GROUNDWORK PART OF SLR

Dublin Pit (EML 6560)

Program for Environment Protection and Rehabilitation (PEPR)

Prepared for: Leinad Land Management Pty Ltd

Date: 18 December 2025

File Reference: 5109_610_009R2

DOCUMENT CONTROL

PROJECT / DETAILS REPORT

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ATTACHMENTS

Declaration of Accuracy

I, **Frank Vouansis** and **Daniel Palumbo** the applicant, have taken reasonable steps to review the information and to ensure its accuracy.

Name: Frank Vouansis

Position: Director

Dated: 18 December 2025

Name: Daniel Palumbo

Position: Director

Dated: 18 December 2025

1 Introduction

1.1 Background

Groundwork Plus (SA) part of SLR (Groundwork Plus) has been engaged by Leinad Land Management Pty Ltd (Leinad) to undertake the development of a Program for Environment Protection and Rehabilitation (PEPR) for Dublin Pit, consisting of Extractive Minerals Lease (EML) 6560 (the Site). The Site is located approximately 50 kilometres (km) north west of Adelaide, and approximately 2.8 km south of the township of Dublin in the Adelaide Plains region of South Australia.

The establishment of mining tenure over the Site has been proposed for the extraction of limestone resource that occurs within the region, which will further support the supply chain of material for the construction industry for the Adelaide Plains region. Large quantities of limestone material are consumed each year in South Australia for domestic and commercial construction activities as well as maintaining the State and Local Government road network. Land development within the Adelaide Plains is also increasing significantly of which the demand for locally sourced construction materials is required to provide economically viable sources of construction materials with reduced transport distances.

The proposed quarry operations are intended to target the shallow limestone resource throughout the area and progressively backfill the quarry void with imported clean fill in accordance with the *Environment Protection Authority (EPA) Standard for the Production and Use of Waste Derived Fill 2013*, establishing a landform that will support the existing use of the land for cropping and grazing whilst also supporting potential future development opportunities for the land's highest and best end use.

The land is located within the South Australian Government Greater Adelaide Regional Plan (GARP) and the Adelaide Plains Council growth areas supporting the future development of the Adelaide Plains. Leinad own the land within and to the north of the Site of which strategic planning has been approved for the establishment of a Dublin Green Circular Economy Precinct. An Urban Framework Plan has been developed to guide the long-term and staged development of the new precinct which is proposed to establish an employment zone incorporating the Site and the land north of the Site. With this in mind, the conceptual final landform for the Site has been designed in consideration of the potential future development within and adjacent to the Site, of which the land use within the Site may be varied to commercial and industrial activities in support of the employment zone following the outcomes of a Code Amendment under the *Planning Development and Infrastructure Act 2016*.

Within the Quarry Development Plans (QDP) for the Site, elevation and survey data is provided in GDA94 under UTM Zone 54. The Reduced Level (RL) references throughout this document are to metres Australian Height Datum (mAHD), the vertical height or elevation above Mean Sea Level which forms the National Standard benchmark to which all height measurements are referred.

1.2 Site Overview

An overview of the tenement details is summarised in **Table 1 – Tenement Detail Summary**.

Table 1 – Tenement Detail Summary

Tenement Number	**EML 6560**
Tenement Holder / Operator	Leinad Land Management Pty Ltd
Registration Grant Date	14/04/2025
Expiry Date	13/04/2039
Commodities	Limestone
Legal Area (hectares (ha))	224.13 ha
Commodity Categories	Construction Materials

1.3 Site Contact

Table 2 – Site Contact Details summaries the Site contact details.

Table 2 – Site Contact Details

Contact Name / Position	Frank Vouansis – Director
Phone Number	0439 966 443
Postal Address	36 Fullarton Road, Norwood SA
Email Address	frank@leipzig.com.au
Contact Name / Position	Daniel Palumbo – Director
Phone Number	0438 289 903
Postal Address	55 Stanbel Road Salisbury Plains SA
Email Address	Daniel.palumbo@palumbo.com.au

2 Description of the Existing Environment

A description of Existing Environment has been described with the Mining Lease Proposal (MLP) assessed by the Department for Energy and Mining (DEM) with the grant of EML 6560 issued on 14 April 2025.

There have been no amendments or changes to the description of existing environment since the MLP was assessed and approved. For completeness, the description of existing environment provided within the MLP has been included within the following sections.

2.1 Topography and Landscape

The Site is situated approximately 2.8 kms south of the township of Dublin in the Adelaide Plains region of South Australia. **Drawing No. 5109.DRG.010R1 – Site Location Map** is presented as a visual cue to understand the Site's location in relation to the surrounding townships and coastlines. Further information on demographics and utilities of the town is outlined in **2.12 Proximity to Infrastructure and Housing**. The Site has an upper elevation of nine (9) mAHD on the north eastern aspect of the Site, whilst the lower areas of the EML are approximately four (4) mAHD on the south eastern boundary of the Site, refer to **Drawing No. 5109.DRG.018R1 – Topographic Map**.

The Site is located within the predominate Limerock Land System (LIM) and the Wild Horse Plains Land System (WHP) (*NatureMaps*, 2023), which consists of very gently undulating stony flats and coastal plains. The undulating plains of the LIM consist of an overall gradient to the south west which is characterised by shallow stony alkaline soils where the land adjoins low lying flats and swamps with a calcreted surface of two (2) to three (3) metres (m) thick. The WHP joins the LIM on the west with the continuous undulating alluvial plains and coastal flats, which is observed with some internal relief provided by very low stony rises (remnants of the old calcreted land surface) or by low linear dunes or sand spreads.

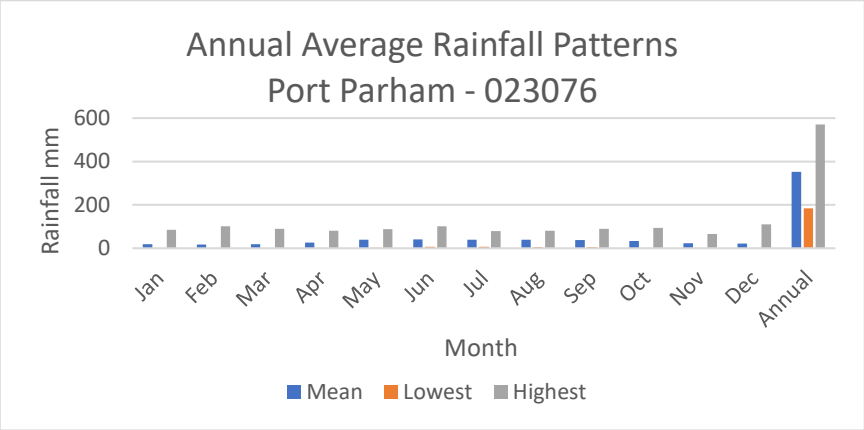
There are no watercourses located within the EML boundary, with areas of remnant vegetation occurring adjacent to the active cropping areas within the Site.

2.2 Climate

The Site is located in a Mediterranean climate with some areas leading to a semi-arid climate with hot, dry summers and cool, wet winters. Weather data was obtained from the Bureau of Meteorology (BoM) from two (2) weather stations located in Port Parham (Station No. 023076) and Roseworthy (Station No. 023122) approximately 8.6 km and 30.5 km from the Site, respectively. The annual average rainfall is 352.7 millimetres (mm) based on the records obtained from the Port Parham weather station, represented as the closest weather station recording daily rainfall records. The average monthly temperature varies, with warm summers and moderately cool winters, refer to **Table 3 – Annual Average Rainfall Patterns** and **Table 4 – Annual Average Maximum and Minimum Temperature Patterns**. Temperature data obtained from the Roseworthy weather station are as low as 9.7 degrees Celsius in winter and extend to an average of 23.6 degrees Celsius in summer.

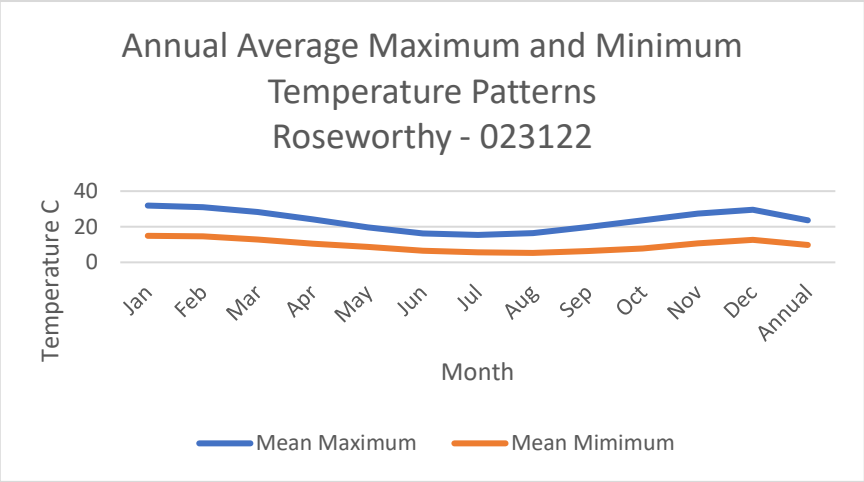
Wind patterns follow prevailing winds from the north, north east in the morning and a dominant south, south easterly wind in the afternoon, refer to **Attachment 1 – Wind Frequency Analysis**.

Table 3 – Annual Average Rainfall Patterns



(BoM, 2023)

Table 4 – Annual Average Maximum and Minimum Temperature Patterns



(BoM, 2023)

2.3 Topsoil and Subsoil

The area comprises of shallow calcareous loamy sand over calcrete (B2), which is very extensive, rubbly calcareous sandy loam (A5), Calcareous loam (A6), which is extensive in the flats region, saline swamp soil (N2), which is limited in depressions (*NatureMaps*, 2023). A search of the Department for Environment and Water (DEW) application, *NatureMaps* (2023), identified that the Site is located with the LIM and WHP regions. Areas of the LIM and WHP tend to have shallow to very shallow and stony alkaline soils which substantially restrict productive potential; therefore, much of the land is only semi arable and in particularly the western region is largely used for low intensity grazing and some cropping on a rotational basis.

Across the EML, the topsoil comprises of a shallow sandy loam at the lower elevations, consisting of dark brown, firm, highly calcareous, light sandy clay loam with hard carbonate nodules from 0 to 12 centimetres (cm). Subsoil within the Site varies in depth between 12 – 32 cm in depth, comprising of yellowish brown /

red, highly calcareous sandy loam (*The Soils of Southern Australia, 2006*). Portions of the Site located predominantly within the central areas of the Site, contain rocky calcrete outcrops with limited topsoil and sub soil cover.

An inspection of the Site in May 2023 by Groundwork Plus confirmed the shallow nature of the topsoil within the Site and presence of rocky outcrop within the central portions of the Site. The lower topography located within the south western portion of the Site contain slightly deeper topsoil and subsoils with less competent limestone caprock and an absence of any rocky outcrops. Whilst there may be some slight variation in soil depths across the Site, they are not expected to be significant in nature or require additional management requirements.

2.4 Geological Environment

The DEM portal South Australian Resources Information Gateway (SARIG) (2023) lists the regional geology of the area as undifferentiated Pleistocene calcrete (Qp\ca) and Quaternary dunefield sands (Qe1) as outlined within **Drawing No. 5109.DRG.004R1 – Regional Geology Map**. The LIM summarises the regional geology as comprising of rubbly calcretes of Ripon / Bakara Formations which overlay Hindmarsh Clay at depths of 100 cm or more but generally the calcrete is impenetrable by hand tools. Solution of the calcrete has resulted in a mosaic of sinkholes in the surface, which are particularly striking in the western part of the system. Moreover, the WHP summaries the regional geology as formed on red, brown and grey mottled clayey sediments which were overlain by windblown calcareous materials that have hardened to a sheet calcrete cap. Having been largely removed, remnant sheet calcrete persists on low rises.

A series of test pits undertaken by A.S. James Pty Ltd undertaken in August 2022 were undertaken to further inform the geological environment within the Site. Topsoil comprised of silty sand was observed within the top 100 mm of the soil profile followed by a thin layer of red brown silty sand approximately 200 mm thick above the limestone resource, refer to **Diagram 1 – Typical Geological Cross Section**.

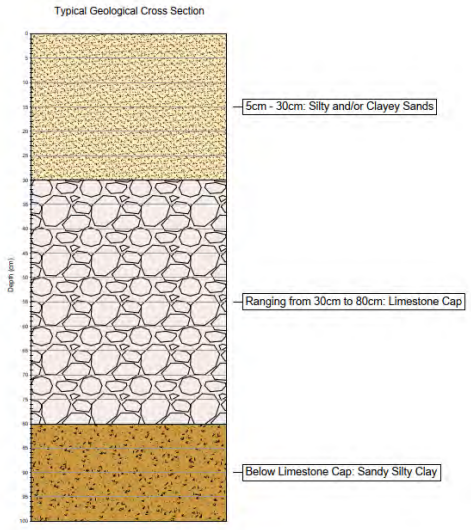


Diagram 1 – Typical Geological Cross Section

2.5 Geohazards

There are no known faults or other geological instability features on or immediately adjacent to the Site. A search of SARIG (2023) for earthquake activity within five (5) km of the Site, recorded one (1) result. A seismic

event occurred approximately 2.7 km north of the Site in April 1979 and was measured to be 1.8 in magnitude.

Limestone is known to contain a low content of respirable silica, based on the proposed extraction volumes per annum and exposure timeframes to the source, exposure limits are considered to be of low risk to receptors. The free silica content is one of many constituents of dust, including pollen, sand, and other plant material. In addition to extraction, other quarrying activities including haulage and movement of vehicles may generate dust.

There are no known minerals that occur in the material to be quarried that are hazardous to human health or the potential to pollute the environment such as asbestos or sulphide minerals that may generate acid.

2.6 Groundwater

A search on *NatureMaps* (2023), identified that the Site is not located within a Prescribed Water Resource Area (PWRA) or a groundwater Prescribed Water Area (PWA).

Review of the DEM portal, SARIG (2023), identified one (1) low-lying, high potential aquatic Groundwater Dependent Ecosystem (GDE) within the south western portion of the EML area, and several low-lying, high potential terrestrial GDEs scattered around the western and southern portions of the EML area, refer to **Drawing No. 5109.DRG.018R1 – Topographic Map**. An inspection of the vegetation by Groundwork Plus in May 2023, confirmed that the vegetation is comprised of a degraded chenopod shrubland within the higher portions of the mapped terrestrial GDE areas with scattered samphire contained within the lower portions of the terrestrial and aquatic GDE areas. Terrestrial GDEs within the EML are unlikely to draw on groundwater as a constant source of water, given the composition of the vegetation being reduced to scattered chenopod shrubs, the available rainfall, and the recorded salinity of groundwater. The mapped aquatic GDE was identified onsite as a Samphire shrubland and will not be encroached upon during the proposed operations as the proposed quarrying activities will not occur within the south western corner of the Site.

The DEW database *WaterConnect* contains limited data on groundwater in the area; however, a search was completed to a radius of three (3) km from the centre of the Site, refer to **Drawing No. 5109.DRG.012R1 – Groundwater Map** for a visual representation of well locations. A total of 10 water wells were identified. Of these, six (6) were found to be investigation wells only, with no water data.

The remaining four (4) water wells reported Standing Water Levels between 3.6 m AHD and 6.82 m AHD. A Groundwater Assessment undertaken by Water Technology in June 2022 calculated the Residual Standing Water Levels (RSWL) in m AHD for three (3) of the wells, refer to **Attachment 2 – Groundwater Assessment**. Regional groundwater quality data based on spatial distribution of salinity observations SARIG (2023) indicates high groundwater salinities, which are commonly observed near coastal wells with a general salinity measurement of Total Dissolved Solids (TDS) milligrams per litre (mg/L). A summary of the groundwater well data is provided within **Table 5 – Local Groundwater Well Summary**.

Table 5 – Local Groundwater Well Summary

Well Unit No.	Distance from Site (km)	Direction to well	Well Status	RSWL (mAHD)	Total Dissolved Solids milligrams per litre (TDS mg/L)	Topo elevation of well (mAHD)	Water Level Date
6529-0041	0.42 km	South	Op	3.16	33,397	4.38	05/05/1972
6529-0042	1.3 km	South east	-	6.75	34,838	7.97	05/05/1972
6529-0043	1.75 km	West	-	6.82	21,856	11	05/05/1972
6529-1178	1.77 km	North west	-	-	6,659	16	30/01/2014

(Source: WaterConnect)

The Groundwater Assessment undertaken by Water Technology in June 2022 included the results of groundwater observations during the onsite geotechnical investigations, refer to Attachment 2 – Groundwater Assessment. Based upon the outcomes of the geotechnical investigations and review of the regional groundwater data, groundwater levels within the Site are present between 2.4 and 4.1 m AHD. Review of reginal groundwater elevation data including the onsite test pits, suggests that groundwater flow within the Quaternary Aquifer beneath the Site flows north east to south west across the Site. On this basis, a two (2) m buffer has been recommended to ensure that the groundwater aquifer is not intercepted by the proposed quarrying activities as outlined within Table 6 – Site Investigations.

Table 6 – Site Investigations

Test Pit No.	Topographic Elevation of Drillhole mAHD	Residual Standing Water Level (RSWL) (mAHD)
1	6.4 m AHD	3.4 m AHD
2	6.3 m AHD	Not intercepted
3	5.3 m AHD	2.4 m AHD
4	5.5 m AHD	2.6 m AHD
5	6.8 m AHD	4.1 m AHD
6	8.6 m AHD	Not intercepted

(A.S.James Pty Ltd, 2022)

The final depth of extraction is variable due to the varying topographic elevations with the EML and the recommendation to maintain a two (2) m buffer, this is demonstrated in **Drawing No.5109.DRG.021BR1 – Extraction Plan – Stage 1 Cross Sections A-A' to C-C'**, **Drawing No.5109.DRG.023BR1 – Extraction**

Plan – Stage 2 Cross Sections A-A' to C-C' and **Drawing No.5109.DRG.025BR1 – Extraction Plan – Stage 3 Cross Sections A-A' to D-D'**.

Based upon the average annual rainfall of 352.7 mm per year and an average pan evaporation rate estimated between 1,600 and 1,800 mm per year outlined within **Attachment 2 – Groundwater Assessment**, and the sandy silty clay material present within the lower portions of the pit two (2) m above the groundwater table, the likelihood of surface water seepage into the groundwater table is considered low. Additionally, based upon the groundwater observations within the Site, the status of groundwater well users and GDEs within proximity to the Site, the proposed extraction operations are unlikely to impact on the groundwater table and result in impacts to groundwater users or GDEs.

2.7 Surface Water

A search on *NatureMaps* (2023), confirmed that the Site is not located within a PWRA or the Murray River Water Protection Area – Murray Zone and Tributaries Zone.

The search identified that the Site is located within the Long Plains surface water catchment and also within the Gawler River Basin and the nearest mapped watercourses are outlined within **Drawing No. 5042.DRG.018R1 – Topographic Map**. Inspection of the nearest mapped watercourse undertaken by Groundwork Plus, confirmed that the area mapped is comprised of a low depression only and does not consist of any water course features or shows signs of being directly connected to the adjacent coastal environment. On this basis, the Site inspection confirmed that there are no known water courses within close proximity to the Site. The closest waterbody to the Site is one (1) dam, approximately 1.8 km north west of the Site.

As outlined within **Section 2.2 Climate**, the Site is located within a low rainfall area of which there are only likely to be low volumes of surface water generated during rainfall events. Should there be large rainfall resulting on overland flow, water within the Site would flow in a south westerly direction across the Site as outlined within. **Drawing No. 5109.DRG.018R1 – Topographic Map**. There are no deigned water courses within the Site which would require a Water Affecting Activity if surface water drainage patterns were required to be modified.

2.8 Vegetation, Weeds and Plant Pathogens

The Site has historically been used for agriculture (cropping and grazing) of which large areas have historically been cleared of native vegetation.

An *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Report identified one (1) vulnerable ecological community: subtropical and temperate coastal saltmarsh present within a five (5) km radius, refer to **Attachment 3 – *Environment Protection and Biodiversity Conservation Act 1999* Protected Matters Report**.

Furthermore, the *EPBC Act 1999* Protected Matters Report identified five (5) native flora species or species habitat that are likely or may occur in the region. These are listed in **Table 7 – *EPBC Act* Listed Threatened Plant Species**.

Table 7 – *EPBC Act* Listed Threatened Plant Species

Species	Common Name	Rating
Caladenia tensa	Greencomb Spider-orchid, Rigid Spider-orchid	Endangered
Pterostylis xerophila	Desert Greenhood	Vulnerable
Senecio macrocarpus	Large-fruit Fireweed, Large-fruit Groundsel	Vulnerable
Swainsona pryophila	Yellow Swainson-pea	Vulnerable
Tecticornia flabelliformis	Bead Glasswort	Vulnerable

A search of *NatureMaps* (2023) identified one (1) State rated rare native flora species: *Maireana rohrlachii* (Rohrlach's Bluebush) and one (1) State rated vulnerable native flora species: *Tecticornia flabelliformis* (Bead Samphire) that may be present within a five (5) km radius.

An inspection of the Site undertaken in June 2023 by a Groundwork Plus Native Vegetation Accredited Consultant confirmed that the Site contains Native Vegetation as defined by the *Native Vegetation Act 1991*. Five (5) Vegetation Associations were identified across the Site:

- *Eucalyptus dumosa +/- Eucalyptus gracilis* mallee over chenopod shrubs;
- *Maireana spp. +/- Nitraria billardierei* degraded open shrubland with emergent *Eucalyptus Dumosa*;
- *Nitraria billardierei* degraded shrubland;
- *Maireana spp.* degraded open shrubland; and
- *Tecticornia spp.* coastal shrubland;

Large sections recently cropped without native vegetation were also present. All vegetation Associations have been heavily impacted by historical land clearance and on-going agricultural practises. Quarry development planning has allowed for the *Eucalyptus dumosa +/- Eucalyptus gracilis* mallee over chenopod shrubs vegetation association and the *Tecticornia spp.* coastal shrubland to be avoided from clearance.

Details of the native vegetation Bushland Assessment are provided within **Attachment 4 – Native Vegetation Management Plan**. An overview of the mapped vegetation within the Site is provide within **Drawing No. 5109.DRG.028R2 – Native Vegetation Clearance Proposal Map**.

2.8.1 Threatened Ecological Community Assessment

A Threatened Ecological Community (TEC), Subtropical and Temperate Coastal Saltmarsh, was identified within the desktop *EPBC Act* Protected Matters Search Report as a community likely to occur within the area based upon a five (5) km search radius from the Site. According to the *EPBC Act* approved Conservation Advice, the TEC has the key diagnostic criteria of the following points:

- occurs south of 23° 37' S latitude,
- occurs on the coastal margin,
- occurs on places with at least some tidal connection,

- occurs on sandy or muddy substrate,
- consists of dense to patchy areas of characteristic coastal saltmarsh plant species and
- proportional cover by tree canopy is not greater than 50 percent nor is proportional ground cover by seagrass greater than 50 percent.

Exclusions from the TEC listed within the Conservation Advice include "saltmarsh occurring on inland saline soils with no tidal connection" and "patches of saltmarsh (possibly senescent) within the coastal margin that are disconnected (either naturally or artificially) from a tidal regime but were once connected."

Site assessments have found no evidence of tidal connection with patches of vegetation containing saltmarsh plant species, with the distance of salt marsh plant species within the Site more than 3.5 km from the coast. Vegetation patches onsite that include saltmarsh plant species are occurring on inland saline soils and are not directly connected to coast tidal zone. Therefore, the TEC is not considered to be present within the Site.

2.8.2 Weeds and Plant Pathogens

A search of *NatureMaps (2023)* identified three (3) Weeds of National Significance (WoNS) that have been recorded within five (5) km of the Site; *Asparagus asparagoides f.* (Bridal Creeper), *Lycium ferocissimum* (African Boxthorn), and *Solanum elaeagnifolium* (Sliver-leaf Nightshade). State Declared weeds that have previously been recorded within five (5) km of the Site include:

- *Cenchrus ciliaris* (Buffel Grass)
- *Echium plantagineum* (Salvation Jane)
- *Gazania linearis* (Gazania)
- *Hyparrhenia hirta* (Tambookie Grass)
- *Marrubium vulgare* (Horehound)
- *Oncosiphon suffruticosum* (Calomba Daisy)

In general, the weed species observed within the Site consist of common agricultural weeds and appear to be in similar abundance to the adjacent land. However, the WoNS *Lycium ferocissimum* (African Boxthorn) and *Solanum elaeagnifolium* (Sliver-leaf Nightshade) were recorded in low densities, as well as the State Declared weed *Marrubium vulgare* (Horehound).

A database search of *NatureMaps* (2023) for the area did not return any results for Phytophthora within the area. No vegetation onsite is known to be affected or potentially affected by economically significant pathogens.

2.9 Fauna

The *EPBC Act 1999* Protected Matters Report (2023) identified 29 native fauna species or species habitat that are likely to occur in the region. The species listed have a national status of either vulnerable, endangered, or critically endangered, refer to **Attachment 3 – *Environment Protection and Biodiversity Conservation Act 1999* Protected Matters Report**.

A search of the Government of South Australia application *NatureMaps* (2023) identified nine (9) native fauna species that have been previously recorded within the preceding 20 years and within a five (5) km radius of the Site in which three (3) were State rated as rare including: *Falco subniger* (Black Falcon), *Neophema elegans elegans* (Elegant Parrot) and *Turnix varius varius* (Painted Buttonquail); three (3) State rated vulnerable species including: *Coturnix ypsilophora australis* (Brown Quail), *Hieraaetus morphnoides* (Little Eagle) and *Thinornis cucullatus cucullatus* (Hooded Plover); and three (3) Stated rated endangered

species including: *Calidris canutus rogersi* (Red Knot (ssp. rogersi)), *Calidris tenuirotris* (Great Knot) and *Pandion haliaetus cristatus* (Eastern Osprey).

A database search of *NatureMaps* (2023) for the area returned seven (7) introduced fauna species that have been recorded within five (5) km of the Site. All species are common and widespread throughout the region and are not likely to pose and management implications. These included:

- *Alauda arvensis arvensis* (Eurasian Skylark)
- *Columba livia* (Feral Pigeon)
- *Passer domesticus domesticus* (House Sparrow)
- *Spilopelia chinensis* (Spotted Dove)
- *Sturnus vulgaris vulgaris* (Common Starling)
- *Turdus merula merula* (Common Blackbird)
- *Mus musculus* (House Mouse)

Upon Site inspection, no listed native fauna species were identified within the Site. Vegetation within the Site has been subject to historical disturbance and clearing of which the remaining vegetation is not likely to contain high value native habitat for rare and endangered species. It would be expected that kangaroos, native birds, foxes, and rabbits would traverse the Site when foraging for food.

2.10 Caves

A search on SARIG (2023) did not identify any caves or significant limestone formations within or nearby to the Site.

2.11 Land Use

The Site has historically and currently been utilised within an agricultural grazing and cropping property in the Adelaide Plains Council, among a landform of undulating stony plains. The Site is located within a Rural Zone, which is defined as a zone to support economic prosperity of South Australia primarily through production, processing, storage and distribution of primary produce, forestry, and the generation of energy from renewable resources (*Plan SA, 2022*). Existing land uses within close proximity to the Site comprise of agricultural feedlots for cattle, poultry farms, cropping and grazing, conservation areas adjacent to the coast and a large waste disposal facility managed by Integrated Waste Services (IWS). Extractive industries are also located within the area with EML 6477 located approximately 70m adjacent the south eastern corner of the Site as part of the IWS landfill facility. It is understood that EML 6477 will eventually be backfilled with waste and capped at approximately 28m high as part of the landfill operations licenced by the EPA and associated Development Approval.

Within the context of the GARP, townships of Dublin and Mallala are intended to retain their own separate identity whilst expanding to support township function and viability. On this basis, Leinad have received approval regarding strategic planning for the establishment of a Dublin Green Circular Economy Precinct including the development of an Urban Framework Plan outlined within **Diagram 2 - Dublin Urban Framework** to guide the long-term and staged development of the new precinct with a mix of residential, employment, infrastructure, community, and open space land uses.

A Code Amendment pursuant with the requirements of the *Planning Development and Infrastructure Act 2016* was prepared by Leinad and approved to establish an employment zone for a portion of the precinct area including the proposed quarry which would provide for a mix of future commercial and industrial land uses within and adjacent to the Site as outlined within **Diagram 2 - Dublin Urban Framework**. A proposed residential area is located approximately 1.3km from the closest northern point of the EML. An open space

buffer is also proposed along the western boundary of the Site which provides for an undeveloped buffer between 280 m and 1.3 km wide between the Site and the adjacent Conservation Zone within the Dublin Urban Framework.

The IWS landfill facility and a poultry farm located south and east of the Site respectively require specific EPA buffer distances from residential developments which overlap the Site as outlined within **Diagram 2 - Dublin Urban Framework**. On this basis, future development east of the Site is unlikely to comprise of residential properties due to the proximity to other existing land uses which are expected remain well into the future.

There are no other known proposals to change the land use to other adjacent land parcels surrounding the Site.

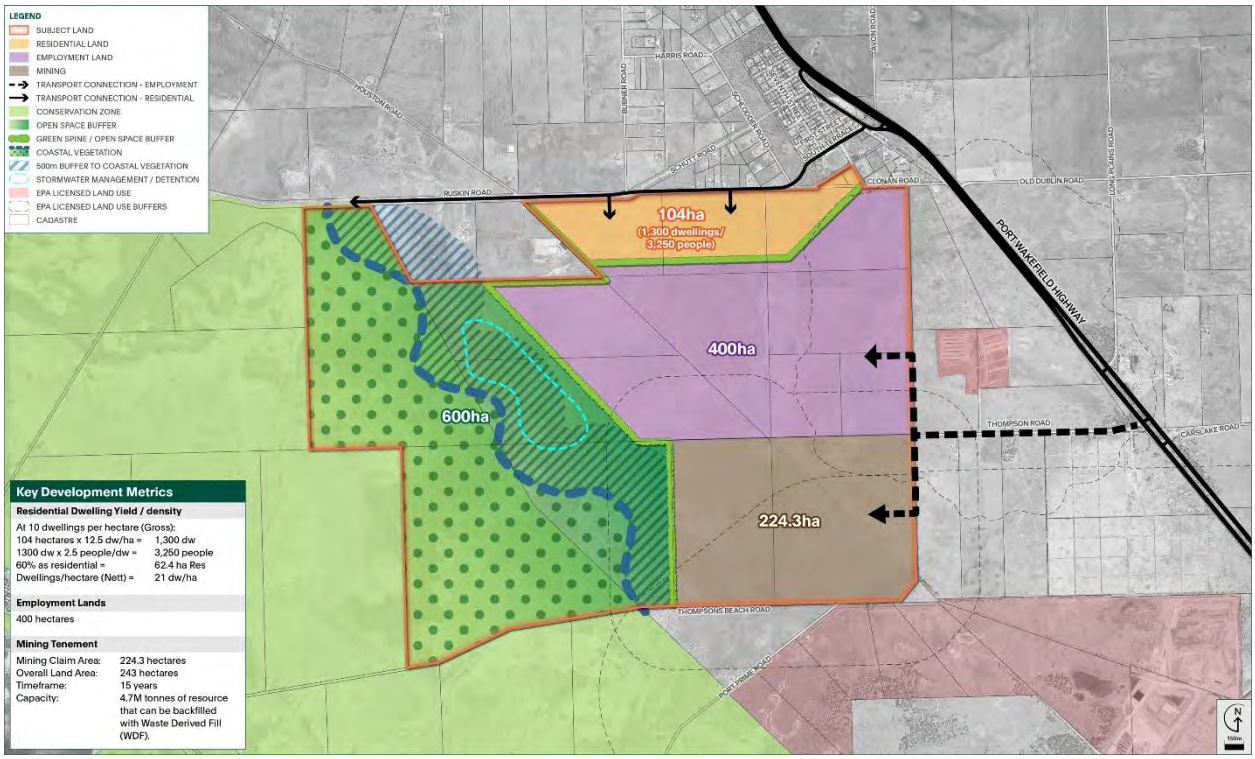


Diagram 2 - Dublin Urban Framework

The Site is not within the interest of public utility easements, defence purposes or located on any overlapping Tenements.

Go Exploration Pty Ltd are the Tenement Holder of Petroleum Exploration Licence (PEL) 120 over the Site.

2.12 Proximity to Infrastructure and Housing

The township of Dublin is located approximately 2.8 km north of the Site. According to the Australian Bureau of Statistics 2021 Census, there are approximately 405 inhabitants living in Dublin and the close surrounds, comprising of 55.7 percent male, 44.3 percent female and four (4) percent Aboriginal and / or Torres Strait Islander people. The township has basic amenities, such as a primary school, post office and a grocery store. The township and the Site are situated within the Adelaide Plains Council.

The nearest residential dwellings are located on Thompsons Beach Road situated approximately 300 m, 500 m, 730 m and 780 m east of the nearest point of the EML boundary. Additional nearby residential dwellings are located approximately two (2) km north east, 2.3 km north west and 1.2 km north of the EML boundary,

refer to **Drawing No. 5109.DRG.016R1 – Land Access Map**. An EML (EML 6477) owned by IWS is located approximately 70 m south of the Site which is accessed via the internal operations of IWS.

The Site is accessed via one (1) minor roadway via Thompsons Beach Road, approximately 10 m from the north eastern boundary, refer to **Drawing No. 5109.DRG.013R1 – Site Access Map**.

There are a number of water wells located within three (3) km of the Site, refer to **Drawing No. 5042.DRG.012R1 – Groundwater Map**.

There is no electricity supply running into the Site. The nearest water main runs along the northern boundary of the Site with a water point located within the Landowners land adjacent to the Site. The nearest transmission line is located approximately 130 m north from the nearest point of the Site on Thompson Road, refer to **Drawing No. 5109.DRG.016R1 – Land Access Map**.

2.13 Exempt Land

Exempt Land exists within EML 6560 as shown in **Drawing No. 5109.DRG.003R1 – Exempt Land Map**. The features as defined under Section 9 of the *Mining Act 1971* are listed in **Table 8 – Exempt Land Features** below.

Table 8 – Exempt Land Features

Certificate of Title (CT) or Crown Land Details	Name of Person Entitled to Exemption	Reason of Exemption	Waiver Obtained	Conditions
CT 5593/253 H140400 S302	Leinad Land Management	• Cropped Land • Within 150 m of infrastructure used for an industrial or commercial purposes valued over $2,500.	S82 agreement provided to DEM	Nil
CT 5633/660 F175266 A799	Leinad Land Management	• Cropped Land • Within 150 m of infrastructure used for an industrial or commercial purposes valued over $2,500.	S82 agreement provided to DEM	Nil

It is noted the structure/s located south east of the Site (CT 5746/845 F 175267 A800) and north east (CT 5357/580 D45574 A3) do not require a waiver of exemption agreement to be undertaken as no operations planned to occur within this portion of exempt land.

