accendo AUSTRALIA

WORKS APPROVAL APPLICATION

LOT 4 BINNINGUP ROAD, BINNINGUP

February 2025

[redacted]

ABN 11 160 028 642

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[redacted]

Limitations

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The preparation of this report has been undertaken and performed in a professional manner, in consideration of the scope of services and in accordance with environmental consulting practices. No other warranty is made.

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1 INTRODUCTION

1.1 Background

The GM Giacci Family Trust acting on behalf of MGM Bulk Pty Ltd (the applicant) is proposing to extract limestone from a 26 ha area (herein referred to as the subject site) located within Lot 4 Binningup Road, Binningup (refer to **Figure 1** and **Figure 2)**.

The subject site is located in the municipality of the Shire of Harvey, approximately 1 km south-east of Binningup and approximately 1 km west of Forrest Highway.

The current topography of the subject site can be described as generally flat with an elevation ranging between approximately 2 to 4.5 metres (m) Australian Height Datum (AHD).

The available volume of limestone (*insitu* volume of approximately 120,000 m^3) is to be extracted in seven stages of no greater than 4 ha each. Extraction will commence from the southern boundary and progress in a northerly direction. The post extraction landform will be designed with maximum batters of 1:4.

The proposal involves the crushing and screening of limestone on site. These activities will require a works approval and subsequent licence under the *Environmental Protection Act 1986*. This document provides supporting information for a works approval application under the *Environmental Protection Act 1986*. The document includes an environmental assessment of emissions and discharges and their associated mitigation and management.

The works approval application is for the set-up and operation of a screening and crushing unit at the above mentioned site, located on Lot 4 Binningup Road, Binningup. The unit will be located on the pit floor during times when extraction is occurring. Crushing of material is an activity that is prescribed by the *Environmental Protection Regulations 1987* as follows:

Category 12: Screening, etc. of material – premises (other than premises within category 5 or 8) on which material extracted from the ground is screened, washed, crushed, ground, milled, sized or separated.

It is anticipated that a maximum of 80,000 tonnes per annum of limestone will be crushed and screened. Typical operating hours for quarries will be adopted for the subject site which involves 7am to 6pm, each Monday to Friday and Saturdays 7 am to 12 pm, with no activities to occur on Sundays or public holidays.

1.2 Location and Layout Plans

The subject site is located within the south-eastern portion of Lot 4 on Deposited Plan 24320, Volume 1853, Folio 291, in the municipality of the Shire of Harvey. Approximately 1 km south-east of Binningup and approximately 1 km west of Forrest Highway.

The Lot is wholly owned by Coast Pastoral Company Pty Ltd (refer to **Appendix A** for Certificate of Title). Authorisation for MGM to act on the landowner's behalf for this proposal has been provided (refer to **Appendix B**).

The subject site is zoned 'General Farming' pursuant to the Shire of Harvey's *Local Planning Scheme No.* 1. It has previously been cleared and is currently comprised of pasture for cattle grazing.

The surrounding properties are also zoned 'Rural' under the *Greater Bunbury Region Scheme* (GBRS) and 'General Farming' pursuant to the Shire of Harvey *Local Planning Scheme No. 1* on the north, east and southern boundaries. Those located to the west of the subject site are zoned 'Urban' and 'Regional Open Space' under the GBRS, and 'Public Purpose' and 'Residential Development' in accordance with the Shire of Harvey's *Local Planning Scheme No. 1*.

2 EXISTING ENVIRONMENT

2.1 Regional Setting

The extraction area is located within Lot 4 Binningup Road, Binningup. The subject site is zoned 'General Farming' pursuant to the Shire of Harvey's *Local Planning Scheme No.* 1. It has previously been cleared and is currently comprised of pasture for cattle grazing.

The surrounding properties are also zoned 'Rural' under the *Greater Bunbury Region Scheme* (GBRS) and 'General Farming' pursuant to the Shire of Harvey *Local Planning Scheme No. 1* on the north, east and southern boundaries. Those located to the west of the subject site are zoned 'Urban' and 'Regional Open Space' under the GBRS, and 'Public Purpose' and 'Residential Development' in accordance with the Shire of Harvey's *Local Planning Scheme No. 1*.

2.2 Topography and Soils

The natural topography of the subject site can be described as generally flat with an elevation ranging between 2 to 4.5 metres (m) Australian Height Datum (AHD) (refer to **Figure 3**).

The subject site lies on the western side of the Swan Coastal Plain. The Plain at this point consists of a broad almost flat alluvial plain that slightly undulates, with seasonal wetlands occurring in the depressions.

The subject site is located within the Perth Coastal Zone landform characterised by coastal sand dunes and calcarenite, and the Spearwood Land System described as "*sand dunes and plain. Yellow deep sands, pale deep sands and yellow/brown shallow sands."* (Tille, 2006).

Within the Spearwood Land System, the subject site is located within the following sub-systems:

- Spearwood S4b Phase – Flat to gently undulating sandplain with shallow to moderately deep siliceous yellow-brown to grey-brown sands with minor limestone outcrops.

The Quaternary deposits within the subject site are the Tamala Limestone. This and its associated sand, form the Spearwood Dunes physiographic unit and are located immediately west of the Bassendean Sand. In general, these dunes are higher than the Bassendean Dunes, have steeper slopes, especially at their eastern edge and exist in two continuous ridges running parallel to the coast (Geological Survey of Western Australia 1982). The thickness of the Tamala Limestone sand across the subject site varies, with the Tamala Limestone proper extending up to 35m in thickness (Lundstrom 2014).

2.2.1 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).

Mapping prepared by the Department for Planning, Lands and Heritage to support the Western Australian Planning Commission's (WAPC's) Planning Bulletin 64: *Acid Sulfate Soils* (WAPC 2007) indicates that there is a 'moderate to low' risk of ASS occurring within a small area near the eastern boundary, with a 'high to moderate' risk of ASS occurring within the remainder of the subject site. Potential impacts associated with

ASS are expected to be low given that the proposal involves the excavation of limestone and the excavation of low lying areas will not occur.

2.3 Climate

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

Temperatures are highest on average in February, at approximately 22.8°C. July has the lowest average temperature of the year of 12°C.

Rainfall for the area is approximately 826 mm per annum with more than 90% of the rain falling during the winter months, April to October inclusive. Evaporation exceeds rainfall in all but the wettest winter months.

The wind direction is predominantly from the east in the morning and from the southwest in the afternoon during the summer months. During the winter months the directions are more variable and lighter but with a predominance of east - northeast in the morning and south west in the afternoon due to the presence of winter lows (BoM 2019).

2.4 Vegetation and Fauna

The flora and vegetation within the subject site has been subjected to prolonged land degradation processes including land clearing and livestock grazing. No remnant vegetation is contained within the subject site, with flora species restricted to pastural grasses and weed species. Accordingly, no flora, vegetation or fauna of conservation significance occurs within the subject site.

2.5 Hydrology

2.5.1 Groundwater

Within the subject site, the underlying aquifers are the superficial and the Leederville. The superficial aquifer, which is mainly unconfined and shallow, contains fresher groundwater resting on saline groundwater. The superficial aquifer is hydraulically connected to the underlying Leederville aquifer (Deeney 1989).

Groundwater flow in the superficial aquifer occurs within the Leschenault Inlet Flow System which extends from an eastern groundwater divide. This includes the Mialla Mound to a western groundwater divide within the coastal dunes. The Leschenault Inlet Flow System is separated from the Lake Preston Flow System to the north by a flow line south of Lake Preston and it continues to the Leschenault Inlet (Rockwater 2009).

The groundwater table slopes downwards to the west from about 2 m AHD along Old Coast Road and to the east from about 2 m AHD at the top of the groundwater divide beneath the coastal dunes at Binningup (Kern 1998). Seasonal variations of the groundwater levels of up to about 1.5 m have been reported (Rockwater 2009).

Groundwater flow is predominately to the west, with a small proportion of eastwards flow from the coastal groundwater divide, towards the topographically low area between Lake Preston and the Leschenault Inlet. A drain extends northwards from Leschenault Inlet into most of this area and carries groundwater discharge southwards to the inlet (Rockwater 2009).

Site-specific groundwater monitoring has been undertaken within the subject site at four piezometers (refer to **Figure 4**). Monitoring was undertaken monthly from August – October 2020 and July to October 2021. Accordingly, two winter peaks of groundwater data has been obtained for the subject site (refer to **Plate 1**). Groundwater peaks were observed in early August, with a maximum groundwater level of 0.98 m

AHD recorded in MW1003. This is supported by DWER preliminary and informal modelling for the location which suggests a 1 m AHD maximum groundwater level beneath the subject site (pers. comm. DWER). Accordingly, the proposed initial maximum depth of the excavation is 1.50 m AHD.

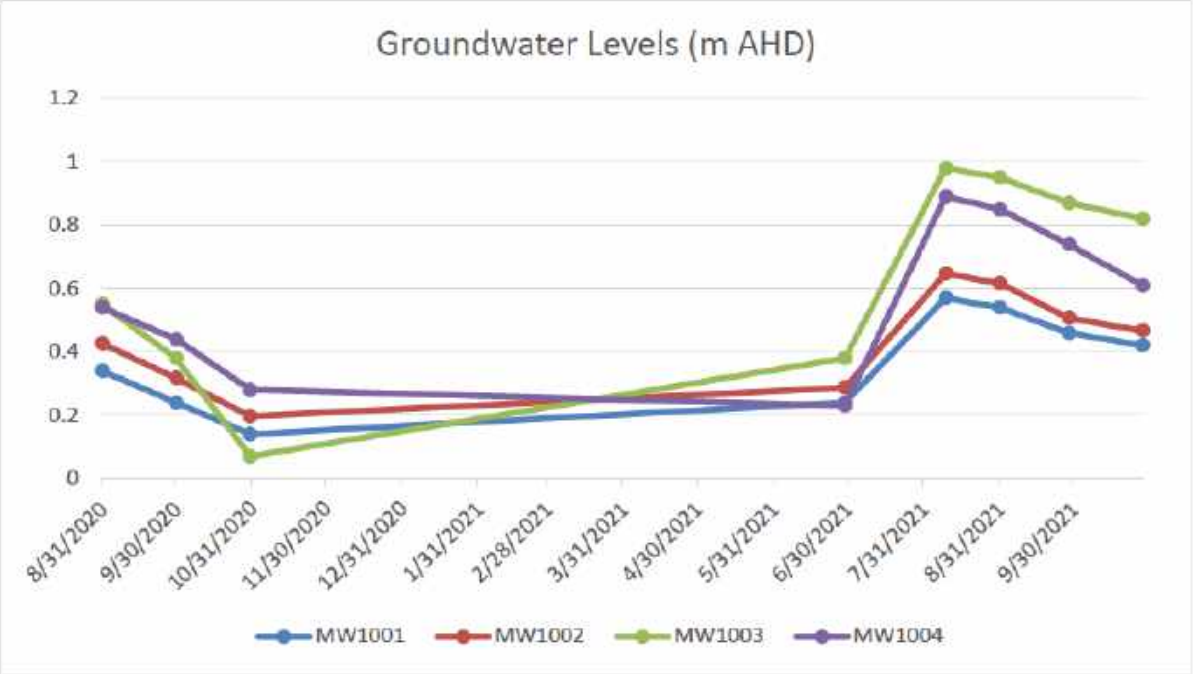

Plate 1. Groundwater levels recorded during 2020 – 2021.

2.5.2 Surface Water

The subject site does not contain any defined natural surface water channels or wetlands (as defined within the *Geomorphic Wetlands of the Swan Coastal Plain* dataset) and is not located within a 'Public Drinking Water Source' area (SLIP 2019).

The western boundary of the subject site is bordered by the Parkfield agricultural drain, with a Multiple Use (MU) wetland (UFI No. 15718) located directly to the west of the drain. There is a farm dam located approximately 30 m to the north-west of the subject site and a Resource Enhancement (RE) wetland (UFI No. 1216) located approximately 130 m to the south-west of the subject site.

Drainage across the subject site flows in an east to west direction towards the coast. During winter when elevated groundwater levels are experienced, surface water flows via the Parkfield drain, towards the south. Drainage within the quarry area will be internal and will infiltrate into the underlying groundwater.

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 for Planning, Lands and Heritage Aboriginal Inquiry System that incorporates both the heritage site register and the heritage survey database (DPLH 2019). 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 database search revealed that no Aboriginal heritage sites are present within the subject site. Nonetheless, it is important to note that Aboriginal heritage sites may still exist in or adjacent to the subject site that are not yet known, or may not yet been listed on the Aboriginal Heritage Register.

3 PROJECT DESCRIPTION

3.1 Area of Disturbance

The limestone quarry will cover an area of approximately 26 ha with a current maximum elevation of 4.5m AHD. It will be excavated to a maximum depth of 1.5 m AHD in seven stages, each less than 4 ha in size. Indicative stages are shown within **Figure 2** to illustrate their relative scale. The actual location of the stages may vary slightly as a range of variables affect actual pit layout at any one time. This could include the maintenance of the required separation to groundwater which may not be achievable within the western portion of the subject site.

The quarry has been designed to provide a 30 m setback to the Parkfield agricultural drain, the MU wetland and the nearest farm dam. Furthermore, a 20 m setback has been provided to the southern Lot boundary.

The proposal involves the screening and crushing of limestone on site. Therefore, a works approval from the DWER is being sought for this activity. The duration of crushing and screening operations will be dependent on the timing and requirements of specific campaigns. Access to the property will be via the existing limestone road within Lot 4 Binningup Road, Lot 5 and Lot 2 Springhill Road (owned by Coast Pastoral Company Pty Ltd), and the sealed Springhill Road that exits onto National Route 1, Forrest Highway.

The planned end use of the quarry is to restore a natural soil profile and return the area to pasture, ensuring that there is no net loss of productive agricultural land.

3.2 Description Overview

All crushing and screening equipment and infrastructure at the subject site will be fully portable to facilitate movement throughout the site required for staged quarrying operations. The key project characteristics associated with the proposal are provided below in **Table 1**.

Table 1. Project characteristics.

Characteristic	Description
Quarry life	Five years
Total resource	A maximum of approximately 120,000 m^3 of limestone.
Project footprint	26 ha
Vegetation clearing	No clearing of native vegetation is required.
Operating hours	7:00 am – 6:00 pm, Monday to Friday, 7:00 am – 12:00pm Saturday.
Fenced compound	A compound area will be fenced to secure equipment and restrict public access.
Water Tankers	A 15,000L water tanker or similar will be used for dust suppression on the access road and working floors as required. The water tanker will be filled from an onsite dam located directly to the north of the extraction area.
Excavator (CAT 330F or similar)	An excavator may be used for the removal of limestone material and for the stockpiling of vegetation, topsoil and limestone materials onsite.
Loader (CAT 972M or similar)	Loaders will be used for the movement and limestone and loading road trucks.

Characteristic	Description
Impact Crusher (Terex Finlay I-130 or similar)	Used for the crushing of limestone.
Screening Plant (Terex Finlay 693+ or similar)	Used for the screening of crushed limestone.
Stacker (Terex Finlay 632 or similar)	Used for stockpiling crushed limestone.
Toilets	A portable toilet may be required onsite.
Generator	A generator may be required to provide power to a variety of equipment.
Water usage	Water will be sourced from an onsite dam.
Waste	All waste products will be stored in appropriate rubbish bins (recycling, putrescible, and hydrocarbons will be separated in lidded bins) and removed from site by a contractor at regular intervals and disposed of at the licensed landfill facilities. There will be no landfill on site

Onsite facilities will be kept to a minimum and importantly no fuel or chemicals will be stored onsite.

The commencement of operations is proposed in the first half of 2025 (subject to obtaining all approvals). The estimated construction costs to mobilise the crushing and screening equipment is approximately $8,000 (refer to **Table 2**). The only cost associated with the infrastructure outlined in this works approval application is the mobilisation of equipment to the subject site.

Table 2. Estimated construction costs.

Timing	Details
Category	12 – Screening, etc. of material
Capacity Range	More than 50,000 tonnes per year
Total Cost	Mobilisation to site - $8,000 Total Cost - $8,000 Not more than $10,000 - Rate 15
Total Fee	$609.00

3.3 Mining Operations

The topsoil (nominally 15 cm of the soil profile) will be stripped and stockpiled behind the excavation face using a loader. Overburden, if present, will be removed using a dump truck and stockpiled to the perimeter of the proposed pit area.

Typical operating hours for quarries will be adopted for the subject site which involves 7am to 6pm, each Monday to Friday (excluding public holidays), and 7am to 12pm on Saturdays. The site will be worked by 2 - 3 persons, depending on market demand.

Access to the property will be via the existing limestone road within Lot 4 Binningup Road, Lot 5 and Lot 2 Springhill Road (owned by Coast Pastoral Company Pty Ltd), and the sealed Springhill Road that exits onto National Route 1, Forrest Highway.

Trucks used for the transportation of the material will vary between 6 wheelers (capacity ~10m^3), semi tippers (capacity ~18 m^3) and road trains (capacity ~28 m^3). The above factors suggest an average of eight

truck movements per day but this will be dependent on demand. No additional road upgrade works, apart from normal maintenance, are anticipated.

Given the highly variable nature of the campaigns, these calculations are estimates only, there may be periods in which these daily truck numbers are exceeded.

3.3.1 Limestone Extraction

The limestone within the quarry is relatively soft and can be removed with an excavator or loader without the need for a bulldozer or blasting. It will then be crushed and screened to produce products of the correct size. A small mobile crusher is required to prepare the correct grainsize. A summary of the proposed limestone extraction activities is provided below:

- Prior to excavation commencing the site will be ground surveyed, the excavation footprint marked out and a 1 metre contour plan developed.
- The topsoil (nominally 15 cm of the soil profile) and overburden (if present) will be stripped and stockpiled using a loader.
- Limestone interburden, if encountered, will be incorporated into the overburden dumps for later use in re-contouring the land surface at the conclusion of excavation.
- An excavator or front-end loader will be used to dig and push the limestone down the excavation face and track roll the limestone in the process.
- The limestone will then be picked up by a rubber tyred loader and fed to the mobile crusher.
- All static and other equipment, such as crushers and screens (where used), will be located on the floor of the quarry to provide visual and acoustic screening.
- Excavation will commence in the south of the quarry and then move in a northerly direction. The face and walls of the pit will act as noise barriers.
- Upon completion of each section of quarry the section will be reformed and back filled, where subgrade material is available, to achieve the proposed final contours.
- At the end of excavation, the floor of the quarry will be deep ripped, covered by overburden and topsoil, and rehabilitated to a constructed soil.

3.3.2 Final Contours

The slope of the final contours of the quarry will be an undulating surface at around 1.5 m AHD which is consistent with the adjoining land. This will ensure a separation of at least 0.5 m between the final contours and the maximum groundwater elevation.

Slopes of the batters at the end of excavation will be retained at 1:4 vertical to horizontal.

3.3.3 Rehabilitation

The end land use of the extraction area will be returned to pasture. Accordingly, it will be necessary to establish a safe and stable landform capable of supporting the proposed future land use.

Upon completion of quarrying, the following broad completion criteria will be achieved:

- A self-sustaining cover of pasture;
- Weed levels that are not likely to impact on the viability of the reconstructed soils; and
- A safe and stable landform suitable for the proposed future land use.

3.4 Crushing and Screening Equipment

3.4.1 Installation

Due to the mobile nature of the crushing and screening equipment, installation at the subject site will be very simple. The 'plug and play' equipment does not require earthworks or significant construction and therefore has a low risk of noise and dust generation during this phase.

3.4.2 Operation

The crusher and screening plant will be located on the pit floor during campaigns when limestone material is being produced. The mobile crushing and screening equipment used is modular and interchangeable. The crusher and screens can be configured differently for the production of several gravel products. The plant is equipped with dust covers for dust management.

3.4.3 Resource Requirements and Regional Infrastructure

Regional resource requirements are described below as follows:

- Water supply is not required for excavation;
- Water will be required for dust suppression, water will sourced from an onsite dam as required;
- Power is not required; and
- Equipment will be refuelled using mobile refuelling trucks equipped with spill kits.

4 ENVIRONMENTAL IMPACTS AND MANAGEMENT

The following factors are considered to represent the potential environmental and amenity impacts associated with the proposal:

- Hydrology;
- Weed and pathogens;
- Noise;
- Dust; and
- Uncontrolled discharge of contaminants to land.

These environmental factors are discussed in more detail below, together with the proposed management actions.

4.1 Hydrology

4.1.1 Surface Water

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. The development is not proposing to alter this process, as there are no drainage lines within the proposed extraction area and surface will continue to be free draining to the water table.

No surface water features have been identified within the extraction site with a 30 m buffer to be maintained to the RE wetland and the Parkfield agricultural drain at all times. Therefore, the development is unlikely to impact on surface flows.

To minimise any potential impacts to the RE wetland, holding ponds for each stage will be located at the base of the pits (at the western end).

During excavation activities, the surface will be internally drained. A low bund will be installed down slope of any excavation area, established from the wall of the pit to the edges of the excavation. The processing area will also be bunded by a low bund to ensure no surface water runoff occurs.

These ponds will be designed in accordance with previous DWER recommendations regarding the retention of surface water runoff from the two-hour 10 year average return interval storm event. Based on average rainfall and the size of each stage, it is calculated that a holding volume of approximately 655m^3 is required for each pond.

In order to contain this volume of water within the pit, detention ponds will be approximately 41m x 16m x 1m deep, with the longest edge parallel to the western boundary. Cut-off drains running along the base of the pit, parallel to the western boundary, will ensure all runoff is diverted into the detention ponds (Lundstrom 2014).

Any surface water falling outside of the pit will be diverted around the pit by the perimeter bunds to the drainage system. Surface water retained within the excavated areas will either evaporate or infiltrate through the pit ensuring water quality to the drainage system is maintained.

4.1.1.1 Construction

The mobilisation and positioning of equipment associated with a Category 12 prescribed premises is not associated with any impacts to surface water, including stormwater runoff.

4.1.1.2 Operation

The operation of the screening and crushing plant will be a dry operation.

All stormwater drainage within the extraction area is internal and the runoff generated by direct rainfall into the pit will be fully retained within the depression basin created by the mining, as demonstrated within the Drainage Management Plan (Accendo 2021, refer to **Appendix C**) approved by the Shire of Harvey. Any surface water falling outside of the pit will be diverted around the pit by the perimeter bunds to the drainage system. Surface water retained within the excavated areas will either evaporate or infiltrate through the pit ensuring water quality to the drainage system is maintained.

The pit will be monitored post rainfall events for any incidences of erosion damage and any required repairs will be undertaken as soon as practicable.

4.1.1.3 Risk Assessment

A risk assessment relating to surface water and stormwater runoff in consideration of the proposed management measures is provided below. The residual risk associated with sedimentation and erosion from stormwater runoff during the operation of the crushing and screening equipment is considered low.

Table 3. Risk assessment associated with surface water and stormwater.

Hazard	Source of Hazard	Potential Impacts	Mitigation	Likelihood	Consequence	Residual Risk
Erosion and sedimentation	Uncontrolled and contaminated stormwater runoff	Erosion and sedimentation resulting in poor surface water quality.	Bunding of the process excavation area to ensure that stormwater is contained within the excavation footprint.	1	2	Low

4.1.2 Groundwater

Groundwater will not be extracted or dewatered during the operation of the quarry and therefore, no impacts to groundwater levels are proposed.

Groundwater monitoring has been undertaken whereby a maximum excavation depth of 1.5 m AHD is proposed to ensure a 0.5 m separation to groundwater at all times.

Throughout the life of the quarry the proponent will undertake monthly monitoring from May to October to ensure that a 0.5 m separation to the maximum groundwater level is maintained. As discussed within **Section 2.5.1** no interaction with groundwater is expected during excavation works. Furthermore, a separation of at least 0.5 m, between the final contours and the maximum groundwater elevation will be maintained.

The extraction and processing of limestone is a chemically free operation with the liquids used being lubricants for machinery and refuelling. There will be no storage of chemicals or fuel on site.

4.1.2.1 Construction

The mobilisation and positioning of equipment associated with a Category 12 prescribed premises is not associated with any impacts to groundwater.

4.1.2.2 Operation

The operation of the screening and crushing plant will be a dry operation and is not associated with any impacts to groundwater.

4.2 Dieback (*Phytophthora cinnamomi*) and Weed Management

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 no evidence of dieback has been observed, no site-specific investigation has been undertaken. Therefore, it is not possible to confirm whether dieback is present or absent. On this basis, it is reasonable to classify the site as 'uninterpretable', denoting that a precautionary management approach should be adopted.

The primary objective of dieback management during operations is to minimise the risk of entry of dieback to the subject site. This can be achieved by preventing the importation of soil or plant material to and from the subject site. The risk of transportation via vehicles and equipment is low given that sealed roads will be utilised prior to entering the subject site.

4.2.1 Construction

The mobilisation and positioning of equipment associated with a Category 12 prescribed premises could be associated with the introduction/spread of dieback and weeds within the subject site. Accordingly, the management measures provided in **Table 4** are proposed.

4.2.2 Operation

The primary objective of dieback management during operations is to minimise the risk of entry of dieback to the subject site. The risk of transportation via vehicles and equipment is low given that sealed roads will be utilised prior to entering the site.

4.2.3 Management Measures

The management measures proposed for dieback control are developed in accordance with the *Dieback Working Group (DWG) – Best Practice Guidelines* (DWG, 2005) for an uninterpretable site and are provided within **Table 4.**

Table 4. Dieback and weed management measures.

***Phytophthora* dieback and weed management**	
Responsibility • Project Manager. • Contractors.	
Objectives • To prevent the introduction and spread of *Phytophthora* dieback and weeds within the subject site.	
Potential Impacts • Introduction and spread of disease (*Phytophthora* spp.) and weeds.	
Management Strategies	**Timing**

• 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 *Phytophthora* dieback management.	• Prior to works commencing.
• All earthmoving and ground engaging equipment will be inspected and cleaned of vegetation and soil prior to entry and exit of the subject site.	• Prior to works.
• Access to the subject site during excavation activities will be restricted to the proposed roads and driveways. No other access points should be established.	• Prior to and during works.
• Reduce vehicle and plant movement into and within the site as much as possible, particularly during wet conditions.	• During works.
• All material will be transported such that soil shall not fall from the vehicle onto road verges.	• During and post works.

4.2.4 Risk Assessment

A risk assessment to determine the residual risk associated with dieback and weeds is provided below. The risk assessment indicates that with the application of suitable management measures the potential risk associated with dieback introduction and spread is 'Low'.

Table 5. Risk assessment associated with dieback and weeds.

Hazard	Source of Hazard	Potential Impacts	Mitigation	Likelihood	Consequence	Residual Risk
Introduction/ spread of dieback and weed species	Importation of soil/plant material. Onsite movement of soil.	Impacts to the condition of remnant vegetation. Spread to offsite locations.	Refer to Management Measures provided in **Table 4**.	1	2	Low

4.3 Noise

The subject site has been designed to maximise setbacks to the closest sensitive receptors. This has involved extensive analysis of the local landform, environmental characteristics, land uses and location of sensitive receptors.

An acoustic assessment (Lloyd George Acoustics 2022) has been undertaken for the subject site in consideration of worst-case meteorological conditions. The assessment determined that with the provision of the noise mitigation measures, compliance with the noise regulations at the nearest sensitive receptors can be achieved. This is even with the addition of a +5 dB penalty for tonality associated with the machinery.

Detailed information pertaining to the noise assessment and the noise management measures are provided within the *Noise Management Plan* (**Appendix D**).

4.3.1 Construction

The mobilisation and positioning of equipment associated with a Category 12 prescribed premises is not associated with any significant noise emissions.

4.3.2 Operation

The proposed extraction activities will be low impact in nature and the minimal noise emanating from the subject site will be indistinct from typical rural noises. Furthermore, extraction activities will only be undertaken during standard hours of operation (in accordance with the conditions of the Development Approval). A summary of potential noise generating activities is presented in **Table 6**.

Table 6. Noise generating activities.

Activity	Duration	Equipment to be used	Sound pressure Level (dB(A))	Comments
Topsoil stripping	3 weeks per year	CAT 972 FEL or similar	109	Initial impact to closest resident which will reduce as stockpiles increase.
Screening and stockpiling of gravel	6 weeks per year	CAT 972 FEL or similar	109	Noise will be muffled by stockpiles
		Terex Finlay 693+ Screen or similar	109	Noise will be muffled by stockpiles
		CAT 330F Excavator or similar	105	Noise will be muffled by stockpiles
Crushing and stockpiling of limestone	6 weeks per year	Terex Finlay I-130 Impact Crusher or similar mobile Crusher	113	Noise will be muffled by stockpiles
		CAT 330F Excavator or similar	105	Noise will be muffled by stockpiles
Loading of trucks from stockpiles	A maximum of 5 years with 6-18 loads per day, dependent on demand.	CAT 972 FEL or similar	109	Noise will be muffled by stockpiles, vehicles are new and well maintained.
Rehabilitation of completed stages	To be undertaken in conjunction with excavation works where applicable.	CAT 972 FEL or similar	109	Limited period of moderate noise levels, indistinguishable from excavation noise when undertaken concurrently.

Noise levels have been obtained from a combination of manufacturers' specifications and from the *Environmental Noise Assessment Report* (Lloyd George Acoustics 2021) prepared for Lot 2 Springhill Rd, Parkfield for the extraction of limestone and sand.

The above sound pressure level estimates were inputted into the *Environmental Noise Screening Tool*, located at Appendix 1 in DWER's *Draft Guideline on Environmental Noise for Prescribed Premises* (May 2016). The preliminary screening assessment (Part 1) indicated no requirement for detailed noise emission

assessment given that the distance to the nearest sensitive land use is greater than the recommended separation distance (300 m to 500 m).

To ensure dust, noise and visual impacts to residents in the Binningup townsite are minimised as far as practicable, the crushing and screening plant will always be located 1 km from the closest residents in Binningup. The acoustic assessment (Lloyd George Acoustics 2022) has assumed that the crushing and screening plant will be relocated throughout the extraction area to reduce travel distance. However, maintaining the crushing and screening plant within the 1km buffer will not have a significant effect and noise will remain compliant with the *Environmental Protection (Noise) Regulations 1997* (pers. comm., Daniel Lloyd, Lloyd George Acoustics).

Crushing and screening will be undertaken in designated areas (1 km from nearest Binningup resident) with the greatest natural protection from winds (concealed at the lowest contours) which simultaneously minimise wind-borne dust emissions and dissipate noise emissions. Excavation and processing will be conducted on the floor of the pit, 3 metres below natural ground level behind constructed perimeter bunds.

