manjedal Brook as is normal for creeklines of this nature, that is at an elevation of 140 – 150 metres AHD. Some hard rock quarries on the Darling Scarp are excavated below (Hanson Red Hill) or well below (Boral Maddington) the existing nearby creek lines without evidence of groundwater seepage or inflow.

The base of the proposed operations is proposed to be 155 metres AHD.

Water Management

The extraction of hard rock is a chemically free operation with the only liquids used being lubricants for machinery. Extractive Industries are one of the few industries permitted to operate in Groundwater Source Protection Areas provided a 3 metre vertical buffer is in place.

As the quarry is mainly to produce large rock for coastal work and not aggregates the amount of water management required is reduced.

Water from disturbed areas will be directed to sumps in the base of the pit and around disturbed areas to provide control of water flow rates and sediment trapping facilities. The water trapping facilities will be designed to retain the 1 in 10 year storm event and release large flows to the environment through protected water ways.

When additional water is required it will be brought to site as required.

The management of water and the risk to it, is discussed in the **attached Water Management Plan – Attachment 4**. The plan is currently being revised and will be finalised when a site survey is available and the mine planning completed.

5.2 Flora, Fauna and Ecosystems

Biodiversity is considered a lower risk because the site is covered by pasture with scattered trees and native vegetation and parkland pasture. See Attachment 6, Biodiversity Management, Rehabilitation and Closure.

5.2.1 Flora

The vegetation consists of pasture with scattered regrowth trees of Marri (*Corymbia/Eucalyptus calophylla*) with minor *Eucalyptus rudis*. There is no native understory.

The pasture consists of common introduced agricultural pasture species.

The vegetation around the quarry is so disturbed and altered that it is not possible to determine the original vegetation community.

Extensive planting will occur on the western screening bund and within the 50 metre setback to Manjedal Brook, which will reform a linkage from the west to the State Forest.

The additional species and planting will assist in compensating for the clearing of the Marri Trees.

The vegetation along the section of Pruden Road that will require widening was assessed and found to only contain 15 species, none of which is listed as Priority or Threatened. The small section of vegetation is in Degraded to Good Condition.

See Attachment 6, Biodiversity Management, Rehabilitation and Closure.

5.2.2 Fauna

The reduced vegetation with a predominance of pasture will result in a reduction in the number of fauna. The shrubs and trees will be providing some habitat.

The amount of fauna is anticipated to be limited because of past continuous grazing on site.

Whilst no specific study has been conducted, native fauna will be living in or using the Marri Trees and other vegetation.

The Marri and Flooded Gum trees were reviewed with respect to Black Cockatoo roosting or nesting habitat and the trees found to be small regrowth trees with no hollows. A detailed survey will be completed as part of the application for a Clearing Permit and will be assessed under that process. See Attachment 6

Some frogs and other wetland species will be present associated with the drainage line of Manjedal Brook.

5.2.3 Ecosystems

The vegetation around the quarry is so disturbed and altered that it is not possible to determine the original vegetation community

5.3 Wetlands

There are no wetlands on the proposed development site. Manjedal Brook constitutes a riparian habitat that has previously been cleared but will be re-established as a 50 metre setback from the Brook..

5.4 Stygofauna and Troglafauna

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

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

The proposed disturbance is relatively small in comparison with the extent of granite rocks on the Darling Scarp, and underlain by tight hard rock.

Whilst there will be some surface invertebrate species living in surface hollows and under rocks there is no potential for significant or restricted short range endemics of stygofauna or troglafauna on site.

The quarrying will expose much more rock and as excavation occurs fractures in the rock will open providing increased habitat for ground and soil fauna during and on completion of excavation than currently occurs.

5.5 Vegetation Impacts

5.5.1 Land Clearing

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

See Attachment 6, Biodiversity Management, Rehabilitation and Closure.

5.5.2 Vegetation Hygiene Management

Vegetation and soil hygiene procedures are proposed to minimise the risk of plant disease introduction and impact.

Vegetation hygiene principles are expanded on in the Biodiversity Management in Attachment 6. The control measures proposed are best quarry practice and are capable of containing and controlling the introduction of plant diseases and their potential spread and are used in both mine closure and during excavation.

See Attachment 6, Biodiversity Management, Rehabilitation and Closure.

5.5.3 Weed Management

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

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

Currently on site the only weeds are Cotton Bush, a Declared Weed. Currently it occurs as scattered plants that is largely kept in check and under control by the cattle grazing the site.

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

See Attachment 6, Biodiversity Management, Rehabilitation and Closure.

5.5.4 Dieback Management

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.