2.14 Amenity

The Site is situated in an open paddock amongst agricultural grazing and cropped lands, which is visible from Thompsons Beach Road. The land is largely cleared of native vegetation for cropping purposes and the terrain is moderately sloping towards the south west. Visually the Site can be seen mostly from Thompsons Beach Road looking both west and east and north and over the proposed area. **Attachment 5 – Visual Assessment Photographic Plates** when viewed with **Drawing No. 5109.DRG.015R1 – Visual Assessment Map** provides an overview of the extent of the Site that is visible from a number of

representative locations around the Site as observed during a visual assessment of amenity aspects was undertaken by Groundwork Plus on 10 May 2023.

A series of photos were taken from multiple locations facing into the proposed quarry to gain an appreciation of the possible views of the operations by sensitive receptors within proximity to the Site. The photos highlight the naturally flat topography of the Site from the north east to south locations along Thompsons Beach Road as outlined in Photo Location (PL) PL 1, PL 4, PL 7, PL 8 and PL 9. Proposed quarry operations may be visible to identified sensitive receptors, however, given the proposed depth of extraction (approximately one (1) m in depth) and stockpile methodology, this is likely to be minimal and not impede greatly on the overall amenity of the area, particularly given the agricultural and light industrial nature of the surrounding landscape.

The final rehabilitated landform is proposed to be approximately one (1) m above the pre-extraction / existing land surface. This will be battered to 1 Vertical (V) : 4 Horizontal (H) and revegetated with an appropriate grass seed mix to blend in with the surrounding landscape. It is also expected a high amount of natural regeneration of native chenopods will occur as suitable colonising native species exist within the adjacent land and as is consistent with the regeneration that has occurred between cropping cycles.

2.15 Air Quality

Dust levels of the surrounding region are anticipated to be typical of a semi-arid and agricultural settings. It is anticipated that dust levels will not be more than the current levels from agricultural activities such as ploughing and sowing. The potential for generation of dust emissions is generally elevated during drier periods and those associated with rural settings. As such, potential dust generating activities expected at the Site include material extraction, transport and transfer of material, screening, storage of material (stockpiles) and influenced by the action of harvesting machinery and farm equipment on the dry soils.

A water cart will be available onsite to undertake dust suppression of haul roads and working areas while the Site is being operated. These measures are not in use with current farming activities on site. The crushing and screening plant is fitted with water sprayers to assist dust suppression as required.

2.16 Noise

Noise levels in the region are generally typical of an agricultural setting. Traffic noise emitted from vehicles travelling along Thompsons Beach Road and machinery associated with agricultural practices are typical anthropogenic noise sources in the surrounding area.

Potential noise generating activities onsite during campaign extraction activities include earthworks, drilling, Heavy Mobile Equipment (HME) movements, processing and crushing. As outlined within **Section 3.3 Quarrying Activities** and **3.4 Crushing, Processing and Product Transport**.

2.17 Heritage (Aboriginal, European, Geological)

A search of the Central Archive of the Department of Premier and Cabinet – Aboriginal Affairs and Reconciliation (DPC-AAR) on 13 February 2023 did not identify any results of Registered Aboriginal sites, objects or remains to be present within and the immediate surround. However, one (1) registered Aboriginal Heritage site has been recorded approximately 2.6 km south of the EML boundary and five (5) reported Aboriginal Heritage sites recorded within five (5) km of the EML boundary.

Historically, there has not been any Aboriginal Heritage surveys undertaken for the Site, nor have there been any instances of any Aboriginal Heritage Sites, Objects or Remains encountered during the current land use. The landform within the Site has been altered and disturbed from agricultural cropping activities. Land within the Site is held in Fee Simple of which Native Title has been extinguished.

A search on the Government of South Australia, application *NatureMaps* (2023), did not identify any non-indigenous or geological heritage sites within the Site or in proximity to the area.

2.18 Proximity to Conservation Areas

A search of the Government of South Australia Enviro Data (2023) *NatureMap*s identified the nearest conservation parks, reserves and Commonwealth recognised conservation areas to the Site as being those listed in **Table 9 – Conservation Reserves and Areas**. Refer to **Drawing No. 5109.DRG.009R1 – Proximity to Conservation Areas Map** for a visual representation of the proximity to conservation areas from the nearest point of the proposed quarry operations.

Table 9 – Conservation Reserves and Areas

Name	Direction	Distance (km)
Adelaide International Bird Sanctuary - Winaityinaityi Pangkara	South west	0.5 km
Upper Gulf St Vincent Marine Park	South west	3.4 km

(NatureMaps, 2023)

A search of the Government of South Australia Enviro Data (2023) *NatureMap*s identified the two (2) the nearest listed Heritage Agreements (HA) as shown in **Table 10 – Heritage Agreements**.

Table 10 – Heritage Agreements

Heritage Agreement Number	Direction	Distance (km)
HA 1164	South east	3.8 km
HA 687	North	2.0 km

(NatureMaps, 2023)

The directory of important wetlands has identified the Clinton wetland as a wetland of national importance which runs along the eastern coastline of the Spencer Gulf north west of Port Augusta to just south of Two Wells. The wetland consists of a mangrove / samphire estuarine area with many large tidal channels fringed by mangroves. Within the wetland system, the Wakefield River is the only major drainage channel providing major freshwater into the tidal flat gulf system (LSA, 2023). As outlined within **Section 2.7 Surface Water** there are no watercourses within or adjacent to the Site which provide connectivity to the coastal environment. At the nearest point of the EML, Clinton wetland is located approximately 0.5km south west from the south west corner of the proposed quarry operations.

2.19 Pre-existing Site Contamination and Previous Disturbance

The property is currently being used for agricultural cropping and grazing with the surrounding properties utilised for agricultural purposes. The presence of numerous weed species indicates that the area is quite disturbed from agricultural activities.

There are no known pre-existing Site contamination or disturbance identified on the EPA contamination site index for the Site.

3 Description of the Proposed Mining Operations

3.1 General Description and Maps of Operation

This section is provided to give a general description of the planned extraction and rehabilitation activities to be undertaken on the Site.

The resource will be extracted in a generic shallow open cut quarrying method through extraction without blasting. Staged Extraction Plans and Rehabilitation Plans are provided and described throughout **Section 3.3.2 Sequence of Quarrying and Progressive Rehabilitation**. The plans demonstrate how the Site is to be extracted and progressively rehabilitated in a staged manner to reduce potential impacts on the surrounding receptors.

As outlined within **Section 3.2.2 Production Rate and Products**, it is estimated that the Site will extract approximately 80,000 tonnes per annum (t/pa) dependent on market demand. Rehabilitation activities at the Site are proposed to incorporate the use Waste Derived Fill (WDF) waste soil for reuse in the form of clean fill to achieve a final landform as outlined within **Section 3.4.5 Industrial and Domestic Wastes**. Construction and Demolition waste (C&D) mixed is intended to be received and recycled for sale and in rehabilitation activities. Asphalt profiling will not be applied in rehabilitation, instead being used for haul road development only.

Based upon review of the existing landform and the potential future uses of the land, the rehabilitated landform is proposed to be backfilled to approximately one (1) m above the pre extraction / existing land surface providing for the opportunity to support the ongoing land use of cropping and grazing (landowner decision) while also enabling other beneficial uses such as employment land for commercial and industrial purposes subject to separate approval requirements under the *Planning Development and Infrastructure Act 2016* for consideration post quarrying and subject to approvals.

The quarrying of limestone is to be carried out in EML 6560. The topsoil will be removed and stored as a bund around the perimeter of the active extraction area during each crushing campaign and the limestone and sand will be quarried to a depth of approximately one (1) m. As the extraction reaches the terminal extents of the pit, and where backfilling is not achieved, the landform will be shaped to establish one (1) vertical (V) to four (4) horizontal (H) (1V:4H) perimeter batters, the quarry floor will be ripped and topsoil will be returned, sown and established with pasture grasses and or agricultural crops in support of the ongoing land use of agriculture and on agreement with the landowner.

The following drawings have been provided to outline operations within the Site:

DRAWINGS

Exempt Land Map	(Drawing No. 5109.DRG.003R1)
Regional Geology Map	(Drawing No. 5109.DRG.004R1)
Site Layout Map	(Drawing No. 5109.DRG.006R3)
Proximity to Conservation Areas Map	(Drawing No. 5109.DRG.009R1)
Site Location Map	(Drawing No. 5109.DRG.010R1)
Groundwater Map	(Drawing No. 5109.DRG.012R1)
Site Access Map	(Drawing No. 5109.DRG.013R1)
Visual Assessment Map	(Drawing No. 5109.DRG.015R1)
Land Access Map	(Drawing No. 5109.DRG.016R1)
Topographic Map	(Drawing No. 5109.DRG.018R1)

Extraction Plan – Stage 1	(Drawing No. 5109.DRG.021AR3)
Extraction Plan – Stage 1 Cross Sections A-A′ to C-C′	(Drawing No. 5109.DRG.021BR1)
Rehabilitation Plan – Stage 1	(Drawing No. 5109.DRG.022AR4)
Rehabilitation Plan – Stage 1 Cross Sections A-A′ to C-C′	(Drawing No. 5109.DRG.022BR2)
Extraction Plan – Stage 2	(Drawing No. 5109.DRG.023AR3)
Extraction Plan – Stage 2 Cross Sections A-A′ to C-C′	(Drawing No. 5109.DRG.023BR1)
Rehabilitation Plan – Stage 2	(Drawing No. 5109.DRG.024AR4)
Rehabilitation Plan – Stage 2 Cross Sections A-A′ to C-C′	(Drawing No. 5109.DRG.024BR2)
Extraction Plan – Stage 3	(Drawing No. 5109.DRG.025AR3)
Extraction Plan – Stage 3 Cross Sections A-A′ to D-D′	(Drawing No. 5109.DRG.025BR1)
Rehabilitation Plan – Stage 3	(Drawing No. 5109.DRG.026AR4)
Rehabilitation Plan – Stage 3 Cross Sections A-A′ to C-C′	(Drawing No. 5109.DRG.026BR2)
Conceptual Final Landform Plan	(Drawing No. 5109.DRG.027AR2)
Conceptual Final Landform Plan Cross Sections A-A′ to D-D′	(Drawing No. 5109.DRG.027BR1)
Native Vegetation Clearance Proposal Map	(Drawing No. 5109.DRG.028R2)

3.2 Resource and Products

3.2.1 Resources

A geotechnical investigation was completed onsite in August 2022 to provide more detail regarding the geological environment of the Site and to determine actual depths to the groundwater table and plan quarry depths to maintain recommended buffers. The program identified a shallow calcrete cap typical for the region, overlayed by silty and or clayey sands with thicknesses ranging from five (5) cm to 30 cm. The limestone cap extended to depths ranging from 0.3 m to 0.8 m and was noted to overlay a sandy silty clay. The depth to the groundwater table was measured from surface and noted as ranging from 2.7 m to 3.0 m.

The target resource for the Site is the calcrete cap layer for further processing into low grade road base materials. However, Leinad also have an interest in materials satisfying fill classifications for use in civil and building industries, for example land development projects within the wider region. On this basis, the resource has been estimated with a two (2) m clearance to the reported groundwater table and retention of 10 cm of the overlying topsoil material onsite for use as the surface layer within the final landform.

Reserves within the Site have been estimated based on an Unmanned Aerial Vehicle (UAV) survey undertaken in June 2023 and volumes contained within three-dimensional pit designs created in Civil3D with a bulk density of 1.8 tonne per cubic metre (t/m^3) for resources and 1.4 t/m^3 for topsoil. At this point in time there is approximately 1.9 million tonnes (MT) of limestone and 167,000 tonne (t) of topsoil reserves available within the Site. A summary of the volumes within each Stage of quarry development calculated using Civil3D by reporting the volume above the pit designs and below the current topography is provided within **Table 11 – Estimated Resource Volumes**. Based upon an estimated annual production of 80,000 kilotonnes (kt) per annum, the Site has an estimated life of approximately 24 years depending upon market demand.

Table 11 – Estimated Resource Volumes

Stage	Limestone Volume (m^3)	Limestone Tonnes (t)	Estimated Topsoil Volume (m3)	Estimated Topsoil Tonnes (t)	Estimated Stage time
1	445,000	800,000	39,000	54,000	10
2	360,000	647,000	45,000	64,000	8
3	243,000	438,000	35,000	49,000	6
TOTAL	**1,048,000**	**1,885,000**	**119,000**	**167,000**	**24**

The resource estimate has been supported by test pitting conducted at the Site and testing of calcrete samples by a National Association of Testing Authorities (NATA) accredited laboratory (Accreditation No: 12730) and is therefore deemed to have been appropriately identified and estimated for the intended product purpose.

3.2.2 Production Rate and Products

The resource to be extracted will serve as construction materials to be used within the civil and building industries. It is envisaged that the majority of the resource will be utilised to produce low grade road base materials for use in unsealed road networks within the northern regions of Adelaide. Where road base cannot be achieved the product is envisaged to be suitable for specification fill projects for land development projects within the low-lying Adelaide Plain and surrounding regions.

An extraction profile of approximately 80 kt per annum provides for a quarry life of approximately 24 years. On this basis and a road truck payload of 40 t per load, it is estimated that up to 800 t per day may be used. This could equate to up to 20 truck movements per day dependent of market demand.

With the resource anticipated to serve as construction materials within the market, rehabilitation at the Site is proposed to incorporate the use WDF in the form of clean fill and construction and demolition wastes (mixed) (excluding asphalt profiling) to achieve a final landform approximately one (1) m above the pre extracted / surrounding landform. Approximately 10 cm of the overlying material onsite will be retained in small stockpiles along the perimeter of the extraction areas throughout the development for use as the surface layer within the final landform to support vegetation growth.

A summary of the estimated backfill volumes for proposed rehabilitation is provided within **Table 12 – Estimated Backfill Volumes**.

Table 12 – Estimated Backfill Volumes

Stage	Volume (m^3)	Tonnes (t)
1	889,000	1,156,000
2	879,000	1,143,000
3	804,000	1,045,000

TOTAL	**2,572,000**	**3,344,000**

Significant development is intended to continue to occur within the northern region of South Australia which is forecast to progressively occur over the next 20 to 30 years. Based upon the current development forecast and the demand for the disposal of clean fill particularly from development sub divisions, there is a reasonable prospect that the required backfill can be sourced within the region to achieve the proposed conceptual final land form.

3.3 Quarrying Activities

3.3.1 Type or types of quarry operation to be carried out

The Site will be extracted using traditional open cut quarry techniques due to the shallow depth of proposed quarrying. The resource will be raised with the use of a bulldozer and or excavator. Drill and blasting techniques are not proposed to be utilised on the Site. As outlined within **Drawing No. 5109.DRG.006R3 – Site Layout Map**, the Site entrance is intended to be located within the north eastern corner of the Site providing direct access onto Thompson Beach Road. The Site is also intending to contain a Site office, carparking and HME laydown area. Topsoil is intended to be stripped and stored in windrows approximately two (2) m high along the perimeter of the Site and immediately adjacent to the extraction areas for reuse within the rehabilitation of the Site. The raised resource material will then be processed via mobile crushing and screening equipment to produce the desired end product within the pit floor areas.

Extraction will commence within the north eastern end of the Site adjacent to the entrance, the mobile crushing and screening equipment will be positioned within the pit floor as outlined within **Drawing No. 5109.DRG.006R3 – Site Layout Map**. The mobile crushing and screening plant will move as the working faces progress throughout the development. Due to the shallow nature of the proposed pit shell, it is envisaged that the mobile crushing and screening plant will move relatively regularly (in the context of quarrying) to ensure operation efficiency. To help inform the progressive extraction and rehabilitation of the Site, a three (3) staged extraction and rehabilitation plan has been developed. A summary of the maximum pit dimensions for each stage is outlined within the cross section for each stage and summarised below within **Table 13 – Staged Estimated Pit Dimensions**.

Table 13 – Staged Estimated Pit Dimensions

Stage	Length (m)	Width (m)
1	775	475
2	1050	410
3	850	690

Importation of WDF - Waste Soil may be incorporated into the rehabilitated landform; however, the area and extent of the WDF - Waste Soil placement will be dependent upon market demand and proximity to local infrastructure projects within the Region. Where WDF - Waste Soil is available and suitable, the incorporation into the rehabilitated landform will provide an enhancement of the rehabilitation activities that have been designed with the available material onsite and supportive of the final land use activities.

Where WDF is not utilised in the final landform, the landform will be shaped to establish 1V:4H perimeter batters, the quarry floor will be ripped and topsoil will be returned and sown with established with pasture grasses and or agricultural crops in support of the ongoing land use of agriculture and in agreement with the landowner.

The placement of WDF - Waste Soil within the quarry void is intended to be undertaken in a manner to ensure that suitable compaction and stability of the landform is established throughout construction. Australian Standard AS 1289.6.3.2 outlines the appropriate procedure for compacting the WDF which will be imported onto the Site. The thickness of each fill layer shall not exceed 500 – 700 mm after approximately 92 percent compaction from heavy equipment trafficking. Where fill is placed it shall be compacted to achieve six (6) blows per 100 mm with a Dynamic Cone Penetrometer (DCP) Testing of Fill Compaction Control shall comply with procedure AS1289.6.3.2. A minimum of two (2) DCP tests should be completed to a depth of 500 mm, for every 2500 m^2 of fill placed, to test compaction of each lift. DCP tests can be completed by Site personnel provided a signed and photographed record of testing is kept on file. If compaction cannot be achieved, a suitably qualified geotechnical engineer shall undertake a review of the onsite compaction and testing regime to determine if the fill is stable. Once the landform has been established, available overburden followed by topsoil shall be spread over the batters and seeded with pasture grasses or a cropping seed to provide soil stabilisation, with no seeding to be directly applied to the WDF material and no WDF will remain at the surface. The external batters of the rehabilitated landform are designed to achieve a 1V:4H to support ongoing land use and safe access. Achievement of the abovementioned landform parameters will be suitable for the post closure land use and in agreeance with the landowner.

Long term staging and operational areas of the Site are intended to be retained within an area of approximately three (3) ha within the north eastern corner of the Site following the commencement of quarrying. Activities within the long-term staging and operational area will comprise of initial extraction, establishment of an operational hard stand area, equipment laydown, workshop, rainwater tanks, Site office, weighbridge, and fuel storage. It is not proposed to construct any permanent structures within the Site.

3.3.2 Sequence of quarrying and progressive rehabilitation

The Site has been developed with a series of extraction and rehabilitation plans that include a staged approach to extraction and rehabilitation activities detailed to incorporate the use of WDF in the form of clean fill and mixed construction and demolition wastes for the progressive establishment of the final landform. WDF is intended to be used for rehabilitation during Stage 1, 2 and 3, where WDF is not utilised in the final landform, the landform will be shaped to establish 1V:4H perimeter batters.

3.3.2.1 Stage 1

Drawing No. 5109.DRG.021AR3 – Extraction Plan – Stage 1 and **Drawing No. 5109.DRG.021BR1 – Extraction Plan – Stage 1 Cross Sections A-A to C-C** provides and outline of the initial quarry extraction commencing within the north eastern corner of the Site. Topsoil proposed to be retained for use within the final surface layer of rehabilitation will be stockpiled along the northern and eastern boundary of the Site with additional stockpiles located along the extent of the extraction area. The topsoil windrow stockpiles will be no greater than two (2) m in height and stored for progressive rehabilitation.

Stage 1 will focus on establishing the pit floor for to allow for future processing of material and stockpiling of product with the direction of quarrying progressively moving westerly towards Stage 2. Once a sufficient area has been established during the initial extraction, it is intended to utilise the pit floor area within Stage 1 for mobile plant and stockpiling of material, close to the point of extraction. As the extraction footprint

within Stage 1 is sufficient to contain the extraction and stockpile activities, progressive rehabilitation is intended to commence following the path of quarrying. During each crushing campaign an area of approximately 10 hectares (ha) will be required for extraction, crushing, screening and stockpiling of materials. An area will be established and remain available near Site entrance for the inspection of C&D Waste (Mixed).

Progressive rehabilitation utilising WDF - Waste Soil

Progressive rehabilitation is intended to follow the path of quarrying as space within the quarry floor becomes available. The establishment of a 1V:3H batter formed as a cut batter along the northern, eastern and southern perimeter of the pit will enable progressive rehabilitation to commence. Generally, rehabilitation is intended to occur as greater than 10 ha on the quarry floor becomes available, however, could occur sooner depending upon the market demand for the supply of WDF. As WDF is received within the Site, it is intended to be stockpiled and stored within the extraction area in preparation for the rehabilitation activities. Where possible, the receipt and placement of WDF will occur within areas directly under rehabilitation to avoid duplication of material handling. **Drawing No. 5109.DRG.022AR4 – Rehabilitation Plan – Stage 1** and **Drawing No. 5109.DRG.022BR2 – Rehabilitation Plan – Stage 1 Cross Sections A-A to C-C** provides and overview of the proposed rehabilitation design for Stage 1. Following application of WDF, available overburden and then topsoil (approximately 10 cm in depth) will be applied and seeded to stabilise the final surface in agreeance with the landowner on the final land use of the area.

Progressive Rehabilitation without application of WDF Waste Soil

Progressive rehabilitation is intended to follow the path of quarrying as space within the quarry floor becomes available. Where WDF is not utilised in the final landform, the landform will be shaped to establish 1V:4H perimeter batters, the quarry floor will be ripped, and available overburden and topsoil (approximately 10 cm in depth) will be returned and sown with pasture grasses and or agricultural crops in support of the ongoing land use of agriculture in consultation with the landowner.

3.3.2.2 Stage 2

Stage 2 extraction is intended to form a continuation from Stage 1, progressively working westerly towards the north western perimeter of the Site as outlined within **Drawing No. 5109.DRG.023AR3 – Extraction Plan – Stage 2** and **Drawing No. 5109.DRG.023BR1 – Extraction Plan – Stage 2 Cross Sections A-A to C-C**.

The site was flown with a UAV to inform the detailed topographic survey of the Site for use in the development of the QDP's developed with the use of civil3D design software to ensure that a two (2) m buffer above the groundwater table is established, therefore sections of this stage remain unextracted.

Drawing No. 5109.DRG.023AR3 – Extraction Plan – Stage 2 provides a cross section through the area excluded from quarrying, when interpreted with **Drawing No. 5109.DRG.023BR1 – Extraction Plan – Stage 2 Cross Section A-A' to C-C'** this outlines that the topography within the area of the exclusion zone is low lying and does not provide any resource that could be extracted while maintaining the two (2) m buffer.

Progressive rehabilitation utilising WDF - Waste Soil

Progressive rehabilitation is intended to progress into the Stage 2 extraction area as space becomes available in order to progressively establish the conceptual final landform as outlined within **Drawing No. 5109.DRG.024AR4 – Rehabilitation Plan – Stage 2** and **Drawing No. 5109.DRG.024BR2 –**

Rehabilitation Plan – Stage 2 Cross Sections A-A to C-C. The establishment of a 1V:3H batters formed as a cut batter along the northern, eastern and southern perimeter of the pit will enable progressive rehabilitation to commence. Generally, rehabilitation is intended to occur as greater than 10 ha on the quarry floor becomes available, however, could occur sooner depending upon the market demand for the supply of WDF. As WDF is received within the Site, it is intended to be stockpiled and stored within the extraction area in preparation for the rehabilitation activities. Where possible, the receipt and placement of WDF will occur within areas directly under rehabilitation to avoid duplication of material handling. Following application of WDF, available overburden and then (approximately 10 cm in depth) will be applied and seeded to stabilise the final surface in agreeance with the landowner on the final land use of the area.

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Progressive Rehabilitation without application of WDF Waste Soil

Progressive rehabilitation is intended to follow the path of quarrying as space within the quarry floor becomes available. Where WDF is not utilised in the final landform, the landform will be shaped to establish 1V:4H perimeter batters, the quarry floor will be ripped, available overburden and topsoil (approximately 10 cm in depth) will be returned and sown with established with pasture grasses and or agricultural crops in support of the ongoing land use of agriculture in consultation with the landowner.

3.3.2.3 Stage 3

Stage 3 extraction is intended to form a continuation from Stage 2, progressively working southerly towards the southern perimeter of the Site as outlined within **Drawing No. 5109.DRG.025AR3 – Extraction Plan – Stage 3** and **Drawing No. 5109.DRG.025BR1 – Extraction Plan – Stage 3 Cross Sections A-A to D-D**.

Progressive rehabilitation utilising WDF Waste Soil

Progressive rehabilitation is intended to progress into Stage 3 extraction area as space becomes available in order to progressively establish the conceptual final landform as outlined within **Drawing No. 5109.DRG.026AR4 – Rehabilitation Plan – Stage 3** and **Drawing No. 5109.DRG.026BR2 – Rehabilitation Plan – Stage 3 Cross Sections A-A to C-C**. The establishment of a 1V:3H batters formed as a cut batter along the northern, eastern and southern perimeter of the pit will enable progressive rehabilitation to commence. Generally, rehabilitation is intended to occur as greater than 10 ha on the quarry floor becomes available, however, could occur sooner depending upon the market demand for the supply of WDF. As WDF is received within the Site, it is intended to be stockpiled and stored within the extraction area in preparation for the rehabilitation activities. Where possible, the receipt and placement of WDF will occur within areas directly under rehabilitation to avoid duplication of material handling. Following application of WDF, available overburden and then topsoil (approximately 10 cm in depth) will be applied and seeded to stabilise the final surface in agreeance with the landowner on the final land use of the area.

Progressive Rehabilitation without application of WDF Waste Soil

Progressive rehabilitation is intended to follow the path of quarrying as space within the quarry floor becomes available. Where WDF is not utilised in the final landform, the landform will be shaped to establish 1V:4H perimeter batters, the quarry floor will be ripped, available overburden and topsoil (approximately 10 cm in depth) will be returned and sown with established with pasture grasses and or agricultural crops in support of the ongoing land use of agriculture in consultation with the landowner.

3.3.3 Stockpiles

3.3.3.1 Topsoil and Subsoil Stockpiles

A series of test pits undertaken by A.S. James Pty Ltd undertaken in August 2022 were undertaken to further inform the geological environment within the Site. Topsoil comprised of silty sand was observed within the top 100 mm of the soil profile followed by a thin layer of red brown silty sand approximately 200 mm thick above the limestone resource, refer to **Diagram 1 – Typical Geological Cross Section**.

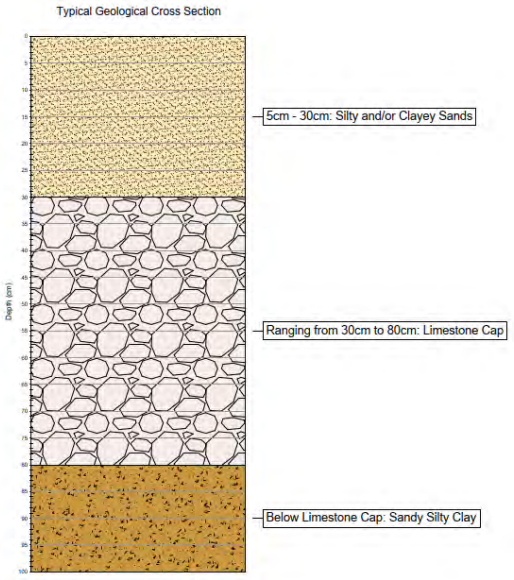

Diagram 1 – Typical Geological Cross Section.

Estimated topsoil volumes available for rehabilitation are calculated at 100 mm in depth in average across the disturbed areas as shown in **Table 14 – Topsoil Estimates.**

Table 14 – Topsoil Estimates

Stage	Topsoil Volume (m3)	Topsoil Tonnes (t)
1	39,000	54,000
2	45,000	64,000
3	35,000	49,000
TOTAL	**119,000**	**167,000**

Topsoil stockpiles will be stored in windrows along the perimeter of each extraction Stage up to two (2) m high. An indicative conceptual location of the initial topsoil locations during Stage 1 outlined within **Drawing No. 5109.DRG.021AR3 - Extraction Plan – Stage 1**. When topsoil screening occurs, screened topsoil stockpiles will be stored in long, rounded mounds not exceeding two (2) m in height for spreading over the progressive rehabilitation areas. If topsoil stockpiles are required to be stored for longer than 12

months, vegetation cover will be established through natural regeneration and or seeding of pasture grasses (where required) to stabilise the stockpiles and prevent control erosion. All topsoil that is stripped for extraction activities will be preserved and used in progressive rehabilitation.

There will be no overburden stockpiled onsite with the red brown silt sand expected to be a resource for blending with other material within the Site. Other quarry products such as scalps and out of specification material is not expected to be high and in the event they occur, they are intended to be incorporated into the progressive rehabilitation of the Site and not expected to be stockpiled.

3.3.3.2 Product Stockpile

During each crushing campaign, product stockpiles will be established within the active extraction and processing area of the quarry floor developed for each campaign. **Drawing No. 5109.DRG.006R3 – Site Layout Map** provides a conceptual location of the product stockpile locations during Stage 1.

As the quarry operations progress throughout the Site, mobile plant and the location of the product stockpiles will follow the path of extraction and will be located within the maximum 350 m by 350 m work zone for each crushing campaign. Where larger contracts required larger product stockpiles to be stored onsite, additional product stockpiles may be located within the long-term laydown and staging area of the quarry located within the north eastern portion of the Site. During each crushing campaign an area of approximately 10 ha will be required for extraction, screening and stockpiling of materials. Product stockpiles will vary in size and volume depending upon the products being made and will generally vary in height between five (5) and 10 m. At the end of each campaign, the top of the product stockpiles will be levelled out to help reduce the height, increase the opportunity for water absorption from rain and help reduce visual aspects of the stockpiles.

Product stockpiles from Tenements also operated by Leinad will be located within the north eastern section of Site once the area has been developed during Stage 1, ranging in height from five (5) to 10 m. The stockpiles are not envisaged to be substantial as they are only proposed to improve road transport logistics by taking advantage of backloading opportunities between operations. The main Tenement envisaged to be utilised for this purpose is Bute Quarry (EML 5702 and EML 6535). Material from these Tenements may be comprised of sand and gravel of various specifications with aggregates ranging in size between five (5) and 40 mm in size.

C&D (mixed) storage and product stockpiles associated with the recycling of C&D waste will be stored within the long-term laydown and staging area of the Site as outlined within **Drawing No. 5109.DRG.006R3 – Site Layout**. Unprocessed C&D stockpiles will be stored onsite separately in between crushing campaigns and processed and recycled every 12 months when mobile crushing plant are returned to Site. Processed stockpiles will be maintained separately to unprocessed stockpiles.

3.3.4 Use of Explosives

The resource will be raised utilising a dozer and / or excavator and therefore no drill and blasting activities are proposed for the Site. No explosives will be stored onsite.

3.3.5 Modes and hours of operation

Quarry operations will be on a campaign basis in response to market demand with the following proposed hours:

General Quarry Operations including Crushing, Screening, Sales, and Maintenance

Monday to Saturday 6:00 am – 6:00 pm

Sunday (when required) 6:00 am – 6:00 pm

(This includes all crushing, processing, loading, hauling, maintenance, and product transport (road trucks) tasks undertaken at the Site).

Sales, Product Transport and Ancillary Operations (Outside of General Quarry Operations above (if required))

Monday to Sunday 6:00 pm – 10:00 pm

(This includes sales, product transport (road trucks), maintenance, repairs of breakdowns, water carting, Site inspections and other activities which are not specific to the extractive operations of the Site).

3.4 Crushing, Processing and Product Transport

3.4.1 Fixed Plant

No fixed plant will be located onsite.

3.4.2 Mobile Plant and Equipment

Due to the Site being run on a campaign basis and dependent on market demand, a fixed plant is not proposed, and mobile equipment will be utilised to process materials and will be relocated to active extraction areas. A list of plant equipment typically used onsite is provided in **Table 15 – Typical Mobile Equipment**.

Table 15 – Typical Mobile Equipment

Details of Equipment	Approximate number of units	Mobile / Fixed
Mobile crushing and screening plant (typically track or wheel mounted)	1	Mobile
Front End Loader (FEL) CAT 966 (or similar)	1	Mobile
Excavator 20 t or 30 t (dependent on availability)	1	Mobile
Dozer CAT D6 – D10 (depending on availability)	1	Mobile
Dump truck (internal load and haul – if required) 35t (or similar)	1	Mobile
Water cart	1	Mobile

3.4.3 Hours of Operation

As detailed within **Section 3.3.5 – Modes and Hours of Operation**.

3.4.4 Processing Wastes

There will be no processing wastes generated throughout the life of the quarry operation, due to absence of overburden within the Site.

3.4.5 Industrial and Domestic Wastes

Industrial and domestic wastes will be temporarily stored onsite within appropriate storage facilities. Any waste oils and filters generated onsite will be temporarily stored within bunded facilities in accordance with EPA Guideline: EPA080/16 *Liquid storage Bunding and spill management* (EPA, 2016). Oils and other industrial wastes will be disposed by an appropriately licenced third party and relevant EPA waste tracking certificates retained onsite where required. Portable toilet facilities are intended to be used onsite with a self-contained above ground waste management system that will be maintained by a septic contractor.

3.4.5.1 Waste Derived Fill

The importation of WDF – Waste Soil will be required for incorporation into the progressive rehabilitation works as a beneficial re-use of material and to help improve the final landform of the Site as a sub layer prior to the placement of any available overburden and topsoil placement adding benefits such as reducing the batter angles or improving the growing medium of the rehabilitated areas. . WDF for re-use (meaning waste soil for direct re-use) means waste consisting of clay, concrete, rock, sand, soil, or other inert mineralogical matter in pieces not exceeding 100 mm in length and containing chemical substances in concentrations less than the concentrations for those substances set out in *Part 1, Regulation 3 of the Environment Protection Regulations 2009* and the EPA *Standard for the production and use of Waste Derived Fill 2013*. WDF (Waste Soil) is intended to be stockpiled within the extraction area in preparation for rehabilitation activities. The WDF – Waste Soil will be confirmed for its suitability for rehabilitation purposes prior to transportation to Site. Once the landform has been established, overburden followed by topsoil shall be spread over the batters and seeded with pasture grasses to provide soil stabilisation, with no seeding to be directly applied to the WDF material and no WDF will remain at the surface.

