



**CLEARING PERMIT SUPPORTING
DOCUMENTATION**

LOT 101 GIBB ROAD, KALOORUP

DECEMBER 2021

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1 INTRODUCTION

1.1 Applicant

The applicant for the Clearing Permit (Area) application is Naszko Investments Pty Ltd (ACN 167 483 829), with details as follows:

[REDACTED]

1.2 Background

The applicant is seeking to extract sand and gravel from a 20.94 hectare (ha) area within Lot 101 Gibb Road, Kaloorup (herein referred to as the subject site) (refer **Figure 1**). The subject site is located within the City of Busselton and is zoned 'Rural' under the City of Busselton's *Local Planning Scheme No. 21*. The subject site has been historically cleared for agricultural use and is comprised of pasture grasses and isolated peppermint (*Agonis flexuosa*) trees.

The proposed extraction operation will be undertaken over a five-year period with approximately 20,000 tonnes of sand and gravel extracted per year. To enable the proposed extraction operation, the removal of 26 peppermint (*Agonis flexuosa*) trees is required (refer to **Figure 2**).

1.3 Scope and Purpose

This document has been prepared to support an application for a Clearing Permit (Area Permit) pursuant to Section 51E of the *Environmental Protection Act 1986* (EP Act). This document provides information regarding the current environmental condition of the subject site, including the predicted impacts of clearing and proposed management actions to mitigate predicted impacts. It also provides an assessment against the ten clearing principles and other relevant legislation and policy.

1.4 Relevant Legislation and Policy

Western Australian legislation relevant to this Clearing Permit application includes:

- *Biodiversity and Conservation Act 2016*;
- *Environmental Protection Act 1986*;
- *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*; and
- *Rights in Water and Irrigation Act 1914* (RiWI Act).

2 BIOPHYSICAL ENVIRONMENT

During the compilation of this clearing permit application, a range of specific environmental and heritage issues were explored in relation to the clearing area, as discussed below.

2.1 Topography, Landform and Soils

The current topography of the subject site can be described as generally flat with online mapping from the Department of Primary Industries and Regional Development's (DPIRD's) *Natural Resource Information* (NRInfo) database indicating an elevation ranging between approximately 70 to 74 metres (m) Australian Height Datum (AHD).

A review of the mapping associated with the Australian Soil Resource Information System (ASRIS) indicates that the subject site is primarily located within the Whicher Scarp System, a component of the Donnybrook Sunkland Zone. This System is comprised of a low scarp and raised platform on the northern edge of the Donnybrook Sunkland, with sand gravel and pale deep sands, loamy gravel and non-saline wet soils. Three soil types have been mapped within the subject site:

- Yelverton very gentle slopes Phase: Undulating terrain. Duplex sandy gravels, semi-wet soils, yellow deep sands and sandy earths and loamy gravels.
- Yelverton flats Phase: Raised flats. Duplex sandy gravels, semi-wet soils, yellow deep sands and sandy earths and loamy gravels.
- Yelverton deep sandy flats Phase: Level to gently undulating raised shelf, lying 10-40 m above the Swan Coastal Plain. The soils are mainly sands.

2.2 Acid Sulfate Soils

Acid Sulfate Soils (ASS) is the common name given to naturally occurring soil and sediment containing iron sulfides. They have become a potential issue in land development projects on the Swan Coastal Plain when the naturally anaerobic conditions in which they are situated are disturbed and they are exposed to aerobic conditions and subsequently oxidise. When oxidised, ASS produce sulfuric acid, which can result in a range of impacts to the surrounding environment. ASS that has oxidised and resulted in the creation of acidic conditions are termed "Actual ASS" (AASS), and those that have acid generating potential but remain in their naturally anaerobic conditions are termed "Potential ASS" (PASS).

ASS risk mapping for the lower south west indicates that the subject site is not classified as having any risk of ASS occurring within 3 m of the natural soil surface or beyond (DWER 2017).

2.3 Hydrology

2.3.1 Groundwater

The subject site is located within the Dunsborough – Vasse sub-area of the proclaimed Busselton-Capel Groundwater Management Area (DoW 2009). Pursuant to the RiWi Act, in proclaimed areas it is an offence to take water without an appropriate licence.

This subarea is fed by three aquifers including the Superficial, Leederville and Surficial (Leeuwin) aquifers. The Superficial aquifer forms an unconfined aquifer beneath the Swan Coastal Plain with a thin saturated thickness of < 5 m and is fully recharged and saturated during the winter months resulting in large areas of water logging. The depth of the superficial layer decreases towards the Whicher Scarp, where it becomes a thin layer (0–3 m) over the laterite, underlain by the Leederville aquifer. The Leederville aquifer is multi-layered and typically 150m thick. It is recharged by direct infiltration and leakage from the above superficial

aquifer. Finally, the Surficial Aquifer refers to shallow groundwater abstraction from the Leederville aquifer, which includes soaks and dams excavated below the watertable (Schafer, D. Johnson, S. Kern, A. 2008).

There is generally no surface runoff water from the sand due to the porosity and permeability of the sand, with precipitation draining to the water table. It has been estimated that 30% of the rainfall will reach the superficial aquifer with an unknown amount filtering into the deeper aquifers, based on the pasture on the sand (Landform Research 2019).

To ensure compliance with Department of Water and Environmental Regulation (DWER) requirements, the excavation floor is to be undulating between 0.5 m - 2 m separation to the locally perched seasonal water table with batter slopes less than 1:4 vertical to horizontal. This will ensure surface water drainage will be similar to the current drainage in quantity and direction of flows (Landform Research 2019). Test holes sunk in 2018 and 2019 confirmed the resource area and depth assessments made by Landform Research (2019), and indicated that the excavation can be completed with no impact on the local water tables or any risk of local flooding (refer to **Appendix A**).

To protect the State's drinking water resources DWER has defined certain Priority Classification Areas within Public Drinking Water Source Areas (PDWSA) providing three levels of groundwater quality protection. These are based on the principles of risk avoidance (Priority 1), risk minimisation (Priority 2) and pollution limiting (Priority 3). The subject site does not lie within any existing or potential PDWSAs.

2.3.2 Surface Water

The subject site does not contain any watercourses or flood paths; however, the headwaters of the Carburnup River are located directly to the north of the subject site. The setback of the proposed extraction area is over 100 m and therefore will not impact the headwaters associated with the River. It is also noted that surface water will be contained within the excavated pits (Landform Research 2019).

Wetlands within Western Australia are classified on the basis of landform and water permanence pursuant to the Semeniuk (1995) classification system (refer to **Table 1**).

Table 1: Wetland classifications (Semeniuk 1995).

Water Longevity	Landform				
	Basin	Channel	Flat	Slope	Highland
Permanent Inundation	Lake	River	-	-	-
Seasonal Inundation	Sumpland	Creek	Floodplain	-	-
Intermittent Inundation	Playa	Wadi	Barlkarra	-	-
Seasonal Waterlogging	Dampland	Trough	Palusplain	Paluslope	Palusmont

Areas of wetlands have been mapped previously by Semeniuk (1995) across the South West Region. This mapping has been converted into a digital dataset that is maintained by the Department of Biodiversity, Conservation and Attractions (DBCA) and is referred to as the '*Geomorphic Wetlands South West*' dataset. This dataset contains information on geomorphic wetland types and assigns management categories that guide the recommended management approach for each wetland area. The wetland management categories and management objectives are listed in **Table 2**.

Table 2: DBCA wetland management categories (Semeniuk 1995).

Category	Description	Management Objectives
Conservation	Wetlands support a high level of ecological attributes and functions.	Highest priority wetlands. Objective is to preserve and protect the existing conservation values of the wetlands through various mechanisms including: • Reservation in national parks, crown reserves and State owned land, • Protection under Environmental Protection Policies; and • Wetland covenanting by landowners. No development or clearing is considered appropriate. These are the most valuable wetlands and any activity that may lead to further loss or degradation is inappropriate.
Resource Enhancement	Wetlands which may have been partially modified by still support substantial ecological attributes and functions.	Priority wetlands. Ultimate objective is to manage, restore and protect towards improving their conservation value. These wetlands have the potential to be restored to Conservation category. This can be achieved by restoring wetland functions, structure and biodiversity.
Multiple Use	Wetlands with few remaining attributes and functions.	Use, development and management should be considered in the context of ecologically sustainable development and best management practice catchment planning through landcare.

The subject site is located adjacent to a Multiple Use (MU) wetland on the south-eastern boundary (UFI 282) (refer to **Figure 3**). An additional five Resource Enhancement (RE) wetlands are located within a 1 km radius of the subject site (UFI 8, 14, 12, 17, 13).

MU wetlands are assessed as possessing few remaining ecological attributes and functions, which is characteristic of these mapped areas adjacent to the subject site. While such wetlands can still contribute to regional or landscape ecosystem management, including hydrological function, they are considered to have low intrinsic ecological value. Typically, they have minimal or no native vegetation remaining (less than 10%). Accordingly, there is no legislative requirement to protect or retain them and as such MU wetlands do not preclude development.

The management objective for MU wetlands is to preserve the hydrological functions in the context of the proposed development (EPA 2008). The proposed activities are not proposing to alter the natural surface flow process, with all water being retained within the excavated areas to enable infiltration through stormwater pits to ensure water quality is maintained.

2.4 Vegetation and Flora

2.4.1 Vegetation Types

The subject site is within the South West Forests Biogeographic Region (Thackway and Cresswell 1995, and Paczkowska and Chapman 2000). This region wraps around the Swan Coastal Plain, extending from Mogumber to the north to Cape Naturaliste in the south and as far east as Mount Barker.

While the majority of the subject site has previously been completely cleared of remnant vegetation, broadscale pre-European vegetation mapping of the area undertaken by Mattiske and Havel (1998) identified the subject site consists of the following vegetation complexes:

- Vegetation Association 310 – Yelverton (Y): woodland of Jarrah (*Eucalyptus marginata*), Marri (*Corymbia calophylla*), Peppermint (*Agonis flexuosas*) and Sheoaks (*Allocasuarina fraseriana*) on low undulating uplands in the humid zone.
- Vegetation Association 314 - Yelverton (Yd): woodland of Sheoaks (*Allocasuarina fraseriana*), Jarrah (*Eucalyptus marginata*), Western woody pear (*Xylomelum occidentale*) and Candlestick banksia (*Banksia attenuata*) on sandy slopes in the humid zone.

The mapped vegetation associations can be used to determine vegetation extent and status within the South West Forests region (refer to **Table 3**). The Environmental Protection Authority (EPA) recognises vegetation associations that are not well represented in reserves as being ‘significant’.

Table 3: Extent of pre-European vegetation remaining the South West Forests IBRA region.

System	Pre-European (ha)	Current Extent (ha)	Remaining Extent (%)	Extent in Managed Lands (%)
IBRA Bioregion				
South West Forests	4,350,580	2,819,347	65	50
Local Government				
City of Busselton	86,581	53,511	62	Not available
Heddle Vegetation Complex				
310 – Yelverton (Y)	9,0007	3,222	36	19
314 – Yelverton (Yd)	2,439	1,359	56	15
Beard Vegetation Association				
1181 - Chapman	9,978	5,318	53	36

The national objectives and targets for biodiversity conservation in Australia have a target to prevent clearance of ecological communities with an extent below 30% of their pre- European extent remaining. In consideration of **Table 3**, both Yelverton vegetation complexes have greater than 30% of their pre-European extent remaining denoting that they are well represented.

The majority of the subject site has been extensively cleared, resulting in vegetation in a ‘completely degraded’ condition. Native vegetation is restricted to the presence of isolated peppermint (*Agonis flexuosa*) trees over pasture grasses.

The vegetation is not representative of the abovementioned vegetative complexes and the subject site does not contain the floristic composition or structure consistent with this vegetation system. Accordingly, the clearing will not impact the extent of the Yelverton vegetation complexes.

2.4.2 Ecological Communities

Threatened Ecological Communities (TECs) are defined by the DBCA and are assigned to a category of Priority 1 to Priority 5.

Selected TECs are also afforded statutory protection at a Federal level pursuant to the *Environment Protection and Biodiversity Conservation Act 1998* (EPBC Act). The EPBC Act provides for the protection of TECs that are listed under section 181 of the Act, and are defined as “Critically Endangered”, “Endangered” or “Vulnerable”.

In addition to listing as a TEC, a community may be listed as a Priority Ecological Community (PEC). An ecological community that is under consideration for listing as a TEC, but does not yet meet the survey criteria or has not been adequately defined, is placed on the list of PECs in either Category 1, 2 or 3.

A search of the EPBC Act Protected Matters database indicated three TECs have the potential to occur within 5 km of the subject site. This includes the Banksia Dominated Woodlands of the Swan Coastal Plain ecological community (Endangered), Shrublands on southern Swan Coastal Plain ironstones (Endangered) and the Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community (Critically Endangered).

The vegetation within the subject site is not representative of these TECs due to the absence of key indicator species (such as Banksia spp. and *Eucalyptus gomphocephala*) and unsuitable soil types (i.e. the absence of ironstone soils).

2.4.3 Flora

A search for known rare and Priority flora within or in proximity to the subject site was undertaken through review of the following databases:

- DBCA's NatureMap database; and
- EPBC Act Protected Matters database

A total of six Threatened flora species, two Priority 1, one Priority 2, ten Priority 3 and four Priority 4 species were recorded within 5 km of the subject site. In addition, the EPBC Act Protected Matters database search returned three results for listed "Critically Endangered" species, 11 results for "Endangered" species and five results for "Vulnerable" flora species. A summary of these species and their likelihood of occurring within the subject site based on preferred soil types is provided within **Table 4**.

Table 4: Database search results for significant flora known to occur within a 5km radius of the subject site.

Species	DBCA Status	EPBC Act Status	Likelihood of Occurrence
<i>Acacia flagelliformis</i>	P4	-	Unlikely. Prefers sandy soils and winter wet areas.
<i>Acacia semitrullata</i>	P4	-	Possible. White/grey sand, sometimes over laterite, clay. Sandplains, swampy areas.
<i>Actinotus whicheranus</i>	P2	-	Unlikely. White sand pockets over laterite.
<i>Andersonia ferricola</i>	P1	-	Unlikely. Prefers white sand soils or red-brown loam
<i>Banksia nivea subsp. uliginosa</i>	T	Endangered	Unlikely. Sandy clay, gravel.
<i>Banksia squarrosa subsp. argillacea</i>	T	Vulnerable	Unlikely. Prefers sandy or gravel soils and winter wet flats
<i>Boronia capitata subsp. gracilis</i>	P3	-	Unlikely. White/grey or black sand. Winter-wet swamps.
<i>Brachyscias verecundus</i>	-	Critically Endangered	Unlikely. In a moss sward. On a granite outcrop.
<i>Caladenia busselliana</i>	-	Endangered	Unlikely. Sandy loam. Winter-wet swamps.
<i>Caladenia huegii</i>	-	Endangered	Unlikely. Grey or brown sand, clay loam.

Species	DBCA Status	EPBC Act Status	Likelihood of Occurrence
<i>Caladenia procera</i>	-	Critically Endangered	Unlikely. Rich clay loam. Alluvial loamy flats
<i>Calothamnus lateralis</i> var. <i>crassus</i>	P3	-	Unlikely
<i>Calothamnus quadrifidus</i> subsp. <i>teretifolius</i>	P4	-	Unlikely
<i>Chordifex gracilior</i>	P3	-	Unlikely. Peaty sand. Swamps.
<i>Cyathochaeta teretifolia</i>	P3	-	Unlikely. Grey sand, sandy clay. Swamps, creek edges.
<i>Daviesia elongata</i>	T	Vulnerable	Unlikely. Prefers sandy soils
<i>Diuris micrantha</i>	T	Vulnerable	Unlikely. Brown loamy clay. Winter-wet swamps.
<i>Drakaea elastica</i>	T	Endangered	Unlikely. winter-wet swamps.
<i>Drakaea micrantha</i>	T	Vulnerable	Unlikely. Prefers white-grey sandy soils
<i>Eucalyptus x phylacis</i>	T	Endangered	Unlikely. Laterite, loam over granite. Coastal areas.
<i>Gastrolobium papilio</i>	T	Endangered	Unlikely. Sandy clay over ironstone and laterite. Flat plains.
<i>Grevillea brachystylis</i> subsp. <i>grandis</i>	T	Critically Endangered	Unlikely. Brown lateritic clay loam soils.
<i>Hakea oldfieldii</i>	P3	-	Unlikely
<i>Isopogon formosus</i> subsp. <i>dasylepis</i>	P3	-	Unlikely. Prefers sand, sandy clay, gravelly sandy soils
<i>Lambertia echinata</i> subsp. <i>occidentalis</i>	T	Endangered	Unlikely. Red clay or sand over laterite. Seasonally wet flats.
<i>Lasiopetalum laxiflorum</i>	P3	-	Unlikely
<i>Loxocarya magna</i>	P3	-	Possible. Prefers Sand, loam, clay, ironstone
<i>Petrophile latericola</i>	T	Endangered	Unlikely. Red lateritic clay. Winter-wet flats.
<i>Pimelea ciliata</i> subsp. <i>longituba</i>	P3	-	Unlikely. Grey sand over clay, loam
<i>Schoenus</i> sp. <i>Jindong</i>	P1	-	Unlikely. Red loamy soils. Stream banks.
<i>Stylidium leeuwinense</i>	P4	-	Unlikely. Grey to black peaty sand. Winter-wet habitats.
<i>Synaphea decumbens</i>	P3	-	Unlikely. Sand over laterite.
<i>Synaphea hians</i>	P3	-	Unlikely. Sandy soils. Rises.
<i>Synaphea petiolaris</i> subsp. <i>triloba</i>	P3	-	Unlikely. Swampy areas, clay flats.
<i>Verticordia densiflora</i> var. <i>pedunculata</i>	T	Endangered	Unlikely. Grey/yellow sand, sandy loam. Winter-wet low-lying areas.
<i>Verticordia plumosa</i> var. <i>ananeotes</i>	T	Endangered	Unlikely. Sandy loam. Seasonally inundated plains.
<i>Verticordia plumosa</i> var. <i>vassensis</i>	T	Endangered	Unlikely. White/grey sand. Winter-wet flats.

Two species of conservation significance have the potential to occur within the subject site based on preferential soil types. These species are either shrubs or herbs. In consideration of the previous and

current land use (intensive livestock grazing) which has resulted in the complete absence of under and mid storey native vegetation, it is considered unlikely that the subject site contains flora species of conservation significance.

2.4.1 Ecological Linkages

The DBCA recognises several Regional Ecological Linkages that have been identified from studies of regionally significant natural areas (Molloy *et al.* 1999). While there is no statutory basis for regional ecological linkages, they have been recognised as an environmental policy consideration in EPA and planning policy over the last decade (EPA, 2009 and references therein).

A Regional Ecological Linkage axis runs through the south-western extent of the subject site (refer **Figure 4**). Vegetation in proximity to the axis within the subject site is only comprised of very occasional peppermint trees. Accordingly, vegetation within the subject site does not significantly contribute to the Regional Ecological Linkage.

2.4.2 Environmentally Sensitive Areas

Section 51B of the EP Act allows the Minister to declare an Environmentally Sensitive Area (ESA). Once declared, the exemptions to clear native vegetation under the regulations do not apply in these areas. Current declared ESAs are listed in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*.

There are no ESAs located within the subject site, however it is noted that an ESA associated with a TEC is located approximately 750 m to the east.

2.5 Fauna

A search of the DBCA NatureMap database was undertaken to establish whether species declared as 'Rare or likely to become extinct' (Threatened), 'Birds protected under an international agreement' (International Agreement (IA)) and 'Other specially protected fauna' (S) as listed under the *Biodiversity Conservation Act 2016* (BC Act) have been recorded in proximity to the subject site. Five fauna species listed as 'Threatened' species and one 'specially protected fauna' species have been recorded within a 5km radius of the subject site. Additionally, the DBCA Priority fauna database identified two Priority 4 fauna species within this radius (refer to **Table 5**).

The EPBC Act *Protected Matters Search Tool* also identified several threatened and migratory species that could potentially occur within or in proximity to the subject site. This included six species classified as 'Vulnerable', four 'Endangered' species and three 'Critically Endangered' species (refer to **Table 5**). Marine species identified within the search were not assessed given that the subject site is not in proximity to a marine environment.

Table 5: Significant fauna potentially occurring within the subject site as identified by State and Commonwealth database searches.

Species	DBCA Status	EPBC Act Status	Likelihood of Occurrence
<i>Botaurus poiciloptilus</i> (Australasian Bittern)	-	Endangered	Unlikely. Absence of preferred habitat
<i>Calyptorhynchus banksii naso</i> (Forest Red Tailed Black Cockatoo)	T	Vulnerable	Unlikely. Absence of preferred habitat
<i>Calyptorhynchus baudinii</i> (Baudin's Cockatoo)	T	Endangered	Unlikely. Absence of preferred habitat

Species	DBCA Status	EPBC Act Status	Likelihood of Occurrence
<i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo)	T	Endangered	Unlikely. Absence of preferred habitat
<i>Dasyurus geoffroyi</i> (Chuditch)	-	Vulnerable	Unlikely. Absence of preferred habitat
<i>Falco hypoleucos</i> (Grey Falcon)	-	Vulnerable	Unlikely. Absence of preferred habitat
<i>Hydromys chrysogaster</i> (Water-rat)	P4	-	Unlikely. Absence of preferred habitat
<i>Isodon fusciventer</i> (Quenda)	P4	-	Unlikely. Absence of preferred habitat
<i>Phascogale tapoatafa subsp. Wambenger</i> (South-western Brush-tailed Phascogale)	S	-	Unlikely. Absence of preferred habitat
<i>Pseudocheirus occidentalis</i> (Western Ringtail Possum)	T	Critically Endangered	Possible. Presence of very marginal habitat
<i>Setonix brachyurus</i> (Quokka)	-	Vulnerable	Unlikely. Absence of preferred habitat
<i>Westralunio carteri</i> (Carter's Freshwater Mussel)	T	Vulnerable	Unlikely. Absence of preferred habitat

The identified fauna habitat is in a Completely Degraded condition (cleared pasture with sporadic paddock trees), largely a consequence of historical clearing and ongoing livestock grazing. Given the degree of disturbance, the original fauna assemblage within the subject site is very likely to be depauperate in many aspects, in particular with respect to ground dwelling species which rely on dense native understory (midstorey and ground cover) vegetation, which is entirely absent.

Of the abovementioned conservation significant species, based on preferred habitat types, only Western Ringtail Possums (WRP) have the potential to occur within the subject site. A further assessment to determine the likelihood of this species occurrence is provided below.

Pseudocheirus occidentalis (Western Ringtail Possum (WRPs))

The WRP is endemic to the south- west of Western Australia. It was formerly patchily distributed through the near-coastal southwest from approximately 120 km southeast of Geraldton to the southern edge of the Nullarbor Plain and its range has now substantially contracted (How *et al.* 1978; de Tores *et al.* 2005; Jones 2004). Extant populations now occur mostly on the coastal strip from Yalgroop (100 km south of Perth) to Waychinicup National Park (just east of Albany), with isolated inland populations in the lower Collie River valley, Harvey River valley and at Perup (Manjimup) (de Tores *et al.* 2005; Jones 2004; Jones 2007).

With the exception of the few isolated inland populations in Eucalypt forests, the WRP generally occurs in coastal peppermint (*Agonis flexuosa*) woodlands, peppermint/tuart (*Eucalyptus gomphocephala*) woodlands, and peppermint/eucalypt woodlands associations, with the highest density populations occurring within the Busselton to Dunsborough coastal strip (de Tores *et al.* 2005; Jones *et al.* 2007).

The subject site is vegetated with occasional mature peppermint trees (*Agonis flexuosa*). At a superficial level, the subject site could represent marginal quality WRP habitat given the presence of preferential foraging species such as peppermint. However, with the absence of canopy connectivity and under/mid storey vegetation, the scattered trees are expected to provide marginal quality habitat at best.

Furthermore, foliage nutrient levels are a major factor in explaining variation in WRP abundance and is also a key factor influencing fecundity. Nitrogen and to a lesser extent phosphorus levels, are the most important determinant of browse quality and habitat suitability for WRPs. In general, WRPs prefer young, soft leaves. They are usually higher in nitrogen, have lower lignin levels and are easier to digest (Ellis *et al.* 1992, Hume 1999, Clarke 2011). The subject site does not contain any juvenile trees that provide softer leaves and higher nitrogen concentrations.

Furthermore, WRP habitat mapping indicates that the subject site contains no suitable habitat. Densely vegetated areas in proximity to the subject site are mapped as 'Medium' to 'Low' quality habitat (refer to **Figure 4**) (Shedley and Williams 2014).

Given the condition and nature of vegetation within the subject site and results from the WRP mapping, the subject site is unlikely to contain a persistent population of WRPs or provide habitat critical for the survival of the species.

2.6 Aboriginal Heritage

All Aboriginal sites in Western Australia are provided protection under the *Aboriginal Heritage Act 1972* in which it is an offence for anyone to excavate, damage, destroy, conceal or in any way alter an Aboriginal site without the Minister's permission.

An online search for relevant Aboriginal heritage information was undertaken using the Department of Planning, Lands and Heritage (DPLH) *Aboriginal Heritage Inquiry System* (AHIS) that incorporates both the heritage site register and the heritage survey database. The Aboriginal Heritage Site Register is maintained pursuant to Section 38 of the *Aboriginal Heritage Act 1972* and contains information on over 22,000 listed Aboriginal sites throughout Western Australia.

Results of the AHIS database search revealed the presence of no Aboriginal heritage sites within the subject site or within a 5 km radius.

3 CLEARING ASSESSMENT

3.1 Avoidance and Mitigation Measures

The applicant undertook an assessment of the area prior to determining the suitability of sand and gravel extraction from the subject site. This included a visual assessment of vegetation within the proposed location. Upon completion of this assessment, it was determined that the trees within the clearing area are unlikely to constitute significant habitat for fauna species of conservation significance. It is considered that no other reasonable or practicable avoidance measures can be implemented within the clearing footprint.

To mitigate the impact of the removal of the 26 peppermint trees from within the subject site, the applicant will undertake revegetation works along the creekline consisting of the planting of 100 peppermint (*Agonis flexuosa*) trees (refer to **Figure 5**). Specifications regarding the revegetation works are provided as follows:

- Rehabilitation will take place during the first winter months following the clearing of the existing peppermint trees.
- Local provenance is to be used in revegetation sourced as tube plants; and
- The planting rate is to achieve the completion criteria at mine closure.

To avoid any direct or indirect environmental impacts, the applicant has also committed to various management measures as discussed in **Section 4**.

3.2 Assessment Against the Ten Clearing Principles

Any clearing of native vegetation requires a permit in accordance with Part V of the EP Act, except where an exception applies under Schedule 6 of the Act or is prescribed by regulation in the *Environmental Protection (Clearing Native Vegetation) Regulations 2004*.

The clearing of native vegetation (26 trees) for the extraction of sand and gravel will require an approved clearing permit. Clearing applications are assessed against the Ten Clearing Principles outlined in Schedule 5 of the EP Act. These principles aim to ensure that all potential impacts resulting from the removal of native vegetation can be assessed in an integrated manner.

An examination of the Ten Clearing Principles is provided below.

a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Mapping (Mattiske and Havel 1998) indicates original vegetation within the subject site would have included two Yelverton complexes ((Y) and (Yd)). The majority of the subject site has been extensively cleared with the only remnant native vegetation comprising isolated peppermint trees (*Agonis flexuosa*). The subject site is in a Completely Degraded condition (Casson *et al.* 2009), being devoid of native understorey vegetation and predominately comprised of pasture grasses. The subject site is therefore not representative of either vegetation system.

Two flora species of conservation significance have the potential to occur within the subject site based on preferential soil types. These species are either shrubs or herbs. In consideration of the previous and current land use (intensive livestock grazing) which has resulted in the complete absence of under and mid storey native vegetation, it is considered unlikely that the subject site contains any flora species of conservation significance.

A search of the Protected Matters Database indicated three TECs are likely to occur within 5 km of the subject site. As discussed within Principle (d), the vegetation condition and absence of key indicator

species indicates that it is very unlikely that any vegetation communities of conservation significance occur within the subject site.

As discussed under Principle (b), the subject site is not likely to comprise significant habitat for any conservation significant fauna species due to the absence of suitable habitat.

It is noted that a Regional Ecological Linkage is mapped within the south-western extent of the subject site. Vegetation in proximity to the axis within the subject site is only comprised of very occasional peppermint trees. Accordingly, vegetation within the subject site does not significantly contribute to the Regional Ecological Linkage. The proposed clearing will result in a very marginal reduction of vegetation in association with the linkage, and therefore it is unlikely to compromise its existing values.

In consideration of the above information, it is very unlikely the vegetation to be cleared comprises a high level of biological diversity. The clearing required is considered to have minimal regional or local significance in the context of the existing remnants of vegetation in the area. Therefore, the proposal is not considered to be at variance to this Principle.

b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

The identified fauna habitat is in a Completely Degraded condition (cleared pasture with sporadic paddock trees), largely a consequence of historical clearing and ongoing livestock grazing. Given the degree of disturbance, the original fauna assemblage within the subject site is very likely to be depauperate in many aspects, in particular with respect to ground dwelling species which rely on dense native understory (midstorey and ground cover) vegetation, which is entirely absent.

Based on preferred habitat types, only WRP have the potential to occur within the subject site. The subject site could represent marginal quality WRP habitat given the presence of preferential foraging species such as peppermint. However, with the absence of canopy connectivity and under/mid storey vegetation, the scattered trees are expected to provide marginal quality habitat at best.

Furthermore, foliage nutrient levels are a major factor in explaining variation in abundance in WRPs and is also a key factor influencing fecundity. Nitrogen and to a lesser extent phosphorus levels, are the most important determinant of browse quality and habitat suitability for WRPs. In general, WRPs prefer young, soft leaves. They are usually higher in nitrogen, have lower lignin levels and are easier to digest (Ellis *et al.* 1992, Hume 1999, Clarke 2011). The subject site does not contain any juvenile trees that provide softer leaves and higher nitrogen concentrations.

In addition, WRP habitat mapping indicates that the subject site contains no suitable habitat.

Given the condition and nature of vegetation within the subject site and results from the WRP mapping, the subject site is unlikely to contain a persistent population of WRPs or provide habitat critical for the survival of the species.

On this basis, the proposal is not considered to be at variance to this Principle.

c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

A search for known rare and Priority flora within or in proximity to the subject site was undertaken through a review of the relevant databases (refer to **Section 2.4.3**) Two species of conservation significance have the possibility of occurring within the subject site based on preferential soil type and population location. These species are either shrubs or herbs. In consideration of the previous land use (intensive livestock grazing) which has resulted in very limited mid storey and no native

understorey vegetation, it is considered unlikely that the subject site contains flora species of conservation significance.

Therefore, the proposal is not considered to be at variance to this Principle.

d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

A search of the DBCAs TEC database and the EPBC Act Protected Matters database within a 5 km proximity to the subject site, revealed the possible presence of three TECs. This includes the Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region ecological community (Endangered), Shrublands on southern Swan Coastal Plain ironstones (Endangered) and the Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community (Critically Endangered).

The subject site does not contain the floristic composition or structure consistent with the identified TECs, as the vegetation is in a highly degraded condition and homogenous in terms of species diversity. On this basis, the subject site is not likely to comprise or be necessary for the maintenance of a TEC. Therefore, the proposal is not considered to be at variance to this Principle.

e) Native vegetation should not be cleared if it is a remnant of native vegetation in an area that has been extensively cleared.

The EPA has a target to retain all remaining areas of each complex where less than 30% remains of their pre-European extent (EPA 2003). As discussed in **Section 2.4.1** the subject site is mapped within the Yelverton (Y) and Yelverton (Yd) vegetation complexes. Both complexes have greater than 30% of their pre-European extent remaining denoting they are well represented. Furthermore, the presence of peppermint trees only is not indicative of either vegetation complex, the subject site does not contain the floristic composition or structure consistent with these vegetation complexes. Accordingly, the clearing will not impact the extent of either Yelverton complex.

Furthermore, as the subject site does not comprise high biological diversity, is not likely to impact upon significant habitat for fauna indigenous to Western Australia, priority or threatened flora and is not likely to comprise a PEC or TEC. On this basis the subject site is not considered to be a significant remnant within an extensively cleared landscape. This proposal is not considered to be at variance to this Principle.

f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

The subject site does not contain any watercourses or floodways, however the headwaters of the Carburnup River are located to the north of the subject site. The subject site is setback over 100 m from the headwaters of the Carburnup River and therefore there will be no impacts to this watercourse.

The subject site does not contain any defined natural surface water channels or wetlands, however it is located adjacent to a MU wetland on the south-eastern boundary (UFI 282). The management objective for MU wetlands is to preserve the hydrological functions in the context of the proposed development (EPA 2008). The development is not proposing to alter the current natural process, with all water being retained within the excavated areas to enable infiltration through stormwater pits to ensure water quality is maintained. Therefore, there will be no impacts to this wetland.

The project will not involve clearing of any riparian native vegetation or clearing of vegetation in proximity to a watercourse.

On this basis, the proposal is not considered to be at variance to this Principle.

g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

The subject site is located within the following land phases:

- Yelverton very gentle slopes Phase: Undulating terrain. Duplex sandy gravels, semi-wet soils, yellow deep sands and sandy earths and loamy gravels.
- Yelverton flats Phase: Raised flats. Duplex sandy gravels, semi-wet soils, yellow deep sands and sandy earths and loamy gravels.
- Yelverton deep sandy flats Phase: Level to gently undulating raised shelf, lying 10-40 m above the Swan Coastal Plain. The soils are mainly sands.

The Yelverton deep sandy flats Phase is mapped as having 0% of the Phase as a high to extreme water erosion risk with 13% of the Yelverton wet valley Phase having a high to extreme water erosion risk. The risk (albeit low) will be mitigated by the retention of all stormwater within the excavated pits at any time and the use of retention and infiltration basins during excavation works.

The Yelverton deep sandy flats Phase is mapped as having 86% of the Phase as a high to extreme wind erosion risk with 24% of the Yelverton wet valley Phase having a high to extreme wind erosion risk. Although a high portion of wind erosion risk has been identified, this will be mitigated by limiting the size of the cells (2 ha open at any time) and the progressive rehabilitation. A Dust and Water Management Plan will be developed to support the proposal prior to works commencing. Therefore, the proposed clearing is not at variance to this Principle.

h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

The subject site is located on privately owned land which has previously been cleared for agricultural activities. Land use abutting the boundaries of the subject site is rural based, including a range of grazing and pastoral land uses.

The subject site does not provide a continuous vegetative link to any nearby or adjacent conservation areas, with the closest conservation reserve located approximately 2.2 km south east of the subject site. This reserve is an unnamed reserve for the purpose of Conservation of Flora and Fauna.

Based on this, the proposed clearing is not at variance to this Principle.

i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface of underground water.

The subject site is within the proclaimed Busselton – Capel Groundwater Area. The subject site does not contain any defined natural surface water channels and is not located within a 'Public Drinking Water Source' area.

The current water cycle within the subject site consists of inputs from rainwater being largely infiltrated on site. The development will maintain this process, with all surface water being retained within the excavated areas to enable infiltration through stormwater pits to ensure water quality is maintained.

Furthermore, no interactions with groundwater are expected with a minimum of 1 m separation to groundwater to be maintained post excavation.

It is therefore unlikely that the proposed clearing will reduce the quality of surface or groundwater and therefore the proposal is not at variance to this Principle.

j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

Given the topography, soil type and proposed excavation design, it is considered unlikely that the proposed clearing will increase the incidence of flooding and therefore the proposal is not at variance to this Principle.

4 ENVIRONMENTAL MANAGEMENT MEASURES

In order to mitigate potential impacts associated with the proposed clearing activities, the following site specific management activities will be implemented.

4.1 Vegetation Management

4.1.1 Background

Vegetation clearing will be required for only 26 Peppermint trees (*Agonis flexuosa*) within the subject site (refer to **Figure 2**). Vegetation will be cleared with mechanical equipment such as an excavator.

In order to ensure that the potential impacts associated with vegetation clearing is minimised as far as practicable, the following management measures are proposed.

Table 6: Vegetation clearing management

Vegetation Clearing	
Responsibility - Project Manager. - Contractors.	
Objectives - Prevent clearing outside of the designated clearing boundaries. - Minimise soil erosion and sedimentation.	
Potential Impacts - Inadvertent additional clearing of native vegetation. - Impacts on fauna species. - Weed and disease invasion.	
Management Strategies - All site personnel will be inducted on the clearing controls for this project. - Vegetation required to be removed will be marked with white flagging tape to avoid any unnecessary disturbance to adjacent vegetation. - The flagging tape which demarcates the trees to be cleared will be checked on a daily basis to ensure that the clearing requirements remain clearly visible. - No movement of vehicles or personnel within the vegetation retention areas will be allowed. - No stockpiling of topsoil or other material is to occur outside of the clearing boundary. - The location and area of vegetation cleared will be checked on a daily basis.	Timing - Prior to clearing. - Prior to clearing. - During clearing. - During clearing. - During clearing. - During clearing.
Performance Indicators - No unauthorised clearing is undertaken. - No fauna is directly impacted during clearing.	
Monitoring - Daily checks to ensure that clearing is consistent with the approved clearing boundaries. - Daily checks to ensure that no fauna have been impacted.	