Phytophthora cinamomi is restricted to the areas greater than the 600 mm rainfall isohyets (EPA 2000 and may occur on this site. There is also potential for other plant pathogens to be brought to the local area. General plant pathogen control principles also assist with weed management and will be implemented.

As the vegetation on site is so altered the risk from dieback disease is considered low because the site does not adjoin native vegetation with a setback of 40 metres on a westwards draining slope, that is away from the Jarrah Marri Forest towards the existing pasture and proposed quarry.

Currently there are no indicators of *Phytophthora* but that is because the site is listed as “uninterpretable”.

See Attachment 6, Biodiversity Management, Rehabilitation and Closure.

5.6 Topsoil and Soil profiles

The open areas are cleared and no topsoil is available.

If new areas are opened and the top face is laid back any topsoil removed will be retained and used for rehabilitation as described in mine closure planning.

See Attachment 6, Biodiversity Management, Rehabilitation and Closure.

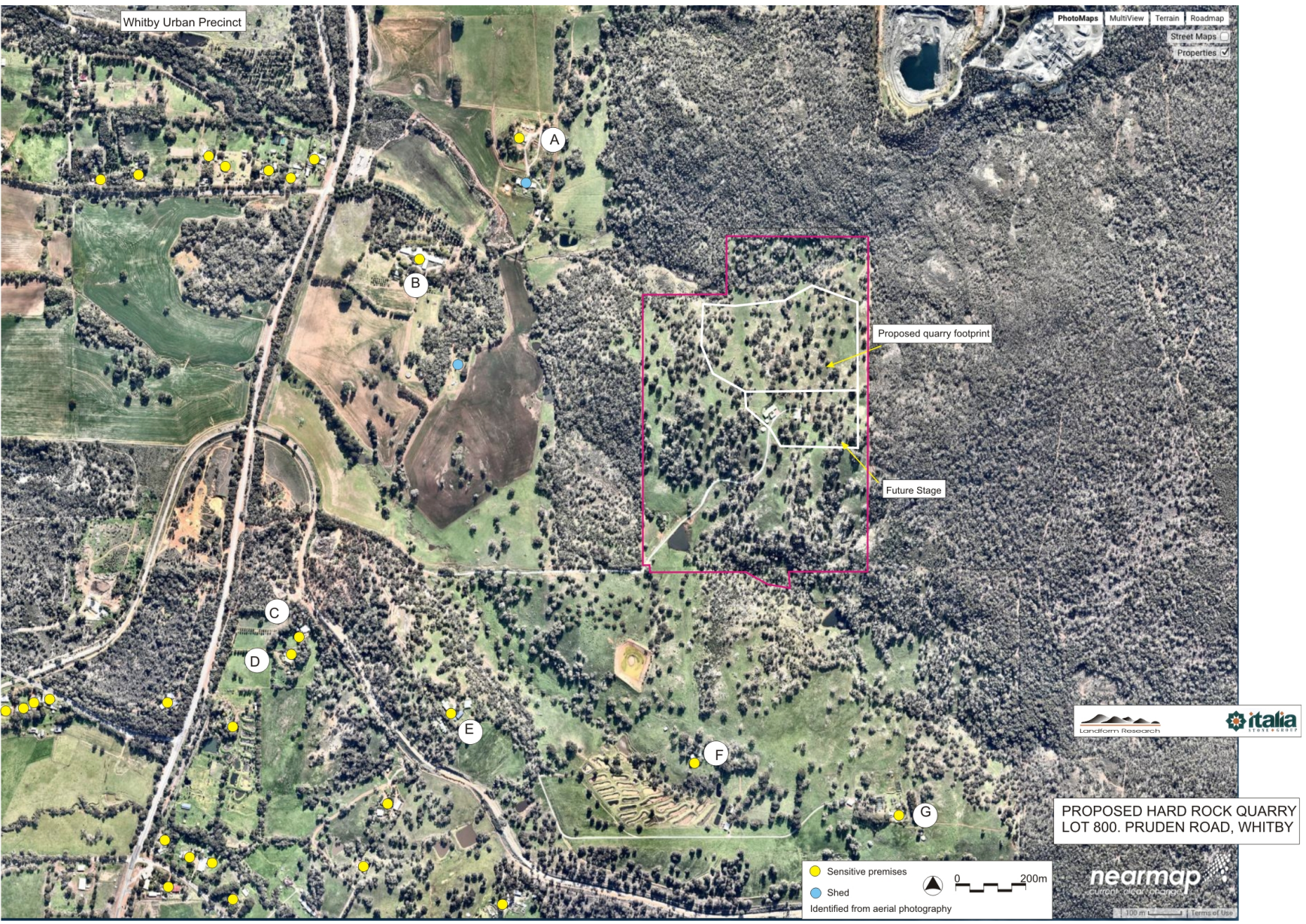


Figure 13 Location of sensitive premises

5.7 Offsite Impacts, Pollution and Noise

See Attachment 3 Offsite Management Plan

5.7.1 Dust

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 excavation, screening and transport operations. Most dust is generated during vehicle movements.

