FLORA AND VEGETATION ASSESSMENT

LOT 502 MURRAY ROAD, QUALLILUP

TRIPLE M TRANSPORT LIMESTONE PIT

June 2018

FLORA AND VEGETATION ASSESSMENT
In support of a Clearing Permit.

LOT 502
MURRAY ROAD, QUALLILUP

TRIPLE M TRANSPORT LIMESTONE PIT

Landform Research
Quarries, Land Systems, Environment, Geology
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SUMMARY

Triple M Transport WA Pty Ltd has operated a limestone pit west of Esperance for nearly 20 years. The pit provides a valuable resource of limestone in an area where limestone is difficult to source because of variable grades conservation nomination of much of the higher grade material.

Crushed Limestone is an essential resource to the State, for correcting soil acidity caused during normal farming operations through the use of nitrogenous fertilizer and legume crops. The need for crushed limestone is recognised by the Department of Agriculture and Food (Bulletin 4784). They have also recognised the importance of this operation in an area of few limestone resources in DAF Bulletin 4760. This limestone pit supplies almost all the Esperance Region with agricultural lime.

The area proposed to be cleared lies on Portion of Lot 502 even though the survey was conducted both on Lot 502 and M63/602.

The limestone on Lot 502 represents one of the few places where this material is available on private land. The site has operated as a limestone pit since 1999 through an Extractive Industries Licence and originally permission to clear through the *Soil and Land Conservation Act 1945*.

Planning Consent and an Extractive Industry Licence is currently in place through the Shire of Esperance and covers an area of around 16.0 hectares.

This proposal seeks approval to progressively clear 5.095 hectares of resource over a period of ten years. The area to be cleared has been chosen as the area of limestone resource within the 16.0 hectare approved extraction footprint, that has been subject to a flora and vegetation survey.

The vegetation hasassessed by the Esperance Wildflower Society in 2000, 2009 and 2017. The 2017 Flora and Vegetation report is attached and includes the earlier assessments.

Two earlier vegetation Studies have been completed by the Esperance Wildflower Society. As the excavation is moving onto a new area an additional study was completed in spring 2017 covering the new proposed excavation area. Over the years the vegetation has also been assessed informally by Lindsay Stephens of Landform Research.

The earlier studies provided the detail for Clearing Permit CPS 4782/1 covering the existing pit to the west.

The site lies in coastal vegetation at Dalyup west of Esperance. The only limestone in the area lies within the coastal dune network which almost everywhere is located within coastal reserves and Crown land.

No Threatened Ecological Communities were recorded. One Priority species recorded was *Austrostipa mundula* (P3) of which around 100 plants were noted across the study area with less on the proposed clearing permit area. A nearby search showed a cluster of around 100 plants of the same species just 400 metres to the south east.

The size of the current pit is limited so there has not been the opportunity to undertake any significant rehabilitation. The rehabilitation that has been possible has been very successful and shows strong growth.

Rehabilitation will continue to be undertaken progressively as the new ground is opened and the completed areas are excavated.

The vegetation on site is Vegetation Association is 7048, Shrublands; *Banksia* scrub-heath on coastal plain in the Esperance Plains of which 78.9% of the original total is located within IUCN Class I – IV Reserves.

Considering the location of this remnant vegetation, its general lack of agricultural capability, combined with the majority of the calcareous sand substrate being too low in grade for use as agricultural lime, there is little pressure on this vegetation type.

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Limestone Extraction, Lot 471, Murray Road, Quallilup.

1.0 LIMESTONE PRODUCTION

Limestone has been mined from this site since 2000 generally at a rate of around 50 000 tonnes per year but up to nearly 100 000 tonnes in high demand years. Almost all limestone is provided for soil amendments.

1.1 Need for Lime for Agriculture

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

Acidification of soils is seen as one of the major impediments to continued viable farming in Western Australia. The State Of the Environment Report Western Australia 2007 shows that about two thirds of the South West agricultural soils are at risk of acidification. When the acidity builds up essential nutrients become unavailable to plants and the crops reduce in vigour and eventually fail. In addition some other elements such as aluminium become soluble and lead to toxicity in stock and plants. See Appendix 1.