Similarly, limestone excavation will occur below natural ground level. The excavation walls will act as a noise insulator for operations in the pits.

To further mitigate potential impacts associated with noise, the proposed management measures provided in **Table 7** will be applied.

Table 7. Management actions for noise.

Item	Action	Trigger/Timing	Responsibility
Inductions			
1	As part of site inductions, employees, contractors and visitors to the site are reminded of their responsibility to undertake work activities in an environmentally sensitive manner, including minimising noise while on site, or entering and leaving the site.	Ongoing	Site Manager
Planning Controls			
2	Daily Planning • The use of significant noise generating equipment or activities simultaneously is avoided. • The noisiest activities are scheduled to the least sensitive times of the day (i.e. crushing and screening during the middle of the day if possible).	Where possible	Site Manager
3	Quarry Planning • Seasonal variations are to be considered to reduce noise emissions where practicable.	Where possible	Site Manager
4	Regular review of meteorological data, specifically wind speed and direction, to guide decisions on quarrying activities.	As required, with consideration to the intensity of activities onsite and the prevailing weather conditions	Site Manager
Operational Controls			
5	Equipment and Machinery • Use machinery and equipment with minimal noise output levels. • Ensure all machinery is regularly serviced as per the equipment's maintenance schedule to minimise noise generation. • Where appropriate, all machinery and equipment will be shut off when not in use. • Use flashing lights/broadband alarms instead of tonal reversing alarms on excavators/loaders. • Apply speed restrictions (10 km/hr within site) and a ban on exhaust braking. • Position crushing and screening machinery to maintain a 1 km separation distance between the unit and the nearest Binningup residence irrespective of the cell being worked.	Continuous	All employees & contractors

Item	Action	Trigger/Timing	Responsibility
6	Earth Bunds • Establish a 4m high earth bund on the southern boundary of the extraction area (refer to **Figure 2)** for the duration of the quarry life. • Establish a 4m high earth bund around the crushing and screening plant (refer to **Figure 2**).	Prior to quarrying	Site Manager
Complaints Management			
7	Erect on-site signage directing public to make complaints to the relevant person.	Prior to quarrying	Site Manager
6	Maintain a complaints register (refer to **Appendix E**). A Complaints Register will be established for the site to record the following information: • Date, time, location and nature of the exceedance. • Identify the cause (or likely cause) of the exceedance and responsible parties. • Identify the activities that were occurring at the time of the non-compliance. • Determine the activities that were most likely contributing to the non-compliance. • Describe what action has been taken to date. • Describe the proposed measures to address the exceedance. If the complaint is verified as being due to a site source, remedial action will be undertaken within 2 hours. The Shire of Harvey will be advised of all complaints as soon as they are received. If a complaint cannot be resolved within the 2 hour response period, it may be necessary to cease operations.	Upon receiving complaint	Site Manager

4.3.3 Risk Assessment

Further to this, a risk assessment to determine the residual risk associated with noise emissions is provided below. The risk assessment indicates that with the application of suitable management measures the potential risk associated with noise emissions is 'Low'.

Table 8. Risk assessment associated with noise emissions.

Hazard	Source of Hazard	Potential Impacts	Mitigation	Likelihood	Consequence	Residual Risk
Noise emission	Excavation machinery and processing	Noise impacts to neighbouring properties	Refer to Actions provided in **Table 7.**	1	2	Low

4.4 Dust Emissions

In accordance with the EPA (2005) Guidance Statement No. 3 *Separation Distances between Industrial and Sensitive Land Uses*, the recommended separation distance between an extractive industry and a residential dwelling is 300-500 m. The closest residential dwellings to the subject site are provided below and shown in **Figure 2**.

Table 9. Residential dwellings within 1,000 m of the subject site.

Resident No.	Occupants	Distance to subject site (m)
1	Rodgers Family	125 m
2	Binningup residents	680 m

There are two sensitive receptors within 1,000 m of the subject site (measured from the closest point). Resident 2 reflects the nearest residential dwellings in the Binningup townsite to the subject site.

No significant dust emissions are expected from the set-up or operation of the crushing unit as suitable management measures will be implemented. This will include the use of water carts as required, and the operation of sprayers and sprinklers, equipped on the crushing and screening equipment, to dampen material stockpiles. This is consistent with industry accepted quarry treatment practices.

4.4.1 Topography

The current topography of the subject site can be described as generally flat with a survey undertaken by Thompson Surveying in 2020 indicating an elevation ranging between approximately 2 to 4.5 metres (m) Australian Height Datum (AHD).

4.4.2 Wind Direction

Annual wind data has been obtained from the Bunbury Bureau of Meteorology station (ID: 94604), located approximately 38 km from the proposed extraction area (refer to **Figure 2-2** in **Appendix F**). The following is taken from the Dust Management Plan (DMP) prepared for the subject site (ETA, 2020):

> 'Seasonal differences are present in the wind speeds and wind directions at this BoM station, based on 9 am and 3 pm measurements. The dominant feature in the morning wind rose is the

wind from the east to south-east, and from the west in the afternoon. Wind speeds greater than 8 n/s (30km/hr) are generally associated with dust lift-off from unsealed surfaces. The wind roses indicate wind speeds of this magnitude are frequently present.'

Wind can create dust lift-off from exposed, un-stabilised surfaces and carry localised dust generated from extraction activities. With dust sensitive premises located in a north-westerly direction from the proposed extraction area, an analysis of the wind rose data has yielded the following conclusions:

- During the summer months, the morning prevailing easterly wind may direct dust in a westerly direction, whilst the afternoon sea breeze may direct dust in an easterly direction; and
- During the winter months, storm winds are from the west which may direct dust in an easterly direction.

4.4.3 Dust Sources

The proposed extractive industry activities will involve the disturbance of large quantities of soil and earthen material. Specifically, this may include the following activities:

- Earthworks during extraction activities;
- Topsoil stripping;
- Loading and transportation of material;
- Crushing and screening of limestone;
- Stockpiling of material – topsoil, overburden and limestone;
- Limestone loading and transport offsite;
- Vehicle movement within the site; and
- Wind erosion of exposed surfaces.

These activities have the potential to generate dust that, if not adequately controlled, can cause nuisance and safety risks. Excavation of the limestone itself is not expected to be a significant source of dust emissions given the typically moist nature of the material. Further, crushing and screening of the limestone does not generally produce significant dust because even in summer, the limestone remains moist. In-pit operations also tend to generate less dust than surrounding activities due to the reduced airflow within the pit.

The removal and replacement of topsoil material has the highest risk associated with dust generation due to the large volumes of material involved and generally lower levels of soil moisture.

4.4.4 Risk Assessment

A human health risk assessment for modelled particulate dust emissions and a toxicological assessment regarding Ambient Air Quality Criteria/Standards (AAQC/S); particularly PM10, was undertaken for the project by Benchmark Toxicology Services Pty Ltd (BTS). The human health and toxicology assessment determined the following (BTS 2022):

- The incremental annual average PM2.5 concentrations due to Binningup Quarry is between 0.00 and 0.57 µg/m^3 across all receptors and all stages and with or without dust controls (i.e.,0% to 7% of the standard and less than 6.1% of BG). On this basis the quarry contributes a negligible health risk due to the key metric for health (annual average PM2.5).
- The overall conclusion is that the proposed quarry has a low and acceptable health impact to practically all receptors. This excludes the Rodgers's residence, whereby compliance with the standards can be achieved with the implementation of management measures.

In addition to the above assessment, an air quality assessment using dispersion modelling was conducted by Environmental Technologies and Analytics (ETA) to determine potential impacts associated with the proposed operation of Binningup Quarry. This assessment determined the following (ETA 2020):

- The predicted dust concentrations and deposition rates at sensitive receptors generally comply with the relevant assessment criteria and/or guidelines, both -
  o with and without the inclusion of background concentrations of particulates, and
  o with or without the implementation of dust control measures.
  The exception would be for annual average cumulative PM2.5, as the assumed background concentration (representing the long term average PM2.5 in the area) already exceeds the criteria. The contribution of PM2.5 from quarry operations to the modelled maximum annual concentration is low, generally contributing less than 1% of the assessment criteria.
- Overall, the model results show the particulate emissions from the project presents a low risk of potential impact on the community of Binningup. The adoption of the proposed dust mitigation and management strategies (as detailed in the proposed Dust Monitoring and Management Plan (ETA 2020)) will further reduce the potential for impact.

4.4.5 Management Measures

Based on the results from the risk assessment and associated modelling, a dust impact analysis was undertaken, details of which can be found within the EPA approved Dust Management Plan (ETA, 2020) (refer to **Appendix F**).

The potential impacts to amenity from dust emissions are considered low with the application of suitable management measures. A summary of these proposed management measures is provided in **Table 10**.

Table 10. Dust management measures (adapted from ETA, 2020).

Legislation and Key Standards		
Environmental Protection Act 1986 (EP Act) *A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities* (DEC 2011)		
Objective		
• Minimise dust lift during all activities. • No adverse dust impacts to sensitive receptors from the quarry operations.		
Targets		
• No unacceptable off-site impact as determined through event and complained investigation.		
Management Actions		
General	**Responsibility**	**Timing**
Notice to be erected at the site, providing contact details of the person to be contacted regarding the works. This person will also be available outside of operational hours to address any complaints.	Site Manager	Prior to extraction
Induction for all employees will include information on: • Potential sources of dust • Dust Management Plan • Speed limits onsite and staying on designated roads • Reporting procedure for dust issues	Site Manager	Prior to extraction
Staging will minimise the disturbance to the land providing a staged clearing excavation and rehabilitation program that will move across the site.	Site Manager	At all times
Avoid stripping topsoil when winds are > 8 m/s irrespective of wind direction.	Site Manager	At all times

Avoid stripping topsoil when it is saturated or when very dry.	Site Manager	At all times
Establish a 4 m high bund around the crushing and screening plant.	Site Manager	Prior to crushing and screening
Bunds seeded with grass to assist with visual amenity and reduce potential dust emissions.	Site Manager	During construction of bunds
Daily forecast and works planning to consider wind speed and wind direction forecast • high wind speeds forecast (> 8 m/s) will lead to a review of site activities and works may be suspended if deemed appropriate.	Machine operator	At all times
Topsoil stripping and bund construction shall not commence during the following conditions: • Winds in excess of 8 m/s • Northerly or north-easterly to south easterly winds.	Site Manager	As required
Dust episode management procedure to be reviewed and if necessary, slow or temporarily stop site operations during high dust episodes.	Site Manager	As required
Watering of surface area - by water truck.	Site Manager	As required
Water trucks are to be available at all times during quarry activities to water the site on observation of dust lift	Drivers	At all times
Loading and transportation of material		
Minimise drop distances when loading and handling limestone to reduce dust generation	Site Manager	At all times
Limestone material expected to be naturally moist prior to and during loading Truck loads will be covered with tarpaulin or similar. Road surface design, preparation and construction Transport of dust-prone material will be via covered trucks or dampened prior to transport to prevent dust lift during transport.	Site Manager/Drivers	At all times
Crushing and screening of material		

Crushing and screening plant to be located in designated areas 1 km from Binningup residents at all times.	Site Manager	During crushing and screening
Installing plant/equipment sheltered from prevailing winds (concealed at the lowest contours of the quarry/pit stage) - Excavation and processing will be conducted on the floor of the pit, 3 m below natural ground level behind the excavation face.	Site Manager	During crushing and screening
Establish a 4 m high bund around the crushing and screening plant. Bunds seeded with grass to assist with visual amenity and reduce potential dust emissions.	Site Manager	Prior to crushing and screening
Stockpiling		
Long term stockpiles seeded with grass to assist with visual amenity and reduce potential dust emissions. Temporary bunds, stockpiles and exposed areas will be watered and stabilised as required. Stabilisation techniques that will be considered depending on environmental conditions will include hydro-mulching.	Site Manager	At all times
Stockpiling limited to in pit. Stockpiles, where possible, will be limited to the anticipated cubic volume/vehicle movement for cartage on the following operating day.	Site Manager	At all times
Minimise material drop-height during stockpile building.	Site Manager	At all times
Vehicle movement		
Vehicle speeds will be restricted to no more than 30 km/hr on the site to minimise dust lift off.	Site Manager/Drivers	At all times
Site traffic will be restricted to designated internal access ways to prevent disturbance of vegetated or natural areas - designated roads.	Site Manager	At all times
Loads leaving site are covered.	Site Manager/Drivers	At all times
Wind erosion of exposed surfaces		

Onsite watercart with a capacity of 15,000 L. Water will be sourced from an onsite dam located directly to the north of the extraction area.	Site Manager	At all times
Rehabilitation will be undertaken sequentially and as soon as reasonably possible to reduce the exposed areas.	Site Manager	At all times
Where rehabilitation is delayed (i.e. staged completion occurs in summer), additional dust control measures will be considered. This includes the application of a paper-water mixture to exposed surfaces to create a temporary crust and prevent wind-borne dust lift-off.	Site Manager	At all times
Temporary bunds, stockpiles and exposed areas will be watered and stabilised as required. Stabilisation techniques that will be considered depending on environmental conditions will include hydro-mulching.	Site Manager	At all times
Areas of land cleared and the period of time they remain cleared are to be kept to a minimum.	Site Manager	At all times
Protect topsoil stockpiles from erosion.	Site Manager	At all times
Avoid long term stockpiling of topsoil by using it to rehabilitate worked out areas immediately.	Site Manager	At all times
Stabilise temporarily disturbed land as soon as practicable (i.e. spreading of aggregate, hydro mulching or other material).	Site Manager	At all times
Restrict access to cleared areas during and after clearing of vegetation to minimise unnecessary disturbance and generation of dust.	Site Manager	At all times
Stabilise temporarily disturbed land as soon as practicable (i.e. spreading of aggregate, hydro mulching or other material).	Site Manager	At all times
Maintain a complaints register (refer to **Appendix E**). A Complaints Register will be established for the site to record the following information: • the date and time of the complaint • who the complaint was from • the specific issue/s raised in the complaint • investigations undertaken into site activities and cause of dust emission • the actions taken to address the specific issue/s raised in the complaint	Site Manager	As required

Monitoring			
Description	**Parameter**	**Responsibility**	**Frequency**
Ambient dust monitoring will be undertaken during the first 12-months of the quarry being operational. The purpose of the ambient monitoring is to inform operations of an increasing trend in dust levels in the vicinity of sensitive receptors at Binningup.	• Single ambient monitoring location on the boundary of the premises ○ Continuous real-time weather monitoring (wind speed and wind direction) ○ Continuous real-time PM10 monitoring (ES-642 Dust monitor (type – nephelometer)) • Wind speed and wind direction alert levels (to indicate when winds are blowing such that sensitive receptors would be downwind of Lot 4 excavation activities • PM10 alert levels (to indicate when measured levels are approaching pre-determined management levels and therefore initiate (trigger) pre-determined management responses.	Site Manager	Continuous
Local meteorological conditions will be monitored to assist in planning operational activities and dust mitigation and management responses, and to assist in dust incident investigations.	Wind direction and wind speed will be measured continuously, and taken into consideration in planning surface activities including dust suppression, specifically: • Proactively – review daily weather forecast for predicted wind conditions in the direction of Binningup ○ When winds are forecast above 4 m/s and to be in the direction of Binningup, the day/shift activities will ensure all dust controls are operational • Reactively – review monitored data (live 10-minute average data) as part of ○ o Response when in receipt of wind speed trigger alert or high dust level alert	Site Manager	Continuous
An ambient dust monitor (nephelometer) measuring particles in the size of 10 microns in aerodynamic diameter (PM10) continuously on a 10-minute	The purpose of the monitor is to provide near "real-time" data to inform operational response to changing dust conditions associated with the operations. Wind speed and wind direction is also measured at this site.	Site Manager	Continuous

average basis, will be installed at a nominated location on the western edge of the premises boundary.	Monitoring will be in place for the first 12-month period of the quarry being in operation, following which the monitoring results will be reviewed to determined if ongoing monitoring is needed.		
The ambient monitoring will be supplemented with site personnel visual observation of dust. Visual diligence is an instantaneous checking mechanism and provides the benefit of any issues being observed can be acted on promptly, irrespective of the measured dust levels at the time. Observation of dust and the source supports the deployment or initiation of targeted action to address the dust directly and promptly. The practice of visual observation will continue for the duration of the quarry operation.	Dust seen to be leaving the work area or source (e.g. haul roads, pit, loading/stockpiling, open areas) will trigger a required action.	Site Manager	Continuous
Contingency and Corrective Actions			
Incident or Consequence	**Corrective Action**	**Responsibility**	
Level 1 – Low risk of offsite impact			
• Visual trigger - Visible dust observed from activity, but not observed leaving the premises boundary	• Check forecast and current condition. • Check controls in place. o If not in place apply control	Site Manager	

• Meteorology trigger - Wind arc away from the Binningup PM10 monitor/residents • Monitored PM10 trigger - Rolling 1-hour average PM10 < 90 µg/m3 at Binningup PM10 monitor act		
Level 2 – Medium risk of off-site impact		
• Visual trigger - Visible dust observed from activity • Meteorology trigger - Wind arc toward Binningup PM10 monitor/residents, and o Poor dispersion conditions – Wind speed <2 m/s Or o Wind erosion conditions - Wind speed > 6 m/s o Monitored PM10 trigger - 2 consecutive 10-minute readings above 90 µg/m3 at Binningup PM10 monitor • Monitored PM10 trigger – 2 consecutive 10-minute readings above 90	• Check forecast and current condition. • Check controls in place. o If not in place apply control • If a Poor dispersion event (i.e. calm)- o If wind is < 2 m/s prepare to stop dust generating activity until sources / work areas are wetted down • Wind erosion event- o If wind > 6 m/s prepare to stop dust generating works until sources / work areas are wetted down.	

µg/m3 at Binningup PM10 monitor		
Level 3 – High risk of off-site impact		
• Visual trigger - Visible dust observed from activity and across premises boundary • Meteorology trigger - Wind arc toward Binningup PM10 monitor/residents, and o Wind erosion conditions - Wind speed >8 m/s • Monitored PM10 trigger - 3 consecutive 10-minute readings above 90 µg/m3 at Binningup PM10 monitor	• Check forecast and current condition. • Check controls in place. o If not in place apply control • If a Poor dispersion event (i.e. calm)- o If wind is < 2 m/s stop dust generating activity until sources / work areas are wetted down • Wind erosion event- o If wind is > 8 m/s stop dust generating activity until sources / work areas are wetted down or until wind speed drops.	
Complaint received	Any complaint that is received in relation to current conditions, will be addressed in line with the Trigger-Action Response protocol set out in Table 3-1 of Appendix F, and will be considered a Level 2 or Level 3 incident for investigation.	Site Manager
	Any complaint received retrospectively will be investigated accordingly.	Site Manager

4.5 Domestic and Industrial Waste Products

No domestic or industrial waste will be stored onsite. Any waste material generated during the operational activities will be taken offsite for disposal at an approved landfill facility on a daily basis. Hydrocarbon wastes such as accidental oil spills will be mopped up with absorbent material and segregated for removal and disposal offsite by a licensed contractor.

An approved portable toilet system may be temporarily placed onsite during construction activities. Waste from the toilet system will be disposed of offsite at an approved treatment facility.

4.6 Hydrocarbons and Dangerous Goods Management

Hydrocarbons are the only dangerous goods that will be utilised within the proposed extraction area. However, storage of hydrocarbons on the site will not occur.

4.6.1 Construction

The mobilisation and positioning of equipment associated with a Category 12 prescribed premises is not associated with any uncontrolled discharges of contaminants to land.

4.6.2 Operation

There is the minor possibility for soil and water contamination as a result of incidental hydrocarbon leakages or spills during the operation/refuelling of machinery. In such instances the management measures specified below will be implemented. Servicing of machinery and equipment will not occur onsite further reducing the possibility of contamination.

Table 11. Hydrocarbon and dangerous goods management measures.

Timing	Management Measure
During quarry operations	Mobile refuelling of equipment and vehicles will be undertaken following set procedures to acceptably minimise the risk of spills and to ensure adequate containment and bunding is in place to contain any spills that may occur.
	Spill kits containing appropriate equipment for control, containment and cleanup of hydrocarbon and chemical spills will be available in appropriate locations onsite and maintained.
	No vehicles or machinery are to be serviced or cleaned within the extraction area.

4.6.3 Risk Assessment

A risk assessment to determine the residual risk associated with the uncontrolled discharge of contaminants is provided below. The risk assessment indicates that with the application of suitable management measures the potential risk associated with uncontrolled discharges is 'Low'.

Table 12. Risk assessment associated with the uncontrolled discharge of contaminants.

Hazard	Source of Hazard	Potential Impacts	Mitigation	Likelihood	Consequence	Residual Risk
Uncontrolled discharge of contaminants to land	Machinery	Contamination of soils and/or water	Refer to Management Measures provided in **Table 11**.	1	2	Low

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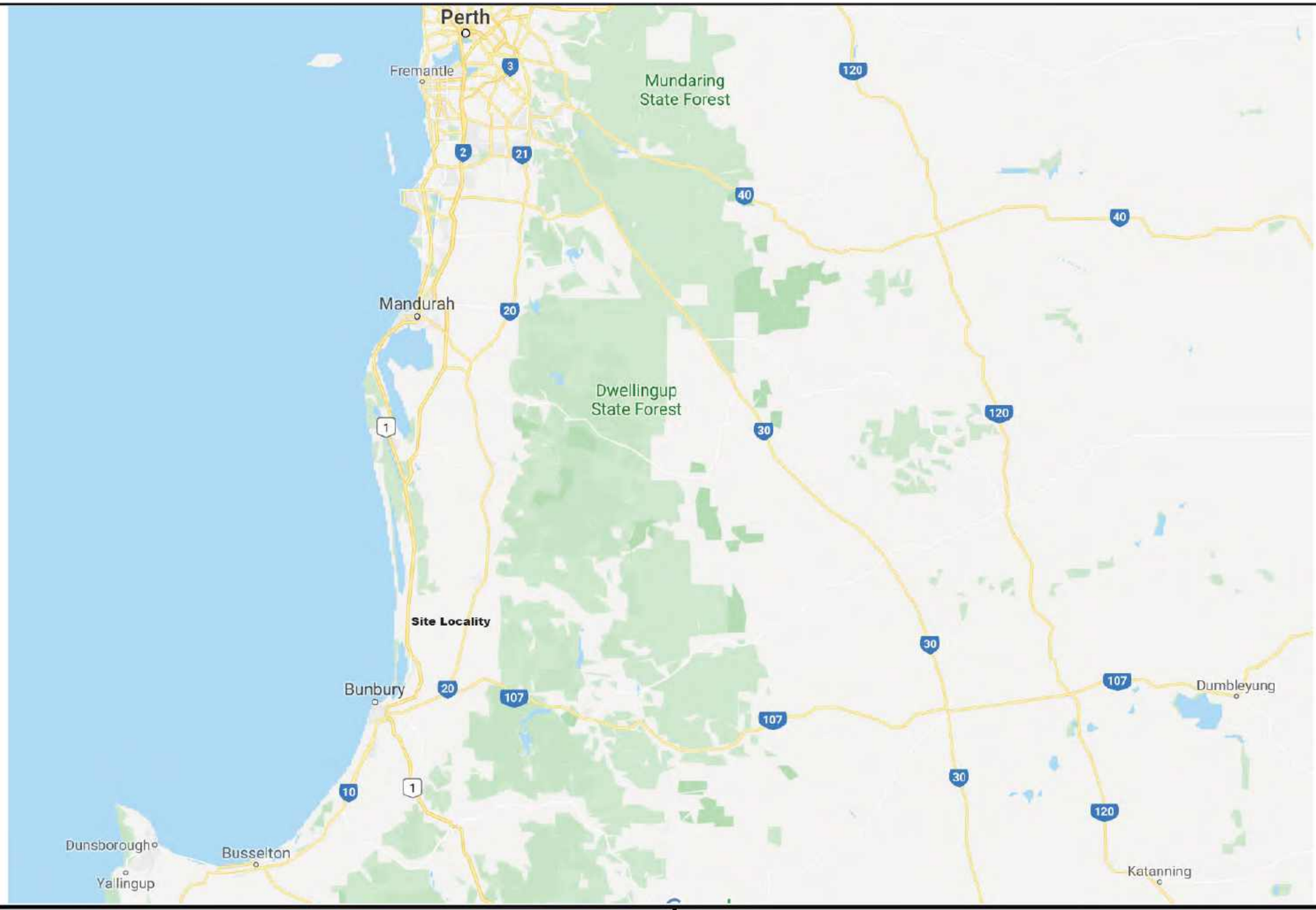
FIGURES



PROJECT **Lot 4 Binningup Road**

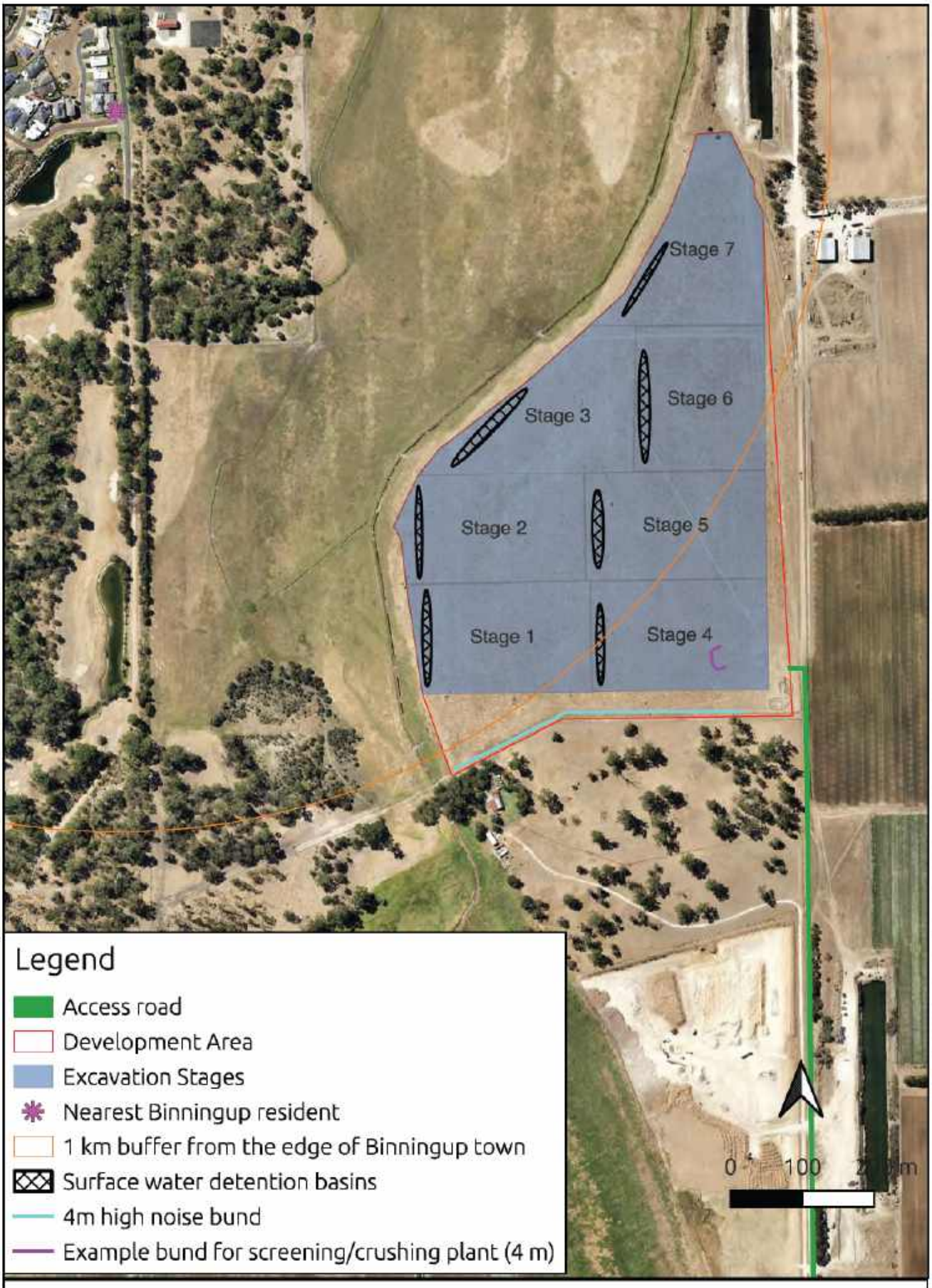
DRAWING TITLE **FIGURE 1 - Site Locality**

CLIENT **MGM Bulk Pty Ltd**

accendo AUSTRALIA
PO Box 5178
West Busselton
Western Australia 6280
Mobile 0416 950 892

Project Number	Drawing Number	Revision
2506	**FIG 1**	**A**

Designed	KMT	Checked	Date 6.12.19
Drawn	PN	Approved	Sheet 1 of 1
Local Authority		Shire of Harvey	



PROJECT	Lot 4 Binningup Road, Binningup	Project Number 2506	Drawing Number Figure 2	Revision B
DRAWING TITLE	Figure 2 – Site Extent with stages	Designed PN Drawn PN	Checked Approved	
CLIENT	MGM Bulk Pty Ltd	Date Local Authority Sheet 1 of 1	1/08/2024 Shire of Harvey	

accendo AUSTRALIA

PO Box 5178
West Busselton
Western Australia 6280
Mobile 041 8060 852

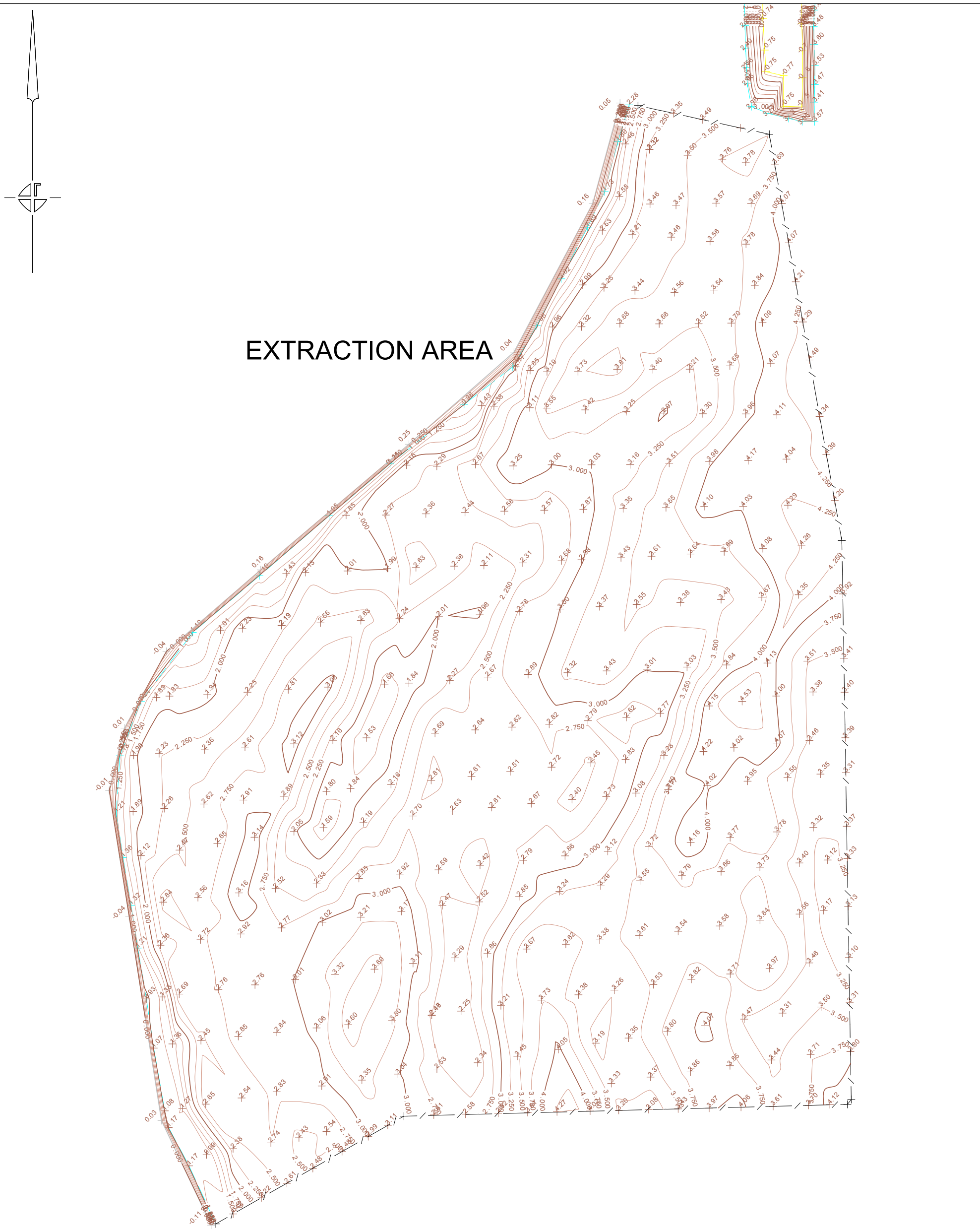


Figure 3: Existing Contours

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ABN 59 166 330 334
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PO Box 1719 BUNBURY WA 6231
Phone: (08) 9721 4000
Fax: (08) 9721 2720
eMail: info@thompsonsurveying.com.au

BSI ISO 9001 FS 520415

File: DWG19678 DL		CLIENT:	GM FAMILY TRUST
Scale (@A3)	Vert: N/A Hor: 1 : 3000	PROJECT:	BINNINGUP RD, BINNINGUP
Date: 07/FEB/2020	Rev.n: 0	TITLE:	TOPOGRAPHIC SURVEY
Checked: DL		DATUM HOR: MGA	VERT: A.H.D.