The closest dwellings from the active pit lie to the south at distances of 770 to 1 470 metres. There are no other dwellings or sensitive premises, as far as is known, within 1.5 km.

The setbacks to sensitive premises comply with the EPA generic buffer Guidelines for all but three dwellings located at 77, 820 and 930 metres, located behind landform and tree belts.

Dust particles are readily stopped by tree belts and distance, with which the site complies. Tree belts slow the wind and allow the dust to settle. See *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. They are based on field studies and demonstrate the effectiveness of tree belts and distance in providing screening against particulate travel.

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 operations comply with the Department of Health buffer recommendations.

The main methods of dust control are awareness of the issues on a day to day and hour to hour basis as activities on site change. The most appropriate dust management procedures are then chosen to minimise occupational dust and environmental dust. Ongoing site awareness will be combined with a commitment to take whatever action is appropriate.

These are the same methods used for all other hard rock quarries that have sensitive premises much closer, for example Boral Orange Grove in Perth (Licensed for 2 million tonnes per year) which has a number of dwellings very close to the operations and less than 500 metres buffer, Hanson, Gelorup and Bunbury Quarries and Holcim Gelorup Quarry which have many dwellings within the Gelorup Urban area within 500 metres of the quarries.

The risk of dust impact on sensitive premises is low.

*Italia Stone Group is committed to minimising dust emissions and will implement the measures outlined in the **Dust Management Plan** in the Offsite Impacts Management Plan where dust is discussed. See Attachment 2.*

5.7.2 Noise

The *Environmental Protection (Noise) Regulations 1997*, require that sensitive premises including dwellings in non industrial areas are not subjected to noise levels exceeding 45 dBA for more than 10% of the time, 55 dBA for more than 1% of the time and never exceeding 65 dBA during normal working hours. There are penalties for tonality of 5 dB, modulation 5 dB and 10 dB for impulsiveness, although impulsiveness is not likely to be relevant.

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.

The excavation operations will incorporate procedures to minimise noise emanation from on site activities.

Methods of extraction are not expected to be any different to past excavation.

All equipment will be fitted with noise shields and efficient silencers. Workers will be inducted and trained for operation on the site and provided with the correct noise protection equipment.

There are no nearby sensitive premises. The closest dwellings or sensitive premises have been identified from aerial photography and ground observations. There are other dwellings at further distances, but these represent the closest and are typical of the potential impacts.

Residence A	770 metres north west	- (partially protected by screening bund and landform)
Residence B	820 metres west north west	- (behind screening bund)
Residence C	1 150 metres south west	- (behind landform)
Residence D	1.220 metres south west	- (behind landform)
Residence E	1 370 metres south west	- (behind landform)
Residence F	1 050 metres from to pit to 2050	- (930 metres from the proposed future stage, behind landform of future quarry stage)
Residence G	1 470 metres south	- (behind landform)

The urban areas west of South Western Highway lie 1 200 metres away. As Residences A and B, that are closer, comply with the Noise Regulations so will noise levels at the zoned urban areas.

The Noise Regulations provide for Construction Noise exemptions to enable construction of the site such as the building of the western screening bund.

Herring Storer were commissioned to undertake noise assessments of the operations and made assessments for the closest residences. The numbering system for the closest residences are used here.

The Herring Noise Assessment was modelled on the anticipated quarrying operation and also modelled the transport route across Lot 800.

Herring Storer modelled a loader loading road trucks and transport along the access route during the night time period, prior to 7.00 am.

For day time operations they modelled, a front end loader within the crusher stockpile area, excavator within the pit loading a quarry haul truck, quarry dump truck, crushing and screening plants and the drill rig.

Herring Storer found that night time operations would be restricted to two truck in and two truck out per hour, but that the day time activities would be unrestricted. See Attachment 2C.

*Italia Stone Group is committed to minimising noise emissions and will implement the measures outlined in **Noise Management** in the Offsite Impacts Management Plan Attachment 2.*

5.7.3 Visual

The quarry footprint was selected to provide the maximum screening of operations.

The proposed quarry operation is set 1 km back from South Western Highway.