The normal methods of treatment of soil acidity is to add agricultural lime and crushed limestone as explained in *Department of Agriculture and Food Bulletin 4784 Soil Acidity, A guide for WA farmers and consultants*. See Appendix 2.

Abeysinhe, P B, 1998, Limestone and Limesand Resources of Western Australia, Geological Survey of Western Australia, Mineral Resources Bulletin 18, also summarises the uses for limestone and lime and the deposits, but does not list the limestone in this locality. The only listing for the south east is an old pit 100 km east from Esperance.

1.2 Local Resources of Limestone - Lime

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

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

Lot 471 and the surrounding local area is one of the few locations where high grade limestone occurs. The importance of the site is recognised in the *Department of Agriculture and Food Bulletin 4660, Survey of Western Australia agricultural lime sources*. On page 5 of that document it can be seen that the Triple M Transport Limestone at SCLS10 is the only lime source within the Esperance Area. The relevant pages from Bulletin 4660 are attached as Appendix 3.

Data from Bulletin 4660, of limestone from the pit, shows that the typical calcium carbonate content is 70% or over. Tests of the pit have revealed calcium carbonate content of 67% to 78%. (Appendix 8)

Other lime resources, such as the bare dunes to the east have only 40% calcium carbonate.

This limestone pit supplies almost all the Esperance Region with agricultural lime. Lot 502 therefore represents a very valuable community resource.

1.3 Approvals in Place

The area proposed to be cleared lies on Portion of Lot 502 even though the survey was conducted both on Lot 502 and M63/602.

The limestone on Lot 502 represents one of the few places where this material is available on private land. The site has operated as a limestone pit since 1999 through an Extractive Industries Licence and originally permission to clear through the *Soil and Land Conservation Act 1945*.

Planning Consent and an Extractive Industry Licence is currently in place through the Shire of Esperance and covers an area of around 16.0 hectares.

An Extractive Industry Licence was granted by the Shire of Esperance on 20 May 2037 Shire of Esperance Resolution 0208-1260. A copy of that approval plus amendment for an area of aroiunf 16.0 hectares is attached.

This proposal seeks approval to progressively clear 5.095 hectares of resource over a period of ten years. The area to be cleared has been chosen as the area of limestone resource within the 16.0 hectare approved extraction footprint, that has been subject to a flora and vegetation survey.

The vegetation hasassessed by the Esperance Wildflower Society in 2000, 2009 and 2017. The 2017 Flora and Vegetation report is attached and includes the earlier assessments.

Two earlier vegetation Studies have been completed by the Esperance Wildflower Society. As the excavation is moving onto a new area an additional study was completed in spring 2017 covering the new proposed excavation area. Over the years the vegetation has also been assessed informally by Lindsay Stephens of Landform Research.

The earlier studies provided the detail for Clearing Permit CPS 4782/1 covering the existing pit to the west.

During the application for the Extractive Industries Licence there was a significant amount of liaison with the various Government Departments.

The proposed sand excavations to the west were considered by the Department of Environmental Protection under delegated authority from the EPA under *Part V of the Environmental Protection Act 1986*. The decision was “Informal Review with Public Advice Given”. DEP Reference 147010. Attached.

The decision was appealed and dismissed by the Minister for the Environment on 12 June 2000. Attached.

A Clearing Permit, under the *Soil and Land Conservation Act 1945*, lapsed in 2002. during that process there was extensive liaison between the Government departments as listed below. (074/99).

The earlier studies provided the detail for Clearing Permit CPS 4782/1 covering the existing pit to the west.

1.4 Consultation

Water and Rivers Commission provided comment to the Shire of Esperance on 5 November 1999. Whilst the site is located in a Priority 1 groundwater area, it is on the very edge of that area adjacent to the Priority 2 zoning. There are no local water production bores

Discussions and site inspection with Les Coyne from DEC on 22 October or November 1999 regarding flora and fauna. At that time there were no records of rare species.

Department of Mines Industry Regulation and Safety were consulted during the original approval process and the site is registered by DMIRS under the Project Management System.

2.0 METHODOLOGY

The Esperance Wildflower Society conducted three surveys of the area.

They completed a study of Lot 471 in 2000. During that study they completed a series of five 20m x 20 m plots based on the methodology of *"Bushland Plant Survey" Wildflower Society of WA (Inc)* Publication, the same methodology used for the survey of many public resaves. The 2000 study is attached to the 2017 study.