With the provision of an EPA Waste and Recycling Facility Licence, the Site also seeks to establish a waste and recycling facility to receive C&D Waste (mixed) comprising of asphalt profiling, concrete (non-asbestos) and bricks for recycling to produce recycled aggregate products or used internally for haul road development and use within the progressive rehabilitation areas. Asphalt profiling will not be applied in landform rehabilitation, instead being used for haul road development only. Recycling and reprocessing of C&D (mixed) will be undertaken within the long-term laydown and staging area of the quarry as outlined within **Drawing No. 5109.DRG.006R3 – Site Layout Map**. Stockpiles of C&D (mixed) will be stored near the initial extraction area for ease of removal and access. The amount of material stockpiled onsite will vary depending upon market demand and will not be stored onsite for longer than 12 months before being reprocessed into recycled products for market or internal supply. It is envisaged that the transport and disposal of C&D (mixed) material to the Site will be facilitated by customers also requiring quarried products from the Site. On this basis, it is not envisaged that all truck movements to the Site will contain C&D (mixed) material and approximately 40,000 t of material may be received within the Site per year.

The abovementioned activities regarding WDF will be undertaken at the Site in accordance with an Imported Fill Management Plan and Recovered Products Plan (IFMP and RPP), as outlined within **Attachment 7 – Dublin Quarry Imported Fill Management Plan and Recovered Products Plan**.

3.5 Supporting Surface Infrastructure

3.5.1 Access and Roads

The Site is located on Thompsons Beach Road at the end of Thompson Road which is approximately 1.78 km in length and can be accessed via a left-hand or right-hand turn from the Port Wakefield Highway, refer to **Drawing 5109.DRG.013R1 – Site Access Map**.

There will be no need for new roads to be constructed or upgraded to access the Site. Internally the Site will construct unsealed access roads which will be utilised to facilitate the movement within the Site.

Based upon the forecasted volume of extraction, it is estimated that there may be up to 20 truck movements per day depending upon market demand.

3.5.2 Accommodation and Offices

A small portable temporary building may be located onsite to provide an office and amenity building for Site personnel. One (1) to three (3) shipping containers and or sheds may also be located onsite to provide a workshop, store spare parts and consumable items as needed. Suitable hardstand areas will be formed to accommodate parking for Site personnel and visitors as well as lay down areas for equipment.

The proposed location of the Site office, workshop, laydown and carparking and storage areas are outlined within **Drawing No. 5109.DRG.006R3 – Site Layout Map**

No accommodation will be located on the Site.

3.5.3 Public Services and Utilities used by the Operation

There is an existing metered mains water connection running along the northern boundary of the EML, refer to **Drawing No. 5109.DRG.016R1 – Land Access Map**. There are no telephone, landline, or electricity connections to the Site.

The Site will be self-sufficient, with use of diesel-powered crushing equipment, and power supplied to office / amenity areas by generators or solar. The existing water connection is intended to provide water for the Site. Depending upon the pressure and supply of the mains water, a water tank(s) may be installed onsite to retain a larger volume of water for the supply of a water cart.

3.5.4 Visual Screening

A visual assessment was undertaken for the Site on 10 May 2023, assessing amenity aspects of the quarry viewed from the nearest sensitive receptor locations and views from public roads within proximity to Site. The visual assessment considered the height of stockpiles and also the proposed final landform in the context of the surrounding environment and also the proposed adjacent land uses, including the proposed employment land, the development constraints of the existing EPA buffer distances around the IWS facility and the poultry farm.

It is understood that overall, there will be little amenity disturbance during the operational stages of the quarry due to the relatively flat topography of the area. No additional screening is proposed as part of the quarry operations.

Progressive rehabilitation is to follow the direction and staging of quarrying. The maximum area of open space at any one time is therefore limited to the stage of mining at that time as outlined within **Section 3.3.1 Type or Types of quarry operation to be carried out** in **Table 13 – Staged Estimated Pit Dimensions**. The final rehabilitated landform is proposed to be approximately one (1) m above the existing land surface. This will be battered to 1V:4H and revegetated with an appropriate grass seed mix to blend in with the surrounding landscape and final preferred land use directed by the landowner. It is also expected a high amount of natural regeneration of native chenopods will occur as suitable colonising native species exist within the adjacent land and as is consistent with the regeneration that has occurred between cropping cycles. Therefore, no additional screening is proposed for the rehabilitated landform.

Visual assessments are intended to be completed annually during operations to ensure no visual amenity impacts to sensitive receptors. At mine closure, remaining WDF stockpiled onsite will be backfilled to the approved final landform. The landform will be seeded with pasture grasses or cropping vegetation. Visual assessments will also be undertaken post closure.

3.5.5 Fuel and Chemical Storage

Major servicing of plant and equipment will be undertaken offsite, and no major storages of chemicals will be undertaken onsite. Minor services and chemicals will be stored onsite as outlined in **Drawing No. 5109.DRG.006R3 – Site Layout Map**. Where fuel and chemicals are required to be stored onsite, they will be stored with designated bunded storage areas in accordance with the EPA Guideline: *EPA080/16 Liquid Storage Bunding and Spill Management* (EPA, 2016).

3.5.6 Site Security

Unauthorised access by the public is prevented by the use of a wire perimeter fence and gate at the access road entrance which is locked when the Site is unattended. Warning signs will be installed at the Site entry to prevent unauthorised access and advise of the potential hazards within the Site. An existing fence exists along the majority of the Tenement boundaries due to their alignment with cadastral boundaries. A new wire fence will be established along the Tenement boundaries that don't have an existing wire fence. One (1) to three (3) shipping containers and or sheds may also be located onsite to provide a workshop where equipment can be stored securely.

3.5.7 Erosion, Sediment and Silt Control

Extraction Phase

During construction and operations localised surface runoff generated from the operational areas of the Site will be captured within the disturbed footprint of the quarry and prevented from flowing outside of the operational areas. Based upon the low rainfall of the region and the flat topography created from the extraction areas, no dedicated sediment and erosion control measures are proposed for the Site, as surface water will be retained within the footprint of the quarry. Additionally, during extraction phases, a perimeter bund is intended to be comprised of the topsoil stockpiles established around the perimeter of the extraction area which will remain until the progressive rehabilitation reaches its final stage. Once the rehabilitated landform has been established and stabilised with compaction, the topsoil will be respread and seeded with pasture grasses or cropping vegetation to establish a vegetated cover and prevent erosion.

The permitter bund is intended to be removed, enabling surface water flows to occur beyond the bund towards the terrestrial and aquatic GDE once the rehabilitated landform has been stabilised.

Rehabilitation Phase

During rehabilitation, should the volumes of WDF become realised, the landform will be raised one (1) m above the existing surface and contoured as outlined within **Drawing No. 5109.DRG.027AR2– Conceptual Final Landform Plan** and **Drawing No. 5109.DRG.027BR1 – Conceptual Final Landform Plan Cross Sections A-A' to D-D'**. Based upon the conceptual final landform contours and cross sections, surface water from the rehabilitated landform will flow in a south westerly manner, directing surface water towards the naturally lower lying portions of the land within the central and western portions of the Site. During rehabilitation, offsite discharge is not expected to occur as surface water will be directed towards the lower depressions within the Site which are not directly connected to the coastal system.

During the establishment of the rehabilitated landform, additional control and management strategies will be adopted for management of surface water runoff and erosion, due to the raised final landform:

- Establishment of a silt fence(s) as per **Drawing No. 5109.DRG.022AR4 – Rehabilitation Plan – Stage 1, Drawing No. 5109.DRG.023AR4 – Rehabilitation Plan – Stage 2** and **Drawing No. 5109.DRG.024AR4 – Rehabilitation Plan – Stage 3** to capture sediment should erosion occur and;
- Undertake stabilisation of the rehabilitated landform with vegetation as early as possible with pasture grasses or cropping vegetation to prevent erosion.

3.6 Vegetation Clearance

A vegetation assessment of the Site was conducted in June 2023. Native vegetation was recorded within the Site comprising of degraded chenopod shrubland with large areas of cropping and some scattered native woodland, which has historically been utilised for agricultural grazing, refer to **Attachment 4 – Native Vegetation Management Plan** and **Drawing No. 5109.DRG.028R2 – Native Vegetation Clearance Proposal Map**. The clearance of native vegetation has been restricted to the lower quality and degraded areas of the Site where there are low species diversity and absence of shrub and tree cover.

A summary of the native vegetation assessment and associated Significant Environmental Benefit (SEB) required prepared by a Groundwork Plus Native Vegetation Accredited Consultant is provided in **Table 16 – SEB Offset Required for Clearance** and **Attachment 4 – Native Vegetation Management Plan**. The adjacent area is under significant redevelopment for employment and residential land and related activities. Due to the scale and extent of this development there have not been any on ground offset opportunities identified as part of this project.

Investigation into third party credit providers have identified that there is not any third party credit providers with a suitable SEB credit available within proximity to the Site that would support the achievement of the SEB.

Table 16 – SEB Offset Required for Clearance

Stage	Site	Species diversity	Threatened Ecological	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	SEB Points required	SEB payment	Admin Fee
1	VA1	12	1	0	0.1	24.10	5.69	137.13	1	143.99	$68,940.70	$3,791.74
2	VA1	12	1	0	0.1	24.10	0.27	6.51	1	6.83	$3,271.35	$197.92
2	VA2	8	1	0	0.1	12.98	26.01	571.15	1	599.71	$287,139.12	$15,792.65
3	VA1	12	1	0	0.1	24.10	1.79	43.14	1	45.30	$21,687.85	$1,192.83
3	VA2	2	1	0	0.1	1.72	0.43	9.44	1	9.91	$4,747.01	$261.09
3	VA3	12	1	0	0.1	47.26	6.29	44.33	1	46.54	$22,283.91	$1,225.62
						Total	40.45	811.7		852.28	$408,069.94	$22,461.85

Due to the life of the quarry, it is proposed that an SEB for the Site is established through a staged payment into the Native Vegetation Fund (NVF). Prior to the commencement of quarry operations within Stage 2 and Stage 3 payment will occur for the amounts outlined within **Attachment 4 – Native Vegetation Management Plan** and **Table 8 – SEB Offset Required for Clearance**. It is noted the SEB payments rates are adjusted annually, and confirmation of the clearance amounts will be confirmed with the regulating body prior to payment and clearance of vegetation.

3.7 Site Water Management

Water will be required for the Site primarily to supply suppression of dust on haul roads, crushing and screening applications for the quarry operation. Approximately six (6) megalitres of mains water per annum is expected to be used to support dust suppression and amenity facilities within the Site. A mains water connection is available to the Site as shown in **Drawing No. 5109.DRG.016R1 – Land Access Map**.

There will be no water used for processing of materials onsite as such there will be no processing water required to be managed within the Site.

3.8 Description of Quarry Site at Completion

At the completion of extraction activities and progressive rehabilitation work, it is envisaged that the Site will be returned to the historic and current use of farming (agricultural cropping and grazing) whilst also enabling other beneficial future uses such as employment land comprised of commercial and industrial uses subject to a Code Amendment pursuant to the requirements of the *Planning Development and Infrastructure Act 2016* and council consent. For this reason, **Drawing No. 5109.DRG.027AR2 – Conceptual Final Landform Plan** and **Drawing No. 5109.DRG.027BR1 – Conceptual Final Landform Plan Cross Sections A-A to D-D** have been designed to outline a conceptual final landform that will ensure that the intended land use can successfully be achieved. The Conceptual Final Landform will be reviewed throughout the progressive development of the Site to ensure that quarry landform is consistent with the ongoing land use

of the surrounding areas. WDF is intended to be used for rehabilitation during Stage 1, 2 and 3, with the application of available overburden followed by topsoil application and seeding. No WDF will remain at the surface of rehabilitated areas.

Where backfilling of WDF is not achieved, the landform will be shaped to establish 1V:4H perimeter batters, the quarry floor will be ripped and topsoil will be returned and sown with established with pasture grasses and or agricultural crops in support of the ongoing land use of agriculture.

As a general guide the following measures may be used to prepare the final landform:

- Using earthmoving equipment to progressively shape and trim the workings to the desired design profiles and flattening the gradients of batters to a stable angle of repose on reaching the terminal limits of extraction.
- Placement and backfill of WDF within the rehabilitated landform in a manner that provides for the required compaction and stabilisation to be achieved.
- Rounding or marrying the contours into the natural ground surface.
- Establishment of 1V:4H permitter batters.
- Topsoiling of contours and WDF placement areas.
- Seeding with pasture grass.
- Providing access to the terminal workings to allow maintenance of rehabilitation works.
- Designing landform and drainage to control erosion for the hydrological regime.

The following measures are to be implemented for topsoil spreading:

- Areas to be spread are to be re-profiled prior to placing of overlying materials.
- Equipment used to spread materials should be scheduled to avoid compaction.
- Before topsoil spreading, subsoils are to be loosened and ripped (if required) to break up any compacted or surface sealing and to enable keying of soils.
- Topsoil is to be removed from stockpiles in a manner that avoids vehicles travelling over the stockpiles.
- Topsoil is to be screened prior to respreading to remove any loose rock material greater than 20 mm in size.
- Ensure all exposed subsoils are covered.
- After spreading topsoil, ensure the surface is left in a roughened state to assist moisture infiltration and inhibit soil erosion.
- Prior to any planting of pasture grasses and or crops, cultivate any compacted or crusted topsoil surfaces.
- Soil spreading is to be immediately followed by seeding or planting if seasonal conditions permit.
- If erosion occurs on treated surfaces, the area is to be reprofiled and re-spread as necessary (note: traversing tracked machinery parallel to the slope gradient may assist in reducing the erosion potential of the reprofiled surface).

Any roads and tracks located within areas to be rehabilitated that are no longer required for the operational functionality of the Site, or for ongoing access to rehabilitated areas, are to be removed, topsoiled, seeded, and allowed to regenerate with vegetation. Ongoing access is to be prevented to these roads and tracks to avoid compaction and increase germination survival rates.

The long-term staging and operational areas, haul roads and access tracks shall be excluded from progressive rehabilitation planning for the purpose of this Conceptual Mine Completion Plan to preserve the functionality and optimal operation of the Site. At completion of the extraction activities and final rehabilitation commences, these areas are to be included in final rehabilitation activities.

Leinad will remove items of quarry related infrastructure at the cessation of the operation. This may include, but will not necessarily be limited to; processing plant, chemical storage facilities, demountable buildings, and graveyard items (e.g. scrap metals, parts, bearings etc). Where any items of infrastructure are to be

retained for ongoing beneficial use, Leinad are to obtain a written Landowner agreement and provide this to the administering authority for approval prior to final decommissioning taking place.

4 Consultation

During the MLP development Leinad engaged with identified stakeholders to inform, consult, and involve stakeholders on the project to gain an understanding of the environmental impacts considered most important to them, and incorporated these items into the management strategies, proposed outcomes and criteria measurement for the Site.

Since the lodgement of the MLP additional consultation was undertaken as requested with IWS Pelican Land Co Pty Ltd (IWS) on 21 October 2024 at IWS's Wingfield offices to provide an overview of the Code Amendment, including Leinad's vision, proposed amendments to the zoning, investigations undertaken and the Engagement Plan. Discussion was also held regarding the quarry development and fill receipt plans. No issues were raised in regarding the proposed quarry operations and Leinad have committed to continued consultation being undertaken with IWS as required.

Additional community and stakeholder consultation has continued to occur in support of the Planning approvals process being undertaken as part of the progression of the Dublin Urban Framework inclusive of EML 6560 and the establishment of Employment Land north of the Site. This has included a range of active engagements through a combination of emails, public notices, stakeholder meetings and phone calls regarding the zoning and Site's plans in consideration of the broader development proposal for the Dublin Urban Framework. No matters have been raised regarding the proposed quarry activities during this process.

5 Environmental Outcomes, Strategies, Criteria and Monitoring

5.1 Surface Water (Erosion, Silt and Stormwater Management)

5.1.1 Outcome

The Tenement holder must during construction, operation and post completion ensure that there is no adverse impact on surface water quality caused by mining operations to water dependant ecosystems.

The Tenement Holder must during construction and operation ensure mining operations do not decrease the quantity of surface water available to water dependent ecosystems off the land.

5.1.2 Control and Management Strategies

Control and Management Strategies
Operational: • Implementation and adherence to final landform and progressive rehabilitation as outlined within **Drawing No. 5109.DRG.027AR2 – Conceptual Final Landform Plan** and **Drawing No. 5109.DRG.027BR1 – Conceptual Final Landform Plan Cross-sections A-A to D-D**. • Establishment of a silt fence(s) in rehabilitation phase for each Stage as per **Drawing No. 5109.DRG.022AR4 – Rehabilitation Plan – Stage 1, Drawing No. 5109.DRG.023AR4 – Rehabilitation Plan – Stage 2** and **Drawing No. 5109.DRG.024AR4 – Rehabilitation Plan – Stage 3.** • Regular inspection and cleaning out of silt along silt fences to ensure silt built up does not exceed half the height of the silt fence. • Ensure the post-extraction landform is safe, stable, non-polluting and suitable for the desired long-term land use. (i.e. suitable erosion and sediment control measures are in place at the completion of quarry operation). • All surface water impacted by quarrying operations is to be retained within the pit void and allowed to evaporate. • Mining operations are to be progressively rehabilitated as per the staged Rehabilitation Plans. • Establishment of a silt fence at the tow of the rehabilitation batter to capture sediment from the rehabilitation landform while under construction. • Establish a permitter bund around the active extraction area of the Site to direct clean surface water around the extraction area of the Site. • Ensure that topsoil stockpiles are located outside of drainage lines and seeded with grasses to prevent erosion. **Closure:** • Implementation and adherence to final landform and progressive rehabilitation as outlined within **Drawing No. 5109.DRG.027AR2 – Conceptual Final Landform Plan** and **Drawing No. 5109.DRG.027BR1 – Conceptual Final Landform Plan Cross-sections A-A' to D-D'**. • Final landform will shaped to a safe and stable 1V:3H batters for extraction or 1V:4H batter WDF Fill rehabilitated surface. • Pasture grasses or cropping vegetation to be progressively planted to stabilise landform and prevent erosion during the establishment of the final landform.

Uncertainty and Assumptions of Control Strategies
The control strategies nominated are known to be effective and apply industry standards for the control and management of sediment laden surface water.
Sensitivity to change of Assumptions
The volume of surface water discharge from the Site may be subject to seasonal variation based upon climatic conditions.

5.1.3 Measurement Criteria

Outcome - Surface Water (Erosion, Silt and Stormwater Management)	
The Tenement holder must during construction, operation and post completion ensure that there is no adverse impact on surface water quality caused by mining operations to water dependant ecosystems.	
Quarry Phase	**Operational and Closure**
Outcome Measurement	
1. **Outcome Achievement** Quarry records of monthly visual inspections of the sediment control measures confirms that surface water from the operational areas are directed into the quarry void during extraction. Quarry records and monthly visual inspections during backfilling rehabilitation demonstrate that there is no silt deposited downflow from the silt fence. 2. **What will be Measured and the Form of Measurement** Quarry management records of visual inspection of the drainage lines and perimeter bund(s). Quarry management records of visual inspections of the silt fences. 3. **Location of Measurement** Within EML 6560 permitter bunds, internal drainage lines and silt fences. 4. **Frequency** Visual assessment and recording monthly during operations and rehabilitation activities. 5. **Control / Baseline Data** Not Applicable. 6. **Leading Indicator Criteria** Not Applicable.	

Outcome - Surface Water (Erosion, Silt and Stormwater Management)	
The Tenement Holder must during construction and operation ensure mining operations do not decrease the quantity of surface water available to water dependent ecosystems off the land.	
Quarry Phase	**Operational**
Outcome Measurement	
1. **Outcome Achievement** Quarry records of monthly visual inspections confirms that surface water from the adjacent land outside of the active extraction areas is not prohibited from flowing around the Site. 2. **What will be Measured and the Form of Measurement** Visual inspections of the perimeter bunds demonstrate they are effectively diverting water around the extraction areas. 3. **Location of Measurement** Perimeter bunds with EML 6560. 4. **Frequency** Monthly. 5. **Control / Baseline Data** Not Applicable. 6. **Leading Indicator Criteria** Not Applicable.	

Outcome - Surface Water (Erosion, Silt and Stormwater Management)	
The Tenement holder must during construction, operation and post completion ensure that there is no adverse impact on surface water quality caused by mining operations to water dependant ecosystems.	
Quarry Phase	**Closure**
Outcome Measurement	
1. **Outcome Achievement** Prior to Tenement relinquishment a suitable qualified person will inspect the final landform to ensure rehabilitation activities have been effective and demonstrate no silt is deposited downflow from the Site. 2. **What will be Measured and the Form of Measurement** Final site inspection by a suitable qualified person, and photographic evidence. 3. **Location of Measurement** Perimeter bunds with EML 6560. 4. **Frequency** Once prior to Tenement Relinquishment. 5. **Control / Baseline Data** Not Applicable. 6. **Leading Indicator Criteria** Not Applicable.	

5.2 Noise

5.2.1 Outcome

The Tenement Holder must, during construction and operation, ensure that there are no public nuisance impacts as a result of mining operations.

5.2.2 Control and Management Strategies

Control and Management Strategies
• Mobile processing plant and ancillary equipment to be positioned as far as practicable from sensitive receptors. • Stockpiles to be positioned where possible between noise generating sources and sensitive receptors. • Fixed engines, pumps and compressors are to be enclosed where practicable, safe and as per manufacturer recommendations. • Equipment is to be maintained in accordance with the original equipment manufacturer's specifications. • Equipment is to be shut down when not in use. • Reduce vehicle speed to 40 km per hour on internal access roads. • Fit broadband reversing alarms, rather than audible sirens or beepers, on the sales loader.. • Avoid unnecessary operation of plant or revving of mobile or stationary motors and engines. • Complaints from neighbouring residents are recorded, investigated, and responded to in a timely manner. • Only undertake extraction and crushing within the Site on a campaign basis.
Uncertainty and Assumptions of Control Strategies
Potential impacts associated with noise nuisance are further reduced through the implementation of the control and management strategies which are considered reasonable and industry standard practice to protect sensitive receptors from noise nuisance. The noise levels generated by the Site activities are not expected to contravene the *Environment Protection (Commercial and Industrial Noise) Policy 2023*.
Sensitivity to change of Assumptions
Noise nuisance impacts may vary if there are significant changes to the operations of the Site and the sources and location on noise generating activities are changed. The sensitivity to change of assumptions is low based on the campaign-based nature of the operation.

5.2.3 Measurement Criteria

Outcome - Noise	
The Tenement Holder must, during construction and operation, ensure that there are no public nuisance impacts as a result of mining operations.	
Quarry Phase	**Operational**
Outcome Measurement	
1. Outcome Achievement Quarry records demonstrate that all noise related complaints are acknowledged within 48 hours and closed out within seven (7) days to the satisfaction of the complainant or as agreed with the Regulator.	

In the event the control measures do not resolve the complaint to the satisfaction of regulators, noise measurements are to be undertaken in accordance with *Part 1 of the Environment Protection (Commercial and Industrial Noise) Policy 2023* at locations agreed upon by the operator and regulator to verify compliance with (5) — Indicative noise levels and (9) Tables for the relevant land use zone.

2. **What will be Measured and the Form of Measurement**
   Acknowledgement and complaint resolution measured through review of quarry management records.
   If required, monitoring will measure noise levels (dB) as per Part 1 of the *Environment Protection (Commercial and Industrial Noise) Policy 2023* (5) — Indicative noise levels and (9) Tables for the relevant land use zone.
3. **Location of Measurement**
   At the sensitive receptor/s or alternative location as agreed with the Mining Regulator.
4. **Frequency**
   As required following a complaint.
5. **Control / Baseline Data**
   Not Applicable.
6. **Leading Indicator Criteria**
   Not Applicable.

5.3 Air Quality

5.3.1 Outcome

The Tenement Holder must, during construction, operation and closure ensure that there are no public health and / or nuisance impacts from air emissions and / or dust generated by mining operations.

5.3.2 Control and Management Strategies

Control and Management Strategies
Operational • Water sprays will be used on processing plant to minimise dust levels generated during this process. • Water truck will be used on haul and access roads, stockpiles, and other cleared areas to minimise dust levels generated. • Water truck operation will be increased in drier climatic conditions. • Stockpiles will be stored within the quarry extraction area to provide a buffer from the wind. • Operators to ensure water sprays on processing plant are inspected and maintained to ensure efficient operation. • Vehicle and mobile machinery movements to be restricted to designated routes and onsite speed limits of 40 km / hr adhered to. • Management to ensure vehicles use established roads and tracks where possible and access to rehabilitated areas to be limited. • Establishing and maintaining vegetated cover on previously disturbed areas as soon as practicable following the completion of earthworks activities.

Closure

- Progressively rehabilitate the Site as areas become available in accordance with **Drawing No. 5109.DRG.027AR2 – Conceptual Final Landform Plan** and **Drawing No. 5109.DRG.027BR1 – Conceptual Final Landform Cross Plan Sections A-A to D-D**.
- Seed rehabilitated areas with pasture grasses as soon as practicable.

Uncertainty and Assumptions of Control Strategies
The potential impacts to air quality are reduced provided that the operator adheres to the control and management strategies which are considered reasonable and industry standard practice to protect sensitive receptors.
Sensitivity to change of Assumptions
The sensitivity to change is considered low; however, mitigation strategies maybe influenced by seasonal variations to onsite climate conditions.

5.3.3 Measurement Criteria

Outcome - Air Quality	
The Tenement Holder must, during construction and operation ensure that there are no public health and / or nuisance impacts from air emissions and / or dust generated by mining operations.	
Quarry Phase	**Operational**
Outcome Measurement	

1. **Outcome Achievement**
   Dust related complaints acknowledged within 48 hours and actioned appropriately within seven (7) days to the satisfaction of the Quarry Regulator.

   If complaints are not resolved to the satisfaction of Mining Regulation, air quality monitoring is to occur at locations, and using methods, as agreed with the Mining Regulator, to demonstrate:

   dust deposition leaving the Tenement does not exceed four (4) grams per square metre (g/m^2) per month.

2. **What will be Measured and the Form of Measurement**
   Acknowledgement and complaint resolution measured through review of quarry management records.
   If required, dust deposition leaving the Tenement will be measured.

3. **Location of Measurement**
   At sensitive receptor/s or alternative location as agreed with the Mining Regulator.

4. **Frequency**
   As required following a complaint.

5. **Control / Baseline Data**
   Not Applicable.
6. **Leading Indicator Criteria**
   Not Applicable.

Outcome - Air Quality	
The Tenement Holder must, during closure ensure that there are no public health and / or nuisance impacts from air emissions and / or dust generated by mining operations.	
Quarry Phase	**Closure**
Outcome Measurement	
1. **Outcome Achievement** A site inspection undertaken by a suitably qualified person prior to surrender of the EML confirms the Site has been rehabilitated and is stable and protected from wind erosion. 2. **What will be Measured and the Form of Measurement** Visual assessment and photographic evidence of seeded rehabilitation area. 3. **Location of Measurement** Rehabilitated areas within EML 6560. 4. **Frequency** Once prior to surrender of Tenement. 5. **Control / Baseline Data** Not Applicable. 6. **Leading Indicator Criteria** Not Applicable.	

5.4 Visual Amenity

5.4.1 Outcome

The Tenement Holder must, during construction and operation ensure that visual amenity impacts for sensitive receptors is minimised as much as is reasonably practical.

The Tenement Holder must ensure post completion that all rehabilitated landforms integrate and harmonise with the surrounding landscape.

5.4.2 Control and Management Strategies

Control and Management Strategies
Operational • Adherence with approved extraction and rehabilitation plans. • Progressive rehabilitation to be undertaken in accordance with approved rehabilitation plans. • Minimise the disturbance footprint and clearing of onsite vegetation to that necessary for the quarry development. • Undertake an annual visual impact assessment by collecting photographs at agreed visual locations. • At the end of each campaign, the top of the product stockpiles will be levelled out to help reduce the height, increase the opportunity for reduction of any potential visual aspects of the stockpiles. **Closure** • Progressive rehabilitation to be undertaken in accordance with **Drawing No. 5109.DRG.027AR2 – Conceptual Final Landform Plan** and **Drawing No. 5109.DRG.027BR1 – Conceptual Final Landform Plan Cross Sections A-A to D-D**. • Quarry related infrastructure removed at cessation of quarrying (unless otherwise approved to be retained in accordance with Landowner agreement).
Uncertainty and Assumptions of Control Strategies
There is a low degree of uncertainty due to the existing topography and scattered vegetation located along the road reserves, which will provide some visual relief.
Sensitivity to change of Assumptions
The sensitivity to change is considered medium based upon the proximity and location of sensitive receptors. The timing of visual amenity improvements may vary depending upon the establishment rates of the vegetation and the duration of quarrying rehabilitation activities.

5.4.3 Measurement Criteria

Outcome - Visual Amenity	
The Tenement Holder must, during construction and operation ensure that visual amenity impacts for sensitive receptors is minimised as much as is reasonably practical.	
Quarry Phase	**Operational**
Outcome Measurement	
1. Outcome Achievement Visual impact assessment of the Site and surrounds are undertaken by a suitably qualified person annually and at the completion of each Stage of quarry development and confirms that progressive rehabilitation strategies have been implemented to minimise visual amenity impacts. **2. What will be Measured and the Form of Measurement** Visual assessment and photographic records of quarry operations. **3. Location of measurement** At agreed locations from outside the Tenement boundaries, refer to **Drawing No. 5109.DRG.015R1 – Visual Assessment Map**. **4. Frequency** Annually. **5. Control / Baseline Data** **Attachment 5 – Visual Assessment Photographic Plates**. **6. Leading Indicator Criteria** Not Applicable.	

Outcome - Visual Amenity	
The Tenement Holder must ensure post completion that all rehabilitated landforms integrate and harmonise with the surrounding landscape.	
Quarry Phase	**Closure**
Outcome Achievement	
1. Outcome Achievement Visual assessment of the Site and surrounds undertaken by a suitably qualified person post quarrying confirming final landforms conform to QDPs as per **Drawing No. 5109.DRG.027AR2 – Conceptual Final Landform Plan** and rehabilitated landforms integrate and harmonise with the surrounding landscape. **2. What will be Measured and the Form of Measurement** Visual assessment and photographic records of final rehabilitated landform. **3. Location of Measurement** At agreed locations from outside the Tenement boundaries as per **Drawing No. 5109.DRG.015R1 – Visual Assessment Map**. **4. Frequency** At the completion of rehabilitation works. **5. Control / Baseline Data** **Attachment 5 – Visual Assessment Photographic Plates**. **6. Leading Indicator Criteria** Not Applicable.	

5.5 Native Vegetation and Habitat

5.5.1 Outcome

The Tenement Holder must, during construction and operation, ensure no loss of abundance or diversity of native vegetation on or off the Land through;

- clearance,
- dust / contaminant deposition,
- fire,
- reduction in water supply, or
- other damage,

unless prior approval under the relevant legislation is obtained.

5.5.2 Control and Management Strategies

Control and Management Strategies
• Ensure development follows the approved QDP's and no clearing of native vegetation occurs without prior approval of the Native Vegetation Council (NVC). • Vegetation clearance shall avoid all native vegetation that is to be retained as outlined within **Drawing No. 5109.DRG.028R2 – Native Vegetation Clearance Proposal Map** • Approved clearance of native vegetation as per **Attachment 4 – Native Vegetation Management Plan**. • Training for mobile plant operators to ensure native vegetation is not cleared without authorisation. • Vehicle access restricted to established roadways. • Visual inspection of work area prior to commencing task (spotter if required). • Relocation of wildlife to be conducted by licenced contractor.
Uncertainty and Assumptions of Control Strategies
Based upon alignment with standard industry practice uncertainty of control strategies is considered low and reasonable.
Sensitivity to change of Assumptions
Sensitivity to change may be likely if the removal of native vegetation, which has not been foreseen within the development of the PEPR arises, appropriate approvals will need to be obtained under the *Native Vegetation Act 1991*. The area requiring vegetation removal is well defined within the QDP's.

5.5.3 Measurement Criteria

Outcome - Native Vegetation and Habitat	
The Tenement Holder must, during construction and operation, ensure no loss of abundance or diversity of native vegetation on or off the Land through; • clearance, • dust / contaminant deposition, • fire, • reduction in water supply, or • other damage, unless prior approval under the relevant legislation is obtained.	
Quarry Phase	**Operational**
Outcome Measurement	
1. **Outcome Achievement** Clearance will be undertaken in accordance with the attached Native Vegetation Management Plan (NVMP), refer **Attachment 4 – Native Vegetation Management Plan**. 2. **What will be Measured and the Form of Measurement** Vegetation clearance through records of Site inspections, photographic evidence, and vegetation removal approval documentation. 3. **Location of Measurement** Within EML 6560. 4. **Frequency** Annually and at the completion of each stage of vegetation clearance. 5. **Control / Baseline Data** **Attachment 4 – Native Vegetation Management Plan**. **Drawing No**. **5109.DRG.028R2** – **Native Vegetation Clearance Proposal Map**. **Table 16 – SEB Offset Required for Clearance**. 6. **Leading Indicator Criteria** Not Applicable.	

5.6 Topsoil Management

5.6.1 Outcome

The Tenement Holder must, during construction and operation ensure that the existing (pre-mining) topsoil quality and quantity is maintained.

5.6.2 Control and Management Strategies

Control and Management Strategies
• Soils are to be stripped ahead of quarrying and temporarily stockpiled. • Stockpiles of topsoil shall not exceed two (2) m in height. • Soils should not be stripped when too wet or too dry. • Topsoil and subsoil should be stockpiled separately where possible. • Wherever possible, soils should be used directly on areas being rehabilitated. • Stripping of soils should be limited to the minimum area necessary.

• Soil stockpiles are to be vegetated (e.g. grass seeded) to protect against erosion and weed infestation. • Erosion and drainage controls are to be integrated into soil stockpiles where possible to prevent erosion and saturation. • Compaction of topsoils by vehicles tracking over stockpiles should be avoided. • All topsoil stockpiles are to be regularly monitored and managed for weed infestation.
Uncertainty and Assumptions of Control Strategies
Uncertainty is considered low based upon the control and management strategies adopted are standard industry practice and are proven to be effective. However, localised changes in climatic conditions may result in variations in vegetation establishment.
Sensitivity to change of Assumptions
Sensitivity to change may be likely if the control and management strategies are not adhered to. The success and rate of the Site's rehabilitation may be affected based upon the availability of topsoil for rehabilitation may affect the overall successful establishment of vegetation.

5.6.3 Measurement Criteria

Outcome - Topsoil Management	
The Tenement Holder must, during construction and operation ensure that the existing (pre-mining) topsoil quality and quantity is maintained.	
Quarry Phase	**Operational**
Outcome Measurement	
1. **Outcome Achievement** Annual inspection and recording of soil stockpiles at the Site to confirm that: • Topsoil stockpiles are kept separate from subsoil stockpiles (if applicable). • There is no evidence of erosion (e.g. rills, gullies) or other evidence of topsoil loss. • Stockpiles of topsoils do not exceed two (2) m in height. 2. **What will be Measured and the Form of Measurement** Records of inspection documenting evidence of topsoil stockpile height and condition. 3. **Location of Measurement** Topsoil storage locations as per **Drawing No. 5109.DRG.021AR3 – Extraction Plan – Stage 1**, **Drawing No. 5109.DRG.023AR3 – Extraction Plan – Stage 2** and **Drawing No. 5109.DRG.025AR3 – Extraction Plan – Stage 3**. 4. **Frequency** Annually. 5. **Control / Baseline Data** Not Applicable. 6. **Leading Indicator Criteria** Not Applicable.	