The quarry is located on a north facing slope on the southern side of tManjedal Brook, facing along the Scarp, rather than west to the Swan Coastal Plain.

The Darling Scarp is listed as a significant landscape feature in State and Local Government Planning as it is a prominent feature, visible from the Swan Coastal Plain. Community concern, rightly so, is for no visual impact from hard rock quarries on the Darling Scarp and to this end the older quarries have all been modified to minimise existing and future visual impacts.

The main impacts if visible will be the faces of the pit, which will be grey in the landscape when compared to the surrounding pasture and trees and exposure of overburden which will be light coloured and brown when compared to the winter green pasture and trees on the Darling Scarp

Therefore a significant amount of effort has gone into the site selection and quarry design to minimise visual impacts.

The two newer quarries, the adjoining WA Bluemetal is not visible from Swan Coastal Plain, and Hanson Red Hill Quarry has been designed to minimise its view footprint.

From the visual assessments the proposed quarry is unlikely to be visible form South Western Highway and is well hidden behind existing tree belts and proposed bunding along the west.

In terms of potential visual impacts the assessed impacts are significantly less than for all the hard rock quarries on the Darling Scarp with the exception of WA Bluemetal.

The location has been chosen to minimise or mitigate the visual impacts from the Swan Coastal Plain and sensitive premises. A visual analysis shows that the site is not visible from South Western Highway because of the extensive tree growth along the road verge of the highway.

The only location where the top of the upper eastern slope of the pit footprint will be visible at two small windows where Manjedal Brook crosses South Western Highway. These two small windows are so small in a 110 kph zone that it is doubtful anyone would be able to see the top of the eastern face of the pit. The visible section will be rehabilitated at the earliest opportunity during construction and operation. See Attachment 3, Visual Management.

The pit is located behind a low spur which forms the western boundary and can be added to with bunding, and behind existing trees.

The access road is chosen to provide suitable gradient as well as being located behind existing trees on site.

The pit footprint has also been chosen behind the break of slope of a spur along the west of the site to provide visual and noise screening.

In addition a bund 4 metres high is proposed to be located along the western side of the pit with the pit cut deep behind the spur and screening bund.

This is the same design and management used at other hard rock quarries along the Darling Scarp.

The direction of excavation and staging is selected to provide maximum screening for noise visual, dust and all other potential environmental risks.

WAPC 2007, *Visual Landscape Planning in Western Australia* has been viewed and the project considered against that document. The relevant section is Part Three, pages 144 to 152 of the Guideline.

That document recommends a visual impact assessment, which has been completed using contours and sections, in addition to site observations and aerial photography. The context of the visual impact has been reviewed to try and maintain the undulating countryside and rural nature of the land.

The potential visual impacts have been identified and relate to the dwellings to the south. Other sites for which the pit and operations may be visible are rural land with no dwellings. Additional assessments are being conducted and will be finalized when the site has been surveyed.

Revegetation, screening bunds and tree belts will be used where possible as will be rehabilitation of the completed areas as soon as practicably possible.

The other consideration is that there is a net community benefit from having a quarry located on the Darling Scarp. With a quarry in place the land will continue to be used for farming and the required buffers will negate the potential for other developments to be located on the Darling Scarp.

During the life of the quarry there will be no change locally to the land uses and visual impacts as no other developments or subdivisions are likely to be approved. This will potentially provide greater protection of the landscape values of the Darling Scarp.

*Italia Stone Group is committed to minimising visual impacts and will implement the measures outlined in the **Visual Management** attached in the Offsite Impacts Management Plan at Attachment 4.*

The proposal complies with the *Shire of Serpentine – Jarrahdale LPP8 Landscape Protection Policy*. With the excavations unlikely to be visible from most of South Western Highway, the setback from Jarrahdale Road and the short nature of the operations, it is considered that whilst there may be some short term conflict with the intent of the policy the use of the hard rock for developments provides substantial environmental offsets in costs, transport impacts and reduced greenhouse gas emissions when compared to sourcing material from further away.

5.7.4 Waste Management

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.

Documents specific to the mining and quarrying operations the DOW – DMP Water Quality Protection Guidelines for Mining and Mineral Processing, have been used to design the water management which contains surface water management in addition to operational management such as fuel and wastes.

- *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 11 Water quality management in mining and mineral processing: mine dewatering.*

- *WQPN 15 Extractive Industries near sensitive water resources.*
- *Department of Water – Water resource considerations for extractive industries.*
- *Department of Water South West Region Guideline – Water resource considerations for extractive industries.*

Italia Stone Group is committed to minimising visual impacts and will implement the measures outlined in the Water Management Plan contained in the Offsite Impacts Management Plan Attachment 3.