Reporting

- The DWER will be notified immediately if clearing beyond the approved clearing boundaries occurs, or if any fauna is directly impacted. Work may be stopped and the site inspected by DWER and a remedy determined before work restarts.
- A review of the performance indicators will be undertaken upon completion of clearing to determine the success of the vegetation clearing management measures. Where non-compliances are identified the DWER will be notified accordingly.

4.2 Weed and Pathogen Management

4.2.1 Background

Phytophthora dieback is a soil-borne pathogen recognised as a major threat to Australian vegetation, and in particular, the vegetation and dependent biota within the southwest botanical province. *Phytophthora* dieback is known to reduce the health and species diversity of native vegetation and the disease is listed as a key threatening process under the EPBC Act.

While there has been no formal mapping of the extent of weed incursion or dieback disease caused by *Phytophthora cinnamomi* within the subject site, weed and pathogen management measures are recommended to minimise the spread and potential infestation. The key objective associated with weed and pathogen management is to prevent the introduction and/or spread of weeds or the disease throughout the subject site.

4.2.2 Management Plan

The following controls will be implemented within the subject site to assist in the control of weed and pathogen movement.

Table 7: Weed and pathogen management

<i>Phytophthora</i> dieback and weed management	
Responsibility • Project Manager. • Contractors.	
Objectives • To prevent the introduction and spread of <i>Phytophthora</i> dieback and weeds within the subject site.	
Potential Impacts • Introduction and spread of disease (<i>Phytophthora</i> spp.) and weeds.	
Management Strategies • Training will be provided to all personnel during the safety and environment induction course. This will include an explanation of the specific requirements relating to <i>Phytophthora</i> dieback management. • All earthmoving and ground engaging equipment will be inspected and cleaned of vegetation and soil prior to entry and exit of the subject site. • Access to the subject site during excavation activities will be restricted to the proposed roads and driveways. No other access points should be established. The access location and vehicle inspection point should be clearly sign posted.	Timing • Prior to clearing. • Prior to clearing. • Prior to and during clearing.

- | | |
|--|--|
| <ul style="list-style-type: none"> • As far as practicable, onsite drainage shall be designed to contain runoff from building envelopes and roads within disturbed areas. • Reduce vehicle and plant movement into and within the site as much as possible, particularly during wet conditions. • All material will be transported such that soil shall not fall from the vehicle onto road verges. | <ul style="list-style-type: none"> • Prior to and during clearing. • During clearing. • During and post clearing. |
|--|--|

Performance Indicators

- Hygiene procedures are adopted during clearing and excavation activities.

Monitoring

- Project Manager will ensure disease hygiene and control measures are implemented during excavation activities.

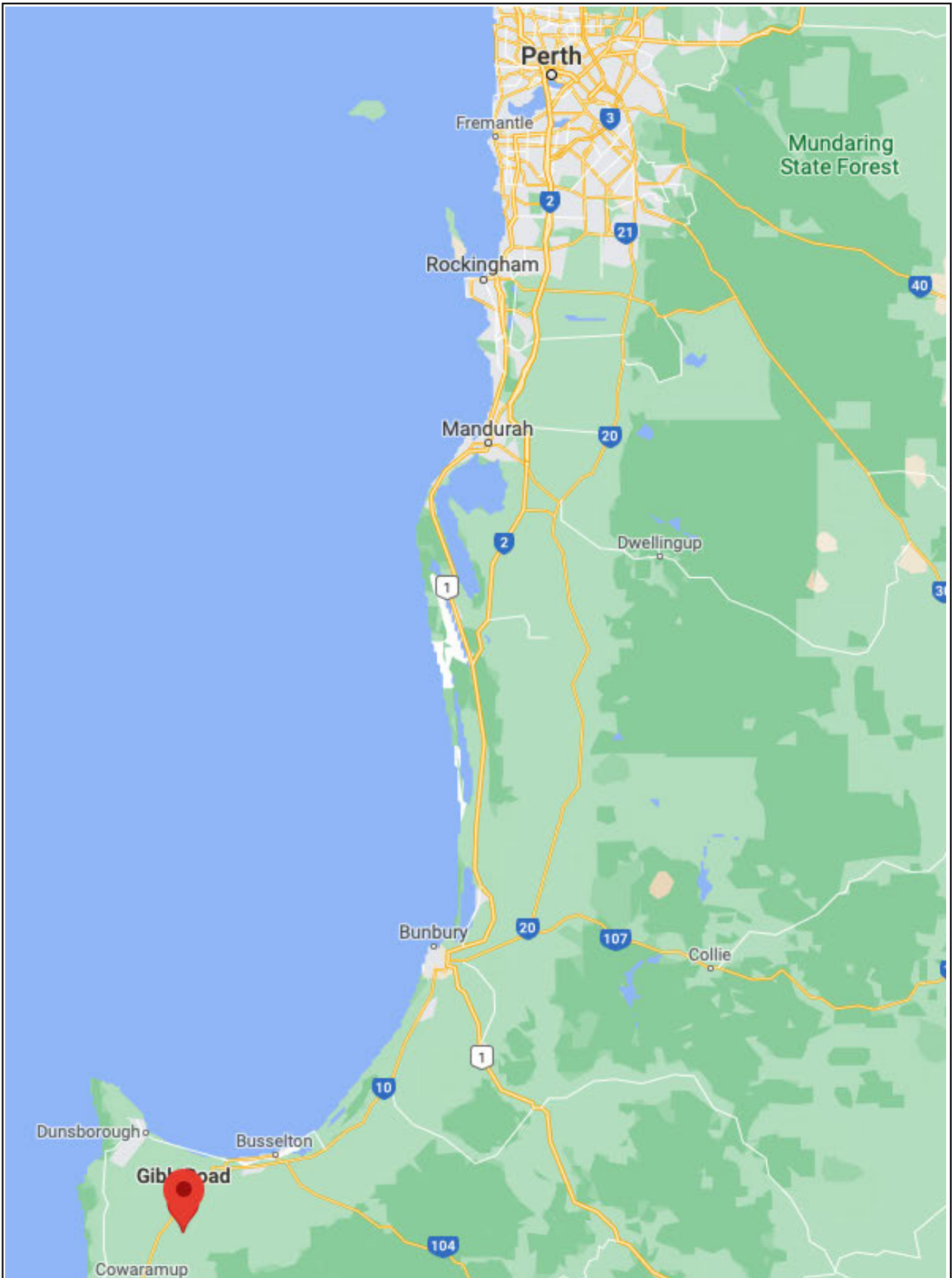
Reporting

- Contractors to confirm that *Phytophthora* dieback and weed management measures have been implemented.

REFERENCES

- City of Busselton (2014). *Local Planning Scheme No. 21*. Geographe Bay, WA
- Department of Biodiversity, Conservation and Attractions (DBCA) (2018). *Geomorphic Wetlands South West – Unreviewed database*. Accessed October 2021.
- Department for Planning, Lands and Heritage (DPLH) (2021) *Aboriginal Heritage Inquiry System*. Accessed October 2021.
- Department of Primary Industries and Regional Development (DPRD) NRInfo database. Available from <https://maps.agric.wa.gov.au/nrm-info/>. Accessed October 2021.
- Department of Primary Industries and Regional Development (DPRD) (2019). *Interpolated contours lines at 2 metre intervals database*. Accessed October 2021.
- Department of Water (DoW) (2009). *Busselton – Capel Groundwater Area Subarea Reference Sheets*. Bunbury, WA.
- Department of Water and Environmental Regulation (DWER) (2017). *Acid Sulfate Soil Risk Map, Lower South West database*. Accessed October 2021.
- Department of Water and Environmental Regulation (DWER) (2021). *Public Drinking Water Source Areas database*. Accessed October 2021.
- Environmental Protection Authority (EPA) (2008). *Guidance Statement No. 33: Environmental guidance for planning and development*. Environmental Protection Authority, Perth, Western Australia. www.epa.wa.gov.au/GS33.asp
- Hedde, E.M., Loneragan, O.W. and Havel, J.J. (1980). *Darling Systems – Vegetation Complexes*, In: *Atlas of Natural Resources Darling System*, Western Australia, Department of Conservation and Environment, Perth.
- Landform Research (2019). *Excavation and Rehabilitation Management Plan*. Prepared for Margaret River Natural Resources Pty Ltd. Koorup, WA
- Molly, S., Wood, J. Hall, S., Wallrodt, S. & Whisson, G. (2009). *South West Regional Ecological Linkages Technical Report*. Available from: <http://walga.asn.au/AboutWALGA/Policy/SouthWestBiodiversityProject/SouthWestRegionalEcologicalLinkagesTechnicalReport.aspx>
- Schafer, D. Johnson, S. Kern, A. (2008). *Hydrogeology of the Leederville aquifer in the western Busselton-Capel Groundwater Area*. Department of Water, WA
- Shedley E. and Williams K (2014) in *An assessment of habitat for western ringtail possum (Pseudocheirus occidentalis) on the southern Swan Coastal Plain*. Unpublished report for the Department of Parks and Wildlife Bunbury, WA
- Thackway, R. and Cresswell, ID, (Eds) 1995, *An Interim Biogeographic Regionalisation for Australia: a framework for establishing the national system of reserves*, Version 4.0. Australian Nature Conservation Agency, Canberra
- Tille, P (2006). *Soil-Landscape Zones of the WA Rangelands and Interior*.
- Western Australian Planning Commission (WAPC) (2007). *Planning Bulletin No. 64: Acid Sulfate Soils*, Western Australian Planning Commission, Western Australia.

FIGURES



PROJECT Lot 101 Gibb Road, Kaloorup

DRAWING TITLE Figure 1 – Site Locality

CLIENT Leeuwin Civil Pty Ltd



Project Number
2173

Designed PN
Drawn PN

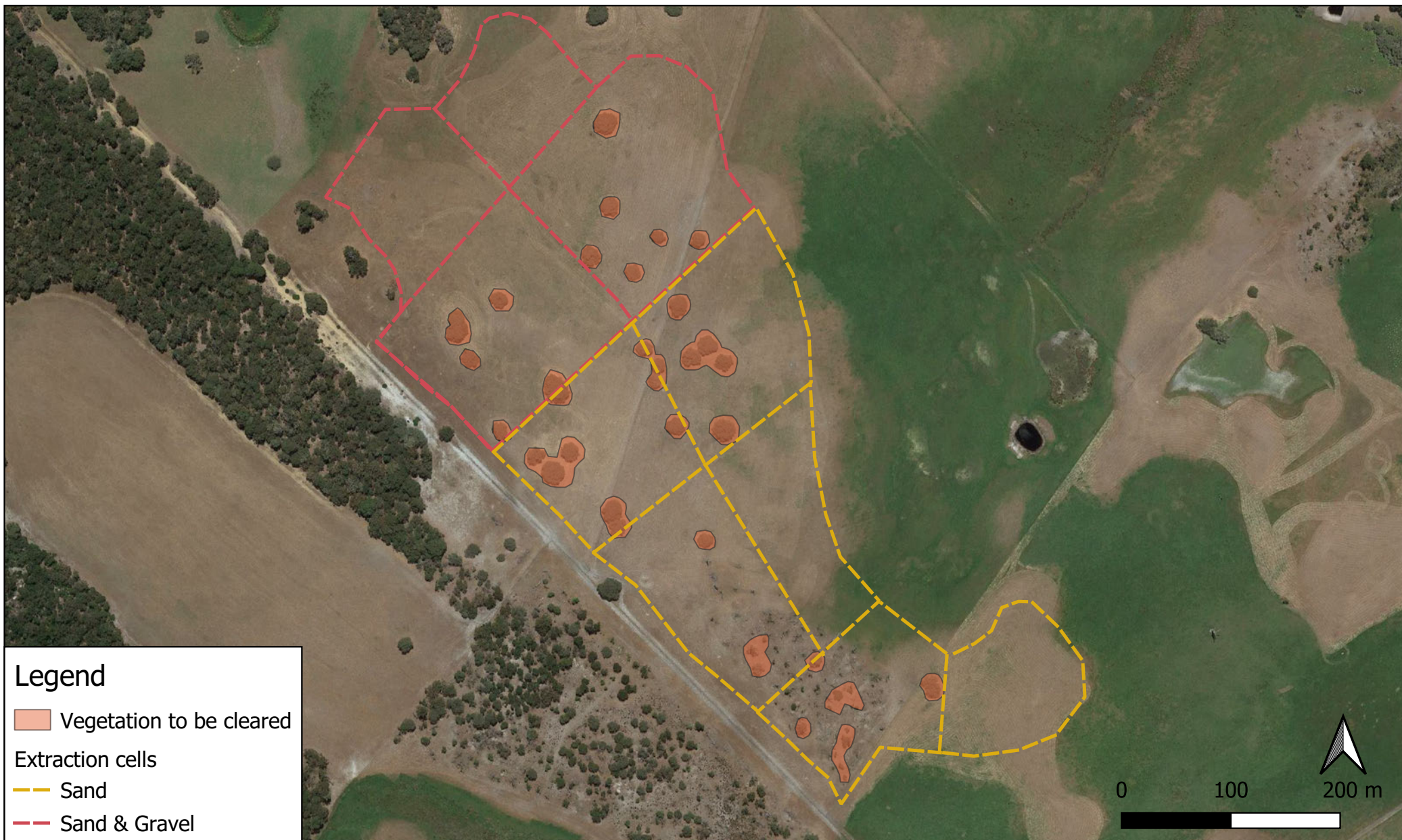
Date
Local Authority
Sheet 1 of 1

Drawing Number
Figure 1

Checked
Approved

14/12/2021
City of Busselton

Revision
A



PROJECT Lot 101 Gibb Rd, Kaloorup

DRAWING TITLE Figure 2 - Site Extent

CLIENT Leeuwin Civil Pty Ltd



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West Busselton
Western Australia 6280
Mobile 0418 950 852

Project Number 2173
Drawing Number Figure 2
Revision A
Date 28/10/2021
Sheet 1 of 1

Designed HB
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Approved
Local Authority City of Busselton

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PROJECT Lot 101 Gibb Rd, Kaloorup

DRAWING TITLE Figure 3 - Wetland Mapping

CLIENT Leeuwin Civil Pty Ltd

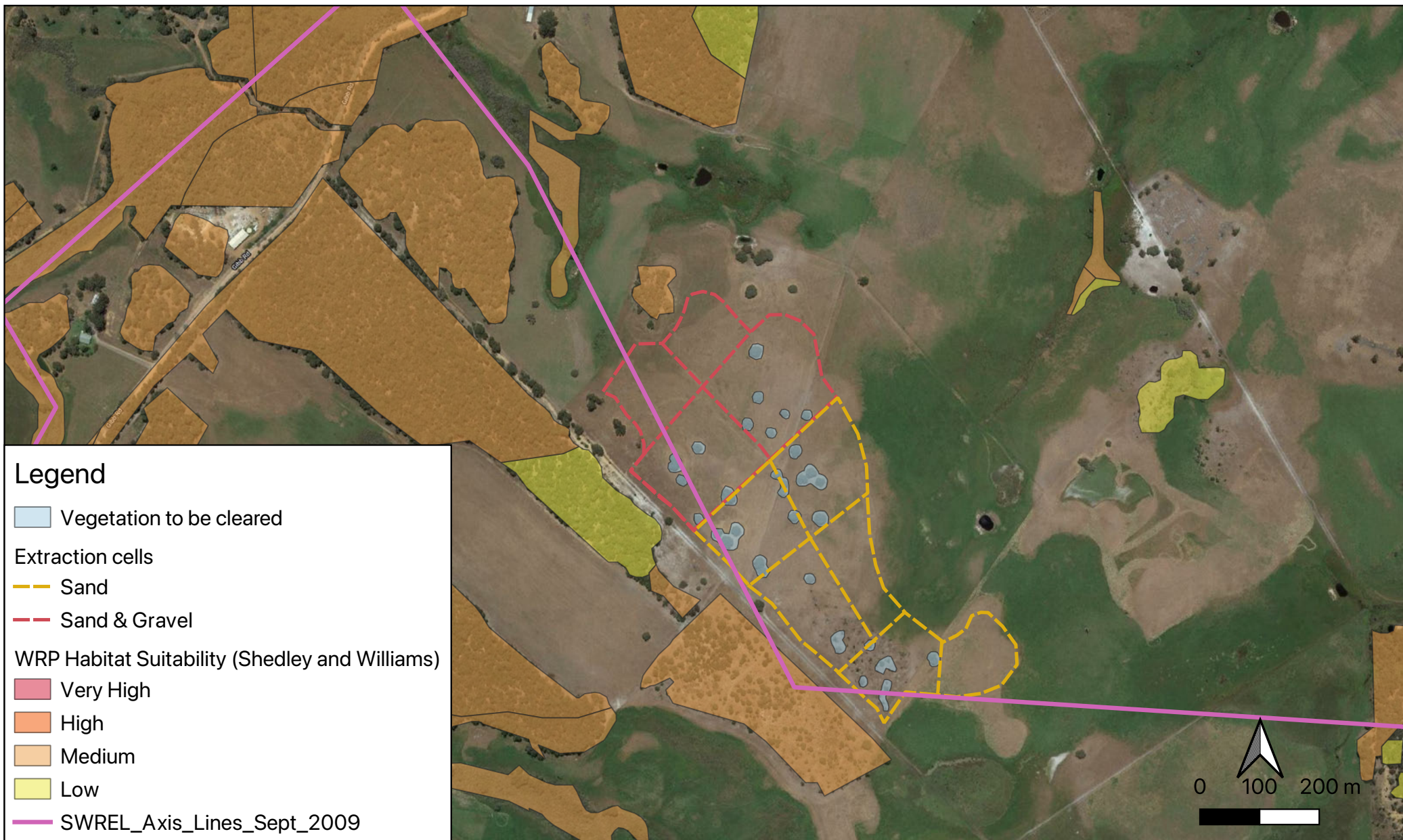


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Project Number 2173
Drawing Number Figure 3
Revision A
Date 13/12/2021
Sheet 1 of 1

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PROJECT Lot 101 Gibb Rd, Kaloorup

DRAWING TITLE Figure 4 - WRP Habitat and Ecological Linkages

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Legend

— Lot 101 Boundary

Revegetation Area

Extraction cells

— Sand

— Sand & Gravel

Vegetation to be cleared

PROJECT Lot 101 Gibb Rd, Kaloorup

DRAWING TITLE Figure 5 - Indicative Revegetation Area

CLIENT Leeuwin Civil Pty Ltd

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AUSTRALIA

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Western Australia 6280
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Drawing Number Figure 5
Revision A
Date 13/12/2021
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APPENDIX A – EXCAVATION AND REHABILITATION MANAGEMENT PLAN



PROPOSED SAND EXCAVATION

EXCAVATION and REHABILITATION MANAGEMENT PLAN

Lot 101, Gibb Road,
Kaloorup

City of Busselton

MARGARET RIVER NATURAL RESOURCES PTY LTD

30 November 2019

EXCAVATION and REHABILITATION MANAGEMENT PLAN

Lot 101, Gibb Road, Kaloorup

MARGARET RIVER NATURAL RESOURCES PTY LTD

As trustee for Margaret River Natural Resources Trust

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Quarry Manager – Roger Cook
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Landform Research

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Summary

A sand resource has been identified on Lot 101 that is suitable for fill sand with some deeper coarse sand that is capable of use for filtration and specialty uses.

This documentation provides the background for an application for Planning Approval and Extractive Industries Licence to extract the resource.

The City of Busselton and nearby areas are undergoing significant development, much of which is located on low lying land that requires fill and consequently requires sand for construction and fill.

The sand is a valuable resource for the community as it is highly suitable for fill and other construction materials. The local area is a known sand resource in which active sand pits occur.

The sand extends to depth but is anticipated that the pit will be 1 – 3 metres deep with an average of 1.5 metres, deepening slightly at the western edge where the resource is thicker. The water table measurements taken on 14 November 2018 and 6 September 2019 show that the sand resource is approximately 2.0 metres deep in the south east and centre thickening to 3.5 metres deep in the north west. With a separation of 0.5 metres to the water table the thickness of resource will be 1 – 1.5 metres in the east and centre and up to 3.0 metres in the west. Gravel resource occurs in the north west with the sand.

City of Busselton, Planning, “Rural Land Use and Development” Policy, 2010 compliments the Local Planning Scheme and has policies with respect to the extraction of sand.

Policy 5A Extractive Industry Provisions seeks the protection and staged use of basic raw materials whilst minimizing environmental and social impacts.

A Lot 101 is zoned “Agriculture” it lies within Policy Area 3 – “Extractive Industry Less Constrained” in City of Busselton, “Rural Land Use and Development” Policy, 2010.

The excavation areas are set back from Gibb Road. Transport will be to Gibb Road and then along Gibb Road to the north, to join with linking roads.

As perimeter buffer of 20 metres with earth bunding is proposed for adjoining lots in compliance with Section 6.4 City of Busselton Policy 5A – Rural Areas land Use and Development Policy.

The depth of excavation will be 1 - 3 metres with an average of 1.5 metres based on resource, with the water table from 0.5 metres to over 2.0 metres below the pit floor, which complies with all policies. The area of sand pit is approximately 20.94 hectares but not all will be taken because of the trees. The volume of resource delineated in the proposal is about 200 000 tonnes.

It is anticipated that up to 30 000 tonnes of sand with a small amount of gravel, will be produced annually. This amounts to an average of approximately 6 laden truck movements per day using trucks laden with 25 tonnes average if all loads are spread out. What is likely is that on some days there will be more trucks and on other days less or no truck movements.

If a large contract is won which will require additional truck movements, Margaret River Natural Resources will notify the City at least one week in advance of the commencement of the contract. As the sand resource is relatively small a large contract would be anticipated to be around 2 trucks per hour or 20 per day. The City will be notified prior to that level of transport, which will provide opportunities for discussions between the proponent and the City.

The loading and access of each truck will normally take approximately 10 minutes.

Hours of operation are proposed to be 7.00 am to 5.00 pm Monday to Friday inclusive, excluding public holidays.

A 10 year length of approval is requested.

The loading and access of each truck will normally take approximately 3 minutes and would be achieved using one loader.

This documentation provides the support for application for Planning Approval and Extractive Industries Licence.

The proposal complies with the all Buffer Guidelines to sensitive premises.

Table 1 Site Summary

ASPECT	PROPOSAL CHARACTERISTIC
EXCAVATION	
Total area of excavation applied for, including the land already open	Proposed excavation – 20.94 hectares (approx.)
Rate of excavation based on average anticipated volumes.	Generally up to 20 000 tonnes per year of sand including a small amount of gravel, with an anticipated maximum of 30 000 tonnes per year depending on contracts. If a large contract is won which will require additional truck movements, Margaret River Natural Resources will notify the City at least one week in advance of the commencement of the contract.
Life of project	10 years
Area cleared per year	No native vegetation. < 1 hectare pasture required per year.
Dewatering requirements	Nil
Maximum depth of excavations	1 - 3 metres in benches as required.
PROCESSING	
Resources	A screening plant will be used to produce specialty sands if required and there is potential for a small mobile wash plant for coarse sand.
Water requirements	Nil
Water supply source	Soak in creekline
INFRASTRUCTURE	
Total area of plant and stock	Located in pit
Area of settling ponds	Water will be retained in the pit
Fuel storage	No fuel storage
TRANSPORT	
Truck movements	Variable but average up to 6 laden trucks per day.
Access	Gibb Road north.
WORKFORCE	
Construction	Opening the pit consists of topsoil and overburden removal prior to excavation, and the formation of the access road.
Operation	2 - 4 persons
Hours of operation	Hours of operation will be 7.00 am to 5.00 pm Monday to Friday inclusive, excluding public holidays for processing and excavation.

This Excavation and Management Plan has been prepared addressing the factors outlined in EPA Guidance Statement 33, *Environmental Guidance for Planning and Development 2005* and *Department of Planning Guidelines for Extractive Industries*.

Management

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 Industry Regulation and Safety.

The regulation is achieved through the DMIRS 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.

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

Environmental Management

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 Water, Environment Regulation, Department of Mines Industry Regulation and Safety, 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, which provides for the environmental risk if 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.

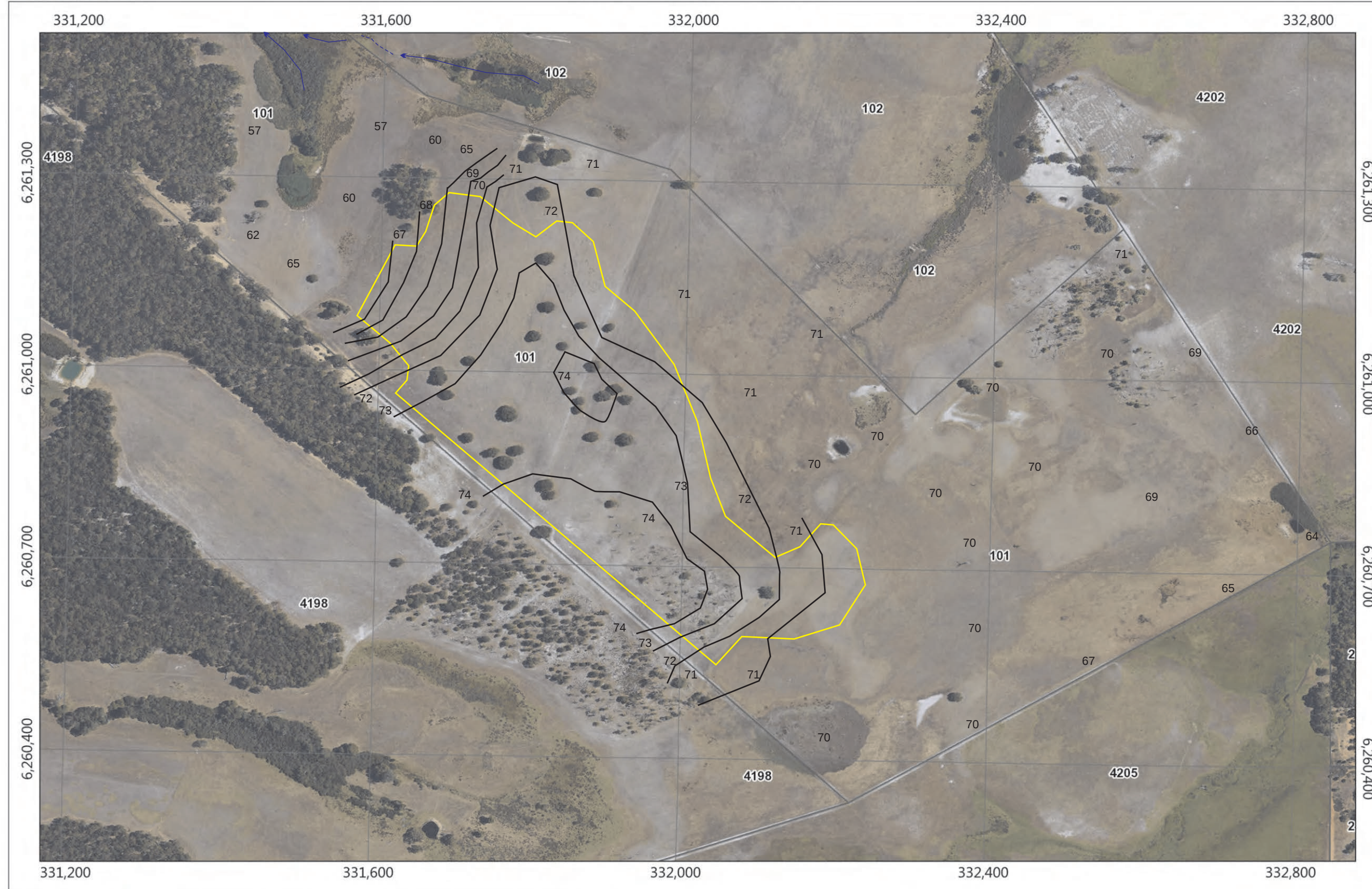
The Environmental Risk Matrix was developed to the principles of AS/NZS ISO 14001:2004 (Environmental Management Systems) and AS/NZS ISO 19011:2014 (Guidelines for auditing Management Systems). The principles of AS/NZS 31000:2009 (Risk Management Guidelines) are also used when considering any risks.

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.

SAND RESOURCES LOT 101, GIBB ROAD

Extracted from GeoVIEW.WA



Legend

- Image**
 - Red: Band_1
 - Green: Band_2
 - Blue: Band_3
- Major Town
- Minor Town
- Place Name**
 - Aboriginal Community
 - Cave
 - Hill
 - Homestead
 - Meteorological Station
 - Mountain
 - Peak
 - Roadhouse
 - Rock
- Railway**
- Road**
 - <all other values>
 - Freeway
 - National Highway
 - State Highway
 - Main Road
 - Mall
 - Minor Road
- Coast**
- DEC Managed lands - Marine**
 - Marine Management Area
 - Marine Nature Reserve
 - Marine Park
- Watercourse mask**
 - 0-200m
 - 200m-1000m
 - 1000m-2000m
 - 2000m-3000m
 - 3000m-4000m
 - 4000m-5000m
 - >5000m
- Lakes**
- Water Course - Major**
- Water Course - Minor**
- DEC Managed lands - Land**
 - 5(1)(g) Reserve, A
 - 5(1)(g) Reserve, C
 - 5(1)(h) Reserve,
 - 5(1)(h) Reserve, A
 - 5(1)(h) Reserve, C
 - Conservation Park,
 - Conservation Park, A
 - Conservation Park, C
 - Marine Management Area, A
 - Marine Nature Reserve, A



Recommend Reference for this map is: Geological Survey of Western Australia
2018, SAND RESOURCES
LOT 101, GIBB ROAD extracted from GeoVIEW.WA, on 16/09/2018 Perth, Western
Australia: Department of Mines, Industry Regulation and Safety.



Department of
Mines, Industry Regulation
and Safety

Geological Survey of
Western Australia



0.5

Kilometers

NOTE: Scale is calculated at the centre of the map. Scale representative
fraction will vary in a North South direction.

The data presented herein are interpreted, and made available
in good faith and derived from sources believed to be reliable
and accurate at the time of release. You should not solely rely
on this information when making a commercial decision.



EXISTING CONTOURS

Figure 2

SAND RESOURCES LOT 101, GIBB ROAD

Extracted from GeoVIEW.WA



Legend

- Image
 - Red: Band_1
 - Green: Band_2
 - Blue: Band_3
- Major Town
- Minor Town
- Place Name
 - Aboriginal Community
 - Cave
 - Hill
 - Homestead
 - Meteorological Station
 - Mountain
 - Peak
 - Roadhouse
 - Rock
- Railway
- Road
 - <all other values>
 - Freeway
 - National Highway
 - State Highway
 - Main Road
 - Mall
 - Minor Road
- Coast
- DEC Managed lands - Marine
 - Marine Management Area
 - Marine Nature Reserve
 - Marine Park
- Watercourse mask
 - 0-200m
 - 200m-1000m
 - 1000m-2000m
 - 2000m-3000m
 - 3000m-4000m
 - 4000m-5000m
 - >5000m
- Lakes
- Water Course - Major
- Water Course - Minor
- DEC Managed lands - Land
 - 5(1)(g) Reserve, A
 - 5(1)(g) Reserve, C
 - 5(1)(h) Reserve,
 - 5(1)(h) Reserve, A
 - 5(1)(h) Reserve, C
 - Conservation Park,
 - Conservation Park, A
 - Conservation Park, C
 - Marine Management Area, A
 - Marine Nature Reserve, A



Recommend Reference for this map is: Geological Survey of Western Australia
2018, SAND RESOURCES
LOT 101, GIBB ROAD extracted from GeoVIEW.WA, on 16/09/2018 Perth, Western
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Geological Survey of
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CONCEPT FINAL CONTOURS

Figure 3

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
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, weeds and dieback.	E	1	Low	Weed and Dieback policies are proposed and will be implemented. The only nearby vegetation is the remnant Jarrah – Marri Forest between Gibb Road and the proposed sand pit. The resource area has around 20 isolated Peppermint trees which are not proposed to be cleared; being retained with 10 metre separation buffers.		E	1	Low
	Threatened Communities may be impacted by inadvertent impacts.	E	1	Low	None present. The site is cleared with isolated Peppermint (<i>Agonis flexuosa</i>) trees which are to be retained.		E	1	Low
	Priority species may be affected by clearing, disturbance, weeds, dieback and other impacts.	E	1	Low	None present. The site is cleared with isolated Peppermint (<i>Agonis flexuosa</i>) trees which are to be retained.		E	1	Low
	Threatened Species may be impacted by inadvertent impacts.	E	1	Low	None present. The site is cleared with isolated Peppermint (<i>Agonis flexuosa</i>) trees which are to be retained.		E	1	Low
	Weeds may become established and impact on the local and on site biodiversity	C	3	High	A weed management program is proposed and will be used in conjunction with normal farm management. The operator is part is also part of the ownership of the land so there is incentive to keep the pasture in good condition.	Weed Management Plan	C	1	Low
	Dieback disease may be present and impact on the local and onsite vegetation.	E	1	Low	Dieback management procedures are in place. See Weeds above.	Dieback Management Plan	E	1	Low
	The developments may fragment communities, biodiversity and ecological linkages.	E	1	Low	The site cleared. Previously cleared vegetation to the north of the pit has been allowed to re-establish. This is enhancing the conservation corridors rather than reducing them.		E	1	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
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, weeds and dieback.	E	1	Low	The site is pasture and cleared sand pit so the fauna habitat values are not likely to be impacted, only enhanced when additional Peppermint trees in linkages are planted.	Figure 3, 4	E	1	Low
	Threatened Faunal Communities may be impacted by inadvertent impacts.	E	1	Low	No Threatened Communities occur on site.		E	1	Low
	Priority Fauna species may be affected by clearing, disturbance, weeds	E	1	Low	There are no Priority Fauna on site. The resource area has around 20 isolated Peppermint trees which being isolated do not appear to provide habitat for Western Ringtail Possums if they occur locally. The isolated Peppermint (<i>Agonis flexuosa</i>) trees are to be retained with a 10 metre buffer. The proposal is to plant 100 Peppermint trees in clumps as a corridor linking the remnant forest to the creekline vegetation which will provide enhanced habitat for the species.		E	1	Low
	Threatened Fauna Species may be impacted by inadvertent impacts.	E	1	Low	The site is pasture and cleared land. There are no habitat or feeding trees that are suitable for Black Cockatoos on the extraction site. See above		E	1	Low
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.	E	1	Low	The site is deep sand with no subterranean cavities.		E	1	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
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.	D	2	Low	The site will be excavated by 1 – 3 metres by skimming the top from a low plateau. The final surface will be similar visually and, in form, the pre-excavation form.	8.0 Visual Management	D	2	Low
	The final land surface should be fit for its required end use.	E	1	Low	The end use will continued to be pasture and productive agricultural land.	Section 11.0 Closure.	E	1	Low
	The development and final landform will not lead to significant visual impacts.	E	1	Low	The site will be excavated by 1 – 3 metres by skimming the top from a low plateau. The final surface will be similar visually and, in form, the pre-excavation form. Viewsheds have been generated and show little or no impact with the pit unlikely to be visible from Gibb Road and not visible from Gale Road.	Figure 4, 5, 7,	E	1	Low
	The final landform and soils may be subject to erosion by wind, water or other processes.	C	2	Mod	The sand excavation operations are designed to minimise erosion and dust. Drainage will be internal with no release of surface water.	See Dust Management Section 6.0 and Closure, Section 11.0	D	2	Low
	Acid soils are not exposed or are managed to ensure that there are no long term adverse effects.	E	1	Low	Not present	Section 9.9	E	1	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
HYDRO - GEOLOGICAL 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.	E	1	Low	Drainage will be internal with no release of surface water. There will be no significant change to recharge and the pit is set back 100 metres from the headwaters of a small creekline	Section 9.0 Water Management.	E	1	Low
	Groundwater may be impacted by changes to recharge, over-pumping, alterations to flow paths or lead to significant evaporation and water loss.	D	1	Low	The operations are based on shallow sand. Excavation will retain a minimum of 0.5 - >2.0 metres separation to the water table in compliance with DWER policies for the South West. All water is retained on site in the base of the pit. There will be no significant change to recharge and the pit is set back 100 metres from the headwaters of a small creekline.	Figure 3, 7 Section 9.0 Water Management.	E	1	Low
	Wetlands may be altered by draining or flooding, potentially changing their ecological functions and biodiversity.	E	1	Low	The only wetlands are regrowth colonisation of <i>Taxandria linearifolia</i> that has spread on the sands to the north where the soil moisture has increased since the land was converted to pasture some decades ago. The excavation is set back 100 metres from the <i>Taxandria</i> colonisation.		E	1	Low
WATER 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.	C	2	High	Fuel and hydrocarbon management programs are in place. No fuel is to be stored on site. The loader is to be refueled from a mobile tanker that will access the site as needed.	Figure 3 Section 9.0 Water Management.	D	2	Low
	Runoff from operations may carry sediment and any deleterious materials off site.	D	2	Low	All water is retained on site in the base of the pit. Runoff from operations is contained and all water is either retained or treated to removed sediment and any deleterious materials. The excavation is set back 100 metres of pasture from the <i>Taxandria</i> colonisation	Figure 3, 7 Section 9.0 Water Management.	E	2	Low
	Water quality during and after development is not adversely affected or altered.	D	2	Low	See above		D	2	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
OFFSITE EMISSIONS To maintain representation, diversity, viability and ecological function at the species, population and community level.	Dust emissions may travel offsite.	B	3	High	Based on the nature of the sand, equipment used and excavation methods, the extraction of sand has potentially the lowest impact and a generic buffer of 300 metres is appropriate and could be less if significant impacts are confined. There are no residential properties within the application area, and the nearest residential site is located over 500 metres from the excavation.	Figures 1, 3. Section 3.0 Section 6.0	D	2	Low
	Dust emissions may impact on local and on site personnel health or quality of life.	E	1	Low	See above. There is a negligible risk to those dwellings as shown by the DWER assessment score. Complies with Department of Health Guidelines and has in place the remnant vegetation to the north.	Section 6.1, Tree Belt Buffers	E	1	Low
	Noise levels will comply with the <i>Environmental Protection (Noise) Regulations 1997</i> .	E	1	Low	Noise levels will comply with <i>Environmental Protection (Noise) Regulations 1997</i> . The site complies with the EPA Generic and research buffer distances. The closest dwelling are over 500 metres from the excavation.		E	1	Low
	Noise levels and operational procedures will be used to protect on site personnel health and safety.	C	3	High	The operations are designed to minimise on site noise and the potential for offsite noise.		D	2	Low
	Emissions gases and other materials potentially adverse to human health will not be used or will be managed.	D	2	Low	There are no gaseous or other potential harmful emissions from the operations.		D	2	Low
	Potential impacts from blasting will comply with the <i>Environmental</i>			NA	There is no blasting.				NA