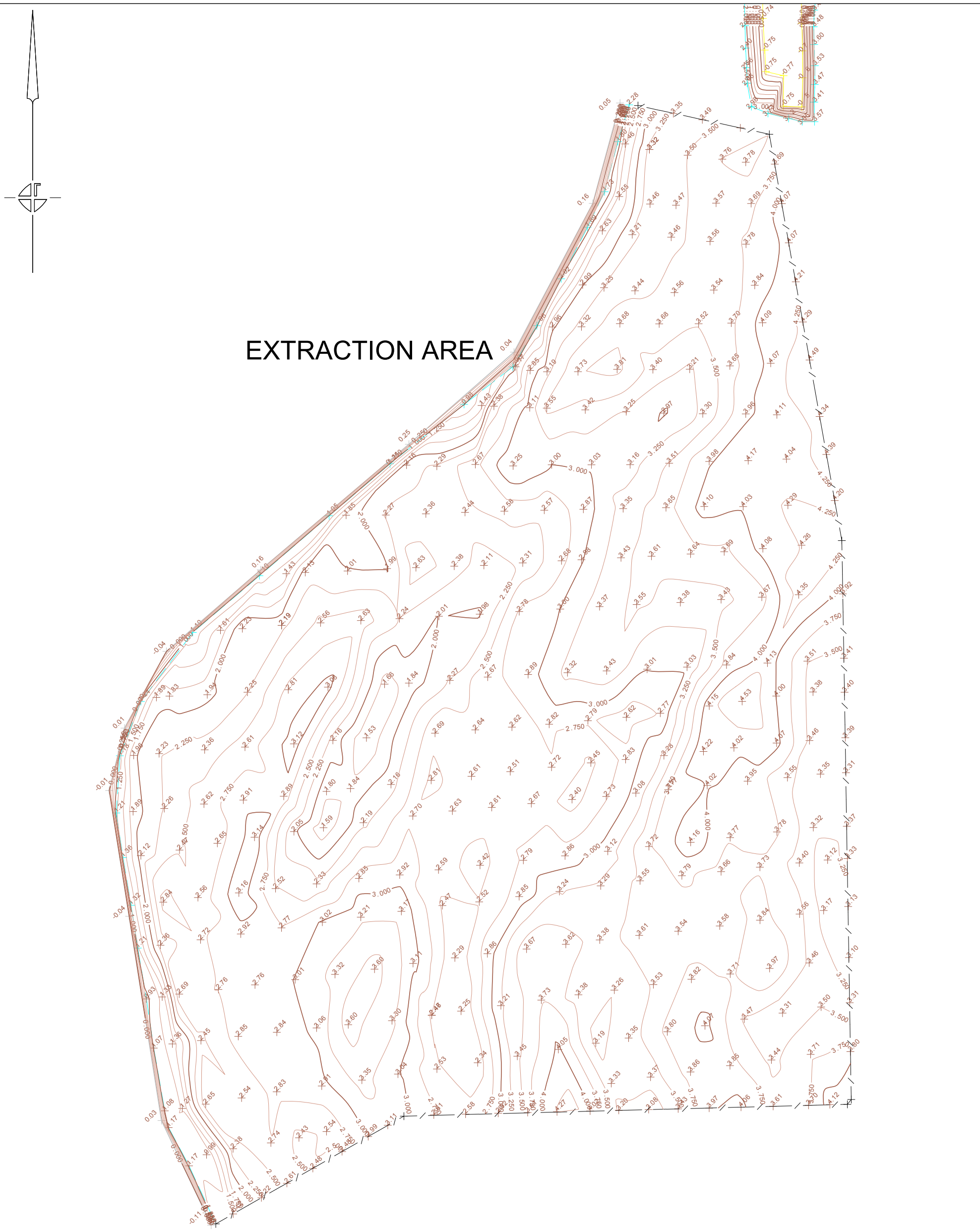

Figure 4. Location of piezometers (blue dots).

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ABN 59 166 330 334
Unit 6, 18 Casuarina Drive, Bunbury
PO Box 1719 BUNBURY WA 6231
Phone: (08) 9721 4000
Fax: (08) 9721 2720
eMail: info@thompsonsurveying.com.au
BSI ISO 9001 FS 520415

File: DWG19678 DL		CLIENT:	GM FAMILY TRUST
Scale (@A3)	Vert: N/A Hor: 1 : 3000	PROJECT:	BINNINGUP RD, BINNINGUP
Date: 07/FEB/2020	Rev.n: 0	TITLE:	TOPOGRAPHIC SURVEY
Checked: DL		DATUM HOR: MGA	VERT: A.H.D.

APPENDIX A – CERTIFICATE OF TITLE

LT. 38

REGISTER BOOK
VOL. 1853 FOL. 291

Application E241782 WESTERN AUSTRALIA

Volume 1839 Folio 859

CERTIFICATE OF TITLE

UNDER THE "TRANSFER OF LAND ACT, 1893" AS AMENDED

I certify that the person described in the First Schedule hereto is the registered proprietor of the undermentioned estate in the undermentioned land subject to the easements and encumbrances shown in the Second Schedule hereto.

REGISTRAR OF TITLES

Dated 11th December, 1989

ESTATE AND LAND REFERRED TO

Estate in fee simple in portion of each of Wellington Locations 17, 20 and 48 and being part of Lot 4 on Diagram 24320, delineated on the map in the Third Schedule hereto.

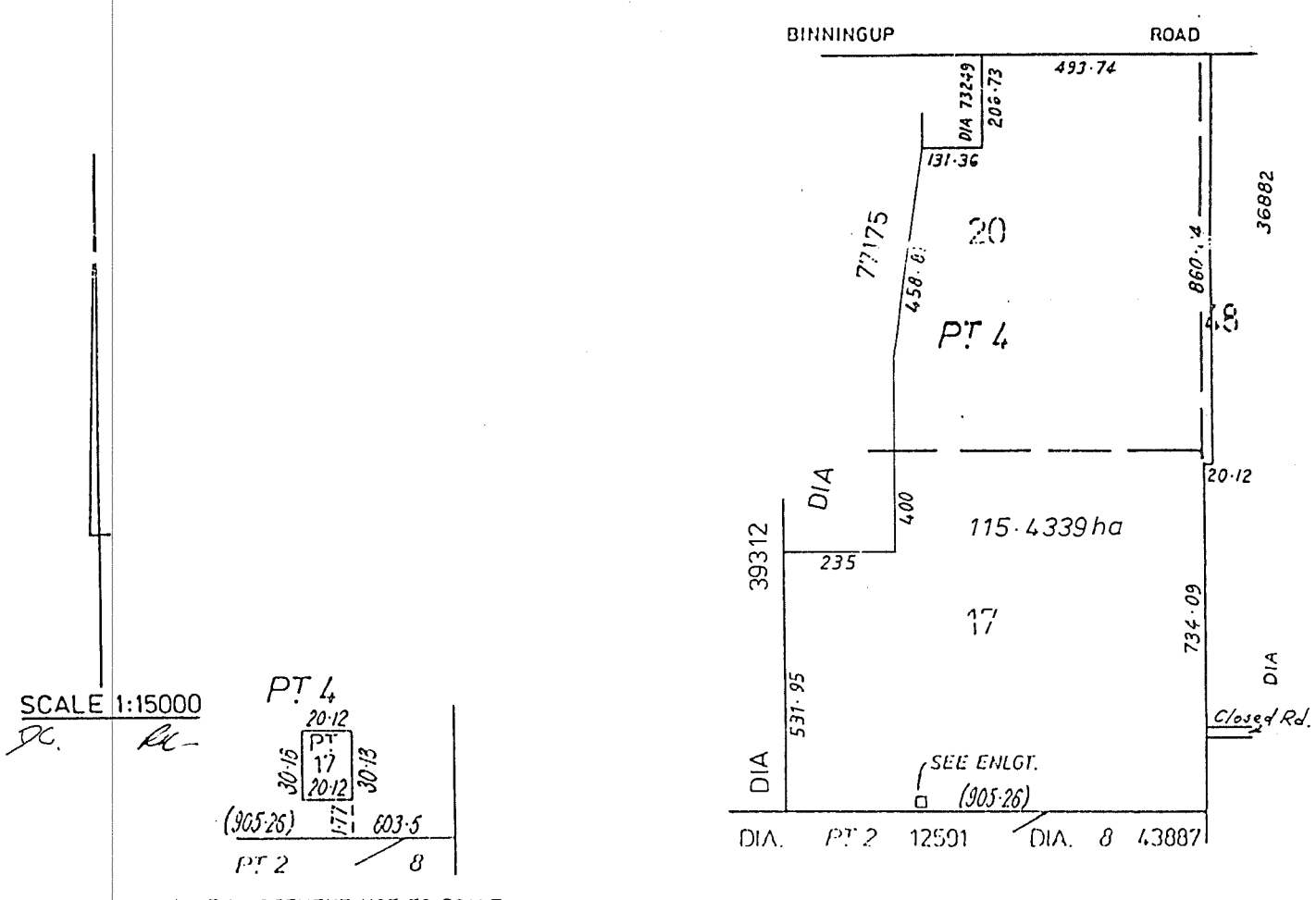
FIRST SCHEDULE (continued overleaf)

Coast Pastoral Co. Pty. Ltd. of 17 Floreat Street, Bunbury.

SECOND SCHEDULE (continued overleaf)

NIL

THIRD SCHEDULE



ENLARGEMENT NOT TO SCALE

NOTE: ENTRIES MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS.

E67591/3/89-20M-L/4665

FIRST SCHEDULE (continued) NOTE: ENTRIES MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS

REGISTERED PROPRIETOR	INSTRUMENT NATURE	INSTRUMENT NUMBER	REGISTERED	TIME	SEAL	CERT. OFFICER

SECOND SCHEDULE (continued) NOTE: ENTRIES MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS

INSTRUMENT NATURE	INSTRUMENT NUMBER	PARTICULARS	REGISTERED	TIME	SEAL	CERT. OFFICER	CANCELLATION	NUMBER	REGISTERED OR LODGED	SEAL	CERT. OFFICER
Lease	E740492	As to portion only: to Bunnings Tree Plantations Ltd., of 4th Floor, 255 Adelaide TErrace, Perth. commencing on 15.3.91.	7.11.91	8.00							

CERTIFICATE OF TITLE VOL. 1853 FOL. 291

APPENDIX B - AUTHORISATION FROM LANDOWNER

To Whom It May Concern

RE: Lot 4, Binningup Road, Binningup. Authorisation for M M Giacci (GM Giacci Family Trust) to mine.

I [redacted] as owner of Coast Pastoral Co Pty Ltd hereby authorise Mario Michele Giacci (GM Giacci Family Trust) to apply for all necessary approvals and also to mine limestone on my land at Lot 4, Binningup Road, Binningup as per Shire of Harvey Extraction License issued on 06/12/2024.

[redacted]

13th February 2025

APPENDIX C – DRAINAGE MANAGEMENT PLAN

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DRAINAGE MANAGEMENT PLAN

LOT 4 BINNINGUP ROAD, BINNINGUP

June 2021

accendo AUSTRALIA

[redacted]

[redacted]

solutions for the human | environment interface

CONTENTS

TABLES

FIGURES

1 INTRODUCTION

1.1 Background

The GM Giacci Family Trust (the applicant) is proposing to extract limestone from a 26 hectare (ha) area (herein referred to as the subject site) located on Lot 4 Binningup Road, Binningup (refer to **Figure 1** and **Figure 2**). The subject site is located in the municipality of the Shire of Harvey, approximately 1 km south-east of Binningup and approximately 1 km west of Forrest Highway.

The subject site is zoned "Rural" under the Greater Bunbury Region Scheme and "General Farming" pursuant to the Shire of Harvey *Local Planning Scheme No.* 1. Under the Scheme the use class "Extractive Industry" is as an "SA" use in the "General Farming" zone. The "SA" designation "*means that the council may, at its discretion, permit the use after notice for application has been given in accordance with Clause 2.3*". Accordingly, in addition to an Extractive Industry Licence the proposal requires planning approval.

The Shire of Waroona granted an Extractive Industry Licence (EIL) and Planning Approval on the 21st December 2020 to enable the applicant to extract and process approximately 120,000 m^3 of limestone from the subject site.

Subject to Condition No. 5 of the EIL, a Drainage Management Plan (DMP) is required to support the proposed activity. Specifically, Condition No. 5 stipulates the following:

'5. Prior to the issue of an Extractive Industry Licence, the Applicant shall prepare and submit for approval by the Shire, a Drainage Management Plan to detail storm water management measures proposed for the site.'

1.2 Purpose and Scope

This DMP has been prepared to fulfil the relevant requirements provided within the Shire of Harvey's *Local Planning Scheme No. 1* and the Shire of Harvey's *Extractive Industries Local Law*. It is intended to provide the Shire of Harvey, the public and relevant government agencies with an understanding of the proposal and the environmental strategies and commitments proposed to address groundwater and surface water within the subject site. This document has been prepared to support and should be read in conjunction with, the Extractive Industry Licence application prepared by Accendo Australia (2020) for limestone extraction within the subject site.

The purpose of this Plan is to describe the proposed management measures necessary to ensure the environmental impacts to groundwater and surface water within and surrounding the subject site are avoided.

The scope of the Plan is to cover the following:

- A description of the existing environment;
- A description of the proposed extraction activities and their impact on surrounding water features;
- A description of the waste management measures to ensure no impacts to water features; and
- A description of the proposed surface and groundwater management measures.

2 EXISTING ENVIRONMENT

2.1 Land Use

The subject site is zoned 'General Farming' pursuant to the Shire of Harvey's *Local Planning Scheme No.* 1. It has previously been cleared and is currently comprised of pasture for cattle grazing.

The surrounding properties are also zoned 'Rural' under the *Greater Bunbury Region Scheme* (GBRS) and 'General Farming' pursuant to the Shire of Harvey *Local Planning Scheme No. 1* on the north, east and southern boundaries. Those located to the west of the subject site are zoned 'Urban' and 'Regional Open Space' under the GBRS, and 'Public Purpose' and 'Residential Development' in accordance with the Shire of Harvey's *Local Planning Scheme No. 1*. There is a golf course located to the west of the subject site with the remaining surrounding properties primarily used for livestock grazing.

2.2 Topography and Soils

The natural topography of the subject site can be described as generally flat with an elevation ranging between 2 to 3 metres (m) Australian Height Datum (AHD) (refer to **Figure 3**).

The subject site lies on the western side of the Swan Coastal Plain. The Plain at this point consists of a broad almost flat alluvial plain that slightly undulates, with seasonal wetlands occurring in the depressions.

The subject site is located within the Perth Coastal Zone landform characterised by coastal sand dunes and calcarenite, and the Spearwood Land System described as *"sand dunes and plain. Yellow deep sands, pale deep sands and yellow/brown shallow sands."* (Tille, 2006).

Within the Spearwood Land System, the subject site is located within the following sub-systems:

- Spearwood S4b Phase – Flat to gently undulating sandplain with shallow to moderately deep siliceous yellow-brown to grey-brown sands with minor limestone outcrops.

The Quaternary deposits within the subject site are the Tamala Limestone. This and its associated sand, form the Spearwood Dunes physiographic unit and are located immediately west of the Bassendean Sand. In general, these dunes are higher than the Bassendean Dunes, have steeper slopes, especially at their eastern edge and exist in two continuous ridges running parallel to the coast (Geological Survey of Western Australia 1982). The thickness of the Tamala Limestone sand across the subject site varies, with the Tamala Limestone proper extending up to 35m in thickness (Lundstrom 2014).

2.2.1 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).

Mapping prepared by the Department for Planning, Lands and Heritage to support the Western Australian Planning Commission's (WAPC's) Planning Bulletin 64: *Acid Sulfate Soils* (WAPC 2007) indicates that there is a 'moderate to low' risk of ASS occurring within a small area near the eastern boundary, with a 'high to moderate' risk of ASS occurring within the remainder of the subject site. Potential impacts associated with

ASS are expected to be low given that the proposal involves the excavation of limestone and the excavation of low lying areas will not occur.

2.3 Climate

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

Temperatures are highest on average in February, at approximately 22.8°C. July has the lowest average temperature of the year of 12°C.

Rainfall for the area is approximately 826 mm per annum with more than 90% of the rain falling during the winter months, April to October inclusive. Evaporation exceeds rainfall in all but the wettest winter months.

The wind direction is predominantly from the east in the morning and from the southwest in the afternoon during the summer months. During the winter months the directions are more variable and lighter but with a predominance of east - northeast in the morning and south west in the afternoon due to the presence of winter lows (BoM 2019).

2.4 Vegetation and Fauna

The flora and vegetation within the subject site has been subjected to prolonged land degradation processes including land clearing and livestock grazing. No remnant vegetation is contained within the subject site, with flora species restricted to pastural grasses and weed species. Accordingly, no flora, vegetation or fauna of conservation significance occurs within the subject site.

2.5 Hydrology

2.5.1 Groundwater

Within the subject site, the underlying aquifers are the superficial and the Leederville. The superficial aquifer, which is mainly unconfined and shallow, contains fresher groundwater resting on saline groundwater. The superficial aquifer is hydraulically connected to the underlying Leederville aquifer (Deeney 1989).

Groundwater flow in the superficial aquifer occurs within the Leschenault Inlet Flow System which extends from an eastern groundwater divide. This includes the Mialla Mound to a western groundwater divide within the coastal dunes. The Leschenault Inlet Flow System is separated from the Lake Preston Flow System to the north by a flow line south of Lake Preston and it continues to the Leschenault Inlet (Rockwater 2009).

The groundwater table slopes downwards to the west from about 2 m AHD along Old Coast Road and to the east from about 2 m AHD at the top of the groundwater divide beneath the coastal dunes at Binningup (Kern 1998). Seasonal variations of the groundwater levels of up to about 1.5 m have been reported (Rockwater 2009).

Groundwater flow is predominately to the west, with a small proportion of eastwards flow from the coastal groundwater divide, towards the topographically low area between Lake Preston and the Leschenault Inlet. A drain extends northwards from Leschenault Inlet into most of this area and carries groundwater discharge southwards to the inlet (Rockwater 2009).

No site-specific groundwater monitoring has been undertaken within the subject site. However, monitoring data from a Department of Water and Environmental Regulation (DWER) monitoring bore (G2A) has been reviewed and water levels within three nearby dams have been surveyed to extrapolate seasonal variations of the groundwater levels within the subject site.

Specifically, this involved obtaining groundwater level data for the month of March from 2011 to 2019 from the monitoring bore (G2A) and obtaining the difference (in m AHD) from the maximum groundwater level recorded in each year (refer to **Table 1** below). Groundwater level data was obtained from the month of March as this is the closest available data to when the dam water levels were surveyed (i.e. February) and these results represent the lowest groundwater levels for each year. Furthermore, data for the month of March was only available from 2011.

Table 1. The seasonal difference in groundwater levels (m AHD) from 2011 to 2019.

23/03/2011	-1.069
19/09/2011	0.571
Difference	**1.64**
27/03/2012	-0.959
18/10/2012	0.061
Difference	**1.02**
19/03/2013	-0.739
20/09/2013	0.581
Difference	**1.32**
17/03/2014	-0.679
21/10/2014	0.695
Difference	**1.374**
19/03/2015	-0.445
17/09/2015	0.675
Difference	**1.12**
18/03/2016	-0.435
16/09/2016	0.765
Difference	**1.2**
17/03/2017	-0.145
21/09/2017	0.865
Difference	**1.01**
22/03/2018	-0.245
20/09/2018	0.765
Difference	**1.01**
22/03/2019	-0.235
19/09/2019	0.715
Difference	**0.95**

The water levels for three groundwater fed dams in proximity to the subject site were surveyed in attempt to gauge exiting groundwater levels within the subject site. The results are provided in **Table 2** and the location of the dams are depicted in **Figure 2**.

Table 2. Surveyed water levels (m AHD) within nearby dams.

Dam 1	Dam 2	Dam 3
-0.74	-0.75	-1.61

Given the proximity of Dam 1 and 2 to the subject site and to provide a conservative approach, it is reasonable to assume that groundwater within the subject site is approximately -0.74 m AHD in February/March.

Based on the results provided in **Table 1**, the highest seasonal difference for groundwater levels was recorded in 2011, with 1.64 m AHD. The trend in seasonal difference for groundwater levels decreases from 2011 to 2019. It is also noted that seasonal variations of groundwater levels within the locality of up to about 1.5 m have been reported (Rockwater 2009).

To determine an approximate maximum groundwater level, the highest recorded seasonal difference of 1.64 m AHD is added to -0.74 m AHD which provides 0.90 m AHD. In order to maintain a 0.5 m separation distance to groundwater from the pit floor, the maximum depth of the excavation would be 1.40 m AHD. However, the DWER have recently adviced that in-house preliminary modelling suggests a 1 m AHD maximum groundwater level beneath the subject site. Accordingly, in the absence of any site-specific data, the proposed initial maximum depth of the excavation is 1.50 m AHD

2.5.2 Surface Water

The subject site does not contain any defined natural surface water channels or wetlands (as defined within the *Geomorphic Wetlands of the Swan Coastal Plain* dataset) and is not located within a 'Public Drinking Water Source' area (SLIP 2019).

The western boundary of the subject site is bordered by the Parkfield agricultural drain, with a Multiple Use (MU) wetland (UFI No. 15718) located directly to the west of the drain. There is a farm dam located approximately 30 m to the north-west of the subject site and a Resource Enhancement (RE) wetland (UFI No. 1216) located approximately 130 m to the south-west of the subject site.

Drainage across the subject site flows in an east to west direction towards the coast. During winter when elevated groundwater levels are experienced, surface water flows via the Parkfield drain, towards the south. Drainage within the quarry area will be internal and will infiltrate into the underlying groundwater.

3 EXTRACTION ACTIVITIES

The limestone quarry will cover an area of approximately 26.4 ha with a maximum natural elevation of 4.53m AHD. It will be excavated to approximately 1.5 m AHD (initially, although this may be adjusted after groundwater monitoring has been undertaken) in seven stages, each less than 4 ha in size. Indicative stages are shown within **Figure 2** to illustrate their relative scale. The actual location of the stages may vary slightly as a range of variables affect actual pit layout at any one time.

The quarry area has been designed to provide a 30 m setback to the Parkfield agricultural drain, the MU wetland and the nearest farm dam. Furthermore, a 20 m setback has been provided to the western Lot boundary.

It is anticipated that approximately 120,000m^3 of limestone will be extracted in total with approximately 24,000 m^3 excavated each year, depending on supply and demand. The proposal involves the screening and crushing of the limestone onsite.

The planned end use of the quarry is to restore a natural soil profile and return the area to pasture, ensuring that there is no net loss of productive agricultural land.

3.1 Operational Works

The topsoil (nominally 15 cm of the soil profile) will be stripped and stockpiled behind the excavation face using a bulldozer or loader. Where possible and if the perimeter bunding is already present, topsoil will be directly transferred to an area being rehabilitated. Overburden, if present, will be removed using a dump truck and stockpiled to the perimeter of the proposed pit area.

Typical operating hours for quarries will be adopted for the subject site which involves a five day week from 7am to 6pm, each Monday to Friday (excluding public holidays). The site will be worked by 2 - 3 persons, depending on market demand.

3.1.1 Truck Movements

Access to the property will be via the existing limestone road within Lot 4 Binningup Road and Lot 2 Springhill Road (owned by Coast Pastoral Company Pty Ltd), and the sealed Springhill Road that exits onto National Route 1, Forrest Highway (refer to **Figure 2**). Trucks used for the transportation of the material will vary between 6 wheelers (capacity -10m^3), semi tippers (capacity ~18 m^3) and road trains (capacity ~28 m^3). The above factors suggest an average of eight truck movements per day but this will be dependent on demand. No additional road upgrade works, apart from normal maintenance, are anticipated.

3.1.2 Limestone Extraction

The limestone within the quarry is relatively soft and can be removed with an excavator or loader without the need for a bulldozer or blasting. It will then be screened to produce products of the correct size. A small mobile crusher is required to prepare the correct grainsize. A summary of the proposed limestone extraction activities is provided below:

- Prior to excavation commencing the site will be ground surveyed, the excavation footprint marked out and a 1 metre contour plan developed.
- Pasture cover will be removed by pushing it into windrows for use on the batters to minimise soil erosion and assist spreading on the final land surface as part of the final rehabilitation.

- All topsoil will be removed for spreading directly onto areas to be revegetated and screening or perimeter bunds. If direct spreading is not possible the topsoil will be stored in low dumps, for spreading at a later date.
- Soil and overburden, as yellow and brown sand and low grade limestone, will then be removed and either directly transferred to a rehabilitation area or stored in low dumps for later rehabilitation use.
- Limestone interburden, if encountered, will be incorporated into the overburden dumps for later use in re-contouring the land surface at the conclusion of excavation.
- An excavator or front-end loader will be used to dig and push the limestone down the excavation face and track roll the limestone in the process.
- The preliminary crushed limestone will then be picked up by a rubber tyred loader and fed to the mobile crusher.
- All static and other equipment, such as crushers and screens (where used), will be located on the floor of the quarry to provide visual and acoustic screening.
- Excavation will commence in the south of the quarry and then move in a northerly direction. The face and walls of the pit will act as noise barriers.
- Upon completion of each section of quarry the section will be reformed and back filled, where subgrade material is available, to achieve the proposed final contours.
- At the end of excavation, the floor of the quarry will be deep ripped, covered by overburden and topsoil, and rehabilitated to a constructed soil.

3.1.3 Final Contours

The slope of the final contours of the quarry will be an undulating surface at around 1.5 m AHD which is consistent with the adjoining land (refer to **Figure 4**). A separation of 1.0 m between the final contours and the maximum groundwater elevation will be obtained.

Slopes of the batters at the end of excavation will be retained at 1:6 vertical to horizontal.

3.1.4 Water Usage

Water is only required for dust suppression within the quarry and the access road. Water will be sourced from a nearby dam on Lot 4.

If required, based on the volume of water used, the water source will be licensed from DWER for water usage as dust suppression.

4 WATER MANAGEMENT

4.1 Surface Water

During excavation activities, the surface will be internally drained. The quarry area has been designed to provide a 30 m setback to the Parkfield agricultural drain, the MU wetland and the nearest farm dam.

4.2 Stormwater

To minimise any potential impacts to the RE wetland, holding ponds for each stage will be located at the base of the pits (at the western end).

During excavation activities, the surface will be internally drained. A low bund will be installed down slope of any excavation area, established from the wall of the pit to the edges of the excavation. The processing area will also be bunded by a low bund to ensure no surface water runoff occurs.

These ponds will be designed in accordance with previous DWER recommendations regarding the retention of surface water runoff from the two-hour 10 year average return interval storm event. Based on average rainfall and the size of each stage, it is calculated that a holding volume of approximately 655m^3 is required for each pond.

In order to contain this volume of water within the pit, detention ponds will be approximately 41m x 16m x 1m deep, with the longest edge parallel to the western boundary. Cut-off drains running along the base of the pit, parallel to the western boundary, will ensure all runoff is diverted into the detention ponds.