5.7 Waste Management

5.7.1 Outcome

The Tenement Holder must, during construction, operation and post completion, ensure no contamination to the environment either on or off the land from commercial, industrial or domestic waste used during mining operations.

5.7.2 Control and Management Strategies

Control and Management Strategies
Operational • All chemical storage facilities onsite must meet specifications of Australian Standard *AS 1940 - The storage and handling of flammable and combustible liquids*, as a minimum. • Ensure all trackable wastes are appropriately disposed of by a licenced operator at an approved facility. • All chemicals and hydrocarbons are stored and handled in a bunded area, designed, and installed in accordance with Australian Standard *AS 1940 - The storage and handling of flammable and combustible liquids*. • Any spill of potential contaminants is to be cleaned up immediately. • The operator must ensure appropriate spill kits are available at all times. • Any industrial waste that is generated from servicing of plant and equipment is removed by the maintenance contractors undertaking the work. • Dispose of contaminated containment and / or absorbent material and any impacted surface soils in accordance with *EPA Guideline: EPA 378/13 Disposal of used hydrocarbon absorbent materials, August 2013*. • **Closure** • Adherence to **Drawing No. 5109.DRG.027AR2 – Conceptual Final Landform Plan** and **Drawing No. 5109.DRG.027BR1 – Conceptual Final Landform Plan Cross Sections A-A to D-D**. • Removal of all plant and equipment unless authorised by landowner(s).
Uncertainty and Assumptions of Control Strategies
Uncertainty is considered low based upon waste streams being well understood and management procedures considered adequate for wastes generated by Site activities.
Sensitivity to change of Assumptions
There is potential for changes to processing and equipment that may result in new waste streams being created and or changes to the volume of waste created at the Site.

5.7.3 Measurement Criteria

Outcome - Waste Management	
The Tenement Holder must, during construction, operation and post completion, ensure no contamination to the environment either on or off the land from commercial, industrial or domestic waste used during mining operations.	
Quarry Phase	**Operational**
Outcome Measurement	
1. Outcome Achievement Records of any environmental incidents to be kept include method of clean up and remediation. Waste tracking certificates to be kept onsite demonstrating that waste was disposed of according to SA EPA guidelines. **2. What will be Measured and the Form of Measurement** Quarry management receipts of waste disposal. Records of spill management. **3. Location of Measurement** Within EML 6560 **4. Frequency** Ongoing waste recording and annual review of records for compliance monitoring. **5. Control / Baseline Data** Not Applicable. **6. Leading Indicator Criteria** Not Applicable.	

Outcome - Waste Management	
The Tenement Holder must, during construction, operation and post completion, ensure no contamination to the environment either on or off the land from commercial, industrial or domestic waste used during mining operations.	
Quarry Phase	**Closure**
Outcome Measurement	
1. Outcome Achievement Closure inspection report demonstrated final landform has been constructed as per **Drawing No. 5109.DRG.027AR2 – Conceptual Final Landform Plan.** Items of quarry related infrastructure (scrap metals, parts, tyres, bearing, etc.) have been removed (unless agreed in writing with the landowner). **2. What will be Measured and the Form of Measurement** Site inspection records, photographic evidence and or landowner agreement. **3. Location of Measurement** Within EML 6560 **4. Frequency** Once prior to the EML revocation application. **5. Control / Baseline Data** Not Applicable. **6. Leading Indicator Criteria** Not Applicable.	

5.8 Public Safety

5.8.1 Outcome

The Tenement Holder must, during construction and operation, ensure that unauthorised entry to the Site does not result in public injuries and or deaths that could have been reasonably prevented.

The Tenement Holder must demonstrate that post completion, the risks to the health and safety of the public so far as it may be affected by mining operations are as low as reasonably practicable.

5.8.2 Control and Management Strategies

Control and Management Strategies
Operational • Fencing around Site perimeter to be established and maintained. • Regular inspection of Site fencing, signage, and access gates to ensure they are adequately maintained and locked at close of business. • Installation and maintenance of signage warning of dangers within the quarry Site at quarry entrance point. • All fill materials are to be placed and compacted in layers to the progressive landform in accordance with **Attachment 7 – Imported Fill Management Plan and Recovered Products Plan**. **Closure** • Adherence with progressive and final landform rehabilitation plans **Drawing No. 5109.DRG.027AR2 – Conceptual Final Landform Plan** and **Drawing No. 5109.DRG.027BR1 – Conceptual Final Landform Plan Cross Sections A-A to D-D**. • Terminal faces will be battered down to adhere with a 1V:4H batter. • Contoured areas and battered walls to be compacted via HME trafficking the area to establish safe and stable final batters. • Ensure the post-extraction landform is safe, stable, non-polluting, and suitable for the desired long-term land use. • Obtain a Landowner agreement for any quarry related infrastructure to be retained at the cessation of the mining activity.
Uncertainty and Assumptions of Control Strategies
The potential impacts to public safety are reduced, provided that the operator adheres to the control and management strategies which are considered reasonable and industry standard practice. Adequate fencing around the perimeter of the Site is maintained and the Conceptual Final Landform is achieved through progressive rehabilitation.
Sensitivity to change of Assumptions
The condition of the fencing may change over time if it is neglected or subject to vandalism. The rate of progressive rehabilitation is subject to market demand and the generation of overburden products onsite for use in establishing the final landform.

5.8.3 Measurement Criteria

Outcome - Public Safety	
The Tenement Holder must, during construction and operation, ensure that unauthorised entry to the Site does not result in public injuries and or deaths that could have been reasonably prevented.	
Quarry Phase	**Operational**
Outcome Measurement	
1. **Outcome Achievement** All public injuries and / or deaths resulting from unauthorised access to the Site are recorded in Operator Activity Register and investigated by a suitably qualified third party within one (1) calendar month (or other time as agreed with the Mining Regulator) and the results of the investigation show that the incident could not have been reasonably prevented by the Tenement Holder. 2. **What will be Measured and the Form of Measurement** Records of incidents in quarry management logbook and results of investigations by a suitably qualified third-party. 3. **Location of Measurement** Within EML 6560. 4. **Frequency** As required following incident/s. 5. **Control / Baseline Data** Not Applicable. 6. **Leading Indicator Criteria** Not Applicable.	

Outcome - Public Safety	
The Tenement Holder must demonstrate that post completion, the risks to the health and safety of the public so far as it may be affected by mining operations are as low as reasonably practicable.	
Quarry Phase	**Closure**
Outcome Achievement	
1. **Outcome Achievement** A Site inspection and report from a suitably qualified person is undertaken upon completion of final rehabilitation work to verify that all slopes are: • Battered to at least a 1V:4H ratio; • Geotechnically stable; • Vegetated; • Constructed as per the conceptual final landform plans. 2. **What will be Measured and the Form of Measurement** Records of a final Site inspection from a suitably qualified person indicate that the Site has been rehabilitated in accordance with **Drawing No. 5109.DRG.022AR4 – Rehabilitation Plan – Stage 1**, **Drawing No. 5109.DRG.024AR4 – Rehabilitation Plan – Stage 2** and **Drawing No. 5109.DRG.026AR4 – Rehabilitation Plan – Stage 3** to ensure suitability for the post closure land use. 3. **Location of Measurement** Rehabilitated landform within EML 6560. 4. **Frequency** Once post quarry completion prior to Tenement revocation application.	

5. **Control / Baseline Data**
   Not Applicable.
6. **Leading Indicator Criteria**
   Not Applicable.

5.9 Traffic

5.9.1 Outcome

The Tenement Holder must, during construction and operation, ensure there are no traffic accidents involving members of the public and mine-related traffic that could have been reasonably prevented by the Tenement Holder.

5.9.2 Control and Management Strategies

Control and Management Strategies
• All personnel are to comply with the Site traffic management policies / procedures. • Site management must ensure that all personnel operating vehicles are licenced to do so. • Site management are to ensure all personnel are aware of their responsibilities in relation to vehicle use through undertaking inductions, issuing notices, and through use of directives. • Site management must ensure road signage is correctly installed and maintained. • All contractors and visitors must report to the Site office as directed upon arrival to the Site. • Two-way radios must be readily accessible in all Site vehicles. • Vehicles must be in a roadworthy condition and fit for purpose. • Road trucks transporting materials are to be fitted with tarping systems.
Uncertainty and Assumptions of Control Strategies
Uncertainty is considered low based upon the control and management strategies adopted are standard industry practices and are proven to be effective and comply with the legislative requirements.
Sensitivity to change of Assumptions
The sensitivity to change is unlikely due to the adopted management strategies and industry standard practices.

5.9.3 Measurement Criteria

Outcome - Traffic	
The Tenement Holder must, during construction and operation, ensure there are no traffic accidents involving members of the public and mine-related traffic that could have been reasonably prevented by the Tenement Holder.	
Quarry Phase	**Operational**
Outcome Measurement	
1. **Outcome Achievement** All incidents involving public injury and / or deaths resulting from traffic accidents associated with the quarry operations are to be recorded in a Quarry Logbook and investigated by a suitably qualified person within one (1) calendar month (or other time as agreed with the Quarrying Regulator), and the results of the investigation show that the incident could not have been reasonably prevented by the Tenement Holder. 2. **What will be Measured and the Form of Measurement** Quarry Logbook records of traffic accidents. 3. **Location of measurement** Quarry Site entry / exit points. 4. **Frequency** Within one (1) month (or other time as agreed with mining regulation) after an incident. 5. **Control / Baseline Data** Not Applicable. 6. **Leading Indicator Criteria** Not Applicable.	

5.10 Heritage

5.10.1 Outcome

The Tenement Holder must, during construction and operation, ensure there is no damage, disturbance or interference to Aboriginal and non-Aboriginal heritage sites, objects or remains as a result of mining operations unless it is authorised under the relevant legislation is obtained.

5.10.2 Control and Management Strategies

Control and Management Strategies
• All personnel at the Site are to be inducted on cultural heritage requirements and the associated legislative responsibilities. • In the event any cultural heritage sites or objects are identified the following is to occur: - Immediately stop work in the vicinity of find. - Notify the relevant authority of the find / potential find at the Site. - No activities are to recommence in the vicinity of the find until such time that liaison with the relevant authority and / or the local Aboriginal groups has been undertaken and authority to proceed has been granted.

Uncertainty and Assumptions of Control Strategies
Uncertainty is considered low based upon the control and management strategies adopted are standard industry practices and are proven to be effective and comply with the legislative requirements.
Sensitivity to change of Assumptions
The sensitivity to change is unlikely due to the adopted management strategies and industry standard practices.

5.10.3 Measurement Criteria

Outcome - Heritage	
The Tenement Holder must, during construction and operation, ensure there is no damage, disturbance or interference to Aboriginal and non-Aboriginal heritage sites, objects or remains as a result of mining operations unless it is authorised under the relevant legislation is obtained.	
Quarry Phase	**Operational**
Outcome Measurement	

1. **Outcome Achievement**
   Quarry Management Logbook demonstrate that, upon discovery within the Site of any possible Aboriginal and / or non-Aboriginal heritage sites; and / or objects or remains;
   - Work ceased until the relevant authorities were notified and work recommenced only once authorisation was received.
   - Documented evidence of potential or actual finds of Aboriginal and / or non-Aboriginal heritage objects and evidence of consultation with the relevant authority.
2. **What will be Measured and the Form of Measurement**
   Quarry Management Logbook records of discovery and evidence of appropriate procedure followed upon discovery.
3. **Location of Measurement**
   Within EML 6560.
4. **Frequency**
   Upon discovery of heritage related items.
5. **Control / Baseline Data**
   Not Applicable.
6. **Leading Indicator Criteria**
   Not Applicable.

5.11 Protection of Third-Party Property

5.11.1 Outcome

The Tenement Holder must, during construction and operation, ensure that there are no adverse impacts to third-party land use or property on or off the land as a result from mining operations.

5.11.2 Control and Management Strategies

Control and Management Strategies
• Firefighting equipment available and maintained onsite (fire extinguishers, emergency response plans and Site preparedness). • Undertake hot works within designated areas in accordance with hot works permit. • No hot works (welding) during total fire ban conditions. • Where accessible, establish and maintain appropriate fire breaks (and inspect monthly throughout fire danger season). • Ensure Country Fire Service (CFS) access is available to the Site.
Uncertainty and Assumptions of Control Strategies
Control measures are considered standard practice for the quarry industry and are proven to be effective in the prevention of potential impacts.
Sensitivity to change of Assumptions
The proposed control and mitigation strategies are well known and effective and are not considered to be sensitive to change.

5.11.3 Measurement Criteria

Outcome - Protection of Third-Party Property	
The Tenement Holder must, during construction and operation, ensure that there are no adverse impacts to third-party land use or property on or off the land as a result from mining operations.	
Quarry Phase	**Operational**
Outcome Measurement	
1. Outcome Achievement All incidents involving damage to third party property resulting from the quarry Site will be recorded in Quarry Management Logbook and investigated by a suitably qualified person within one (1) calendar month (or other time as agreed with the Mining Regulator) and the results of the investigation show that the incident could not have reasonably been prevented by the quarrying activity. **2. What will be Measured and the Form of Measurement** Records of incidents in Quarry Management Logbook and results of investigations by a suitably qualified third-party. **3. Location of Measurement** Within one (1) month (or other time as agreed with mining regulation) after an incident. **4. Frequency** As required following incident/s. **5. Control / Baseline Data** Not Applicable. **6. Leading Indicator Criteria** Not Applicable.	

5.12 Groundwater

5.12.1 Outcome

The Tenement Holder must, during construction, operation and post completion, ensure that there is no adverse impact to the quality and / or quantity of groundwater caused by mining operations to existing users and groundwater dependent ecosystems.

5.12.2 Control and Management Strategies

Control and Management Strategies
Operational • Adherence with QDP's **Drawing No. 5109.DRG.021AR3 – Extraction Plan - Stage 1, Drawing No. 5109.DRG.021BR1 – Extraction Plan - Stage 1 Cross Sections A-A to C-C, Drawing No. 5109.DRG.023AR3 – Extraction Plan - Stage 2, Drawing No. 5109.DRG.023BR1 – Extraction Plan - Stage 2 Cross Sections A-A to C-C, Drawing No. 5109.DRG.025AR4 – Extraction Plan - Stage 3, Drawing No. 5109.DRG.025BR1 – Extraction Plan - Stage 3 Cross Sections A-A to D-D**. • Regular review of quarry development pit floor levels to ensure operations correspond with QDP's and its commitment to remain two (2) m above highest seasonal groundwater level. • Periodic review of extraction area to ensure no groundwater seepage is occurring. If groundwater is seepage observed, undertake a risk assessment and management plan to be developed. • Installation of five (5) groundwater monitoring bores (including four shallow wells) around the perimeter of the mining excavation area and one (1) in the centre of the mining excavation area refer to **Drawing No. 5109.DRG.006R3 – Site Layout Map**. • Monitor groundwater water levels and Ec and pH levels quarterly for the first five (5) years of operation to determine optimal time of year to capture seasonal maximum levels and improve groundwater monitoring plan and design if required pit to adhere to minimum (2) m groundwater buffer. **Closure** • Adherence to **Drawing No. 5109.DRG.027AR2 – Conceptual Final Landform Plan** and **Drawing No. 5109.DRG.027BR1 – Conceptual Final Landform Plan Cross Sections A-A to D-D**.
Uncertainty and Assumptions of Control Strategies
Control and management strategies are considered reasonable and commensurate with potential impacts of groundwater interception.
Sensitivity to change of Assumptions
Medium sensitivity to change based upon the highly saline GW beneath the Site and absence of immediately adjacent GW users. There remains some uncertainty regarding the magnitude and timing of seasonal fluctuations.

5.12.3 Measurement Criteria

Outcome - Groundwater	
The Tenement Holder must, during construction, operation and post completion, ensure that there is no adverse impact to the quality and / or quantity of groundwater caused by mining operations to existing users and groundwater dependent ecosystems.	
Quarry Phase	**Operational**
Outcome Measurement	

1. **Outcome Achievement**
   Quarterly monitoring of groundwater levels and quality (EC and pH) at groundwater wells outlined within **Drawing No. 5109.DRG.006R3 – Site Layout Map** demonstrates that there have not been any significant changes to groundwater conditions as a result of quarry activities at the Site and that a minimum two (2) m buffer between the pit floor and the local groundwater table is maintained for the first five (5) years of operation.

   Post five years, seasonal monitoring (based on seasonal groundwater results captured in initial five (5) years) of groundwater levels and quality (EC and pH) at groundwater wells outlined within **Drawing No. 5109.DRG.006R3 – Site Layout Map** demonstrates that there have not been any significant changes to groundwater conditions as a result of quarry activities at the Site and that a minimum two (2) m buffer between the pit floor and the local groundwater table is maintained.

2. **What will be Measured and the Form of Measurement**
   Quarterly high groundwater levels (first 5 years)
   Seasonal high groundwater levels (post 5 years).
   Groundwater quality (EC and pH) levels.

3. **Location of Measurement**
   Five (5) groundwater monitoring bores within EML 6560, as outlined in **Drawing No. 5109.DRG.006R3 – Site Layout Map**.

4. **Frequency**
   Groundwater levels and quality measurements for EC and pH levels quarterly for the first five (5) years of operation.

   Post five (5) years construction, bi annually (based on seasonal groundwater results captured in initial five (5) years).

5. **Control / Baseline Data**
   Attachment 2 – Groundwater Assessment.

6. **Leading Indicator Criteria**

   Groundwater level monitoring and interpreted water table elevation contours demonstrate that the base of the quarry excavation is at least 2.2 m above the seasonally high water table elevation.

   5

   Groundwater levels to be monitored quarterly for the first five years, with frequency of monitoring following five years of operations (biannually) that is appropriate to demonstrate achievement of the outcome.

Interpreted water table elevation contours to be prepared annually aligned to the seasonally high water table elevation (assumed at this stage to be the end of winter/early spring until site specific data is available to confirm this).

Outcome - Groundwater	
The Tenement Holder must, during construction, operation and post completion, ensure that there is no adverse impact to the quality and / or quantity of groundwater caused by mining operations to existing users and groundwater dependent ecosystems.	
Quarry Phase	**Operational**
Outcome Measurement	

1. **Outcome Achievement**
   Annual inspection of the pit floor levels recorded in the Mine Logbook will demonstrate that mining operations do not exceed the mine depth levels stated in **Drawing No. 5109.DRG.021AR3 – Extraction Plan - Stage 1, Drawing No. 5109.DRG.023AR3 – Extraction Plan - Stage 2, Drawing No. 5109.DRG.025AR3 – Extraction Plan - Stage 3**.

   Monthly inspection records during operations of the extraction area confirms that there are no signs of groundwater seepage into the pit floor during operation of the Site.

2. **What will be Measured and the Form of Measurement**
   Quarry pit levels.
   Visual monitoring / pit inspection for groundwater seepage.

3. **Location of Measurement**
   Active pit floor areas.

4. **Frequency**
   Monthly inspections for groundwater seepage.
   Annual - pit floor levels.

5. **Control / Baseline Data**
   Attachment 2 – Groundwater Assessment.

6. **Leading Indicator Criteria**

   Groundwater level monitoring and interpreted water table elevation contours demonstrate that the base of the quarry excavation is at least 2.2 m above the seasonally high water table elevation.

   Groundwater levels to be monitored quarterly for the first five years, with frequency of monitoring following five years of operations (biannually) that is appropriate to demonstrate achievement of the outcome.

   Interpreted water table elevation contours to be prepared annually aligned to the seasonally high water table elevation (assumed at this stage to be the end of winter/early spring until site specific data is available to confirm this).

Outcome - Groundwater	
The Tenement Holder must, during construction, operation and post completion, ensure that there is no adverse impact to the quality and / or quantity of groundwater caused by mining operations to existing users and groundwater dependent ecosystems.	
Quarry Phase	**Closure**
Outcome Measurement	
1. **Outcome Achievement** Final landform to be constructed in accordance with the approved final designs and inspected by a certified engineer at completion. 2. **What will be Measured and the Form of Measurement** Inspection to confirm final batter angles and rehabilitated areas as per **Drawing No. 5109.DRG.027AR2 – Conceptual Final Landform** 3. **Location of Measurement** Rehabilitated area within EML 6560. 4. **Frequency** Once post quarry completion prior to tenement revocation application. 5. **Control / Baseline Data** Not applicable. 6. **Leading Indicator Criteria** Not applicable.	

5.13 Weeds, Pests and Plant Pathogens

5.13.1 Outcome

The Tenement Holder must, during construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species on the land.

5.13.2 Control and Management Strategies

Control and Management Strategies
Operational and Closure • Weed infestations are to be controlled as soon as possible to prevent further spread of weeds. • Ground cover is to be maintained for as long as possible by minimising land disturbance at any one (1) time. • Annual weed spraying campaigns should be implemented at the Site, with additional spraying campaigns (e.g. spot spray, bi-annual sprays) undertaken as necessary. • Weeds identified onsite are to be prioritised for weed management according to the status of the weed, and the cause of the weed establishment must be determined to prevent or minimise further introduction and spread. • Employees should be trained appropriately to recognise existing and potential weeds present onsite and within the surrounding areas to ensure weeds are not inadvertently brought onto the Site via items contaminated by seed (e.g. vehicles, machinery, hand tools, soil).

- If areas containing weeds are encountered, clean all equipment, vehicles, and machinery prior to leaving the area.
- All access routes and hardstands are to be maintained in a weed-free or weed-reduced state, to lessen potential spread via vehicle movements.
- Established roads and tracks are to be used whenever possible and weed-infested areas / sites are to be avoided.
- All earthmoving equipment will be cleaned and disinfected prior to entering the Site.
- Movement of vehicles and machinery will be restricted to established tracks where possible.
- If any weed infestations are observed onsite, they to be controlled immediately through spraying measures to prevent any further spreading.

Uncertainty and Assumptions of Control Strategies

Declared weed and pest species will be controlled through regular inspections and implementation of control and management strategies. Based upon reasonable industry standard practice there is a low degree of uncertainty and assumptions pertaining to the control and management strategies.

Sensitivity to change of Assumptions

The sensitivity to change is considered low based upon weed and pest controls that are well established and prove to be effective where implemented.

5.13.3 Measurement Criteria

Outcome - Weeds, Pests and Plant Pathogens	
The Tenement Holder must, during construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species on the land.	
Quarry Phase	**Operational**
Outcome Measurement	

1. **Outcome Achievement**
   Records of annual inspections undertaken in Spring, are held by the operator to demonstrate no introduction of new weeds, pests, or plant pathogens nor an increase in abundance of existing weeds and pests onsite.
2. **What will be Measured and the Form of Measurement**
   Quarry records of inspections undertaken show no introduction or increased abundance of new weeds, pests or plant pathogens compared to previous reporting year and adjacent land.
3. **Location of Measurement**
   Within EML 6560.
4. **Frequency**
   Annually in Spring
5. **Control / Baseline Data**
   Not applicable.
6. **Leading Indicator Criteria**
   Not Applicable.

Outcome - Weeds, Pests and Plant Pathogens	
The Tenement Holder must, during construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species on the land.	
Quarry Phase	**Closure**

Outcome Measurement
1. **Outcome Achievement** Records of inspection undertaken prior to tenement relinquishment, demonstrate no introduction of new weeds, pests or plant pathogens, nor an increase in abundance of existing weeds and pests onsite 2. **What will be Measured and the Form of Measurement** Quarry management records will demonstrate weed management undertaken during rehabilitation works. Record of final inspection report 12 months post completion of rehabilitation activities to ensure no infestations of weeds or pests on the rehabilitated landform. 3. **Location of Measurement** Within EML 6560. 4. **Frequency** As required prior to during rehabilitation activities. Once prior to tenement relinquishment 12 months post rehabilitation works. 5. **Control / Baseline Data** Not applicable. 6. **Leading Indicator Criteria** Not Applicable.

5.14 Native Fauna

5.14.1 Outcome

The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations that could reasonably have been prevented.

5.14.2 Control and Management Strategies

Control and Management Strategies
• Vehicle access restricted to established roadways and extraction areas. • Visual inspection of work area prior to commencing task (spotter if required). • Prior to vegetation clearance activities being undertaken, the staged extraction area shall be physically surveyed and marked onsite to outline the approved vegetation clearance area. • Relocation of wildlife to be conducted by licenced contractor.
Uncertainty and Assumptions of Control Strategies
Control measures are considered standard practice for the quarry industry and are proven to be effective in the prevention of potential impacts.
Sensitivity to change of Assumptions
Likelihood of fauna presence may change dependent on time of year and surrounding activities.

5.14.3 Measurement Criteria

Outcome - Native Fauna
The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations that could reasonably have been prevented.

Quarry Phase	Operational
Outcome Measurement	

1. **Outcome Achievement**
   Records of inspections undertaken by a suitably qualified person prior to stripping / clearing vegetation are held by the operator to demonstrate clearance areas are free from native fauna and / or active nesting sites.

   All incidents injury and / or deaths of fauna resulting from quarrying operations onsite are to be recorded in a quarry management log book and investigated and the results of the investigation show that the incident could not have been reasonably prevented by the quarry operator.

2. **What will be Measured and the Form of Measurement**
   Records of inspection for native fauna at the commencement of each stage of extraction and records of incidents maintained onsite.
3. **Location of Measurement**
   Within EML 6560.
4. **Frequency**
   Upon an incident occurring and at the commencement of each stage of extraction.
5. **Control / Baseline Data**
   Not Applicable.
6. **Leading Indicator Criteria**
   Not Applicable.

5.15 Waste Derived Fill

5.15.1 Outcome

The Tenement Holder must, during construction, operation and post completion, ensure no adverse impacts to the environment from WDF brought onto the land unless otherwise authorised through the relevant legislation.

5.15.2 Control and Management Strategies

Control and Management Strategies
Operational: • Adherence to **Attachment 7 – Dublin Quarry Imported Fill Management Plan and Recovered Products Plan** for acceptance criteria, handling, testing, and records management. • All WDF material accepted into Site for use in rehabilitation must meet EPA Standard for the Production and Use of WDF (October 2013). • Maintain records and details of receipt of all WDF fill material including source site, volume, and contractor / company. • Undertake visual Inspections Waste Soil loads entering the Site and refuse material which does not meet WDF criteria. • Acceptance of additional WDF 'Waste Soil' must be accompanied by written, signed, and dated certification from a suitably qualified person stating that the waste constitutes Waste Fill when it exceeds 100 t from a single source site unless otherwise approved by the EPA in writing. • The receipt of WDF (waste Soil) and C&D (mixed) will be undertaken in accordance with the EPA Standard for the Production and Use of WDF. • All C&D waste recycling undertaken in accordance with the provisions of an approved Recycling Depot EPA Licence and associated plans.

- Ensure WDF and product stockpiles are maintained in separate stockpiles and identified with appropriate signage.
- Waste soil stockpiles to vary between five (5) and 10 m in height.
- Stockpiles of waste soil are not to be stored onsite for longer than six (6) months.
- Recycled asphalt profiling is stockpiled separately to unprocessed asphalt profile.
- Ensure asphalt profiling is limited to haul road use only.
- The receipt and management of the C&D Waste (Mixed) will be licenced under the *Environment Protection Act 1993* if / when the material is intended to be reprocessed or recycled.

Closure:

- Ensure WDF utilised in rehabilitation activities is covered with available overburden and then topsoiled prior to seeding with pasture grass, with no WDF to remain on the surface.
- Adherence to Standard AS1289.6.3.2 to ensure the appropriate procedure for compacting the WDF imported onto the Site is followed.

Uncertainty and Assumptions of Control Strategies
Waste streams are well understood, and management procedures and regulation procedures are considered adequate for wastes generated by Site activities.
Sensitivity to change of Assumptions
General waste streams are unlikely to change as a result of the quarry activities undertaken at the Site.

5.15.3 Measurement Criteria

Outcome - Waste Management – Waste Derived Fill	
The Tenement Holder must, during construction, operation and post completion, ensure no adverse impacts to the environment from WDF brought onto the land unless otherwise authorised through the relevant legislation.	
Quarry Phase	**Operational**
Outcome Measurement	

1. **Outcome Achievement**
   Quarry management records demonstrate that C&D Waste (mixed) and WDF 'Waste Soil' materials imported to the Site are weighed, stockpiled, documented and re-used in accordance with the requirements of *EPA Standard for the production and use of Waste Derived Fill (2013)* and associated EPA licencing (where required).
2. **What will be Measured and the Form of Measurement**
   Quarry management records of WDF tracking receipts which outline the following:
   - Classification of the WDF including inspection and sampling reports.
   - Volume of WDF received at the Site.
   - The Site where the WDF has been sourced from and the contractor / company who has transported the material, kept as a WDF Form.
3. **Location of Measurement**
   Within EML 6560.
4. **Frequency**
   Annually and upon receipt of C&D Waste (mixed) and Waste Soil as WDF.
5. **Control / Baseline Data**
   Not Applicable.
6. **Leading Indicator Criteria**
   Not Applicable.

Outcome - Waste Management – Waste Derived Fill	
The Tenement Holder must, during construction, operation and post completion, ensure no adverse impacts to the environment from WDF brought onto the land unless otherwise authorised through the relevant legislation.	
Quarry Phase	**Closure**
Outcome Measurement	

1. **Outcome Achievement**
   Geotechnical assessment by a suitably qualified person confirms the final landform has been established as per the approved quarry development plans, geotechnical requirements, and is safe, stable and non-polluting
2. **What will be Measured and the Form of Measurement**
   Quarry management records of:
   - A final Site inspection from a suitably qualified person indicate that the Site has been rehabilitated in accordance with **Drawing No. 5109.DRG.022AR4 – Rehabilitation Plan – Stage 1**, **Drawing No. 5109.DRG.024AR4 – Rehabilitation Plan – Stage 2** and **Drawing No. 5109.DRG.026AR4 – Rehabilitation Plan – Stage 3** to ensure suitability for the post closure land use.
   - Records of Site monitoring for a minimum period of five (5) years post completion of bulk earthworks.
3. **Location of Measurement**
   Rehabilitated areas within EML 6560.
4. **Frequency**
   Once following the completion of rehabilitation activities, prior to the revocation of the Tenement.
5. **Control / Baseline Data**
   Not Applicable.
6. **Leading Indicator Criteria**
   Not Applicable.

6 Operator Capability

Leinad is a wholly owned business by three (3) Directors who are property development experts, with a demonstrated success of property development in South Australia including large construction and civil construction projects. The company adheres to a safety management system and ensures all subcontractors have the required safety management systems procedures and policies in order to operate on projects. Other companies that the directors own have Federal Safety Commission accreditation along with ISO 45001 (Safety), ISO 9001 (Quality) and ISO 14001 (Environmental) accreditations.

Leinad Directors, shareholders and Engineers have extensive experience in development and civil engineering projects as demonstrated below.

I / We have the following technical, operational, and financial capabilities and resources available for carrying out proposed mining operations:

- Over a decade of experience in the construction industry, in both the private and Government sectors.
- Expertise in:
    - Acquisitions and Finance,
    - Project Planning,
    - Negotiation,
    - Contract Management,
    - Development Strategies and Risk Management,
    - Property Research Sales and Marketing,
    - Project Delivery,
    - Project Management,
    - Property and business development, planning, sales, safety standards and delivery
    - Stormwater Management
    - Food importation, and
    - Property and building consultancy.
- Experience in projects ranging from high-rise apartment complexes and multi-stage dwellings, to schools and medical facilities
- Qualifications including Engineering, Civil Engineering, Project Management, Business Management, Real Estate, and Business Administration

In the last five (5) years, a related body corporate or I have failed to comply with a provision of a corresponding Australia Law or designated Australian Act in connection with authorised operations that resulted in:

Not Applicable - I / We have no related records that have failed to comply with Australian Law

7 Lease Conditions

A summary of the non-environmental outcome lease conditions that relate to the Site and where they have been addressed within the PEPR is provided below within **Table 17 – Summary of Non-Outcome Based Lease Conditions** and **Table 18 – Fourth Schedule Criteria and Strategies**.

Table 17 – Summary of Non-Outcome Based Lease Conditions

Licence Condition	Where in PEPR condition is met
Second Schedule	
1. The Tenement Holder must submit a Proposed PEPR for the purpose of Part 10A of the Act within 12 months after the grant of the Mineral Tenement or within such longer period of time as the Minister or a person authorised by the Minister may allow.	The submission of this PEPR will meet this lease condition.
2. The Tenement Holder must commence mining operations in accordance with the Approved PEPR under Part 10A of the Act within 12 months after the Program has been approved or within such longer period as the Minister or a person authorised by the Minister may allow.	Operations will commence as soon as practicable following the approval of this PEPR.
3. After commencement of mining operations, the Tenement Holder must continue mining operations in accordance with the requirements of the Approved PEPR or any subsequent revised PEPR.	Operations will be conducted onsite in accordance with the approved PEPR, which will be measured through the outcome and measurement criteria outlined within **Section 5 Environmental Outcomes, Strategies, Criteria and Monitoring**. Adherence to the outcomes and measurement criteria will be outlined through the development and submission of an Annual Compliance Report (ACR) every 12 months.
4. The Tenement holder must maintain a two (2) m between the pit floor and the highest seasonal groundwater level.	Outlined within **Section 5.12 Groundwater**.
5. Tenement Holder must comply with all State and Commonwealth legislation and regulations applicable to the activities undertaken pursuant the grant of the Mineral Tenement including (but not limited to) the: a. *Environment Protection and Biodiversity Conservation Act (Cth) 1999;* b. *Planning, Development and Infrastructure Act (SA) 2016;* c. *Landscape South Australia Act 2019;*	Adherence to the environmental outcomes within **Section 5 Environmental Outcomes, Strategies, Criteria and Monitoring** will ensure that Site operations will adhere to the relevant State and Commonwealth legislation.

d. *Aboriginal Heritage Act (SA) 1988;* e. *Heritage Places Act (SA) 1993;* f. *Work Health and Safety Act (SA) 2012;* g. Environment Protection Act (SA) 1993; h. *Native Vegetation Act (SA) 1991;* i. *Road Traffic Act (SA) 1961.*	

Table 18 – Fourth Schedule Criteria and Strategies

Fourth Schedule	
Groundwater Criteria 14. The Tenement Holder is required to address the following matters for the purposes of Regulation 63(1)(b) of the Regulations in relation to the Groundwater Outcome in Fourth Schedule Clause 13: 14.1. Install a minimum of five compliance groundwater monitoring bores as part of the groundwater monitoring plan, including four shallow wells around perimeter of the mining excavation area and one in centre of the mining excavation area. 14.2. Establish the compliance groundwater monitoring bores at appropriate locations and of sufficient density and depth to measure or infer the groundwater elevations in relation to the pit floor; and 14.3. Monitor groundwater water levels quarterly for the first five years of operation to determine optimal time of year to capture seasonal maximum and improve groundwater monitoring plan and mining pit design to ensure achievement of the outcome. 14.4. Frequency of measurement following the first five years of operation, that is appropriate to ensure demonstration of achievement of the outcome.	Refer to **Section 5.12 Groundwater**.
Groundwater Leading Indicator Criteria 15. Tenement Holder is required to address the following matters for the purposes of Regulation 63(1)(d) of the Regulations in relation to Fourth Schedule Clause 15 for groundwater:	Refer to **Section 5.12 Groundwater**

15.1. leading indicator criteria based on groundwater elevations; and 15.2. leading indicator criteria based on pit floor levels; and 15.3. the frequency of leading indicator measurements must be appropriate to ensure there is an early warning of failure of any strategy.	
Waste Derived Fill Strategy 20. The Tenement Holder is required to address the following matters for the purposes of Regulation 63(1)(b) of the Regulations in relation to the Waste Derived Fill Outcome in Fourth Schedule Clause 19: 20.1. Prepare and implement an Imported Fill Management Plan for the site which will include the acceptance criteria, handling, testing, records management and proposed use of imported fill.	Refer to **Section 5.15 Waste Derived Fill**, **Section 3.4.5.1 Waste Derived Fill** and **Attachment 7 – Imported Fill Management Plan and Recovered Products Plan**.