	<i>Protection (Noise) Regulations 1997</i> and guidelines for ground vibration.								
	Employ procedures and design the operations to minimise the risk of excessive greenhouse emissions.	E	1	Low	The pit is designed to operate as efficiently as possible.		E	1	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
HERITAGE Known heritage sites will be protected.	Known aboriginal heritage sites will be protected.	E	2	Low	No archaeological or ethnographic sites are known from or recorded on Department of Planning, Land and Heritage databases.		E	2	Low
	Sites of European heritage will be protected.			NA	None known				NA
	Heritage sites uncovered during operations will be independently assessed and managed through communication with the community, Government and traditional owners.	D	2	Low	A commitment is made to this.	Section 2.5.3	D	2	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
SOCIAL and HEALTH To minimise the impact on the local community	Human health is protected from adverse impacts of dust, noise, other emissions and chemicals.	E	1	Low	Sand grains such as this carry no known health impacts.		E	1	Low
	Transport may impact on local, and regional roads or school bus routes.	E	1	Low	Transport will continue to be along an access road through adjoining properties to Gale Road, which is sealed. The access road has been used for past sand operations.		E	1	Low
	The operations have been designed to provide sufficient buffers and visual protection.	E	1	Low	The site complies with the EPA Generic and research buffer distances and Health Department WA Guidelines. The closest dwelling lies at over 500 metres		E	1	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
CLOSURE AND REHABILITATION 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	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.	B	3	High	A shallow swale 1 – 3 metres deep is to be retained at the end of excavation. Rehabilitation will be directed towards the final end land use of a return to pasture and productive agricultural land on the floor. Topsoil will be transferred directly from an area being cleared and spread across the surface of the areas to be rehabilitated. If direct transfer is not possible, any material stored in dumps will be respread.	Figure 3, 4, 7 Section 11.0 Closure	D	2	Low
	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.	C	2	Med	This is committed to.	Figure 3, 4, 7 Section 11.0 Closure	D	2	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.	C	2	Med	This is committed to.	Figure 3, 4, 7 Section 11.0 Closure	D	2	Low
	All contaminated materials are to be removed from site prior to closure.	C	2	Med	All contaminated materials are to be removed from site prior to closure.	Figure 3, 4, 7 Section 11.0 Closure	D	2	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
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 site lies in a local area where a number of sand pits have operated over the years. This operation will replace an exhausted sand pit on the adjoining land.	Figure 1			

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
COMMUNITY CONSULTATION To provide a community consultation process commensurate with the size nature and time line of the project.	The proposal will be advertised and the nearby people will be able to comment.			NA	The City of Busselton has been consulted with respect to the proposed renewal of the sand excavation and will advertise the proposed sand pit. Margaret River Natural Resources has liaised with all adjoining property owners who do not have any issues with the development.				NA
	A complaints and improvements procedure will assist management of the site.			NA	An ongoing complaints program is proposed.	3.5 Complaints Procedure			NA

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
PLANNING COMPLIANCE To comply with Government Policy, planning zones and procedures.	The project is designed to comply with State and Local Planning requirements.	E	2	Low	The project is designed to comply with State and Local Planning requirements in particular SPP 2.5. The Land zoning is "Agriculture". The zoning lists basic raw materials within the objectives of the zone. State Planning Policy 2.5 (SPP 2.5) requires basic raw materials to be identified, protected, used in a staged manner and not impinged by competing land uses. SPP 2.5 prevails over the Town Planning Scheme, which should reflect the intent of the State Planning Policy. This is a renewal of an existing sand operation. The proposal complies with the City of Busselton, Planning Policy 5, "Rural Land Use and Development" Policy, 2010.	Section 2.5 Land Zonings and Policies	E	2	Low
	The area of potential impacts is not large enough to significantly impact on essential or desirable land uses.	E	2	Low	The disturbance footprint is not anticipated to increase significantly as rehabilitation will follow excavation.		E	2	Low
	The development will not adversely impact on an area identified as having high agricultural or community values.	E	1	Low	The land is pasture and will be returned to pasture on the floor. The final agricultural values are not expected to be significantly different.		E	1	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
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.	C	3	High	The operations are designed to comply and operate to the <i>Mines Safety and Inspection Act 1994</i> . The operations are registered under the Department of Mines Industry Regulation and Safety, SRS system. A Fire Management Plan will be provided in combination with normal farm fire management.		D	2	Low
	Ensure that potential impacts are retained on site and do not cause significant risk of safety to the local and wider community.	D	2	Low	The only transport route is Gale Road, which is sealed and is used for other sand mining operations. The traffic from this site will constitute an average of 6 laden trucks per day which will replace the sand extraction on the adjoining Lot 1 so there should be little or no change to local traffic. There are no proposed changes to the intensity and scale of the operations or the transport routes. The site is fenced and installed with locked gates.		D	2	Low
	Have in place a transport policy to ensure that transport along public roads is conducted in a safe manner.	E	1	Low	Transport policies such as covering loads are proposed as is truck safety.	A	E	1	Low

Environmental Factor - Objective	Identified Issues and Commitments	Unmanaged Risk			Proposed Management	References	Managed Risk		
		Likelihood	Consequence	Risk			Likelihood	Consequence	Risk
GEOTECHNICS 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.	C	2	Med	The end use is a very shallow gentle swale and a return to pasture and productive land.		D	2	Low
	The quarry and operations will comply with the <i>Mines Safety and Inspection Act 1994</i> .	C	4	High	Margaret River Natural Resources Pty Ltd is committed with complying with the relevant Acts and Regulations. The site is registered on the DMIRS SRS System and has a Project Management Plan in place.		D	2	Low
	The operational and final surfaces and features are designed to be not affected by extreme climate events.	E	1	Low	The end use is a very gentle swale and a return to pasture and productive land. There will be no alteration to drainage or other local landforms.		E	1	Low

RISK MATRIX

			Effect / Consequence				
			1	2	3	4	5
Type			Insignificant	Minor	Moderate	Major	Severe
Environmental Impact			No discernible, adverse impact, individuals of species may be affected locally.	Discernible effect on the environment but no adverse impact, minor number of individuals of species may be affected locally	Minor adverse effect to the environment (including public amenity), moderate loss of individuals of species locally.	Moderate damage to ecosystem function, major loss of individuals of species locally, loss of public amenity.	Significant long-term damage/loss to ecosystem function, extinction of a species locally
Likelihood	A Almost Certain	Likely that the unwanted event could occur often (once per week) during the life of an individual item or system	Medium 11	High 16	High 20	Very High 23	Very High 25
	B Likely	Likely that the unwanted event could occur several times per year during the life of an individual item or system.	Medium 7	Medium 12	High 17	High 21	Very High 24
	C Possible	Likely that the unwanted event could occur sometime (once per year) during the life of an individual item or system.	Low 4	Medium 8	High 13	High 18	High 22
	D Unlikely	Unlikely, but possible for the unwanted event to occur once in the life of an individual item or system.	Low 2	Low 5	Medium 9	High 14	High 19
	E Rare	Highly unlikely that the unwanted event could ever occur in the life of an individual item or system.	Low 1	Low 3	Medium 6	Medium 10	High 15

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1.0 INTRODUCTION

1.1 Background and Proposal

The City of Busselton and the Shire of Augusta Margaret River and nearby areas are undergoing significant development, which requires fill sand for foundations and to lift the elevation of low lying land for construction.

A sand resource has been identified on Lot 101 that is suitable for fill sand with some deeper coarse sand that is capable of use for filtration and specialty uses.

This documentation provides the background for an application for Planning Approval and Extractive Industries Licence to extract the resource.

The proposal is to extract sand from approximately 20.94 hectares on Lot 101 and transport it along Gibb Road north and then west to Bussell Highway.

1.2 Proponent

Margaret River Natural Resources Pty Ltd is a well regarded local sand resource supplier that has operated in the Busselton local government area for ten years, supplying sand to the local markets and providing coarse sands for sorting into various water filtration and other purposes.

Contact can be made through;

MARGARET RIVER NATURAL RESOURCES PTY LTD, as trustee for Margaret River Natural Resources Trust.

28 Cutler Road
Jandakot, WA 6164

Quarry Manager – Roger Cook
08 93417 1111
0419 198 049

1.3 Location and Ownership

Lot 101 lies approximately 8 kilometres north from Cowaramup Townsite, 3 km east from Bussell Highway.

1.4 Project Objectives

The proposal is to continue to provide a source of local sand to assist in minimising the cost of construction in the local and wider area.

Importance and Rationale

Nature of the resource

The sand is a sub rounded to rounded quartz sand generally medium grained; with a significant portion of the grains being larger than 1.5 mm. It is dark grey brown in the surface with a small amount of humus, then grading to brown sand at depth with some associated gravel.

The whole resource area has been investigated using an excavator digging test holes on a grid pattern. The sand varies from yellow to white and from 1 – 3 metres deep with an average of 1.5 metres.

The sand occurs as a discontinuous sheet of coarse sand overlain by finer fill sand derived from the ocean when the sea lapped the Whicher Scarp.

The sand appears to be of aeolian origin, and extends to 3.0 metres depth but averages 1.5 metres. The sand is similar to the sand that has been extracted from nearby pits.

Sand in the local area, that is free from excessive clay, is restricted in areas which are cleared. Therefore this site is important because it is cleared pasture and will be returned to pasture.

The DMIRS has recognised the risks from sterilisation of resources of sand in the southern areas and is currently undertaking an assessment of future community needs.

See;

- Western Australia, Western Australian Planning Commission, *State Planning Policy 2.4, Basic Raw Materials*.
- Western Australia, Western Australian Planning Commission, *State Planning Policy 2.5, Agriculture and Rural Land Use*.
- Department of Planning and the WAPC released the draft *Basic Raw Materials Demand and Supply Study for the Bunbury – Busselton Region*.
- Department of Planning 2016, *Basic Raw Materials Fact Sheet*.
- Abeyasinghe P B, 2003, *Silica Sand Resources of Western Australia, Geological Survey of Western Australia, Mineral Resources Bulletin 21*.
- Department of Planning 2009, *Basic Raw Materials – Applicants Manual*.

The aims of the proposal are to;

Provide a supply of white and yellow silica and fill sand.

- Provide a supply of sand for the construction industry to be used in the local Region together with a small amount of coarser sand that is suitable for filtration purposes.
- Maximise the use of basic raw materials in the local area, to enable greenhouse gases, transport, and other environmental issues associated with alternative resources, to be minimised.
- Help to keep the prices of local basic raw materials at the lowest possible levels, by maintaining small transport distances. This benefits the whole community.
- Comply with State Planning Policy No 2.5, Agricultural and Rural Land Use Planning 2016, which states that basic raw materials should be taken prior to sterilisation of the area by development.
- Return the excavated area to pasture.

2.0 PLANNING ASSESSMENT

2.1 Current Land use

Lot 101 is a grazing property, that lies in a local area of existing quarries that have extracted sand and gravel. Much of these resources are now used and alternative resources are now required.

The extraction area is cleared apart from scattered regrowth trees of Peppermint *Agonis flexuosa* on the sand resource. There are around 20 regrowth Peppermint on the resource area.

There are no dwellings within 500 metres. Arrangements have been made with the landholders to the south where sand has been extracted.

The same transport route as the sand from the property to the south are to be used, (See the attached permission from the respective landholders.

2.2 Proposed Land use

Sand extraction with an end use to parkland pasture.

2.3 End Use

After sand excavation the land will be returned to productive agricultural land.

The contoured surface will therefore be restored slopes and form that match the adjoining land form and land uses.

2.4 Land Zonings and Policies

2.4.1 State Government Policies and Planning Schemes

- ***State Planning Policy 1.0, State Planning Framework Policy***

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 sand and gravel the, the overarching document is the;

- o State Planning Policy 1.0 State Planning Framework.

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.

A number of other key State Government Policies are also relevant to the local regional planning such as the State Planning Strategy 2050 released in 2014.

• ***State Planning Strategy, 2050 (2014)***

State Planning Strategy 2050 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 approach in the strategy considers Basic Raw Materials as listed below.

ELEMENT	2050 OUTCOMES	MEASUREMENT	ASPIRATIONS
Basic raw material (BRM) supply	Accessible and affordable supplies of BRM are available close to demand	The cost of supplying basic raw materials to the building and construction on industry	➤ Appropriate policies are in place to manage existing and future BRM supplies over the long term. ➤ BRM are optimally used for their highest purpose. ➤ The securing of BRM sites is managed through robust strategic sequential land use planning and development control prior to final land use ➤ Demand for BRM is partly managed through compact settlement structures that contain high-density built form.

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

The operations have been designed to continue to provide good environmental management that minimises environmental change and enables continued rural land uses.

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

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

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

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

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

Part of Section 5.7 states;

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

Planning strategies, schemes and decision making should:

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.

Support sequencing of uses where appropriate to maximise options and resultant benefits to community and the environment.

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

- **State Planning Policy No 2.5, Agricultural and Rural Land Use Planning, 2016**

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 was updated in December 2016 and provides strong measures to identify, protect and use basic raw materials.

SPP 2.5 does reiterate the need to protect and use basic raw materials.

Basic Raw Materials are included in the definitions as

Sand (including silica sand), clay, hard rock, limestone (including metalurgical limestone), agricultural lime, gravel, gypsum, and other construction materials. The materials may be of State, regional or local significance depending on the resource location, size, relative scarcity, value and demand for the product.

Amongst seeking to protect agricultural values, Policy Objective 4 (c) states

Outside the Perth and Peel Planning regions, secure significant basic raw material resources and provide for their extraction.

Section 5.9 deals with Basic Raw Materials and seeks to achieve the following in an environmentally acceptable manner;

Protect the resources until the resource is extracted (5.9.a)

Identify significant basic raw materials on sub-regional and local planning strategies, region and local planning schemes (5.9.b, 5.9.c, 5.9.d)

The extraction of basic raw materials should not be generally prohibited (5.9.e)

Provide for sequential land use (5.9.f)

Limit sensitive land uses to locations demonstrated to not limit existing or potential extraction of basic raw materials (5.9.g)

Provide for the consideration of native vegetation or significant biodiversity values and may require retention and protection of vegetation and environmental assets (5.9.h)

Have regard for the potential impacts of fragmentation and connectivity of native vegetation (5.9.i)

Maintain adequate buffers to protect water quality in public drinking water source areas (5.9j).

SPP 2.5 also supports preventing conflicting land uses (5.12.1), supports the generic buffers recommended by other Government documents such as the EPA Guidelines for separation distances (5.12.3), and seeks to restrict subdivision from impinging on basic raw material resources.

Policy SPP 2.5 is also supported by Guidelines that seek to protect the Landscape and secure Transport Routes.

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

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

This is discussed further in Section 2.11 Surrounding Landuses and Buffers of this document.

Basic Raw Materials Demand and Supply Study for the Bunbury – Busselton Region draft 2012

In August 2012, the Department of Planning and the WAPC released the draft Basic Raw Materials Demand and Supply Study for the Bunbury – Busselton Region.

The document is used to determine the future requirements for the various basic raw materials in the local urban developments and the Bunbury – Busselton Region. It predicts that by 2021 an additional 8706 dwellings will be required in the region.

A total of 43 753 000 cubic metres sand is predicted to be required until 2030 alone so fill sand such as this is a much needed commodity.

2.4.2 Local Government Policies and Planning Schemes

The City of Busselton has one Local Planning Scheme; TPS 21.

The City of Busselton also has a land use strategy to provide a context for local planning within the regional planning strategies;

City of Busselton Local Planning Policy 5, Rural Land Use and Development Policy 2010.

In addition the City of Busselton has an extractive industry bylaw;

Lot 101 lies within Policy Area 3 for Extractive Industries.

All the listed planning instruments provide guidance on local planning, but, in addition, approval is required under the;

- City of Busselton Local Planning Scheme 21.

The relevant policies have all been considered with respect to this application. The Quarry complies with, or is compatible with, all policies, strategies and schemes.

A summary of each of the relevant policies, strategies and schemes is provided below, with a comment on how the excavation of sand relates to each.

City of Busselton Local Planning Scheme Number 21

The City of Busselton Scheme 21 lists the site as occurring in the Agriculture Zone.

The Agriculture Zone aims to preserve agricultural land uses and not compromise the landscape and natural environment.

Extractive Industries are an “A” use within that zone. Approval under Local Planning Scheme 21 is normally granted with a number of conditions.

Lot 101 is listed as lying within the “Agriculture Zone”.

City of Busselton, Planning Policy 5 “Rural Land Use and Development” Policy, 2010

The City of Busselton, Planning Policy 5, “Rural Land Use and Development” Policy, 2010 compliments the Local Planning Scheme and has policies with respect to the extraction of sand.

Policy 5A Extractive Industry Provisions seeks the protection and staged use of basic raw materials whilst minimizing environmental and social impacts. The Policy outlines a comprehensive set of assessments and management with respect to extractive industries, including, but not limited to;

- Visual Assessment,

- Route Assessment and Transportation,
- Community Referral by the City,
- Environmental Considerations,
- Buffers and setbacks,
- Dust and Noise,
- Land Clearing,
- Water Tables and Acid Sulfate conditions,
- Site Restoration and Rehabilitation.

Extractive Industries Licence

An Extractive Industries Licence is issued under City of Busselton Local Law

Current Land Zonings

Lot 101 is zoned “Agriculture”.

Lot 101 lies in *Policy Area 3 – “Extractive Industry Constrained” in City of Busselton, Planning Policy 5, “Rural Land Use and Development” Policy, 2010*

2.4.3 End Use – Sequential Planning

The extraction of sand is seen as an interim use prior to a return of the area to pasture.

No sequential land planning can be made because the future use is not known. Therefore the most appropriate end use is to restore the existing cleared and parkland pasture land with native vegetation around the perimeter and in strategic locations.

This would enable semi-rural land uses and rural uses on the landform. Any use other than rural will require rezoning of the land. Even so the proposed revegetation would be suitable for rural living if rezoning was to occur at some point in the future.

2.4.4 Legislative Framework - Stakeholders

There have been no significant changes to the scale and nature of the local land uses over the past few years. Sand excavation has been approved to the south and the adjoining lot to the east.

Table 1 Legislative Framework

Legislation	Environmental Factor regulated/affected	Discussion	Action
<i>Aboriginal Heritage Act 1972</i>	Aboriginal heritage sites	Recorded Heritage Sites A database search of DPLH has been conducted and no site recorded	A commitment is made to halt activities that may impact on a site if any is found during excavation, pending assessment by consultants.
<i>Planning and Development Act 2005. City of Busselton LPS 21.</i>	Development approvals for on site constructions and any ensuing environmental impacts.	Planning Consent is required from the City of Busselton under City of Busselton LPS 21.	A concurrent application for development approval is lodged.
City of Busselton, Planning Policy 5 "Rural Land Use and Development" Policy, 2010	The application and management of quarries is covered by the Policy.	This assessment and Management Plan has considered the issues outlined in the Policy and has addressed them and other factors as necessary.	The Excavation and rehabilitation Plan uses "Best Practise" to mitigate potential environment and social impacts.
<i>City of Busselton Extractive Industries Local Law 2010</i>	The operations of the quarry are regulated by both the Planning Approval and Extractive Industries Licence	An Extractive Industries Licence is required.	An application for an Extractive Industry Licence is concurrently lodged.
<i>Health Act 1911</i>	Environmental and health impacts from waste water treatment and community health.	No matters of significance that would trigger this legislation have been identified.	The proposal complies with the Health Department Guideline for Dust separation. (See Dust Management) No waste materials will be disposed of on site.
<i>Department of Planning, Land and Heritage Transport Impact Guidelines 2016</i>	New developments may need to consider transport options.	This is a small sand pit located in an area where sand and gravel extraction has occurred for many years. This operation will be similar to the closed sand pits in terms of access and scale of activities or transport.	Discussions will be held with the City of Busselton to determine what arrangements need to be implemented with respect to road maintenance..
<i>Western Australian Planning Commission Planning Bulletin 111/2016</i>	New developments may need to consider fire risk and mitigation such as a bushfire policy and BAL attack document.	This is a sand pit with no structures that present a fire risk. The pit acts as a fire management zone as it is devoid of vegetation.	No assessment is required because there are no significant fire risk and WAPC 2016 Planning Bulletin 111/2016 does not require a BAL Attack assessment.
<i>Environmental Protection Act 1986 Part IV - Assessment</i>	Referred to the EPA if the project is or may constitute a significant environmental impact.	This is a small sand pit in an area where small quarries are common.	No referral to the EPA will be required as there is no chance of this being a "Significant Environmental Impact".
<i>Environmental Protection Act 1986 Part V – DWER Licence</i>	Environmental factors that may be significantly impacted related to Prescribed Premises- Processing and Screening	If screening is to prepare in excess of 5 000 tonnes per year the operation will require a Department of Water Environment Regulation Licence.	A DWER Licence will be applied for prior to screening which triggers the "Prescribed Premises"; 5 000 tonnes per annum. It is unlikely that the washing of sand will exceed 5 000 tonnes per year and if there is no screening Part (V) of the Environmental Protection Act may not be triggered.
<i>Environmental Protection (Noise) Regulations 1997</i>	Noise impacts.	The excavation is located over 500 metres from any sensitive premises with other existing and old extraction close by. The proposed excavation therefore	Noted. See Noise Management.

		complies with the EPA generic buffer guidelines.	
<i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004</i>	Clearing and disturbance of native vegetation.	Clearing Permit under the <i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004</i> is required <i>under the Regulations</i> .	A Clearing Permit is unlikely to be required for scattered trees with some trees likely to be able to be retained.
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)	Matters listed on the EPBC database.	The matters listed under the <i>EPBC Act 1999</i> which might apply to this site such as Black Cockatoo habitat and Western Ring Tail Possum Habitat.	The proposal does not require the clearing of Black Cockatoo habit. See below.
<i>Wildlife Conservation Act 1950</i>	Provides for the protection of flora and fauna.	The clearing of vegetation is covered under the <i>Environmental Protection (Clearing of Native Vegetation) Regulation</i> . There is potential for Western Ringtail Possums to live locally. These are listed as "Vulnerable".	The proposal does not require the clearing of Black Cockatoo habit with the only vegetation to be impacted being isolated regrowth Peppermint. The potential for impact on Possums is considered low for the following reasons. • The clearing of Peppermint trees is minimised with the scattered trees to be retained. • The existing Peppermint Trees are isolated and do not afford suitable habitat for Possums. • Additional Peppermint Trees will be planted in clumps with wildlife linkages.
<i>Conservation and Land Management Act 1984</i>	Parks and Reserves and issues relating to flora and fauna.	There are no known issues or nearby reserves that will trigger this legislation.	Noted.
<i>Biodiversity Conservation Act 2016</i>	The legislation seeks to protect and manage biodiversity in all its forms through regulation, conservation and restoration.	There are no known issues that trigger this legislation.	Noted.
<i>Heritage of Western Australia Act 1990</i>	Heritage	No heritage matters are identified locally or on quarry footprint. DPLH databases were searched.	Noted.
<i>Waterways Conservation Act 1976</i>	Water quality and management of surface water	There are no watercourses on the extraction site although a creekline commences to the north of the proposed pit.	A Water Management Plan has been prepared and is included. The Water Management Plan has been approved by the DWER.
<i>Rights in Water and Irrigation Act 1914</i>	Water quality and management of surface water	See above	See above.
<i>Country Areas Water Supply (CAWS) Act 1947</i>	Water supplies	The site does not lie within a surface or groundwater control area.	Noted
State Agreement Acts	Specific acts that relate to certain large projects that may impact on some locations.	Not applicable	
<i>Contaminated Sites Act 2003</i>	Contaminated materials that may arise from excavation or be used in	The only factor that is likely to fall under this category is the storage and use of maintenance items and on site maintenance.	No materials are present or to be used which would trigger this legislation apart from normal fuel and maintenance.

	excavation and processing.		A Water Management Plan has been prepared that includes commitments to remove any contaminated soils or other material regularly and at the end of excavation as part of the closure actions.
<i>Dangerous Goods Safety Act 2004</i>	Potential for dangerous good to impact on the environment.	Refers to fuel, which is required and blasting under the <i>Dangerous Goods Safety (Explosives) Regulations 2007</i> .	Margaret River Natural Resources will comply with the requirements for fuel through management plans that will be implemented. Fuel and Servicing Management Plans are included in the attached Water Management Plan.
<i>Mines Safety and Inspection Act 1994</i>	Safety and management of mining operations which in turn may impact on the environment.		Mine Safety The site will be registered under the SRS and a Project Management Plan, Risk Assessment and Emergency plans approved. The Project Management Plan addresses all aspects of mining. The SRS System addresses ongoing Health and Safety.
Project Management Plan – SRS System	Safety and management of mining operations which in turn may impact on the environment.	Compliance with the Project Management Plan when it is submitted and approved.	Mine Safety The site is registered under the SRS and a Project Management Plan, Risk Assessment and Emergency plans approved. See Above

Table 2 Stakeholder Register

Stakeholder	Date - Timing	Potential Considerations	Proponent Response - Outcome
Internal Stakeholders			
Internal Management	- Ongoing - Day to day management of the operations, - Future directions and ownership.		The methods of operation are not proposed to be significantly different from other sand quarries in the local area or from other sand extraction operations conducted to the northwest in the City of Busselton.
External Stakeholders			
EPA	This is a small sand pit in an area where small quarries are common		No referral is necessary.
Department of Biodiversity Conservation and Land Management	Manages native flora and fauna		Minimal clearing is required and will be considered under a Clearing Permit Application as required.
Department of Environment and Energy Commonwealth	- The listed matter that might apply is the Western Ringtail Possum. There will be no impact on species preferred for feeding or breeding habitats for Black Cockatoos. - The Western Ringtail Possum is listed as "Vulnerable" under the EPBC Act 1999.		The potential for impact on Possums is considered low for the following reasons. - The clearing of Peppermint trees is minimised. - The existing Peppermint Trees are isolated and do not afford suitable habitat for Possums. - Additional Peppermint Trees will be planted in clumps with wildlife linkages.
City of Busselton	- Provides Planning approval under Local Planning Scheme 21. - Issues Extractive Industries Licence for the quarry under the Local Law. - Regulates land zonings and planning in conjunction with the Western Australian Planning Commission		- Margaret River Natural Resources Pty Ltd will work with the City of Busselton on complying with the conditions and minimising local impacts. - There have been discussions with the City of Busselton with respect to the new entrance from Gibbs Road, to service the farming operations on Lot 101. This was required because the land was agisted

	- Controls the measures used to prevent bush fires. - Regulates truck use on local roads.	to the holder of Lot 102 who accessed Lot 101 directly through a gate.
Nearby Residents	- The quarry has setbacks and buffers exceeding 500 metres and complies with the EPA Generic Buffer Guidelines. - The scale and type of operations are similar to those operating in the local area.	- Margaret River Natural Resources Pty Ltd has discussed the proposal with all adjoining lot owners who appear comfortable with the proposed operations. - Discussions have been held with the landholder of Lot 4198 who did not express concerns with the proposal. Discussions were held with respect to extracting the adjoining resource from Lot 4198 but no agreement has been entered into. - Discussions have been held with the owner of Lot 102 who agists stock on Lot 101 for both the previous land holder and the current landholder. - Discussions have been held with the owners/operators of Lot 4002 who operate an existing sand quarry on Lots 4201 and 4202. - The other adjoining Lot, Lot 25 is well protected by vegetation and is set well back (over 500 metres from the proposed sand pit and transport route to the property boundary and over a kilometres from the dwelling. The sensitive land uses are well protected by vegetation. - There has been some local comment raised with respect to transport along Gibb Road after a new entrance was created to Gibb Road. No transport of trucks or large equipment associated with extraction will be moved along Gibb Road. The entrance to Gibb Road will continue to be used for some light vehicles and for continuing farm activities.
Department of Lands Planning and Heritage (DAA) and traditional land holders	Maintains heritage databases	Department of Planning Lands and Heritage database has been searched and no sites have been found.
DWER	- May provide advice on aspects of environmental impact and management. - Issues clearing permits under the <i>Environmental Protection Act 1986</i>. (Not required)	If clearing of the scattered regrowth trees is proposed for which a Clearing Permit is required, a Clearing Permit will be applied for.
	- Published guidelines for water quality management for extractive industries. - Licenses bores and oversees water use. - Has control over the management of ground and surface water in the area, including water catchments.	- Complies with DWER Guidelines for water management and separation to the groundwater of > 2 metres, generally and with the 0.5 metres separation provided by the South West Guideline for extractive industries. - The Water Management Plan has been approved by DWER - The site lies within Geographe Bay Rivers Surface Water Protection Area.
	A DWER Licence is required under <i>Part IV of the Environmental Protection Act 1986</i> for crushing or screening if the annual volumes exceed 5000 - 50 000 tonnes. (Category 70 Prescribed Premises).	- A DWER Licence will be applied for, if screening exceeds 5 000 tonnes per year. - It is unlikely that the washing of sand will exceed 5 000 tonnes per year and if there is no screening Part (V) of the Environmental Protection Act may not be triggered.
WAPC	- Prepares State Planning Policies. - SPP 2.5 now covers this area,	Noted
DMIRS Safety Division	- Conditions on the safety of the operations. - Controls the safety and methods of excavation through the <i>Mines Safety and Inspection Act 1994</i>. - Responsible for regulation of mines under the	Noted and in place.

	<i>Mining Act 1978.</i>	
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3.0 BUFFERS AND SOCIAL IMPACTS

There are no proposed changes to the scale and nature of the excavations. The access points and intensity of excavation will not change.

3.1 Consideration of nearby sensitive premises

The quarry is designed to maximise the setbacks to the closest sensitive premises.

As part of the development of the management plans for the proposed quarry extensive analysis of the local landform, land uses and location of sensitive premises were made by Landform Research from the available sources of published information, aerial photography, historical aerial photography, site mapping, review of the nearby and surrounding land uses, local and regional planning and local and wider environmental attributes.

The main environmental issues identified in relation to buffers and setbacks to sensitive premises, in addition to those generally recognised by the various Government and Published guidance's are;

- Visual amenity
- Dust management
- Noise management
- Blasting
- Local amenity
- Cumulative impacts of quarries

3.2 Policies

Generic and State Buffers

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.

SPP 4.1 discusses the need to provide 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 DWER standards and DPLH Generic Industrial Buffer Guidelines; that is the EPA 300 - 500 metre generic buffer used in SPP 2.4 and SPP 2.5 that are used in the absence of supporting or scientific studies and information.

EPA guidance "*Separation Distances between Industrial and Sensitive Land Uses*", June 2005 lists the generic buffers for sand quarries as 300 – 500 metres depending on the extent of processing.

The Draft DWER Buffer Guidelines (DER 2015) have been withdrawn. The generic buffer for screening up to 50 000 tonnes was 500 metres.

The buffer documents now defer to the EPA 2005 Guidance Statement.

The buffer referred to can be both on site and offsite although in this case only on site buffers are required.

A generic buffer relates to the distance at which there are unlikely to be any problems without some further investigations and does not mean that smaller buffers are not acceptable.

SPP 2.5 supports preventing conflicting land uses (5.12.1), supports the generic buffers recommended by other Government documents such as the EPA Guidelines for separation distances (5.12.3), and seeks to restrict subdivision from impinging on basic raw material resources.

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.

The walls of the pit, perimeter bunding and nature of the ridge landform will be used to reduce noise transmission.

Excavation will be worked from inside out on the floor of the pit working below natural ground level.

Based on the nature of the sand, equipment used and excavation methods, the extraction of sand has potentially the lowest impact and a generic buffer of 300 metres is appropriate and could be less if significant impacts are confined.

There are no residential properties near the application area, with over 500 metres separation to all sensitive premises.

The sand pit therefore complies with the EPA Generic Buffer Guidelines.

City of Busselton Rural Areas and Land Use Development Policy - 2010

Section 5A of the Policy; Extractive Industry Provisions Section 6.2 provides for some setbacks.

Section 6.2.1 limits extractive industries to 500 metres from a tourist facility where the owners object., Section 6.2.2 Limits the setback to 500 metres from a dwelling where the owner objects with Section 6.2.3 limiting the separation to generally no closer than 300 metres depending on the size and scale of the operation.

City of Busselton Policy 5A – Rural Areas land Use and Development Policy provides guidelines for the buffers to sensitive premises.

Lot 101 lies within Policy 3 Extractive Industry Constrained. Section 6.2.3 of the Policy provides for sand to generally not be extracted within 300 metres of a sensitive premises, dependant on the *“nature and scale of the operation and the content of a Dust and Noise Management Plan”*.

The proposed quarry complies with *the City of Busselton Rural Areas and Land Use Development Policy – 2010*, with sensitive premises having setbacks of over 500 metres.

A perimeter buffer of 20 metres with earth bunding is proposed for adjoining lots in compliance with Section 6.4 City of Busselton Policy 5A – Rural Areas land Use and Development Policy. That buffer will then be battered down to match the excavated area.

3.3 Community Consultation

The Proposal will be advertised to the local property owners as part of the consideration by the City of Busselton.

Margaret River Natural Resources Pty Ltd have consulted extensively with all adjoining properties and have held discussions with the City of Busselton.

As Lot 101 was farmed by the owner of Lot 102 access from Lot 102 was provided through the fence between the two properties. However with the sale of Lot 101, an upgraded access had to be provided to service the farming operations on Lot 101.

This crossover upgrade resulted in some local people on Gibb Road expressing concern with the potential use of Gibb Road south. Gibb Road south is a partially winding narrow road. However Gibb Road north is a better grade of road and is suitable for the transport of sand.

Therefore Margaret River Natural Resources Pty Ltd held discussions with all adjoining property holders and the City and have determined that the best access route is Gibb Road north. See the attached Transport Plan.

A summary of the discussions with the local people is provided in Table 2, Stakeholder Register.

3.4 Heritage

A search of the Department of Aboriginal Affairs database does not reveal aboriginal sites on Lot 101.

The site has been an operating farm for many years, with ongoing soil disturbances through that time.

Should any archaeological site be uncovered, work will cease in that area pending an assessment of the site by an independent consultant, traditional owners and the Department of Planning Lands and Heritage as required.

3.5 Complaints Mechanism

The following complaints mechanism is proposed.

- The contact details will be displayed at the entrance to the operations.
- A complaints book will be provided and maintained.
- Upon receipt of a complaint it will be investigated and action taken if the complaint is determined to be legitimate.
- When a complaint is found to be legitimate, any reasonable actions to mitigate the cause of the complaint will be taken, to prevent a recurrence of the situation in the future.
- Details of any complaints, the date and time, means by which the complaint was made, the nature of the complaint, the complainant, investigations and any resulting actions and the reasons, will be recorded in the Complaints Book.