Apart from lubricants, excavation methods are very clean with no chemicals being used. The same methods are to be used that have not resulted in any adverse spills or impacts.

Non essential or old plant and materials will be removed from the site. Locked gates and the existing fences will be maintained to prevent illegal dumping and contamination of water.

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

Vehicle and plant washdown and dewatering will not be required.

See Section 3.4.6 *Waste Rock and Tailings – Waste Inventory* for a list of the main waste types originating from operations.

The Water Management Plan addresses fuel management, wastes and other materials and actions that may pose a risk to the surface or groundwater.

5.7.5 Dangerous Goods and Hazardous Materials

See Section 3.4.6 *Waste Rock and Tailings – Waste Inventory* for a list of the main waste types and hazardous materials related to the operations. There are no hazardous materials apart from blast materials, fuels and service items.

All materials that are potentially hazardous are outlined and managed according to the Water Management Plan included in the Water Management Plan (attachment 2).

There will be no blast materials stored on site. All materials will be brought to site as required, immediately prior to firing. See Blast Management, Section 3.0 of the Offsite Risks Management Plan attached as Attachment 3.

6.0 SOCIAL IMPACTS

6.1 Alternative Resources

The need for granite hard rock is discussed under 1.2 Project Objectives.

Hard rock such as granite is required for coastal developments where rock up to 12 tonnes in size is required to prevent coastal erosion and storm damage of the structures.

Such rock size cannot be supplied by the basal quarries because the joint spacings are too small.

There are few alternative resources on the Darling Scarp and therefore it is important to identify and protect any areas where hard rock or other extraction can be completed with minimal community impacts.

6.2 Surrounding land use

Land Use

The main surrounding land use is pasture on large lots.

The land immediately to the west is taken up by Murdoch University for agricultural and veterinary school purposes.

The land adjoining to the north is held by PMR Quarries as part of the WA Bluemetal operations and north of that is the Hanson Byford quarry operations.

South of Lot 800 are larger rural lifestyle properties on the Darling Scarp that are being used for rural purposes and a marron farm.

There is an area east of the South Western Highway that is used for the temporary storage of trees and vegetation.

East of Lot 800 the land forms part of the State Forest.

Policies

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

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.

EPA guidance "Separation Distances between Industrial and Sensitive Land Uses", June 2005 lists the generic buffers for hard rock quarries as 1 000 metres depending on the extent of processing.

State Planning Policy No 4.1, State Industrial Buffer Policy also uses a generic buffer of 1 000 metres where no other supporting information is available

A generic buffer relates to the distance at which there are unlikely to be any impacts without further investigations. It does not mean that smaller buffers are not acceptable. EPA Guidance for the Assessment of Environmental Factors No 3, June 2005, provides for a case by case separation, based on the potential impacts.

There are three residences within or close to 1 000 metres, from the pit and operations.

The selection of the pit footprint and its design have been developed to provide the maximum separation distances and landform buffering.

The buffers are discussed in Visual Management at Attachment 3.

Herring Storer Acoustics have been commissioned to undertake noise assessments of the operations and made assessments for the closest residences. The numbering system used for Herring Storer is the same as that used below.

The closest dwellings or sensitive premises have been identified from aerial photography and ground observations. There are other dwellings at further distances, but these represent the closest and are typical of the potential impacts.

Residence A	770 metres north west	- (partially protected by screening bund and landform)
Residence B	820 metres west north west	- (behind screening bund)
Residence C	1 150 metres south west	- (behind landform)
Residence D	1.220 metres south west	- (behind landform)
Residence E	1370 metres south west	- (behind landform)
Residence F	930 metres south	- (behind landform)
Residence G	1 470 metres south	- (behind landform)

As can be seen from the separation distances there are three sensitive premises which are at a distance of less than 1 000 metres, Dwellings A, B and F. Dwellings B and F are well protected by landform and the design of the quarry and the quarry will not be visible from those dwellings.

It is just possible that from Dwelling B which is a sensitive premises, but not a dwelling, being associated with Murdoch University, that the top of the eastern face will be visible for the first few years of the pit, until that portion of that face can be rehabilitated. See Attachment 3 for visual management and section lines. A 4 metre bund is proposed to be planted with tall trees to mitigate the risk of the top of the eastern face being visible.

Dwelling A is located down the Manjedal Valley. The pit is designed to operate behind a western spur and that, combined with the 4 metre screening bund along the western boundary and the north eastern section of the pit site not being excavated in Stage 1, will assist in reducing visual impact from that location.