8 Reference List

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DRAWINGS

ATTACHMENTS

Attachment 1

Wind Frequency Analysis

Attachment 2

Groundwater Assessment

Attachment 3

Environment Protection and Biodiversity Conservation Act 1999 Protected Matters Report

Attachment 4

Native Vegetation Management Plan

Attachment 5

Visual Assessment Photographic Plates

Attachment 6

Confidential - Aboriginal Heritage Sites Search

Attachment 7

Dublin Quarry Imported Fill Management Plan

255000E

257500E

6182500N

6180000N

CT5663/399
H140400 S299

CT5625/70
H140400 S163

CT5486/425
H140400 S164

CT5546/561
H140400 S300

CT5593/256
H140400 S161

CT5486/425
H140400 S162

CT5583/58
H140400 S435

CT5593/257
H140400 S301

CT5593/253
H140400 S302

EML 6560

CT5633/660
F175266 A799

CT5583/59
H140400 S436

REV	DESCRIPTION	DATE	BY
1	Updated Tenement number following approval of EML	22/04/2025	LO

Data Sources:
Photography:
Topography:
Cadastre: Data.sa.gov.au. Boundaries are indicative only, not all boundaries shown
Ecosystem:
Other: SARIG, 2025

Legend:

- EML Boundary
- Cadastral Boundaries
- Cropped land
- 150 m Buffer - Powerlines
- 150 m Buffer - Water Pipeline
- 150m Buffer Other Structure
- 400m Buffer - Residences
- Residence
- Other Structure
- Water Pipeline
- Powerlines

N

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Exempt Land Map

GROUNDWORK PART OF SLR
PH +61 3871 0411
WWW.GROUNDWORKPLUS.COM.AU

SCALE: 1:12,200 When Printed On A3

0 60 120 180 240 m

DRAWING NUMBER: 5109.DRG.003

REVISION: 1

DATE: 22-April-2025 DRAWN: MB

PRINTED: 22-April-2025 CHECKED: MJ

DATUM: HORIZONTAL / VERTICAL / EPSG:7854

MGA / AHD / 54

255000E

257500E

6182500N

6180000N

Qe1

Qa

Qe

Qe1

Qp\ca

EML 6560

Qe1

Qhck

EML 6477

REV	DESCRIPTION	DATE	BY
1	Updated Tenement number following approval of EML	22/04/2025	LO

Data Sources:
Photography:
Topography:
Cadastre: Data.sa.gov.au. Boundaries are indicative only, not all boundaries shown
Ecosystem:
Other: SARIG, 2025

Legend:

EML Boundary

Surface Geology

Qa ; Undifferentiated Quaternary alluvial/fluvial sediments.

Qe ; Undifferentiated Quaternary aeolian sediments.

Qe1 ; Quaternary dunefield sands.

Qp\ca ; Undifferentiated Pleistocene calcrete.

N

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Regional Geology Map

GROUNDWORK PART OF SLR
PH +61 3871 0411
WWW.GROUNDWORKPLUS.COM.AU

SCALE: 1:13,000 When Printed On A3

0 60 120 180 240 m

DRAWING NUMBER: 5109.DRG.004

REVISION: 1

DATE: 22-April-2025 DRAWN: MB

PRINTED: 22-April-2025 CHECKED: MD

DATUM: HORIZONTAL / VERTICAL / EPSG:7854

MGA / AHD / 54

256000E

257000E

6181700N

6180700N

Legend:

- Extractive_mineral_leases
- Stage 1
- Stage 2
- Stage 3
- Topsoil Stockpile
- Long Term Laydown and Staging Area
- Site Entry and Exit
- Site Office
- Site Carpark
- Mobile Plant
- Product Stockpile Area
- Groundwater Monitoring Wells
- 400m Buffer - Residence Exempt Land Buffer
- Direction of Quarrying
- Degraded Maireana Shrubland
- Eucalyptus Woodland
- Maireana +/- Nitrebush shrubland with emergent Eucalyptus
- Nitrebush Shrubland
- Samphire Salt Flats

Site Entry & Exit

Weighbridge

Storage

RW tanks

Site Carpark

Mobile Plant

Product Stockpile Area

C&D Stockpile

Temporary Stockpile area

EML 6560

EML 6477

REV	DESCRIPTION	DATE	BY
1	Addition of Groundwater Monitoring Wells	Mar 2024	LJ
2	Updated Tenement number following approval of EML	22/04/2025	LO
3	Updated for PEPR RFI	Dec 2025	EM

Data Sources:
Photography: UAV Survey 10-May-2023, Google Satellite Imagery accessed: 22-April-2025
Topography:
Cadastre: Data.sa.gov.au;Boundaries are Indicative only, not all boundaries shown
Ecosystem:
Other: SARIG, 2025

N

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Site Layout Map

GROUNDWORK PART OF SLR
PH +61 3871 0411
WWW.GROUNDWORKPLUS.COM.AU

SCALE: 1:6,600 When Printed On A3

0 30 60 90 120 m

DRAWING NUMBER: 5109.DRG.006

REVISION: 3

DATE: 22-April-2025 DRAWN: CL

PRINTED: 22-April-2025 CHECKED: MJ

DATUM: HORIZONTAL / VERTICAL / EPSG:7854

MGA / AHD / 54

252000E

255000E

258000E

6183000N

6180000N

EML 6560

EML 6477

Adelaide International Bird Sanctuary National Park-Winaityinaityi Pangkara

Upper Gulf St Vincent

EML 3214

EML 3221

EML 3220

EML 3218

EML 3219

EML 3213

EML 3210

REV	DESCRIPTION	DATE	BY
1	Updated Tenement number following approval of EML	22/04/2025	LO

Data Sources:
Photography: UAV Survey 2022-06-02; Google Satellite Imagery accessed 2025-04-22
Topography:
Cadastre:
Ecosystem:
Other: SARIG, 2025

Legend:
- EML Boundary
- State Marine Parks
- National, Recreation and Conservation Parks

N

PROJECT: Dublin

CLIENT: Leinad Land Management Pty Ltd

TITLE: Proximity to Conservation Areas Map

GROUNDWORK PLUS PART OF SLR
PH +61 3871 0411
WWW.GROUNDWORKPLUS.COM.AU

SCALE: 1:26,000 When Printed On A3 (0 100 200 300 400 m)

DRAWING NUMBER: 5109.DRG.009

REVISION: 1

DATE: 22-April-2025 DRAWN: MB

PRINTED: 22-April-2025 CHECKED: MD

DATUM: HORIZONTAL / VERTICAL / EPSG:7854
MGA / AHD / 54

REV	DESCRIPTION	DATE	BY
1	Updated Tenement number following approval of EML	22/04/2025	LO

Data Sources:
Photography: Google Satellite Imagery accessed: 22-April-2025
Topography:
Cadastre:
Ecosystem:
Other: SARIG, 2025

Legend:
- EML Boundary
- National, Recreation and Conservation Parks
- Roads
- Site
- Towns

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Site Location Map

GROUNDWORK PLUS PART OF SLR
PH +61 3871 0411
WWW.GROUNDWORKPLUS.COM.AU

SCALE: 1:26,000 When Printed On A3 (0 100 200 300 400 m)
DRAWING NUMBER: 5109.DRG.010
REVISION: 1
DATE: 22-April-2025 DRAWN: CL
PRINTED: 22-April-2025 CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / EPSG:7854
MGA / AHD / 54

252000E 255000E 258000E 261000E

6183000N

6180000N

Long Plains
EML 6560

6529-1178
6529-995
6529-994
6529-43
6529-41
6529-42
6529-993
6529-992
6529-997
6529-996

REV	DESCRIPTION	DATE	BY
1	Updated Tenement number following approval of EML	23/04/2025	LO

Data Sources:
Photography: UAV Survey 2022-06-02; Google Satellite Imagery accessed 2025-04-23
Topography:
Cadastre:
Ecosystem:
Other: SARIG, 2025

Legend:
- EML Boundary
- Water Catchment Boundaries
- 3 km search boundary
- Watercourses
- Water Wells for Groundwater Assessment
- Investigation Wells - No data

N

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Groundwater Map

GROUNDWORK PART OF SLR
PH +61 3871 0411
WWW.GROUNDWORKPLUS.COM.AU

SCALE: 1:25,000 When Printed On A3
0 100 200 300 400 m
DATE: 23-April-2025 DRAWN: MB
PRINTED: 23-April-2025 CHECKED: MD

DRAWING NUMBER: 5109.DRG.012
REVISION: 1
DATUM: HORIZONTAL / VERTICAL / EPSG:7854
MGA / AHD / 54

255000E

258000E

6183000N

6180000N

EML 6560

THOMPSONS BEACH ROAD

THOMPSON ROAD

LONG PLAINS ROAD

PORT WAKEFIELD HIGHWAY

PORT WAKEFIELD HIGHWAY

Freight Route

CARSLAKE ROAD

PORT PRIME ROAD

REV	DESCRIPTION	DATE	BY
1	Updated Tenement number following approval of EML	23/04/2025	LO

Data Sources:
Photography: UAV Survey 2022-06-02; Google Satellite Imagery accessed 2025-04-23
Topography:
Cadastre:
Ecosystem:
Other: SARIG, 2025

Legend:
- EML Boundary
- Site Entry and Exit
- All Road Linework
- Access Road
- Freight Route

N

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Site Access Map

GROUNDWORK PLUS PART OF SLR
PH +61 3871 0411
WWW.GROUNDWORKPLUS.COM.AU

SCALE: 1:15,000 When Printed On A3

0 70 140 210 280 m

DRAWING NUMBER: 5109.DRG.013

REVISION: 1

DATE: 23-April-2025 DRAWN: MB

PRINTED: 23-April-2025 CHECKED: MD

DATUM: HORIZONTAL / VERTICAL / EPSG:7854

MGA / AHD / 54

255000E

258000E

6183000N

6180000N

PL 8

PL 4

PL 9

PL 7

PL 3

PORT WAKEFIELD HIGHWAY

PORT WAKEFIELD HIGHWAY

LONG PLAINS ROAD

THOMPSONROAD

PL 1

EML 6560

PL 2

PL 5

THOMPSONS BEACH ROAD

PL 6

PORT PRIME ROAD

REV	DESCRIPTION	DATE	BY
1	Updated Tenement number following approval of EML	23/04/2025	LD

Data Sources:
Photography: UAV Survey 2022-06-02; Google Satellite Imagery accessed 2025-04-23
Topography:
Cadastre:
Ecosystem:
Other: SARIG, 2025

Legend:
- EML Boundary
- All Road Linework
- Photo Point Direction
- Site Entry and Exit
- Other Structure
- Residence
- Photo Point Locations

N

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Visual Assessment Map

GROUNDWORK PART OF SLR
PH +61 3871 0411
WWW.GROUNDWORKPLUS.COM.AU

SCALE: 1:15,000 When Printed On A3 (0 70 140 210 280 m)

DRAWING NUMBER: 5109.DRG.015

REVISION: 1

DATE: 23-April-2025 DRAWN: MB

PRINTED: 23-April-2025 CHECKED: MD

DATUM: HORIZONTAL / VERTICAL / EPSG:7854

MGA / AHD / 54

252500E 255000E 257500E 260000E

6182500N

6180000N

Dublin

RUSKINROAD
BUBNERROAD
SCHUTTROAD
SCHLODDERROAD
SEVENTHSTREET
FIRSTSTREET
AVONROAD
CLONANROAD
OLD DUBLINROAD
LONG PLAINSROAD
THOMPSONS BEACHROAD
THOMPSONROAD
CARSLAKEROAD
PORT WAKEFIELDHIGHWAY
PORT PRIMEROAD
LEMMEYROAD
RICHTERSROAD
HUNTERSROAD
KIDMANROAD
CRABBROAD

3 km
2 km
1 km

Adelaide International Bird Sanctuary National Park-Winaityinaityi Pangkara

EML 6560
EML 6143
EML 6468
EML 6558
EML 6477
EML 3214
EML 3221
EML 3220
EML 3218
EML 3219
EML 3213

REV	DESCRIPTION	DATE	BY
1	Updated Tenement number following approval of EML	23/04/2025	LD

Data Sources:
Photography: Google Satellite Imagery accessed: 23-April-2025
Topography:
Cadastre: Data.sa.gov.auBoundaries are Indicative only, not all boundaries shown
Ecosystem:
Other: SARIG, 2025

Legend:
- EML Boundary
- Cadastral Boundaries
- Conservation Area
- Roads
- Powerlines
- Watermains
- Towns
- Other Structures
- Residence
- Site Entry and Exit

N

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Land Access Map

GROUNDWORK PART OF SLR
PH +61 3871 0411
WWW.GROUNDWORKPLUS.COM.AU

SCALE: 1:30,000 When Printed On A3 (0 100 200 300 400 m)

DRAWING NUMBER: 5109.DRG.016

REVISION: 1

DATE: 23-April-2025 DRAWN: CL

PRINTED: 23-April-2025 CHECKED: MJ

DATUM: HORIZONTAL / VERTICAL / EPSG:7854

MGA / AHD / 54

255600E

256400E

257200E

6181600N

6180800N

EML 6560

REV	DESCRIPTION	DATE	BY
1	Updated Tenement number following approval of EML	23/04/2025	LO

Data Sources:
Photography: Google Satellite Imagery accessed: 23-April-2025
Topography: UAV Survey 2023-05-10
Cadastre:
Ecosystem:
Other: SARIG, 2025

Legend:
- EML Boundary
- Aquatic Groundwater Dependent Environment
- Terrestrial Groundwater Dependent Environment
- Drainage Direction
- 1 m Contours

N

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Topographic Map

GROUNDWORK PART OF SLR
PH +61 3871 0411
WWW.GROUNDWORKPLUS.COM.AU

SCALE: 1:6,200 When Printed On A3
0 30 60 90 120 m

DRAWING NUMBER: 5109.DRG.018

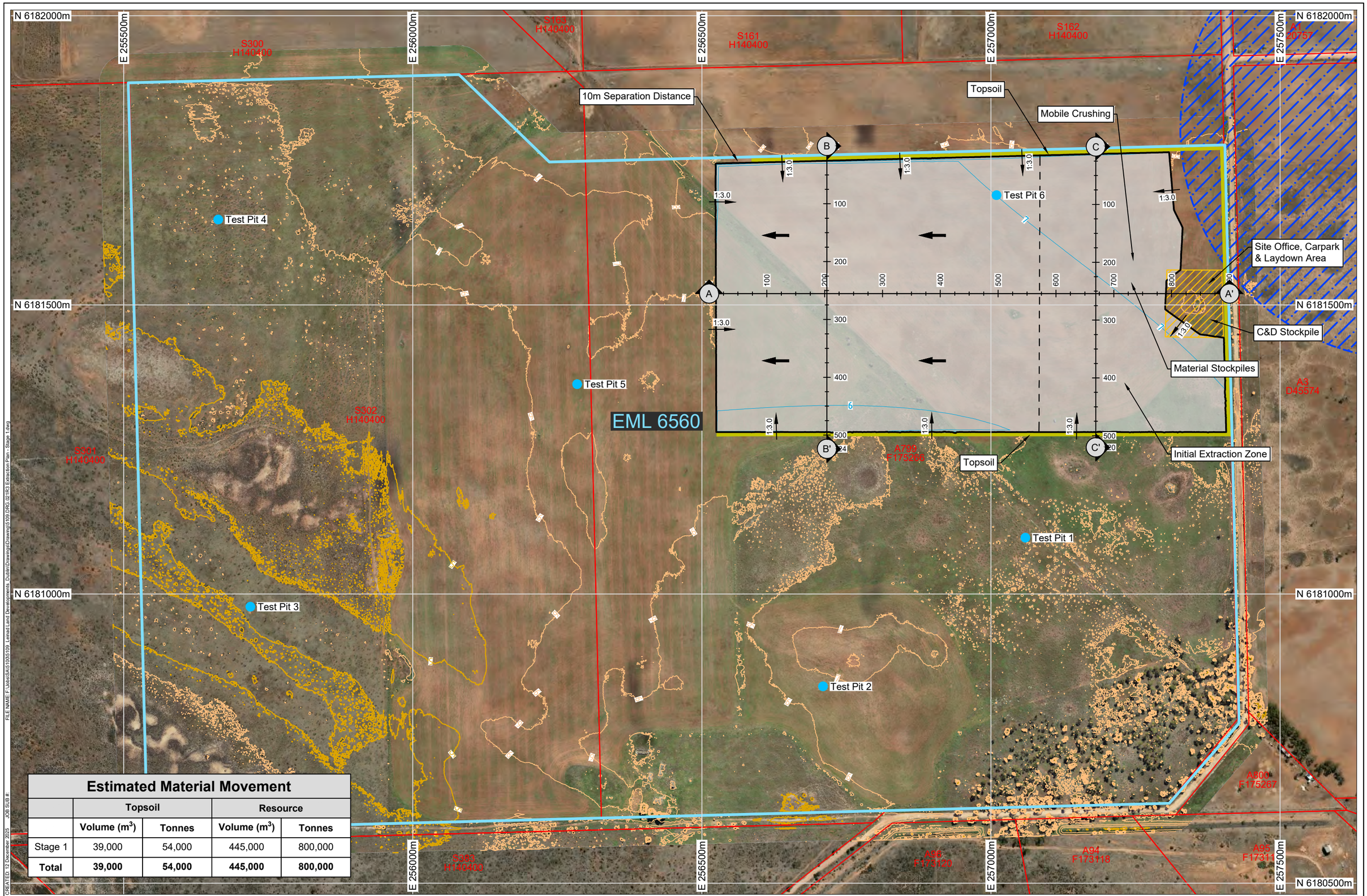
REVISION: 1

DATE: 23-April-2025 DRAWN: CL

PRINTED: 23-April-2025 CHECKED:

DATUM: HORIZONTAL / VERTICAL / EPSG:7854

MGA / AHD / 54



Estimated Material Movement

	Topsoil		Resource	
	Volume (m^3)	Tonnes	Volume (m^3)	Tonnes
Stage 1	39,000	54,000	445,000	800,000
Total	**39,000**	**54,000**	**445,000**	**800,000**

REV	DESCRIPTION	DATE	BY

Data Sources:
Photography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre: © The Government of South Australia (DIT) 2021
Ecosystem:
Other: © 2023 Microsoft Corporation; © 2023 Maxar; © CNES (2023) Distribution Airbus DS

Legend:
- Cadastral Boundary
- Extractive Minerals Lease
- Current Stage Extraction Area
- Direction of Extraction
- Topsoil
- Existing Ground Surface Contours
- Proposed Finished Surface Contours
- Longterm Staging Area
- Exempt Land Boundary

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Extraction Plan - Stage 1

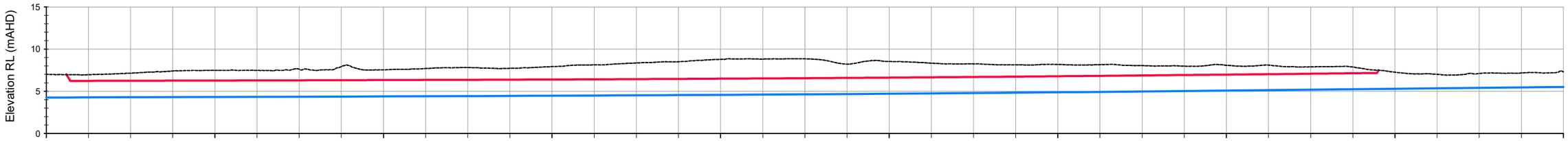
GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:6,000 When Printed On A3 — 0 — 120m
DRAWING NUMBER: 5109.DRG.021A
REVISION: 3
DATE: 12 December 2025 DRAWN: CP
PRINTED: 12 December 2025 CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE: GDA94 / MGA / AHD / 54

FILE NAME: F:\Jobs\SA\5100\5109_Leinad Land Developments_Dublin\Drawings\Drawing\5109.DRG.021R3 Extraction Plan - Stage 1.dwg
JOB SUB #:
CREATED: 12 December 2025

Section A-A'

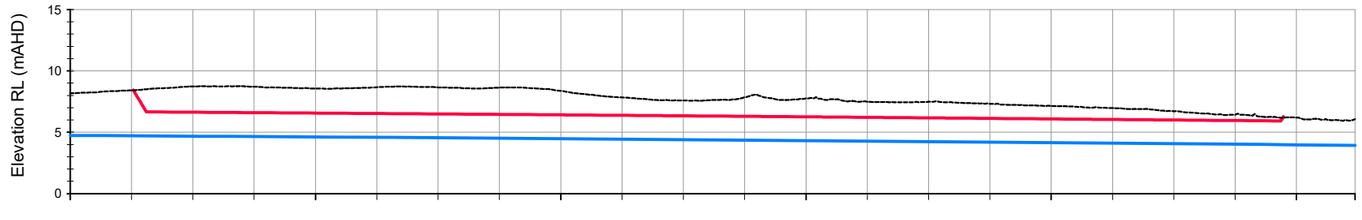
SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750	775	800	825	850	875	900
Extraction Depth (m AHD)	0.7	0.9	1.2	1.2	1.2	1.3	1.6	1.2	1.4	1.5	1.3	1.5	1.7	1.9	2.0	2.3	2.3	2.3	1.6	1.9	1.7	1.5	1.4	1.4	1.3	1.2	1.1	1.1	1.1	0.8	0.7					
Pit Distance to Groundwater (m)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					

Section B-B'

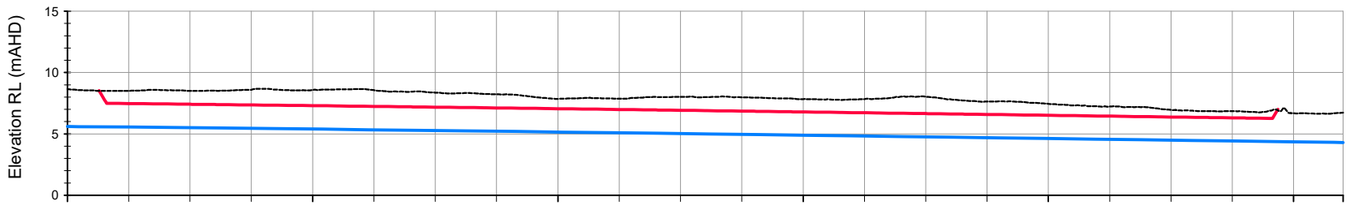
SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	524
Extraction Depth (m AHD)		2.1	2.1	2.0	2.1	2.2	2.2	2.0	1.5	1.2	1.5	1.5	1.3	1.3	1.2	1.1	0.9	0.7	0.5		
Pit Distance to Groundwater (m)		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		

Section C-C'

SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	520
Extraction Depth (m AHD)	1.0	1.1	1.2	1.3	1.3	1.2	1.1	0.8	0.9	1.1	1.1	1.0	1.1	1.4	1.1	0.9	0.8	0.6	0.5		
Pit Distance to Groundwater (m)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		

CREATED: 16 December 2025 JOB SUB #: FILE NAME: F:\Jobs\SA\51005109_Leinad Land Developments_Dublin\Drawings\Drawing\5109.DRG_021R3 Extraction Plan - Stage 1.dwg

REV	DESCRIPTION	DATE	BY

Data Sources:
Photography:
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre:
Ecosystem:
Other:

Legend:
- Existing Ground Surface
- Pit Design Surface
- Groundwater Surface

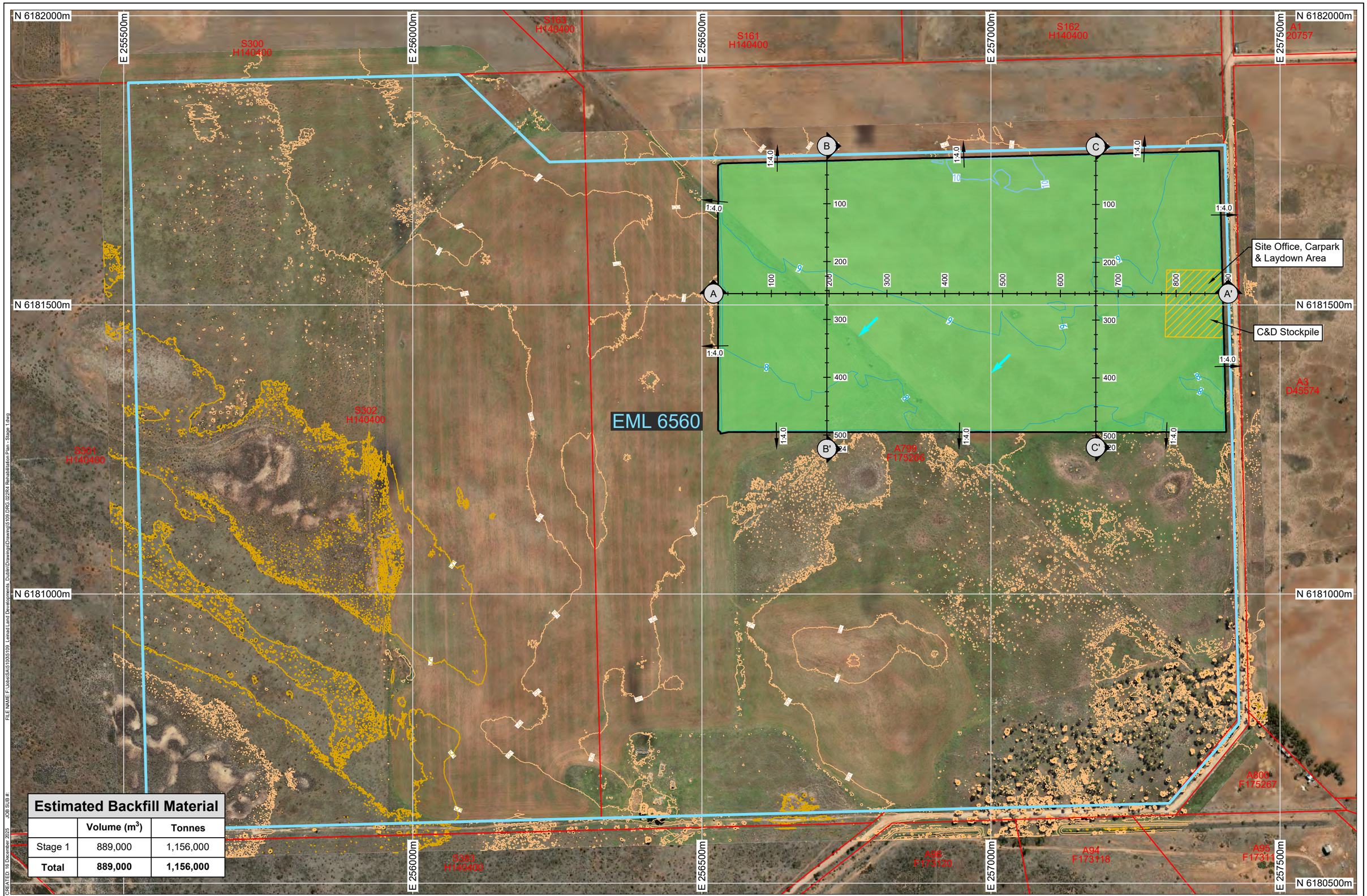
PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Extraction Plan - Stage 1
Cross Sections A-A' to C-C'

GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:2,500 When Printed On A3 — 0 — 50m
DRAWING NUMBER: 5109.DRG.021B
REVISION: 1
DATE: 16 December 2025 DRAWN: CP
PRINTED: 16 December 2025 CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE
GDA94 / MGA / AHD / 54



Estimated Backfill Material

	Volume (m^3)	Tonnes
Stage 1	889,000	1,156,000
Total	**889,000**	**1,156,000**

REV	DESCRIPTION	DATE	BY
1	Updated Rehabilitation Design	2024/10/20	CP
4	Updated Laydown Area	2025/12/16	CP

Data Sources:
Photography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre: © The Government of South Australia (DIT) 2021
Ecosystem:
Other: © 2023 Microsoft Corporation; © 2023 Maxar; © CNES (2023) Distribution Airbus DS

Legend:
- Cadastral Boundary
- Extractive Minerals Lease
- Current Stage Rehabilitation Area
- Surface Water Flow Direction
- Existing Ground Surface Contours
- Proposed Finished Surface Contours
- Longterm Staging Area

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Rehabilitation Plan - Stage 1

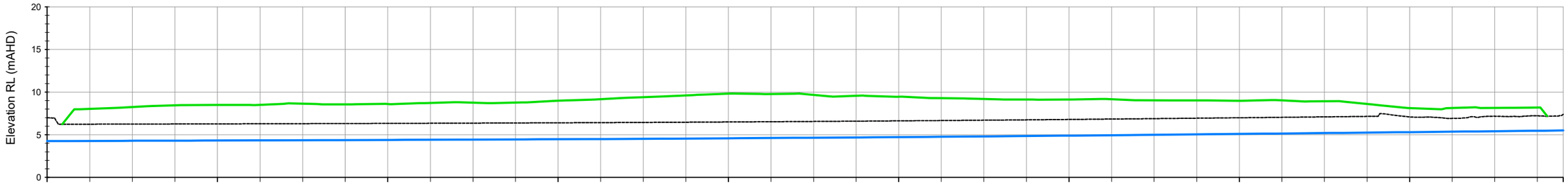
GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:6,000 When Printed On A3 (0 — 120m)
DRAWING NUMBER: 5109.DRG.022A
REVISION: 4
DATE: 16 December 2025 DRAWN: CP
PRINTED: 16 December 2025 CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE: GDA94 / MGA / AHD / 54

FILE NAME: F:\Jobs\SA\5100\5109_Leinad Land Developments_Dublin\Drawings\Drawing\5109.DRG.022R4 Rehabilitation Plan - Stage 1.dwg
JOB SUB #
CREATED: 16 December 2025

Section A-A'

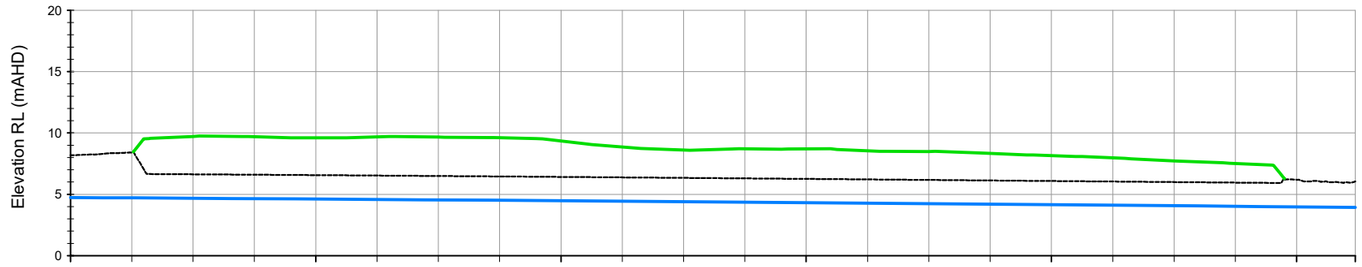
SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750	775	800	825	850	875	890
Post Extraction to Backfill Distance (m)	1.8	2.0	2.2	2.2	2.2	2.3	2.2	2.3	2.4	2.4	2.4	2.6	2.7	3.0	3.1	3.3	3.2	3.1	3.0	2.8	2.6	2.5	2.4	2.3	2.3	2.1	2.1	2.0	2.0	1.8	1.5	1.0	1.2	1.0	1.0	

Section B-B'

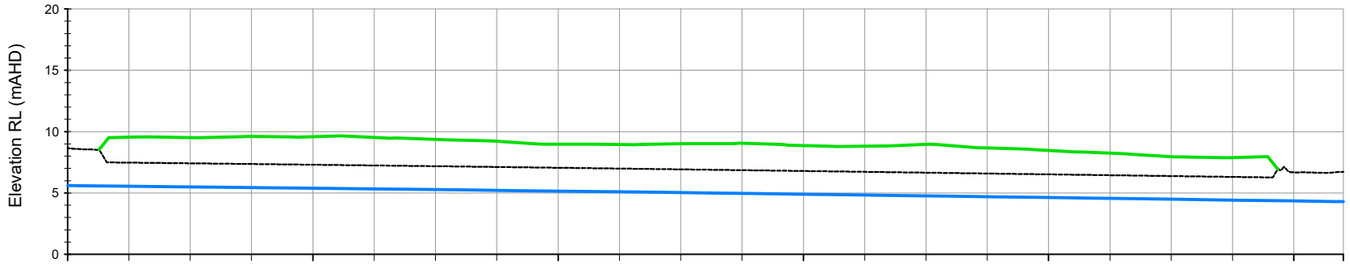
SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	524
Post Extraction to Backfill Distance (m)		3.1	3.1	3.0	3.1	3.2	3.2	2.9	2.5	2.3	2.4	2.4	2.3	2.3	2.2	2.1	1.9	1.7	1.6		

Section C-C'

SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	520
Post Extraction to Backfill Distance (m)	2.1	2.1	2.2	2.3	2.3	2.2	2.1	1.9	2.0	2.1	2.2	2.1	2.1	2.3	2.1	1.9	1.8	1.6	1.6		