- The City of Busselton will be informed of any complaint or any other report provided to a Government Department within 3 working days.
- The complaints book will be made available for viewing or requested details made available to the Shire or any other official upon request.



Figure 4 Photograph of the sand resource. The Peppermint Trees are to be retained



Figure 5 Sand resource

4.0 PHYSICAL ATTRIBUTES

4.1 Geology and Geomorphology

The sand lies between the Leeuwin Complex and the Yilgarn Craton in a down faulted basin filled with Permian overlain by Cretaceous sediments.

The land system is the Yelverton System (DPIRD Mapping) that now lies above the Whicher Scarp and was formed as a north facing bay at a time of higher sea level.

The general formation of the sand systems are thought to be a marine with dunes, for the surface finer sands, with the basal sands being considered to have potentially originated from the Permian glacial times.

The geology is discussed in Wilde S A and D R Nelson, 2001, *Geology of the Western Yilgarn Craton and Leeuwin Complex, Western Australia – Field Guide*, Geological Survey of Western Australia and Marnham J R, G J Hall and R L Langford, 2000, *Regolith-Landform Resources of the Cowaramup-Mentelle 1 : 50 000 Sheet*, Geological Survey of Western Australia.

The sand resource lies on the plateau erosion surface that sits across the site at an elevation. The sand resource is located on a plateau sand and gravel ridge that rises from around 68 metres AHD to 74 metres AHD.

4.2 Regolith and Soils

The soils and excavation of Sands are well known from the other sand pits that have operated and currently operate across the local area. A small amount of gravel and gravelly soil occurs in the west of the resource.

The resource typically has a grey sand overburden up to 100 mm thick over leached white silica sand grading to yellow sand. Yellow sand occurs more in the west closer to the laterite duricrust, with the leached white sand more common in the areas of lower elevation or areas that have been subject to leaching in the geological past.

The finer sand overlies discontinuous thin layers of coarser sand.

Under the sand is the sandy loam subsoils that are developed on the Cretaceous sediments.

The soils are well described in Marnham J R, G J Hall and R L Langford, 2000, *Regolith-Landform Resources of the Cowaramup-Mentelle 1 : 50 000 Sheet*, Geological Survey of Western Australia.

4.3 Climate

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

Temperatures are recorded at Witchcliffe, where the maximum temperatures in the hottest and coldest months, December to January and July, are 24 to 27 degrees C and 16 - 17 degrees C respectively. In winter the average minima drop to 8 degrees C in July.

Average annual rainfall for the area is 958 mm. Most of the rain falls during the winter months April to October inclusive. Evaporation exceeds rainfall in all but the wetter months.

Wind direction is predominantly from the east in the morning and from the north west to south west in the afternoon during the summer months, with winter winds being lighter but having a component of strong winds in winter storms.



Figure 4 Photograph of the sand resource. The Peppermint Trees are to be retained

Witchcliffe Climate

WITCHCLIFFE LONG-TERM AVERAGES

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Mean Max (°C)	26.6	27.2	25.6	22.5	19.7	17.4	16.4	16.8	17.4	19.6	22.8	24.8	21.4
Mean Min (°C)	14.0	14.4	13.0	11.2	9.7	8.8	8.0	8.2	8.7	9.3	10.9	12.4	10.7
Mean Rain (mm)	10.4	9.0	27.8	66.6	142.9	179.1	196.5	159.0	122.3	62.6	36.7	15.3	1033.3
Median Rain (mm)	5.4	6.7	26.4	57.0	118.6	148.6	197.8	149.8	103.6	56.9	31.4	8.2	958.1
Mean Rain Days	3.6	5.2	7.8	14.3	19.5	21.2	23.5	22.6	20.2	16.7	10.5	7.2	164.9

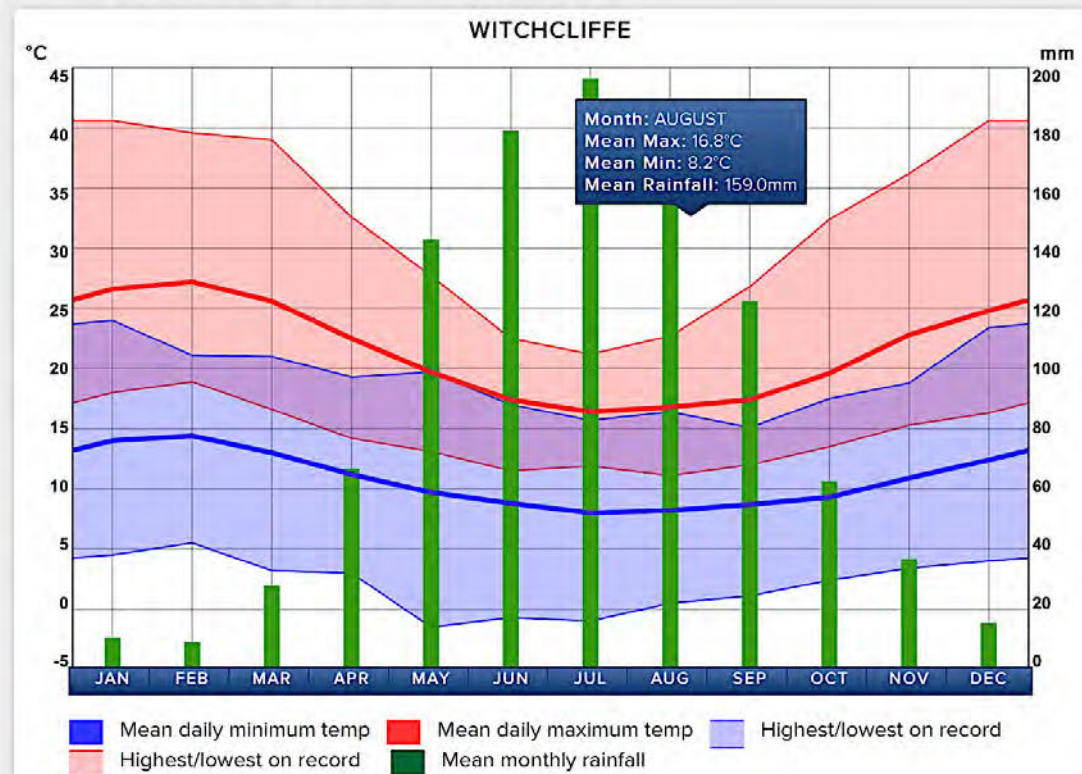
WITCHCLIFFE DAILY RECORDS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
High Max (°C)	40.6	39.6	39.0	32.6	27.7	22.5	21.2	22.7	26.8	32.4	36.2	40.6	40.6
Low Max (°C)	18.0	18.9	16.6	14.2	13.1	11.5	11.9	11.1	12.0	13.5	15.3	16.3	11.1
High Min (°C)	24.0	21.1	21.0	19.3	19.7	17.0	15.7	16.4	15.1	17.5	18.8	23.4	24.0
Low Min (°C)	4.5	5.5	3.2	3.0	-1.5	-0.7	-1.0	0.5	1.1	2.4	3.4	4.0	-1.5
High Rain (mm)	27.8	16.0	47.6	63.0	65.4	62.6	99.4	71.0	44.4	53.0	36.2	27.0	99.4

WITCHCLIFFE MONTHLY RECORDS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
High Mn. Max (°C)	29.7	30.1	28.3	24.5	21.6	18.0	17.1	18.3	18.7	22.1	25.1	27.3	22.4
Low Mn. Max (°C)	25.2	25.6	23.6	20.5	18.4	16.4	15.7	15.5	15.7	16.8	20.0	20.6	20.0
High Mn. Min (°C)	15.7	16.7	14.6	13.2	12.3	10.5	9.7	10.3	10.5	11.0	13.1	14.3	11.3
Low Mn. Min (°C)	12.8	13.0	11.6	9.4	6.7	5.6	6.6	5.4	6.7	7.6	9.2	11.1	10.0
High Rain (mm)	35.8	24.2	89.8	150.4	253.6	339.6	344.4	227.8	241.0	128.2	82.4	32.6	1338.8
Low Rain (mm)	0.2	1.2	1.4	5.4	50.8	88.6	79.2	40.0	48.0	20.8	9.6	0.0	707.2

WITCHCLIFFE ANNUAL TEMPERATURES & RAINFALL



4.4 Hydrogeology

See Section 9.0 Water Management Plan

Surface Water

There is no surface runoff of water on the sand resource due to the porosity and permeability of the sand, with precipitation draining to the water table.

Only the areas that are well above the water table have been selected for excavation. In summer the local soils dry out, but in winter the rate of precipitation wets the sand. There are no winter-wet conditions.

The site is not subject to any watercourses or flood paths but the headwaters of a creek originates to the north of the eastern portion of the pit, originating from water entering the overlying sands and then running along the more clayey basement of Cretaceous sediments. The setback to the headwaters of the creek are over 100 metres from the edge of the sand pit.

The surface water and superficial groundwater are the only relevant considerations for this proposal.

It is noted that the clearing of the former forest from Lot 101 will have led to significantly increased recharge and the formation of the creeklines which are more permanent features.

Groundwater

There is generally no surface runoff of water from the sand due to the porosity and permeability of the sand, with precipitation draining to the water table. It has been estimated that 30% of the rainfall will reach the superficial aquifer with an unknown amount filtering into the deeper aquifers, based on the pasture on the sand.

The groundwater issues were considered by the Environmental Protection Authority in Bulletins 512, 788, 821 and 818, and whilst these do not specifically refer to the extraction of basic raw materials, and are for the Lake Clifton Catchment, they do consider the impact of clearing, planting trees and rural, residential developments. The figure the EPA used for recharge from native vegetation was 10 – 15% rainfall, whereas cleared land had a recharge of 30 – 40 %.

Recharge from pasture is anticipated currently to be near 30% based on the vegetation and elevation above the water table. Recharge on excavated areas will also be in the order of 30% because of smaller separations to the water table based on the existing sand ridges accepting and retaining moisture from smaller rainfall events which do not reach the water table. (Environmental Protection Authority Bulletins 512, 788, 821 and 818). This will result in little change to recharge with excavation.

Department of Water 2010 *Murray Drainage and Water Management Plan* at Pinjarra places the transmissivity as 5 – 15 metres per day or around 9.2 metres per day for similar sand in a similar hydrogeological situation.

The infiltration rates ensure that the sand does not become saturated and no water exists in the resource sand areas.

The resource area is elevated with a shallow seasonal superficial water table perched at the top of the underlying Cretaceous sediments when the vertical infiltration rate is exceeded by the winter precipitation.

The site sits within the South West Groundwater Areas Allocation Plan 200000 and lies in the Dunsborough – Vasse Subarea for Superficial and Leederville Formation. The underlying Yarragadee Aquifer will not be impacted.

In reality it is only the Superficial Aquifer that is relevant to this proposal in terms of the depth to groundwater beneath the base of the sand pit.

There are no acid sulphate or salinity issues, with the soils and water being fresh and elevated in the landscape.

In the south west, the Department of Water South West Region Guidelines Water Resource Considerations for Extractive Industries permits a final land surface of 0.5 metres above the highest winter water table. The south west guideline is more applicable to this site than the guideline WQPN 15 because the end use of the land will be to continued agriculture use.

The excavation of sand from the site complies with the DOW South West guidelines and WQPN 15 and uses the management actions wherever there is environmental benefit.

The protection of surface and ground water from contamination by hydrocarbons is viewed by Margaret River Natural Resource as a critically important issue in managing its environmental responsibilities at this site. The company has examined this risk and adopted a range of policies and procedures to mitigate the impact of hydrocarbon spills on the environment. DWER has approved the attached Water Management Plan.

4.5 Vegetation

The resource area is cleared, to pasture with scattered regrowth but relatively mature Peppermint trees of about 20 in number. These trees are to be retained with a 10 metre buffer.

The main vegetation on site is the Jarrah Marri Forest remnant towards Gibb Road.

If any vegetation is to be cleared a Clearing Permit will be applied for.

4.6 Fauna

The fauna on site will already be significantly depleted by the clearing as there are just scattered Peppermint trees on site.

The proposal does not require the clearing of Black Cockatoo habitat with the only vegetation to be impacted being isolated regrowth Peppermint.

- The potential for impact on Possums is considered low for the following reasons.
- The clearing of Peppermint trees is minimised.
- The existing Peppermint Trees are isolated and do not afford suitable habitat for Possums.
- Additional Peppermint Trees will be planted in clumps with wildlife linkages. 100 Peppermint trees will be planted to link the remnant Jarrah – Marri Forest west of the pit to the small creekline vegetation.

5.0 PROJECT DESCRIPTION

5.1 Construction

Construction Time

The construction time will be minimal and will be mainly restricted to the construction of the transport route to Gibb Road.

The sand resource will be cleared and then excavated from the face. Any plant used on site will be mobile plant and will not require construction.

5.2 Excavation

Excavation methods are to be carried out as a sequence.

The whole resource area has been investigated using an excavator digging test holes on a grid pattern. The sand varies from yellow to white and from 1 – 3 metres deep with an average of 1.5 metres.

- Topsoil will be removed and recovered for spreading directly onto areas to be revegetated.
- If topsoil cannot be directly transferred it will be stored in low dumps at the perimeter of the excavation footprint.
- There will be little or no overburden, which will consist of subgrade sand.
- Overburden will then be pushed from the excavation area to provide perimeter bunding to assist in visual noise and dust management.
- Sand will be excavated from the floor of the pit to a depth of 1 – 3 metres with an average of 1.5 metres. Gravel will only be excavated in the west of the pit and constitutes a small resource of < 50 000 tonnes
- The sand resource delineated comprises slightly over 150 000 tonnes.
- The sand to be used for fill will be loaded directly to road truck by loader. The loader will stay at the face and the road trucks will be restricted to access roads spreading out from the centre of the operational area. Drivers will be instructed to stay in their trucks within the loading area.
- The loader will work at the face, approaching the face in a perpendicular manner to enable the natural slump of sand to make the working face safe.
- Trucks will be confined to a dedicated ring road that will be moved as required as the face progresses. The trucks will approach in an anticlockwise direction so the driver is facing the loader. Drivers will be required to stay in their trucks while in the loading area.
- All vehicles will have radio contact.

- Operations will occur on the floor of the pit with the face providing visual and noise screening to the closest residences. That is the pit will be orientated so that the face is located between the excavation area and nearby sensitive premises such as dwellings or chalets.
- It is also possible that some sand will be suitable as concrete sand for concrete batching. Any such sand will normally require screening to remove roots and other deleterious organic matter.
- At the completion of excavation, the final soil slope on the floor of the excavation will be flat and slightly undulating. The batters will be graded to ensure the final slopes form an interim stable land surface in compliance with the *Mines Safety and Inspection Act (1994) and Regulations (1995)* at 1 : 4 vertical to horizontal.
- Rehabilitation will progressively follow mining, wherever possible with completed areas of the excavation being revegetated as soon as practicable.

5.3 Pit Design and Staging

EXCAVATION	
Total area of excavation applied for, including the land already open	Proposed excavation – 20.94 hectares (approx.)
Rate of excavation based on average anticipated volumes.	Generally up to 20 000 tonnes per year of sand including a small amount of gravel, with an anticipated maximum of 30 000 tonnes per year depending on contracts. If a large contract is won which will require additional truck movements, Margaret River Natural Resources will notify the City at least one week in advance of the commencement of the contract.
Life of project	10 years
Area cleared per year	No native vegetation. < 1 hectare pasture required per year.
Dewatering requirements	Nil
Maximum depth of excavations	1 - 3 metres in benches as required.

A perimeter buffer of 20 metres with earth bunding is proposed for adjoining lots in compliance with Section 6.4 City of Busselton Policy 5A – Rural Areas land Use and Development Policy. That buffer will then be battered down to match the excavated area.

Excavation will continue down to an elevation of 1 to 3.0 metres, well above the highest winter water table which will be predominantly >2.0 metres above the superficial water table as the sand resource is located on the plateau ridge.

In the south west, the Department of Water *South West Region Guidelines Water Resource Considerations for Extractive Industries* permits a final land surface of 0.5 metres above the highest winter water table. The south west guideline is more applicable to this site than the guideline WQPN 15 because the end use of the land will be to continued agriculture use.

To maintain this type of operation normal methods of open cut excavation will be used which will require a sufficiently large footprint to enable haul roads to extend to the floor at suitable grades to ensure efficient and safe excavation conducted in a manner that minimises environmental impact.

The development of the pit will depend on the internal haul roads and access, efficiency, safety and environmental management. The footprint of disturbed ground is not proposed to be enlarged after allowing for progressive rehabilitation.

The pit is anticipated to have a life of ten years.

Final Contours

For weathered materials such as sand, a recommended batter slope 1 : 4 vertical to horizontal will be established for the batter slopes with a gently undulating floor of the pit. As the pit will average only 1.5 metres deep the final land surface will be similar to the existing land surface except that it will be slightly lower.

The Peppermint trees on the resource area will be retained and therefore lead to a slightly undulating final surface. The trees will be provide with a 10 metre setback and batter slope.

The Concept Final Contours are shown on the attached plan which does not allow for the retention of the trees apart from in concept.

Rehabilitation will be progressive, but because of the nature of the excavation will be restricted to completed faces. The majority of the pit will not be able to be rehabilitated until the completion of excavation. Batters will be rehabilitated when formed.

Wherever possible, rehabilitation will be continued as areas are completed to ensure that the amount of ground that is open at any one time is minimised. As access is currently through the existing pit, rehabilitation of this pit is not possible at this time.

Geotechnical parameters

The final profile of the excavated surface will be to *Mines Safety and Inspection Act 1994* as explained in documents such as *Guidelines on Safety Bund Walls Around Abandoned Open Pits (DOIR 1991)*.

The sand pit has steeply sloping faces during excavation in compliance with the DMIRS face angles for sand excavation. These will be battered down to 1 : 4 vertical to horizontal as a geotechnically stable landform that can be used for agricultural purposes.

5.4 Processing

Much of the sand is sold as fill without any processing. Some sand may be screened.

When coarse sand is identified and extracted there may be the potential for a small wash plant to remove the fines from the coarse sand. The fines, which may contain organic matter, will then be used to assist with the restoration of the sand pit if available.

It is unlikely that the washing of sand will exceed 5 000 tonnes per year and if there is no screening Part (V) of the Environmental Protection Act may not be triggered.

A DWER Licence will be required under Part V of the *Environmental Protection Act 1986* for screening if the annual volumes exceed 5 000 - 50 000 tonnes. (Category 70 Prescribed Premises).

5.5 Stockpiles

Stockpiles may be needed for sand if the white and yellow sand and coarse sand is taken separately.

Stockpiles will only be required if the sand is screened and these will be located on the floor of the pit and be a maximum of 4 metres high, which, with the lowered elevation of the pit floor and perimeter bunding of topsoil, will mean that the stockpiles are not anticipated to be visible from Gibb Road and not visible from Gale Rad.

5.6 Equipment

- The only facilities proposed for the site are a large shed for the storage of mobile plant and minor spare parts.
- Ablutions are to be a serviced portable system.
- A loader will excavate sand and load the trucks.
- An excavator will be used for higher faces and specialty work.
- A bulldozer is unlikely to be required but may be required to push down a face or other construction work.
- Mobile screen to sieve the sand is required for specialty sands.
- The only other vehicles are the road trucks
- Refueling will be conducted from mobile tanker in the pit. There will be no fuel stored on site.
- Major maintenance will continue to be conducted offsite.

5.7 Hours of Operation

Hours of operation will be 7.00 am to 5.00 pm Monday to Friday inclusive, excluding public holidays. This is similar to the operations of nearby quarries in the local area.

5.8 Access and Security

The access road from Gibb Road will be used for the transport of sand or to service the sand operations. That access point is for rural purposes only and will be required as an emergency exit or for farm purposes when sand extraction has been completed.

The site will be secured by locked gates when it is not being actively worked. The boundary fencing will be maintained to prevent inadvertent and unauthorised entry.

Warning signs for trucks will continue to be used to alert road users to the entrance onto Gibb Road. Maintenance of signage will be undertaken through the City of Busselton.

Transport

Transport will be along Gibb Road north as outlined in the attached Transport Management Plan.

That access has been used for sand transport from the excavations on Lot 1. The scale and intensity of the transport will be similar to that previously conducted from Lot 1. Sand extraction on Lot 1 is complete with little sand being extracted so there is unlikely to be any cumulative impacts from the transport of sand.

Gibb Road is partially sealed at the northern end near dwellings and a vineyard. The remainder of the transport route is gravel with suitable traffic and width characteristics to enable for the transport of basic raw materials.

The number of truck movements will vary throughout the year depending on the size of contracts. To transport the required amount of sand a certain number of trucks must be used. See the attached Traffic Management Plan.

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

With a calculated volume of sand of 200 000 tonnes and a ten year life of the operations that equates to around 20 000 tonnes of sand extracted every year, but due to the variable nature of contracts, up to 30 000 tonnes of sand is anticipated to be transported in any one year.

With an average truck size of say 25 tonnes that equates to up to 1 200 laden truck movements in any one year for 30 000 tonnes extracted. If sand was transported on 200 days of the year that equates to an average of 6 laden truck movements per day.

It is suggested that for a large contract the Shire of Busselton be notified at least 1 week prior to the commencement of a large contract and informed of the tonnages, likely truck movement and anticipated volumes to be transported during that contract. This process is used at other sand pits and provides the City with an opportunity to discuss any specific issues with the operator.

A road maintenance agreement will be determined with the City of Busselton based on the *City of Busselton Planning Policy 5, Rural Land Use and Development Policy 2010*.

Table 3 Seasonal Closure and Campaign Closure

	CLOSURE OBJECTIVE	Completion Criteria	Actions for Care and Maintenance Greater than 12 months
1.0 COMPLIANCE			
1.1	All legally binding conditions and commitments relevant to closure and rehabilitation will be met.	1.1	Prior to undertaking temporary closure. ➤ Review the latest documentation. ➤ Assess compliance with the conditions and commitments ➤ Faces and the landform are to comply with DMIRS Safety Guidelines and be stable for the long term.
2.0 SAFETY			
2.1	Make the site safe.	2.1	Prior to vacating; ➤ Secure the site and any plant or structures to be left. ➤ Mobile plant and other equipment not required will be removed from site. ➤ The site will be cleaned, structures will be removed. ➤ Provide fencing, bunding, signage or other measures as required to provide a safe site, particularly above any faces. Security ➤ Complete activities to make the site safe. ➤ Provide bunding and warning signs above faces as required. ➤ Provide locked gates or log access restraints as required or maintain staff on site. ➤ Check and maintain perimeter fences. ➤ Visual audit of completed ground, to verify compliance.
3.0 HYDROGEOLOGY			
3.1	Ensure that there are no materials	3.1	➤ Remove fuel service materials. ➤ Remove any materials from which leaching may occur.

	that could cause pollution or environmental harm.		
4.0 BIODIVERSITY			
4.1	Minimise the risk to on site or offsite biodiversity.	4.1	➤ Implement the Dieback Management Plan. ➤ Implement the Weed Management Plan. ➤ Inspect the site for Significant Environmental and Declared weeds. Treat accordingly ➤ Inspect adjoining native vegetation and rehabilitation for edge weed effects. Treat accordingly.
5.0 STAKEHOLDERS			
5.1	Ensure stakeholder issues are considered.	5.1	➤ Prior to temporary closure, as necessary, consult with the relevant stakeholders to check whether the closure planning, where possible, considers their interests and carry them out as necessary. If care and maintenance continues modify procedures in response to changes in stakeholder position, policies or conditions.

5.9 Water Use

There is not anticipated to be a significant requirement for water use. The only water use will be limited water as required or dust suppression on the access road and for washing coarse sand if sufficient sand is available.

It is unlikely that the washing of sand will exceed 5 000 tonnes per year and if there is no screening *Part (V) of the Environmental Protection Act 1986* may not be triggered.

If washing is undertaken the sand will be washed with water supplied from the existing soak just north of the sand pit, with water returning to the superficial groundwater system through seepage into the basal soils with little evaporation or use.

Water will continue to be required for dust suppression. This is discussed under Dust Management in the Offsite Impacts Management Plan.

Separations to groundwater comply with DWER requirements of > 500 mm.

A rounded figure of 1 000 litres or 1 kL water use per day is anticipated based on past experience at other pits, for dust suppression. For 100 days of full water requirements in a year, considering the low extraction volumes, winter and other wet days, the water requirements are anticipated to be 1 000 kL of water for dust suppression annually. A Dwelling normally uses around 300 kL per year as a comparison.

5.10 Workforce

The workforce will vary, depending on the level of operation and market demands, but usually 2 – 4 persons will work on site plus truck drivers as they access the operations.

5.11 Safety

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

Every morning prior to start there is a daily briefing or consideration of the potential hazards, any incidents such near misses, health and safety and any other relevant issues.

Site Safety

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

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

All personnel are provided with site induction, safety and environmental awareness training.

Emergency

The site is within mobile phone contact and all vehicles are equipped with two way radios.

- The loader will excavate from the face using an in – out movement, only approaching the face from a perpendicular movement which is the safe option. The face will be no higher than the reach of the bucket, unless the sand free falls at the angle of repose in which case the face can be higher. For higher faces, benches or an excavator will be used.
- Personal protection is worn by all persons on site, with a minimum of hi – viz, safety boots, long clothing, hearing and eye protection and helmets when near the face or operating machinery.
- Road trucks are separated from the operating loader. Site warning signs and directions will be installed as required to maintain safety.
- Safety bunds or temporary fences will be used above any active vertical faces.
- Warning signs are maintained as required.
- Emergency preparedness plans will be developed and implemented.
- Staff and contractors are inducted and trained as necessary and have the relevant qualifications to fulfill the tasks they are assigned to.
- Where applicable Safe Operating Procedure Sheets are made available for hazards. Workers and staff on all sites are trained in the use of the procedures and all employees provided with site induction and training as necessary prior to commencing work on the site.

Emergency

- The site is within mobile phone contact.
- Safety management and operating procedures will be implemented.

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*.

Normally developments in bushfire areas are required to have fire management plans in place.

Western Australian Planning Commission Planning Bulletin 111/2016 provides for an exemption of a bushfire plan requirement because there will be no structures that will burn and the open ground will form a fire break. It also provides for an exemption where the proposed activity is a continuation of existing activities. This applies to this continuation of sand extraction.

The Department of Mines Industry Regulation and Safety, SRS and PMP systems, with the registration of all quarries, requires bushfire planning to be covered under that system. The PMP (Project Management Plan) will be required to be produced and approved prior to excavation being commenced.

The management actions that are used to minimise fire risk are summarised below.

- Vehicles will be restricted to operational area, particularly on high fire risk days.
- Diesel rather than petrol powered vehicles are used.
- Perimeter fire breaks will be maintained for Lot 101.
- The mobile plant on site will be available to assist with emergency fire management when safe to do so.
- Fire risk is addressed and maintained through the site Safety Management Procedures (Project Management Plan)
- Water supplies will be drawn from existing farm supplies with the proposed dam to supply water.
- The farm fire fighting unit is available for fire management.
- The site is secured from unauthorised access by maintaining the existing fencing and locked gates.
- Public access will not be permitted.
- An emergency muster area is provided.
- On site communications and worker induction and training will be provided.
- The site is within mobile phone range, the surrounding area is relatively flat and any bushfire smoke will readily be noticed.

6.0 DUST MANAGEMENT

6.1 Environmental Dust

Background

Excessive dust has the potential to impact on both the workers and the adjoining land, and its potential for generation must be taken in context.

There are a number of key aspects to dust impacts;

- What is the source of particles?
- What is the potential for the particles to be disturbed?
- What is the nature of the particles and how are they likely to behave?
- What types of impacts are the particles likely to have if they move?
- What management actions can be used to mitigate or reduce dust impacts?

Most dust on site will be generated during vehicle movements.

Commonly called "dust," scientists and regulators refer to the term particulate matter (or PM) to describe the range of particles that exists in the air breathed in.

Particulate matter exists naturally in the atmosphere, eg sea-salt spray and pollens. PM can be increased due to human activities such as vehicle exhaust, industrial processes, power stations, mining, farming and wood heaters, or smoke from bushfires.

Exposure to PM can be associated with health and amenity impacts if the exposure is excessive.

The likely risk of these impacts depends on a range of factors including the size, structure and composition of the PM and the general health of the person.

Particulate matter needs to be suspended in the air to carry any distance. The particles must be smaller than sand grains, which will only carry short distances because the grains are too large to move at any more than bouncing. The particles that are able to be suspended are called Suspended Particulate Matter and the total amount of that is referred to as TSP.

Research

Little published data is available from general mining in Western Australia even though monitoring is undertaken at some sites. There is data specifically from mining, (predominantly coal) from New South Wales (NSW Health) where particulate levels have been measured to be;

PM <2.5 microns as 2 – 5% of emissions (One micron is 1 / 1000 of 1 mm).

PM< 2.5 are invisible and called "fine particles". They are the main health issue and are caused by vehicle emissions whether they are along roads or on private land. Vehicle emissions will not occur at night or at other times when the site is not active.

PM 2.5 – PM10 microns as 15 – 45%

PM 10 (particles between 2.5 and 10 microns) are invisible and called “coarse particles”. They can be breathed in, but are removed by alveoli and mucous. (NSW Health). This dust may be generated when land is cleared and topsoil disturbed or the site is subject to traffic in summer.

PM>10 microns as 50 – 70%

PM>10 is visible dust and will, based on the resource, be the vast majority of the particles.

Normally all sizes of dust are generated together, and there will be visible dust being generated when invisible dust is being formed. Therefore any visible dust present is a good sign and early indicator of a dust risk. A summary of the sources and proportions of dust is shown in; NSW EPA and NSW Ministry of Health Environmental Health Branch 2015, Review of the health impacts of emission sources, types and levels of particulate matter air pollution in the ambient air in NSW.

This is backed up by occupational monitoring through the Department of Mines Industry Regulation and Safety. Unpublished data from those quarries shows quarries are compliant or can readily be made compliant with the health and safety and community standards through normal dust management practices. See Section 1.4 Occupational Dust.

In Australia the research relates mainly to coal mines, but new research relating to the drilling of natural stone – rock quarries provided good data generally. Whilst there is no drilling and cutting on this site there is data in the research for the carry of the particles which is relevant.

Sairanen M and O Selonen, 2018, *Dust formed during drilling in natural stone quarries*, Bull. Eng. Geol. Environ. 77:1249 to 1262.

That research found that the particles generated from the quarries tested were PM>10 microns or greater. The PM<2.5 microns almost totally originated from external sources and vehicles, and not the actual grinding of the rocks.

The other key findings were that for coarse particles (Total suspended particles – TSP and PM10, the mass concentrations of the particles decreased rapidly in all directions with most pronounced decreases upwind and at 50 metres the concentration mass was “barely distinguished from the altering median level”. The same was also found for the fine particles PM 2.5 to PM1.0.

That drop off was also correlated to the visual appearance of dust. That is there was no visual dust past 50 metres and that was confirmed by the sample results. Background “concentration was attained 69 – 90 m for coarse particles and at 55 – 105 m distance for fine particles”.

For the quarry haul road dust, the background concentration of dust was reached at a distance of 30 metres. This quantifies the potential dust impacts from roads.

Sand Quarry – minor Gravel Extraction

Sand excavation is at the lowest risk from dust, producing very little dust material, with the exception of the vehicle dust generated from unsealed roads and the dust from fine clays within the sand that can be disturbed by vehicles movements when dry. The sand particles are comparatively large and only move in stronger winds by bouncing to about 300 - 500 mm above the ground surface when dry and are readily stopped by any vegetation, even pasture.

The main particles on site are large sand grains, which are not mobilised to the atmosphere and cannot be breathed in. The small amounts of fine clay and other particles from roads are “coarse particles” and do not provide a significant health risk even if generated.

For this operation the main transport routes (Northern portion of Gibb Road and beyond) are sealed and it is only the portion of Gibb Road near the resource and access road to the site and the internal roads that are not sealed but are wetted down as required.

With the pit being over 500 metres from dwellings there is a negligible risk to dwellings as shown by the DWER assessment score. See Table 5 below.

Occupational dust associated with the quarrying processes falls under the *Mines Safety and Inspection Act 1994 and Regulations 1995* overseen by the Department of Mines Industry Regulation and Safety who regularly inspect the site.

Tree Belt - Buffers

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.

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. These buffer distances for spray drift are greater than that required for dust particles as shown by Sairanen M and O Selonen, 2018, with the buffers of 30 metres for roads and 100 metres for the pit.

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

A minimum of 500 metre buffer distances is available for dwellings from the sand pit, which complies with the Guideline and the Queensland, Health Department and research. In addition there are scattered and clumps of trees in the intervening space.

there are scattered trees in the intervening space that will assist in slowing wind speed.

The average number of laden trucks per day will be 6 with 6 unladen truck movements in.

6.2 Assessment of Dust Risk

Dust Guidelines

Dust management is an integral part of the extraction and processing of any basic raw material.

The most common form of disturbance is by mobile plant and vehicle impacts. In this local area dusty roads have the most potential to produce dust, such as the access road which is no different to any other local unsealed road.

The potential for dust emissions falls under the *Guidance for the Assessment of Environmental Factors, EPA, March 2000*. Assessments of the potential dust risk are normally made using the Land development sites and impacts on air quality, *Department of Environmental Protection and Conservation Guidelines, November 1996*.

These guidelines are still in place but are incorporated into the *DEC (DER) 2011 Guideline for Managing the Impacts of Dust and Associated Contaminants from Land Development Sites, Contaminated Sites Remediation and other Related Activities*.

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

Even so a dust risk assessment has been completed using the DEC (DWER) 2011 Guideline.

Table 4 Dust Risk Assessment from DWER (DEC)

PART A Number	Item	
		Score
1	Nuisance potential of the material	Low for excavated material and with dust control in place - 2
2	Topography and vegetation screening	Screened and sheltered - 1
3	Area of site activities	Active trafficked areas at any one time are 1 - 5 hectares in area - 3
4	Type of work being undertaken	The small scale of excavation is equivalent to partial earthworks - 6
	Summer total without dust measures	Maximum = 12

PART B Number	Item	
		Score
1	Distance to premises	Premises between 500 to 1000 metres - 6
2	Effect of prevailing wind	Isolated premises affected by one wind direction The premises is not really affected, not in the path of prevailing winds which are easterly and south westerly - 1
	Total Part B	Maximum = 7

Activity	Calculated Score Part A x Part B	Allocated Risk of Dust
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Excavation with or without dust suppression.	Maximum Premises = 12 x 8 = 84	Classification 1 Negligible Risk, The actions and contingencies proposed are consistent with the DWER Policy Dust management will be required for pit best practice and worker environment.
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6.3 Buffers

The sand operations comply with the EPA Generic Buffers for sand excavation and the Health Department and research. See Section 6.1.

6.4 Occupational Dust

There is very low risk from occupational dust to workers on site, and if dust levels on site are low they are also low offsite.

6.5 Actions and Management

Table 5 Dust Management

ACTIVITY	POSSIBLE RISK SEVERITY and FREQUENCY	OPERATIONAL PROCEDURES AND COMMITMENTS	RISK AFTER MANAGE MENT
EARTHWORKS			
Land Clearing, construction earthworks and building the bund	Low - Occasionally to open new ground	- This involves removing the topsoil for use in revegetation and topping the screening bunds, followed by removal of the overburden. - Clearing will be conducted to only remove the area required for immediate mining to expose the resource and construct the operational features. - If winds are sufficiently strong, or other weather conditions are unacceptable to negate the effects of dust management, operations will cease until conditions improve and compliance can be achieved. - Visual monitoring of the visual dust is the best and fastest method of monitoring dust risk and dust generation and faster response can be achieved than alarms or monitors. If visual dust is significant then smaller particles may also be present.	Low
Land restoration	Low - Once per year or less frequent	- Land restoration is infrequent and normally conducted only once per year. - Scheduled activities such as ripping, overburden and topsoil spreading will be conducted at times of low dust risk	Low
EXCAVATION - PROCESSING			
Excavation	Low - Frequent	- There are no changes to the sand excavation methods. - Sand excavation is moving away from the dwelling to the north - Excavation will be conducted on the floor of the pit to provide maximum shelter for dust protection. - The treed buffers to the north provide compliance with Government Guidelines.	Low
Loading and stockpile creation	Low - Frequent and in campaigns	Few stockpiles are used. Loading from the face produces little dust and is covered under excavation.	Low
TRANSPORT			

Transport	Low - small numbers	- It is noted that the average number of laden trucks per day will be 6 with 6 unladen truck movements in. - All loads will be covered. (No tarp or cover – No load).	Low
Road condition	Low - Frequent	- The access road is sealed. - All loads for transport outside the pit are covered. - The access road and crossover are maintained in good condition (free of potholes, rills and product spillages). - Gibb Road is maintained by the City of Busselton for small potholes and by the City for more major works. - An agreement for road maintenance will be discussed with the City of Busselton and a contribution to maintenance provided as assessed during the discussion.	Low
Health and Amenity		- A readily auditable trigger of no visible dust to cross the property boundary with the exception of the western – south western boundary where there are no nearby dwellings, in line with DWER Licence and best practice in WA. - The research (Sairanen M and O Selonon, 2018) has demonstrated that visual assessment of dust agrees with the measured concentrations of dust. - The trigger for dust management is the generation of visual dust. - The loader operator will determine the amount of dust being generated and they are in the best position to assess dust generation and to direct remediation. - On site induction training will include observation and mitigation where possible of all dust emissions. - Occupational dust associated with the quarrying processes falls under the <i>Mines Safety and Inspection Act 1994 and Regulations 1995</i> overseen by the Department of Mines Industry Regulation and Safety who regularly inspect the site. - Included in the program are personal dust monitoring assessments. If on site dust is managed, offsite dust risk is also managed. - Operations will temporarily cease if conditions occur where dust cannot be managed. - The latest weather conditions to increase the awareness of dust risk.	
Complaints		- All complaints relating to dust are to be investigated immediately on receipt of a complaint. - A record of all dust complaints is to be maintained together with the mitigation measures to be used to reduce the dust impacts.	