The pit will be monitored post rainfall events for any incidences of erosion damage and any required repairs will be undertaken as soon as practicable.

4.3 Groundwater

Groundwater will not be extracted or dewatered during the operation of the quarry and therefore, no impacts to groundwater levels are proposed. The extraction and processing of limestone is a chemically free operation with the liquids used being lubricants for machinery and refuelling. There will be no storage of chemicals or fuel on site.

The proponent is proposing to install four piezometers in April 2020 within the subject site (refer to **Figure 5**). Monthly monitoring of the piezometers will be undertaken in 2020 with a view to obtain peak groundwater levels in winter. In consultation with the DWER, the monitoring data will then be assessed to determine the suitability of the proposed maximum excavation depth (i.e. 1.5 m AHD). Should the data indicate that the maximum excavation depth is overly conservative, the applicant may seek to modify any related licence conditions.

Throughout the life of the quarry the proponent will undertake monthly monitoring from May to October to ensure that a 1.0 m separation to the maximum groundwater level is maintained.

4.4 Domestic and Industrial Waste Products

No domestic or industrial waste will be stored onsite. Any waste material generated during the operational activities will be taken offsite for disposal at an approved landfill facility on a daily basis. Hydrocarbon wastes such as accidental oil spills will be mopped up with absorbent material and segregated for removal and disposal offsite by a licensed contractor.

An approved portable toilet system may be temporarily placed onsite during construction activities. Waste from the toilet system will be disposed of offsite at an approved treatment facility.

4.5 Hydrocarbons and Dangerous Goods Management

Hydrocarbons are the only dangerous goods that will be utilised within the proposed extraction area. However, storage of hydrocarbons on the site will not occur.

Servicing of machinery and equipment will not occur onsite further reducing the possibility of contamination.

There is the minor possibility for soil and water contamination as a result of an incidental hydrocarbon leakages or spills during the operation of machinery. In such instances the management measures specified below will be implemented.

Table 3. Hydrocarbon and dangerous goods management measures.

Timing	Management Measure
During quarry operations	Mobile refuelling of equipment and vehicles will be undertaken following set procedures to acceptably minimise the risk of spills and to ensure adequate containment and bunding is in place to contain any spills that may occur.
	Spill kits containing appropriate equipment for control, containment and cleanup of hydrocarbon and chemical spills will be available in appropriate locations onsite and maintained.
	No vehicles or machinery are to be serviced or cleaned within the extraction area.

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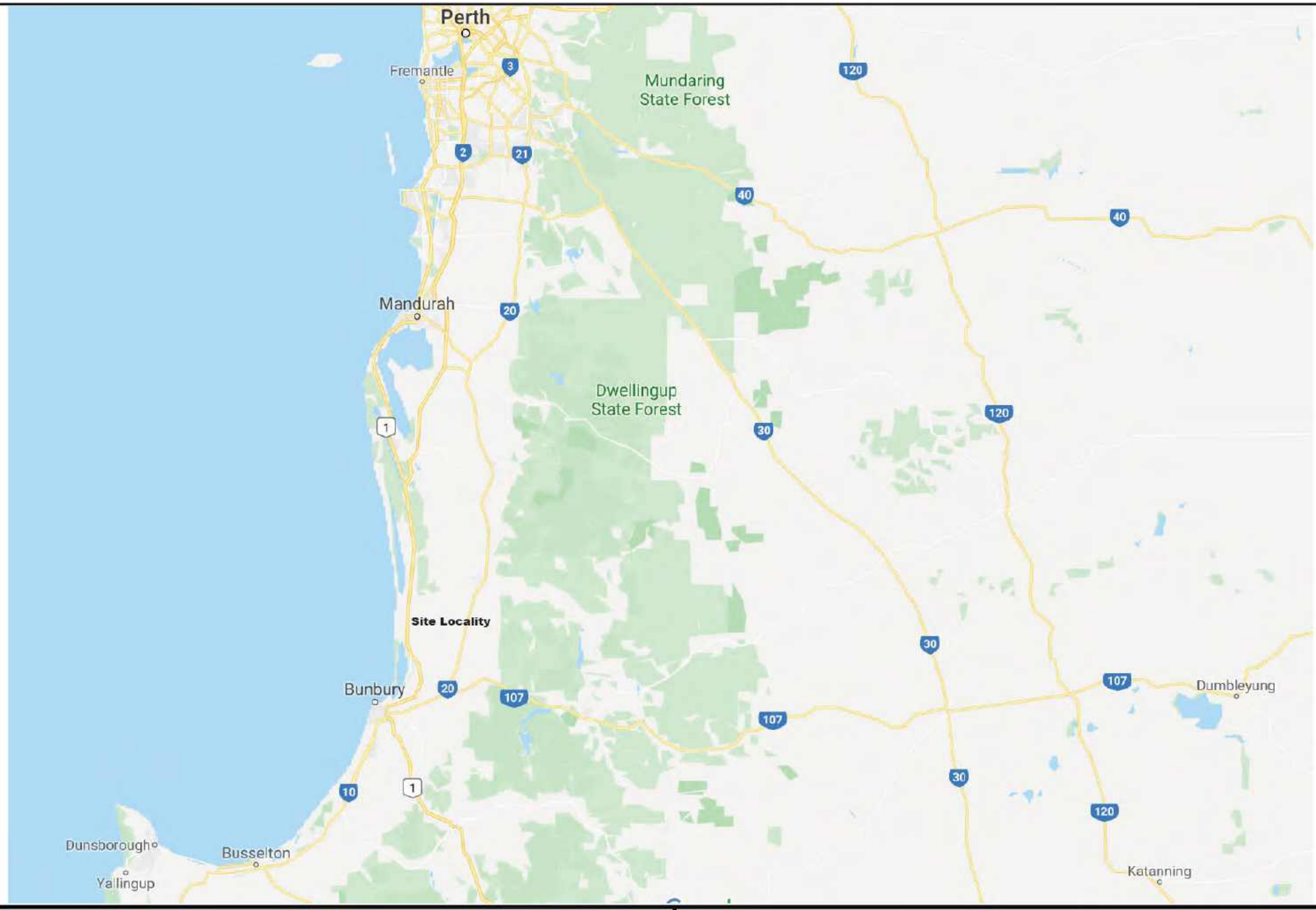
FIGURES



PROJECT **Lot 4 Binningup Road**

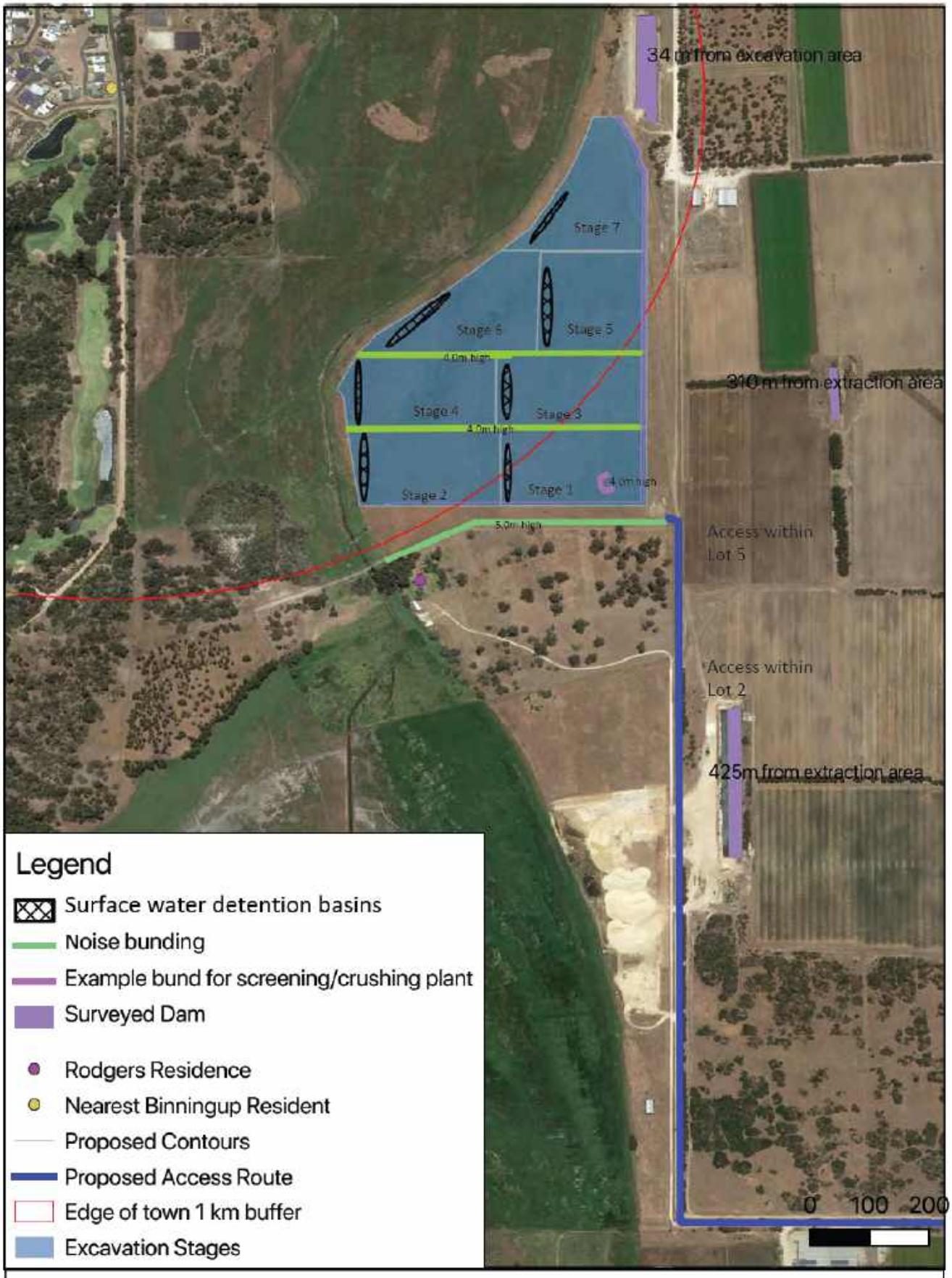
DRAWING TITLE **FIGURE 1 - Site Locality**

CLIENT **MGM Bulk Pty Ltd**

accendo AUSTRALIA
PO Box 5178
West Busselton
Western Australia 6280
Mobile 0416 950 892

Project Number	Drawing Number	Revision
2132	**FIG 1**	**A**

Designed	KMT	Checked	Date 7/6/2021
Drawn	PN	Approved	Sheet 1 of 1
Local Authority		Shire of Harvey	



Legend

- Surface water detention basins
- Noise bunding
- Example bund for screening/crushing plant
- Surveyed Dam
- Rodgers Residence
- Nearest Binningup Resident
- Proposed Contours
- Proposed Access Route
- Edge of town 1 km buffer
- Excavation Stages

PROJECT	Lot 4 Binningup Road	Project Number	Drawing Number	Revision
		2132	Figure 2	A
DRAWING TITLE	Figure 2 Site Extent	Designed PN	Checked	
		Drawn PN	Approved	
CLIENT	MGM Bulk Pty Ltd	Date	17/6/2021	
		Local Authority	Shire of Harvey	
		Sheet 1 of 1		

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PO Box 5178
West Busselton
Western Australia 6280
Mobile 0418 950 852

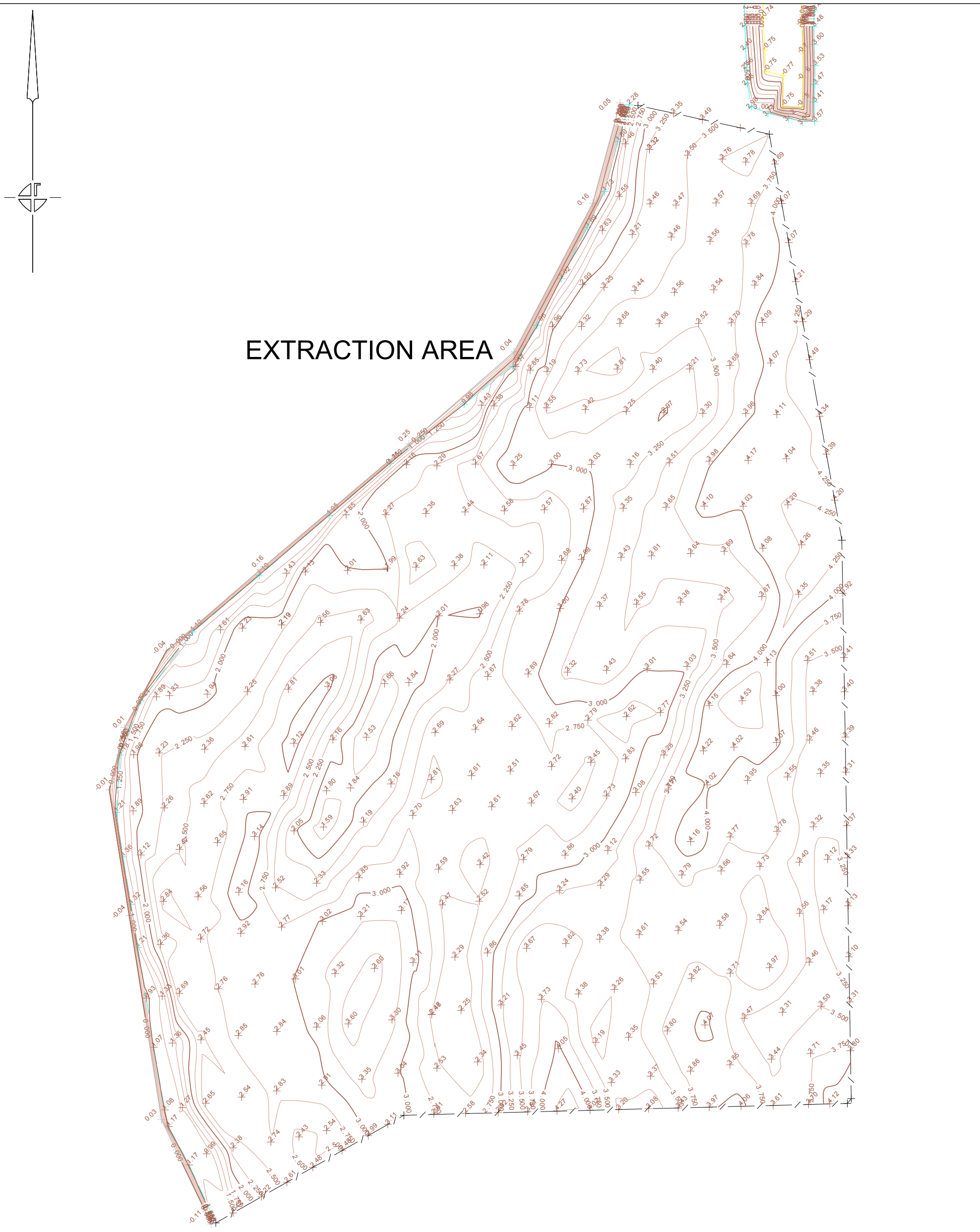

Figure 3: Existing Contours

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eMail: info@thompsonsurveying.com.au

BSI ISO 9001 FS 520415

File: DWG19678 DL		CLIENT:	GM FAMILY TRUST
Scale (@A3)	Vert: N/A Hor: 1 : 3000	PROJECT:	BINNINGUP RD, BINNINGUP
Date: 07/FEB/2020	Rev.n: 0	TITLE:	TOPOGRAPHIC SURVEY
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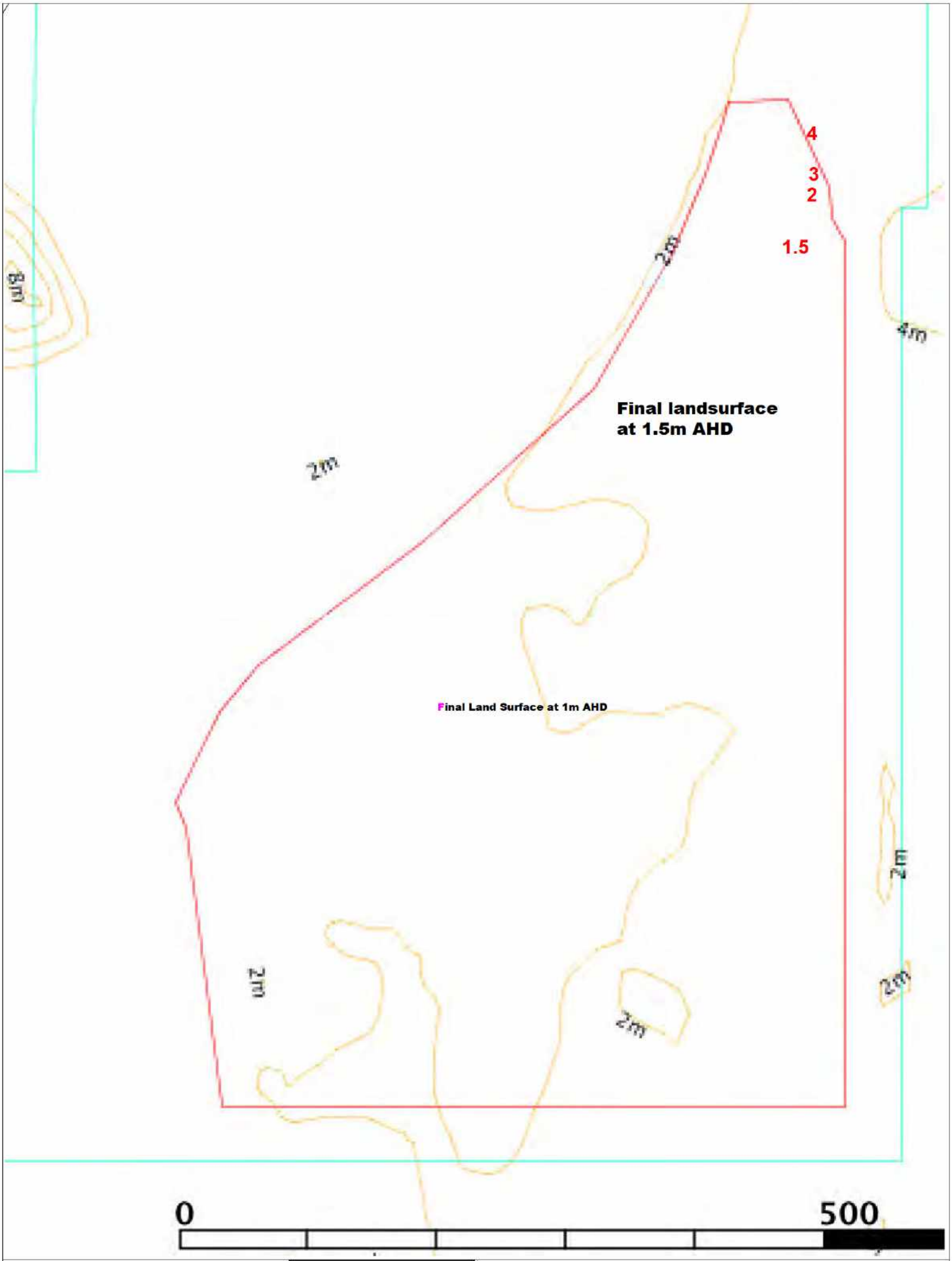

PROJECT **Lot 4 Binningup Rd, Binningup**

DRAWING TITLE **FIGURE 4 -Proposed Contours**

CLIENT **MGM Bulk Pty Ltd**

Legend

Excavation Boundary)
Proposed Contours
Lot Boundary

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Western Australia 6280
Mobile 0418 950 852

Project Number	Drawing Number	Revision
2132	**FIG 4**	**A**

Designed KMT Checked Date 17/6/2021
Drawn PN Approved Sheet 1 of 1
Local Authority Shire of Harvey

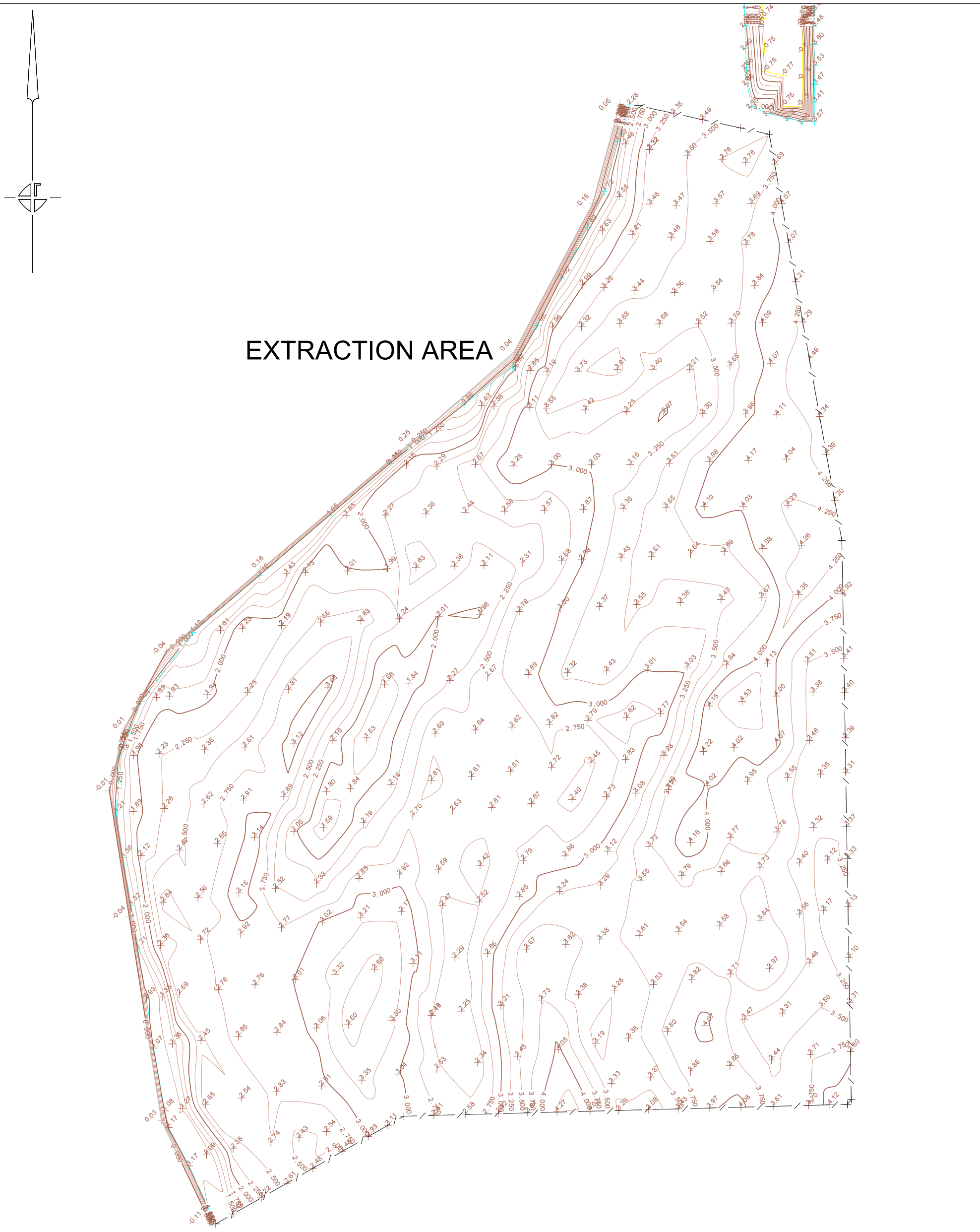

Figure 5. Location of proposed piezometers (blue dots).

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eMail: info@thompsonsurveying.com.au
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File: DWG19678 DL		CLIENT:	GM FAMILY TRUST
Scale (@A3)	Vert: N/A Hor: 1 : 3000	PROJECT:	BINNINGUP RD, BINNINGUP
Date: 07/FEB/2020	Rev.n: 0	TITLE:	TOPOGRAPHIC SURVEY
Checked: DL		DATUM HOR: MGA	VERT: A.H.D.

APPENDIX D – NOISE MANAGEMENT PLAN

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NOISE MANAGEMENT PLAN

LOT 4 BINNINGUP ROAD, BINNINGUP

May 2023

accendo AUSTRALIA

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Document Control

Version	Date	Author	Reviewer
V1	5/05/2020	PN	KMT
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V4	25/11/2020	KMT	AJM
V5	15/04/2023	KMT	CC
Filename	1946_Lot 4 Binningup Rd NMP_v5		

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FIGURES

1 INTRODUCTION

1.1 Background

The GM Giacci Family Trust (the applicant) is proposing to extract limestone from a 26 hectare (ha) area (herein referred to as the subject site) located on Lot 4 Binningup Road, Binningup (refer to **Figure 1**). The subject site is located in the municipality of the Shire of Harvey, approximately 1 km south-east of Binningup and approximately 1 km west of the Forrest Highway.

1.2 Purpose

The purpose of this Noise Management Plan is to identify potential nuisance noise and prescribe measures to mitigate the impact of that nuisance on noise sensitive premises.

Noise producing activities are limited to the operation of vehicle and machine engines. Blasting and drilling, which are significant noise activities, are not proposed.

2 EXTRACTION ACTIVITIES

The limestone quarry will cover an area of approximately 26 ha with a maximum natural elevation of 4.5m AHD. It will be excavated to approximately 1.5m AHD in seven stages, with each stage less than 4 ha in size.

The quarry area has been designed to provide a 30 m setback to the Parkfield agricultural drain, the Multiple Use wetland and the nearest farm dam. Furthermore, a 20 m setback has been provided to the southern Lot boundary.

The planned end use of the quarry is to restore a natural soil profile and return the area to pasture, ensuring that there is no net loss of productive agricultural land.

2.1 Operational Works

The topsoil (nominally 15 cm of the soil profile) and overburden (if present) will be stripped and stockpiled using a loader.

Typical operating hours for quarries will be adopted for the subject site with operations proposed from 7am to 6pm, each Monday to Friday (excluding public holidays), and 7am to 12pm Saturdays. The site will be worked by 2 - 3 persons, depending on market demand.

2.1.1 Limestone Extraction

The limestone within the quarry is relatively soft and can be removed with an excavator or loader without the need for a bulldozer or blasting. It will then be screened to produce products of the correct size. A small mobile crusher is required to prepare the correct grainsize. A summary of the proposed limestone extraction activities conducted within each stage is provided below:

- Prior to excavation commencing the site will be ground surveyed, the excavation footprint marked out and a 1 metre contour plan developed.
- The topsoil (nominally 15 cm of the soil profile) and overburden (if present) will be stripped and stockpiled using a loader.
- Limestone interburden, if encountered, will be incorporated into the overburden dumps for later use in re-contouring the land surface at the conclusion of excavation.
- An excavator or front-end loader will be used to dig and push the limestone down the excavation face.
- The preliminary crushed limestone will then be picked up by a rubber tyred loader and fed to the mobile crusher.
- All static and other equipment, such as crushers and screens, will be located on the floor of the quarry to provide visual and acoustic screening.
- Excavation will commence in the south of the quarry and then move in a northerly direction. The face and walls of the pit will act as noise barriers.
- Upon completion of each section of quarry the section will be reformed and back filled, where subgrade material is available, to achieve the proposed final contours.
- At the end of excavation, the floor of the quarry will be deep ripped, covered by overburden and topsoil, and rehabilitated to a constructed soil.

3 NOISE ASSESSMENT

3.1 Regulation and Guidance

Environmental noise in Western Australia is governed by the *Environmental Protection Act 1986*, through the *Environmental Protection (Noise) Regulations 1997* (the Regulations).

Regulation 7 defines the prescribed standard for noise emissions as follows:

"7. (1) Noise emitted from any premises or public place when received at other premises –

(a) Must not cause or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind; and

(b) Must be free of –

i. tonality;

ii. impulsiveness; and

iii. modulation,

when assessed under regulation 9."

A *"...noise emission is taken to significantly contribute to a level of noise if the noise emission ...exceeds a value which is 5 dB below the assigned level..."*

The closest sensitive receivers are located in the township of Binningup, with the closest receiver 680 metres from the extraction area.

No commercial or industrial land uses were found within 450 metres of the receivers so the influencing factor is zero and the baseline assigned levels provided in Regulation 8 and shown in **Table** 1 would apply.

Table 1. Baseline assigned noise levels.

Time of Day	Assigned Level (dB)		
	L_{A10}	L_{A1}	L_{Amax}
0700 to 1900 hours Monday to Saturday (Day)	45 + influencing factor	55 + influencing factor	65 + influencing factor

3.2 Noise Sources

The project works will involve the use of machinery and equipment that will generate noise during operation. Sources of noise from the subject site will include:

- Machinery noise from equipment use.
- Noise from safety equipment (beepers on machinery).
- Noise from trucks departing the site.

Reversing alarms can represent significant nuisance noise to sensitive receptors. There are a number of alternatives to alarms that maintain a safe work environment and also comply with occupational health and safety legislation. Reversing alarms alert pedestrians when a vehicle is moving, however, given that no pedestrians will be onsite (private property), the applicant has committed to using flashing lights or a broadband alarm system as an alternative. The sound of a broadband alarm is much less intrusive by

nature than the sound of a tonal alarm and tends to be masked by the background noise at a lesser distance. This will eliminate/reduce noise emissions associated with reversing alarms.

3.3 Wind Direction

Annual wind data has been obtained from the Bunbury Bureau of Meteorology station (ID: 94604), located approximately 38 km from the proposed extraction area. Speed and direction frequency wind roses indicate winds at Bunbury are bimodal, with the two dominant directions of east and west. The land-sea breeze cycle dominates the prevailing winds of the region, particularly over summer, with moderate easterly winds in the morning and stronger southerly sea breezes in the afternoon commencing around noon and weakening during the evening. The sea breeze may occur in all seasons, although it is most frequent and intense during the summer months.

During the summer months the dominant wind in the mornings is from the south-east at 10-14 knots, swinging to the south-west at 20-25 knots in the afternoon. During winter, the winds are most commonly 10-14 knots with no dominant prevailing direction. During storm events, winds from the west and north-west can reach 40 knots.

Wind can carry noise greater distances than expected, or conversely disperse noise more quickly. With noise sensitive premises located in a north-westerly direction from the proposed extraction area, an analysis of the wind rose data has yielded the following conclusions:

- During the summer months, the morning prevailing easterly wind may direct noise in a westerly direction, whilst the afternoon sea breeze may direct noise in an easterly direction; and
- During the winter months, storm winds are from the west which may direct noise in an easterly direction.