REV	DESCRIPTION	DATE	BY
1	Updated Rehabilitation Design	2024/10/20	CP
2	Added (m) to Chainage and Post Extraction to Backfill Distance	2025/12/16	CP

Data Sources:
Photography:
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre:
Ecosystem:
Other:

Legend:
- Post Extraction Surface
- Rehabilitation Backfill Surface
- Groundwater Surface

PROJECT: Dublin Pit

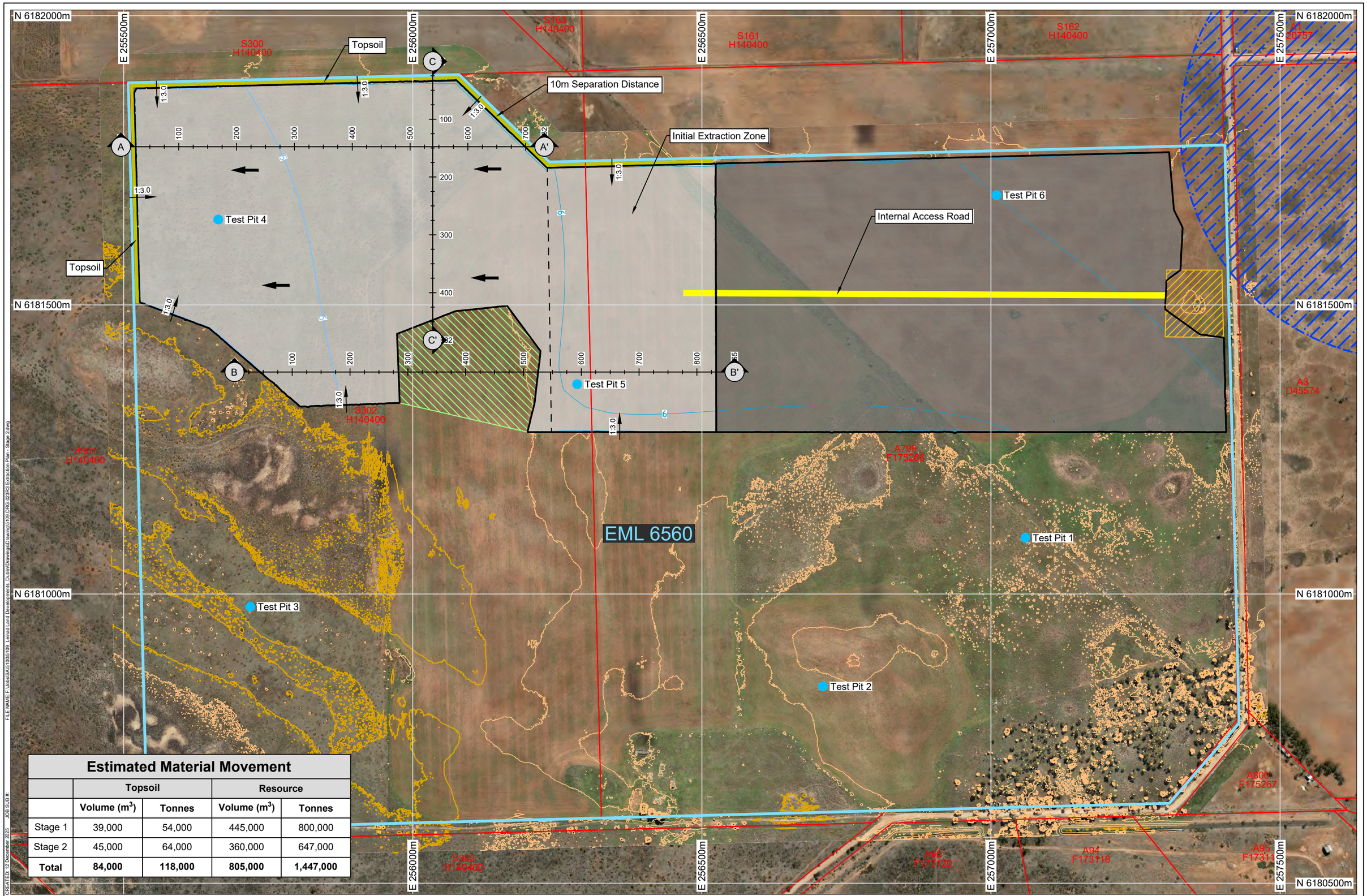
CLIENT: Leinad Land Management Pty Ltd

TITLE: Rehabilitation Plan - Stage 1
Cross Sections A-A' to C-C'

GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:2,500 When Printed On A3 (0 – 50m)
DRAWING NUMBER: 5109.DRG.022B
REVISION: 2
DATE: 16 December 2025
DRAWN: CP
PRINTED: 16 December 2025
CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE: GDA94 / MGA / AHD / 54

CREATED: 16 December 2025 JOB SUB # FILE NAME:F:\Jobs\SAS\10051\09_Leinad Land Developments_Dublin\Drawings\5109.DRG.022R4 Rehabilitation Plan - Stage 1.dwg



Estimated Material Movement

	Topsoil		Resource	
	Volume (m^3)	Tonnes	Volume (m^3)	Tonnes
Stage 1	39,000	54,000	445,000	800,000
Stage 2	45,000	64,000	360,000	647,000
Total	**84,000**	**118,000**	**805,000**	**1,447,000**

REV	DESCRIPTION	DATE	BY

Data Sources:
Photography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre: © The Government of South Australia (DIT) 2021
Ecosystem:
Other: © 2023 Microsoft Corporation; © 2023 Maxar; © CNES (2023) Distribution Airbus DS

Legend:
- Cadastral Boundary
- Extractive Minerals Lease
- Current Stage Extraction Area
- Previous Stage Extraction Area
- Direction of Extraction
- Existing Ground Surface Contours
- Proposed Finished Surface Contours
- Longterm Staging Area
- No Quarry Excavation Area
- Exempt Land Boundary
- Topsoil

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Extraction Plan - Stage 2

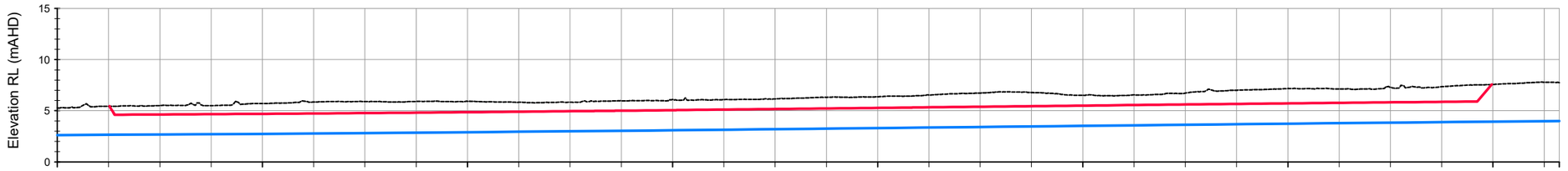
GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:6,000 When Printed On A3 (0 – 120m)
DRAWING NUMBER: 5109.DRG.023A
REVISION: 3
DATE: 12 December 2025 DRAWN: CP
PRINTED: 12 December 2025 CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE: GDA94 / MGA / AHD / 54

FILE NAME: F:\Jobs\SA\5109\5109_Leinad Land Developments_Dublin\Drawings\Drawing\5109.DRG.023P.5109_Extraction Plan - Stage 2.dwg
JOB SUB #:
CREATED: 12 December 2025

Section A-A'

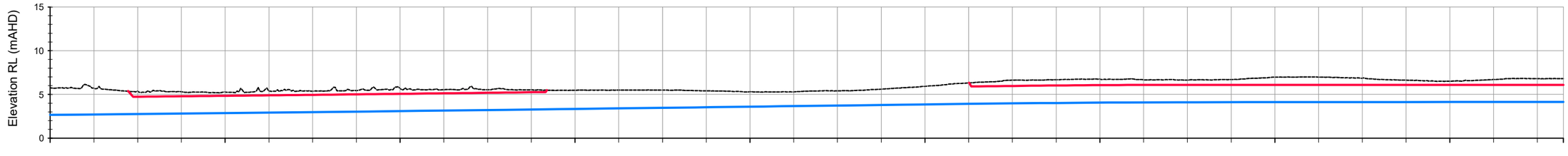
SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	732
Extraction Depth (mAHD)		0.9	0.8	1.0	1.1	1.1	1.1	1.1	0.9	0.9	1.0	1.0	1.0	1.0	1.1	1.1	1.2	1.3	1.3	1.0	1.0	1.1	1.3	1.5	1.4	1.5	1.5			
Pit Distance to Groundwater (m)		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			

Section B-B'

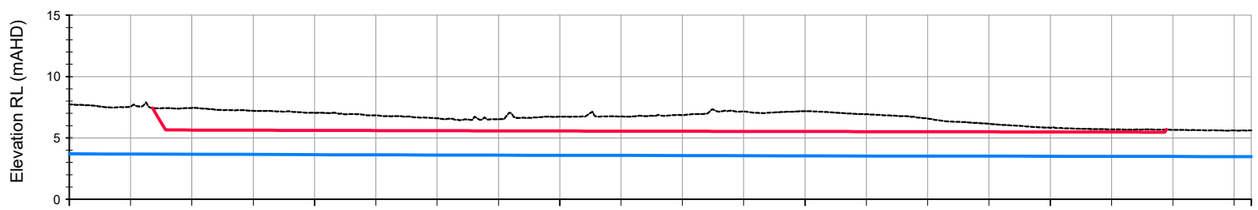
SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750	775	800	825	850	865
Extraction Depth (m AHD)		0.6	0.5	0.4	0.5	0.4	0.4	0.6	0.4	0.3	0.3											0.7	0.7	0.7	0.6	0.6	0.6	0.9	0.9	0.8	0.5	0.4	0.6	0.7	0.7
Pit Distance to Groundwater (m)		2	2	2	2	2	2	2	2	2	2											2	2	2	2	2	2	2	2	2	2	2	2	2	2

Section C-C'

SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	482
Pit Depth (m)		1.8	1.6	1.4	1.2	1.0	0.9	1.2	1.2	1.3	1.6	1.7	1.4	1.1	0.7	0.3	0.2			
Pit Distance to Groundwater (m)		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			

CREATED: 16 December 2025 JOB SUB # FILE NAME: F:\Jobs\SA\51005109_Leinad Land Developments_Dublin\Drawings\Drawing\5109.DRG_022R3 Extraction Plan - Stage 2.dwg

REV	DESCRIPTION	DATE	BY

Data Sources:
Photography:
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre:
Ecosystem:
Other:

Legend:
- Existing Ground Surface
- Pit Design Surface
- Groundwater Surface

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Extraction Plan - Stage 2
Cross Sections A-A' to C-C'

GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:2,500 When Printed On A3 — 0 — 50m
DRAWING NUMBER: 5109.DRG.023B
REVISION: 1
DATE: 16 December 2025 DRAWN: CP
PRINTED: 16 December 2025 CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE
GDA94 / MGA / AHD / 54

N 6182000m
E 255500m
E 256000m
E 256500m
E 257000m
E 257500m
N 6181500m
N 6181000m
N 6180500m

S300 H140400
S163 H140400
S161 H140400
S162 H140400
A1 20757
A3 D45574
S301 H140400
S302 H140400
A799 F175268
A800 F175267
S383 H140400
A96 F173720
A94 F173718
A95 F17311

10m Separation Distance
Internal Access Road
EML 6560

A
A'
B
B'
C
C'

1:4.0

ISCA Typical Silt Fence Detail

Estimated Backfill Material

	Volume (m^3)	Tonnes
Stage 1	889,000	1,156,000
Stage 2	879,000	1,143,000
Total	**1,768,000**	**2,299,000**

REV	DESCRIPTION	DATE	BY
1	Updated Rehabilitation Design	2024/10/20	CP
4	Updated Laydown Area	2025/12/16	CP

Data Sources:
Photography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre: © The Government of South Australia (DIT) 2021
Ecosystem:
Other: © 2023 Microsoft Corporation; © 2023 Maxar; © CNES (2023) Distribution Airbus DS

Legend:
- Cadastral Boundary
- Mineral Claim
- Current Stage Rehabilitation Area
- Previous Stage Rehabilitation Area
- Surface Water Flow Direction
- Existing Ground Surface Contours
- Proposed Finished Surface Contours
- Longterm Staging Area
- Silt Fence

PROJECT: Dublin Pit
CLIENT: Leinad Land Management Pty Ltd
TITLE: Rehabilitation Plan - Stage 2

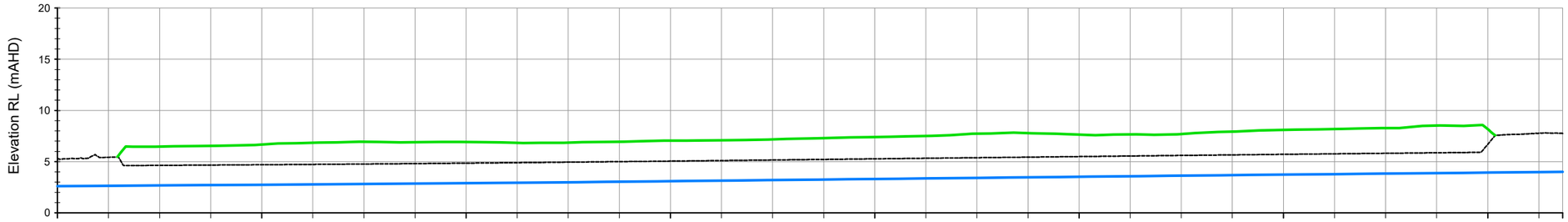
GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:6,000 When Printed On A3 (0 — 120m)
DRAWING NUMBER: 5109.DRG.024A
REVISION: 4
DATE: 16 December 2025 DRAWN: CP
PRINTED: 16 December 2025 CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE: GDA94 / MGA / AHD / 54

FILE NAME: F:\Jobs\SAS\1005109_Leinad Land Developments_Dublin\Drawings\Drawing\5109.DRG.024r4 Rehabilitation Plan - Stage 2.dwg
JOB SUB #
CREATED: 16 December 2025

Section A-A'

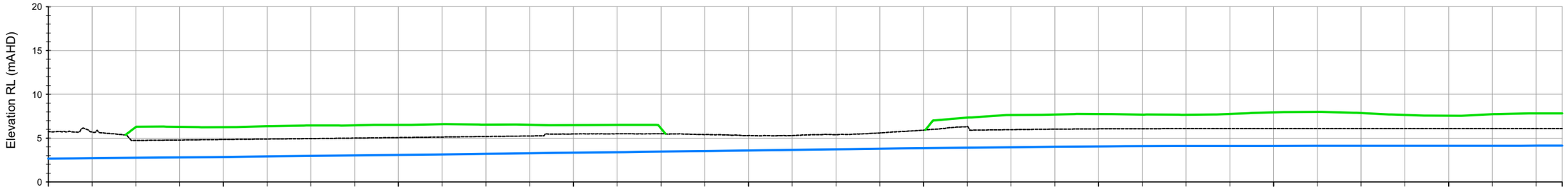
SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	737
Post Extraction to Backfill Distance (m)		1.8	1.9	2.0	2.1	2.2	2.1	2.1	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.2	2.3	2.3	2.1	2.1	2.1	2.3	2.4	2.4	2.5	2.7	1.5		

Section B-B'

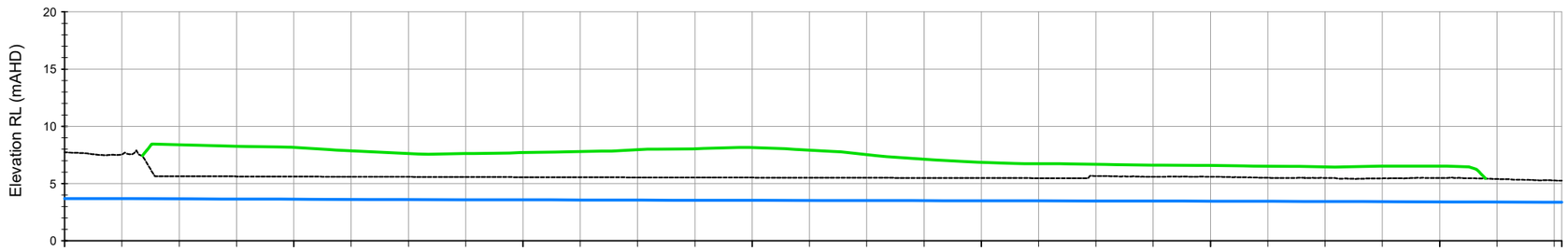
SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750	775	800	825	850	865
Post Extraction to Backfill Distance (m)		1.5	1.5	1.4	1.5	1.5	1.5	1.5	1.5	1.4	1.3	1.0	1.0	0.6							1.0	1.7	1.7	1.7	1.6	1.6	1.7	1.9	1.9	1.8	1.6	1.5	1.6	1.7	1.7

Section C-C'

SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	653
Post Extraction to Backfill Distance (m)		2.7	2.6	2.5	2.3	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.4	2.0	1.6	1.4	1.3	1.0	1.0	1.0	1.0	1.0	1.1	1.0			

REV	DESCRIPTION	DATE	BY
1	Updated Rehabilitation Design	2024/10/20	CP
2	Added (m) to Chainage and Post Extraction to Backfill Distance	2025/12/16	CP

Data Sources:
Photography:
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre:
Ecosystem:
Other:

Legend:
- Post Extraction Surface
- Rehabilitation Backfill Surface
- Groundwater Surface

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Rehabilitation Plan - Stage 2
Cross Sections A-A' to C-C'

GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:2,500 When Printed On A3 (0 – 50m)
DRAWING NUMBER: 5109.DRG.024B
REVISION: 2
DATE: 16 December 2025 DRAWN: CP
PRINTED: 16 December 2025 CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE: GDA94 / MGA / AHD / 54

CREATED: 16 December 2025 JOB SUB #: FILE NAME: F:\Jobs\SA\51005109_Leinad Land Developments_Dublin\Drawings\Drawing\5109.DRG.024B Rehabilitation Plan - Stage 2.dwg

N 6182000m
E 255500m
E 256000m
E 256500m
E 257000m
E 257500m
N 6181500m
N 6181000m
N 6180500m

S300 H140400
S163 H140400
S161 H140400
S162 H140400
A1 20757
A3 D45574
S302 H140400
S301 H140400
A799 F175268
A800 F175267
A94 F173118
A95 F17311
A96 F173120
S303 H140400

EML 6560

Test Pit 1
Test Pit 2
Test Pit 3
Test Pit 4
Test Pit 5
Test Pit 6

Internal Access Road
Initial Extraction Zone
Topsoil
10m Separation Distance

A
A'
B
B'
C
C'
D
D'

1:3.0

Estimated Material Movement

	Topsoil		Resource	
	Volume (m^3)	Tonnes	Volume (m^3)	Tonnes
Stage 1	39,000	54,000	445,000	800,000
Stage 2	45,000	64,000	360,000	647,000
Stage 3	35,000	49,000	243,000	438,000
Total	**119,000**	**167,000**	**1,048,000**	**1,885,000**

REV	DESCRIPTION	DATE	BY

Data Sources:
Photography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre: © The Government of South Australia (DIT) 2021
Ecosystem:
Other: © 2023 Microsoft Corporation; © 2023 Maxar; © CNES (2023) Distribution Airbus DS

Legend:
- Cadastral Boundary
- Extractive Minerals Lease
- Current Stage Extraction Area
- Previous Stage Extraction Area
- Direction of Extraction
- Existing Ground Surface Contours
- Proposed Finished Surface Contours
- Longterm Staging Area
- No Quarry Excavation Area
- Exempt Land Boundary
- Topsoil

PROJECT: Dublin Pit
CLIENT: Leinad Land Management Pty Ltd
TITLE: Extraction Plan - Stage 3

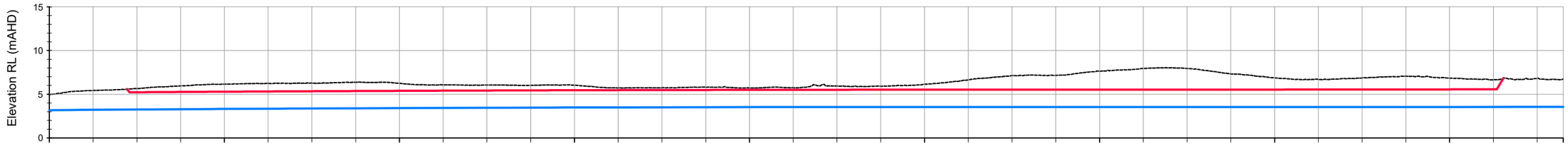
GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:6,000 When Printed On A3 — 0 — 120m
DRAWING NUMBER: 5109.DRG.025A
REVISION: 3
DATE: 12 December 2025
DRAWN: CP
PRINTED: 12 December 2025
CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE
GDA94 / MGA / AHD / 54

FILE NAME: F:\Jobs\SAS\10005109_Leinad Land Developments_Dublin\Drawings\Drawing\5109.DRG_025R3 Extraction Plan - Stage 3.dwg
JOB SUB #:
CREATED: 12 December 2025

Section A-A'

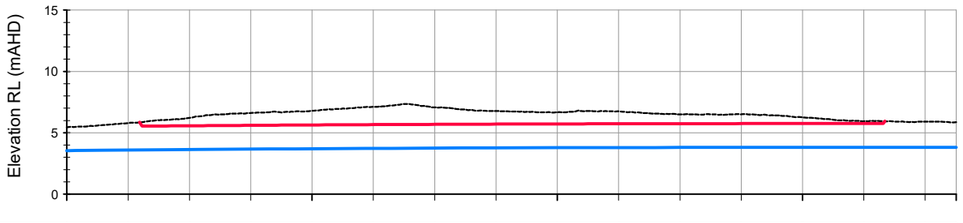
SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750	775	800	825	850	865
Extraction Depth (m AHD)		0.4	0.7	0.9	0.9	0.9	1.0	0.9	0.7	0.6	0.6	0.6	0.3	0.3	0.3	0.2	0.2	0.4	0.4	0.6	1.1	1.6	1.6	2.1	2.4	2.4	1.8	1.3	1.2	1.3	1.5	1.3	1.1		
Pit Distance to Groundwater (m)		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		

Section B-B'

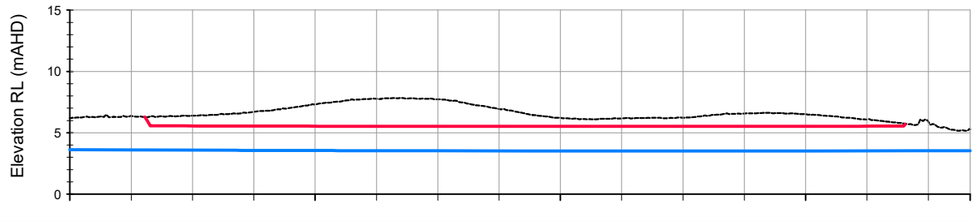
SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	363
Extraction Depth (m AHD)		0.6	1.0	1.2	1.4	1.4	1.1	0.9	1.0	0.8	0.8	0.5	0.2		
Pit Distance to Groundwater (m)		2	2	2	2	2	2	2	2	2	2	2	2		

Section C-C'

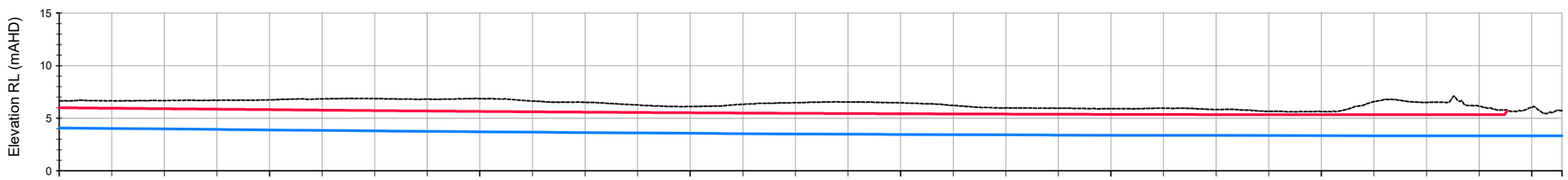
SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	367
Pit Depth (m)		0.8	1.2	1.8	2.2	2.2	1.4	0.7	0.6	0.7	1.0	1.0	0.5		
Pit Distance to Groundwater (m)		2	2	2	2	2	2	2	2	2	2	2	2		

Section D-D'

SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	714
Extraction Depth (m AHD)	0.7	0.8	0.8	0.9	1.1	1.1	1.1	1.2	1.0	0.9	0.7	0.6	0.8	1.0	1.1	1.0	0.8	0.6	0.6	0.5	0.6	0.5	0.3	0.3	1.3	1.2	0.8		
Pit Distance to Groundwater (m)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		

REV	DESCRIPTION	DATE	BY

Data Sources:
Photography:
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre:
Ecosystem:
Other:

Legend:
- Existing Ground Surface
- Pit Design Surface
- Groundwater Surface

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Extraction Plan - Stage 3
Cross Sections A-A' to D-D'

GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:2,500 When Printed On A3 — 0 — 50m
DRAWING NUMBER: 5109.DRG.025B
REVISION: 1
DATE: 16 December 2025 | DRAWN: CP
PRINTED: 16 December 2025 | CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE
GDA94 / MGA / AHD / 54

CREATED: 16 December 2025 JOB SUB #: FILE NAME: F:\Jobs\SA\5105109_Leinad Land Developments_Dublin\Drawings\Drawing\5109.DRG.02R3 Extraction Plan - Stage 3.dwg

N 6182000m
E 255500m
E 256000m
E 256500m
E 257000m
E 257500m
N 6181500m
N 6181000m
N 6180500m

S300 H140400
S163 H140400
S161 H140400
S162 H140400
A1 20757
A3 D45574
S302 H140400
S301 H140400
A799 F175266
A800 F175267
A94 F173118
A95 F1731
A96 F173120
S303 H140400

1:4.0

B
A
A'
B'
C
C'

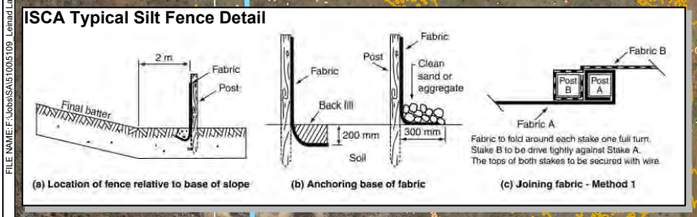
100
200
300
400
500
600
700

Internal Access Road

EML 6560

10m Separation Distance

ISCA Typical Silt Fence Detail



Estimated Backfill Material

	Volume (m^3)	Tonnes
Stage 1	889,000	1,156,000
Stage 2	879,000	1,143,000
Stage 3	804,000	1,045,000
Total	**2,572,000**	**3,344,000**

REV	DESCRIPTION	DATE	BY
1	Updated Rehabilitation Design	2024/10/20	CP
4	Updated Laydown Area	2025/12/16	CP

Data Sources:
Photography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre: © The Government of South Australia (DIT) 2021
Ecosystem:
Other: © 2023 Microsoft Corporation; © 2023 Maxar; © CNES (2023) Distribution Airbus DS

Legend:
- Cadastral Boundary
- Mineral Claim
- Current Stage Rehabilitation Area
- Previous Stage Rehabilitation Area
- Surface Water Flow Direction
- Existing Ground Surface Contours
- Proposed Finished Surface Contours
- Longterm Staging Area
- Silt Fence

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Rehabilitation Plan - Stage 3

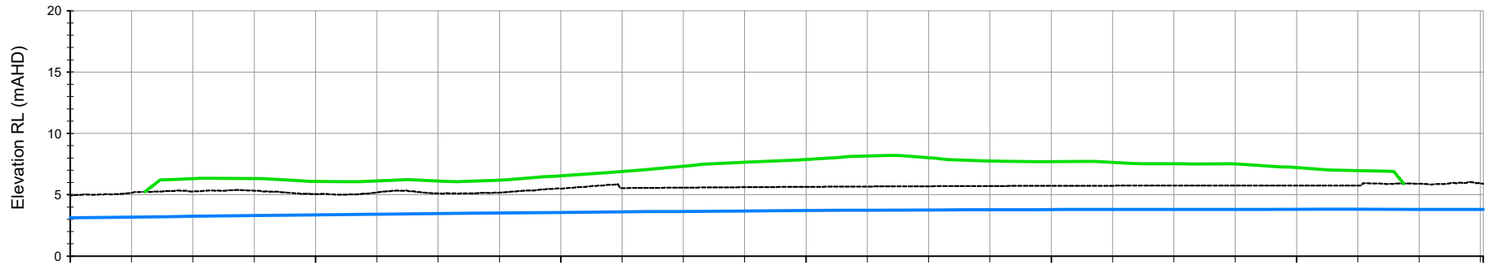
GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:6,000 When Printed On A3 (0 — 120m)
DRAWING NUMBER: 5109.DRG.026A
REVISION: 4
DATE: 16 December 2025
DRAWN: CP
PRINTED: 16 December 2025
CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE: GDA94 / MGA / AHD / 54

FILE NAME:F:\Jobs\SA\5109\5109 Leinad Land Developments Dublin\Drawings\Drawing\5109.DRG.026R4 Rehabilitation Plan - Stage 3.dwg
JOB SUB #:
CREATED: 16 December 2025

Section A-A'

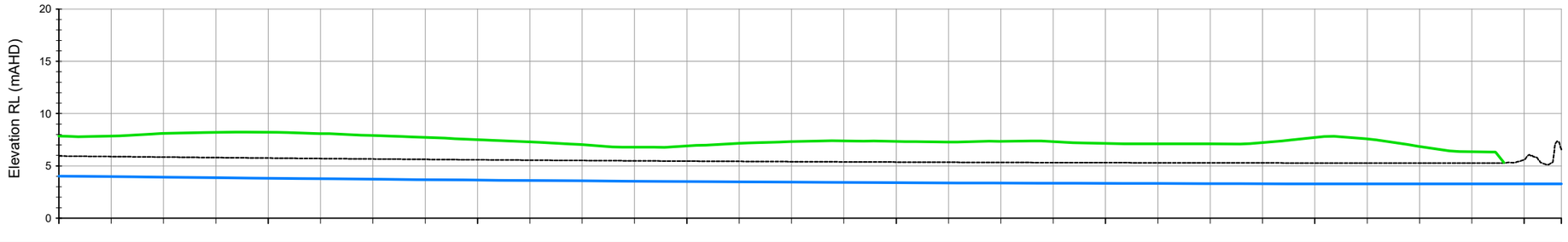
SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	576
Post Extraction to Backfill Distance (m)		1.0	1.0	1.0	0.9	1.0	1.0	1.0	1.4	1.7	2.0	2.2	2.5	2.3	2.0	2.0	1.9	1.8	1.7	1.5	1.2		

Section B-B'

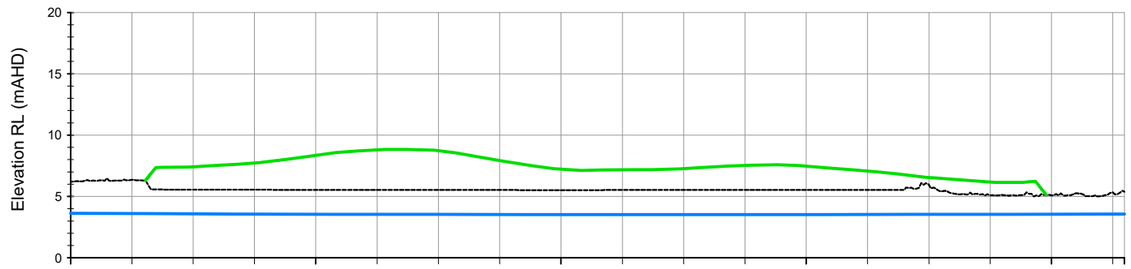
SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	718
Post Extraction to Backfill Distance (m)	2.0	2.3	2.4	2.5	2.4	2.3	2.1	1.9	1.8	1.5	1.3	1.5	1.7	1.9	2.0	2.0	1.9	2.0	2.0	1.8	1.8	1.8	1.9	2.4	2.3	1.6	1.1		

Section C-C'

SCALES: HORIZONAL 1:2500 VERTICAL 1:500



Chainage (m)	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	430
Post Extraction to Backfill Distance (m)		1.8	2.2	2.8	3.3	3.2	2.4	1.7	1.7	1.7	2.0	1.9	1.5	0.6	1.1			

REV	DESCRIPTION	DATE	BY
1	Updated Rehabilitation Design	2024/10/20	CP
2	Added (m) to Chainage and Post Extraction to Backfill Distance	2025/12/16	CP

Data Sources:
Photography:
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre:
Ecosystem:
Other:

Legend:
- Post Extraction Surface
- Rehabilitation Backfill Surface
- Groundwater Surface

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Rehabilitation Plan - Stage 3
Cross Sections A-A' to C-C'

GROUNDWORK plus
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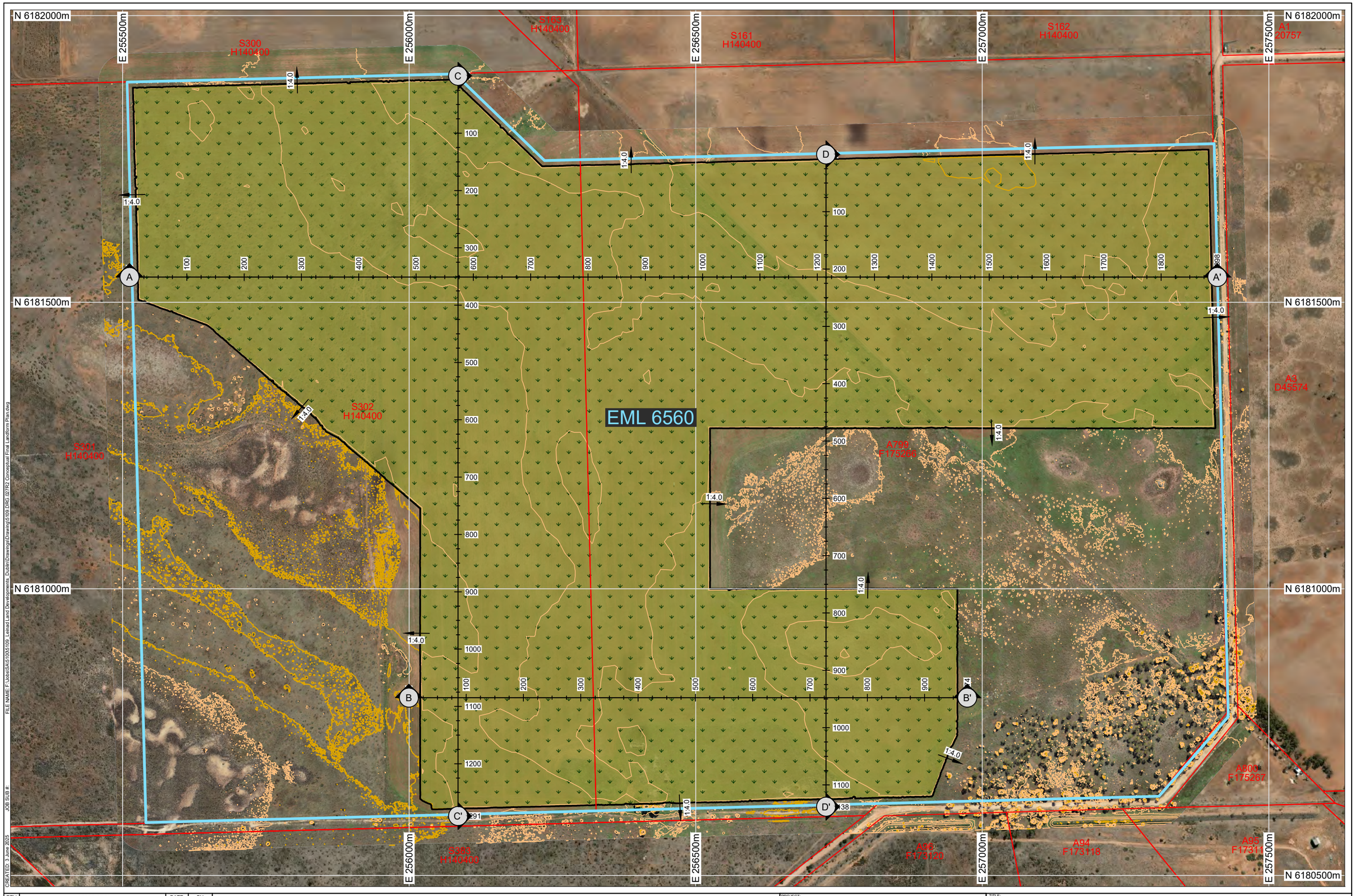
WWW.GROUNDWORK.COM.AU