6.6 Dust Monitoring

Most dust generated from processing and vehicle movements has a very large visible component.

The loader operator is in the best position to assess dust and implement management to mitigate or reduce the dust risk and generation.

Human monitoring can detect potential dust risks prior, and take action prior, to significant dust being generated. They notice dust immediately such as from tyres, whereas machine monitoring has to rely on significant dust being generated, travelling to the boundaries of the premises and triggering an alarm. The operators would be negligent if they let the dust get to that level of impact prior to taking action. (The research by *Sairanen M and O Selonon, 2018* demonstrates that visual assessment of dust agrees with the measured concentrations of dust).

The auditable condition is visible dust crossing the boundary of the premises; the lot boundary. A readily auditable trigger of no visible dust to cross the property boundary with the exception of the western – south western boundary where there are no nearby dwellings, in line with DWER Licence and best practice in WA.

This is the condition used on Department of Water Environment Regulation Licences and all other quarries such as sand and hard rock quarries in Western Australia and has worked well in the past.

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

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

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

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

7.0 NOISE MANAGEMENT

7.1 Operations

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

7.2 Regulatory Framework

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

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

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

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

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

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

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

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

Influencing factors that raise the allowable noise levels are activities such as external industrial noise, some nearby land uses and busy roads. These are not relevant to this site.

Under Schedule 1 of the Noise Regulations the premises on which the extraction of basic raw materials are extracted, is classified as Industrial Land for the purposes of calculating influencing factors. This was defined as the whole cadastral boundaries in State Administrative Tribunal decision {2013} WASAT 139, Bushbeach v City of Mandurah. In this case the premises is quite small and approximates the area of disturbance and will have little impact on the influencing factors.

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

7.3 Environmental Noise Management

The types of equipment proposed to be used are listed below. Not all plant will be on site at any one time and that provides for contingencies to reduce the operational noise on site if necessary at certain times.

Based on the experience of Landform Research and the operation of many other sand quarries the proposed sand excavation will easily be able to comply with the Noise Regulations at the closest dwellings.

Anticipated equipment required for the production of the various resources are.

Equipment	Sand Extraction
Rubber tyred loader (Komatsu WA 430 or similar)	Loading sand from the face
Semi trailer or other road trucks	Transporting product
Excavator	Operating at the face in the of the pit
Mobile screen	Small screen may be used to operate occasionally in the centre of the pit for screening sand for specialty uses
Bulldozer	May be required, occasionally to push down the top sand resource or lower the faces.

Table 6 Noise Management

General Noise Management		
OPERATIONAL PROCEDURES	COMMITMENTS	MANAGED RISK
Comply with the <i>Environmental Protection (Noise) Regulations 1997</i>.	- Margaret River Natural Resources is committed to continued compliance with the Regulations. - The proposed operations are designed to comply with the EPA generic buffer distances	Noted
Maintain adequate buffers to sensitive premises.	It is noted that the average number of laden trucks per day will be 6 with 6 unladen truck movements in.	Low
Locate exposed features behind natural barriers and landform.	It is noted that the average number of laden trucks per day will be 6 with 6 unladen truck movements in.	Low
Maintain all plant in good condition with efficient mufflers and noise shielding.	This is used and is committed to. All plant is to be maintained in sound condition.	Low
Maintain haul road and hardstand surfaces in good condition (free of potholes, rills and product spillages) and with suitable grades.	- No changes to the access roads are proposed. - See dust management	Low
Implement a site code outlining requirements for operators and drivers for noise management.	A site code is to be implemented and Margaret River Natural Resources is committed to site induction and training for all personnel for all parts of the operations.	Low
Shut down equipment when not in use.	Shutdown is used to save fuel and maintenance costs in addition to noise minimisation.	Low
Fit warning lights, rather than audible sirens or beepers, on mobile equipment	Lights or low frequency frog beepers are to be used rather	Low

wherever possible.	than high pitched beepers to restrict noise intrusion.	
• Provide a complaints recording, investigation, action and reporting procedure.	• A complaints recording and investigation procedure is proposed and will be implemented and maintained.	Low
• Provide all workers with efficient noise protection equipment.	• All personal noise protection equipment will be provided to staff as required.	Low
• Minimise and conduct at the least disruptive times.	• Quarrying is to be conducted during the approved working hours.	Low

7.4 Occupational Noise

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

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

As part of its commitments, Margaret River Natural Resources are pro-active with its worker safety awareness;

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

Warning signs are used to identify areas of potential noise associated with mobile plant.

The DMIRS will conduct inspections of all quarries.

8.0 VISUAL MANAGEMENT

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

Guidance on visual impact is contained in *Department of Planning, 2007, Visual Landscape Planning in Western Australia (DoP 2007)*. Guidance can also be found in *Forest Commission of Victoria, undated, Landscape Types of Victoria*.

The pit is set back a minimum of 470 metres from Gibb Road behind a significant buffer of trees and rehabilitated land, with the remainder of the pit over 500 metres away.

To assess the potential for the site to be visible the local roads of Gibb and Gale Roads were driven to determine the potential for the pit to be seen. Google Earth Pro was then used to generate sight lines from the pit back to the nearby land uses and from Gibb Road back towards the pit.

The pit is not identified as being significantly impacted by viewsheds apart from a very small area in the north west of the pit, if the intervening trees were not in place. However in that location there is considerable vegetation within the road verge of Gibb Road which will protect the views of the pit. In addition steps are taken during excavation to mitigate or minimise view impacts.

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

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

- The quarry is located on the top of a natural plateau ridge which minimizes the viewsheds.
- The pit is almost all 500 metres plus from Gibb Road
- The pit is at a distance, behind natural barriers of the pit and the intervening trees.
- Excavation will take place from the floor of the pit below natural ground level
- The access road is at low elevation and truck movements are not visible.
- Overburden and interburden dumps are pushed into positions where they will form screening barriers, particularly to the west, north west.
- Progressive rehabilitation of all completed, excavated or disturbed areas will be implemented.

9.0 WATER QUALITY MANAGEMENT

9.1 Water Source Protection Areas

Department of Water Environment Regulation – South West Region Guideline –Water resource considerations for extractive industries apply to this site.

The excavation on Lot 101 complies with DWER Guidelines for water management and separation to the groundwater of > 2 metres in most situations and at all times 0.5 metres (500 mm). for all other areas including the edge of the low lying areas.

9.2 Water Requirements

The pit is relatively small with short access roads and operated intermittently in campaigns.

The water requirements are anticipated to be minimal and sourced from farm supplies. In most cases dust suppression will not be required.

Around 1 000 kL per year is to be used for minor dust suppression and for washing product.

Whilst to wash any product will pump more water, with little evaporation the water will be seep back to the superficial water table.

The proposed operation complies with all Government Policies and Guidelines.

Potable water is brought to the site as needed.

9.3 Water Quality Protection Guidelines

All facilities and procedures on site are designed to comply with the DWER – DMIRS Water Quality Protection Guidelines for Mining and Mineral Processing and are all complied with;

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

9.4 Surface Water

The sand resource is located on plateau sand ridge which rises from around 68 metres AHD to 74 metres AHD. The sand resource is separated from the headwaters of the small creekline by 100 metres. The site lies within the Geographe Bay Rivers Surface Water Area. See the attached Updated Water Management Plan.

9.5 Groundwater

See also section 4.4 Hydrogeology.

The resource area is elevated with a shallow seasonal superficial water table perched at the top of the underlying Cretaceous sediments when the vertical infiltration rate is exceeded by the winter precipitation.

Excavation will continue down to an elevation of 1 to 3.0 metres, well above the highest winter water table which will be predominantly >2.0 metres above the superficial water table as the sand resource is located on the plateau ridge.

The water table measurements taken on 14 November 2018 and 6 September 2019 show that the sand resource is approximately 2.0 metres deep in the south east and centre thickening to 3.5 metres deep in the north west. With a separation of 0.5 metres to the water table the thickness of resource will be 1 – 1.5 metres in the east and centre and up to 3.0 metres in the west. Gravel resource occurs in the north west with the sand.

In the south west, the Department of Water *South West Region Guidelines Water Resource Considerations for Extractive Industries* permits a final land surface of 0.5 metres above the highest winter water table. The south west guideline is more applicable to this site than the guideline WQPN 15 because the end use of the land will be to continued agriculture use.

Around 1 000 kL per year is used for minor dust suppression and is to be sourced from a soak at the headwaters of the small creekline. See the attached Updated Water Management Plan.

9.6 Salinity

Precipitation falling on the site is fresh.

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

The existing bore provides a monitoring point for water quality.

The groundwater is not exposed, apart from a small sump in the base of the pit to act as a water source.

9.7 Dewatering

No dewatering is proposed. All water is to be retained in the pit and infiltrates into the sand.

9.8 Recharge

The area has no surface drainage because of the permeable and porous nature of the sand. There is no surface drainage from the excavation site. All excess water infiltrates the permeable sand.

There will be no alteration to drainage lines, and neither surface water nor ground water will be affected. On closure the surface will continue to be free draining to the water table.

The resource area is pasture and will be returned to pasture.

The groundwater issues were considered by the Environmental Protection Authority in Bulletins 512, 788, 821 and 818, and whilst these do not specifically refer to the extraction of basic raw materials, and are for the Lake Clifton Catchment, they do consider the impact of clearing, planting trees and rural, residential developments. The figure the EPA used for recharge from native vegetation was 10 – 15% rainfall, whereas cleared land had a recharge of 30 – 40 %.

It is noted that the clearing of the former forest from Lot 101 will have led to significantly increased recharge and the formation of the creeklines as more permanent features.

Recharge from pasture is anticipated currently to be near 30% based on the vegetation and elevation above the water table. Recharge on excavated areas will also be in the order of 30% because of smaller separations to the water table based on the existing sand ridges accepting and retaining moisture from smaller rainfall events which do not reach the water table. (Environmental Protection Authority Bulletins 512, 788, 821 and 818). This will result in little change to recharge with excavation.

9.9 Acid Sulfate Risk

Definitive survey procedure is produced in *DEC (DWER) 2013, Identification of Acid Sulfate Soils and acidic Landscapes* and within document *Acid Sulfate Soil Management Advisory Committee NSW, 1998, Acid Sulfate Manual*. This information 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 main method of assessment is based on geological examination. If at risk conditions are identified than laboratory testing may be required but must be completed carefully because there is a high risk of false positives with the available testing regimes.

Acid sulfate only becomes a potential risk when a number of circumstances are present.

Acid Sulfate is a natural phenomena, that can be exacerbated by disturbance. For it to be present there needs to be;

- Rock, soil or regolith present that is carrying sulfides.
- Sulfide carrying materials from below the water table are to be exposed to the atmosphere.
- Excavation below the water table is to be carried out exposing the sulfide carrying materials to oxygen in the atmosphere.
- Dewatering of the sulfide carrying materials is proposed, exposing them to oxygen.
- Exposure of peat or organoferricrete materials, that were permanently under reducing conditions, to the air.

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 site has been inspected by Lindsay Stephens of Landform Research and the resource area tested with excavation test holes to 3.0 metres depth. None of the at risk parameters occur on site.

On site the soils are yellow sands that are oxidised and do not carry any risk of acid sulphate potential. Some minor iron induration is encountered in the faces of the pit, generally below the proposed base of the pit.

This concurs with *Nattaporn-Prakongkep, R J Gilkes, B Singh and S Wong, 2011, Mineralogy and chemistry of sandy soils in the Perth metropolitan area of the Swan Coastal Plain, Department of Environment and Conservation* who concluded that there is no risk of acid sulfate soils in sands unless there is peat or organoferricrete present and excavation proceeds below the water table. In such situations no testing would be required because there is no risk. None of these conditions are encountered.

9.10 Unauthorised Access and Illegal Dumping

- The potential for rubbish to be dumped relates to unauthorised access to the site. Access is restricted by current farm fencing and locked gates. The pit is 500 metres from the nearest road.
- Wastes generated from on site operational activities will be recycled wherever possible and periodically disposed of at an approved landfill site.
- Any illegally dumped materials are to be removed promptly to an approved landfill or other suitable site, depending on the nature of the material.

9.11 Wastewater Disposal

A serviced portable toilet is proposed to be in place while the site is operating. Serviced means they are pumped out by a licensed contractor.

9.12 Refuelling – *Copied from the attached Updated Water Management Plan*

Fuel management will be in accordance with the relevant guidelines. The methods to be used are summarised below.

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

- *WQPN 60 – Tanks for mobile fuel storage in PDWSAs.*
- *WQPN 15 - Extractive Industries updated 2019.*
- *Department of Water Environment Regulation – South West Region Guideline – Water resource considerations for extractive industries.*

Refuelling - Fuel Management Plan

- There will be no onsite fuel storage. The loader will continue to be refuelled on site from a mobile tank or tanker. This method is used on most mine and construction sites as well as many farming properties.
- Refuelling on site will occur in the active pit area to allow for containment if any spill did occur.
- The main risk of contamination is the minor drips that occur during the removal of hoses etc. Minor spills are quickly degraded by soil microbial matter.
- The only other risk is from a tank rupture, but tanks are designed to manage this eventuality and are approved to the relevant standards. Soil contaminated by large spills will be removed from the site to an approved disposal area.

- The operators of the mobile refuelling facilities are trained in re-fuelling duties including the management of any spills.
- In the event of a spill or adverse incident, activities will be stopped in that area until the incident is resolved.
- Spillage will be contained in plant and working areas by shutting down plant or equipment if the plant or equipment is the source of the spill (provided it is safe to do so). The sand will provide high absorbency and will retain any spill.
- Soil contaminated by spills will be removed from the site to an approved disposal area.
- All significant adverse incidents (such as a fuel spill of >5 litres) in one dump, are to be recorded, investigated and remediated. A record is to be kept of incidents, and DWER, and City of Busselton notified within 24 hours of an incident.

9.13 Servicing and Maintenance - *Copied from the attached Updated Water Management Plan*

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

➤ *WQPN 15 - Extractive Industries updated 2019.*

The main risk of contamination comes from tank or hose rupture on earth moving machines.

- All major servicing of vehicles will be conducted off site.
- The loader will continue to be parked at a secure site at night and minor servicing will be conducted there.
- Regular inspections and maintenance of fuel, oil and hydraulic fluids in storages and lines will be carried out for wear or faults.
- In the event of a small service item being required during operations, such as lubricating and maintenance activities, these will be carried out in designated areas in the pit. Equipment for the containment and cleanup of spills is to be provided as required.
- Waste oil and other fluids derived from the routine maintenance of mobile machinery, will be transported off site and disposed off at an approved landfill site. Grease canisters, fuel filters, oil filters and top-up oils are stored in appropriate containers in a shed or brought to the site as required.
- If any spillage occurs it will be contained in the plant and working areas by shutting down plant or equipment if the plant or equipment is the source of the spill (provided it is safe to do so).
- Accidental spill containment and cleanup protocol will be implemented as necessary.
- Non essential or old operating 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.

- There will be no waste disposal on site. Wastes generated will be recycled wherever possible and periodically disposed of at an approved landfill site. Any waste materials derived during routine maintenance activities will be stored in appropriate sealed containers within a designated storage area or taken from site and disposed of at an approved facility.
- Regular inspections (at least weekly) are conducted to ensure no wastes, litter and the like are present in or around the excavation and processing area.

10.0 BIODIVERSITY

10.1 Flora

The excavation area is cleared and will be returned to pasture and productive agricultural land of pasture.

There are about 20 Peppermint Trees on the resource area, If these are to be cleared a Clearing Permit will be applied for prior to clearing. At this time it is not proposed to clear the Peppermint trees, but rather excavate around the trees, leaving a 10 metre buffer to each tree.

The creekline is dominated by *Taxandria linearifolia* regrowth and colonisation.

If cleared, to compensate and to provide an offset, 100 Peppermint Trees (*Agonis flexuosa*) will be planted in clumps between the remnant Jarrah Marri Forest that is closer to Gibb Road and the small creekline. This will create a habitat for Ringtail Possums which is not currently available because the existing Peppermint Trees are scattered and isolated and will not currently provide suitable habitat for the possums.

10.2 Fauna

The site is pasture apart from scattered regenerating native plants. Native fauna is likely to be severely depleted on this pasture.

Areas of native vegetation adjoin to the west and south, which will provide habitat or refuge for any displaced species.

The fauna on site will already be significantly depleted by the clearing as there are just scattered Peppermint trees on site.

The proposal does not require the clearing of Black Cockatoo habitat with the only vegetation to be impacted being isolated regrowth Peppermint.

The potential for impact on Possums is considered low for the following reasons.

- The clearing of Peppermint trees is minimised.
- The existing Peppermint Trees are isolated and do not afford suitable habitat for Possums.
- Additional Peppermint Trees will be planted in clumps with wildlife linkages. 100 Peppermint trees will be planted to link the remnant Jarrah – Marri Forest west of the pit to the small creekline vegetation.
- This will create a usable habitat for the Ringtail Possums if they occur locally and link the forest to the *Taxandria linearifolia* along the creekline.

10.3 Wetlands

There are no wetlands on the resource area. The creekline which commences 100 metres from the pit will have greater water in it since the removal of the forest which one occupied the whole of Lot 101. Therefore the soils around the creekline have increased in water since clearing and the *Taxandria linearifolia* has therefore been able to colonise the pasture and increase the size of the *Taxandria* Thicket along and around the creekline.

10.4 Stygofauna and Troglifauna

Stygofauna, occur in caves and “are aquatic subterranean animals, found in a variety of groundwater systems”. Troglifauna occur in air chambers in underground caves or smaller voids.

There is no limestone or similar rock on the resource area and therefore no potential for significant or unusual stygofauna in sand.

10.5 Weeds and Plant Diseases

Weed and plant disease management plans are attached at the end of this document.

11.0 CLOSURE

11.1 Background

The excavated area was cleared prior to excavation and will be returned to pasture with some clumps of Peppermint trees between the creekline and the remnant Jarrah – Marri Forest.

Experience by Landform Research in rehabilitation of sand quarries has shown that when completed well there is no need for irrigation of the rehabilitation and in the local areas.

It should be noted that Margaret River Natural Resources is part of the group that owns Lot 101. It is therefore in their interests to efficiently and correctly rehabilitate the excavated area.

Closure Objectives

The closure and rehabilitation is developed from a set of closure objectives that are designed to provide a parkland pasture end land use.

The closure objectives are shown Table 9 below.

In Table 9 the methods to be used to achieve the closure and rehabilitation objectives are shown, referenced to each of the closure objectives.

In order to provide monitoring and auditing of the closure and rehabilitation objectives a set of Completion Criteria are developed in Table 10 where the monitoring and restoration procedures are listed. The Completion Criteria are provided with a number, which is listed in each table as relevant.

Occasionally with sand excavations an operation is placed under care and maintenance or has a temporary closure. In such a situation some actions have to be taken to ensure the site is safe and does not have the potential to provide additional environmental impact. The provisions for temporary closure are shown in Table 4.

As part of the development of the closure and rehabilitation an inventory of the materials on site is provided in Table 8.

The materials inventory is a checklist of the materials that might occur when extracting materials from the ground and does not necessarily indicate that such materials are present on site.

Closure Summary

The extraction of sand is an interim use prior to reconstruction to a restoration of pasture.

Dieback and Weed Management in addition to monitoring and replanting failed areas is proposed.

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

Rehabilitation will progressively follow mining, with completed areas of the excavation being revegetated as soon as practicable.

The final land surface will be smoothed and sloped to be compatible with the existing natural landform of the area, averaging 1.5 metres below the current land surface.

Appropriate contour banks will be used to control and harvest surface water from the post mined landform.

A definitive time for seeding and the planting is not prescribed, but rather a commitment to establish the vegetation within the first autumn/winter following placement of the overburden/topsoil.

Proposed Final Contours

Final contours are discussed in Section 5.3 Pit Design and Staging.

In summary the end land surface will be in accordance with the safety considerations of the *Mines Safety and Inspection Act 1995* and the requirements and guidelines of the DMIRS; for example *Guidelines on Safety Bund Walls Around Abandoned Open Pits 1991*.

The depth of the pit will continue to be reformed to an undulating floor generally 2 metres above the water table but reducing to >0.5 metre separation in the south near the wetter pasture with perimeter faces battered down to 1 : 4 vertical to horizontal. The depth will be determined by the base floor having a separation to the highest water table of 0.5 to 1.0 metres as outlined in the attached Updated Water Management Plan that has been approved by DWER..

Materials Inventory

The materials remaining at closure from sand mining are natural soil materials that do not produce any remaining or lingering environmental risk.

An audit of the potential materials that may be present from mining at closure is presented below.

Table 7 Materials Inventory

Type	Comment	Treatment	Reference
Soil	Topsoil is natural and contains no detrimental materials.	None required. To be used in rehabilitation.	
Subsoils - Overburden	Subsoil sand is natural and contains no detrimental materials.	Non required. Generally taken as resource.	
Waste rock and non surface material and tailings	Not present. The pit bottoms in earthy yellow sand which is a natural material normally occurring on the surface.	None required.	
Saline surface water	The water quality is fresh.	No treatment necessary	
Saline ground water	The water quality is fresh.	No treatment necessary	
Acidic materials and drainage	Not present. The sand does not contain sulfides and there is no risk of acidic materials developing. The sand does not carry acidic materials or any at risk materials. Concurs with <i>Nattaporn-Prakongkep, R J Gilkes, B Singh and S Wong, 2011, Mineralogy and chemistry of sandy soils in the Perth metropolitan area of the Swan Coastal Plain, Department of Environment and Conservation.</i>	No treatment necessary.	Field geological examination by Landform Research and the soil test holes excavated in a grid across the resource area.
Sodic or dispersive materials	The water quality is fresh.		Field geological examination by Landform Research
Asbestos – asbestiform minerals	None present.		Field geological examination
Radioactive materials	Not present	The sand does not contain radioactive minerals. The activity level is much lower radioactivity than other locations such as coastal locations where heavy minerals are more prevalent.	Published WA Geological Survey radiometric mapping
Metallic or chemical materials	Not present	No metallic or sulfidic materials or minerals are present in these sands.	Field geological examination and experience and published information.
Tailings storage	Not required		
Ablutions waste		Serviced portable toilet system is provided.	Water Management Plan
Dangerous Goods and Hazardous Materials	None will remain on closure.	There are normally no hazardous materials used for sand mining apart from fuel, and servicing. The only other materials are for tasks such as weed management and	

		are dealt with under those sections.	
	FUEL The various plant will be refueled from mobile tanker. <i>None will remain on closure.</i>	Any soil or other materials with drips and spills will be removed offsite to an approved waste site or location.	Water Management Plan
	SERVICE MATERIALS Only minor lubrication will be conducted on site All major servicing will be conducted offsite. <i>None will remain on closure</i>	Any wastes will be collected and removed from site promptly to an approved recycling or waste disposal area. Only minor servicing will be conducted on site. All major servicing will be conducted offsite.	Water Management Plan
General waste		Regularly removed from site to an approved disposal area	Water Management Plan

11.2 Closure Implementation

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

The following procedures will be used for final closure and rehabilitation of any stage of excavation and on completion of the sand pit.

- The closure of completed areas of the operations will be progressive with closure of all remaining ground at the end of operations.
- Maintenance and monitoring will be conducted until completion criteria is met. A three year cut off is provided for rehabilitated soils.
- Unexpected or early closure will be completed in the same way as permanent closure below but the full rehabilitation will be completed as one operation.

Table 8 Closure and Rehabilitation Techniques

	CLOSURE OBJECTIVE	Completion Criteria	Actions for Permanent Closure of any stage or the operations.
1.0 COMPLIANCE			
1.1	All legally binding conditions and commitments relevant to mine closure and rehabilitation will be met.	1.1a 1.1b	➤ Rehabilitate any areas that are no longer required to local pasture with clumps of native vegetation. ➤ Review the latest documentation. ➤ Comply with legal requirements and commitments and conditions of approval. ➤ Assess compliance with the conditions and commitments and end use. ➤ Reform the land surface to have a landform similar to the natural form but at a lower elevation. ➤ Design the rehabilitation to comply with, and be able to achieve the completion criteria and commitments. ➤ Compile an audit table of all conditions and commitments that relate to closure and conduct an audit of those items upon the completion of each stage of rehabilitation and annually until sign off.

			➤ Visually audit against all conditions.
2.0 LANDFORM AND SOILS			
2.1	All non natural structures, with mining will be removed.	2.1	➤ All non natural inert materials associated with quarrying will be collected and removed from site unless required for internal roads. ➤ All ground once occupied such as hardstand is to be deep ripped and soils reconstructed as required. ➤ If not required, roadbase, hardstand and any other inert materials left over from the site operations will be scraped and picked up and will be used to backfill the pit faces or reused. ➤ Visual audit of completed ground, to verify compliance.
2.2	All wastes will be removed from site.	2.2a 2.2b	➤ Visual audit of completed ground, to verify compliance with “no contamination to be left”. ➤ Soil testing will be undertaken if there is evidence of adverse materials remaining such as fuel spills. ➤ As a result of any testing remediation will be undertaken to ensure that the site is not contaminated. ➤ Check samples will be collected to verify a lack of contamination.
2.3	The land surface will be visually similar to the surrounding landform.	2.3	➤ Complete the activities to make the site safe. ➤ Faces and the landform are to comply with DMIRS Guidelines and be stable for the long term. ➤ Ensure that the batters are formed to comply with DMIRS and geotechnical requirements. ➤ Where possible match the landform to the adjoining excavated and non excavated surfaces. ➤ Push down or backfill faces and slopes. ➤ The surface will be undulating with similar slopes to the pre – mined condition. ➤ The excavated floor is to be undulating at between 0.5 m - > 2.0 metres separation to the locally perched seasonal water table with batter slopes less than 1 : 4 vertical to horizontal. ➤ The excavated surface is to be resistant to wind and water erosion. ➤ Visual observations and survey of the landforms to confirm compliance.
2.4	The land surface and soils are to be capable of supporting pasture with clumps of native vegetation – trees.	2.4	➤ The soils are to be constructed from overburden overlain by topsoil, leaf litter, vegetation fragments as available in areas of native vegetation . ➤ Deep rip the floors and batter slopes along contour. Deep rip any compacted hardstand or internal roads. ➤ At the end of the current excavation the overburden topsoil followed by the vegetation will be spread across the excavated area as the key part of the final rehabilitation. ➤ The topsoil cover of 50 – 100 mm will be pushed to the edge of the current excavation in separate windrows where available. This is usually the top 50 mm to 100 mm. Topsoil will be respreads as the final surface covering. ➤ Visual observations and discussions with operators.
3.0 HYDROGEOLOGY			
3.1	The reformed surface be >2 metres above the highest groundwater table.	3.1	➤ Push down or backfill faces and slopes. ➤ The excavated floor is to be undulating at between 0.5 m - > 2.0 metres separation to the locally perched seasonal water table with batter slopes less than 1 : 4 vertical to horizontal. ➤ Surface water drainage will be similar to the current drainage in quantity and direction of flows. ➤ Visual observations and survey of the landforms to confirm compliance.

4.0 BIODIVERSITY			
4.1	The rehabilitated areas will, in time, form sustainable pasture with clumps of trees and local native vegetation.	4.1	Biological Hygiene ➤ Implement the Dieback Management Plan. ➤ Implement the Weed Management Plan. Topsoil Recovery ➤ Overburden will be removed by pushing to the perimeter of the proposed pit to form perimeter bunding to the pit. This material will be used for later rehabilitation. ➤ When stored topsoil is used it may be diluted and mixed with fresh topsoil. Revegetation ➤ Where possible any disturbed areas that are no longer required will be rehabilitated using the methods described above within 12 months of becoming available. ➤ Topsoil and vegetation fragments will be transferred directly from an area being cleared and spread across the surface to provide seed sources and habitats wherever possible. If direct transfer is not possible, any material stored in dumps will be respread. ➤ Larger vegetation will be formed into occasional piles for habitat creation on the lower elevations. ➤ Pre-seeding weed control is only likely to be required where topsoils are used that contain weed species. This is unlikely to be the case on this site where the existing vegetation is in excellent condition even though some exotic species are currently present within the “natural” vegetation. ➤ Any weeds likely to significantly impact on the rehabilitation will be sprayed with Roundup or other herbicide or grubbed out, depending on the species involved. Fusilade will be used where grasses present an impediment to rehabilitation. Weed affected topsoil and overburden will be buried. Native vegetation in the clumps connecting the remnant forest to the creekline. ➤ Rehabilitation will take place during the first winter months following the clearing of the existing Peppermint Trees if they are cleared as a result of the grant of a Clearing Permit ➤ Local species (<i>Agonis flexuosa</i>) are to be used in revegetation (100 plants) sourced as tube plants and used because they are the favoured habitat of the Western Ringtail Possum. ➤ Any materials brought to the site will be dieback and weed free. ➤ Trees/shrubs will be installed as tube plants during June - July in clumps on the rehabilitated land surface and will be provided with a 10 g tree fertiliser tablet placed beside the plant. The planting density will be 50 tube plants per hectare, planted in clumps. ➤ The clumps of trees will be fenced to exclude stock, and rabbit guards installed if deemed necessary at the time of planting. If no stock are retained on site, fencing will not be necessary. ➤ Tube plants are to be established in low undulations and not on the high points of furrowed soil. The planting rate is to achieve the completion criteria allowing for deaths. Pasture ➤ The preferred method of revegetation is to use the pasture seed from existing topsoil on pasture areas. However this may be deficient and additional seed is likely to be required. ➤ The sowing of pasture and crop will be integrated into the normal farming systems. Seeds of pasture species will be spread by normal farm practice at rates and species determined by the land holders/farm manager with advice from either a consultant or the Department of Primary Industries and Regional Development. ➤ The pasture species will be matched to the soil types and rainfall. The location falls into the “High Rainfall Coastal” planting regime with sandy soils. Suitable perennial legumes include Birdsfoot trefoil, Lucerne, Strawberry Clover, and Sulla. Perennial pasture includes Perennial

			Ryegrass, Phalaris, Cocksfoot, and Summer Active Tall Fescue, Kikuyu and Rhodes Grass. Annual pasture species include Italian Ryegrass, Serradella, subterranean clover. ➤ The actual species used will be determined by the individual season, nature of the rainfall in the preceding months and stocking/hay production proposed by the landholder which may change from time to time. ➤ Seeding rates are 2 – 5 kg/ha depending on the species used; for example Ryegrass is seeded at 3 kg/ha whereas Rhodes Grass is seeded at 4 kg/ha. ➤ If sufficient vegetation does not germinate the area will be over-seeded in early Autumn with a mixture of pasture species. Completion Criteria ➤ Pasture with clumps and linkages of 100 local native Peppermint between the forest remnant and the creekline vegetation if the existing Peppermint on site are to be cleared under a Clearing Permit.
4.2	The re-established surface will be free from Declared or Significant Environmental weeds that could compromise the success of the rehabilitation or impact on adjoining vegetation.	4.2	➤ Inspect the site for Significant Environmental and Declared Weeds. ➤ If found, inspect adjoining native vegetation for edge effects. ➤ Inspect rehabilitation and the edges of access roads. ➤ Provide weed control using the methods outlined in the Weed Management. ➤ Implement Dieback protection measures outlined in the Dieback Management Plan. ➤ Observations, discussions with operators and vegetation assessment.
5.0 STAKEHOLDERS			
5.1	The interests of all relevant stakeholders will be considered during operations, closure planning and closure.	5.1	➤ Prior to closure, consult the stakeholders to check whether the closure planning, where possible, considers their interests and carry them out as necessary. ➤ Consult with City of Busselton, in relation to their requirements for closure. ➤ Review the latest documentation. ➤ Comply with legal requirements and commitments. ➤ Closure audit.
6.0 SAFETY			
6.1	The site will be left safe for parkland pasture end use.	6.1	➤ Provide warning signs as required. ➤ Provide fences, bunding and warning signs above faces as required. ➤ Provide locked gates or access restraints as required. ➤ Inspect all areas and ensure the land surfaces and access points, are stable to erosion from wind and water. ➤ The disturbed land will be made safe and in compliance with the <i>Mines Safety and Inspection Act 1994</i> and DMIRS Mine Closure Guidelines. ➤ Surfaces will be formed to DMIRS Guidelines and match natural ground. ➤ Holes, sumps drains, ditches and the like will be filled and removed. ➤ The land surface is to have a landform similar to the natural form. ➤ Audit of completed ground, to verify compliance. ➤ Visual observations of the landforms.

11.3 Monitoring

Table 9 Monitoring and Remediation

	CLOSURE OBJECTIVE		Completion Criteria	Measurement Tools	Performance Indicators	Remediation
1.0 COMPLIANCE						
1.1	All legally binding conditions and commitments relevant to mine closure and rehabilitation will be met.	1.1a	➤ The disturbed land will be made safe and in compliance with the <i>Mines Safety and Inspection Act</i> .	➤ Conduct an audit of all legally binding conditions.	➤ All legally binding conditions have been complied with. ➤ Audit at least annually. ➤ Monitor for 3 years.	➤ Reform the land surface and bring the operation into line with the conditions and legal requirements.
		1.1b	➤ Comply with the requirements of the Planning Consent and Extractive Industries Licence.	➤ Conduct an audit of the environmental conditions. ➤ This includes Clearing Permits, DWER Licences and other conditions.	➤ All conditions have been complied with. ➤ Audit at least annually. ➤ Monitor for 3 years.	➤ Undertake any action that is necessary to bring the site into compliance.
2.0 LANDFORM AND SOILS						
2.1	All non natural structures, with mining will be removed.	2.1	➤ The site will be cleaned, and non natural materials associated with mining will be removed.	➤ Visual audit of completed ground, to verify compliance.	➤ No non natural structures will be retained on site. ➤ Conduct at closure.	➤ Remove any foreign materials.
2.2	All wastes will be removed from site.	2.2a	➤ All non local hardstand and roads will be collected and removed or buried in a safe location.	➤ Visual audit of completed ground, to verify compliance. ➤ Discussion with staff and operators.	➤ Non local materials associated with excavation ➤ Conduct at closure.	➤ Remove or bury non natural materials.
		2.2b	➤ Any contaminated soil or materials will be removed to an approved waste disposal site.	➤ Visual audit of completed ground, to verify compliance. ➤ Discussion with staff. ➤ Soil testing if there is evidence of material remaining.	➤ No visual evidence or sample data (if conducted) of contaminated or waste materials. ➤ Conduct at closure.	➤ Remove any remaining facilities and remediate or remove any contaminated soil. ➤ Retest and remediate as necessary.
2.3	The land surface will be visually similar to the surrounding landform.	2.3	➤ The land surface will be visually similar to the surrounding landform.	➤ Visual observations from the key viewscapes.	➤ The land surface will be visually similar to the surrounding landform. ➤ At closure and for 3 years.	➤ Repeat the relevant site closure procedures.
2.4	The land surface and soils are to be capable of supporting pasture with clumps of native	2.4	➤ Reconstructed soil properties will be appropriate to pasture.	➤ Visually observe the land surface.	➤ At closure and for 3 years or sign off.	➤ Repeat the relevant site closure procedures with respect to soil preparation.

	vegetation – trees.					
3.0 HYDROGEOLOGY						
3.1	The reformed surface be 0.5m to >2.0 metres above the highest groundwater table.	3.1	➤ The rehabilitated surface will have a separation of be 0.5m to >2.0 metres above the highest groundwater table.	➤ Implement site survey. ➤ Use piezometers or test pits as necessary to confirm compliance. ➤ Visual observations and site survey.	➤ Floor to be undulating some 1.5 metres on average below the natural surface.	➤ Reform the land surface with backfill or other measures to bring the surface into compliance.
4.0 BIODIVERSITY						
4.1	The rehabilitated areas will, in time, form sustainable pasture with clumps of Peppermint trees connecting the remnant forest and the creekline vegetation.	4.1	➤ The rehabilitated areas will be pasture with clumps of trees and local native vegetation.	➤ Conduct visual audits and as necessary plant counts.	➤ The rehabilitated areas will be pasture with clumps of trees and local native vegetation. ➤ At closure and for 3 years or sign off.	➤ Where deficient, provide additional tube planting or seeding.
4.2	The re-established surface will be free from Declared or Significant Environmental weeds that could compromise the success of the rehabilitation or impact on adjoining vegetation.	4.2	➤ No significant infestations of environmental or declared weeds.	➤ Visual audits. ➤ Maintain ongoing records.	➤ Exotic and weed species will not compromise rehabilitated areas. ➤ At closure and for 3 years or sign off.	➤ Undertake additional weed management such as spraying or mechanical removal. ➤ Continue monitoring and management to check compliance. ➤ Repeat as necessary for 3 years or until sign off.
5.0 STAKEHOLDERS						
5.1	Ensure stakeholder issues are considered.	5.1	➤ Prior to closure, consult any relevant stakeholders to check whether the closure planning considers their interests.	➤ Verify the closure plan against the Stakeholder interests. ➤ Site audit and discussions with operators.	➤ Stakeholder interests are incorporated into the closure planning where possible. ➤ At closure and for 3 years or sign off.	1. Undertake any action that is required to meet the requirements of the stakeholders. 2. Repeat as necessary the various steps in the closure planning and revegetation.
6.0 SAFETY						
6.1	The site will be left safe for parkland pasture end use.	6.1	➤ The disturbed land will be made safe and in compliance with the <i>Mines Safety and Inspection Act 1994</i> and DMIRS Mine Closure Guidelines.	➤ Visual audit of completed ground, to verify compliance. ➤ Discussion with staff.	➤ Faces and the landform are to comply with DMIRS Guidelines and be stable for the long term. ➤ At closure and for 3 years or sign off.	➤ Undertake any action that is necessary to make the site safe.