3.4 Noise Assessment

An acoustic assessment (Lloyd George Acoustics 2022) has been prepared for the subject site to determine noise emissions from the proposed limestone extraction operation in consideration of the allowable levels prescribed within the *Environmental Protection (Noise) Regulations 1997* (refer to **Appendix A**).

The environmental noise assessment involved manipulation of *SoundPLAN 8.2* software with the CONCAWE algorithms, incorporating the ISO 171534-3 improved method. These algorithms were selected as they include the influence of wind and atmospheric stability. Input data required in the model included:

- Meteorological information (representing worst-case conditions);
- Topographical data;
- Ground absorption; and
- Source sound power levels.

Results were generated for the following scenario:

- Worst-case meteorological conditions;
- Operational activities included a loader working at the quarry face, a loader loading material at the crushing and screening plant, with the crusher and screens operating; and
- No implementation of noise mitigation/management measures.

Based on the above scenario, for the worst-case conditions, noise levels are predicted to marginally exceed assigned levels at the nearest Binningup resident (R4).

Accordingly, with the provision of the noise mitigation measures (as provided within **Section 4**), during worst-case conditions, no exceedances of the *Environmental Protection (Noise) Regulations 1997* will occur at any of the identified sensitive receptors.

4 MANGEMENT MEASURES

The applicant will ensure that all noise emissions will comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* as far as reasonably practicable. Management of the operational processes associated with the extractive industry can further reduce any adverse noise impacts.

To ensure dust, noise and visual impacts to residents in the Binningup townsite are minimised as far as practicable, the crushing and screening plant will always be located 1 km from the closest residents in Binningup. The acoustic assessment (Lloyd George Acoustics 2022) has assumed that the crushing and screening plant will be relocated throughout the extraction area to reduce travel distance. However, maintaining the crushing and screening plant within the 1km buffer will not have a significant effect and noise will remain compliant with the *Environmental Protection (Noise) Regulations 1997* (pers. comm., Daniel Lloyd, Lloyd George Acoustics).

Crushing and screening will be undertaken in designated areas (1 km from nearest Binningup resident) with the greatest natural protection from winds (concealed at the lowest contours) which simultaneously minimise wind-borne dust emissions and dissipate noise emissions. Excavation and processing will be conducted on the floor of the pit, 3 metres below natural ground level behind constructed perimeter bunds.

Similarly, limestone excavation will occur below natural ground level. The excavation walls will act as a noise insulator for operations in the pits.

In addition, the management measures prescribed within **Table 2** will be implemented to reduce noise emissions.

Table 2. Management actions for noise.

Item	Action	Trigger/Timing	Responsibility
Inductions			
1	As part of site inductions, employees, contractors and visitors to the site are reminded of their responsibility to undertake work activities in an environmentally sensitive manner, including minimising noise while on site, or entering and leaving the site.	Ongoing	Site Manager
Planning Controls			
2	Daily Planning • The use of significant noise generating equipment or activities simultaneously is avoided. • The noisiest activities are scheduled to the least sensitive times of the day (i.e. crushing and screening during the middle of the day if possible).	Where possible	Site Manager
3	Quarry Planning • Seasonal variations are to be considered to reduce noise emissions where practicable.	Where possible	Site Manager
4	Regular review of meteorological data, specifically wind speed and direction, to guide decisions on quarrying activities.	As required, with consideration to the intensity of activities onsite and the prevailing weather conditions	Site Manager
Operational Controls			
5	Equipment and Machinery • Use machinery and equipment with minimal noise output levels. • Ensure all machinery is regularly serviced as per the equipment's maintenance schedule to minimise noise generation. • Where appropriate, all machinery and equipment will be shut off when not in use. • Use flashing lights/broadband alarms instead of tonal reversing alarms on excavators/loaders. • Apply speed restrictions (10 km/hr within site) and a ban on exhaust braking.	Continuous	All employees & contractors
6	Earth Bunds • Establish a 4m high earth bund on the southern boundary of the extraction area (refer to **Figure 1)** for	Prior to quarrying	Site Manager

Item	Action	Trigger/Timing	Responsibility
Inductions			
	the duration of the quarry life. • Establish a 4m high earth bund around the crushing and screening plant (refer to **Figure 1**).		
Complaints Management			
7	Erect on-site signage directing public to make complaints to the relevant person.	Prior to quarrying	Site Manager
8	Maintain a complaints register (refer to **Appendix B**). A Complaints Register will be established for the site to record the following information: • Date, time, location and nature of the exceedance. • Identify the cause (or likely cause) of the exceedance and responsible parties. • Identify the activities that were occurring at the time of the non-compliance. • Determine the activities that were most likely contributing to the non-compliance. • Describe what action has been taken to date. • Describe the proposed measures to address the exceedance. If the complaint is verified as being due to a site source, remedial action will be undertaken within 2 hours. The Shire of Harvey will be advised of all complaints as soon as they are received. If a compliant cannot be resolved within the 2 hour response period, it may be necessary to cease operations.	Upon receiving complaint	Site Manager

FIGURES

APPENDIX A – NOISE ASSESSMENT

Lloyd George Acoustics

[redacted]

Environmental Noise Assessment

Limestone Extraction Quarry
Lot 4 Binningup Road, Binningup

Reference: 20065584-01C

Prepared for:
GM Giacci Family Trust

Report: 20065584-01C

[redacted]

This report has been prepared in accordance with the scope of services described in the contract or agreement between Lloyd George Acoustics Pty Ltd and the Client. The report relies upon data, surveys, measurements and results taken at or under the particular times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by the Client. Furthermore, the report has been prepared solely for use by the Client, and Lloyd George Acoustics Pty Ltd accepts no responsibility for its use by other parties.

[redacted]

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Appendices

1 INTRODUCTION

The GM Giacci Family Trust (the applicant) is proposing to extract limestone from a 26 hectare (ha) area located on Lot 4 Binningup Road, Binningup, Western Australia.

The limestone quarry will cover an area of approximately 26 ha with a maximum natural elevation of 4.5m AHD. It will be excavated to approximately 1.5m AHD in seven stages. The actual location of the stages may vary slightly as a range of variables affect actual pit layout.

Figure 1-1, shows the location of the site together with the closest noise sensitive receivers, and the proposed stages.

Figure 1-1 Project Locality & Closest Receivers

The operations consist of limestone extraction and crushing on-site, with the crushing plant located generally within the stage being extracted to limit the distance required to travel between the quarry face and the crusher. Product will be hauled off-site requiring approximately eight truck movements per day, depending on demand. Access to the property will be via the existing limestone road within Lot 4 Binningup Road and Lot 2 Springhill Road (owned by Coast Pastoral Company Pty Ltd), and the sealed Springhill Road that exits onto National Route 1, Forrest Highway. Typical operating hours of the quarry will be from 7.00 am to 6.00 pm, Monday to Friday (excluding public holidays) and 7.00 am to 12.00 pm Saturdays.

This report presents the assessment of the noise emissions from limestone extraction, including crushing and haulage, against the allowable levels of the *Environmental Protection (Noise) Regulations 1997*.

Appendix A contains a description of some of the terminology used throughout this report.

2 CRITERIA

Environmental noise in Western Australia is governed by the *Environmental Protection Act 1986*, through the *Environmental Protection (Noise) Regulations 1997* (the Regulations).

Regulation 7 defines the prescribed standard for noise emissions as follows:

"7. (1) Noise emitted from any premises or public place when received at other premises –

(a) Must not cause or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind; and

(b) Must be free of –

i. tonality;

ii. impulsiveness; and

iii. modulation,

when assessed under regulation 9"

A "…noise emission is taken to significantly contribute to a level of noise if the noise emission … exceeds a value which is 5 dB below the assigned level…"

Tonality, impulsiveness and modulation are defined in Regulation 9. Noise is to be taken to be free of these characteristics if:

(a) The characteristics cannot be reasonably and practicably removed by techniques other than attenuating the overall level of noise emission; and

(b) The noise emission complies with the standard prescribed under regulation 7 after the adjustments of *Table 2-1* are made to the noise emission as measured at the point of reception.

Table 2-1 Adjustments Where Characteristics Cannot Be Removed

Where Noise Emission is Not Music			Where Noise Emission is Music	
Tonality	Modulation	Impulsiveness	No Impulsiveness	Impulsiveness
+ 5 dB	+ 5 dB	+ 10 dB	+ 10 dB	+ 15 dB

Note: The above are cumulative to a maximum of 15dB.

The baseline assigned levels (prescribed standards) are specified in Regulation 8 and are shown in *Table 2-2*.

Table 2-2 Baseline Assigned Noise Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area[1]	0700 to 1900 hours Monday to Saturday (Day)	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and public holidays (Sunday)	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days (Evening)	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Industrial	All hours	65	80	90

1. ***highly sensitive area*** means that area (if any) of noise sensitive premises comprising —
   (a) a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
   (b) any other part of the premises within 15 metres of that building or that part of the building.

The closest noise sensitive receiver is located approximately 640 metres to the west of the extraction area within the township of Binnignup. The property directly to the south of the extraction area, being 98 Springfield Road, is located within the boundaries of the operations and is therefore considered to be a "caretaker's" residence. Under Schedule 1, Part A of the Regulations, this property is considered to be an Industrial premises.

No commercial or industrial land uses were found within 450 metres of the noise sensitive receivers so the influencing factor is zero and the baseline assigned levels provided in *Table 2-2* would apply.

As the assigned noise levels are statistical levels and therefore the period over which they are determined is important. The Regulations define the Representative Assessment Period (RAP) as *a period of time of not less than 15 minutes, and not exceeding 4 hours*, which is determined by an *inspector* or *authorised person* to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission. An *inspector* or *authorised person* is a person appointed under Sections 87 & 88 of the *Environmental Protection Act 1986* and include Local Government Environmental Health Officers and Officers from the Department of Environment Regulation. Acoustic consultants or other environmental consultants are not appointed as an *inspector* or *authorised person*. Therefore, whilst this assessment is based on a 4 hour RAP, which is assumed to be appropriate given the nature of the operations, this is to be used for guidance only.

2.1 Reversing Alarms on Mobile Plant

With regards to noise from reversing alarms, regulation 3(1)(h) states:

(1) Nothing in these regulations applies to the following noise emissions —

(h) noise emissions from —

(i) a reversing alarm fitted to a motor vehicle, mobile plant, or mining or earthmoving equipment;

If -

(iii) it is a requirement under another written law that such an alarm be fitted; and

(iv) it is not practicable to fit an alarm that complies with the written law under which it is required to be fitted and emits noise that complies with these regulations;

It is considered that any reversing alarms fitted to the mobile plant and transport trucks are not necessarily exempt under the Regulations, since they are not specifically required under another written law.

The commonly used fixed noise output tonal reversing alarms also known as 'reversing beeper' emit, by their very nature, tonal and modulating noise at high levels. As such, this type of reversing alarm generally cannot comply with the Regulations even at distant receivers. Alternative alarms such as broadband alarms are commonly used to minimise the impact.

3 METHODOLOGY

3.1 Noise Monitoring

Under the Regulations, there are certain requirements that must be satisfied when undertaking measurements and are defined in Regulations 19, 20, 22 and 23 and Schedule 4. In undertaking the measurements, these have been satisfied, specifically noting the following:

- The noise data loggers used was an ARL Ngara Type 1 statistical noise data logger (Serial No. 878115);
- This equipment holds current laboratory certificates of calibration that are available upon request. The equipment was also field calibrated before and after and found to be within +/- 0.5 dB.
- The microphone was fitted with a standard wind screen.
- The microphone was at least 1.2 metres above ground level and at least 3.0 metres from reflecting facades (other than the ground plane).

Measurements were recorded on site between 25th January and 3rd February 2021. The sample period was set to 15-minutes and various percentile data recorded.

3.2 Noise Modelling

Computer modelling has been used to predict noise levels at each nearby receiver. The advantage of modelling is that it is not affected by background noise sources and can provide the noise level for various weather conditions and operating scenarios.

The software used was *SoundPLAN 8.2* with the CONCAWE algorithms incorporating the ISO 171534-3 improved method selected. These algorithms have been selected as they include the influence of wind and atmospheric stability. Input data required in the model are:

- Meteorological Information;
- Topographical data;
- Ground Absorption; and
- Source sound power levels.

3.3 Meteorological Information

Meteorological information utilised is provided in *Table 3-1* and is considered to represent worst-case conditions for noise propagation. At wind speeds greater than those shown, sound propagation may be further enhanced, however background noise from the wind itself and from local vegetation is likely to be elevated and dominate the ambient noise levels.

Table 3-1 Modelling Meteorological Conditions

Parameter	Day (0700-1900)
Temperature (°C)	20
Humidity (%)	50
Wind Speed (m/s)	4
Wind Direction*	All
Pasquil Stability Factor	E

* Note that the modelling package used allows for all wind directions to be modelled simultaneously.

It is generally considered that compliance with the assigned noise levels needs to be demonstrated for 98% of the time, during the day and night periods, for the month of the year in which the worst-case weather conditions prevail. In most cases, the above conditions occur for more than 2% of the time and therefore must be satisfied.

3.4 Topographical Data

Topographical data for the quarry area natural ground surface was provided by Accendo Australia in the form of 1 metre contour lines and also sourced from *GoogleEarth* in the form of spot heights. It is noted the land is undulating and slopes up in an westward direction. Binningup township is generally situated behind a natural bund. The pit floor level is assumed to be at 1.5 metres AHD.

3.5 Ground Absorption

Ground absorption varies from a value of 0 to 1, with 0 being for an acoustically reflective ground (e.g. water or bitumen) and 1 for acoustically absorbent ground (e.g. grass). In this instance, a value of 0.5 (mix of sand and gravel, wet soil) has been used as an average across the quarry area and 1.0 for the rural land between the quarry and the receivers.

3.6 Source Sound Levels

The sound power levels used in the modelling are provided in *Table 3-2*.

Table 3-2 Source Sound Power Levels

Description	Octave Band Centre Frequency (Hz)								Overall dB(A)
	31.5	63	125	250	500	1k	2k	4k	
Impact Crusher (Terex Finlay I-130)	109	119	116	110	111	108	105	100	**114**
Supertrak (Terex Finlay 693+) Screen	107	106	106	105	107	105	101	98	**109**
Stacker (Terex Finlay 632)	94	95	93	94	88	93	90	78	**96**
CAT 972 Front End Loader	109	111	102	96	106	106	102	96	**109**
CAT 330F Excavator	98	101	112	111	96	94	93	89	**105**

The overall noise levels for the fixed plant (e.g. crusher, screen and the stacker) were taken from the previous noise studies. Mobile equipment sound power levels are sourced from manufacturer's data. Spectral information was derived from data already on file for similar equipment.

In addition to the above, the following is noted in regard to each source:

- The sound power levels represent L_{10} source levels for normal operation; and
- All equipment was modelled as a point source located 2.0 metres above local ground/quarry floor.

4 RESULTS

4.1 Noise Monitoring

The purpose of undertaking ambient noise measurements is to determine whether the subject noise, particularly annoying characteristics such as tonality, is likely to be audible above background levels. To achieve this, the noise level that is exceeded for 90% of the time (lowest 10%) over a 15 minute period (L_{A90} level) is calculated and then the 90th percentile of that level is used as the background level over the corresponding time period.

While the subject noise may not be audible at all times, due to short-term noise events such as traffic or farm machinery (L_{A10} level), the overall background level can be used to determine if the subject noise is likely to be audible during times when no other noise events are occurring.

The noise level in each 15-minute interval is shown *Figure 4-1*. The overall background noise level for the day period (when excavation works are to be carried out) is calculated as 38 dB L_{A90}.

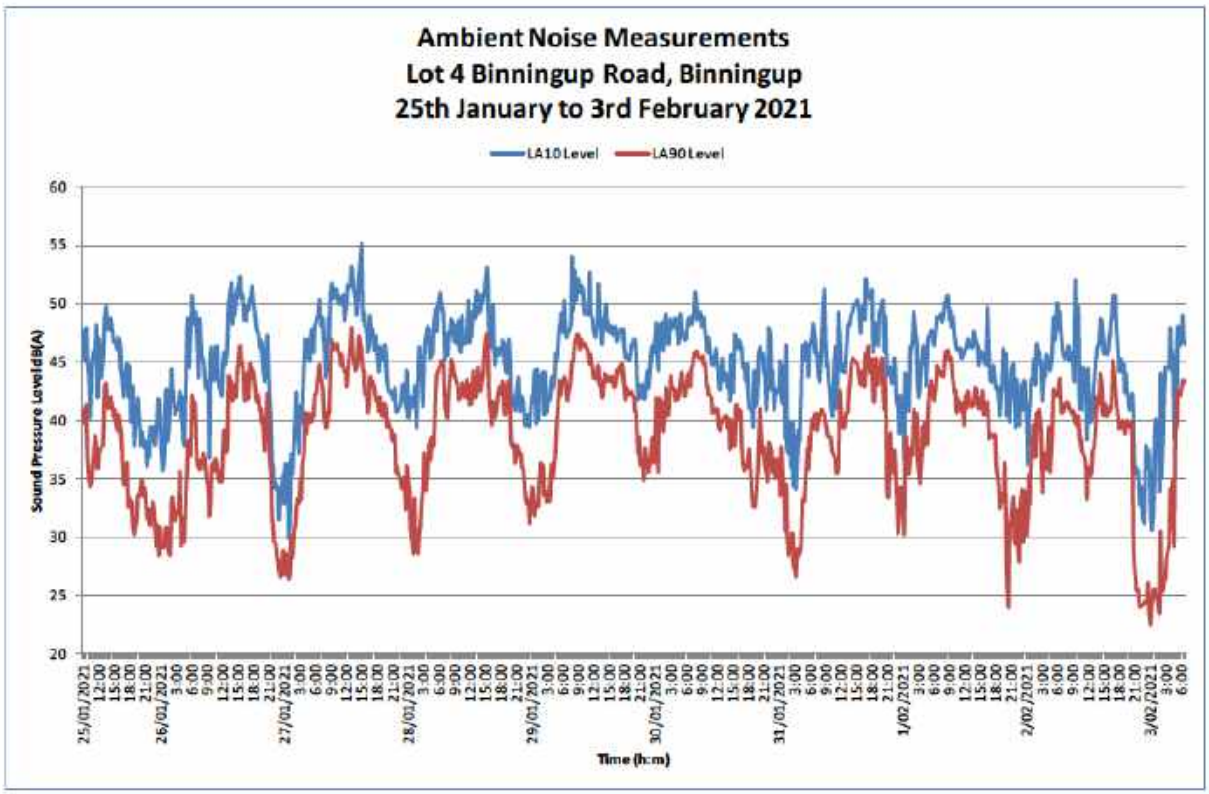

Figure 4-1 Results of Ambient Noise Measurements

4.2 Extraction Works

The results of the noise predictions to sensitive receivers, resulting from the extraction works in Stages 2 and 6, being considered as worst-case for Receiver R6 and for the Binningup Townsite respectively, is presented in *Table 4-1*.

The predictions assume a loader is working at the quarry face, a loader is loading material at the crushing and screening plant, with the crusher and screens are operating. Mitigation measures are not assumed for this scenario.

The locations of the noise sensitive receivers and the "caretaker's" residence (R6) are detailed in *Figure 4-2*.

Table 4-1 Predicted Noise Levels, dB L_{A10} Assuming No Mitigation Measures

Receiver	Predicted Noise Level L_{A10}, dB		Adjusted* Noise Level L_{A10}, dB		Comments
	Stage 2	Stage 6	Stage 2	Stage 6	
R1	31	25	36	30	Complies with daytime assigned level
R2	35	38	40	43	Complies with daytime assigned level
R3	36	39	41	44	Complies with daytime assigned level
R4	39	41	44	46	Exceeds daytime assigned level
R5	38	39	43	44	Complies with daytime assigned level
R6	58	45	63	50	Complies at all times

** Adjusted by +5 dB for tonality as detailed in Table 2-1.*

It can be seen that the predicted noise levels are significantly above the ambient noise measurements of 38 dB L_{A90} at some locations. Therefore, any tonal noise characteristics are likely to be audible and the results must be adjusted to include a +5 dB penalty.

Figure 4-2

Limestone Extraction Quarry - Lot 4 Binningup Road, Binningup
Receiver Locations & Quarry Extents

Lloyd George Acoustics
www.lgacoustics.com.au
(08) 9401 7770

5 ASSESSMENT & RECOMMENDATIONS

From *Table 4-1*, it can be seen that noise levels are predicted to exceed assigned levels at the closest residences in Binningup (R4). As such, noise mitigation measured must be considered.

The recommended noise mitigation is in the form of noise bunds located around the crushing and screening plant.

It is considered to be good practice to reduce the noise emissions to "caretaker's" residences, if practicable, and a 4m high bund should be considered along the southern boundary to achieve a reasonable reduction in noise levels to this receiver. The bund located on the southern boundary of the extraction area would remain in place for the duration of the quarry life and rehabilitation program.

The proposed bund locations and heights are provided in *Figure 5-1*.

The predicted noise levels to noise sensitive receivers, for each stage of the quarry life and assuming the recommended noise mitigation measures, including a noise bund on the southern boundary, is provided in *Table 5-1.*

Table 5-1 Predicted Noise Levels, dB L_{A10} to Sensitive Receivers during Extraction

Receiver	Predicted Noise Level L_{A10}, dB							Comments
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	
R1	20	29	20	27	22	22	22	Complies with daytime assigned level
R2	30	32	32	34	35	35	35	Complies with daytime assigned level
R3	32	33	33	35	36	36	36	Complies with daytime assigned level
R4	34	36	35	38	38	39	37	Complies with daytime assigned level
R5	33	35	34	37	36	37	35	Complies with daytime assigned level
R6	50	48	46	46	42	42	38	Complies with assigned level at all times

While plant of this nature generally exhibits tonal noise characteristics, the existing ambient noise level of 38 dB L_{A90} is only marginally below the highest predicted noise level of 39 dB L_{A10} and therefore this noise characteristic is not likely to be audible at the nearest sensitive receivers. However, even with an adjustment of +5 dB, as detailed in *Table 2-1*, the assigned level is met at each noise sensitive receiver.

The predicted noise levels for each if the stages are also shown graphically in *Figures 5-2 to 5-8*.

It should be noted that construction of the earth bunds would be covered by regulation 13 of the Regulations. In this regulation, the assigned levels do not apply during normal working hours providing good management of noise is undertaken.

Figure 5-1

Signs and symbols
- Berm
- Point source

N

Length Scale
0 30 60 120 180 240 m

Limestone Extraction Quarry - Lot 4 Binningup Road, Binningup
Location and Heights of Noise Bunds - Stage Bunding shows Stage 4

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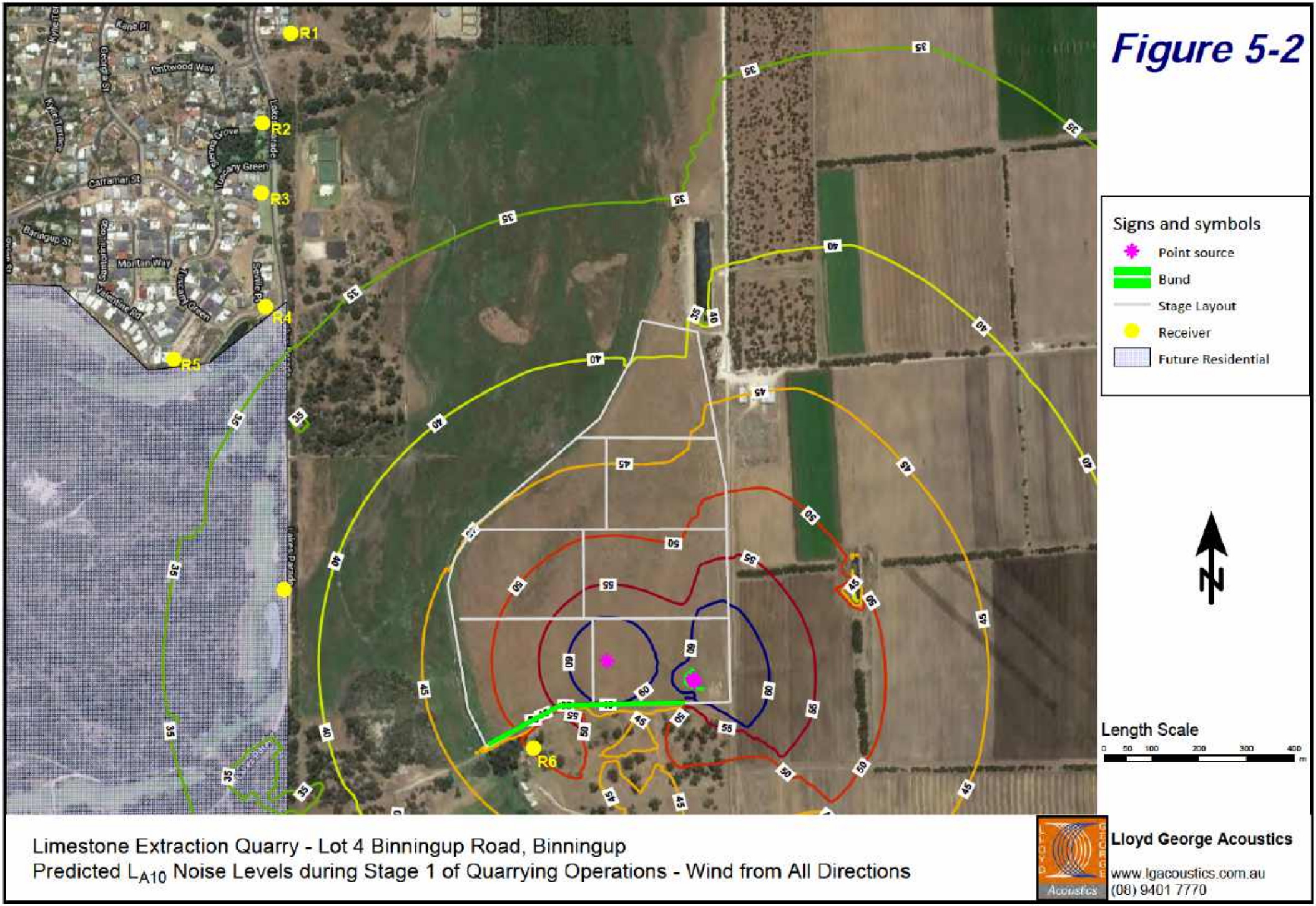
(08) 9401 7770

Figure 5-2



Limestone Extraction Quarry - Lot 4 Binningup Road, Binningup
Predicted L_{A10} Noise Levels during Stage 1 of Quarrying Operations - Wind from All Directions