SCALE: 1:2,500 When Printed On A3 — 0 — 50m
DRAWING NUMBER: 5109.DRG.026B
REVISION: 2
DATE: 16 December 2025
DRAWN: CP
PRINTED: 16 December 2025
CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE
GDA94 / MGA / AHD / 54



FILE NAME: F:\Jobs\SAS\10005109 Leinad Land Developments, Dublin\Drawings\Drawing\5109.DRG.027R2 Conceptual Final Landform Plan.dwg
JOB SUB #
CREATED: 3 June 2025

REV	DESCRIPTION	DATE	BY
1	Updated Rehabilitation Design	2024/10/20	CP

Data Sources:
Photography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre: © The Government of South Australia (DIT) 2021
Ecosystem:
Other: © 2023 Microsoft Corporation; © 2023 Maxar; © CNES (2023) Distribution Airbus DS

Legend:
- Cadastral Boundary
- Extractive Minerals Lease
- Grassed Area

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

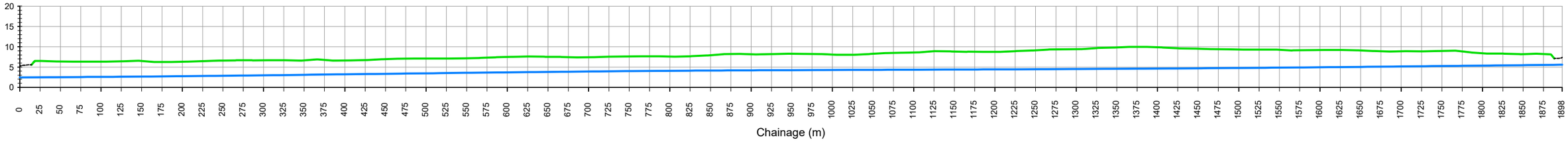
TITLE: Conceptual Final Landform Plan

GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:6,000 When Printed On A3 (0 — 120m)
DRAWING NUMBER: 5109.DRG.027A
REVISION: 2
DATE: 3 June 2025
DRAWN: CP
PRINTED: 3 June 2025
CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE GDA94 / MGA / AHD / 54

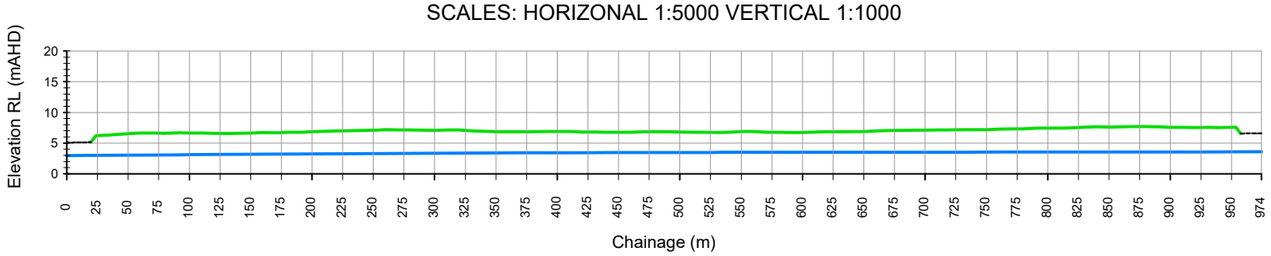
Section A-A'

SCALES: HORIZONAL 1:5000 VERTICAL 1:1000



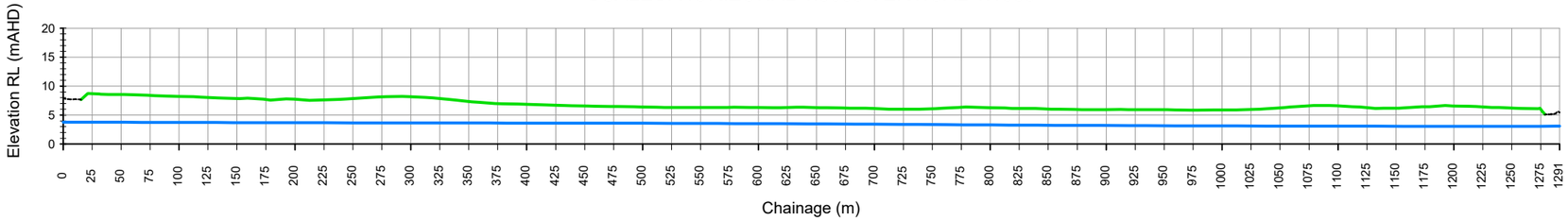
Section B-B'

SCALES: HORIZONAL 1:5000 VERTICAL 1:1000



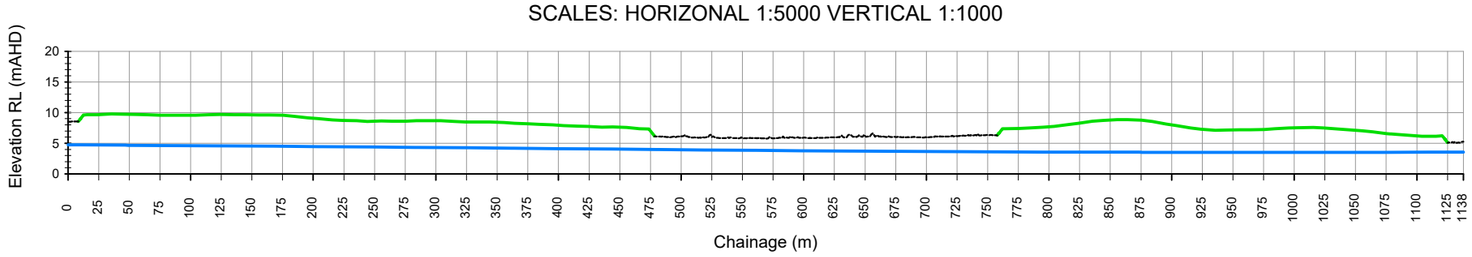
Section C-C'

SCALES: HORIZONAL 1:5000 VERTICAL 1:1000



Section D-D'

SCALES: HORIZONAL 1:5000 VERTICAL 1:1000



CREATED: 20 October 2024 JOB SUB # FILE NAME: F:\Jobs\SAS\1005109 Leinad Land Developments Dublin\Drawings\Drawing\5109.DRG.027R1 Conceptual Final Landform Plan.dwg

REV	DESCRIPTION	DATE	BY
1	Updated Rehabilitation Design	2024/10/20	CP

Data Sources:
Photography:
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre:
Ecosystem:
Other:

Legend:
- Existing Ground Surface
- Grassed Rehabilitation Surface
- Groundwater Surface

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Conceptual Final Landform Plan Cross Sections A-A' to D-D'

GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:5,000 When Printed On A3 — 0 — 100m
DRAWING NUMBER: 5109.DRG.027B
REVISION: 1
DATE: 20 October 2024 DRAWN: CP
PRINTED: 20 October 2024 CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE
GDA94 / MGA / AHD / 54

256000E

257000E

6182000N

6181000N

EML 6560

REV	DESCRIPTION	DATE	BY
1	Updated Tenement number following approval of EML	29/05/2025	LO
2	Added labels for Tenement number and accurate clearance areas.	08/12/2025	CL

Data Sources:
Photography: UAV Survey 10 May 2023; Google Satellite Imagery accessed: 29-May-2025
Topography: UAV Survey 10 May 2023
Cadastre:

Legend:

- EML Boundary
- Clearance Areas
- Stage 1
- Stage 2
- Stage 3
- Degraded Maireana Shrubland
- Eucalyptus Woodland
- Maireana +/- Nitrebush shrubland with emergent Eucalyptus
- Nitrebush Shrubland
- Samphire Salt Flats

N

PROJECT: Dublin Quarry

CLIENT: Leinad Land Management Pty Ltd

TITLE: Native Vegetation Clearance Proposal Map

GROUNDWORK PART OF SLR
PH +61 3871 0411
WWW.GROUNDWORKPLUS.COM.AU

SCALE: 1:7,500 When Printed On A3 (0 30 60 90 120 m)

DRAWING NUMBER: 5109.DRG.028

REVISION: 2

DATE: 08-December-2025 DRAWN: CL

PRINTED: 08-December-2025 CHECKED: EM

DATUM: HORIZONTAL / VERTICAL / EPSG:7854

MGA / AHD / 54

ATTACHMENTS

Attachment 1

Wind Frequency Analysis

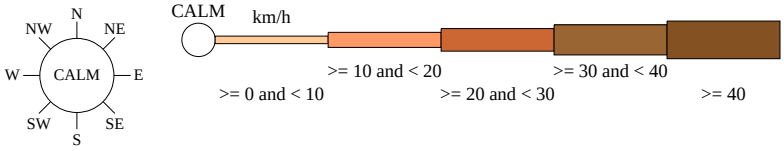
Rose of Wind direction versus Wind speed in km/h (01 Aug 1997 to 10 Aug 2022)

Custom times selected, refer to attached note for details

ROSEWORTHY AWS

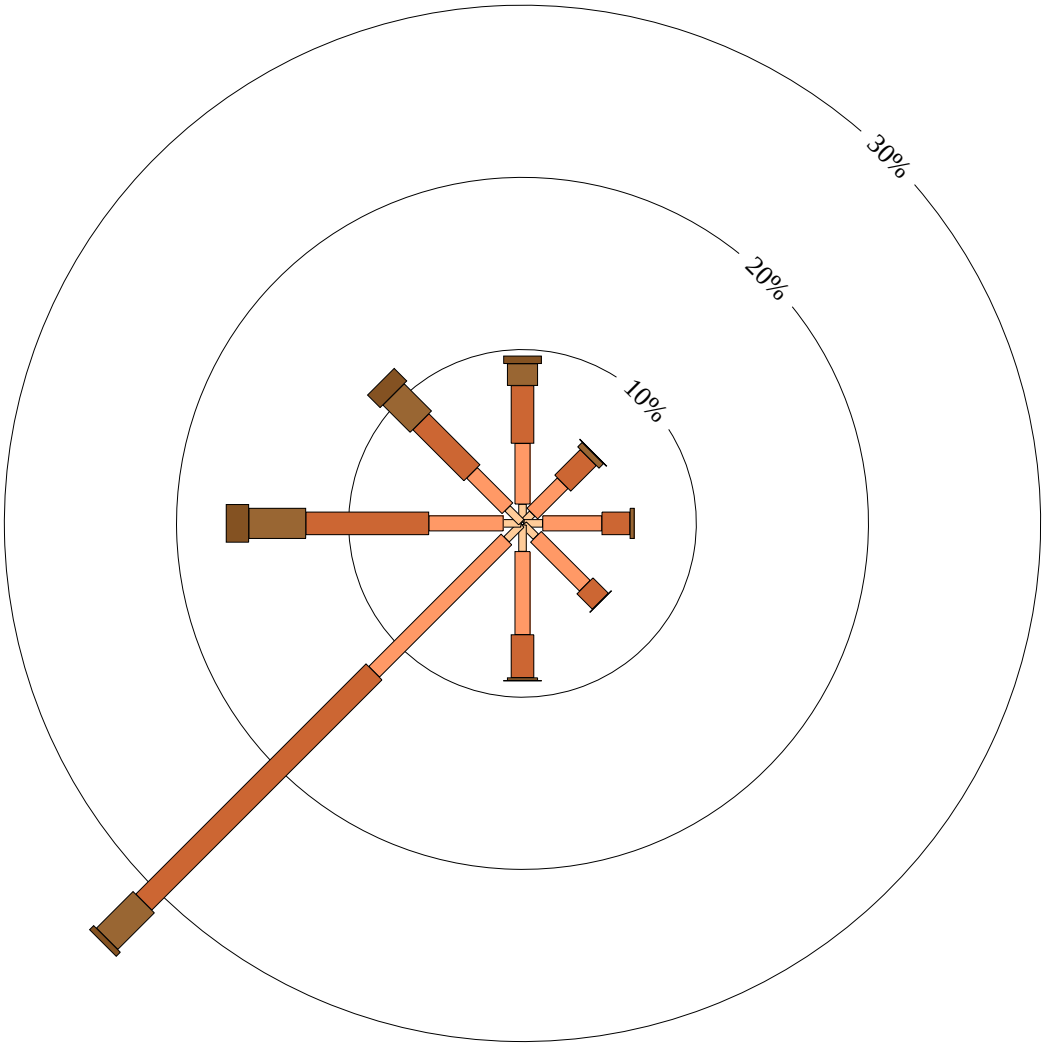
Site No: 023122 • Opened Jul 1997 • Still Open • Latitude: -34.5106° • Longitude: 138.6763° • Elevation 65m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.



3 pm
11068 Total Observations

Calm *



Rose of Wind direction versus Wind speed in km/h (01 Aug 1997 to 10 Aug 2022)

Custom times selected, refer to attached note for details

ROSEWORTHY AWS

Site No: 023122 • Opened Jul 1997 • Still Open • Latitude: -34.5106° • Longitude: 138.6763° • Elevation 65m

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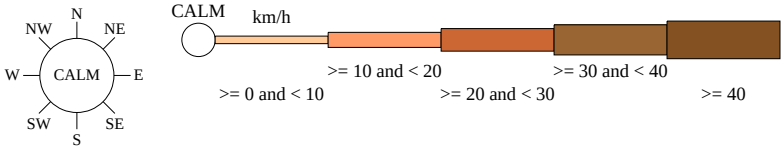
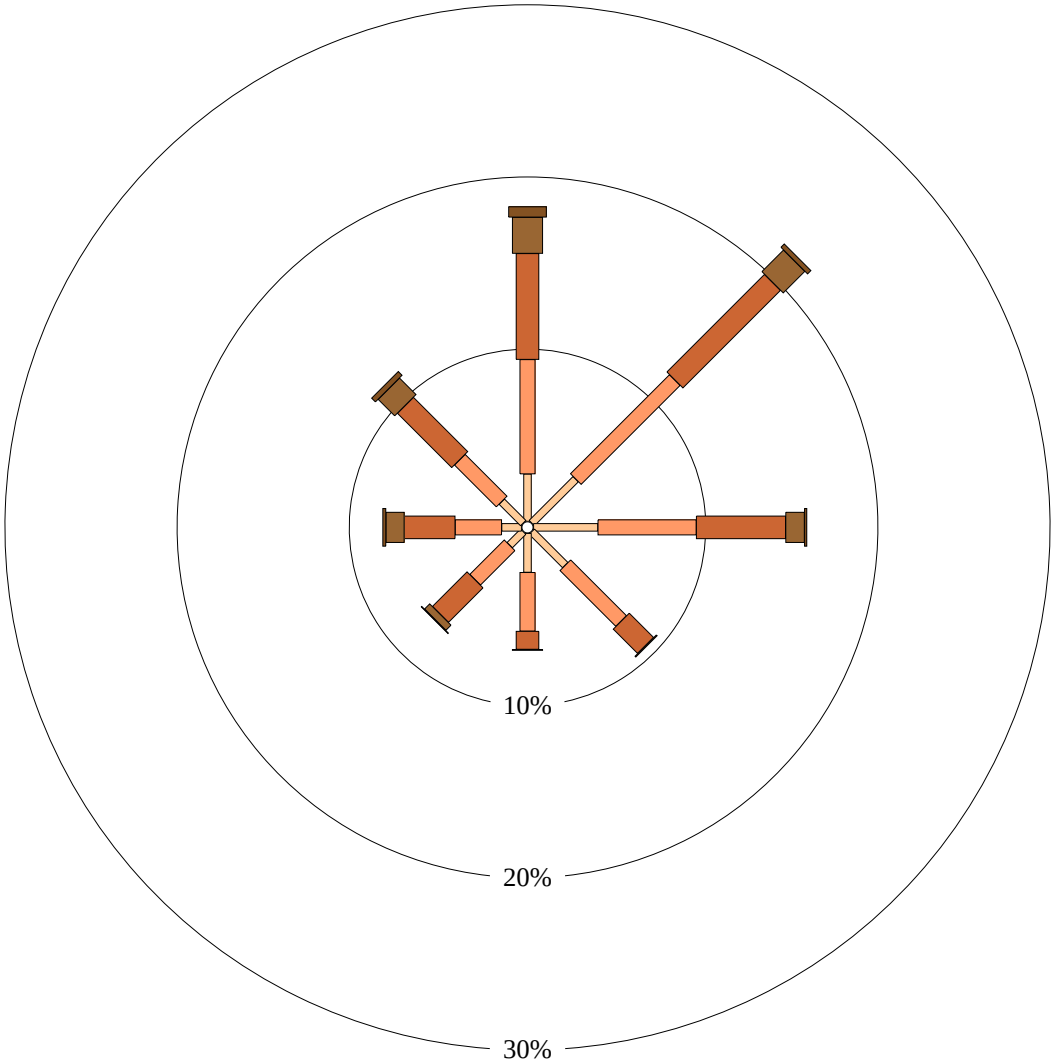
Other important info about this analysis is available in the accompanying notes.



9 am
11042 Total Observations

Calm 2%



Attachment 2

Groundwater Assessment

12 October 2023

Matthew Jones
Principal – Environment
Groundwork Plus
2/3 16 Second St, Nuriootpa SA 5355
mdupree@groundwork.com.au

Dear Matthew,

RE: Mineral Claim 4557 Desktop Groundwater Assessment

The following assessment outlines groundwater conditions at Mineral Claim 4557 (herein referred to as the Site) located 3 km south of the township of Dublin in South Australia. The findings of this assessment are summarised below:

- The target extractive mineral is a shallow limestone layer found within one metre of the surface.
- The Site is located 4 km inland from the coast where the topography is generally flat and low lying. Surface elevation ranges from around 9 m AHD on the eastern Site boundary grading down to 5 m AHD on the western Site boundary.
- The Site is not situated within a Prescribed Wells Area (PWA), Prescribed Water Resources Area (PWRA) or an EPA Water Protection Area.
- Groundwater in the Quaternary aquifer is shallow, with test pits indicating that it may be present from 2.7 m to 3.0 m below ground level within MC 4557. WaterConnect data from shallow Quaternary wells outside of MC 4557 indicates groundwater levels of 1.2 m to 3.3 m below ground level.
- Groundwater in the shallow Quaternary aquifer is expected to flow in a southwesterly direction towards the coast. Groundwater elevations range from around 5.5 m AHD on the eastern Site boundary grading down to 2.5 m AHD on the western Site boundary.
- Groundwater salinity in shallow Quaternary wells suggests that salinity is likely to be above 20,000 mg/L. Lower salinity groundwater can be found in deeper Tertiary wells at depths of greater than 50 m below ground level.
- The nearest existing user is a stock well located 400 m south of the Site (6529-41), however, its recorded salinity is 33,397 mg/L which is above the recommended salinity guideline for its intended use.
- There are several potential terrestrial GDEs described as Samphire Shrubland located south and west of the Site. One potential aquatic GDE listed as a Salt Lake is located in the southwestern corner of the mineral claim. This feature does not appear to be permanently inundated.
- It is recommended that a 2 mse buffer is maintained between the base of the quarry and the seasonally high watertable. This will eliminate potential impact pathways with existing users and GDEs.

Background

This assessment has been undertaken to inform the development of a quarry plan for Mineral Claim 4557 (MC 4557) 3 km south of the township of Dublin in South Australia (Figure 1). The target extractive mineral is a shallow limestone layer found within one metre of the surface. Following excavation, it is understood the Site will be backfilled with EPA approved clean fill and local topsoil. This assessment considers the nature of groundwater in the area and assesses the potential risks to groundwater from quarrying activities.

Figure 1 presents the location of MC 4557. Other land uses of note in the area include an EPA approved waste landfill depot 3 km to the southeast and several EPA approved feedlots/animal husbandry yards to the east. The Adelaide International Bird Sanctuary is located immediately west of the Site.

Hydrogeological Setting

Climate and Rainfall

The Site is located within an area with a warm temperate climate. Port Parham 9 km northwest of the Site is the nearest Bureau of Meteorology station (No. 023076) with a continuous rainfall record (1969 to present). The average annual rainfall for this station is 353 mm, with the lowest average monthly rainfall occurring in February (17 mm) and the highest average in June (41 mm). Average annual pan evaporation is estimated to be between 1,600 to 1,800 mm (Bureau of Meteorology, 2023).

Elevation and Drainage

The Site is located on a flat low-lying area around 4 km inland from the coast. Drainage occurs in a southwesterly direction, though there are no defined watercourses near the Site. Several low-lying waterbodies exist in the area, one of which covers the southwestern portion of the Site. Elevation at the Site ranges from around 9 m AHD in the east to around 5 m AHD in the west. The local topography and drainage at the Site are presented in Figure 2.

Geology

The Site is located within the St Vincent Basin which consists of a complex arrangement of Quaternary and Tertiary age units that reach a maximum thickness of several hundred metres. In the northern part of the basin, the Quaternary sediments have been generalised into a series of six aquifers (Q1-Q6), which are confined by six layers of low permeability sediments. The underlying Tertiary sediments have been classified into the first, second, third and fourth Tertiary aquifers (referred to as T1, T2, T3 and T4 respectively).

The surficial geology of the Site is dominated by Pleistocene calcrete (Qp\ca in Figure 3). West of the Site the Saint Kilda Formation (Qhck) occurs at the surface, characterised as coastal marine sediment comprising calcareous, fossiliferous sand and mud of intertidal sand flats, beaches and tidal marshes. A thin Quaternary aeolian unit (Qe1) is present in the southwestern corner of MC 4557. Quaternary alluvial/fluvial sediments (Qa) occur to the north of the Site. The surface geology from the Wakefield 1:100,000 Geological Map Sheet is illustrated in Figure 3.

Groundwater Data

To assess groundwater conditions at the Site, data was downloaded from the following on-line applications:

- WaterConnect.
- South Australian Resources Information Gateway (SARIG).
- Australian Groundwater Dependent Ecosystem Atlas.

A summary of the data is presented below, with information within 3 km of the Site considered in this assessment.

Groundwater Levels and Flow

The depth to groundwater at the Site has been assessed via a series of test pits excavated during August 2022 (Table 1). Four of the six test pits reported intersecting groundwater (test pits 1, 3, 4 and 5). Where intersected, groundwater was found to be between 2.7 m and 3.0 m below ground level (Figure 4). At test pit 2, the groundwater level was found to be greater than 3.5 m. Test pit 6 was terminated at 0.5 m due to refusal in a hard limestone layer. Whilst it is acknowledged that groundwater wells are the most common method for assessing groundwater levels, it is considered that the test pits provide a reasonable indication of the likely depth to groundwater at the Site.

Data from nearby shallow wells accessed from WaterConnect suggests groundwater in the Quaternary aquifer ranges from 1.2 m to 3.3 m. The depth to groundwater in the Tertiary wells near the Site is generally several metres lower when compared to the Quaternary wells. The available depth to water data including that obtained from the test pits is illustrated in Figure 4.

There is limited time series data available for the Site, however, it is expected that groundwater levels in the shallow Quaternary aquifer would be highest around the end of winter/early spring. This coincides reasonably well with the timing of the test pits which were excavated on 05 August 2022. Despite this, it is acknowledged that there remains some uncertainty regarding the magnitude and timing of seasonal fluctuations.

Groundwater elevation data including that obtained from the test pits is illustrated in Figure 5. Groundwater contours were interpreted for the Quaternary aquifer based on groundwater elevations from the test pits and data from WaterConnect (Figure 6). Four control points were included in the contouring process to account for the absence of groundwater elevation data in the Quaternary aquifer to the west, north and east of the Site. The values at the control points where guided by more distal data located at similar distances from the coast. The control point locations and values are provided in Figure 6. The interpreted groundwater elevation contours indicate that groundwater flow in the Quaternary aquifer is from the northeast to southwest towards the coast. Groundwater elevations range from around 5.5 m AHD on the eastern Site boundary grading down to 2.5 m AHD on the western Site boundary.

Due to the shallow nature of the proposed works, groundwater contours for the deeper Tertiary aquifers have not been assessed.

Table 1: Test Pit Summary

Name	Easting	Northing	Test Pit Depth (m)	Ground Elevation (mAHD)	SWL (m)	RSWL (mAHD)
TP1	257059.4	6181097	3	6.447	3	3.4
TP2	256709.5	6180840	3.5	6.261	>3.5	NA
TP3	255718.9	6180978	3	5.318	2.9	2.4
TP4	255663.3	6181648	3	5.447	2.8	2.6
TP5	256284.3	6181363	3	6.776	2.7	4.1
TP6	257009.5	6181690	0.5	8.506	>0.5	NA

Notes: 1. SWL = depth to groundwater from ground surface
2. All test pits completed 05/08/2022
3. Coordinates GDA2020 / MGA zone 54

Groundwater Salinity

Groundwater in the Quaternary aquifer(s) at the Site is expected to be saline. Nearby Quaternary wells have salinities in the range of 21,856 mg/L to 44,660 mg/L (Figure 7). Lower salinities are observed in the deeper Tertiary aquifers with salinities ranging from 4,764 to 8,280 mg/L. The depth of the Tertiary wells in the area are generally greater than 50 m. The interpreted shallow salinity (TDS mg/L) layer from WaterConnect is also illustrated in Figure 7. This interpreted salinity layer suggests that salinity at the Site is likely to be in the range of 14,000 mg/L to 35,000 mg/L. This is consistent with the observed data from nearby Quaternary wells.

Existing Groundwater Users

Groundwater wells in the area are assigned as stock, irrigation, industrial or monitoring. There are also several wells with no assigned purpose adjacent the Site (Figure 8). The nearest well to the Site is 6529-41, located 400 m south of the mineral claim. This well has been assigned as a stock well, however, its recorded salinity is 33,397 mg/L which is above the recommended guidelines for stock watering.

Based on the available salinity data, the salinity in the Quaternary aquifer exceeds the recommended salinity thresholds for all environmental values in the EPA Water Quality Policy (2015) and it is unlikely that there are any users accessing water from this aquifer near the Site. Groundwater from the Tertiary aquifer meets the salinity thresholds for several of the environmental values including livestock drinking water, aquaculture and human consumption of aquatic foods.

The impact pathway between groundwater and existing users can be negated by maintaining a 2 m buffer between the base of the quarry and the seasonally high watertable.

Groundwater Dependent Ecosystems

Some ecosystems rely on groundwater to meet ecological water requirements, and as such may be sensitive to changes in the natural groundwater regime. These ecosystems are defined as Groundwater Dependent Ecosystems (GDEs). The Australian GDE Atlas published by the National Water Commission (2012) provides locations of potential GDEs based on broad scale analysis, existing data sets and remote sensing. GDEs are broadly categorised into the following types:

- Aquatic ecosystems that rely on the surface expression of groundwater; this includes surface water ecosystems which may have a groundwater component, such as rivers, wetlands and springs.
- Terrestrial ecosystems that rely on the subsurface presence of groundwater; this includes all vegetation ecosystems.
- Subterranean ecosystems; this includes cave and aquifer ecosystems.

Inspection of the Australian GDE Atlas via the Bureau of Meteorology web-based mapping application indicates the presence of aquatic and terrestrial GDEs near the Site (Figure 9).

Several potential terrestrial GDEs surround the Site to the south and west. These vegetation communities are assigned as samphire shrubland, and have been assigned as having either a low, moderate, or high potential reliance on groundwater. There is one small potential aquatic GDE located in the southwest of MC 4557 classified as a Salt Lake with a high potential reliance on groundwater. This feature does not appear to be permanently inundated.

It is important to note that the GDE Atlas displays ecosystem polygons where groundwater interaction may occur, it does not suggest all vegetation within the polygon depends on groundwater (Doody et al. 2017) nor does it make any assessment of the ecological value of these ecosystems. The impact pathway between groundwater and GDEs can be negated by maintaining a 2 m buffer between the base of the quarry and the seasonally high watertable.

Groundwater Management

Groundwater Regulation

The Site is not situated within a Prescribed Wells Area (PWA), Prescribed Water Resources Area (PWRA) or an EPA Water Protection Area. The nearest prescribed area is the Adelaide Plains PWA located 12 km to the southeast (formerly referred to as the Northern Adelaide Plains PWA).

Potential Groundwater Related Risks

For quarry operations to be classified as low risk, a buffer of 2 m is recommended between the base of the excavation and the seasonally high watertable (DEM, 2021 – MG38 - New Quarry Applications). This recommendation is in place to reduce the groundwater related risks associated with:

- Drawdown extending to existing users and potential GDEs;
- Contamination of the aquifer from on-site activities (e.g. re-fueling); and
- Loss of groundwater through evaporation and evapotranspiration resulting in increased groundwater salinity.

The use of the Site for disposal of EPA approved fill also presents a potential risk to groundwater quality. These risks will be managed via an EPA license application for the Site.

Quarry Floor Elevation

Two cross sections showing the surface elevation[1] and the interpreted depth to groundwater have been prepared to assist in assessing groundwater conditions at the Site (Figure 10). The cross-section locations are illustrated in Figure 6. A theoretical pit floor surface has also been presented which has been calculated by adding 2 meters to the interpreted watertable elevation raster. This surface shows that quarrying will only be possible in selected areas where a 2 m buffer between the quarry floor and the seasonally high watertable can be achieved. The watertable elevation contours presented in Figure 6 and the associated raster grid have been provided to Groundwork Plus for detailed quarry planning.

To avoid any potential impacts to groundwater, it is recommended that extraction areas are kept to areas where a 2 m buffer can be achieved.

Groundwater Management and Monitoring

This assessment assumes that the base of the quarry remains 2 m above the seasonally high watertable, and that dewatering is not required to access the resource. Under these circumstances, there is not expected to be any adverse impacts to existing groundwater users. Whilst it is acknowledged that there may be some uncertainty associated with the seasonally high watertable at the Site, the high salinity and therefore limited beneficial use of groundwater in the Quaternary aquifer results in a low risk to the resource.

Installation and monitoring of shallow groundwater wells can be used to validate the findings of this assessment. Four shallow groundwater monitoring wells located around the perimeter of the proposed excavation area and one in the center would be sufficient for monitoring purposes.

The quarry should also be monitored for signs of groundwater seepage/inflow on a monthly basis during operations. In the event that monitoring indicates groundwater seepage/inflow, the base of the quarry should be adjusted to remain 2 m above the seasonally high watertable.

Closing

Thank you for the opportunity to undertake this assessment. Please contact the undersigned if you have any questions or queries.

Yours sincerely

Rohan Baird

Director | Principal Hydrogeologist

Water Resource Solutions Pty Ltd

E: rohan.baird@wrsolutions.au

[1] Mallala 2013 LiDAR 1 Metre DEM accessed through https://elevation.fsdf.org.au/

References

Bureau of Meteorology, Groundwater dependent ecosystems atlas. http://www.bom.gov.au/water/groundwater/gde/

Bureau of Meteorology, 2023, Online Climate Statistics (http://www.bom.gov.au/watl/evaporation/)

Bresciani E, Batelaan O, Banks EW, Barnett SR, Batlle-Aguilar J, Cook PG, Costar A, Cranswick RH, Doherty J, Green G, Kozuskanich J, Partington D, Pool M, Post VEA, Simmons CT, Smerdon BD, Smith SD, Turnadge C, Villeneuve S, Werner AD, White N and Xie Y, 2015, Assessment of Adelaide Plains Groundwater Resources: Summary Report, Goyder Institute for Water Research Technical Report Series No. 15/31, Adelaide, South Australia.

Department for Energy and Mining 2021. New quarry applications. Minerals Regulatory Guidelines MG38, Mineral Resources Division. Department for Energy and Mining, South Australia, Adelaide

Doody, T. M., Barron, O. V., Dowsley, K., Emelyanova, I., Fawcett, J., Overton, I. C., Pritchard, J. L., Van Dijk, A. I. J. M., & Warren, G. (2017). Continental mapping of groundwater dependent ecosystems: A methodological framework to integrate diverse data and expert opinion.