11.4 Weed Management Plan

Weed management is to be used to minimise impact on adjoining remnant vegetation and on adjoining properties as well as maintaining the agricultural capability of the rural lot.

Margaret River Natural Resources is part of the group that owns Lot 101. It is therefore in their interests to efficiently and correctly rehabilitate the excavated area.

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.

Weeds are most likely to impact on;

- Disturbed areas such as overburden dumps, topsoil stockpiles.
- Edges of access roads.
- Edges of firebreaks adjacent to surrounding vegetation.
- Locations accessible to the public on which rubbish is dumped.

The main sources of weeds are;

- Weeds from edge effects from access and local roads.
- Gradual creep of weeds along access roads.
- Rubbish dumped by the public. This is not likely as the resource is set well back from Gibb Road
- Materials or waste brought to site by employees.
- Soil and seeds from vehicles arriving at site. This often applies to trucks that have carried something else such as grain, or vehicles to be used in earthworks.
- Wind blown seed from surrounding land.
- Birds and other vectors. This is more common than is often given credit for. eg Solanum species.
- The Dieback Management Actions will be used to assist weed management.

Weed Management

- Weed Management will integrate with normal farm weed management.
- Inspections are to be conducted to monitor the presence and introduction of Environmental and Declared Weeds on an annual or more frequent basis. On identification, Declared and significant environmental weeds will either be removed, buried, or sprayed with a herbicide.

- All vehicles and equipment to be used during land clearing or land reinstatement, are to be clean and free from soil or plant material when arriving at site.
- No soil and vegetation will be brought to the site apart from that to be used in rehabilitation.
- Plants to be used in rehabilitation are to be free from weeds.
- Weed affected top soils may need to be taken offsite, used in weed affected areas, buried by 500 mm soil/overburden or taken offsite.
- Illegally dumped rubbish is the major source of weeds and will be removed promptly.
- No weed contaminated or suspect soil or plant material is to be brought onto the site.
- When clearing land or firebreaks vehicles will work in conjunction with dieback principles and push from areas of better vegetation towards areas of lower quality vegetation.
- Weeds are to be sprayed with broad spectrum spray prior to planting or seeding in weed affected soils as required.

11.5 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. Microscopic soil-borne fungi of the genus *Phytophthora* kill a wide range of native plants and can cause severe damage to many vegetation types, particularly those from the families Proteaceae, Epacridaceae, Xanthorrhoeaceae and Myrtaceae.

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

There are several guides to the management of Dieback.

- Department of Parks and Wildlife (DBCA) Dieback Hygiene Manual 1992 is a practical guide to Dieback management.
- Department of Parks and Wildlife (DBCA) Best Practice Guidelines for the Management of *Phytophthora cinamomi*, draft 2004.
- Dieback Working Group 2005, Management of *Phytophthora Dieback* in Extractive Industries.
- Dieback Working Group, 2000, Managing *Phytophthora Dieback*, Guidelines for Local Government.

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

On this site, even though there is no current evidence of dieback or other species normal best practice, plant disease management actions will be used,

- The aim of dieback management during excavation is to minimise the risk of entry of any additional plant pathogens to the site.

- There is very little risk of the operations spreading dieback onto vegetation on adjoining properties as there is no access to those properties and they are cleared.
- All vehicles and equipment used during land clearing or land reinstatement, will be clean and free from soil or plant material when arriving at site.
- When removing topsoil and clearing, vehicles will run around the perimeter and then push inwards where possible.
- No soil and vegetation will be brought to the site apart from that to be used in rehabilitation and that which is dieback free.
- Plants to be used in rehabilitation are to be certified as from dieback free sources.
- Excavation vehicles will be restricted to the excavation area apart from clearing land.
- Rehabilitated surfaces will be free draining and not contain wet or waterlogged conditions.
- Illegally dumped rubbish is to be removed promptly.
- When clearing land or firebreaks vehicles are to work from disturbed areas towards the pit; or, in situations where dieback interpretation is not possible, from areas of higher quality vegetation to areas of lower quality vegetation.

DBCA has determined that material such as sand, taken from deeper in the regolith profile where there is no organic and other plant matter, carries low risk of spreading dieback. (DEC 2004).

The Weed Management Policy will be complied with.

REFERENCES – READING

Abeyasinghe P B, 2003, *Silica resources of Western Australia*, Geological Survey of Western Australia, Mineral Resources Bulletin No 21.

Australian Geomechanics Society, 2003, *Engineering Geology of Perth, Parts 1 and 2, Volume 38 No 3 and No 4*.

Bastian L V, 1996, *Residual soil mineralogy and dune subdivision, Swan Coastal Plain, Western Australia*, Australian Journal of Earth Sciences 43, 31-44.

Brearely A, 2005, Swanland, *Estuaries and Coastal lagoons of South-western Australia*, University of Western Australia press.

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

Department of Conservation and Land Management, 1980, *Atlas of Natural Resources of the Darling System*.

Department of Environmental Protection, 1996, *Land development sites and impacts on air quality: A guideline for the prevention of dust and smoke pollution from land development sites in Western Australia*. Department of Environmental Protection, Perth.

Department of Environment and Conservation, 2011 *Guideline for Managing the Impacts of Dust and Associated Contaminants from Land Development Sites, Contaminated Sites Remediation and other Related Activities*.

Department of Environmental Protection (1997b). *Environment Protection (Noise) Regulations 1997: Summary of the Regulations*. Department of Environmental Protection, Perth.

Department of Minerals and Energy (1991). *Environmental Management of Quarries: Development, Operation and Rehabilitation Guidelines*. DOIR, Perth.

Firman J B, 2006, *Ancient weathering zones, pedocretes and palaeosols on the Australian Precambrian shield and in adjoining sedimentary basins: a review*, IN *Journal of the Royal Society of Western Australia*, Volume 89 part 2.

Geological Survey of Western Australia, 1990, *Geology and Mineral Resources of Western Australia, Memoir 3*.

Gozzard J R, 1987, *Information on Industrial Minerals - Coastal Plain between Lancelin and Fremantle*, Geological Survey of Western Australia record 1978/11.

Marnham J R, G J Hall and R L Langford, 2000, *Regolith-Landform Resources of the Cowaramup-Mentelle 1 : 50 000 Sheet*, Geological Survey of Western Australia.

Playford, P E, A E Cockbain and G H Low, 1976, *Geology of the Perth Basin Western Australia*, Geological Survey of Western Australia Bulletin 124.

Safstrom R and N Short, 2012, *Agriculture futures: Potential rural uses on the Palusplain*, Department of Agriculture and Food Resources Management Technical Report 372.

Townley L R et al, 1993, "Volume 3 *Interaction Between Lakes, Wetlands and Unconfined Aquifers*", Water Authority of Western Australia and EPA,

Western Australian Planning Commission, *State Planning Policy 1.0 State Planning Framework*.

Western Australian Planning Commission, *State Planning Policy 2.0, Environment and Natural Resources Policy*.

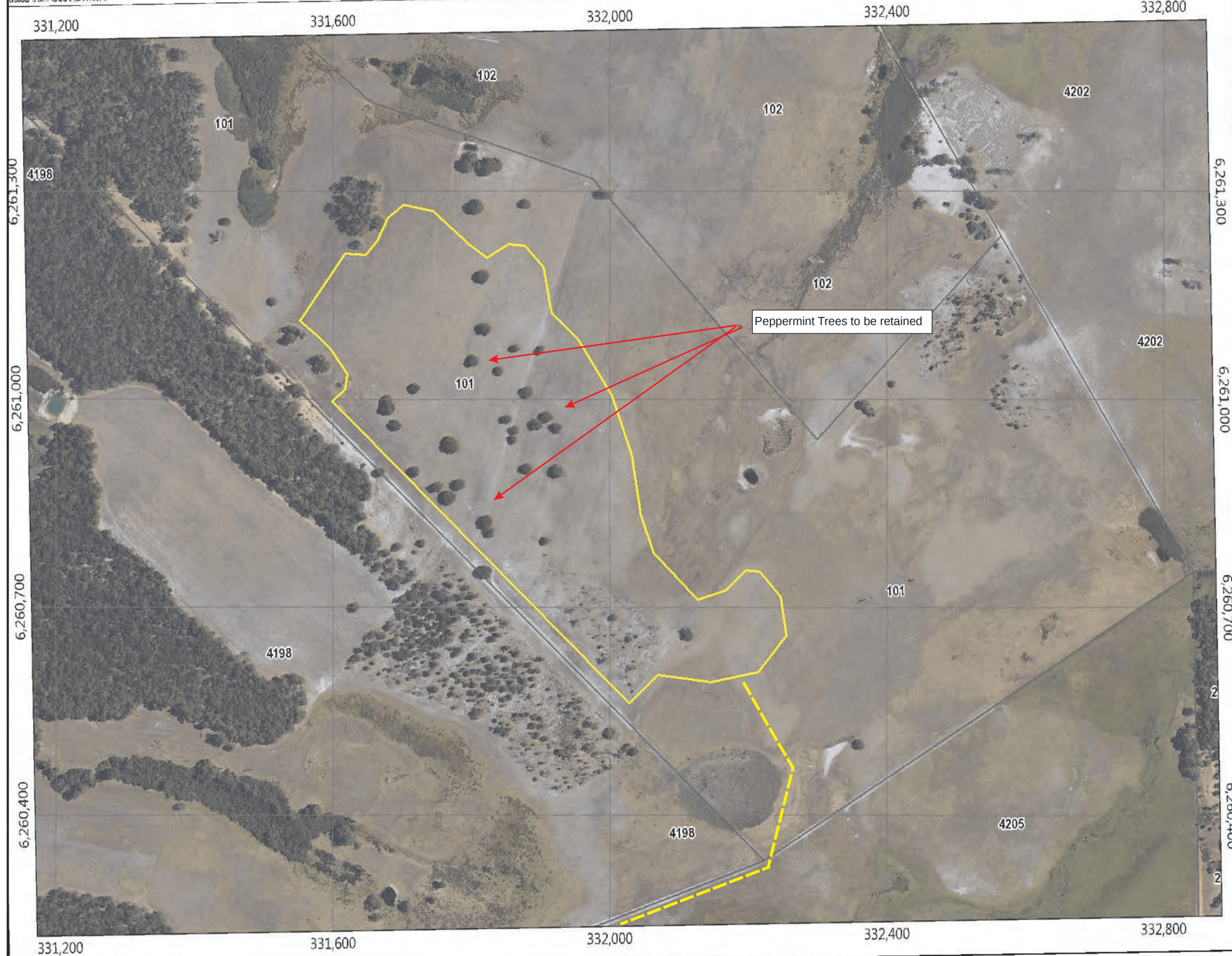
Western Australian Planning Commission, *State Planning Policy No 2.5, Agricultural and Rural Land Use Planning*.

Western Australian Planning Commission, *State Planning Policy No 4.1, State Industrial Buffer Policy*.

Wilde S A and D R Nelson, 2001, *Geology of the Western Yilgarn Craton and Leeuwin Complex, Western Australia – Field Guide*, Geological Survey of Western Australia.

SAND RESOURCES LOT 101, GIBB ROAD

Extracted from GeoVIEW.WA



Legend

Image

- Red: Band_1
- Green: Band_2
- Blue: Band_3

Major Town

Minor Town

Place Name

- Aboriginal Community
- Cave
- Hill
- Homestead
- Meteorological Station
- Mountain
- Peak
- Roadhouse
- Rock

Railway

Road

- <all other values>
- Freeway
- National Highway
- State Highway
- Main Road
- Mail
- Minor Road

Coast

DEC Managed lands - Marine

- Marine Management Area
- Marine Nature Reserve
- Marine Park

Watercourse mask

- 0-200m
- 200m-1000m
- 1000m-2000m
- 2000m-3000m
- 3000m-4000m
- 4000m-5000m
- >5000m

Lakes

Water Course - Major

Water Course - Minor

DEC Managed lands - Land

- 5(1)(g) Reserve, A
- 5(1)(g) Reserve, C
- 5(1)(h) Reserve, A
- 5(1)(h) Reserve, C
- Conservation Park
- Conservation Park, A
- Conservation Park, C
- Marine Management Area, A
- Marine Nature Reserve, A



Recommend Reference for this map is: Geological Survey of Western Australia
2018, SAND RESOURCES
LOT 101, GIBB ROAD extracted from GeoVIEW.WA, on 16/09/2018 Perth, Western
Australia: Department of Mines, Industry Regulation and Safety.



Department of
Mines, Industry Regulation
and Safety

Geological Survey of
Western Australia



0.5

Kilometers

NOTE: Scale is calculated at the centre of the map. Scale representative
fraction will vary in a North South direction.

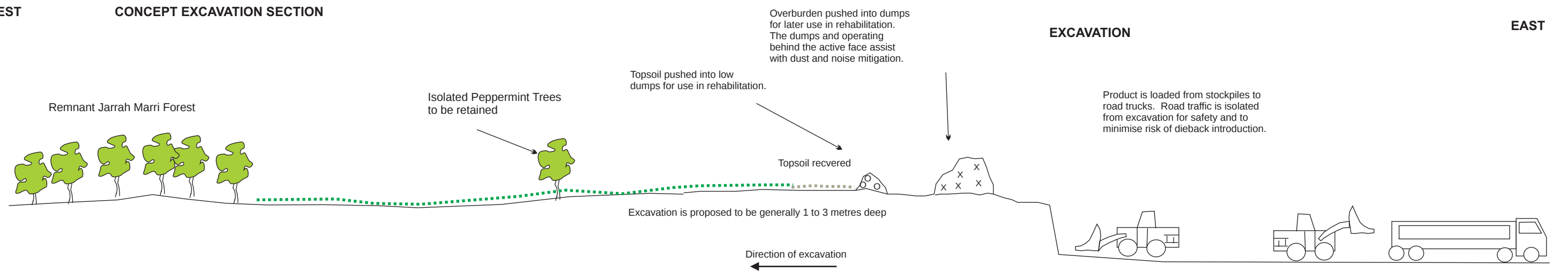
The data presented herein are interpreted, and made available
in good faith and derived from sources believed to be reliable
and accurate at the time of release. You should not solely rely
on this information when making a commercial decision.

Figure 7

WEST

CONCEPT EXCAVATION SECTION

EAST



Excavating sand from a face similar to the proposed operation

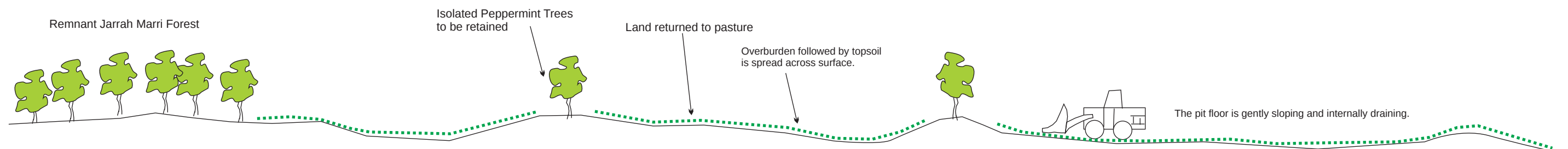


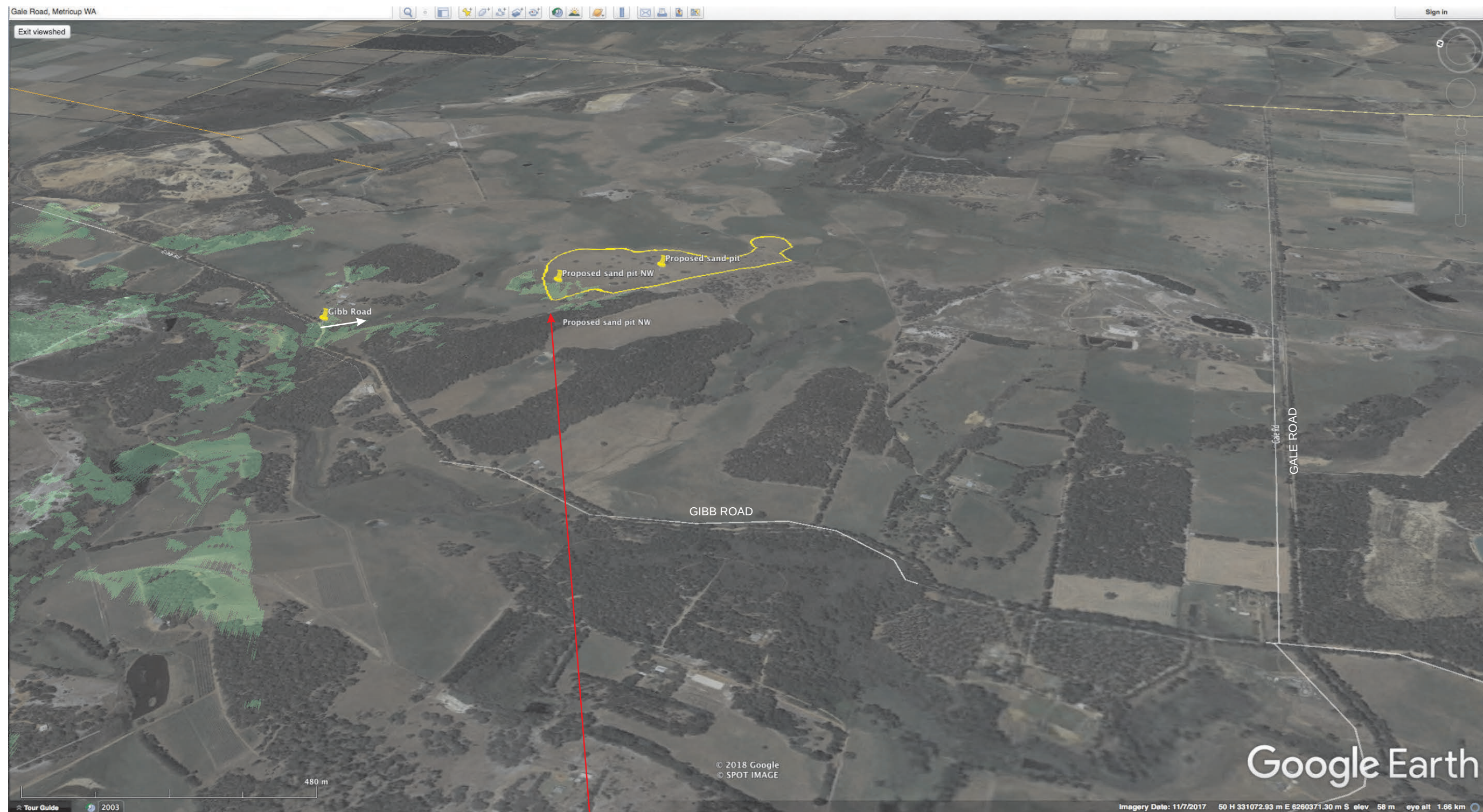
Loading to a road truck in a typical sand operation

WEST

LAND RESTORATION AND REHABILITATION

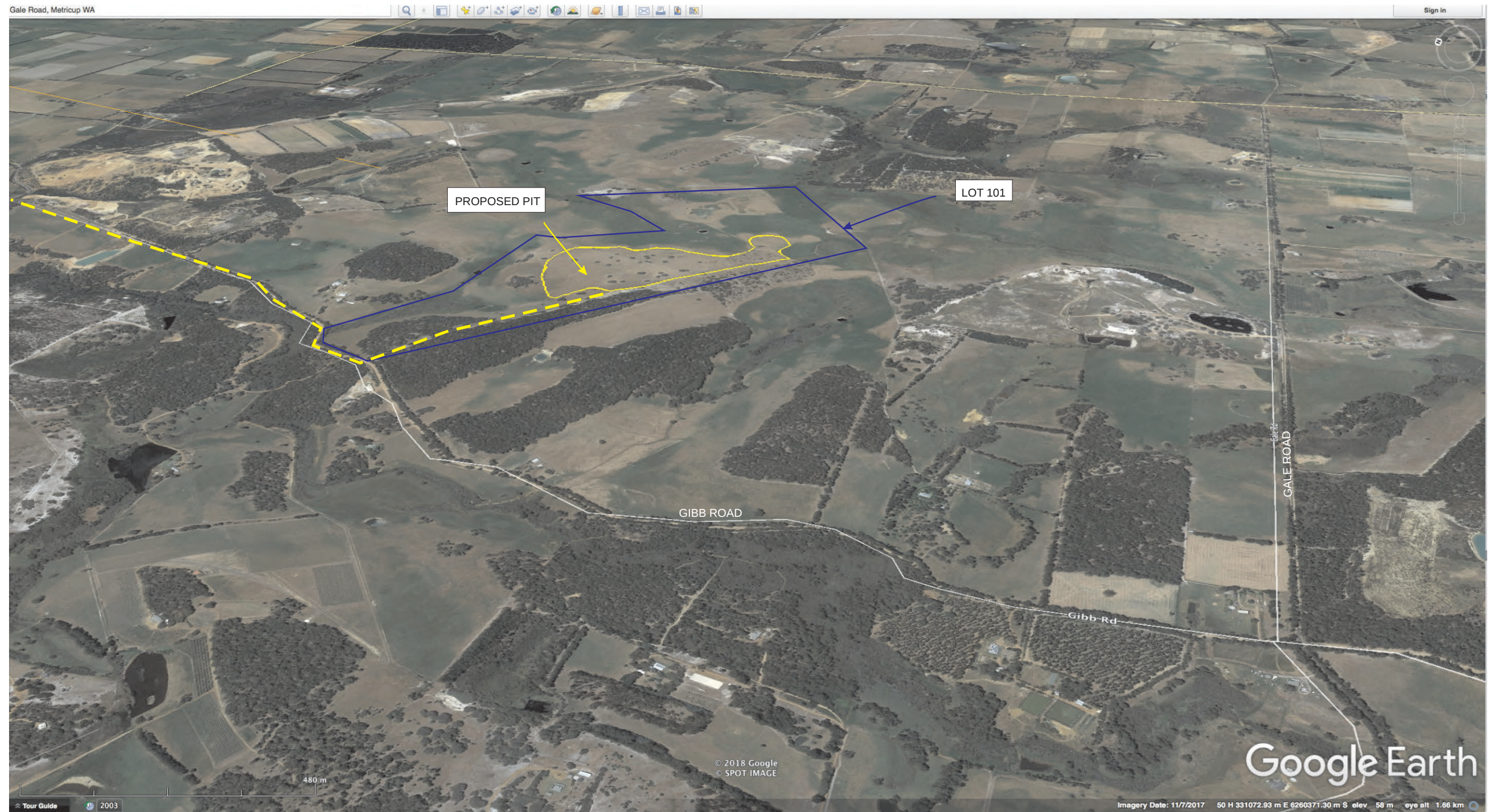
EAST





MARGARET RIVER NATURAL RESOURCES

The small area of visibility from Gibb Road will be negated by bunding of the active excavation in the direction of the potential view



MARGARET RIVER NATURAL RESOURCES

Updated Water Management Plan

Proposed Sand Pit Lot 101, Gibb Road, Kaloorup

Margaret River Natural Resources Pty Ltd

21 October 2019

1.0 Geology and Geomorphology

The sand lies between the Leeuwin Complex and the Yilgarn Craton in a down faulted basin filled with Permian overlain by Cretaceous sediments.

The land system is the Yelverton System (DPIRD Mapping) that now lies above the Whicher Scarp and was formed as a north facing bay at a time of higher sea level.

The general formation of the sand systems are thought to be a marine with dunes, for the surface finer sands, with the basal sands being considered to have potentially originated from the Permian glacial times.

The geology is discussed in Wilde S A and D R Nelson, 2001, *Geology of the Western Yilgarn Craton and Leeuwin Complex, Western Australia – Field Guide*, Geological Survey of Western Australia and Marnham J R, G J Hall and R L Langford, 2000, *Regolith-Landform Resources of the Cowaramup-Mentelle 1 : 50 000 Sheet*, Geological Survey of Western Australia.

The sand resource is located on a plateau sand and gravel ridge that rises from around 68 metres AHD to 74 metres AHD.



2.2 Regolith and Soils

The soils and excavation of sands are well known from the other sand pits that have operated and currently operate across the local area. A small amount of gravel and gravelly soil occurs in the west of the resource.

The resource typically has a grey sand overburden up to 100 mm thick over leached white silica sand grading to yellow sand. Yellow sand occurs more in the west closer to the laterite duricrust, with the leached white sand more common in the areas of lower elevation or areas that have been subject to leaching in the geological past.

The finer sand overlies discontinuous thin layers of coarser sand.

Under the sand is the sandy loam subsoils that are developed on the Cretaceous sediments.

The soils are well described in Marnham J R, G J Hall and R L Langford, 2000, *Regolith-Landform Resources of the Cowaramup-Mentelle 1 : 50 000 Sheet*, Geological Survey of Western Australia.

3.0 Climate

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

Temperatures are recorded at Witchcliffe, where the maximum temperatures in the hottest and coldest months, December to January and July, are 24 to 27 degrees C and 16 - 17 degrees C respectively. In winter the average minima drop to 8 degrees C in July.

Average annual rainfall for the area is 958 mm. Most of the rain falls during the winter months April to October inclusive. Evaporation exceeds rainfall in all but the wetter months.

The 2 hour 10 year exceedance rainfall event is 39.2 mm.

Wind direction is predominantly from the east in the morning and from the north west to south west in the afternoon during the summer months, with winter winds being lighter but having a component of strong winds in winter storms.

Witchcliffe Climate

WITCHCLIFFE LONG-TERM AVERAGES

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Mean Max (°C)	26.6	27.2	25.6	22.5	19.7	17.4	16.4	16.8	17.4	19.6	22.8	24.8	21.4
Mean Min (°C)	14.0	14.4	13.0	11.2	9.7	8.8	8.0	8.2	8.7	9.3	10.9	12.4	10.7
Mean Rain (mm)	10.4	9.0	27.8	66.6	142.9	179.1	196.5	159.0	122.3	62.6	36.7	15.3	1033.3
Median Rain (mm)	5.4	6.7	26.4	57.0	118.6	148.6	197.8	149.8	103.6	56.9	31.4	8.2	958.1
Mean Rain Days	3.6	5.2	7.8	14.3	19.5	21.2	23.5	22.6	20.2	16.7	10.5	7.2	164.9

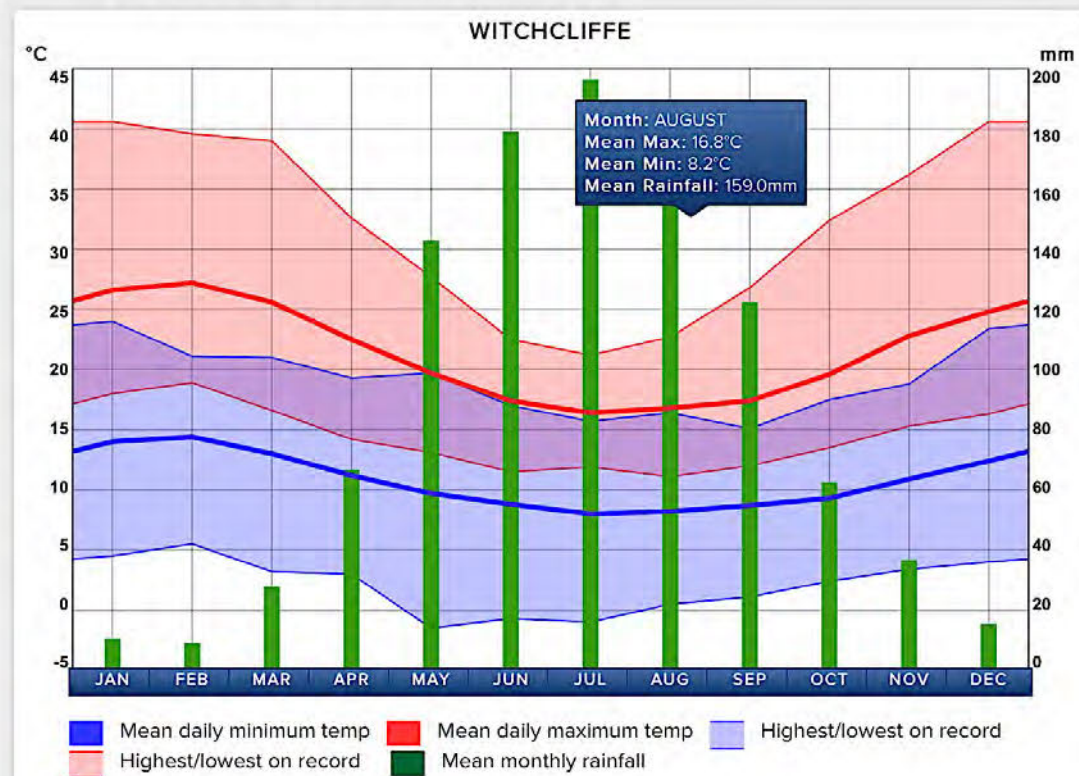
WITCHCLIFFE DAILY RECORDS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
High Max (°C)	40.6	39.6	39.0	32.6	27.7	22.5	21.2	22.7	26.8	32.4	36.2	40.6	40.6
Low Max (°C)	18.0	18.9	16.6	14.2	13.1	11.5	11.9	11.1	12.0	13.5	15.3	16.3	11.1
High Min (°C)	24.0	21.1	21.0	19.3	19.7	17.0	15.7	16.4	15.1	17.5	18.8	23.4	24.0
Low Min (°C)	4.5	5.5	3.2	3.0	-1.5	-0.7	-1.0	0.5	1.1	2.4	3.4	4.0	-1.5
High Rain (mm)	27.8	16.0	47.6	63.0	65.4	62.6	99.4	71.0	44.4	53.0	36.2	27.0	99.4

WITCHCLIFFE MONTHLY RECORDS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
High Mn. Max (°C)	29.7	30.1	28.3	24.5	21.6	18.0	17.1	18.3	18.7	22.1	25.1	27.3	22.4
Low Mn. Max (°C)	25.2	25.6	23.6	20.5	18.4	16.4	15.7	15.5	15.7	16.8	20.0	20.6	20.0
High Mn. Min (°C)	15.7	16.7	14.6	13.2	12.3	10.5	9.7	10.3	10.5	11.0	13.1	14.3	11.3
Low Mn. Min (°C)	12.8	13.0	11.6	9.4	6.7	5.6	6.6	5.4	6.7	7.6	9.2	11.1	10.0
High Rain (mm)	35.8	24.2	89.8	150.4	253.6	339.6	344.4	227.8	241.0	128.2	82.4	32.6	1338.8
Low Rain (mm)	0.2	1.2	1.4	5.4	50.8	88.6	79.2	40.0	48.0	20.8	9.6	0.0	707.2

WITCHCLIFFE ANNUAL TEMPERATURES & RAINFALL





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Bureau of Meteorology

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Design Rainfall Data System (2016)

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Design Rainfalls

☐ Very Frequent

☒ IFDs (Frequent and Infrequent)

☐ Rare

Standard Durations

☒ 1 - 45 minutes

☒ 1 - 18 hours

☒ 24 - 168 hours

Non-Standard Durations

Duration: minutes

☒ Observed Rainfalls

Update

Reset

Other Options

☐ Coefficients

☐ Seasonality

Location

Label: Kaloorup

Latitude: 33° 47' 22" S
[Nearest grid cell: 33.7875 (S)]

Longitude: 115° 11' 27" E
[Nearest grid cell: 115.1875 (E)]



IFD Design Rainfall Depth (mm)

Issued: 19 July 2019

Rainfall depth for Durations, Exceedance per Year (EY), and Annual Exceedance Probabilities (AEP).
[FAQ for New ARR probability terminology](#)

Table

Chart

Unit:

Duration	Annual Exceedance Probability (AEP)						
	63.2%	50%#	20%*	10%	5%	2%	1%
1 min	2.23	2.48	3.28	3.84	4.40	5.17	5.77
2 min	3.75	4.12	5.39	6.33	7.31	8.63	9.71
3 min	5.03	5.55	7.27	8.53	9.83	11.6	13.0
4 min	6.11	6.76	8.89	10.4	12.0	14.1	15.7
5 min	7.03	7.80	10.3	12.0	13.8	16.2	18.1
10 min	10.3	11.4	15.2	17.7	20.3	23.8	26.5
15 min	12.3	13.7	18.2	21.3	24.4	28.6	31.9
20 min	13.8	15.4	20.4	23.9	27.4	32.2	36.0
25 min	15.1	16.7	22.2	26.0	29.8	35.1	39.2
30 min	16.1	17.9	23.6	27.7	31.8	37.5	41.9
45 min	18.5	20.5	27.0	31.6	36.4	43.0	48.3
1 hour	20.3	22.5	29.5	34.6	39.9	47.1	53.0
1.5 hour	23.2	25.6	33.5	39.2	45.2	53.5	60.3
2 hour	25.5	28.1	36.6	42.9	49.4	58.5	66.0
3 hour	29.2	32.1	41.7	48.8	56.1	66.4	74.8
4.5 hour	33.5	36.8	47.7	55.6	63.8	75.4	84.9
6 hour	36.9	40.6	52.5	61.1	70.0	82.6	92.9
9 hour	42.3	46.5	60.1	69.8	79.6	93.8	105
12 hour	46.5	51.1	66.0	76.5	87.0	102	115
18 hour	52.8	58.1	74.9	86.5	98.1	115	129
24 hour	57.5	63.3	81.4	93.9	106	124	139
30 hour	61.4	67.4	86.6	99.7	113	132	147
36 hour	64.6	70.9	90.9	104	118	138	154
48 hour	70.0	76.7	97.8	112	126	147	164
72 hour	78.7	85.8	108	123	138	160	177
96 hour	86.3	93.9	117	133	148	169	186
120 hour	93.8	102	126	142	157	177	193
144 hour	101	110	135	151	165	185	200
168 hour	110	119	144	160	174	192	205

Note:

The 50% AEP IFD does not correspond to the 2 year Average Recurrence Interval (ARI) IFD. Rather it corresponds to the 1.44 ARI.

* The 20% AEP IFD does not correspond to the 5 year Average Recurrence Interval (ARI) IFD. Rather it corresponds to the 4.48 ARI.

4

4.0 Surface Water

There is no surface runoff of water on the sand resource due to the porosity and permeability of the sand, with precipitation draining to the water table.

Only the areas that are well above the water table have been selected for excavation. In summer the local soils dry out, but in winter the rate of precipitation wets the sand. There are no winter-wet conditions.

The site is not subject to any watercourses or flood paths but the headwaters of a creek originates to the north of the eastern portion of the pit, originating from water entering the overlying sands and then running along the more clayey basement of Cretaceous sediments. The setback to the headwaters of the creek is over 100 metres from the edge of the sand pit.

The surface water and superficial groundwater are the only relevant considerations for this proposal.