Lloyd George Acoustics
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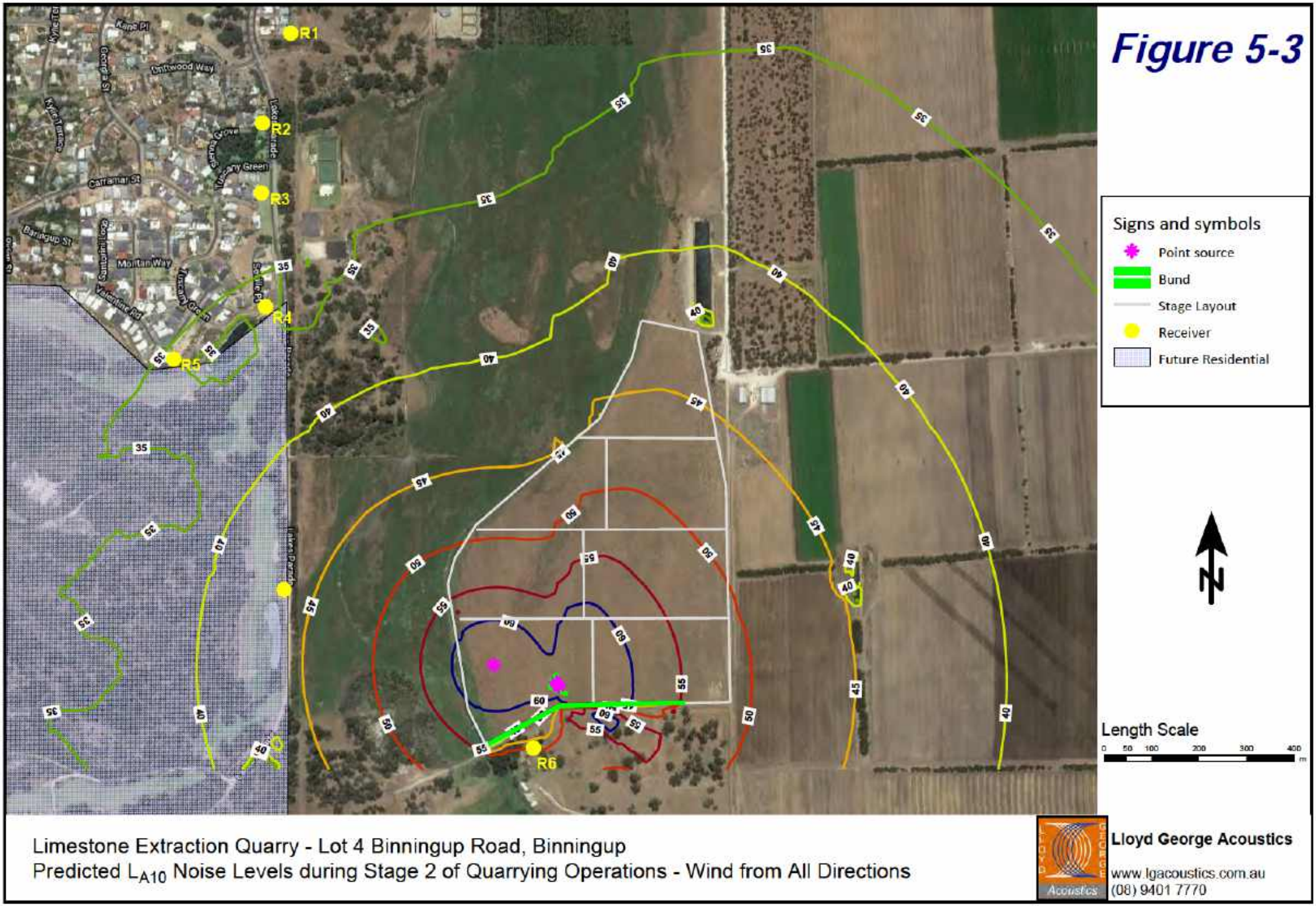
Figure 5-3
R1
R2
R3
R4
R5
R6
Signs and symbols
Point source
Bund
Stage Layout
Receiver
Future Residential
Length Scale
0 50 100 200 300 400 m
Limestone Extraction Quarry - Lot 4 Binningup Road, Binningup
Predicted L_{A10} Noise Levels during Stage 2 of Quarrying Operations - Wind from All Directions
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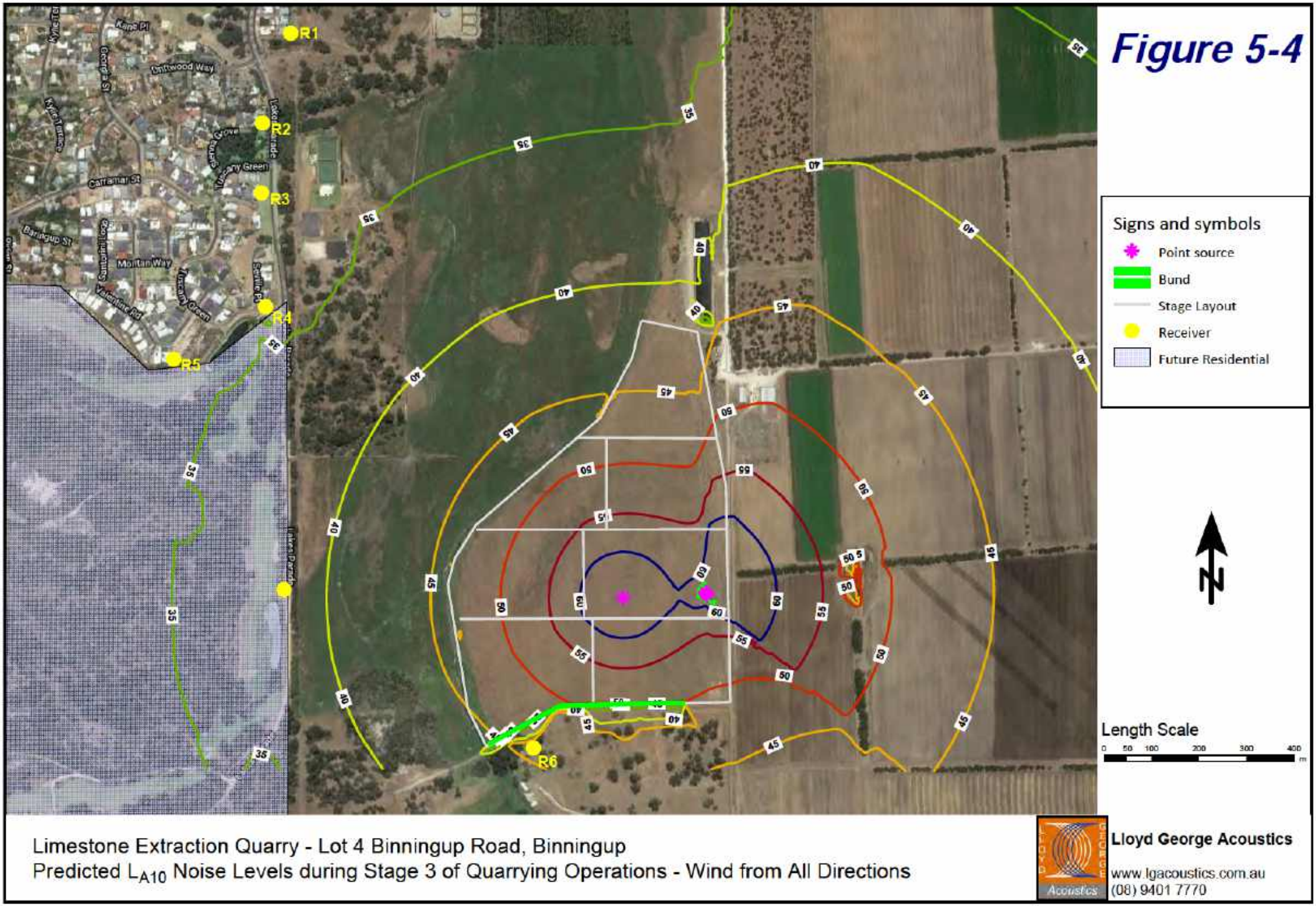
Figure 5-4
R1
R2
R3
R4
R5
R6
Signs and symbols
Point source
Bund
Stage Layout
Receiver
Future Residential
Length Scale
0 50 100 200 300 400 m
Limestone Extraction Quarry - Lot 4 Binningup Road, Binningup
Predicted L_{A10} Noise Levels during Stage 3 of Quarrying Operations - Wind from All Directions
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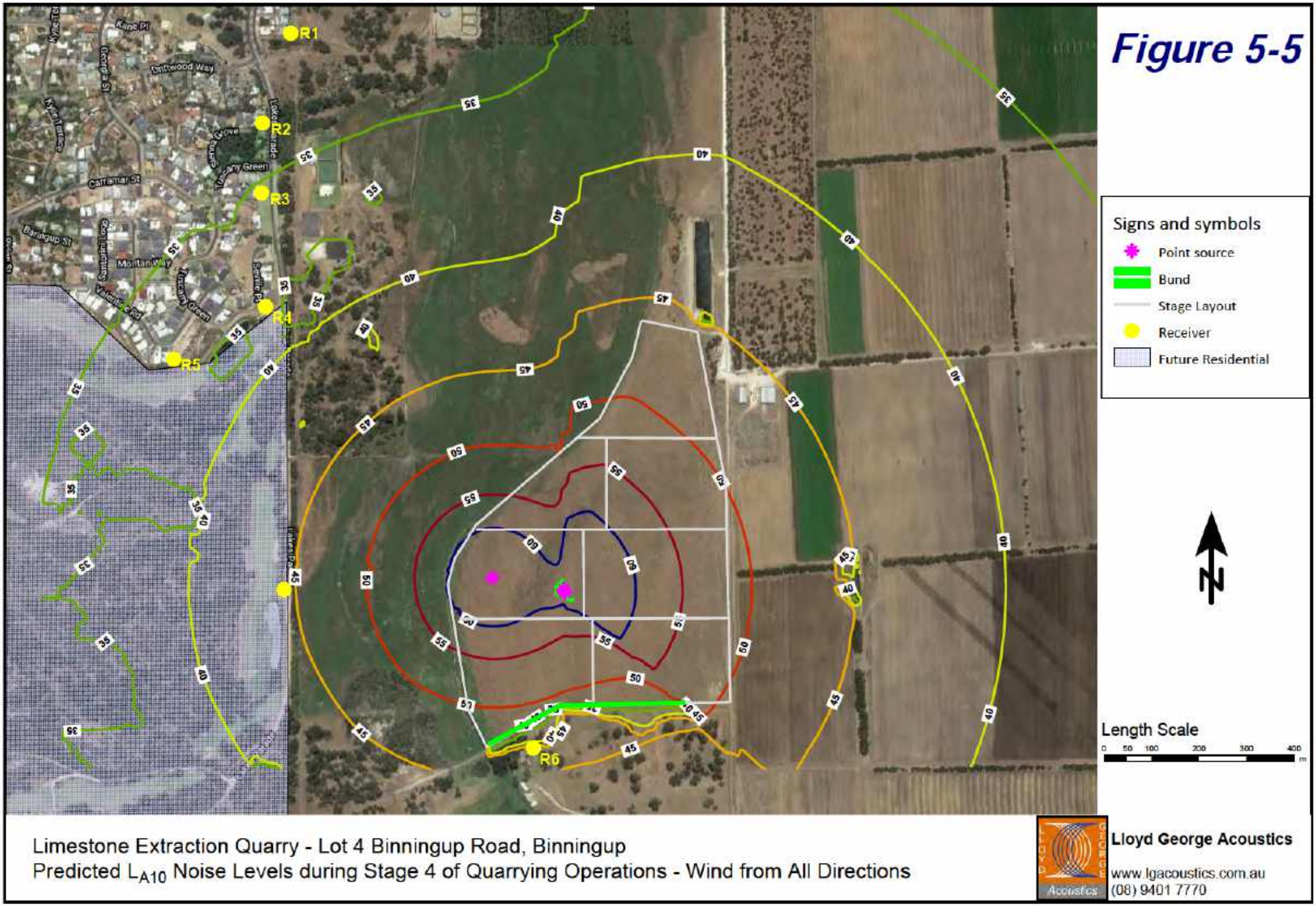
Figure 5-5
R1
R2
R3
R4
R5
R6
Signs and symbols
Point source
Bund
Stage Layout
Receiver
Future Residential
Length Scale
0 50 100 200 300 400 m
Limestone Extraction Quarry - Lot 4 Binningup Road, Binningup
Predicted L_{A10} Noise Levels during Stage 4 of Quarrying Operations - Wind from All Directions
Lloyd George Acoustics
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Figure 5-6

Limestone Extraction Quarry - Lot 4 Binningup Road, Binningup
Predicted L_{A10} Noise Levels during Stage 5 of Quarrying Operations - Wind from All Directions

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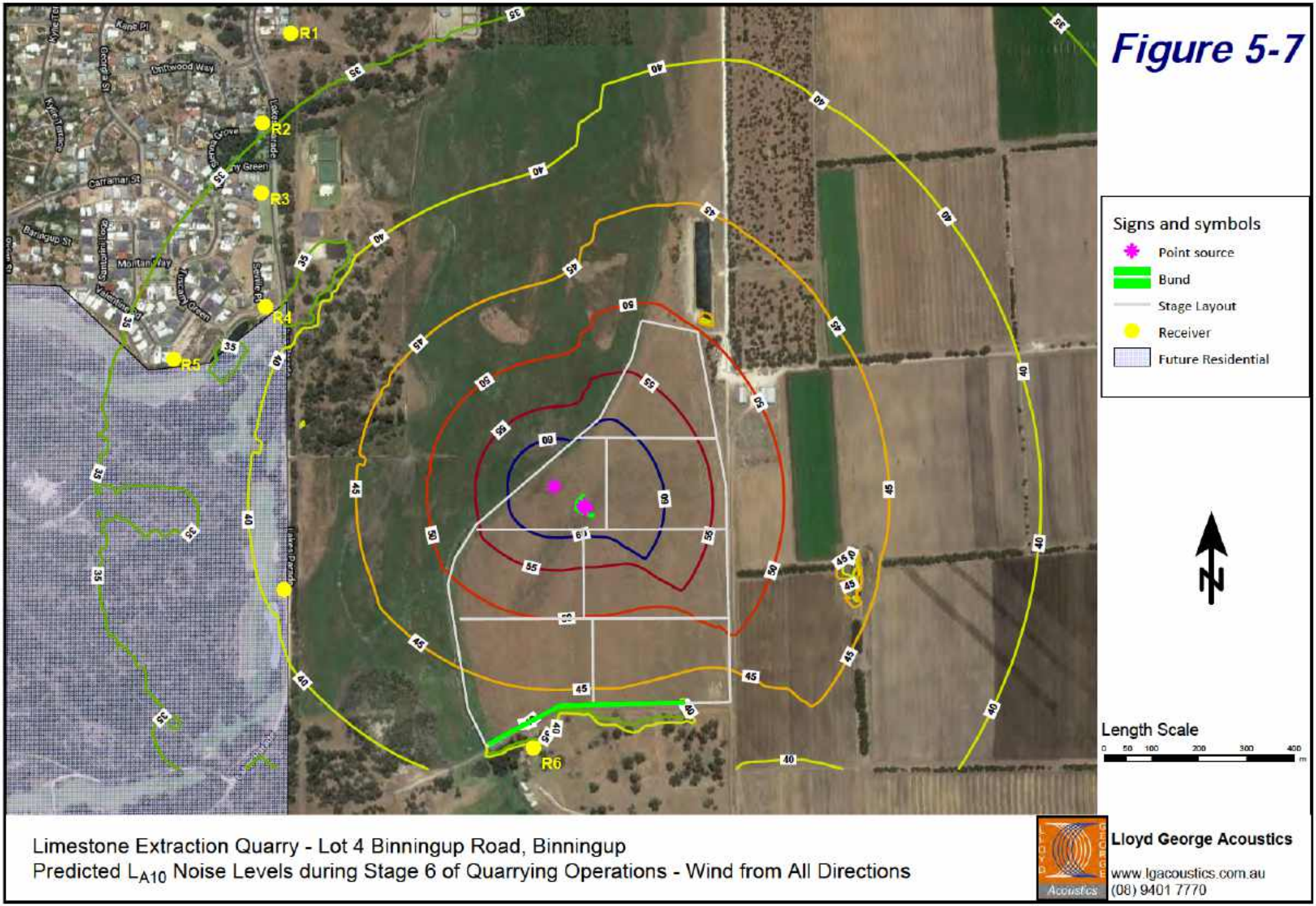
Figure 5-7
R1
R2
R3
R4
R5
R6
Signs and symbols
Point source
Bund
Stage Layout
Receiver
Future Residential
Length Scale
0 50 100 200 300 400 m
Limestone Extraction Quarry - Lot 4 Binningup Road, Binningup
Predicted L_{A10} Noise Levels during Stage 6 of Quarrying Operations - Wind from All Directions
Lloyd George Acoustics
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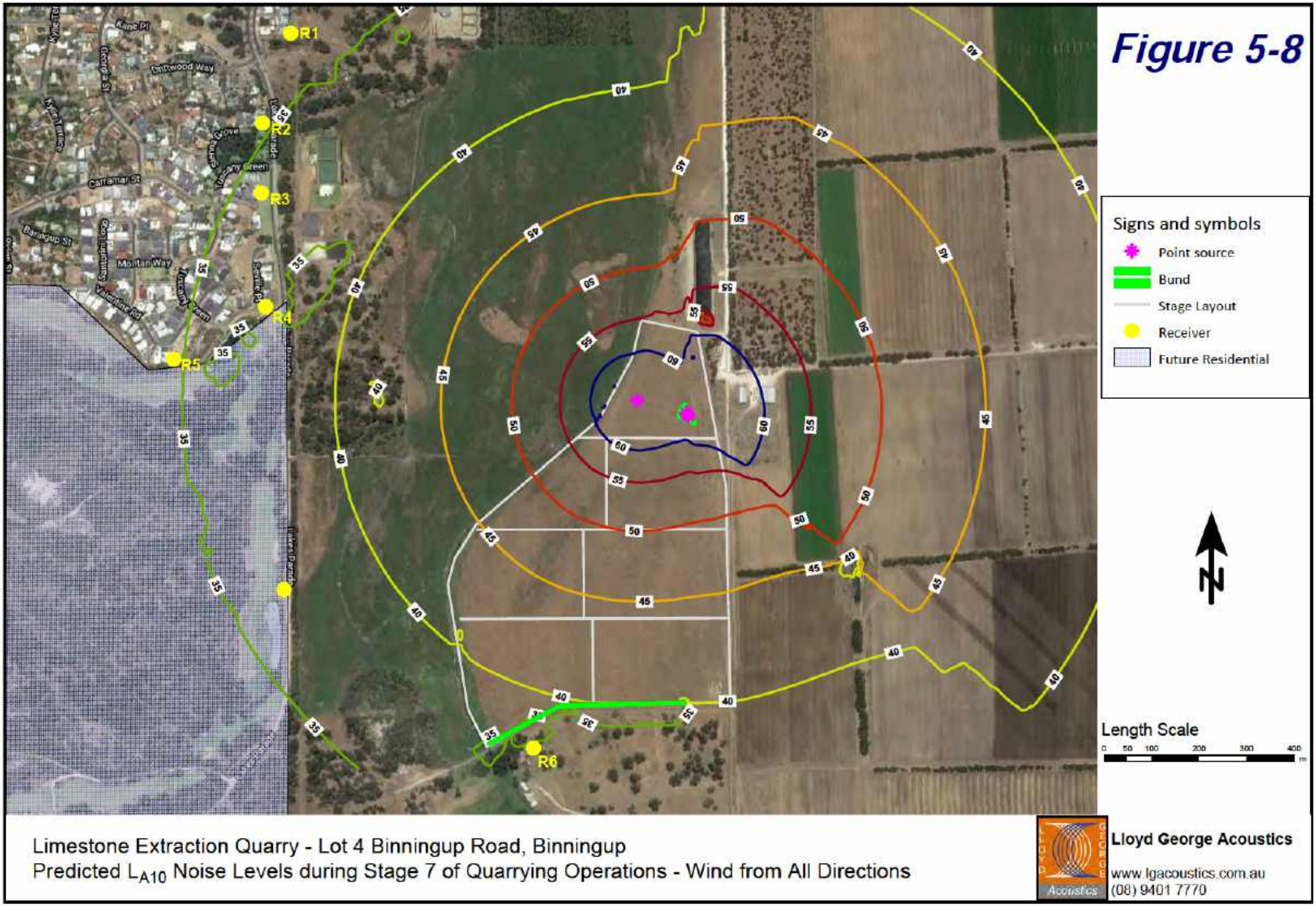


Figure 5-8
R1
R2
R3
R4
R5
R6
Signs and symbols
Point source
Bund
Stage Layout
Receiver
Future Residential
Length Scale
0 50 100 200 300 400 m
Limestone Extraction Quarry - Lot 4 Binningup Road, Binningup
Predicted L_{A10} Noise Levels during Stage 7 of Quarrying Operations - Wind from All Directions
Lloyd George Acoustics
www.lgacoustics.com.au
(08) 9401 7770

An assessment of noise impacts resulting from truck movements has also been undertaken. The only affected receiver would be 98 Springhill Road (R6). As there are only approximately eight truck movement a day, the noise from this source would occur for less than 10 percent of the time (i.e. less than 24 minutes in any four hour period). Therefore this noise source would be assessed against the L_{A1} assigned level under the Regulations. Assuming the truck is limited to 40 km/h when travelling along the road, the predicted L_{A1} noise level at R6 during Stage 2 of the extraction process, being the highest impact, is 41 L_{A1} dB. This is compliant with the assigned level of 80 L_{A1} dB at this location. These levels are also only marginally above the ambient levels at this location and therefore are not likely to be intrusive.

Once the limestone is extracted, each stage will be backfilled and rehabilitated. This scenario has been assessed for each stage of the quarrying operation. It is assumed that a loader will be working at natural ground level. The bund on the southern boundary of the extraction area would remain in place but the bund on the southern boundary of each stage would be removed as that is made up of topsoil to be replaced for that stage. There would be no crushing and screening.

The predicted noise levels for each stage assuming the above scenario is presented in *Table 5-2.*

Table 5-2 Predicted Noise Levels, dB L_{A10} to Sensitive Receivers during Rehabilitation

Receiver	Predicted Noise Level L_{A10}, dB							Comments
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	
R1	20	29	19	27	19	21	21	Complies with daytime assigned level
R2	30	31	31	33	33	34	34	Complies with daytime assigned level
R3	31	33	32	34	34	36	35	Complies with daytime assigned level
R4	33	35	34	38	36	38	36	Complies with daytime assigned level
R5	33	34	33	36	34	36	34	Complies with daytime assigned level
R6	50	51	45	45	40	41	37	Complies with assigned level at all times

6 CONCLUSIONS

The noise emissions resulting from the proposed quarrying and rehabilitation operations at Lot 4 Binningup Road, Binningup, Western Australia were assessed by means of noise modelling and the results compared against the assigned levels within the *Environmental Protection (Noise) Regulations 1997*.

Based on the assumptions made and the modelling results, it is concluded that providing noise controls are put in place as described in *Section 5,* compliance with the applicable assigned noise level can be achieved at all receivers during both the extraction and rehabilitation processes. .

In addition, the following best practices should be implemented to further minimise noise impacts:

- If reversing alarms are deemed necessary, all plant should to be fitted with broadband reversing alarms;
- The pit face should run north-south for each stage of the operations, therefore allowing the pit face to act as a barrier for the residents in Binningup;
- Noise bunds to be built and maintained using the quietest practicable plant and construction methods e.g. loader working from behind the bund pushing material;
- The road required for loading of trucks should be designed such that the trucks are not required to reverse, this ensures truck reversing alarms are minimised.

It should be noted that this assessment assumes that the crushing and screening plant is located within the stage of the quarry being worked. While this would generally result in this plant being within the 1000 m buffer of the township of Binningup, it minimises the distance the loader is required to travel from the pit face to the crusher and therefore reduced the overall noise emissions. However, if this is not permitted, keeping the crushing and screening plant outside of the 1000 m buffer of the township of Binningup, would still result in compliance with the Regulations.

Appendix A

Terminology

The following is an explanation of the terminology used throughout this report.

Decibel (dB)
The decibel is the unit that describes the sound pressure and sound power levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.

A-Weighting
An A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. An A-weighted sound level is described as L_A dB.

Sound Power Level (L_w)
Under normal conditions, a given sound source will radiate the same amount of energy, irrespective of its surroundings, being the sound power level. This is similar to a 1kW electric heater always radiating 1kW of heat. The sound power level of a noise source cannot be directly measured using a sound level meter but is calculated based on measured sound pressure levels at known distances. Noise modelling incorporates source sound power levels as part of the input data.

Sound Pressure Level (L_p)
The sound pressure level of a noise source is dependent upon its surroundings, being influenced by distance, ground absorption, topography, meteorological conditions etc and is what the human ear actually hears. Using the electric heater analogy above, the heat will vary depending upon where the heater is located, just as the sound pressure level will vary depending on the surroundings. Noise modelling predicts the sound pressure level from the sound power levels taking into account ground absorption, barrier effects, distance etc.

L_{ASlow}
This is the noise level in decibels, obtained using the A frequency weighting and the S (Slow) time weighting as specified in IEC 61672-1:2002. Unless assessing modulation, all measurements use the slow time weighting characteristic.

L_{AFast}
This is the noise level in decibels, obtained using the A frequency weighting and the F (Fast) time weighting as specified in IEC 61672-1:2002. This is used when assessing the presence of modulation only.

L_{APeak}
This is the greatest absolute instantaneous sound pressure in decibels using the A frequency weighting as specified in IEC 61672-1:2002.

L_{Amax}
An L_{Amax} level is the maximum A-weighted noise level during a particular measurement.

L_{A1}
An L_{A1} level is the A-weighted noise level which is exceeded for one percent of the measurement period and is considered to represent the average of the maximum noise levels measured.

L_{A10}
An L_{A10} level is the A-weighted noise level which is exceeded for 10 percent of the measurement period and is considered to represent the "*intrusive*" noise level.

L_{Aeq}
The equivalent steady state A-weighted sound level ("equal energy") in decibels which, in a specified time period, contains the same acoustic energy as the time-varying level during the same period. It is considered to represent the "average" noise level.

L_{A90}
An L_{A90} level is the A-weighted noise level which is exceeded for 90 percent of the measurement period and is considered to represent the "*background*" noise level.

One-Third-Octave Band
Means a band of frequencies spanning one-third of an octave and having a centre frequency between 25 Hz and 20 000 Hz inclusive.

L_{Amax} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded at any time.

L_{A1} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded for more than 1% of the representative assessment period.

L_{A10} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded for more than 10% of the representative assessment period.

Tonal Noise
A tonal noise source can be described as a source that has a distinctive noise emission in one or more frequencies. An example would be whining or droning. The quantitative definition of tonality is:

the presence in the noise emission of tonal characteristics where the difference between -

(a) the A-weighted sound pressure level in any one-third octave band; and

(b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.

This is relatively common in most noise sources.

Modulating Noise
A modulating source is regular, cyclic and audible and is present for at least 10% of the measurement period. The quantitative definition of modulation is:

a variation in the emission of noise that —

(a) is more than 3 dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band;

(b) is present for at least 10% of the representative.

Impulsive Noise
An impulsive noise source has a short-term banging, clunking or explosive sound. The quantitative definition of impulsiveness is:

a variation in the emission of a noise where the difference between $L_{A\ peak}$ and $L_{A\ Max\ slow}$ is more than 15 dB when determined for a single representative event;

Major Road
Is a road with an estimated average daily traffic count of more than 15,000 vehicles.

Secondary / Minor Road
Is a road with an estimated average daily traffic count of between 6,000 and 15,000 vehicles.

Influencing Factor (IF)

$$= \frac{1}{10}(\%\ \text{Type A}_{100} + \%\ \text{Type A}_{450}) + \frac{1}{20}(\%\ \text{Type B}_{100} + \%\ \text{Type B}_{450})$$

where:

$\%\ \text{Type A}_{100}$ = the percentage of industrial land within a100m radius of the premises receiving the noise

$\%\text{TypeA}_{450}$ = the percentage of industrial land within a 450m radius of the premises receiving the noise

$\%\ \text{Type B}_{100}$ = the percentage of commercial land within a100m radius of the premises receiving the noise

$\%\text{TypeB}_{450}$ = the percentage of commercial land within a 450m radius of the premises receiving the noise

+ Traffic Factor (maximum of 6 dB)

= 2 for each secondary road within 100m

= 2 for each major road within 450m

= 6 for each major road within 100m

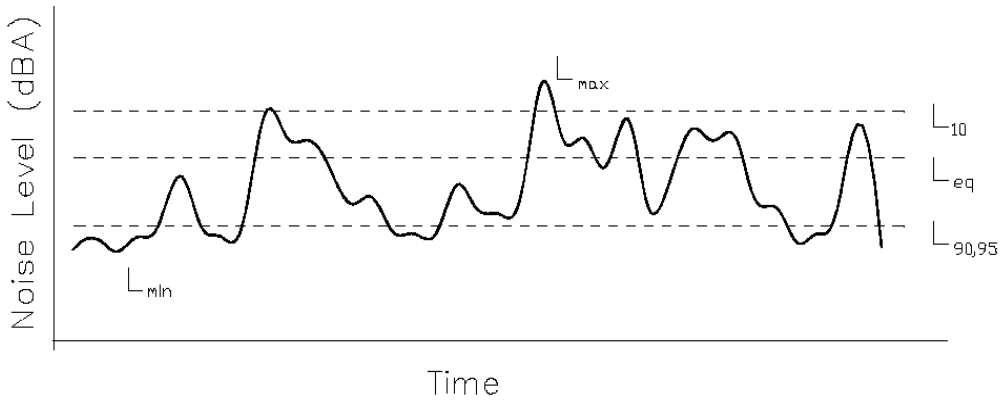
Representative Assessment Period
Means a period of time not less than 15 minutes, and not exceeding four hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission.

Background Noise
Background noise or residual noise is the noise level from sources other than the source of concern. When measuring environmental noise, residual sound is often a problem. One reason is that regulations often require that the noise from different types of sources be dealt with separately. This separation, e.g. of traffic noise from industrial noise, is often difficult to accomplish in practice. Another reason is that the measurements are normally carried out outdoors. Wind-induced noise, directly on the microphone and indirectly on trees, buildings, etc., may also affect the result. The character of these noise sources can make it difficult or even impossible to carry out any corrections.

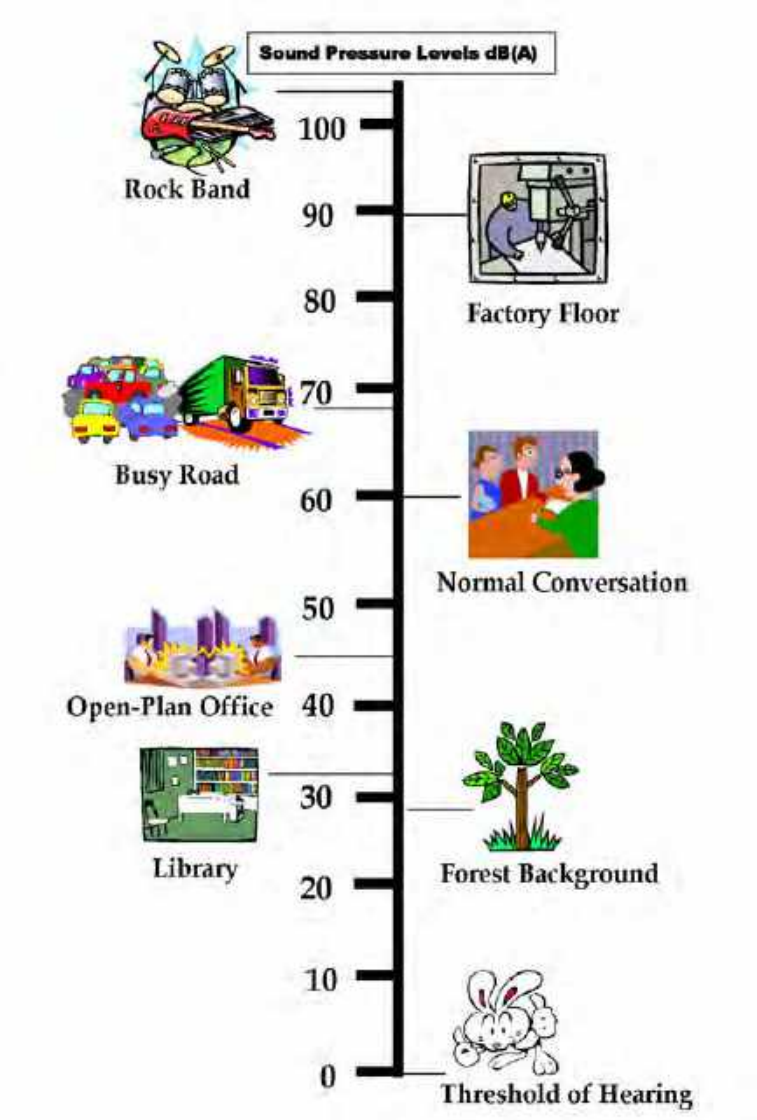
Ambient Noise
Means the level of noise from all sources, including background noise from near and far and the source of interest.

Specific Noise
Relates to the component of the ambient noise that is of interest. This can be referred to as the noise of concern or the noise of interest.

Chart of Noise Level Descriptors



Typical Noise Levels



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

APPENDIX E - 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

APPENDIX F – DUST MANAGEMENT PLAN

ENVIRONMENTAL TECHNOLOGIES & ANALYTICS

Lot 4 Binningup Road, Binningup, Dust Monitoring and Management

Final Plan
Version 1

SHIRE OF HARVEY
APPLICATION FOR DEVELOP APPROVAL
APPROVED
[redacted]
21/12/20
DATE

Prepared for Accendo Australia Pty Ltd

November 2020

Project Number: 1182

Lot 4 Binningup Road, Binningup, Dust Monitoring and Management

Final Report

Executive Summary

The GM Giacci Family Trust (the applicant) is proposing to extract limestone from a 26 hectare (ha) area (herein referred to as the subject site) located on Lot 4 Binningup Road, Binningup (refer to Figure 1-1). The subject site is located in the municipality of the Shire of Harvey, approximately 1 km south-east of Binningup and approximately 1 km west of the Forrest Highway.