An additional study was conducted outside Lot 471, south towards the coast and an area to the south in 2008 and 2009. Whilst that study is not relevant to this proposal it does provide additional information on vegetation within the local area. The study is attached to the 2017 study.

Lindsay Stephens of Landform Research has inspected the site on a number of occasions from December 2009, to 2017, review the excavation, vegetation and rehabilitation issues. No additional flora studies were completed.

3.0 PHYSICAL ENVIRONMENT

3.1 Site Description

The site covers part of the cliffed coast at Quallilup, 40 km west of Esperance.

The main resource lies in a series of sand dunes at an elevation of 40 – 60 metres AHD.

The limestone consists of a series of overlying and interbedded limesands - limestone varying from calcarenite, a sandy limestone through to limestone of variable calcium carbonate content to calcareous overlying sands.

There is also some recalcified capstone development on the current and older buried soil horizons.

The limestone ranges up to 80% $CaCO_3$ but ranges lower in some beds and, with selection and blending is capable of averaging 75% $CaCO_3$. Due to dissolution of the calcium carbonate the $CaCO_3$ drops inland so that some few hundred metres from the coast the grade is typically 60%, hence the resource is located so close to the coast.

The limestone can be crushed for agricultural lime with the harder material being used for road base.

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

Climate

The climate is semi-arid Mediterranean. Climate is recorded at Esperance although local rainfall is available. Temperatures average up to maxima of around 25 degrees in summer and down to 17 degrees in winter. Minima range from around 15 down to 7 degrees summer to winter.

Rainfall locally is approximately 625 mm per year based on farm data. Most of the rain falls in the months May to August inclusive. Evaporation is approximately 1700 mm per year. (Water and Rivers 1997 WRAP 5).

Hydrology

Lake Quallilup is a permanent lake that is fed via overflow from the Dalyup River feeding into Lake Gore to the north west. It is a saline to brackish lake depending on the volume of water flowing into it.

Lake Gore and reserve land west of Lake Quallilup is classified as a RAMSAR Wetland. Lake Quallilup is not listed as a RAMSAR Wetland but this does not diminish its conservation values. The pit is 300 metres from Lake Quallilup. Quarrying over the past 10 years has not revealed any impact on the lake or any disturbance on the intervening vegetation and habitats.

Rainfall on the proposed excavation area infiltrates vertically downwards to a deep granite basement well below the base of the limestone pit. The base of the pit is at approximately 40 metres AHD.

In locations such as this, adjacent to the ocean and a lake, the water table is normally close to 1 – 5 metres AHD unless perched within a valley of the granite basement. Groundwater flow will either be west to Lake Quallilup or south to the cost if there is a rise in the granite basement west of the pit, although there is no evidence of this.

The site lies on the western edge of a Priority 1 Groundwater Protection Area near the boundary of Priority 2. There are no production bores in the local area and ground water flow is west and south away from the protection area. In 1999 the Water and Rivers Commission approved the quarry.

The base of the pit is therefore some 30 metres above the highest known water table and well within the compliance of the Department of Water guidance of a 3 metre separation between the base of an excavation and the highest known water table in a Priority 1 Groundwater Protection Area.

The pit only operates during the summer months.

3.2 Proposed Landuse – Excavation Methods

A discussion of the operations is contained in the attached management plan.

The pit operates only during the summer months when the limestone is being applied to agricultural land.

The vegetation is cleared with a loader and pushed into low bunds/dumps.

Topsoil is then recovered for later use in rehabilitating the pit. This is stored in separate low bunds and dumps at the edge of the pit.

Overburden is then pushed to the edge of the pit, stored in separate bunds/dumps for use in rehabilitation.

No chemicals are used in the extraction of limestone apart from normal fuels and lubricants.
As the current pit is used for all processing and stockpile areas, little rehabilitation has been undertaken. As the pit moves forward, when permitted by a Clearing Permit, the excavated ground will be rehabilitated according to the approved rehabilitation plan.

Very successful revegetation of the available areas of the existing operations has been completed as shown in the photographs in the management plan.