It is noted that the clearing of the former forest from Lot 101 will have led to significantly increased recharge and the formation of the creeklines which are more permanent features.

Figure 2 shows the dry elevated area where the sand resource occurs. It also shows the water courses that commence down slope from the proposed pit and which will not be impacted by the excavations. See Figure 7 for the on site contours.

The water table measurements taken on 14 November 2018 show that the sand resource is approximately 2.0 metres deep in the south east and centre thickening to 3.5 metres deep in the north west. Additional soil test holes were conducted on 11 September 2019. With a separation of 0.5 metres to the water table the thickness of resource will be 1 – 1.5 metres in the east and centre and up to 3.0 metres in the west. Gravel resource occurs in the north west with the sand. Test hole 13 had a separation to perched groundwater of 5.1 metres on 11 September 2019.

In the south west, the Department of Water *South West Region Guidelines Water Resource Considerations for Extractive Industries* permits a final land surface of 0.5 metres above the highest winter water table. Draft WQPN 15 BRM extraction near sensitive resources is also relevant for guidance.

There is generally no surface runoff of water from the sand due to the porosity and permeability of the sand, with precipitation draining to the water table. It has been estimated that 30% of the rainfall will reach the superficial aquifer with an unknown amount filtering into the deeper aquifers, based on the pasture on the sand.

The groundwater issues were considered by the Environmental Protection Authority in Bulletins 512, 788, 821 and 818, and whilst these do not specifically refer to the extraction of basic raw materials, and are for the Lake Clifton Catchment, they do consider the impact of clearing, planting trees and rural, residential developments. The figure the EPA used for recharge from native vegetation was 10 – 15% rainfall, whereas cleared land had a recharge of 30 – 40 %.

Recharge from pasture is anticipated currently to be near 30% based on the vegetation and elevation above the water table. Recharge on excavated areas will also be in the order of 30% because of smaller separations to the water table based on the existing sand ridges accepting and retaining moisture from smaller rainfall events which do not reach the water table. (Environmental Protection Authority Bulletins 512, 788, 821 and 818). This will result in little change to recharge with excavation.

A review of summer and winter ground and aerial photography shows that the pit is located in elevated sandy ground that does not get waterlogged in winter and does not grow good pasture because of the poor soil quality on elevated ground. See Figure 2.

At the end of excavation the soils will be returned to a lower elevation at which soil moisture is more readily available and the pasture will last into summer. The effect will be that the excavated area will appear green on Figure 2, indicating summer soil moisture.

Minor surface water is generated from the slopes above the pit and the haul road. This will form from rainfall infiltrating the ground, running along on top of the granite basement and then emerging at the gutters to the haul road.

All surface water from the access roads will drain to the edges to infiltrate the adjoining sand as is the case with any gravel road.

All surface water will be retained in the pit. DWER has normal guidelines for water management of retaining the 2 hour ten year exceedance of 39.2 mm within the pit.

Whilst the base of the pit is normally sand, the western portion bottoms on less permeable gravel and underlying sediments. Therefore to retain the volume of water from a 2 hour 10 year exceedance event a rainfall of 40 mm is used for simplicity and assuming a saturated catchment.

For that rainfall one hectare of pit will generate 400 m³ of stormwater. Therefore for each hectare the edges of the pit are to be able to retain that volume of water.

To prepare the pit the topsoil and overburden is pushed to low bunds on the side of the pit and then the pit is excavated to a depth of around 1 to 3 metres. That means the depth of the pit, including the perimeter bund of normally around 1 metre high, is around 2 – 4 metres in depth.

Assuming that the pit is only 2 metres deep at the lowest elevation, and using a floor slope of 1 to 10 vertical to horizontal for the steepest pit slope, then each linear metre of pit wall will hold 20 m³ of stormwater. To retain the 2 hour ten year storm event a pit to wall distance of only 20 - metres along the edge of the pit is required per hectare of pit. See the attached cross section..

This demonstrates how the pit will easily retain all the water from the design rainfall event. For a pit that is larger a correspondingly larger basin area is required. In reality the wall and bund around the pit will normally be at least 3 metres which will reduce the required basin size further.

The design of the pit is consistent with Department of Water, *Water resource considerations for extractive industries*, DOW South West Region Guideline and Draft WQPN 15 BRM extraction near sensitive resources.

5.0 Groundwater

Department of Water 2010 *Murray Drainage and Water Management Plan* at Pinjarra places the transmissivity as 5 – 15 metres per day or around 9.2 metres per day for similar sand in a similar hydrogeological situation.

The infiltration rates ensure that the sand does not become saturated and no water exists in the sand resource areas.

The resource area is elevated, with a shallow seasonal superficial water table perched at the top of the underlying Cretaceous sediments when the vertical infiltration rate is exceeded by the winter precipitation.

The site sits within the South West Groundwater Areas Allocation Plan 2000 and lies in the Dunsborough – Vasse Subarea for Superficial and Leederville Formation. The underlying Yarragadee Aquifer will not be impacted.

In reality it is only the Superficial Aquifer that is relevant to this proposal in terms of the depth to groundwater beneath the base of the sand pit.

There are no acid sulphate or salinity issues, with the soils and water being fresh and elevated in the landscape.

The excavation of sand from the site complies with the DWER South West guidelines and uses the management actions wherever there is environmental benefit.

The protection of surface and ground water from contamination by hydrocarbons is viewed by Margaret River Natural Resources as a critically important issue in managing its environmental responsibilities at this site. The company has examined this risk and adopted a range of policies and procedures.

The resource area is elevated with a shallow seasonal superficial water table perched at the top of the underlying Cretaceous sediments when the vertical infiltration rate is exceeded by the winter precipitation.

Excavation will continue down to an elevation of 1 to 3.0 metres, well above the highest winter water table which will be predominantly >2.0 metres above the superficial water table as the sand resource is located on the plateau ridge.

The location and extent of the resource to be excavated was developed following extensive aerial and ground observations by Lindsay Stephens of Landform Research. See Figures 2 and 7.

The water table measurements taken on 14 November 2018 show that the sand resource is approximately 2.0 metres deep in the south east and centre thickening to 3.5 metres deep in the north west. With a separation of 0.5 metres to the water table the thickness of resource will be 1 – 1.5 metres in the east and centre and up to 3.0 metres in the west. Gravel resource occurs in the north west with the sand.

In the south west, the Department of Water *South West Region Guidelines Water Resource Considerations for Extractive Industries* permits a final land surface of 0.3 - 0.5 metres above the highest winter water table. The south west guideline is more applicable to this site than the guideline WQPN 15 because the end use of the land will be to continued agriculture use.

Around 1 000 kL per year is used for minor dust suppression and is to be sourced from a soak at the headwaters of the small creekline.

Holes were excavated to the base of the resource on 12 November 2018. The local area (Witchcliffe) experienced a very wet August in 2018 with consistent but slightly below average rainfall in September through November. Even so with the heavy rainfall of August and the consistent later rainfall the soils remained moist.

The soil test holes were sunk with an excavator to the base of the resource and the elevation measured below natural ground level. The soil test holes were sunk under the supervision of Roger Cook of Margaret River Natural Resources on 12 November 2018 in locations allocated by Lindsay Stephens of Landform Research to check the previously interpreted elevations of the resource and water tables.

Additional test holes were conducted using an excavator on 11 September 2019 and measured by Lindsay Stephens of Landform Research, which was about the highest winter groundwater for 2019, based on rainfall data. Several test holes were sunk near the 2018 soil test holes to compare the water table from 2018 and 2019. The data was similar in each year as could be expected based on the drainage off the ridge especially to the north west.

The soil test holes are shown on Figure 7 with a section along the resource provided. The contours of the late winter water tables are shown on Figure 6.

The test holes confirm the resource area and depth assessments previously made and show that the excavation can be completed with no impact on the local water tables or any risk of local flooding.

Within the resource area, the perched seasonal groundwater varies from an elevation of 63.5 metres AHD, in the north west, rising to 71.0 metres in the central parts of the resource.

It is also noticed that within each concept stage the elevation of the seasonal maximum water table varies quite considerably. Therefore the best means of determining the base floor of the pit, between 0.5 and 1.0 metres, is during excavation.

The elevation of the water table provides a starting point for the floor elevation, but it is only during excavation that more precise measurements can be made as the resource and the water table varies in elevation. Even so there should be no exposure of the water table during excavation apart for short periods in the small active area of the pit whilst adjustments are made to the final floor elevation.

Soil test Hole Results.

HOLE NUMBER	EASTING	NORTHING	GROUND AHD	DEPTH TO WATER	GROUND WATER AHD NOV 2018	GROUND WATER AHD SEPT 2019
1	331 452	6261 490	49.0 m	0.0 m	49.0 m	
2	331 676	6261 347	63.6 m	3.5 m	60.1 m	
3	331 689	6261 157	69.3 m	3.2 m	66.1 m	
4	331 820	6260 930	73.2 m	3.5 m	69.7 m	
5	331 939	6260 766	72.4 m	1.5 m	70.9 m	
6	332 047	6260 649	72.3 m	2.1 m	70.2 m	
7	331 828	6260 924	73.4 m	3.3 m		70.1 m
8	331 689	6261 157	69.3 m	2.3 m		67.0 m
9	331 705	6261 312	65.0 m	2.7 m		62.3 m
10	331 697	6260 883	72.1 m	2.7 m		69.4 m
11	331 873	6260 706	72.3 m	>2.5 m		< 69.8 m
12	332 022	6260 833	70.7 m	1.1 m		69.6 m
13	331 854	6261 096	72.2 m	5.1 m		67.1 m
14	331 799	6261 197	72.1 m	> 1.1 m		< 71.0 m
15	331 694	6261 065	72.0 m	2.4 m		69.6 m
16	331 619	6260 969	72.8 m	> 1.7 m		< 71.1 m
17	332 209	6260 890	69.7 m	0.5 m		69.2 m
18	331 489	6261 275	56.7 m	0.0 m		56.7 m

In addition there is a commitment to monitor the water table during excavation using small test holes and/or piezometers in the base of the pit as the pit is excavated. Any areas which do not have the correct separation to the water table will be backfilled as necessary to ensure that the correct amount of sand of around 0.5 – 1.0 metres is provided above the winter high water table. See Figure 8.

Protection of the Water Table

The management of water during excavation is contained in the Excavation Management Plan dated 28 November 2018. Excavation is to occur with a separation of 0.5 to 1.0 metres of the winter maximum perched water table.

The pasture on the ridge is low grade as it sits on leached white sand well above the water table. In summer the temporary perched water table drops below the underlying subsoil base of loamy and sandy clay sediments. This causes the pasture to die as can be seen from summer aerial photographs.

The aim of the excavation has always been, in addition to extracting the sand, improving the pasture on site by removing the leached white sand from the surface and reconstructing a soil based on loamy yellow sands closer to the water table. The reconstructed soils have much greater water and nutrient holding capacity than the current leached sands.

This means that the final land surface will be 0.5 to 1.0 metres above the highest perched water table.

The best means of not intersecting the water table is to excavate and provide piezometers of temporary test holes to measure the late winter water tables. If the separations are not sufficient the floor of the pit is to be back filled to achieve the separation. Test excavations and piezometers will be used to confirm the separations to the water table.

The water table should not be exposed at any time and if it is exposed in late winter then the floor will be raised to the final floor separation of 0.5 – 1.0 metre separation. The normal excavation at cut will be 0.2 to 0.3 metres below the final floor elevation to enable room for the 0.2 to 0.3 metres of topsoil to be replaced.

If the floor floods in late winter the floor of the pit is too low and the floor will be backfilled to achieve the completion criteria pit floor with a separation of 0.5 to 1.0 metres.

6.0 WATER QUALITY MANAGEMENT

6.1 Water Source Protection Areas

Department of Water Environment Regulation – South West Region Guideline –Water resource considerations for extractive industries apply to this site.

The excavation on Lot 101 complies with DWER Guidelines for water management and separation to the groundwater of > 2 metres in most situations and at all times 0.5 metres (500 mm), for all other areas including the edge of the low lying areas.

6.2 Water Requirements

The pit is relatively small with short access roads and operated intermittently in campaigns.

The water requirements are anticipated to be minimal and sourced from farm supplies. In most cases dust suppression will not be required.

Around 1 000 kL per year is to be used for minor dust suppression and for washing product.

Whilst to wash any product will pump more water, with little evaporation the water will seep back to the superficial water table.

The proposed operation complies with all Government Policies and Guidelines.

Potable water is brought to the site as needed.

6.3 Water Quality Protection Guidelines

All facilities and procedures on site are designed to comply with the DWER – DMIRS Water Quality Protection Guidelines for Mining and Mineral Processing and are all complied with;

- Minesite stormwater
- WQPN 15 Extractive Industries near sensitive water resources
- Draft WQPN 15 BRM extraction near sensitive resources 2014
- *Department of Water Environment Regulation – South West Region Guideline – Water resource considerations for extractive industries.*

6.4 Surface Water

See the documentation in Section 3.0 above which is largely taken from the Excavation Management Plan dated 28 November 2018.

6.5 Groundwater

See the documentation in Section 4.0 above which is largely taken from the Excavation Management Plan dated 28 November 2018.

6.6 Salinity

Precipitation falling on the site is fresh.

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

The existing bore provides a monitoring point for water quality.

The groundwater is not exposed, apart from a small sump in the base of the pit to act as a water source.

6.7 Dewatering

No dewatering is proposed. All water is to be retained in the pit and infiltrates into the sand.

6.8 Recharge

See the documentation in Section 3.0 above which is largely taken from the Excavation Management Plan dated 28 November 2018.

6.9 Acid Sulfate Risk

Definitive survey procedure is produced in *DEC (DWER) 2013, Identification of Acid Sulfate Soils and acidic Landscapes* and within document *Acid Sulfate Soil Management Advisory Committee NSW, 1998, Acid Sulfate Manual*. This information 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 main method of assessment is based on geological examination. If at risk conditions are identified then laboratory testing may be required but must be completed carefully because there is a high risk of false positives with the available testing regimes.

Acid sulfate only becomes a potential risk when a number of circumstances are present.

Acid Sulfate is a natural phenomena, that can be exacerbated by disturbance. For it to be present there needs to be;

- Rock, soil or regolith present that is carrying sulfides.
- Sulfide carrying materials from below the water table are to be exposed to the atmosphere.
- Excavation below the water table is to be carried out exposing the sulfide carrying materials to oxygen in the atmosphere.
- Dewatering of the sulfide carrying materials is proposed, exposing them to oxygen.
- Exposure of peat or organoferricrete materials, that were permanently under reducing conditions, to the air.

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 site has been inspected by Lindsay Stephens of Landform Research and the resource area tested with excavation test holes to 3.0 metres depth. None of the at risk parameters occur on site.

On site the soils are yellow sands that are oxidised and do not carry any risk of acid sulphate potential. Some minor iron induration is encountered in the faces of the pit, generally below the proposed base of the pit.

This concurs with *Nattaporn-Prakongkep, R J Gilkes, B Singh and S Wong, 2011, Mineralogy and chemistry of sandy soils in the Perth metropolitan area of the Swan Coastal Plain, Department of Environment and Conservation* who concluded that there is no risk of acid sulfate soils in sands unless there is peat or organoferricrete present and excavation proceeds below the water table. In such situations no testing would be required because there is no risk. None of these conditions are encountered.

6.10 Unauthorised Access and Illegal Dumping

- The potential for rubbish to be dumped relates to unauthorised access to the site. Access is restricted by current farm fencing and locked gates. The pit is 500 metres from the nearest road.
- Wastes generated from on site operational activities will be recycled wherever possible and periodically disposed of at an approved landfill site.
- Any illegally dumped materials are to be removed promptly to an approved landfill or other suitable site, depending on the nature of the material.

6.11 Wastewater Disposal

A serviced portable toilet is proposed to be in place while the site is operating. Serviced means they are pumped out by a licensed contractor.

6.12 Refuelling

Fuel management will be in accordance with the relevant guidelines. The methods to be used are summarised below.

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

- *WQPN 60 – Tanks for mobile fuel storage in PDWSAs.*
- *WQPN 15 - Extractive Industries near sensitive water resources.*
- *Department of Water Environment Regulation – South West Region Guideline – Water resource considerations for extractive industries.*

Refuelling - Fuel Management Plan

- There will be no onsite fuel storage. The loader will continue to be refuelled on site from a mobile tank or tanker. This method is used on most mine and construction sites as well as many farming properties.
- Refuelling on site will occur in the active pit area to allow for containment if any spill did occur.

- The main risk of contamination is the minor drips that occur during the removal of hoses etc. Minor spills are quickly degraded by soil microbial matter.
- The only other risk is from a tank rupture, but tanks are designed to manage this eventuality and are approved to the relevant standards. Soil contaminated by large spills will be removed from the site to an approved disposal area.
- The operators of the mobile refuelling facilities are trained in re-fuelling duties including the management of any spills.
- In the event of a spill or adverse incident, activities will be stopped in that area until the incident is resolved.
- Spillage will be contained in plant and working areas by shutting down plant or equipment if the plant or equipment is the source of the spill (provided it is safe to do so). The sand will provide high absorbency and will retain any spill.
- Soil contaminated by spills will be removed from the site to an approved disposal area.
- All significant adverse incidents (such as a fuel spill of >5 litres) in one dump, are to be recorded, investigated and remediated. A record is to be kept of incidents, and DWER, and City of Busselton notified within 24 hours of an incident.

6.13 Servicing and Maintenance

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

- *WQPN 15 - Extractive Industries near sensitive water resources.*

The main risk of contamination comes from tank or hose rupture on earth moving machines.

- All major servicing of vehicles will be conducted off site.
- The loader will continue to be parked at a secure site at night and minor servicing will be conducted there.
- Regular inspections and maintenance of fuel, oil and hydraulic fluids in storages and lines will be carried out for wear or faults.
- In the event of a small service item being required during operations, such as lubricating and maintenance activities, these will be carried out in designated areas in the pit. Equipment for the containment and cleanup of spills is to be provided as required.
- Waste oil and other fluids derived from the routine maintenance of mobile machinery, will be transported off site and disposed off at an approved landfill site. Grease canisters, fuel filters, oil filters and top-up oils are stored in appropriate containers in a shed or brought to the site as required.
- If any spillage occurs it will be contained in the plant and working areas by shutting down plant or equipment if the plant or equipment is the source of the spill (provided it is safe to do so).
- Accidental spill containment and cleanup protocol will be implemented as necessary.

- Non essential or old operating 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.
- There will be no waste disposal on site. Wastes generated will be recycled wherever possible and periodically disposed of at an approved landfill site. Any waste materials derived during routine maintenance activities will be stored in appropriate sealed containers within a designated storage area or taken from site and disposed of at an approved facility.
- Regular inspections (at least weekly) are conducted to ensure no wastes, litter and the like are present in or around the excavation and processing area.

Prepared by

Lindsay Stephens



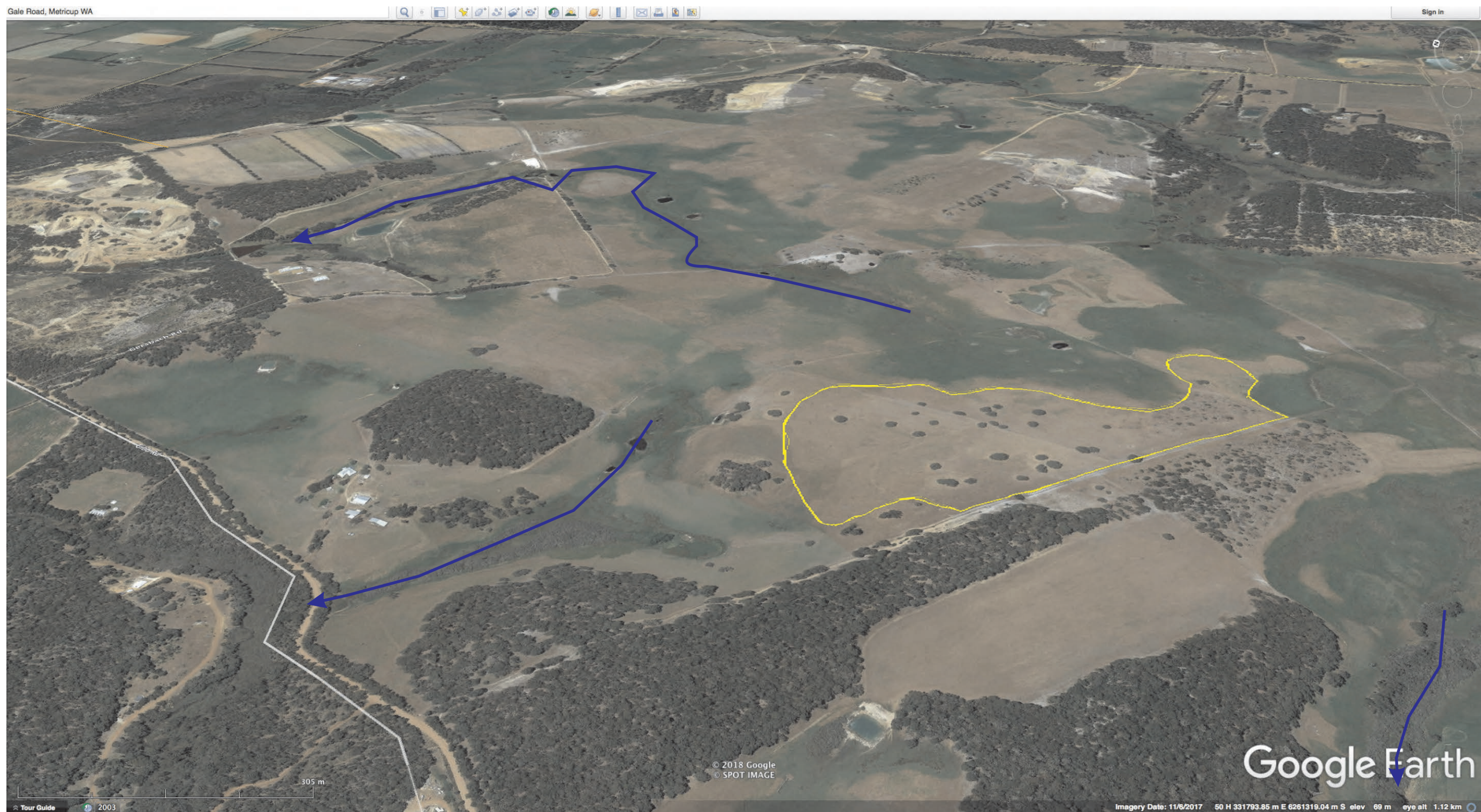
Landform Research

Lindsay Stephens BSc (Geology), MSc (Plant Ecology)

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**MARGARET RIVER NATURAL RESOURCES
LOT 101 GIBB ROAD, KALLOORUP**

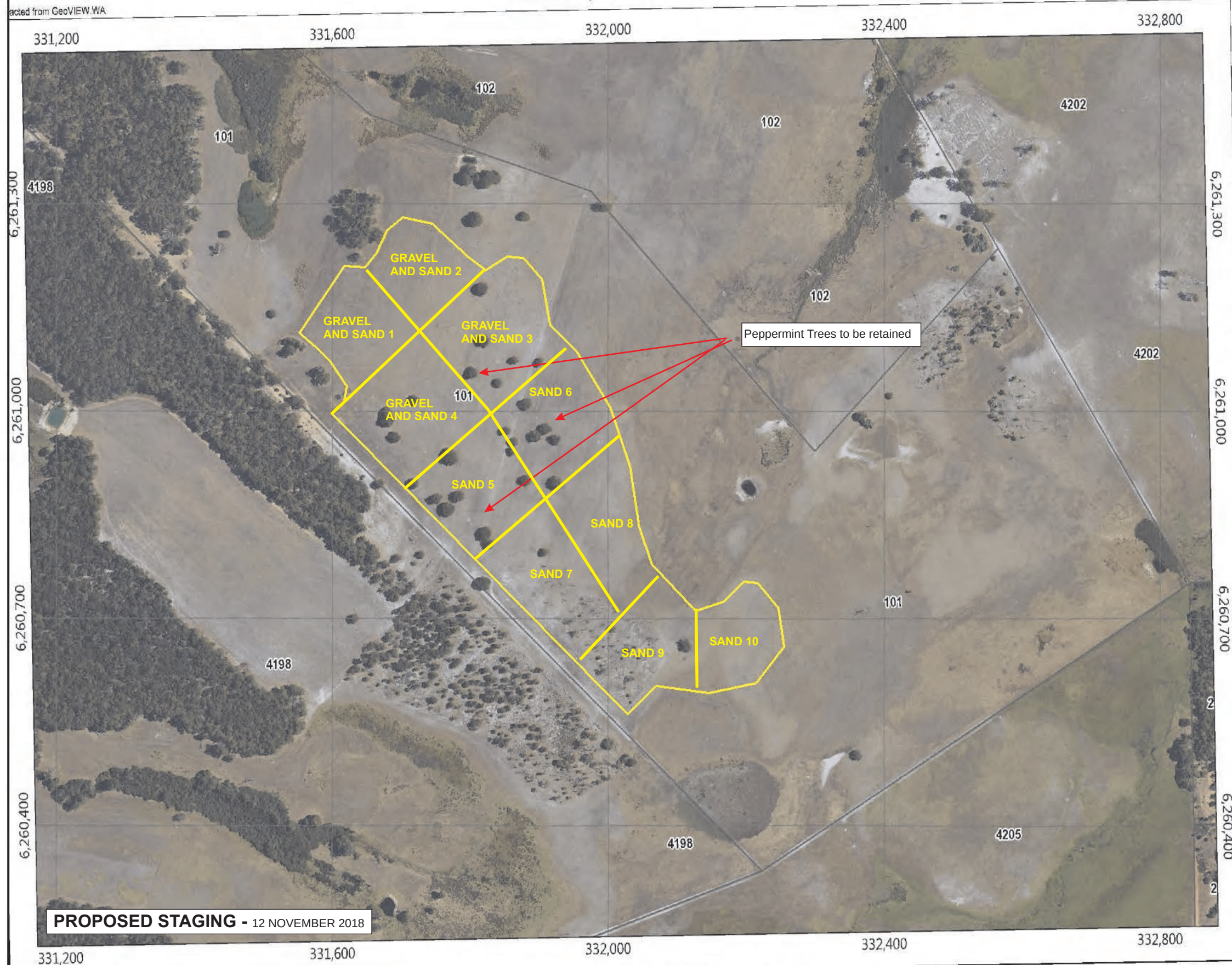
Location of pit on elevated dry ground

15 JULY 2019

Figure 2

SAND RESOURCES LOT 101, GIBB ROAD

Extracted from GeoVIEW WA



Legend

Image

- Red: Band_1
- Green: Band_2
- Blue: Band_3

Major Town

Minor Town

Place Name

- Aboriginal Community
- Cave
- Hill
- Homestead
- Meteorological Station
- Mountain
- Peak
- Roadhouse
- Rock

Railway

Road

- <all other values>
- Freeway
- National Highway
- State Highway
- Main Road
- Mall
- Minor Road

Coast

DEC Managed lands - Marine

- Marine Management Area
- Marine Nature Reserve
- Marine Park

Watercourse mask

- 0-200m
- 200m-1000m
- 1000m-2000m
- 2000m-3000m
- 3000m-4000m
- 4000m-5000m
- >5000m

Lakes

- Water Course - Major
- Water Course - Minor

DEC Managed lands - Land

- 5(1)(g) Reserve, A
- 5(1)(g) Reserve, C
- 5(1)(i) Reserve
- 5(1)(h) Reserve, A
- 5(1)(h) Reserve, C
- Conservation Park
- Conservation Park, A
- Conservation Park, C
- Marine Management Area, A
- Marine Nature Reserve, A



PROPOSED STAGING - 12 NOVEMBER 2018

Recommend Reference for this map is: Geological Survey of Western Australia
2018, SAND RESOURCES
LOT 101, GIBB ROAD extracted from GeoVIEW WA, on 16/09/2018 Perth, Western
Australia: Department of Mines, Industry Regulation and Safety.



Department of
Mines, Industry Regulation
and Safety

Geological Survey of
Western Australia



0.5

Kilometers

NOTE: Scale is calculated at the centre of the map. Scale representative
fraction will vary in a North South direction.

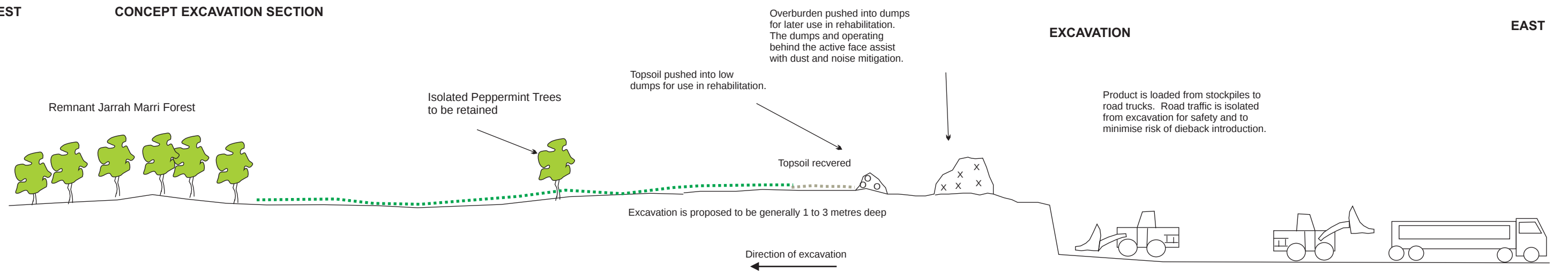
The data presented herein are interpreted, and made available
in good faith and derived from sources believed to be reliable
and accurate at the time of release. You should not solely rely
on this information when making a commercial decision.