A Dust Management Plan (DMP) for the site has been prepared (Accendo Australia, 2020) outlining the nature of the operations and key dust sources, as well as the proposed dust management measures proposed to be implemented.

Given the relatively close proximity to Binningup community and current community concern expressed toward the quarry, amendments to the DMP are proposed to account for both proactive and reactive dust management responses.

In addition an ambient monitor is proposed to be installed and operated (on the boundary of the premises) to inform the implementation of dust controls and the response to potential dust events prior to impacts being experienced in the community of Binningup. As there is currently no air quality monitoring in this area, a dust monitor is planned to be installed prior to quarry operations commencing.

The purpose of this revised DMP is to document the dust control mechanisms that are proposed for Lot 4, and the plans to minimise the potential for impact from the operation of the quarry on the nearest receptors in the Binningup community, particularly from fugitive dust emissions from the limestone extraction operations.

The basis of the DMP is summarised in Table ES 1.

Table ES 1: Dust Management Plan Summary

Operational Dust Management Plan for Lot 4 Quarry Operations - Summary	
Aim	To manage dust at site to achieve acceptable performance criteria
Key sources	Wind erosion of exposed surfaces Wheel generated dust from transported limestone from pit to off-site on unsealed road surfaces Screening in the quarry Loading activities in the quarry • Dig and push limestone excavation • Lift and feed into mobile crusher • Loading limestone into trucks for off-site delivery Crushing in the quarry Scraper removing and moving topsoil in the quarry
Key management practice	Water truck used to apply water on surfaces (roads and cleared areas) where dust suppression is needed Vehicle movements at surface level will be restricted to designated roads

Operational Dust Management Plan for Lot 4 Quarry Operations - Summary	
	Vehicle speeds will be restricted to 30 km/hr on unsealed roads to minimise wheel generated dust Staging of cells and restricting the number of cells being actively worked. Surface stabilisation of topsoil stockpiles.
Relevant company procedures | documents	Company Dust Management Procedures • Dust Management – Site induction • Water truck – Scheduling and Maintenance • Water spray – Flow checks and Maintenance • Complaint response • Ambient monitor – Servicing and Maintenance
Key performance indicators or criteria	No unacceptable off-site impact as determined through event and complaint investigation
Monitoring	An ambient dust monitor running continuously to measure PM_{10} (data accessible in near "real-time") will be installed and operational during the first 12 months of operation of the quarry. The need for monitoring beyond this first year will be determined based on review of the monitoring results. The Binningup PM_{10} monitor will be installed on the western boundary of the premises and may be relocated as each stage/cell is worked. Data from the monitor will be used to inform operations for the purpose of: • Defining baseline concentrations of dust in the region before quarry activities commence. • Determining any potential changes or impacts resulting from the quarry operations. • Supporting proactive and reactive dust management to be incorporated into the operational procedures.
Trigger-Action-Response	**TRIGGER** *Level 1 – Low risk of offsite impact* • Visual trigger - Visible dust observed from activity, but not observed leaving the premises boundary • Meteorology trigger - Wind arc away from the Binningup PM_{10} monitor/residents • Monitored PM_{10} trigger - Rolling 1-hour average $PM_{10} < 90\ \mu g/m^3$ at Binningup PM_{10} monitor *Level 2 – Medium risk of off-site impact* • Visual trigger - Visible dust observed from activity • Meteorology trigger - Wind arc toward Binningup PM_{10} monitor/residents, and

Operational Dust Management Plan for Lot 4 Quarry Operations - Summary	
	○ Poor dispersion conditions - Wind speed <2 m/s OR ○ Wind erosion conditions - Wind speed >6 m/s • Monitored PM10 trigger - 2 consecutive 10-minute readings above 90 µg/m^3 at Binningup PM_{10} monitor *Level 3 – High risk of off-site impact* • Visual trigger - Visible dust observed from activity and across premises boundary • Meteorology trigger - Wind arc toward Binningup PM_{10} monitor/residents, and ○ Wind erosion conditions - Wind speed >8 m/s • Monitored PM10 trigger - 3 consecutive 10-minute readings above 90 µg/m^3 at Binningup PM_{10} monitor **RESPONSE ACTION** *Level 1 – Low risk of offsite impact* • Check forecast and current condition. • Check controls in place. ○ If not in place apply control *Level 2 – Medium risk of off-site impact* • Check forecast and current condition. • Check controls in place. ○ If not in place apply control • If a Poor dispersion event (i.e. calm)- ○ If wind is < 2 m/s prepare to stop dust generating activity until sources / work areas are wetted down • Wind erosion event- ○ If wind > 6 m/s prepare to stop dust generating works until sources / work areas are wetted down *Level 3 – High risk of off-site impact* • Check forecast and current condition. • Check controls in place. ○ If not in place apply control • If a Poor dispersion event (i.e. calm)- ○ If wind is < 2 m/s stop dust generating activity until sources / work areas are wetted down • Wind erosion event-

Operational Dust Management Plan for Lot 4 Quarry Operations - Summary	
	○ If wind > 8 m/s stop dust generating works until sources / work areas are wetted down or until wind speed drops
Reporting	To be confirmed by client • Annual environmental report (expected to be a requirement of the Part V Environmental Protection Act approval to operate a prescribed activity)
Corrective actions	To be confirmed by client • Appropriate actions will be issued and managed via the company's Trigger-Action-Response as outlined.

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Tables

Figures

1 Introduction

The GM Giacci Family Trust (the applicant) is proposing to extract limestone from a 26 hectare (ha) area located on Lot 4 Binningup Road, Binningup (refer to Figure 1-1). The site is located in the municipality of the Shire of Harvey, Western Australia, approximately 1 kilometre (km) south-east of Binningup and approximately 1 km west of the Forrest Highway. The site is positioned within 2 km of the coastline on land that has been previously cleared of native vegetation. It is zoned "Rural" under the Greater Bunbury Region Scheme and "General Farming" pursuant to the Shire of Harvey Local Planning Scheme No. 1 (Accendo Australia, 2020a).

The nearest sensitive receptors locations are the nearby residences at Binningup at least 680 metres (m) away, and the Rodgers Family residence 125 m away, shown in Figure 1-1. Other land uses in the immediate area (within a 2 km radius) includes residential (suburb of Binningup), sport and recreational venues (golf, lawn bowls, tennis), and agricultural activities.

1.1 Operational Dust Management Plan Objective

The purpose of the dust management plan (DMP) is to document the dust control mechanisms that will be in place for the life of the limestone extraction operations (approximately 5 years). The plan provides a standard set of working instructions and procedures to be adopted for dust suppression and response action on-site. It is assumed that all on-site personnel will be inducted to the plan, and will follow the procedures as outlined.

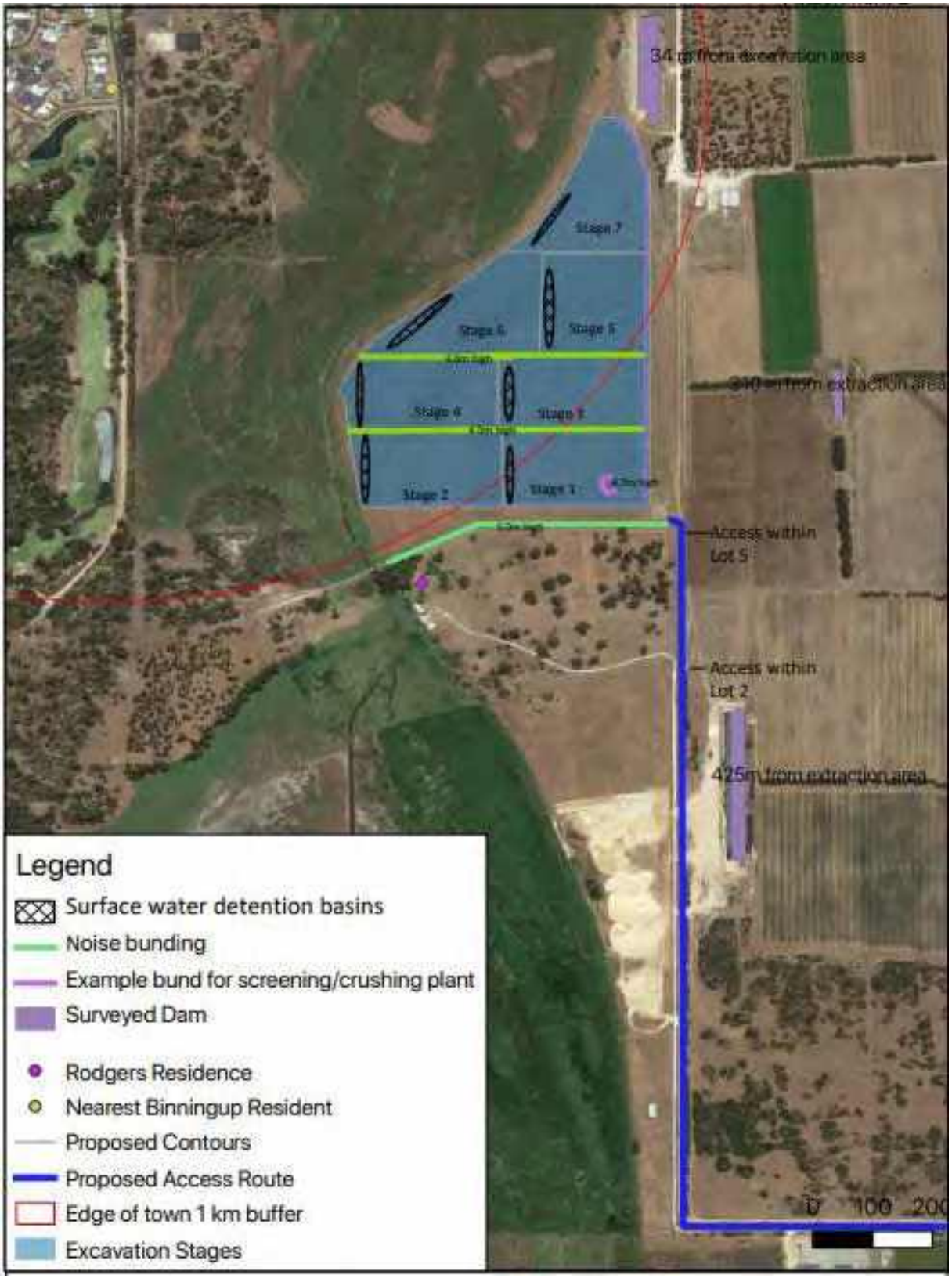

Figure 1-1: Project location and setting (Accendo Australia, 2020)

2 Operations Potential Dust Impacts

2.1 Background and Context

Dust is a generic term used to describe solid airborne particles generated and dispersed into the air. Airborne particles are classified by their aerodynamic size as Particulate Matter (PM), PM_{10}, $PM_{2.5}$ and Total Suspended Particles (TSP).

- PM_{10} – particles with an equivalent aerodynamic diameter of up to 10 microns (µm), and important for assessing potential impact on human health. These particles do not usually settle out of the atmosphere in the absence of another mechanism such as further reaction, nucleation or due to precipitation.
- $PM_{2.5}$ – particles with an equivalent aerodynamic diameter of up to 2.5 µm, and important for assessing potential impact on human health, and similar to PM_{10} are not likely to settle in close proximity to the source.
- TSP - All particles suspended in the atmosphere including fine, respirable particles (PM_{10} and $PM_{2.5}$) and larger particles that will settle out of the air and generally considered as having an aerodynamic diameter of up to 50 µm, and is important for assessing potential impact on amenity (dust nuisance). Particles in this size range are mainly generated by mechanical action, and will result from wind erosion of cleared surfaces when wind speeds are above around 8 m/s. These particles (at the higher size range) are also expected to be removed from the atmosphere (i.e. settle or deposit) within a few kilometres of a source.

There are a number of environmental factors that will contribute to the generation of dust at site, specifically the local climate features of wind speed, wind direction, rainfall and evaporation. In the absence of local monitoring data, the long term climate statistics for Bunbury (Bureau of Meteorology (BoM) Station number 009965) are considered to be generally representative of Binningup. The temperature and rainfall data for the period 1995 – 2020 are shown in Figure 2-1. The data indicates the possibility of rainfall occurring across all months in the year, with the highest mean rainfall occurring May to September. Winter temperatures are relatively cool, with mean summer temperatures generally above 25 degrees Celsius. While evaporation is not recorded at this station, the cycle of very few days in the summer months receiving rainfall and relatively high temperatures will lead to dry surface conditions and increases the tendency to be susceptible to wind erosion.

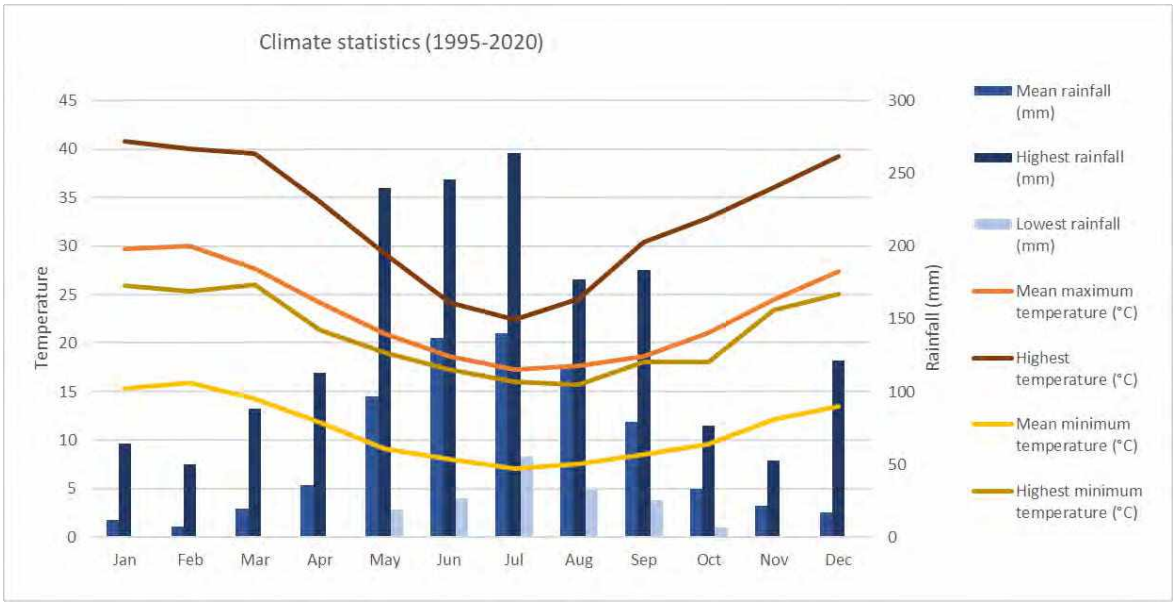

Figure 2-1: Long term climate statistics for Binningup (temperature and rainfall, as measured by BoM Bunbury)

Bunbury 9am (1995- 2020) | Bunbury 3pm (1995- 2020)

Figure 2-2: Long term climate statistics for Binningup (wind speed and direction, as measured by BoM Bunbury)

The long term annual average wind roses are shown in Figure 2-2. Seasonal differences are present in the wind speeds and wind directions at this BoM station, based on 9 am and 3 pm measurements (see Appendix A). The dominant feature in the morning wind rose is the wind from the east to south-east, and from the west in the afternoon. Wind speeds greater than 8 m/s (30 km/hr) are generally associated with dust lift-off from unsealed surfaces. The wind roses indicate wind speeds of this magnitude are frequently present.

There are also a number of factors that will influence the potential for impact on sensitive receptors, including the source-receptor pathway (i.e. the direction of the sensitive receptors compared to the location of the source and whether receptors are likely to be upwind or downwind of the prevailing wind direction) and the relative distance between the source and the receptor.

Guidelines for Western Australia (EPA, 2005) indicate a separation of distance of 500 m between screening activities and sensitive receptors and between 300-500 m for limestone extraction (no grinding and milling) and sensitive receptors, to reduce the potential for dust impacts. The guideline notes that “in most cases, land use conflicts resulting from industrial emissions are not expected where the generic separation distances are maintained.” Where the separation distance is less, then it is necessary to review and ensure that there are appropriate controls in place such that the potential dust sources are managed and controlled at source, as has been the approach taken for Lot 4.

2.2 Sources of dust

2.2.1 Non-project related (existing) particulate (dust) sources

Other land uses in the immediate area (within a 2 km radius) of Lot 4 that have the potential to contribute particulate material (dust) includes the residential area of Binningup (smoke from wood heaters, vehicles emissions), sport and recreational venues (golf, lawn bowls, tennis courts with unsealed access roads and areas),

and agricultural | horticultural activities which will have a seasonal component linked to the growing and cropping cycle. Being located on the coast, the area will also be influenced by marine aerosols (sea salt) especially during strong westerly winds. The area will also be seasonally influenced by particles derived from fires (both locally and regionally) as a consequence of prescribed or controlled burning activities as well as wildfires.

In summary, the existing dust sources in the local area that are not associated with the quarry include:

- dust entrainment due to vehicle movements along unsealed public roads
- episodic emissions from local vegetation/prescribed burning (e.g. grass and bushfires)
- marine aerosol (close proximity to coastline)
- high wind events
- seasonal emissions from residential wood burning fires
- local agricultural activities
- vehicle emissions from vehicle movements along public roads.

2.2.2 Project related particulate (dust) sources

The sources of dust in relation to the quarry activities were identified through the initial DMP (Accendo Australia, 2020) as being:

- Topsoil stripping by a scraper
- Earthworks during excavation/limestone extraction activities by front end loader
- Loading and transportation of material – topsoil, overburden and limestone
- Crushing and screening of limestone
- Stockpiling of material - topsoil, overburden and limestone
- Limestone loading and transport off-site
- Vehicle movement within the site and along unsealed road surfaces (transport route)
- Wind erosion of exposed surfaces

The excavation of the limestone itself is not expected to be a significant source of dust emissions given the typically moist nature of the material. Further, crushing and screening of the limestone does not generally produce significant dust as the limestone remains moist, and the activity will be undertaken within the pit. In-pit operations also tend to generate less dust than surrounding activities due to the reduced airflow within the pit. The removal and replacement of topsoil material has a high risk associated with dust generation due to the large volumes of material involved and the potential for lower levels of soil moisture. Each source has been considered in terms of annual emission estimation, both in the absence of control and with the proposed dust control, in Section 2.4.

2.3 Potential dust impact

Dust has the potential to impact the environment, health and welfare of the community, as well as the local amenity, causing a nuisance to surrounding land users. Therefore managing air quality for the protection of human health and amenity (including nuisance) requires consideration of dust in two contexts:

- Health impacts, as demonstrated by the concentration of dust measured as particles that could enter the human respiratory system, and due to their small size enter the lungs (i.e. PM_{10} and $PM_{2.5}$).
- Amenity, as demonstrated by dust that is visibly leaving the site or dust that has settled (deposited) on surfaces (i.e. deposited dust and TSP).

Ambient air quality standards and guidelines are the numerical values generally adopted as the measure of acceptable air quality. These are set out in Table 2-1 for information purposes.

Table 2-1: Summary of Adopted Assessment Criteria

Parameter	Air quality assessment criteria	Protection value	Reference
TSP	90 µg/m³ (24-hour average)	Amenity	DWER (2019)
PM_{10}	50 µg/m³ (24-hour average)	Heath	NEPM (NEPC, 2016)
	25 µg/m³ (annual average)		
$PM_{2.5}$	25 µg/m³ (24-hour average)		
	8 µg/m³ (annual average)		
Deposition	4 g/m²/month (annual average)	Amenity	EPAV (2007)

It should be noted that there are challenges in evaluating the potential impact on amenity, as amenity is a subjective value, and people generally have different tolerances to dust levels. Perception of dust can therefore lead to community complaints at levels lower than the adopted criteria. Unreasonable amenity impacts may occur due to regular dust events over several weeks leading to a gradual build-up of dust on surfaces, or may be a result of short period dust events of very high concentrations which cause rapid build-up of dust on surfaces.

These ambient air quality standards and guidelines are set to account for all contributing dust sources in the airshed. By definition, and intention, they are not suitable as dust management response trigger values.

The nearest community sensitive receptors to Lot 4, are summarised in Table 2-2, noting that there is one receptor within the separation distance guideline (at approximately 125 m). The next nearest receptor is approximately 680 m (ie. beyond the guideline distance and therefore not expected to be unreasonably impacted by dust from the quarry). This notional receptor location is the closest point of the Binningup township.

Table 2-2: Nearest sensitive receptors (Accendo Australia, 2020)

Resident No.	Receptor	Separation distance (m)	Note
1	Rodgers Family	125 m	Written agreement in place. Location is influenced by 139 ha horticultural land to the immediate east and existing limestone quarry 250 m south.
2	Binningup residents	680 m	This is the minimum separation distance to a resident and takes into account the seven Stages (cells)

A set of good practice design features have been incorporated into the design of the quarry which will effectively reduce the potential for dust impact. These design features include:

- Quarry design is for seven separate cells, with no more than two cells open or being worked at any point in time – this effectively reduces the potential area open and susceptible to wind erosion factors.
- The crushing and screening plant is a mobile unit in that it will be relocated to each working cell ensuring that there is minimal distance for material movement in pit. It will be positioned to maintain a 1 km

separation distance between the unit and the nearest Binningup residence irrespective of the cell being worked, where possible.

- Excavation and processing will be carried out on the pit floor which is lower than natural ground level, allowing for a degree of dust retention within the pit.
- Construction of a 4 m high bund around the crushing and screening plant to assist in retaining dust in the pit. The bund will be seeded with grass to minimise surface exposure to wind erosion.
- Water truck on-site when operating the quarry

Conventional dust management measures have been incorporated into the operational plan for the quarry. These measures, in conjunction with good operating practice, are expected to deliver emissions that do not present unreasonable increases above existing background dust levels at the sensitive receptors.

To account for community concern, a further layer of dust management control will be achieved at site through adopting a set of "Trigger" values that will guide the implementation of dust response actions in a tiered response. The tiered response is intended to ensure that the dust from the operations and site is identified and addressed appropriately and in a timely manner so as to minimise the potential for impact on the Binningup community. The Trigger-Action-Response is outlined in Section 3, and will be supported by ambient air quality monitoring at the boundary of the quarry operations.

2.4 Dust emissions estimation

The dust generating emission sources associated with the project, and the estimate of emission from these activities is summarised in Table 2-3. The detailed basis of estimation is provided in Appendix B.

Emission estimates indicate the potential for wind erosion from exposed areas of the quarry pit itself and other exposed areas and dust generated from the screening plant are the most significant source of dust emissions from the project, as shown in Figure 2-5. The influence of estimated operating hours is clearly seen in Figure 2-4, compared to the potential for wind blown dust over the year. A conservative approach has been applied to the emission estimates.

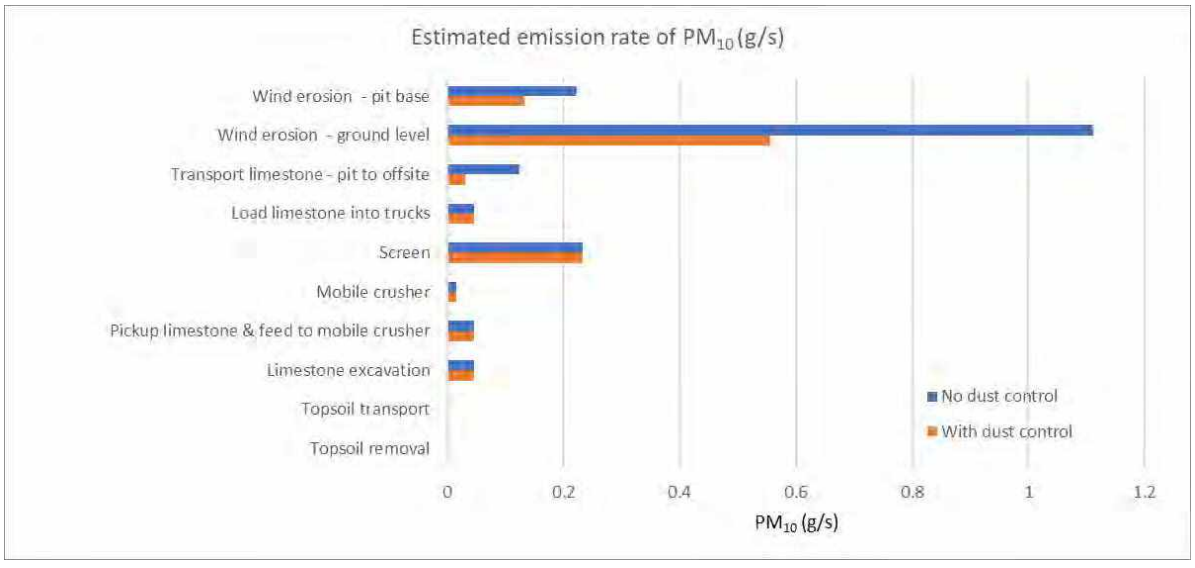

Figure 2-3: Estimated emission rate for dust source contribution by project activity (with and without dust control)

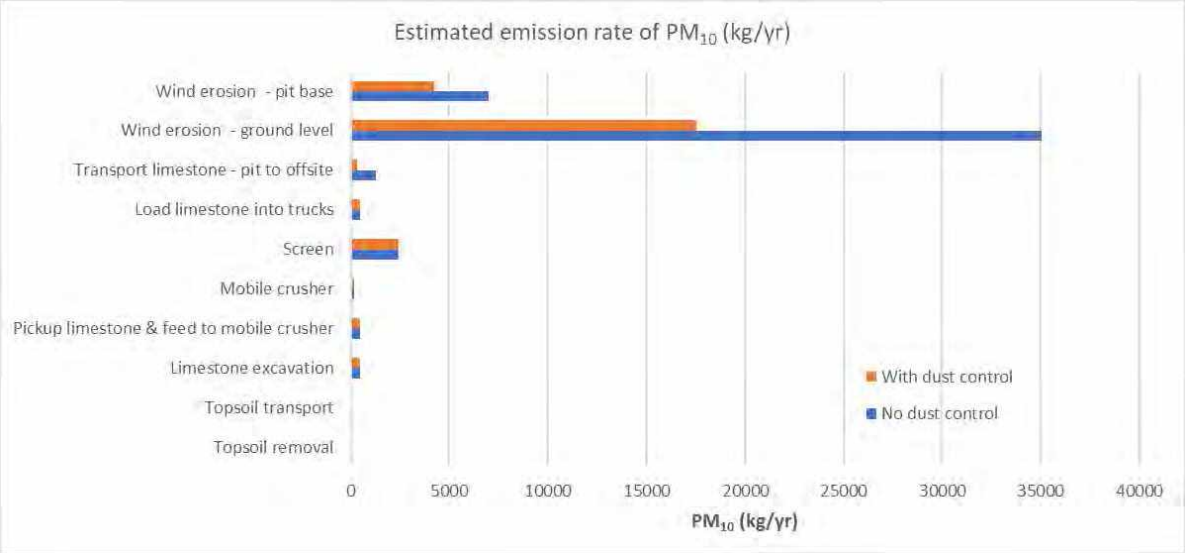

Figure 2-4: Estimated annual emission for dust source contribution by project activity (with and without dust control)

Table 2-3: Dust source emissions estimation – kilograms per year(kg/yr)

Source	Activity	Without dust control			With dust control			Control applied	Emission Reduction
		TSP	PM_{10}	$PM_{2.5}$	TSP	PM_{10}	$PM_{2.5}$		
Scraper (stripping topsoil)	Topsoil removal	94	24	4	47	12	2	Scraper on topsoil naturally/artificially moist	50%
Scraper (travel mode)	Topsoil transport	100	14	2	50	7	1	Watering	50%
Loader	Limestone excavation - dig and push limestone down excavation face	1,000	480	72	1,000	480	72	No control	0%
	Rubber tyred loader pick up limestone and feed to mobile crusher	1,000	480	72	1,000	480	72	No control	0%
Crusher	Mobile crusher	400	160	24	400	160	24	Bund (wind break)	0%
Screen	Screen	3,200	2,400	360	3,200	2,400	360	Bund (wind break)	0%
Loader	Load limestone into trucks	1,000	480	72	1,000	480	72	No control	0%
Wheel-generated dust	Transport limestone - pit to offsite	4,344	1,282	192	1,086	321	48	Level 2 watering (haul roads)	75%
Wind erosion of exposed area	Wind erosion of exposed area - ground level	100,114	35,040	5,256	50,057	17,520	2,628	Watering	50%
	Wind erosion of exposed area - pit base	20,023	7,008	1,051	12,014	4,205	631	Wind erosion - vegetation established but not sustaining	40%

Figure 2-5: Relative dust source contribution by project activity

2.5 Impact Analysis

The dust generating emission sources associated with the project, and the potential environmental, health and amenity impacts associated, are summarised in Table 2-4. The dust management controls incorporated into the design and operation of the Project are also indicated.

The primary mechanism for dust generation from the site is due to mechanical separation, wind erosion from exposed surfaces, and wheel action. The main control mechanism is the application of water, protection from prevailing wind and exposed surface stabilisation.