The Noise Study completed by Herring Storer Acoustics demonstrates that the noise regulations can be complied with and include a conservative approach, leaving additional management by increased bund elevation, staging of plant operation and other actions to further mitigate noise. See Attachment 2C.

The dust management plan will ensure that the residences are not impacted by dust, and there are contingencies to cease operations in particularly adverse conditions. See Attachment 2D. The buffers comply with the guidelines of the

- *Guidance for the Assessment of Environmental Factors, EPA, March 2000.*
- *Department of Environmental Protection and Conservation Guidelines, November 1996.*
- *DEC 2011 Guideline for Managing the Impacts of Dust and Associated Contaminants from Land Development Sites, Contaminated Sites Remediation and other Related Activities.*
- *Planning Guidelines Separating Agricultural and Residential Land Uses, Department of Natural Resources Queensland 1997(Pages 65 – 111)*
- *Department of Health WA, 2012, Guidelines for Separation of Agricultural and Residential Land Uses which uses the same criteria (Pages 112 – 118).*

Section lines have been drawn, noise modelling has been conducted, blast and dust management plans have been developed.

The other important consideration is that the pit is proposed to operate below natural ridge lines. The adjoining hills will provide significant noise and visual screening which make this operation quite different to other hard rock quarries, which often have faces above natural ground level.

On the other hand the processing area is higher in the landscape and measures are recommended to minimise dust, noise and visual impacts from that operation.

The requirement for buffers mainly relates to dust and noise. Distances to the closest sensitive premises remain sufficient for the mitigation of noise and dust, and rarely to never are there any complaints relating to these parameters.

Compared to other hard rock quarries on the Darling Scarp and other locations, the available buffers are much greater than Boral Orange Grove Maddington Quarry, Hanson Bunbury, Mt Barker and Gelorup Quarries, Holcim Gelorup and Albany Quarries and all of which have a number of dwellings at 500 plus metres or less and all have operated for many years.

The buffers and setbacks are similar to those available to Hanson Byford Quarry.

End Use

The end use will be a return of the quarry to a sloping valley side covered by local native trees and shrubs.

The setback to Manjedal Brook will be re-established to local native riparian and other vegetation, matched to habitat.

6.3 Conservation Status

Conservation

There are no significant conservation issues identified for Lot 800 apart from Manjedal Brook and the Darling Scarp. All issues are discussed under the individual sections of the documentation.

6.4 Research

Baseline Data Collection and Analysis

Additional data and research is being undertaken on;

- A site contour survey to be used during the detailed quarry design.
- Mine planning which will be updated as part of the ongoing design and operations.
- Detailed site water management will be updated as or if required as the mine planning is further advanced and the ground areas and subsoils are known in all areas.
- Research on rehabilitation will be undertaken, although these processes are well known from work Landform Research has completed on many quarries, including hard rock quarries of Hanson at Red Hill, Byford, Gelorup and Mt Barker, Boral at Orange Grove, PMR Quarries at Pickering Brook and the Esperance Port Quarry rehabilitation for which Italia (Roadstone) won environmental awards.

6.5 Heritage

Indigenous Heritage

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

A search of the Department of Aboriginal Affairs database shows there are no listed sites on or near the site.

Should any evidence of early aboriginal occupation be uncovered, development will be stopped pending an assessment by a recognised consultant.

If the site is confirmed as a site under the provisions of *Section 15 of the Aboriginal Heritage Act 1972-1980* and Amendments operations will cease pending relevant negotiations.

European Heritage

As far as is known, there are no known local areas of European heritage.

6.6 Landuse and Conservation

Planning

Lot 800 lies within the Shire of Serpentine - Jarrahdale.

The planning aspects of the land and the proposed development are considered under Section 1.8 Planning Policies and Land Zonings

The site is compatible with the relevant planning policies and has the ability to be approved by the Shire of Serpentine Jarrahdale, Western Australian Planning Commission and the Government regulatory agencies.

Conservation Management

No particular Conservation reserves or other significant areas are located near the proposed quarry site apart from the State Forest that adjoins along the eastern boundary. A forty metre management setback is proposed for that boundary.

Normal management of potential environmental impacts will protect the environmental and the nearby Manjedal Brook to the north which will have the riparian buffer re-established.

6.7 Stakeholder Consultation

- **Shire of Serpentine - Jarrahdale**

Discussions will be held between Italia and the Shire of Serpentine Jarrahdale, both prior to submission of the Development Application and during the assessment processes.