4.0 VEGETATION ASSESSMENT

4.1 Community Types

The vegetation was assessed by the Esperance Wildflower Society in 2000., 2009 and 2017.

The dominant species on the exposed limestone was *Pultenaea heterochila,* which was common wherever limestone was present at the soil surface. Other species contributing significantly to the structure of the open heath included *Acrotriche cordata, Acacia cochlearis, Pimelea ferruginea,* and *Scaevola cuneiformis.*

Vegetation on the deep sands was typically *Anthocercis littorea* open scrub, with *Solanum symonii* and *Adriana quadripartita* codominant in places. Gaps between these species were sometimes occupied by sedgelands of *Lepidosperma squamatum* and *L. gladiatum* or open herbfields of *Opercularia spermacocea*, especially at the base of dunes and on dune slopes.

Other species that were common within the open scrub included *Spyridium globulosum, Gahnia aristata, Desmocladus flexuosus, Acacia cochlearis*, and *A. cyclops*. At the northern end of the site, the grass *Poa poiformis* was a common component of the sub-shrub layer. Occasional clumps of the speargrass *Austrostipa acrociliata* occurred on the dune slopes.
The vegetation is typical of the coastal vegetation around much of the south coast.

The vegetation is classified by Beard 1973, as;

eaSi, Coastal dune scrub.

In the NRM mapping through the Department of Agriculture and Food database the vegetation is listed as;

Vegetation Type 1914 Type 1, Description Shrublands, *Banksia* scrub heath on the coastal plains in the Esperance Plains Region.

Vegetation Association – 7048, Shrublands; *Banksia* scrub-heath on coastal plain in the Esperance Plains.

NVIS Lv2, Structural formation - Open Shrubland.

NVIS Lv3

4.2 Vegetation on Site

- **Species List**

The species recorded during the site investigations by the Esperance Wildflower Society.

A total of 77 species from 36 plant families were recorded, with seven species being exotic.

5.0 SIGNIFICANT VEGETATION

5.1 Declared Rare, Priority or Significant Taxa

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

5.2 Threatened or Priority Ecological Communities

The vegetation is not listed as either Endangered or a Priority Community under State databases and Legislation. See the report by the Esperance Wildflower Society.

The ***Scrub heath on deep sand with Banksia and Lambertia, and Banksia scrub heath on Esperance Sandplain*** is listed as Priority 3 Community on State Conservation Lists but does not occur on site.

5.3 EPBC Legislation

No Declared Threatened, Priority Species, Significant flora or Threatened or significant ecological communities were identified during the vegetation assessment conducted by the Esperance Wildflower Society.

The Proteaceous dominated vegetation, ***Proteaceae dominated kwongkan shrublands of the south east coastal floristisc provence of Western Australia***, is listed as Threatened under the *EPBC Act 1999*. A Conservation Advice is provided for that plant community and includes extensive species lists. The species lists provided are not typical of those found on Lot 502, which on the resource area is coastal heath.

The vegetation on the resource area is not representative of these communities.

6.0 VEGETATION CONDITION

The Vegetation Condition Score used in this study is that used in Bush Forever 2000. The condition is excellent.

Using the vegetation condition score developed by Kaesehagen 1995 the vegetation is generally classified as Excellent even though it is undertaking successional growth from a fire several years earlier. See Esperance Wildflower Society 2018 atttached.

7.0 REPRESENTATION OF THE FLORA - VEGETATION

7.1 Significant Flora

No Declared Threatened, Species, were identified during the vegetation assessment conducted by the Esperance Wildflower Society.

One Priority species recorded was *Austrostipa mundula* (P3) of which around 100 plants were noted across the study area with less on the proposed clearing permit area. A nearby search showed a cluster of around 100 plants of the same species just 400 metres to the south east.

Vegetation on site will be providing habitats for birds and other small fauna, but with its sparseness on the low ridge and fire impacts the number of fauna species is likely to currently be restricted.

7.2 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.

Beard 1973, on the Esperance and Malcom Areas shows the same vegetation as occurring along the coast from well to the west and east for over 200 km.