Table 2-4: Dust impact analysis

Dust source	Dust generating activity	Potential Impact	Dust control by design	Dust control through management
Topsoil stripping and other earthworks (other than limestone extraction)	Bulldozer or front end loader (FEL) used to remove the topsoil by pushing it into windrows. Overburden pushed to perimeter to form bunding around the active area.	Wheel/track-generated dust from bulldozer/FEL moving dry surface material. Dust may impact on nearby sensitive receptors in close proximity to the processing plant[1] • Settling on sensitive vegetation • Settling on surfaces • Sensitive receptors.	Staging will minimise the disturbance to the land providing a staged clearing excavation and rehabilitation program that will move across the site. Avoid stripping topsoil when it is saturated or when very dry. Avoid stripping topsoil when winds are > 8 m/s irrespective of wind direction. Establish a 4 m high bund around the crushing and screening plant. Bunds seeded with grass to assist with visual amenity and reduce potential dust emissions.	Daily forecast and works planning to consider wind speed and wind direction forecast • high wind speeds forecast (> 8 m/s) will lead to a review of site activities and works may be suspended if deemed appropriate. Topsoil stripping and bund construction shall not commence during the following conditions: • Winds in excess of 8 m/s • Northerly or north-easterly to south easterly winds. Dust episode management procedure to be reviewed and if necessary, slow or temporarily stop site operations during high dust episodes. Watering of surface area prior to commencing topsoil stripping and bund construction - by water truck.
Limestone extraction	Extraction by front end loader	Wheel/track-generated dust from bulldozer/FEL moving dry surface material. Dust may impact on nearby sensitive receptors in close proximity to the processing plant • Settling on sensitive vegetation • Settling on surfaces • Sensitive receptors.		Daily forecast and works planning to consider wind speed and wind direction forecast • high wind speeds forecast (> 8 m/s) will lead to a review of site activities and works may be suspended if deemed appropriate. Dust episode management procedure to be reviewed and if necessary, slow or temporarily stop site operations during high dust episodes. Watering of surface area prior to commencing excavation - by water truck. Water trucks are to be available at all times during quarry activities to water the site on observation of dust lift.
Loading and transportation of material	Loading limestone in pit by front end loader. Transporting on unsealed roads out of pit and offsite.	Wheel/track-generated dust from bulldozer/FEL moving dry surface material. Dust may impact on nearby sensitive receptors in close proximity to the processing plant • Settling on sensitive vegetation • Settling on surfaces • Sensitive receptors	Minimise drop distances when loading and handling limestone to reduce dust generation Limestone material expected to be naturally moist prior to and during loading Truck loads will be covered with tarpaulin or similar. Road surface design, preparation and construction Transport of dust-prone material will be via covered trucks or dampened prior to transport to prevent dust lift during transport.	Daily forecast and works planning to consider wind speed and wind direction forecast • high wind speeds forecast (> 8 m/s) will lead to a review of site activities and works may be suspended if deemed appropriate. Dust episode management procedure to be reviewed and if necessary, slow or temporarily stop site operations during high dust episode. Watering of surface area prior to commencing transport - by water truck. Water trucks are to be available at all times during quarry activities to water the site on observation of dust lift. Road surface maintenance.

[1] Mobile crushing and screening plant.

Dust source	Dust generating activity	Potential Impact	Dust control by design	Dust control through management
Crushing and Screening	One FEL operating - push ore delivered and load to crusher. Wind erosion. Operation of crushing and screening plant.	Wheel-generated dust from FELs moving ore in pit. Dust may impact on nearby sensitive receptors in close proximity to the processing plant • Settling on sensitive vegetation • Settling on surfaces • Sensitive receptors at Binningup.	Crushing and screening plant to be located in designated areas 1 km from Binningup residents at all times, where possible. Installing plant/equipment sheltered from prevailing winds (concealed at the lowest contours of the quarry/pit stage) - Excavation and processing will be conducted on the floor of the pit, 3 m below natural ground level behind the excavation face. Establish a 4 m high bund around the crushing and screening plant. Bunds seeded with grass to assist with visual amenity and reduce potential dust emissions. *Water sprays to be considered by the client.*	Daily forecast and works planning to consider wind speed and wind direction forecast • high wind speeds forecast from the east to southeast will lead to a review of site activities and works may be suspended if deemed appropriate. Watering of surface of work area with water truck. Dust episode management procedure to be reviewed and if necessary, slow or temporarily stop site operations during high dust episodes.
Stockpiling	Building stockpile, reclaiming from stockpile, wind action on stockpile.	Dust may impact on nearby sensitive receptors in close proximity to the processing plant • Settling on sensitive vegetation • Settling on surfaces • Sensitive receptors at Binningup.	Long term stockpiles seeded with grass to assist with visual amenity and reduce potential dust emissions. Temporary bunds, stockpiles and exposed areas will be watered and stabilised as required. Stabilisation techniques that will be considered depending on environmental conditions will include hydro-mulching. In pit crushing, screening and handling. Stockpiling limited to in pit. Stockpiles, where possible, will be limited to the anticipated cubic volume/vehicle movement for cartage on the following operating day.	Daily forecast and works planning to consider wind speed and wind direction forecast • high wind speeds forecast from the east to southeast will lead to a review of site activities and works may be suspended if deemed appropriate. Minimise material drop-height during stockpile building. Dust episode management procedure to be reviewed and if necessary, slow or temporarily stop site operations during high dust episodes.
Vehicle movement	Vehicle movements within the site, and exiting site	Dust may impact on nearby sensitive receptors in close proximity to the processing plant, entrance and exits points to site and unsealed road surfaces • Settling on sensitive vegetation • Settling on surfaces • Sensitive receptors at Binningup. Material may be tracked off site.	Speed limits onsite. Vehicle speeds will be restricted to no more than 30 km/hr on the site to minimise dust lift off. Site traffic will be restricted to designated internal access ways to prevent disturbance of vegetated or natural areas - designated roads. Loads leaving site are covered.	Daily forecast and works planning to consider wind speed and wind direction forecast • high wind speeds forecast from the east to southeast will lead to a review of site activities and works may be suspended if deemed appropriate. Water trucks are to water down unsealed roads during operation to reduce dust lift. Dust episode management procedure to be reviewed and if necessary, slow or temporarily stop site operations during high dust episodes.
Wind erosion of exposed surfaces	Stockpile surface and working face Un-stabilised surfaces Access roads (other than haul roads)	Wind erosion of open and unsealed areas. Wind speeds above 4 m/s will generally disturb the soil surface layer causing dust to disperse into the air. Dust may impact on nearby sensitive receptors in close proximity to the processing plant • Settling on sensitive vegetation • Settling on surfaces • Sensitive receptors at Binningup.	Onsite watercart with a capacity of 15,000 L. Water will be sourced from an onsite dam located directly to the north of the extraction area. Average 8 movements per day. Rehabilitation will be undertaken sequentially and as soon as reasonably possible to reduce the exposed areas. Where rehabilitation is delayed (i.e. staged completion occurs in summer), additional dust control measures will be considered.	Water trucks are to water down unsealed surfaces during operation to reduce dust lift. In dry conditions with predicted strong winds (> 8 m/s), watering will occur at the end of each working day to minimise dust generation outside of working hours.

Dust source	Dust generating activity	Potential Impact	Dust control by design	Dust control through management
			This includes the application of a paper-water mixture to exposed surfaces to create a temporary crust and prevent wind-borne dust lift-off. Temporary bunds, stockpiles and exposed areas will be watered and stabilised as required. Stabilisation techniques that will be considered depending on environmental conditions will include hydro-mulching. Areas of land cleared and the period of time they remain cleared are to be kept to a minimum. Protect topsoil stockpiles from erosion. Avoid long term stockpiling of topsoil by using it to rehabilitate worked out areas immediately. Stabilise temporarily disturbed land as soon as practicable (i.e. spreading of aggregate, hydro mulching or other material). Restrict access to cleared areas during and after clearing of vegetation to minimise unnecessary disturbance and generation of dust. Stabilise temporarily disturbed land as soon as practicable (i.e. spreading of aggregate, hydro mulching or other material).	

3 Dust Monitoring and Response Program

Ambient dust monitoring will be undertaken during the first 12-months of the quarry being operational. **The purpose of the ambient monitoring is to inform operations of an increasing trend in dust levels in the vicinity of sensitive receptors at Binningup[2].**

In summary, the monitoring program includes:

- Visual monitoring by site personnel
- Single ambient monitoring location on the boundary of the premises
  - Continuous real-time weather monitoring (wind speed and wind direction)
  - Continuous real-time PM10 monitoring (ES-642 Dust monitor (type – nephelometer))
- Wind speed and wind direction alert levels (to indicate when winds are blowing such that sensitive receptors would be downwind of Lot 4 excavation activities
- PM10 alert levels (to indicate when measured levels are approaching pre-determined management levels and therefore initiate (trigger) pre-determined management responses.

As there is currently no local ambient monitoring data in the immediate vicinity of Lot 4 or the township of Binningup, the intent will be to install the ambient monitor as soon as practicable, and prior to commencing quarry operations. This will improve the understanding of existing ambient air quality (PM_{10}), which is expected to be influenced by the close proximity to the coast (marine aerosols) and neighbouring agricultural / cropping activities, so as to confirm suitability of Trigger levels.

Monitoring will be in place for the first 12-month period of the quarry being in operation, following which the monitoring results will be reviewed to determined if ongoing monitoring is needed.

3.1 Local meteorology monitoring

Meteorological conditions have a direct influence on dust generation. Periods of little to no wind speed can prevent the dissipation and dispersion of dust in the vicinity of a source, and periods of high wind speed can increase the generation of dust due to the action of wind erosion on exposed surfaces.

Local meteorological conditions will be monitored to assist in planning operational activities and dust mitigation and management responses, and to assist in dust incident investigations. Wind direction and wind speed will be measured continuously, and taken into consideration in planning surface activities including dust suppression, specifically:

- Proactively – review daily weather forecast for predicted wind conditions in the direction of Binningup
  - When winds are forecast above 4 m/s and to be in the direction of Binningup, the day/shift activities will ensure all dust controls are operational
- Reactively – review monitored data (live 10-minute average data) as part of
  - Response when in receipt of wind speed trigger alert or high dust level alert

[2] Note that purpose of monitoring will influence the design of the monitoring program. It has been assumed that given the proximity of the Binningup community and the presence of other dust sources in the area, that a continuous monitor with wind speed and wind direction will facilitate the directional delineation of dust likely or not likely being attributable to the quarry. Installing the monitor prior to the commencement of quarry activities will also facilitate the relative baselining of existing PM_{10} levels in the area.

- Routine visual inspection
- In response to a notification, complaint or as part of a dust investigation.

3.2 Local particulate monitoring

An ambient dust monitor (nephelometer) measuring particles in the size of 10 microns in aerodynamic diameter (PM10) continuously on a 10-minute average basis, will be installed at a nominated location on the western edge of the premises boundary. The purpose of the monitor is to provide near "real-time" data to inform operational response to changing dust conditions associated with the operations. Wind speed and wind direction is also measured at this site. Monitoring will be in place for the first 12-month period of the quarry being in operation, following which the monitoring results will be reviewed to determined if ongoing monitoring is needed.

OPTION for client consideration - as the excavation will be staged over time, the single monitor will be most effective for the program when it is aligned between the active quarry cell/stage and the community of Binningup. To achieve this consideration may be given to relocate the monitor as the quarry excavation progresses from Stage 1 through to Stage 7. This option could be pursued in future if the single monitor approach is shown to be inadequate for actual dust levels, or if monitoring is determined to be necessary beyond the first 12-month period of quarry operation.

OPTION for client consideration - as the excavation will be staged over time, the single monitor could be supplemented with video monitoring, along the western boundary. This would be intended to capture evidence of dust departing the site boundary, and could be used to supplement (reduce) the frequency with which work stoppages may be required due to high wind speeds, and as part of the dust incident investigation or complaint resolution process. This option could be pursued in future if the single monitor approach is shown to be inadequate for actual dust levels, or if monitoring is determined to be necessary beyond the first 12-month period of quarry operation.

3.3 Visual observation of dust

The ambient monitoring will be supplemented with site personnel visual observation of dust. Visual diligence is an instantaneous checking mechanism and provides the benefit of any issues being observed can be acted on promptly, irrespective of the measured dust levels at the time. Observation of dust and the source supports the deployment or initiation of targeted action to address the dust directly and promptly. The practice of visual observation will continue for the duration of the quarry operation.

3.4 Trigger-Action-Response to Alerts

Initial "trigger-action-response" levels have been proposed to provide a tiered approach to operations management and mitigation of potential dust impact on the community of Binningup. A tiered approach is adopted, placing emphasis on dust management of the actual dust sources. The tiered approach is also applied with the intention of providing a balance between allowing adequate time to implement management changes, without acting prematurely or inadvertently, leading to unnecessary change in the operational daily plan.

Three metrics are proposed to be used initially, each with a three-tiered trigger based on low, medium and high risk of an off-site dust impact. The three metrics used are:

- Visual monitoring for dust lift-off – the principle is to manage dust from each activity being undertaken in the quarry. Dust seen to be leaving the work area or source (e.g. haul roads, pit, loading/stockpiling, open areas) will trigger a required action.

- Meteorological monitoring – includes the use of current and forecast weather conditions (wind speed, wind direction and rainfall) to plan and schedule works to avoid (where possible) windy conditions where the wind is blowing from the east to south-south-east sector directly towards Binningup community; and where this is not possible, implementing additional dust mitigation controls particularly increasing the water application on site.
- Ambient dust monitoring – operating a continuous dust monitor (nephelometer, PM10) on the western boundary of the operations to provide real-time data on dust levels, including automated alerts (SMS and email to critical site personnel) when reaching each Trigger level.

The initial trigger levels proposed are shown in Table 3-1, and the associated response actions proposed are set out in Table 3-1. These would guide the implementation of a series of actions intended to reduce the likelihood of an impact (i.e. elevated PM_{10}) occurring in the direction of the Binningup community.

As with any proposed trigger, a review process is necessary to ensure the ongoing suitability and effectiveness of the trigger framework. This will support the review and refinement of the values and conditions that are most applicable to achieving the dual desired outcome of minimising the likelihood of potential impact at the Binningup community, and minimising the initiation of unnecessary action (i.e. false alerts).

An initial review of the triggers will be carried out within the first three months of the quarry commencing operations. A further review will be undertaken after the first 12 months of the quarry being operational, and will done in conjunction with the ambient PM10 monitoring data review.

3.5 Complaints system

The community's concern with potential dust generation and impacts from the operations is acknowledged and has been considered in revising the DMP.

Good communication is essential to good working relationships with the community and will help to ensure the effective management of any impacts of a quarry. Central to this will be to have in place an effective complaints handling process.

A Complaints Register will be maintained. The following information will be recorded:

- the date and time of the complaint
- who the complaint was from
- the specific issue/s raised in the complaint
- investigations undertaken into site activities and cause of dust emission
- the actions taken to address the specific issue/s raised in the complaint.

Any complaint that is received in relation to current conditions, will be addressed in line with the Trigger-Action Response protocol set out in Table 3-1, and will be considered a Level 2 or Level 3 incident for investigation.

Any complaint received retrospectively will be investigated accordingly.

Table 3-1: Initial Trigger Values

Trigger Level	Trigger values and Trigger-Action-Response		
	Visual observations of dust	**Meteorology (winds)**	**Monitored[3] PM_{10}**
Level 1 Low Risk of Off-site Impact	Visible dust observed from activity	Wind arc away from Binningup (160 clockwise to 60 degrees)	Rolling 1-hour average <90µg/m³ and wind arc away[4] from Binningup (160 clockwise to 60 degrees)[5]
Response	*Report and investigate as a potential "incident"* • *Check controls in place.* *If not in place apply control.*	*Poor dispersion conditions present or forecast.* *Report and investigate as a potential "incident"* • *Check controls in place.* *If not in place apply control.*	*Report and investigate as a potential "incident"* • *Check controls in place.* • *If not in place apply control.*
Level 2 Medium Risk of Off-site Impact	Visible dust observed from activity across site Visible dust observed leaving activity area(s)	Wind arc toward Binningup (60 to 160 degrees) Poor dispersion conditions • Wind speed < 2 m/s OR Wind erosion conditions • Wind speed > 6 m/s	2 consecutive 10 minute readings • > 90 µg/m³ at boundary monitor and with a broad wind arc toward[6] Binningup
Response	*Report and investigate as an "incident"* • *Check controls in place.* • *If not in place apply control.* *Check forecast and current conditions for meteorology-* • *Check wind speed and wind direction* • *Rainfall* *Action in line with Meteorology response.*	*Increased potential for dust lift-off.* *Report and investigate as an "incident"* • *Check controls in place.* • *If not in place apply control.* *Poor dispersion event (i.e. winds are calm)-* • *If wind is < 2 m/s **prepare to stop** dust generating activities until sources / work areas are wetted down* *Wind erosion event-* *If wind > 6 m/s **prepare to stop dust generating activity** until sources / work areas are wetted down*	*Report and investigate as an "incident"* • *Check controls in place.* • *If not in place apply control.* *Check forecast and current conditions for meteorology-* • *Check wind speed and wind direction* • *Rainfall* *Action in line with Meteorology response.*
Level 3 High Risk of Off-site Impact	Visible dust observed leaving premises site boundary	Wind arc toward Binningup (60 to 160 degrees) Wind erosion conditions • Wind speed > 8 m/s	3 consecutive 10 minute readings • >90 µg/m³ at Binningup monitor and with narrow wind arc toward Binningup monitor
Response	Report and investigate as an "incident". Locate source. Stop all activity until dust is suppressed at source. Do not resume normal works until wind speed reduces to 8 m/s.		

[3] Monitor is assumed to be positioned on the western boundary of the premises in alignment to Binningup. If the monitor is positioned closer to Binningup, then a lower PM trigger value will need to be specified.

[4] The wind arc "Away" from Binningup is considered to be wind blowing from the direction 160 degrees clockwise to north and to 60 degrees. Given the coastal location, it is expected that winds from the direction of the Indian Ocean will have the potential to trigger elevated levels of PM10 due to marine aerosol.

[5] Current dust emission limits applied in European countries and regions vary between 20 and 150 mg/m³.day for ambient dust measured around quarries – no Australian reference.

[6] The wind arc "Toward" Binningup is considered to be wind blowing 60 degrees (clockwise) through to 160 degrees. A narrow arc may be determined once the monitor is in place, and will take into account the quarry cell being worked

4 Roles and Responsibilities

In order to be effective and efficient, dust management and mitigation needs to be an operations wide integrated activity. To this end the key roles, accountabilities and responsibilities are summarised in Table 4-1.

Table 4-1: Operational dust management plan – roles, responsibilities and accountabilities

Role	Responsibility
Asset Owner | Licensee	Ensure that operational dust management is integrated as part of business outcomes. Ensure personnel are aware of their obligations in relations to the implementation of the operational dust management plan. Ensure resources are available to achieve the commitments in the operational dust management plan. Implement the operational dust management plan.

Site Manager	Accountable for:
	
	• Implementation of controls to manage dust – suppression activities
	• Maintaining of equipment to ensure machinery does not cause unnecessary / excessive dust emissions
	• Ambient air quality monitoring
	  ○ Configure Trigger Alerts and review periodically for effectiveness
	  ○ Regularly review monitoring data
	  ○ Internal reporting of monitoring
	• Responding to Trigger Alert requiring action
	  ○ Investigate results indicating high dust levels
	  ○ Investigation response and resolution of dust event investigations and reporting, including
	  - Notification to Shire of Harvey
	  - Remedial action implemented within 2-hours of complaint verification
	  - Halting operations when remedial action does not resolve high dust levels
	• Audit operations success in implementing corrective actions responding to ambient monitoring alerts for dust management and dust mitigation

Site personnel - All	Ensure that operational dust management is integrated as part of daily work routine. Observations of visual dust are reported promptly. Implementation of action in response to trigger alerts are actioned promptly.

5 References

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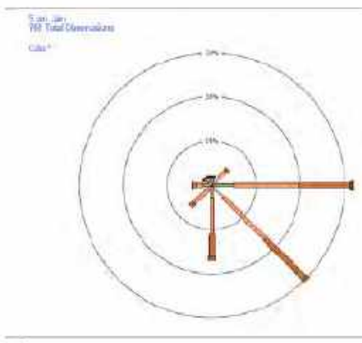
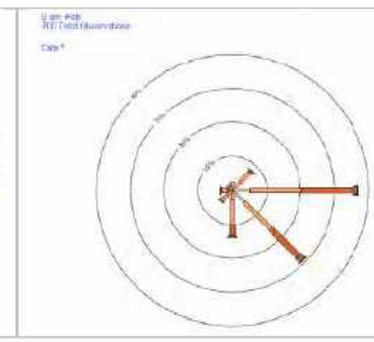
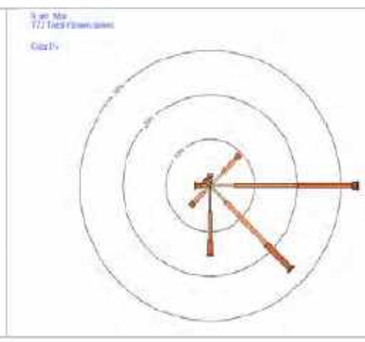
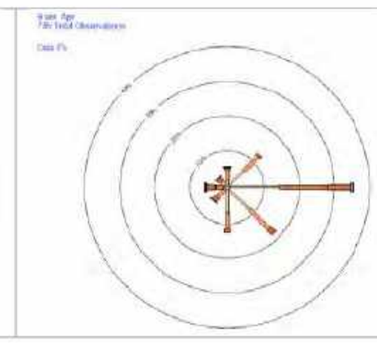
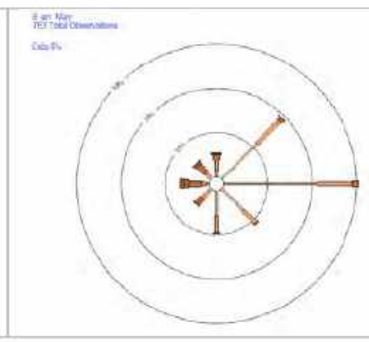
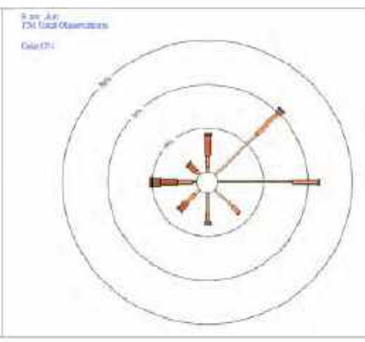
6 Acronyms and Glossary

Acronym	Description
BoM	Bureau of Meteorology
BWh	Koppen-Geiger classification
C	Degrees Celsius (temperature)
CV	Conveyor
DWER	Department of Water and Environmental Regulation
EPAV	Environmental Protection Authority Victoria, Australia
ES-642	Nephelometer (dust monitor model)
ETA	Environmental Technologies& Analytics Pty Ltd
FEL	Front end loader
g/m²/month	Grams per square metre per month
g/s	grams per second
h/yr	Hours per year
kg	kilogram
kg/t	kilogram per tonne
kg/yr	kilograms per year
kPa	kiloPascals
km	kilometre
m	metre
m/s	metres per second
mm	millimetre
Mt	Million tonnes
Mtpa	Million tonnes per annum

Acronym	Description
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measure
NPI	National Pollutant Inventory
NSW	New South Wales
ODMP	Operations Dust Management Plan
PM	Particulate matter, small particles and liquid droplets that can remain suspended in air.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of 10 µm or less.
PM_{10}	Particulate matter with an aerodynamic diameter of 2.5 µm or less.
ROM	Run of mine
t	Tonnes
t/h	Tonnes per hour
tpa	tonnes per annum
tph	tonnes per hour
TS	Transfer station
TSP	Total suspended particulates
µg/m³	micro grams (one millionth of a gram) per cubic metre
µm	micrometre
USEPA	United States Environment Protection Agency

7 Appendices

Appendix A - Long term climate statistics – wind speed and direction

January	February	March	April	May	June
9am					
					
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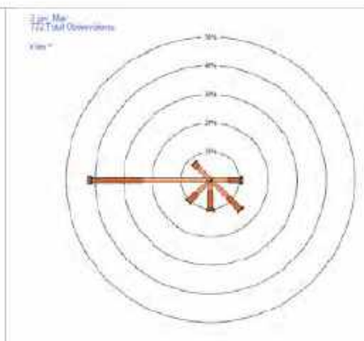
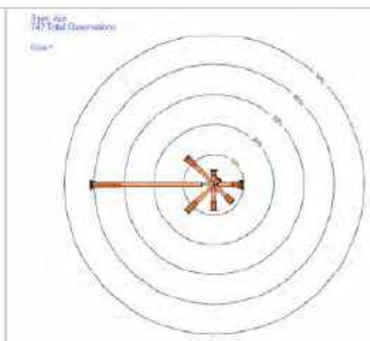
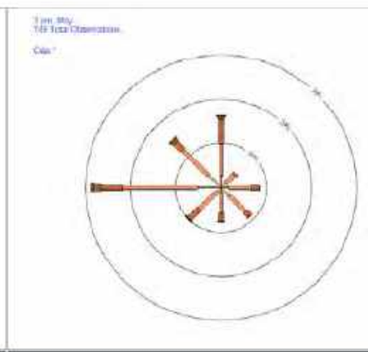
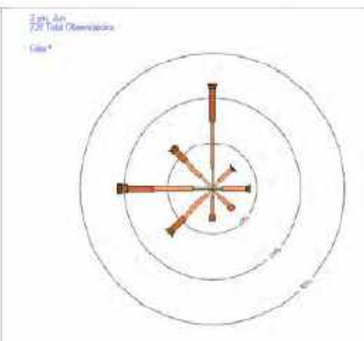
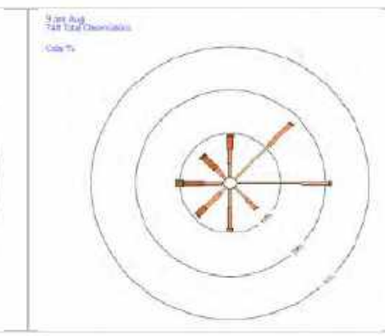
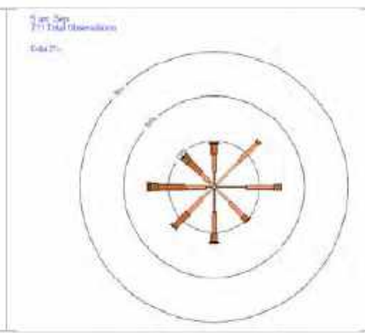
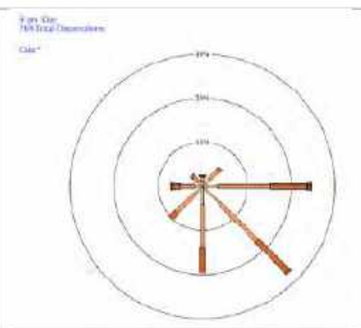
					

July	August	September	October	November	December
9am					
					
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	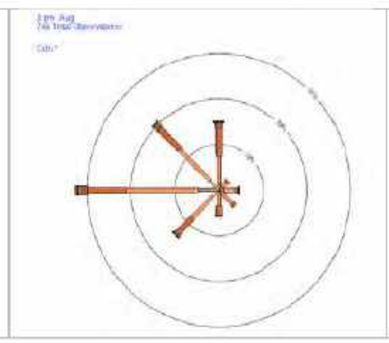		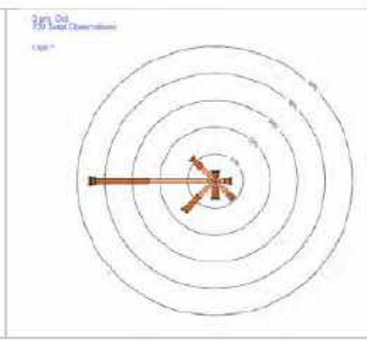		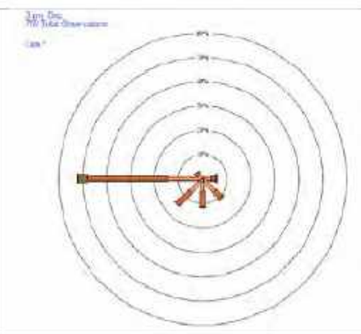

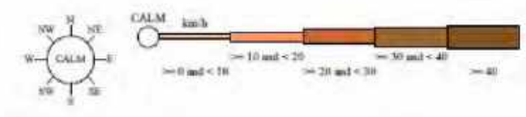

Appendix Figure 1: Climate statistic for Bunbury (BoM, 2020)

Appendix B - Emissions Estimation

			Emission Factors				Activity Rate		Op Hours	Uncontrolled emissions						Controlled emissions							
										Emission Rates (g/s)			Emission Rates (kg/yr)			Control		Emission Rates (g/s)			Emission Rates (kg/yr)		
Activity	Source	Source - Emission Factor	Units	TSP	PM10	PM2.5	Value	Units	hrs/yr	TSP	PM10	PM2.5	TSP	PM10	PM2.5	Description	Reductio	TSP	PM10	PM2.5	TSP	PM10	PM2.5
Topsoil removal	Scraper (stripping topsoil)	NPI for mining 1.1.13	kg/tonne	0.029	0.0073	0.0011	3,231	tpa	2,860	0.009	0.002	0.000	94	24	4	Scraper on tops	50%	0.005	0.001	0.000	47	12	2
Topsoil transport	Scraper (travel mode)	NPI for mining 1.1.12	kg/VKT	2.57	0.35	0.05	39	VKT/yr	2,860	0.010	0.001	0.000	100	14	2	Watering	50%	0.005	0.001	0.000	50	7	1
Limestone excavation - dig and push limest	Loader	NPI for mining 1.1.13	kg/tonne	0.025	0.012	0.0018	40,000	tpa	2,860	0.097	0.047	0.007	1,000	480	72	No control	0%	0.097	0.047	0.007	1,000	480	72
Rubber tyred loader pick up limestone and t	Loader	NPI for mining 1.1.13	kg/tonne	0.025	0.012	0.0018	40,000	tpa	2,860	0.097	0.047	0.007	1,000	480	72	No control	0%	0.097	0.047	0.007	1,000	480	72
Mobile crusher	Crusher	NPI for mining Table 3	kg/tonne	0.01	0.004	0.0006	40,000	tpa	2,860	0.039	0.016	0.002	400	160	24	No control	0%	0.039	0.016	0.002	400	160	24
Screen	Screen	NPI for mining Table 3	kg/tonne	0.08	0.06	0.0090	40,000	tpa	2,860	0.311	0.233	0.035	3,200	2,400	360	No control	0%	0.311	0.233	0.035	3,200	2,400	360
Load limestone into trucks	Loader	NPI for mining 1.1.13	kg/tonne	0.025	0.012	0.0018	40,000	tpa	2,860	0.097	0.047	0.007	1,000	480	72	No control	0%	0.097	0.047	0.007	1,000	480	72
Transport limestone - pit to offsite	Wheel-generated dust	NPI for mining 1.1.13	kg/VKT	3.91	1.15	0.17	1,111	VKT/yr	2,860	0.422	0.125	0.019	4,344	1,282	192	Level 2 watering	75%	0.105	0.031	0.005	1,086	321	48
Wind erosion of exposed area - ground leve	Wind erosion of exposed area	SKM (005) modfied Shao equation	kg/ha/hr	1.143	0.400	0.060	10	ha	8,760	3.175	1.111	0.167	100,114	35,040	5,256	Watering	50%	1.5873	0.5556	0.0833	50,057	17,520	2,628
Wind erosion of exposed area - pit base	Wind erosion of exposed area	SKM (005) modfied Shao equation	kg/ha/hr	1.143	0.400	0.060	2	ha	8,760	0.635	0.222	0.033	20,023	7,008	1,051	Wind erosion -	40%	0.3810	0.1333	0.0200	12,014	4,205	631

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