Communications will be continued as necessary with the Shire during the life of the operations with the Shire normally inspecting quarries between one and four times per year.

- **Community**

Italia Stone Group will notify local residents of the proposed quarry, and, prior to construction commencing, will establish a community reference group to enable a forum for the discussion of the proposed operations. It is proposed to hold regular meetings with the adjoining landholders and Shire during construction and at least annually after that.

- **Environmental Protection Authority**

The proposed quarry will be submitted to the EPA to enable it to set the level of assessment if the proposal is deemed to be a potentially significant project that should be assessed under *Part IV of the Environmental Protection Act 1986*.

- **Department of Environment Regulation**

A DER Licence will be required for crushing and processing the hard rock will be required under *Part V of the Environmental Protection Act 1986*

- **Department of Mines and Petroleum**

The Safety Division of the DMP will oversee on site safety, and inspect the site from time to time and receive the annual reporting.

- **Department of Parks and Wildlife**

The Department of Parks and Wildlife oversee the management of the surrounding land associated with State Forest through a number of management plans.

The proposal has been designed to minimise any risk to the State Forest.

- **Department of Water**

The Department of Water overseas the management of water courses such as Manjedal Brook. DOW will provide input to the water management on site and the Water Management Plan.

Date	Description of consultation	Stakeholder	Stakeholder comment/issue	Italia Stone Group Response	Stakeholder Response
2016 Ongoing	Referral of the application to the Shire. Discussions with the Shire of Serpentine Jarrahdale	Shire of Serpentine Jarrahdale	This Management Plan forms the basis of the proposal and the basis on which discussions will be held. No discussions have yet been held.	During the application process the application will be referred to the Shire of Serpentine – Jarrahdale for consideration.	Discussions will be held as required. The comments of the Shire will be considered and incorporated into the Management Plan where possible.
As required.	Consultation	Department of Water	Issues guidelines for water quality management for extractive industries. Oversees protection of groundwater and water courses. Issues water licences. The proposal will be referred to the DOW for their advice to the Shire.	The onsite water management planning will be updated when the site survey has been conducted.	
Issue of Licence Annual reporting	Licensing Annual reporting Renewal Annual inspections	DER	Liaison will be held with the DER during the Works Approval and Licensing processes.	A DER Licence will be applied for the crushing and screening to be conducted on site.	
Annually	Consultation	DMP	A Clearing Permit will be required if the operations are expanded.	A Clearing Permit will be applied for if the operations are expanded and clearing is required.	
Annually	Consultation	DMP Safety Division	Controls the safety and methods of excavation through the <i>Mines Safety and Inspection Act 1994</i> . Ongoing discussions will be held with DMP during operations.	Comply with any DMP Safety Division requirements.	
As required	None at this stage	Department of Parks and Wildlife	Oversees all significant environmental impacts.	Italia is aware of their responsibilities in relation to flora and fauna.	

			Responsible for flora and fauna conservation.	There do not appear to be any significant flora and fauna issues. The proposal is designed not to have any impact on the State Forest.	
As required	Input to tenement conditions	Main Roads	Discussions will be held with Main Roads or advice sought on the access to, and the cross over at, South Western Highway	Greenfield Services (traffic engineers) have been commissioned to provide advice on the access to South Western Highway.	