NRM mapping shows the site as;

> Vegetation Type 1914 Type 1, Description Shrublands, *Banksia* scrub heath on the coastal plains in the Esperance Plains Region.
>
> Vegetation Association – 7048, Shrublands; *Banksia* scrub-heath on coastal plain in the Esperance Plains.
>
> NVIS Lv2, Structural formation - Open Shrubland.
>
> NVIS Lv3, Floristic Formation - *Banksia* Open Shrubland

Shepherd et al 2002, Native Vegetation in Western Australia Extent, Type and Status, Department of Agriculture and Food Resource Management Technical Report 249 lists Vegetation Association 7048 as having;

> Pre-European extent of 143 128 hectares of which 118 188 hectares remains. This represents 82.6.% of the original extent.
>
> Of the remaining vegetation 78.9% is located within IUCN Class I – IV Reserves, 0.0% is located within other Reserves and 0.0% is located within pastoral leases managed by DEC.

Considering the location of this remnant vegetation, its general lack of agricultural capability, combined with the majority of the calcareous sand substrate being too low in grade for use as agricultural lime, there is little pressure on this vegetation type.

With rehabilitation there will be the opportunity to return local species to the site.

The vegetation already meets the 30% retention criteria with 78.9% located within secure reserves.

8.0 CLEARING ASSESSMENT

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.

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

The *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* provide for planning and other policy issues to be taken into account when determining clearing applications.

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

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

The issue of clearing native vegetation and fauna habitat cannot therefore be considered separately but must be considered in terms of community needs.

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

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

Assessment against the Clearing Principles

	CLEARING PRINCIPLE *(Schedule 5 Environmental Protection Amendment Act, 1986).*	**COMMENT**
1a	High Level of diversity	• The site has been assessed in the flora surveys by the Esperance Wildflower Society and found to have a relatively low level of diversity with 77 taxa of which seven were exotic. • Even so the vegetation is in excellent condition and is typical of large areas of the south eastern coastal vegetation. • See Flora and Vegetation Surveys by the Esperance Wildflower Society 2018. *The proposed clearing may be partially at at variance with this principle.*
1b	Significant fauna habitat	• The vegetation is providing habitat for local species although some reductions can be expected as a result of the recent fire.. The Esperance Wildflower Society in the earlier reports recorded the presence of kangaroo droppings and 12 species of bird. • Revegetation is to local native species and has been very successful, returning the completed areas of the pit to local native habitat similar to the pre-mined condition. • Whilst habitat will be cleared progressively, it will be replaced at the end of excavation by similar species composition that will be capable of developing into similar habitat to the pre-mined vegetation. • The DEP assessed the site under Part V of the EP Act 1986 on behalf of the EPA. The level of assessment was set at Informal Review with Public Advice Given. This was appealed and dismissed. • There is no evidence of disturbance to adjoining vegetation outside the operational pit. The site is only worked during the summer months. *The proposed clearing is not at variance with this principle.*
1c	Necessary to existence of Rare flora	• No Threatened (Declared Rare) was found. • One Priority species recorded was *Austrostipa mundula* (P3) of which around 100 plants were noted across the study area with less on the proposed clearing permit area. A nearby search showed a cluster of around 100 plants of the same species just 400 metres to the south east. *The proposed clearing is not at variance with this principle.*
1d	Threatened Ecological Community	• No Priority or Threatened Ecological Community occurs on site either under State or Commonwealth databases. *The proposed clearing is not at variance with this principle.*
1e	Significant area of vegetation in an area that has been extensively cleared	• Most of the coastal heathlands in the south east remain. There is little pressure for clearing. The soils have low agricultural capability and the coastal sands are normally of low calcium carbonate content that is unsuitable for lime manufacture. • Shepherd et al 2002, Native Vegetation in Western Australia Extent, Type and Status, Department of Agriculture and Food Resource Management Technical Report 249 lists Vegetation Association 7048 as having; Pre-European extent of 143 128 hectares of which 118 188 hectares remains. This represents 82.6.% of the original extent. Of the remaining vegetation 78.9% is located within IUCN Class I – IV Reserves, 0.0% is located within other Reserves and 0.0% is located within pastoral leases managed by DEC.