Figure 3

WEST

CONCEPT EXCAVATION SECTION

EAST



Excavating sand from a face similar to the proposed operation

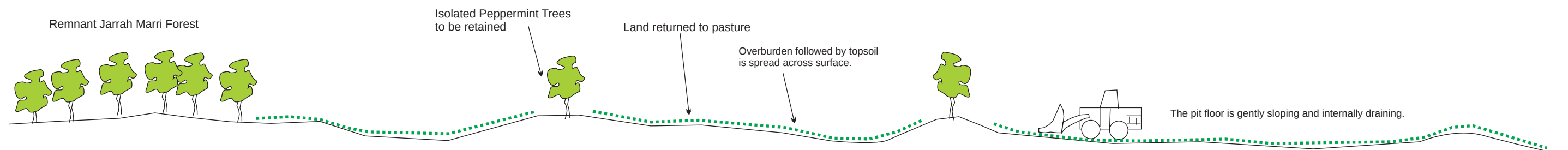


Loading to a road truck in a typical sand operation

WEST

LAND RESTORATION AND REHABILITATION

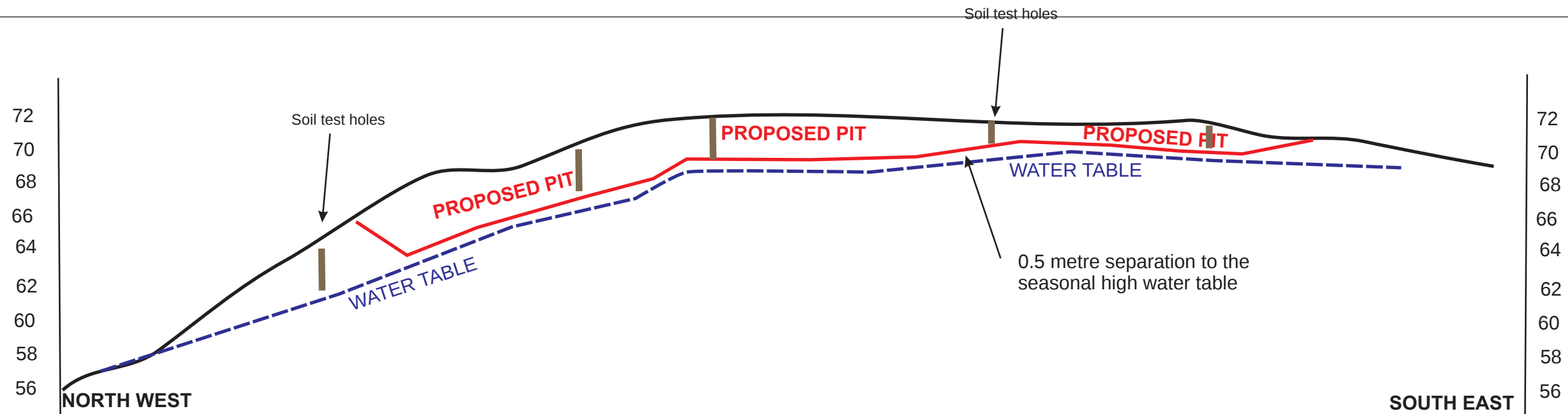
EAST



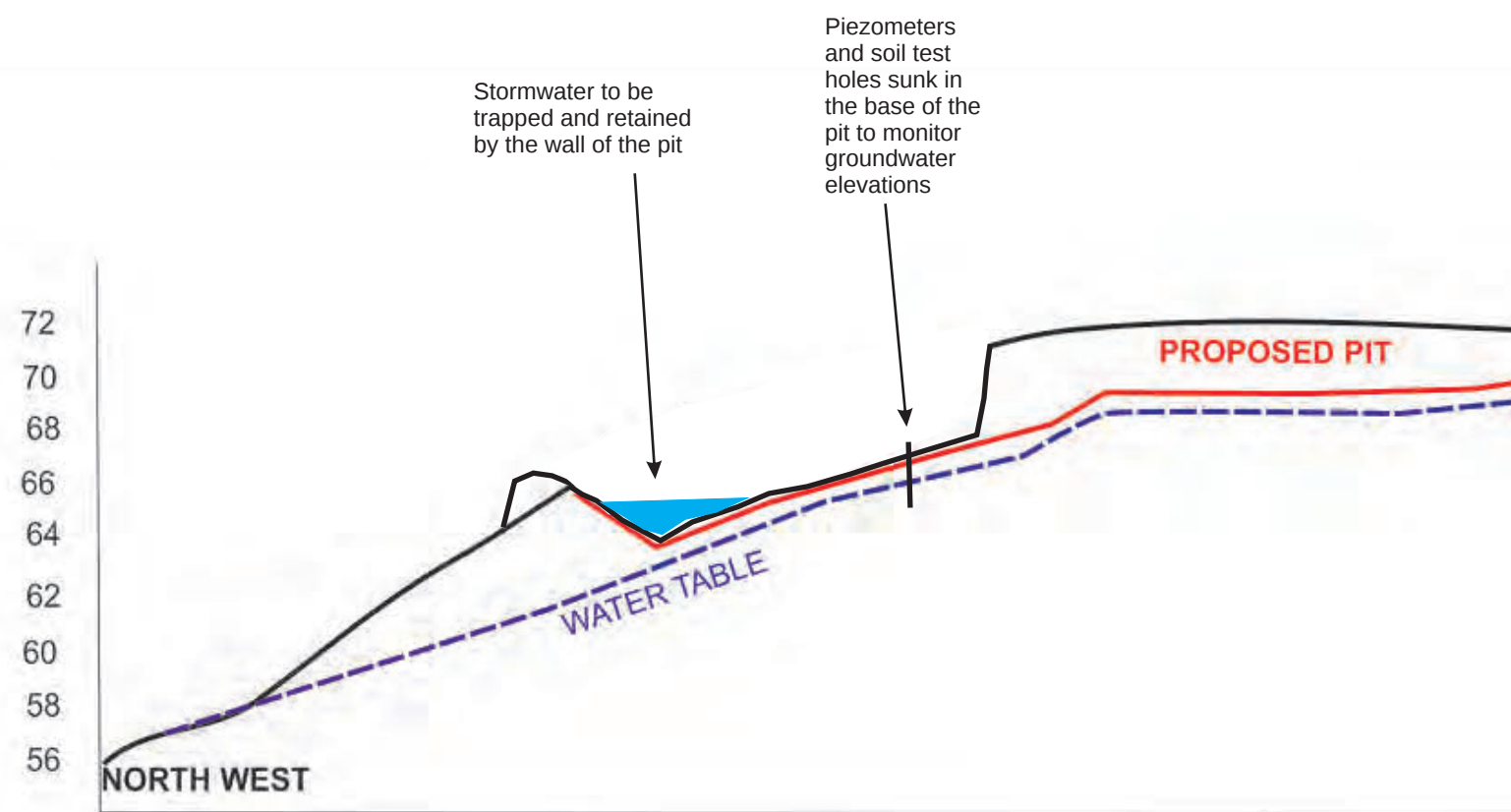


CONTOUR PLAN OF LOT 101, GIBB ROAD, KALOORUP

Figure 5



SECTION ACROSS THE PROPOSED PIT



CONCEPT WATER MANAGEMENT DURING EXCAVATION

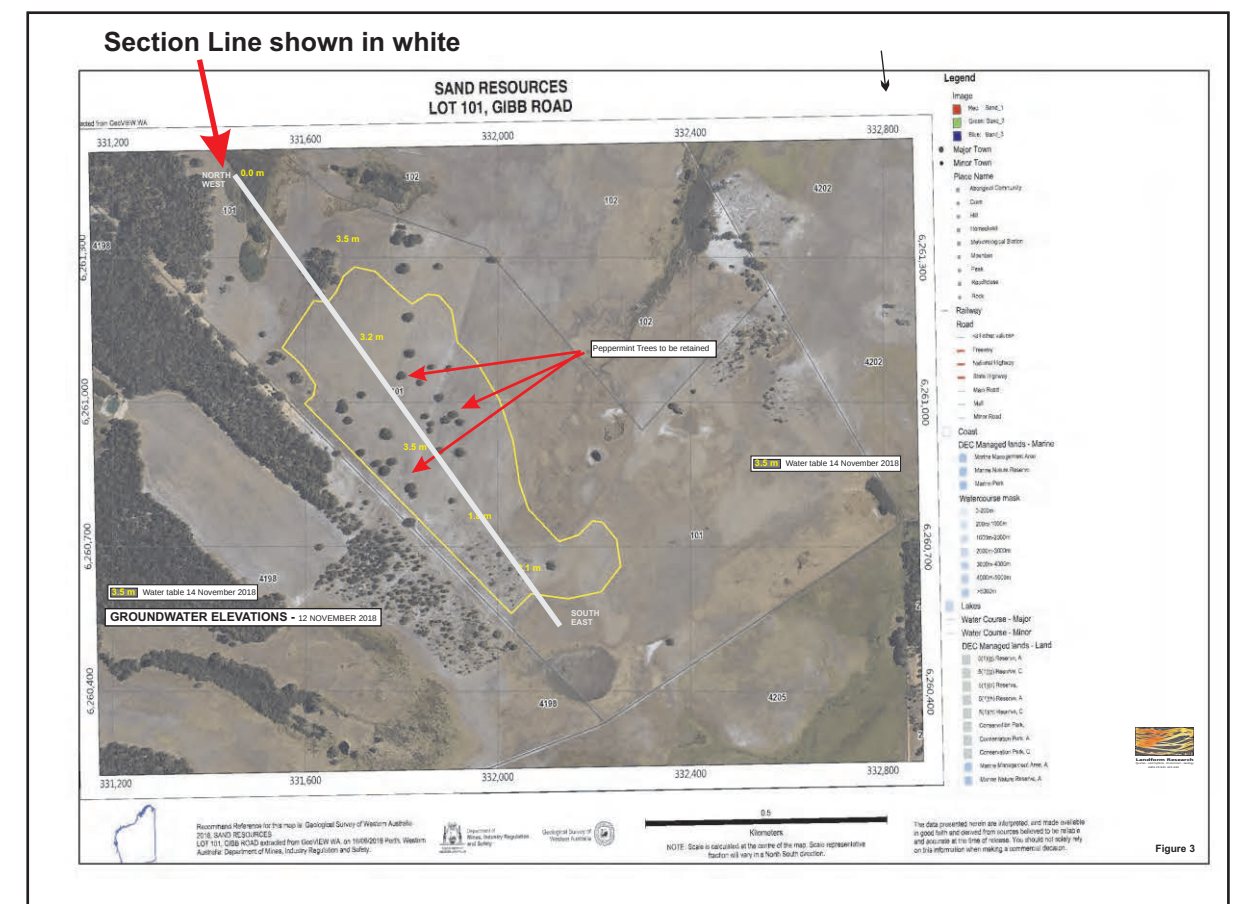


Figure 3

CONCEPT AND SKETCH SECTIONS OF THE PROPOSED PIT ON LOT 101, GIBB ROAD, KALOORUP

Figure 6

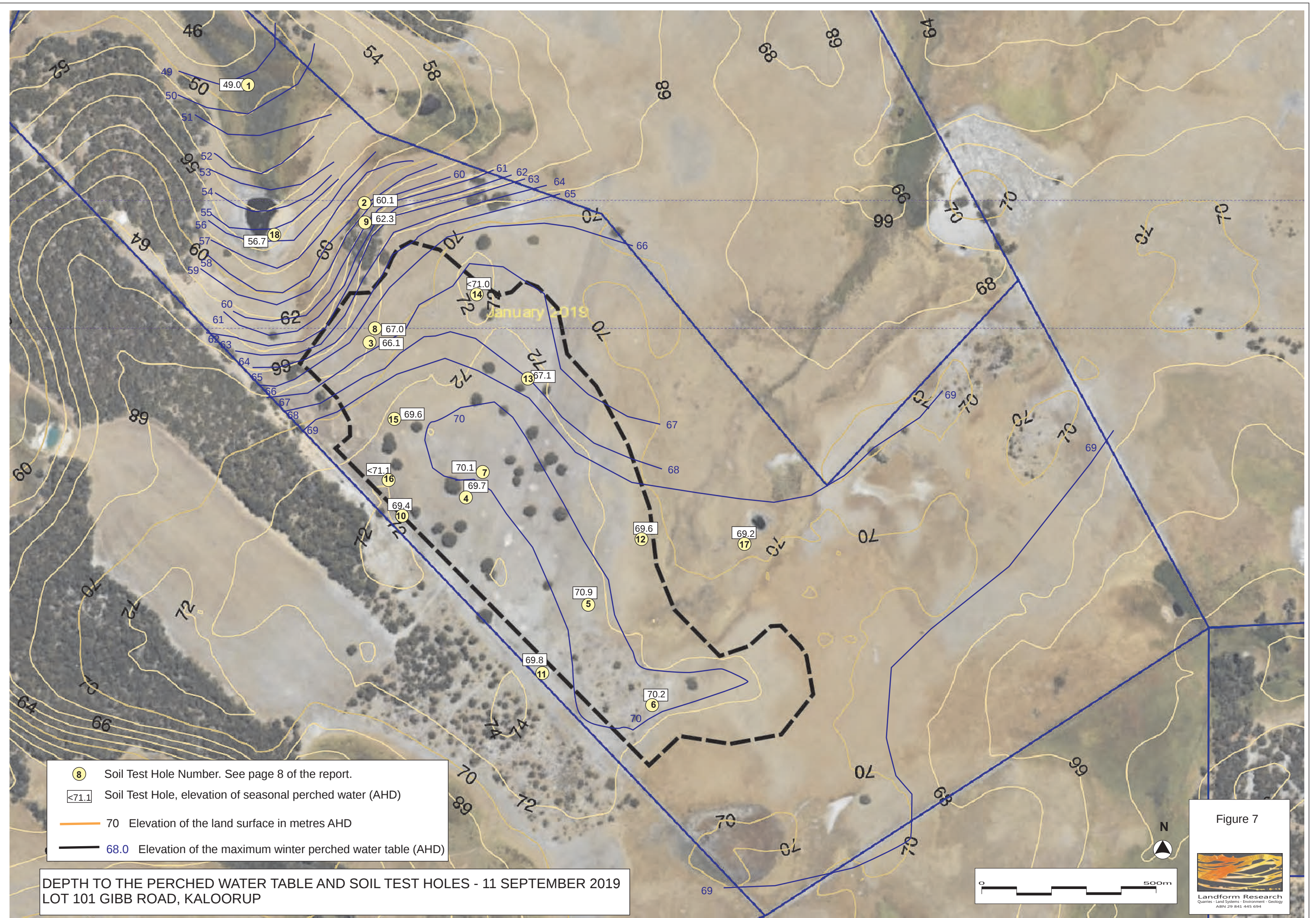


Figure 7



Test Hole 16, > 1.7 to perched water



Test Hole 13, 5.5 metres to perched water



Test Hole 9, 2.7 metres to perched water



Hole 15, 2.4 metres to perched water



Test Hole 8, 2.3 metres to perched water



Test Hole 7, 3.3 metres to perched water



Test Hole 11, >2.5 metres to perched water table



Hole 14, > 1.1 metres to perched water

SITE PHOTOGRAPHS OF SOIL TEST HOLES - 11 SEPTEMBER 2019 LOT 101 GIBB ROAD, KALLOORUP

Figure 8

AMENDED TRAFFIC ROUTE AND MANAGEMENT

GIBB – NORTH JINDONG AND ROY ROADS

PROPOSED SAND PIT, LOT 101, GIBB ROAD KALOORUP

13 September 2019

Summary

The proposed amended transport route for pit traffic along the northern section of Gibb Road to North Jindong Road and Roy Road to Bussell Highway, provides an ability to quickly reach a much safer section of road than was previously proposed along Gale Road.

There is 1.5 km of gravel road along which the trucks will travel and that becomes a traffic management issue for which Margaret River Natural Resources has proposed a Transport Management Plan (attached).

The proposed truck traffic complies with the City of Busselton for the width, construction and current traffic movements along Gibb Road.

Prepared by



Landform Research

Amended Transport Route

The original transport route was proposed to cart the sand through Lots 4205 and Lot 1 Gale Road and then along Gale Road.

On review of the transport options the transport of sand through Lots 4205 and Lot 1 Gale Road and along Gale Road is not now considered the best option.

There is a better and safer option by using North Jindong Road and Roy Roads, which are bitumen roads with two lanes marked by lime marking. Also the City of Busselton have advised that Payne Road is a RAV Network 3 with Conditions, indicating its safer formation.

On the other hand Gale Road, whilst sealed, has several sharp corners where the truck traffic has to slow down. The seal coat is only single lane, meaning that trucks and other vehicles will have to slow and leave the bitumen. See the attached Figures. Figure 1 for location and 7, 8 and 9 for photographs.

Gale Road has been used for the transport of sand and gravel for many years by local operators but is considered less safe than using the amended transport route.

On the other hand Gibb Road has a seal coat for the northern section with the remainder being gravel road in good condition with a width of 7 metres and a transport length of gravel of 1.5 kilometres.

This gravel portion of Gibb Road has very low traffic counts and appears to be used solely to access several dwellings on the section of road.

The sealed section of Gibb Road was constructed to enable the transport of gravel from the City of Busselton Pit with that pit at the northern end of Gibb Road appearing now to only have minor use and use by off road trail bike riding.

The revised transport route is;

- Lot 101 Gibb Road
- Gibb Road north
- Payne Road – North Jindong Road
- Roy Road
- Bussell Highway

Scale and Intensity of the transport

The proposed scale and intensity of the transport is not proposed to change.

The number of truck movements will vary throughout the year depending on the size of contracts. To transport the required amount of sand a certain number of trucks must be used.

Road transport will use a variety of road approved vehicles such as rigid trucks, semi-tippers (16 to 26 tonnes) or rigid (8) wheeler tippers (3 – 15 tonnes) and potentially with a 5 axle dog trailer.

With a calculated volume of sand of 200 000 tonnes, and a ten year life of the operations, that equates to around 20 000 tonnes of sand extracted every year. However due to the variable nature of contracts, up to 30 000 tonnes of sand is anticipated to be transported in any one year.

With an average truck size of say 25 tonnes that equates to up to 1 200 laden truck movements in any one year for 30 000 tonnes extracted. If sand was transported on 200 days of the year that equates to an average of 6 laden truck movements per day.

There could be a slightly higher daily average number of truck movements if more smaller trucks access the site. For example if the average load is 20 tonnes then the average number of truck movements to cart 30 000 tonnes of material annually will be 7.5 trucks per day. In any case the average will be less than one per hour.

To be conservative an average of 10 vehicles are suggested per day on 200 days per year allowing for staff and service vehicles.

However with the nature of sand sales, there will be times when more trucks arrive on a particular day and times when there will be less.

A condition of a maximum of 30 trucks on any one day is acceptable to Margaret River Natural Resources.

In addition it is suggested that for a large contract the Shire of Busselton be notified at least 1 week prior to the commencement of a large contract and informed of the tonnages, likely truck movements and anticipated volumes to be transported during that contract. This process is used at other sand pits and provides the City with an opportunity to discuss any specific issues with the operator.

A road maintenance agreement will be determined with the City of Busselton based on the *City of Busselton Planning Policy 5, Rural Land Use and Development Policy 2010*.

Existing road

City of Busselton Engineers completed traffic counts along Gibbs Road in May-June of this year. (source City of Busselton)

These traffic counts indicate approximately “30 vehicle per day annual average day traffic” on Gibb Road.

The count was taken 2.6km north of the intersection with Gale Road which is around the location of the entrance to Lot 101.

In addition the City advises that the traffic count was an annual average of 30 vehicles per day. They also advised that there is currently an application for the harvesting of a BlueGum Plantation which will add to the truck movements along Gibb Road. It is estimated that 8 truck movements will be added as a result of the tree harvesting. That will take the average daily traffic to 38 movements per day.

No speed data was available.

If a conservative additional traffic of 10 vehicles per day are added then the current daily traffic loading, on an annual basis, increases to around 48 vehicles average maximum per day.

City of Busselton advised that their last Engineer’s inspection of Gibbs Road it was an unsealed road with a 7m wide formation, which is similar to the measurements made by Margaret River Natural Resources on 11 September 2019.

The City of Busselton advised that their engineering section do not have issues with transport vehicles turning right on to Gibbs Road to Payne Road. Payne Road is a RAV Network 3 With Conditions, so this would be preferable to heading south to Gale Road, which is not on the RAV network.

Data provided by the City of Busselton is summarised in the table below. Using the City measurements of 7 metre width gravel then up 70 daily average number of vehicles is applicable as shown in the table below supplied from the City of Busselton. With the predicted average of around 48 vehicles the vehicle movements comply with the current road construction.

It is also noted that the City of Busselton graded Gibb Road on 11 September 2019.

Table 3 - Seal Widths and Carriageway widths for Rural Roads

Design Traffic Volumes (AADT) (veh/day) (Note 1)	Carriageway Width (seal width + trafficable shoulders) (m)	Sealed Width (m)
0 - 75	7	Unsealed (see note 1)
75 - 150	7.5	3.5 (note 2)
150 - 500	8.0	6.0 (note 3)
Over 500	8.0 (note 4)	7.0

Source - Based generally on "Rural Roads Guide", Table 4.1 & 4.2

The northern portion of Gibb Road has a seal coat for the northern section with the remainder being gravel road in good condition with a width of 7 metres and a transport length of gravel of 1.5 kilometres.

That means that transport along Gibb Road becomes a management issue of the predicted truck traffic.

Therefore a traffic management program is proposed for all trucks travelling along the gravel section of Gibb Road. See the attached Traffic Management Plan.

Site Access

Access to Lot 101 is located at the southern boundary of the lot. The gate is set back 40 metres from the property boundary of Lot 101 to enable a truck to park on Lot 101 prior to entry or exit, without parking on Gibb Road. (Figures 1, 5 and 6). See also the photograph in Figure 7.

The access road runs along the existing fire break for a distance of around 550 metres. The access is straight, with good visibility. The track has been upgraded to the point where trucks can travel safely along the road, but not to the point where the road is so good that trucks will speed. As the access road has some underlying laterite duricrust there are some natural undulations, which will act as speed humps. (Figures 1, 5 and 6). See also the photograph in Figure 7.

The internal access road will also be sheeted with gravel as necessary to provide the safe access. Gravel will be accessed from the gravel resource on the proposed extractive industry area.

For such a small sand resource it is not preferred to provide a wide road that will increase visual impact, but to provide a safe access that is more compatible with the surrounding landscape.

There is not anticipated to be a significant upgrade to the existing access road to achieve the access goals.

The access road is not near any dwellings. The closest dwellings are to the actual entrance rather than other parts of the access road. Figures 1, 2, 3 and 4.

The distances to sensitive premises are;

- 340 metres north across thick native forest
- 460 metres south west
- 525 metres north west
- 640 metres west
- 730 metres south west.

With respect to the existing gravel section of Gibb Road, there are thought to be 6 dwellings set back off that section of road, set back at distances of:

- 130 metres - minimum of 90 metres dense forest
- 130 metres - minimum of 90 metres dense forest
- 145 metres - east of Gibb road with pasture and scattered trees between
- 140 metres - minimum of 50 metres forest
- 145 metres - minimum of 90 metres dense forest
- 330 metres - minimum of 90 metres dense forest

There is unlikely to be any significant increase from dust by the additional vehicles considering the scattered rain that falls through the year and the setbacks to the dwellings from Gibb Road.

Jones D N, L Bemede, A R F Bond, C Dexter and C L Strong, 2016, Dust as a contributor to the road effect zone: a case study from a minor forest road in Australia, Australian Journal of Environmental Management Volume 23, No 1 p 67 – 80 noted that dust deposition at a distance of 40 metres from a gravel road in forest varied from 8% to 30% of the deposition at the roadside depending on the level of vegetation cover. They also found that mammals were not significantly impacted by the dust compared to when the road was sealed.

In other studies dust particles have been found to be 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.

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

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

The only dwelling which has less buffers is the dwelling east from Gibb Road, but this is set back behind a row of verge trees that even though they are not 40 meters wide, they are located at the edge of the road and are effective in reducing the wind speed and travel, allowing time for any dust to settle prior to the air travelling across the paddock.

In addition a speed limit of 40 kph will be imposed on truck traffic by Margaret River Natural Resources to minimise noise and dust generated from Gibb Road and to minimise any safety risks.

It is noted that being a public road the *Environmental Protection (Noise) Regulations 1997* do not apply. See Figures 1, 2, 3 and 4. See Figures 7, 8 and 9 for photographs of the transport route.

Timing of the vehicles

Hours of operation will be 7.00 am to 5.00 pm Monday to Friday inclusive, excluding public holidays. This is similar to the operations of nearby quarries in the local area.

Lindsay Stephens
Landform Research

ROAD TRUCK MANAGEMENT – DRIVER INSTRUCTIONS

Margaret River Natural Resources Pty Ltd

All truck contractors are supplied with written guidelines on the operations of the pit.

Drivers are inducted to the site through the Safety Management Procedures for the site.

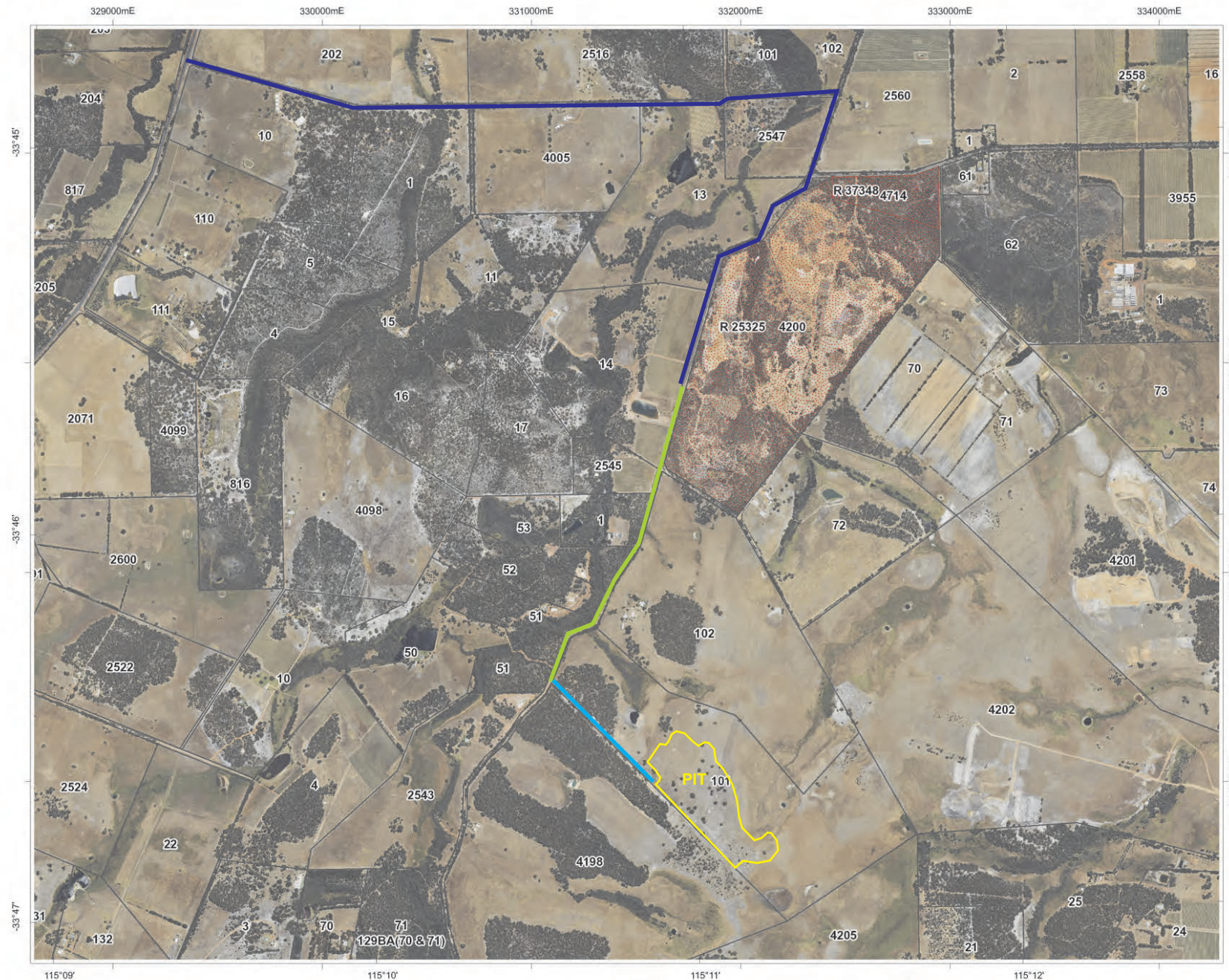
Signs are used on site to inform drivers of their responsibilities.

Drivers found breaching site procedures are warned and their employer notified in writing. Drivers breaching procedures on a second occasion are banned from the pit.

1. All companies and contractors transporting sand or gravel will be informed of the operating hours and procedures applying to their contract.
2. All trucks must arrive at the site clean and free from earth, sand, gravel, clay, vegetable matter or grain seed. Trucks not clean will not be permitted to be loaded.
3. There will be no cleaning or tip off at site.
4. All truck drivers and companies will be informed of the “normal operating hours of 7.00 am to 5.00 pm” Monday to Friday, excluding Public Holidays.
5. Trucks will be permitted to enter the site and be parked prior to the “start time”, to remove the safety hazard of parking on Gibb Road or within the community.
6. Parking on Gibb Road is not permitted.
7. On entry, trucks will be required to park and wait to be loaded.
8. On entry trucks will radio forward of entry on the allocated UHF radio channel.
9. Trucks are to enter the site at low power and make their way to the pit to wait for loading or instruction.
10. Trucks will not be loaded prior to the “start time”.
11. Trucks are to leave the pit under low power.
12. The speed limit along the access road and within the pit is 25 kph.
13. Trucks are to swing anticlockwise into the pit to be loaded.
14. Trucks are not permitted to reverse except for safety or emergency.
15. No excessive revving of engines on roads is permitted near or within the site apart from safety considerations.
16. No air or exhaust brakes are to be used within the pit or on nearby roads except for emergency.
17. No horns are to be sounded within the pit or nearby except for emergency.

18. Truck drivers are not permitted to leave the cab during loading unless they are located in a safe or designated place.
19. Communication between trucks and the loader will be via radio and eye contact.
20. Prior to leaving the pit all loads must be secured by tarpaulins or other suitable cover for minimising the loss of sand or gravel.
21. Prior to leaving site trucks are to be inspected by the drivers for sand or gravel or other materials adhering to the trucks.
22. Trucks are to slow to 40 kph when travelling on the gravel section of Gibb Road.
23. Drivers failing to adhere to the “Road Truck Management” will be banned from the pit.

Margaret River Natural Resources - Transport Route



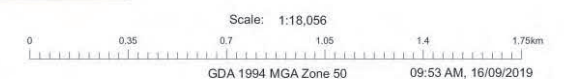
Legend

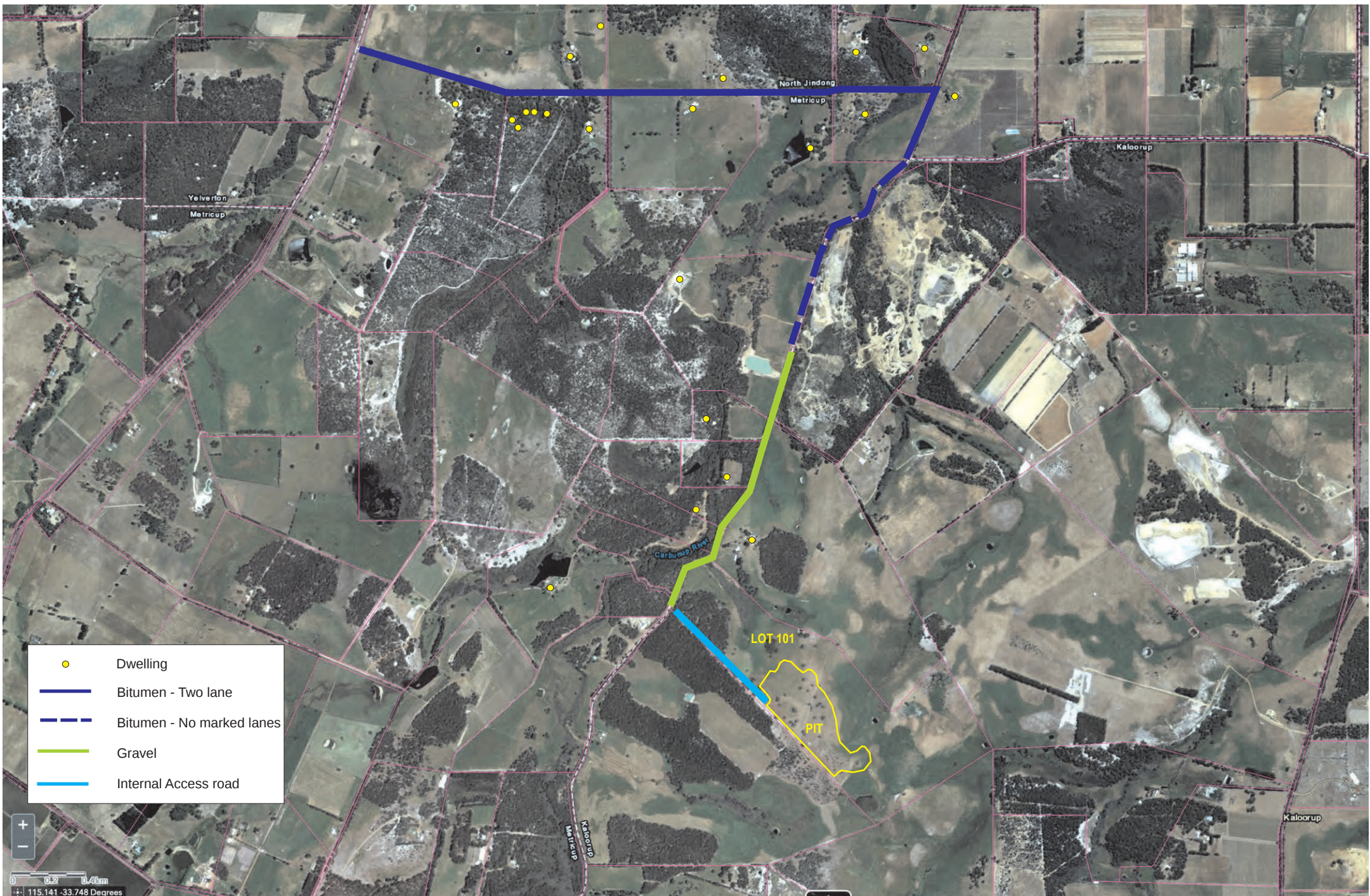
- Bitumen - Two lane
- - - Bitumen - No marked lanes
- Gravel
- Internal Access road

FIGURE 1

The data presented herein are interpreted, and made available in good faith and derived from sources believed to be reliable and accurate at the time of release. You should not solely rely on this information when making a commercial decision.

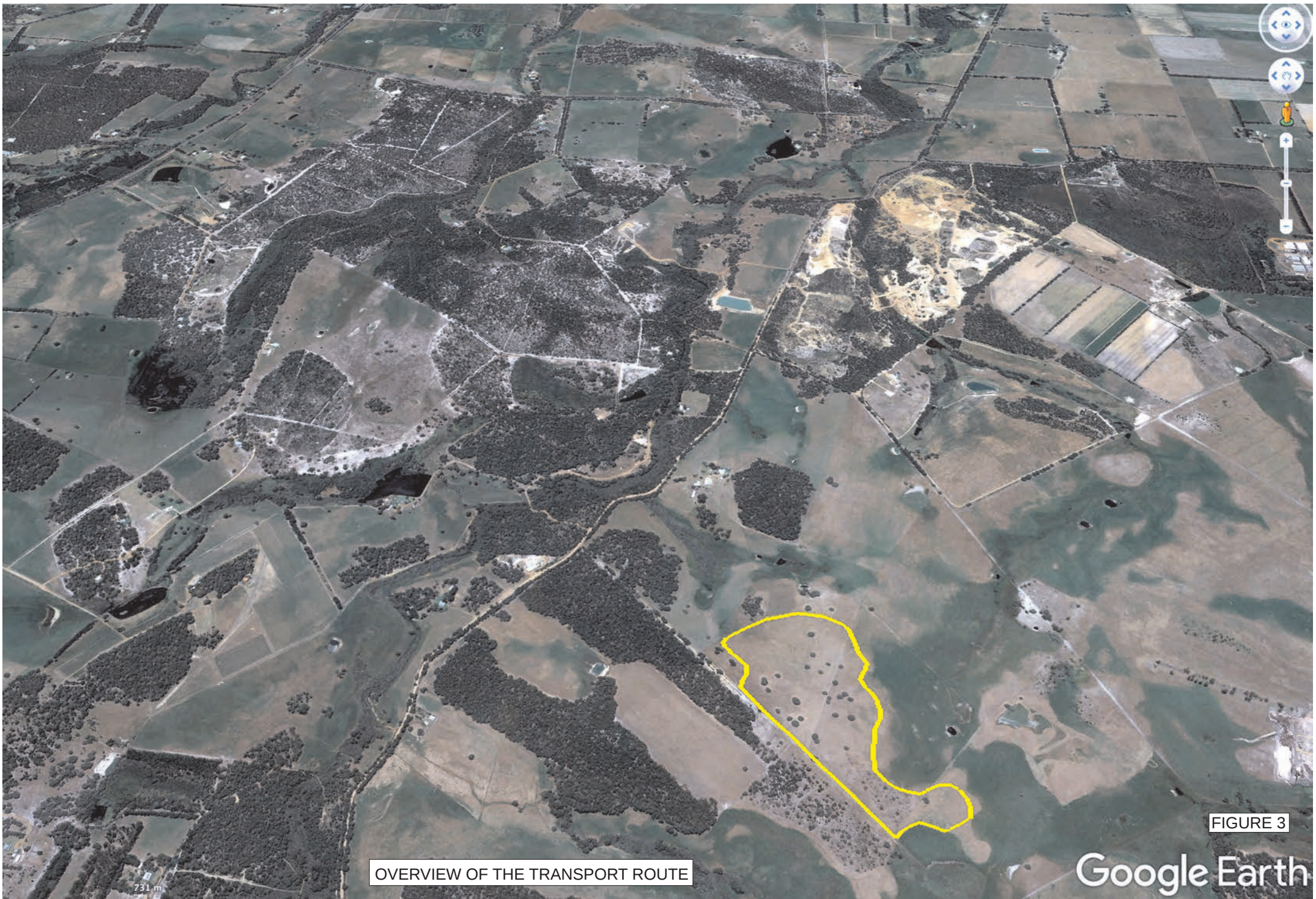
Recommended Reference for this map is: Geological Survey of Western Australia 2019, extracted from GeoVIEW.WA, on 16/09/2019 Perth, Western Australia: Department of Mines, Industry Regulation and Safety.





LOCATION OF DWELLINGS

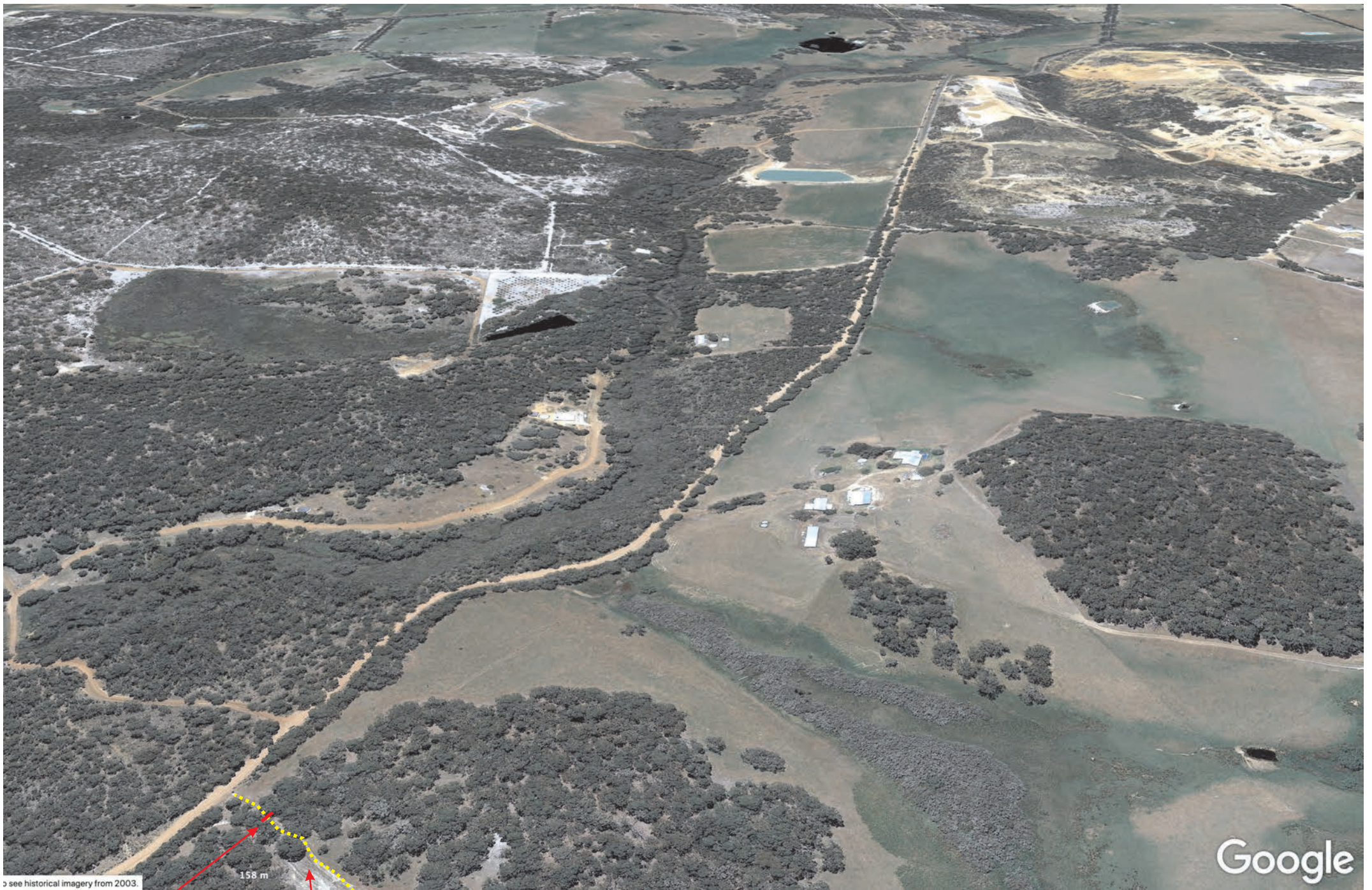
FIGURE 2



OVERVIEW OF THE TRANSPORT ROUTE

FIGURE 3

Google Earth



to see historical imagery from 2003.

Location of the gate

Location of the access road

OVERVIEW OF THE GRAVEL SECTION OF GIBB ROAD

FIGURE 4



Location of the access road along the existing fire break

LOCATION OF THE ACCESS ROAD

FIGURE 5



LOCATION OF THE ENTRANCE CROSS OVER AND GATE FIGURE 6



Access from Gibb Road. Note gate set back to allow for truck parking and passing



Gibb Road, north from the access point



Gibb Road south of Gersbach Road



Gibb Road, north of Gerbasch Road



Gibb Road at change of gravel to bitumen



Bitumen northern portion of Gibb Road



View south along North Jindong Road to intersection with Payne Road (left) and Gibb Road (right)



Roy Road view west from North Jindong Road



North Jijndong Road towards the intersection of Roy Road (left)



Roy Road, view west from the intersection with North Jindong Road



Roy Road central east



Roy Road central west

FIGURE 9

APPENDIX B – COMPLAINTS REGISTER

Complaints Register

Ref. No.	Date	Name & Address of Complainant	Time/Date of Complaint	Detail of Complaint	Summary of Actions Taken	Shire Notified	Person Responsible