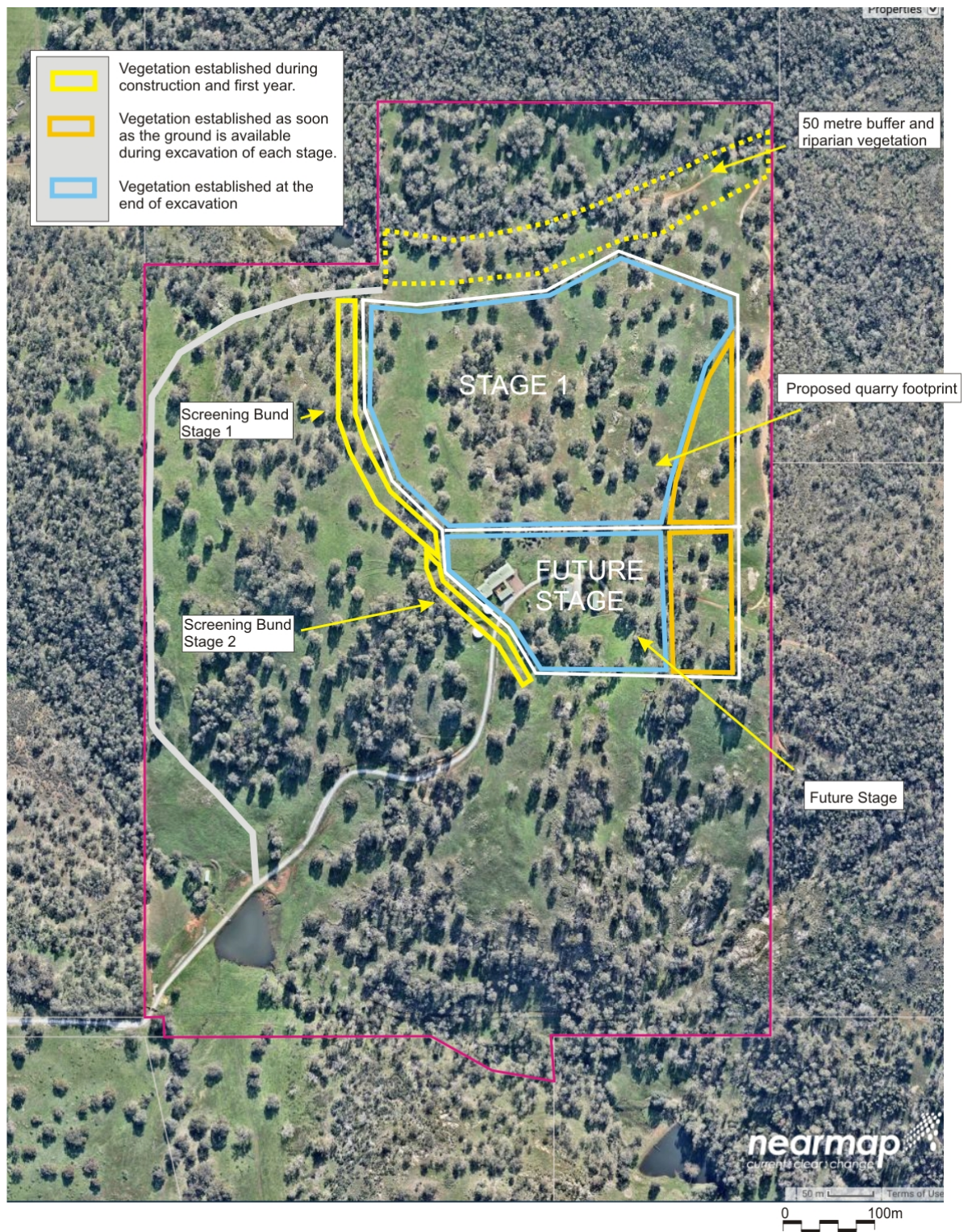


Figure 14 Staging and Rehabilitation



Figure 15 Concept and sketch section of rehabilitation

7.0 REHABILITATION AND CLOSURE

The rehabilitation and closure planning will be updated from time to time as the excavation progresses forwards.

The rehabilitation methods will be applied to any ground that is to be closed and rehabilitated, even that which is rehabilitated in the early stages of construction.

Lot 800 is rural land and will be returned to that land use at the end of excavation in compliance with all local and regional planning policies. See 1.8 Planning Policies and Land Zonings.

The extraction of granite hard rock is seen as an interim use of the land followed by an end use of local native vegetation within the pit itself and rural land use on other parts of Lot 800.

The final contours are to a sloping land surface in compliance with the *Mines Safety and Inspection Act 1994* and *DMP Mine Closure Guidelines*.

The end result of the pit will be that ultimately 16 hectares of parkland pasture will be returned to local native trees and shrubs at the conclusion of excavation.

The main closure issues relate to the reformed slopes that need to be formed to be resistant to erosion combined with visual management in addition to making the pit safe.

There will be no tailings, adverse soil or other materials or features on site and none are proposed during future excavations.

There will be some dumps of subgrade rock and overburden, which will be used for rehabilitation of faces.

The pit is to be excavated to a series of benched faces in the north that will be rehabilitated to a steeper rocky slope of about 1 : 2 which will match the rocky local areas.

Post mining landuse will be a return to local native trees and shrubs on steeper slopes.

The Completion Criteria are identified below as auditable tasks developed from the Closure Objectives.

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

Assessment of species and success.

- All species used in rehabilitation of the pit slopes are to be local provenance species suited to the local regolith.
- Species are to mimic the local communities.
- In some key screening areas non local native species may be used to provide rapid visual protection.
- A plant density that is variable but with an average plant density of 50 plants per 100 m² in locations where topsoil is available and 30 plants per 100 m² in other locations.
- Species richness of 5 species per 100 m² in all areas.

Full details of the Biodiversity Management, Rehabilitation and Closure are found in Attachment 6.

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