		• Considering the location of this remnant vegetation, its general lack of agricultural capability, combined with the majority of the calcareous sand substrate being too low in grade for use as agricultural lime, there is little pressure on this vegetation type. • With rehabilitation there will be the opportunity to return local species to the site. • The vegetation already meets the 30% retention criteria with 78.9% located within secure reserves. *The proposed clearing is not at variance with this principle.*
1f	Wetland or watercourse	• The site lies east of Lake Quallilup with a separation of 300 metres. • The site is elevated at up to 60 metres AHD with groundwater flow deep below the base of the pit. • Water and Rivers (DWER) reviewed the proposal for the existing limestone pit, prior to commencement and did not raise any objections. • Whilst the site is located in a Priority 1 groundwater area, it is on the very edge of that area adjacent to the Priority 2 zoning. There are no local water production bores. Figure 4 in Water and Rivers Commission 1999, Esperance Water Reserve Water Source Protection Plan, WRP 22. *The proposed clearing is partially at variance with this principle.*
1g	Land degradation	• The excavation can continue to be managed in a manner that does not lead to degradation of the soil and land integrity apart from normal development issues. • Certainly the land is cleared and temporarily denuded, but the existing rehabilitation has demonstrated that the disturbance is temporary and that good ecological values can be restored. Landform values return as the excavated surface is revegetated. • There is no evidence of any changes to native vegetation adjoining the existing pit as a result of the access road as shown by examination of the vegetation. • There are some weeds coming along the access road probably as a result of traffic, public use and disturbed ground being open to colonisation by exotic species. There does not appear to be any significant weeds associated with the existing pit. • The excavation is a temporary disturbance to the land and with rehabilitation and time a new habitat will develop to replace that lost. *The proposed clearing is partially at variance with this principle.*
1h	Impact on adjacent or nearby conservation areas	• See 1f Wetland and watercourse. • Lake Quallilup is not part of the RAMSAR listed wetland system of Lake Gore but this does not change the ecological values of Lake Quallilup. • The buffer to Lake Quallilup will be over 300 metres. This buffer is limited by the distribution of the high calcium carbonate resource which only occurs in this area at the proposed location with some extension onto Crown land to the east. • Reserve 30672 adjoins to the east and south. During excavation since 2000 there have been no impacts on that reserve from the quarrying activities. • Biodiversity values will over time return. As noted in 1f above the DEC has inspected the current workings and found them to be in compliance. *The proposed clearing is not at variance with this principle.*
1i	Deterioration of underground water	• Quarrying is one of the few activities permitted in Public Drinking Water Source Areas. • The site lies east of Lake Quallilup with a separation of 300 metres.

		• The site is elevated at up to 60 metres AHD with groundwater flow deep below the base of the pit. • DWER reviewed the proposal prior to commencement and did not raise any objections. Whilst the site is located in a Priority 1 groundwater area, it is on the very edge of that area adjacent to the Priority 2 zoning. There are no local water production bores. Figure 4 in Water and Rivers Commission 1999, Esperance Water Reserve Water Source Protection Plan, WRP 22. (Appendix 7 page 12). • The existing mining operations have demonstrated that excavation can take place with no impact on the surface or intermittent lake water. • Excavation since 2000 has not shown any detriment to the local water quality in the groundwater or Lake Quallilup. Changes to the salt content of the lake water occur as a result of flow volumes in the Dalyup River. • See 1f Wetland or Watercourse. *The proposed clearing is not at variance with this principle.*
1j	Increase flooding	• The site is high in the landscape and, with a relatively small area of clearing, will have no observable impact on water elevations in Lake Quallilup. • There is no evidence of the access roads impacting on water regimes, flooding or surrounding vegetation. • See 1f Wetland or Watercourse and 1i Deterioration of underground water. *The proposed clearing is not at variance with this principle.*

ADDITIONAL CLEARING PRINCIPLES – EXTRACTIVE INDUSTRIES		**COMMENT**
Environmental Protection Act 1984 Section 51O Planning Matters		
1	*Planning Matters*	• The limestone is not classified under any planning documents as a special resource. However as the location is within the agriculture area this is normal in such areas. • The limestone is recognised by the Department of Primary Industries and Regional Development as an important resource. See 2a below. • An Extractive Industry Licence was granted by the Shire of Esperance on 30 October 2000 and renewed in October 2001 for a period of 21 years for the existing pit. • The proposed pit was approved by the Shire of Esperance, expiring on 10 May 2037. • During the application for the Extractive Industries Licence there was a significant amount of liaison with the various Government Departments. *The proposed clearing is compatible with factor.*
Environmental Protection Act 1984 Section 51O Relevant Matters		
2a	*Need for the resource*	• The limestone resources are recognised by the Department of Primary Industries and Regional Development as being highly significant resources for the continued production of agriculture lime. • Agriculture lime is essential to combat increasing soil acidity in the Esperance Region, and the number of high grade deposits is very low. • This site is listed in Department of Primary Industries and Regional Development Food bulletins as a source of agriculture lime. • Whilst limestone is common in coastal areas most of the

		resources are of lower grade. Low grade resources require much greater volumes to be used, significantly increasing excavation and transport costs and ground disturbance. For example much of the coastal dunes have a calcium carbonate content of only 40%. Therefore the resource being excavated with up to 78% will require only about half the tonnage of the locally common limestone and limesand to have the same acid soil mitigation effect. *The proposed clearing is compatible with factor.*
2b	*Classification of the resource and existing approvals*	• See 1 and 2a above. *The proposed clearing is compatible with factor.*
2c	*Availability of alternative resources and the impact of their use*	• There are few to no alternative resources. If this limestone is not used, it will have to be sourced from outside the area or from lower grade deposits both of which result in higher costs to the farming operations and significant additional greenhouse gas emissions. • Whilst limestone is common in coastal areas most of the resources are of lower grade. Low grade resources require much greater volumes to be used, significantly increasing excavation and transport costs and ground disturbance. For example much of the coastal dunes have a calcium carbonate content of only 40%. Therefore the resource being excavated with up to 78% will require only about half the tonnage of the locally common limestone and limesand to have the same acid soil mitigation effect.. • Taking limestone from elsewhere simply transfers any environmental issues elsewhere. It does not negate environmental impacts. • High grade limestone is very patchily distributed locally and is not common. • The locality is an established and recognised limestone resource area. *The proposed clearing is compatible with factor.*
2d	*Proposed final land use*	• The proposed final land use is to return the site to local native vegetation. • An approved revegetation plan is in place and the existing revegetation has been very successful. See the Management Plan, • Figures 7 and 8. *The proposed clearing is compatible with factor.*
2e	*Offsite Environmental impacts if the resource is not used*	• Not taking the resource will result in limestone having to be imported from elsewhere or, if available, from other areas that will also likely require clearing. Any alternative area may not offer any better environmental impacts. • If lower grades are used the volumes of limestone required to neutralize the soils will be greater. This will contribute additional greenhouse gas emissions. *The proposed clearing is compatible with factor.*
2f	*Sound environmental management and rehabilitation*	• Environmental and rehabilitation management procedures are in place. • The various Government authorities had input to the opening of the resource. *The proposed clearing is compatible with factor.*

REFERENCES

ANZECC, 1999, *National Framework for the Management and Monitoring of Australia's Native Vegetation*.

Beard J S, 1973, *Vegetation Survey of Western Australia, Esperance and Malcom, 1: 250 000 Series*. Vegmap Perth.

Myers J S, 1995, *1 : 1 000 000 Geological Series, Esperance,* Geological Survey of Western Australia.

Chamber of Commerce and Industry, 1995 and 1996, *Managing the Basic Raw Materials of Perth and the Outer Metropolitan Region*, Parts 1 and 2.

Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

Commonwealth of Australia, 2001, *National Objectives and Targets for Biodiversity Conservation 2001 – 2005.*

Department of Environment and Conservation, 2006, *Declared Rare and Priority Flora List*.

Environmental Protection Authority (2004), *Guidance Statement, Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia, No 51, June 2004.*

Environmental Protection Authority (2016), *Guidance Statement Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia.*

Environmental Protection Authority, Position Statement No 2, December 2000, *Environmental Protection of Native Vegetation in Western Australia*.

Esperance Wildflower Society 2000, 2009 and 2018, Vegtation Assessments.

Kaesehagen, 1995, *Bushland Condition Mapping*, IN Invasive Weeds and Regenerating Ecosystems in Western Australia, Proceedings of Conference held at Murdoch University, July 1994, Institute for Science and Technology Policy, Murdoch University.