Figure 1: Location Plan

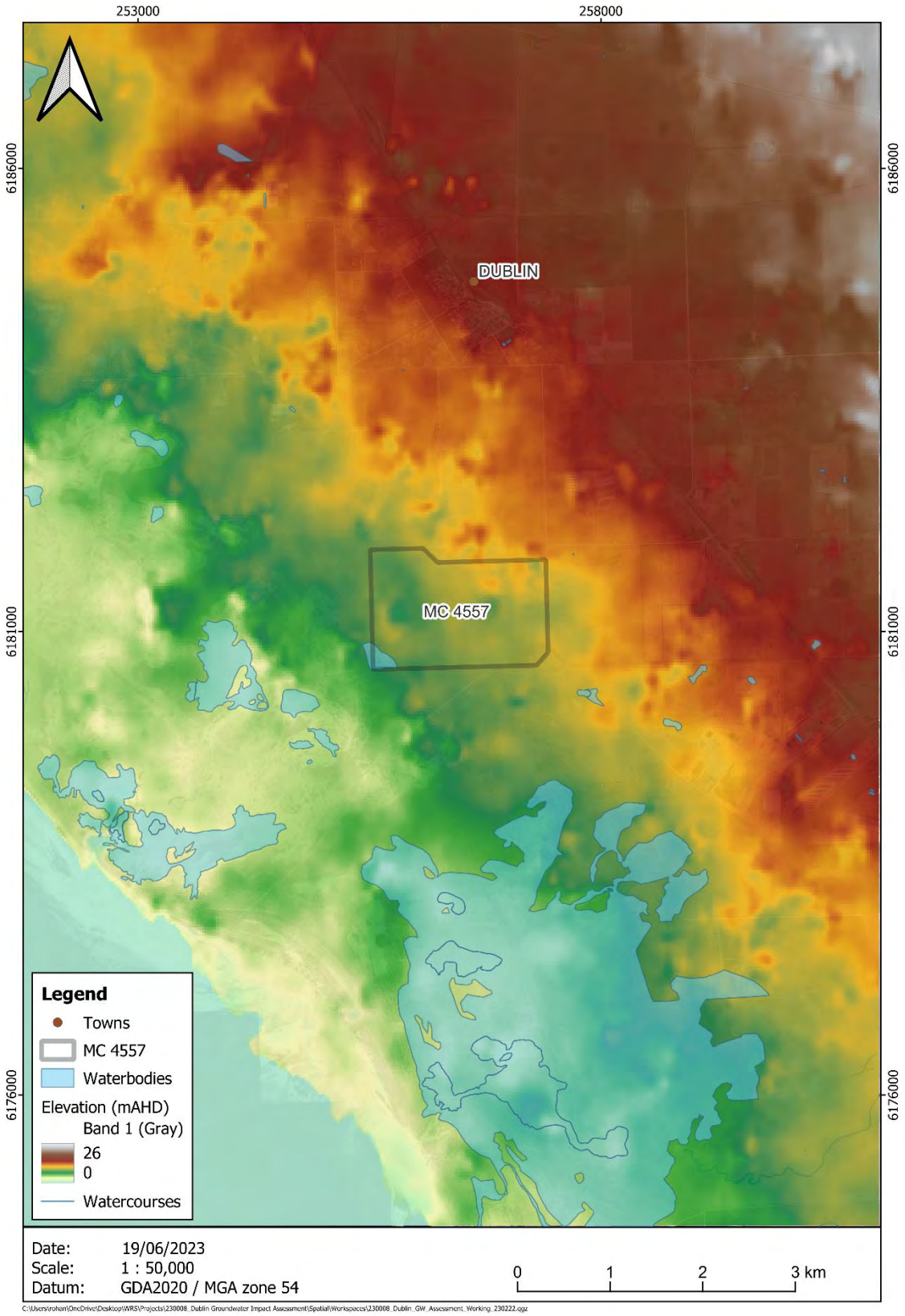


Figure 2: Elevation and Drainage

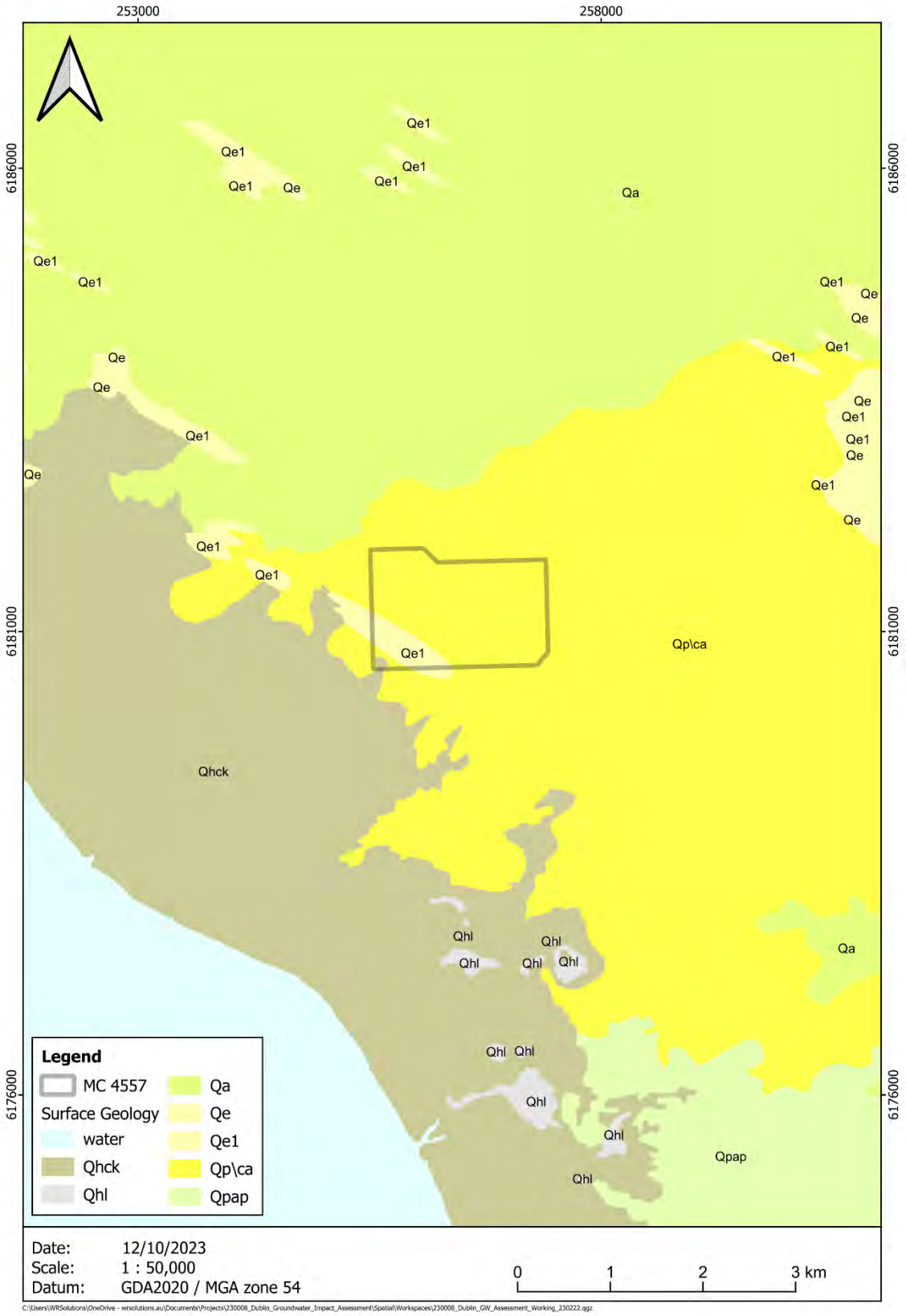


Figure 3: Surficial Geology

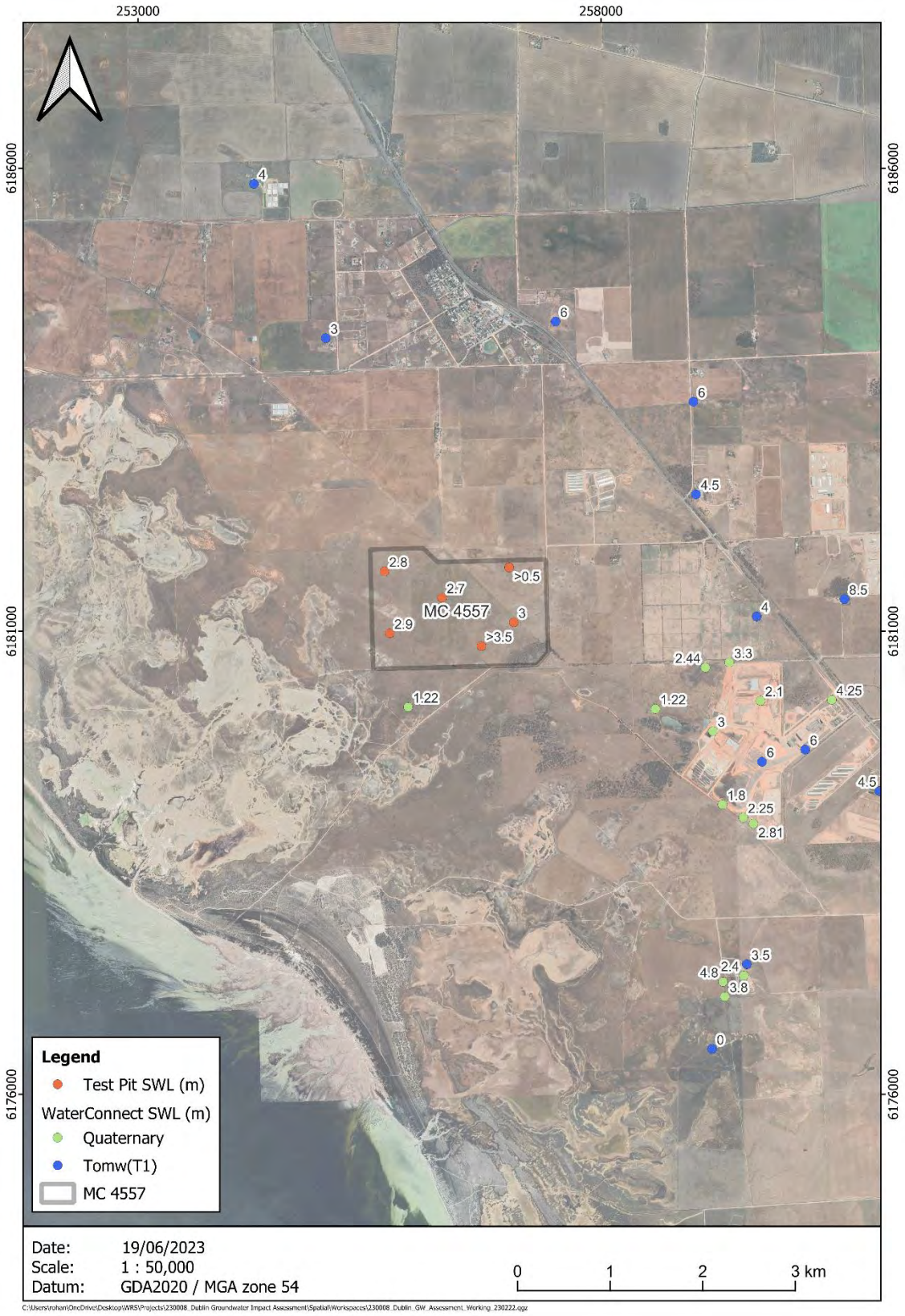


Figure 4: Depth to Groundwater

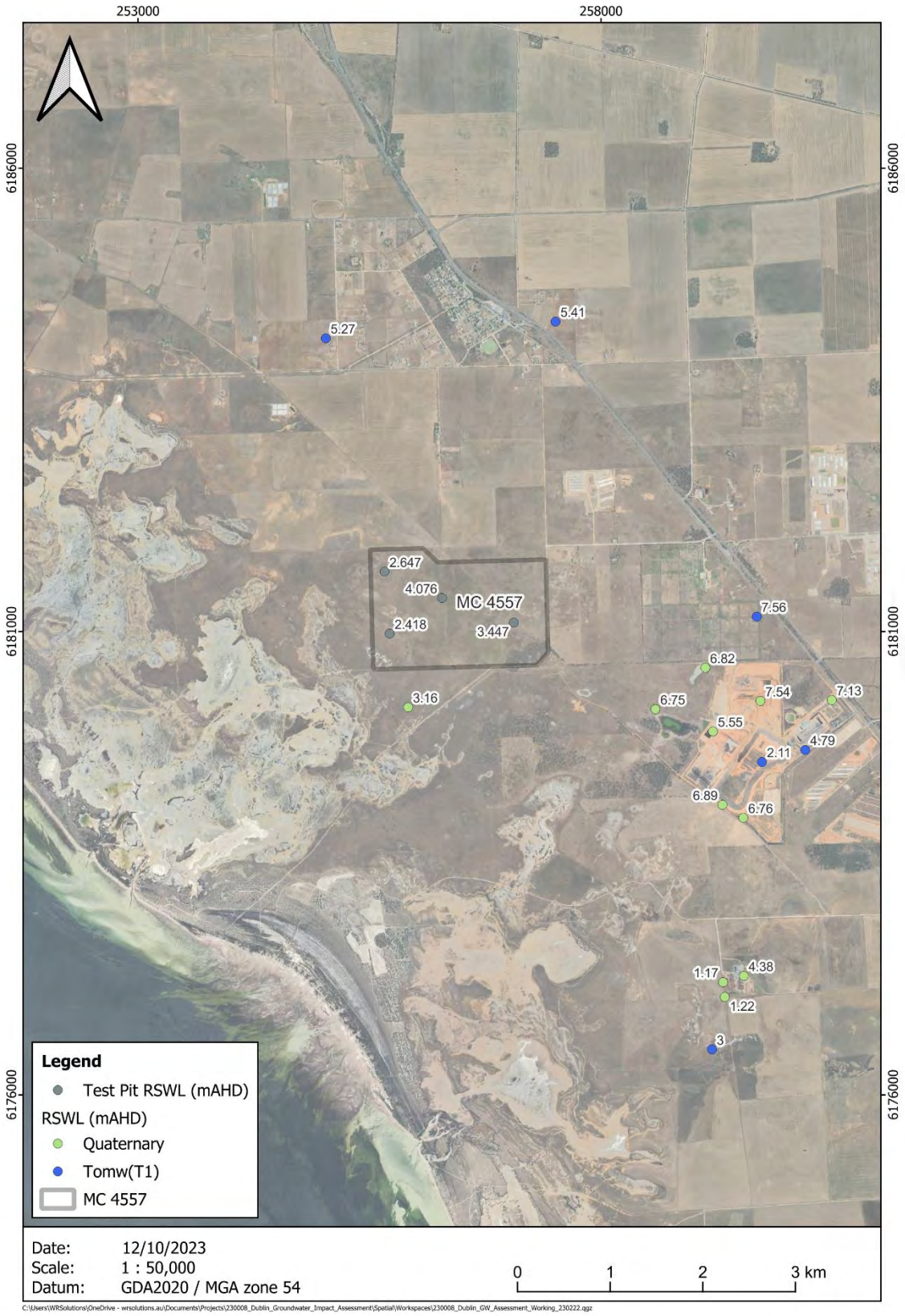


Figure 5: Groundwater Elevations (m AHD)

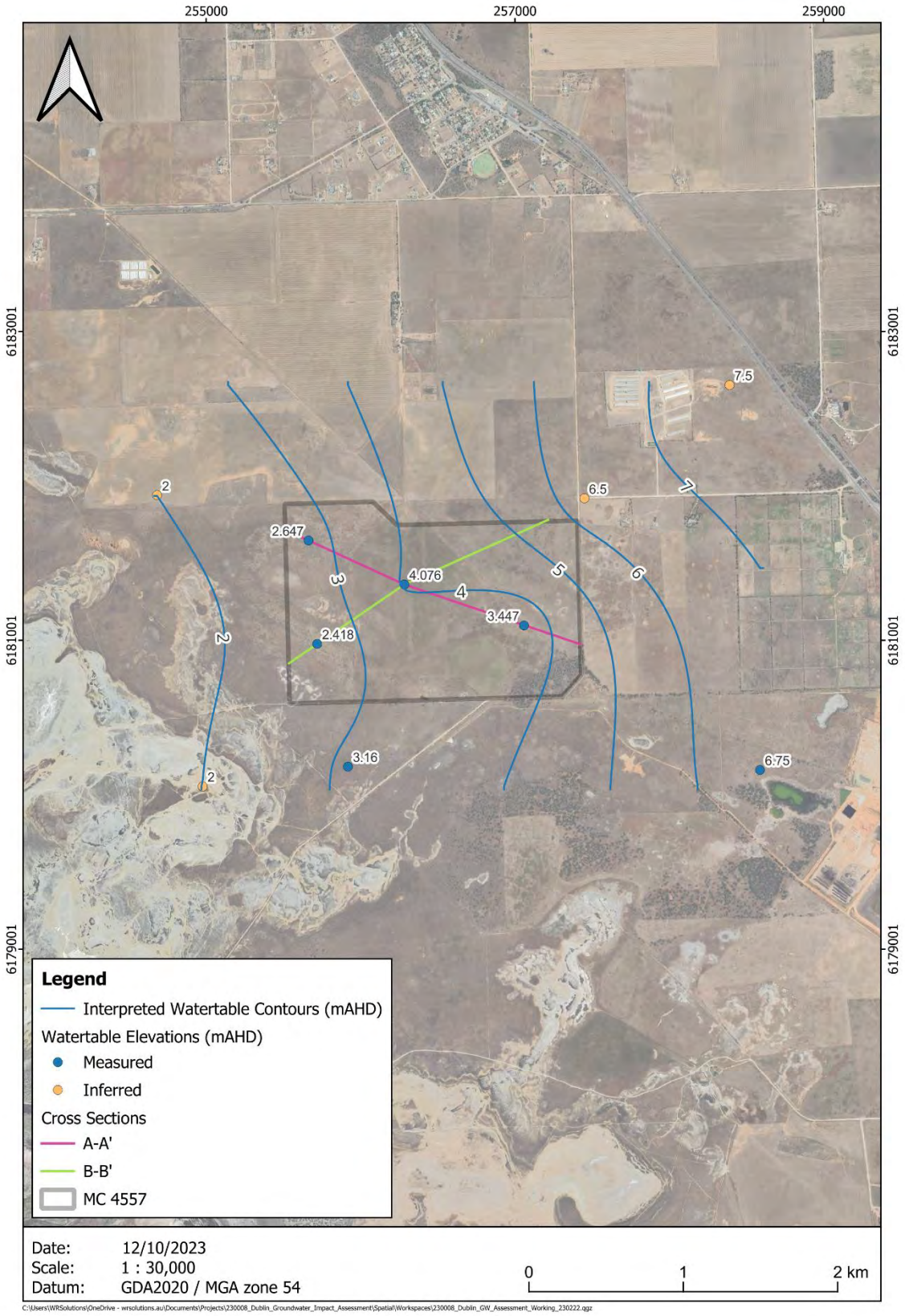


Figure 6: Interpreted Watertable Elevation Contours (m AHD)

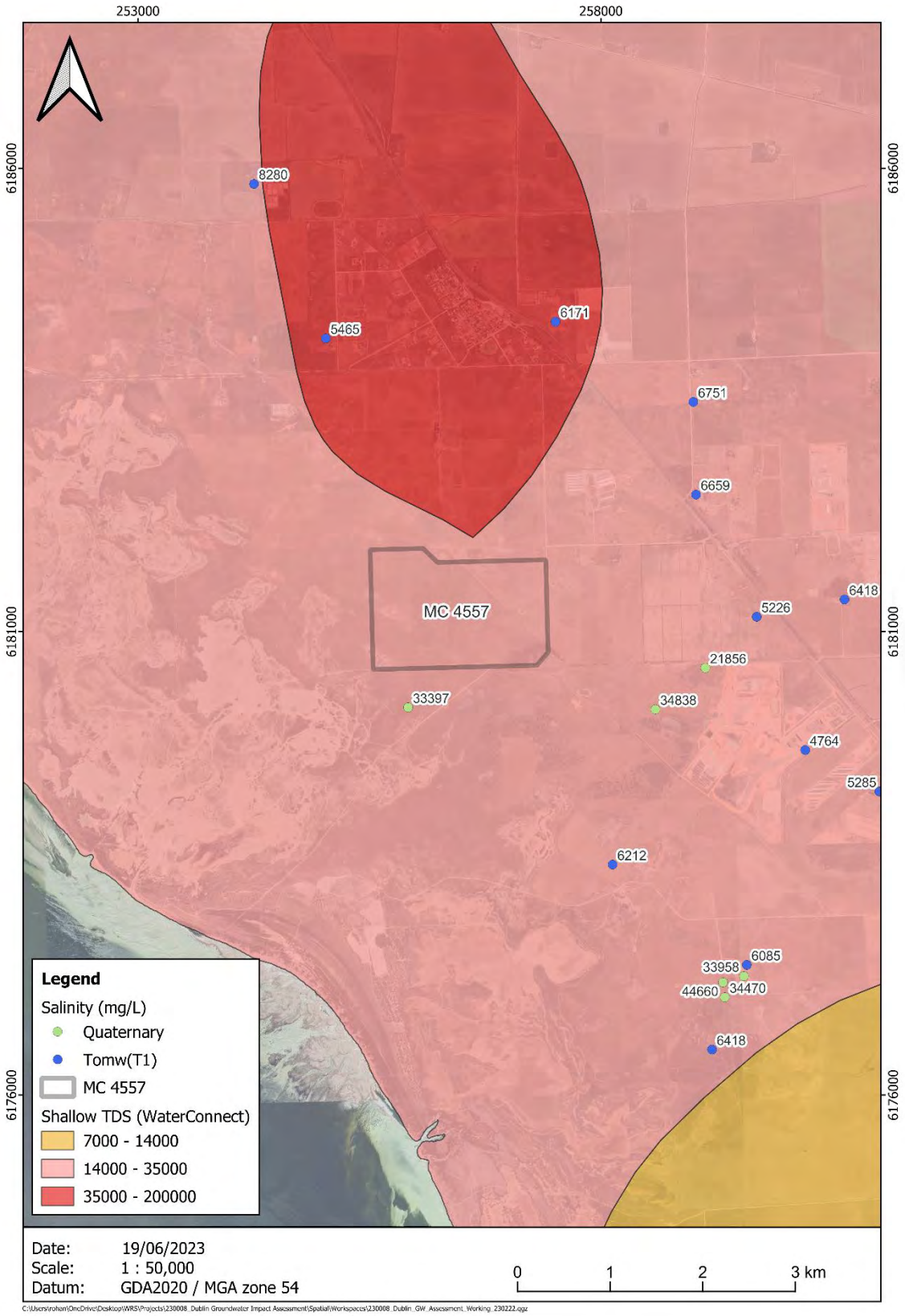


Figure 7: Groundwater Salinity

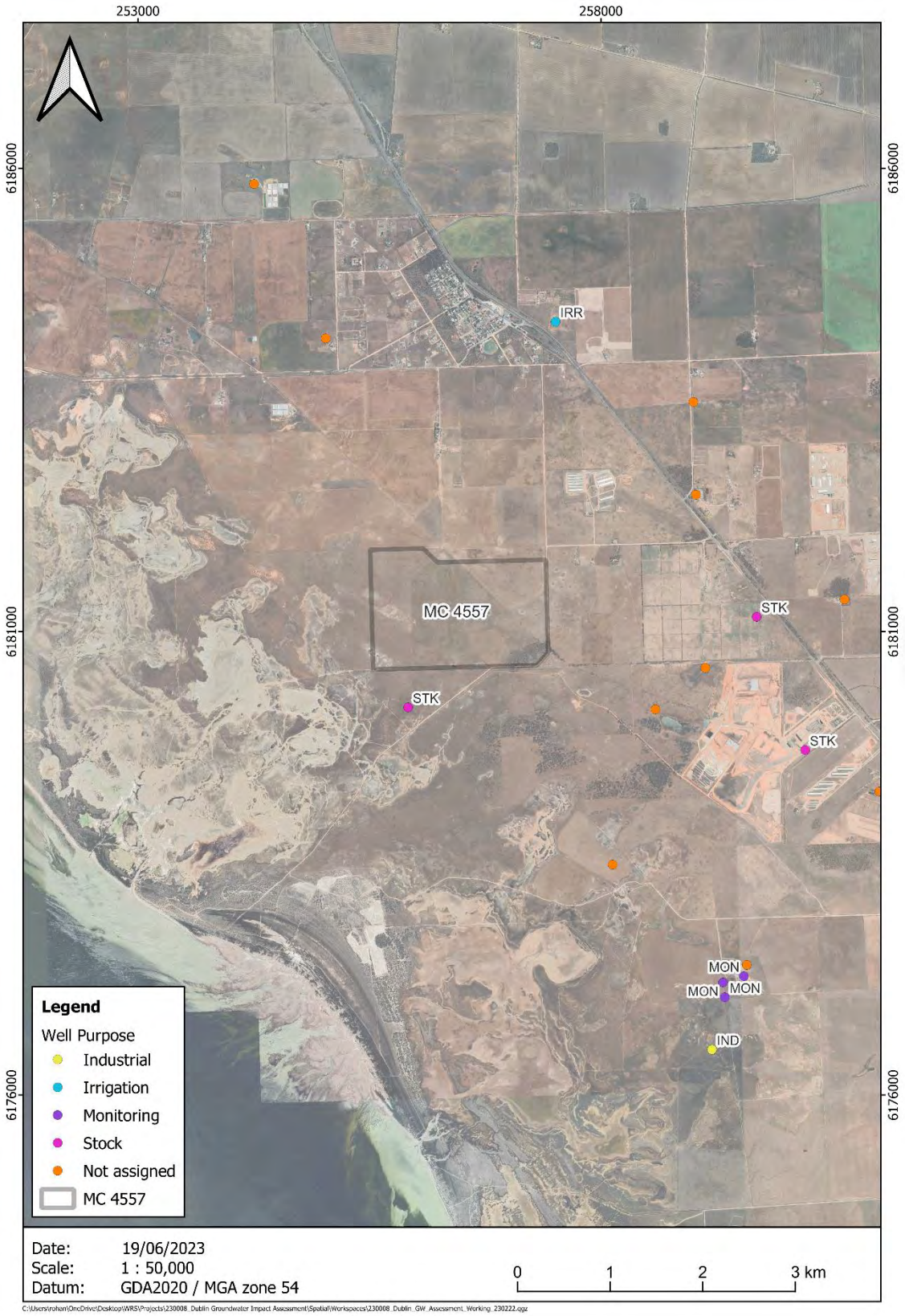


Figure 8: Existing Groundwater Users

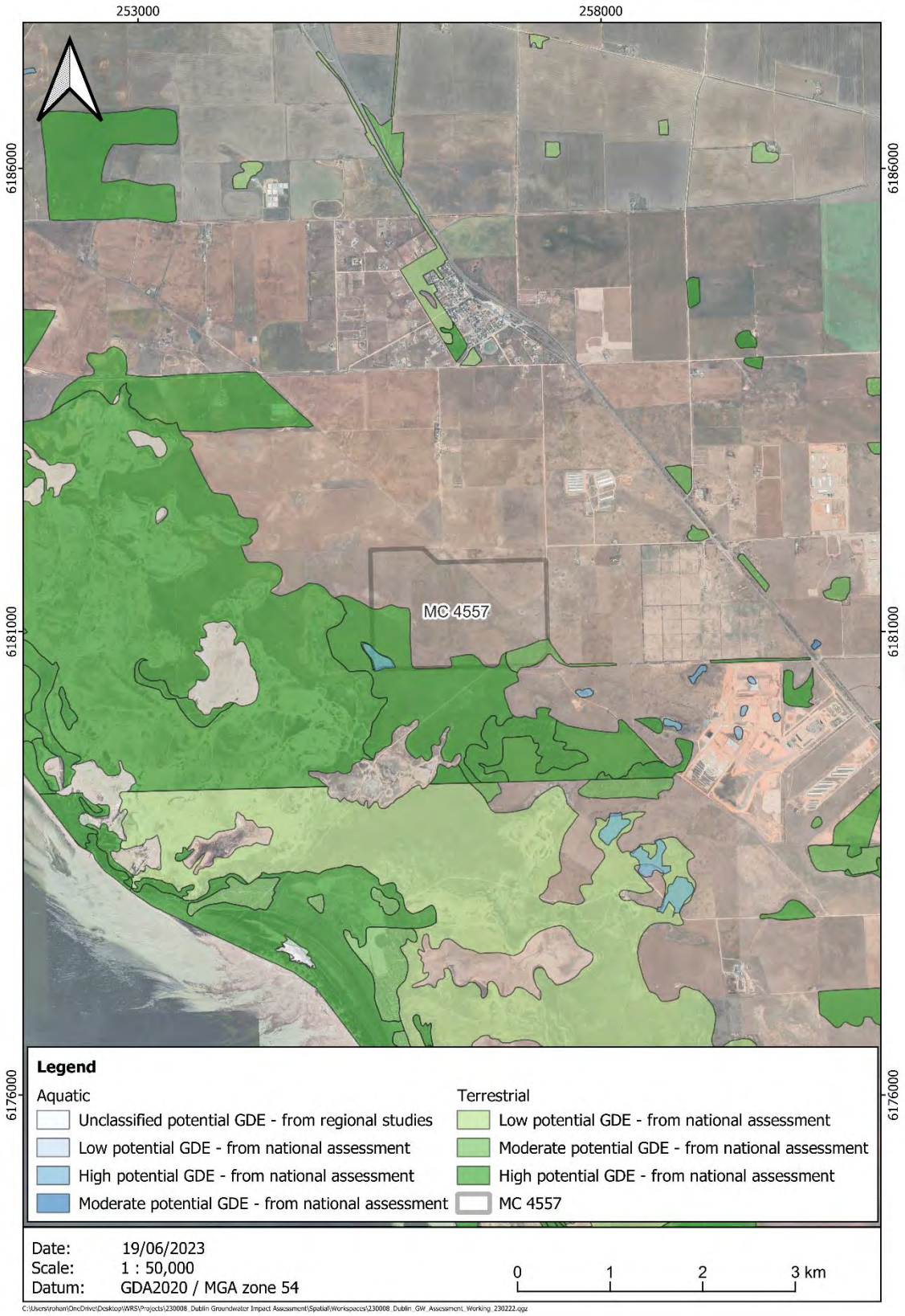
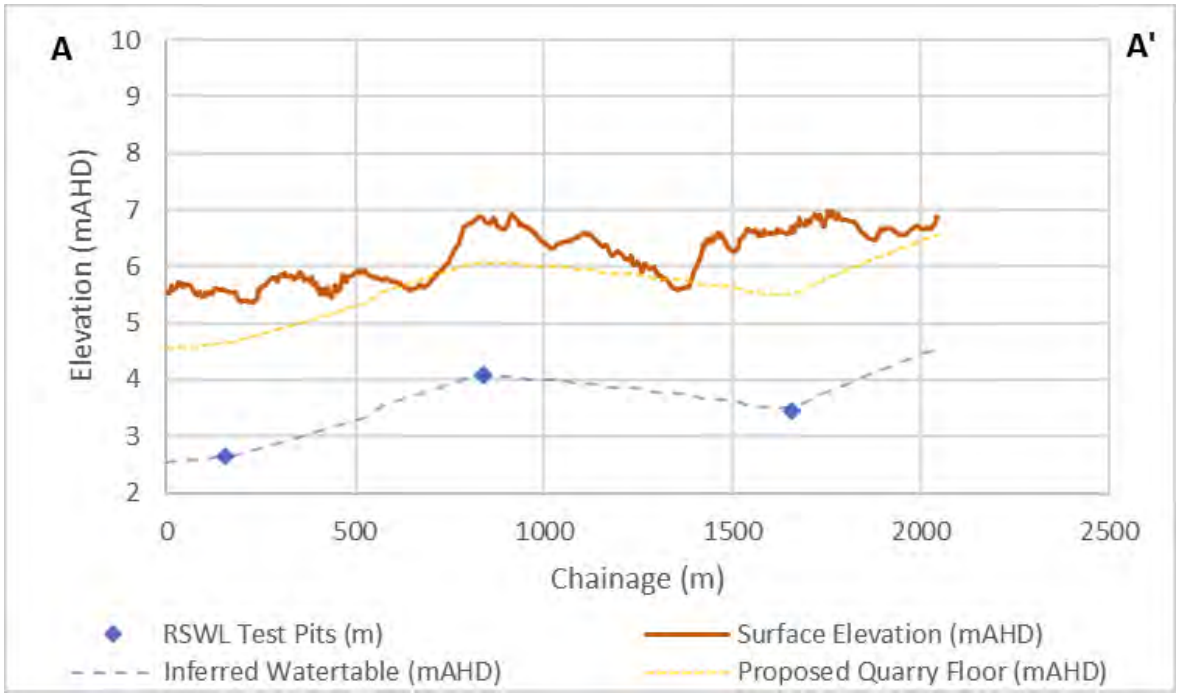


Figure 9: Potential Groundwater Dependent Ecosystems



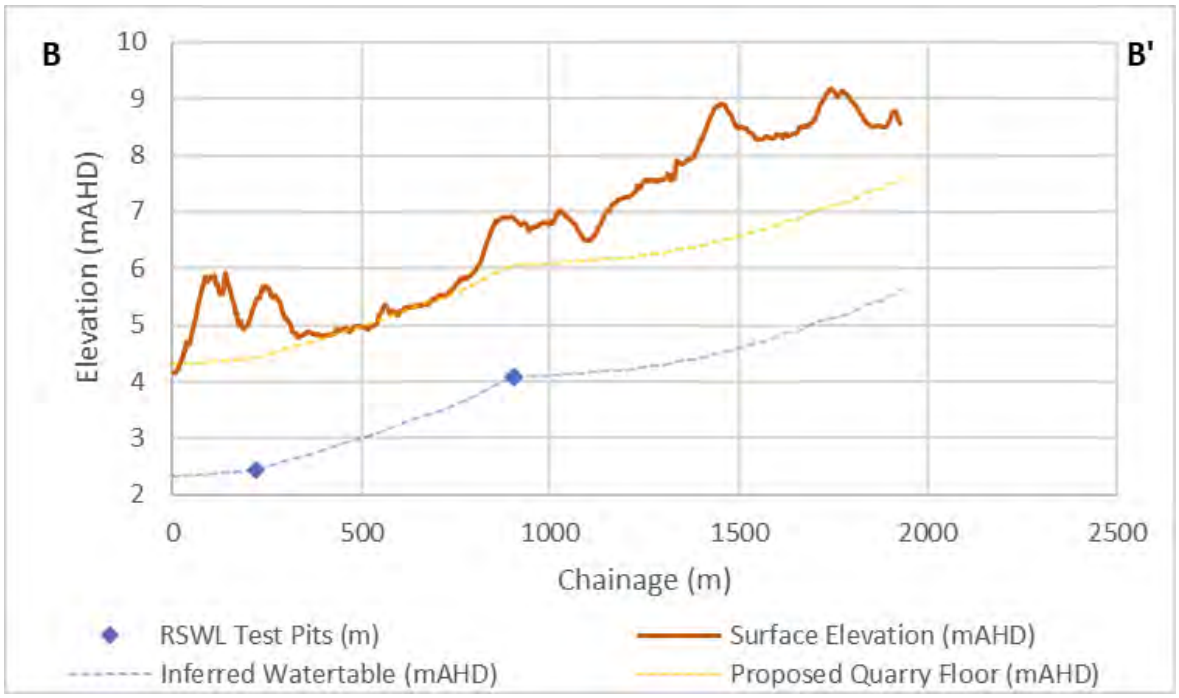


Figure 10: Site Cross Sections (Top A-A', Bottom B-B')

Attachment 3

Environment Protection and Biodiversity Conservation Act 1999 Protected Matters Report

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 13-Feb-2023

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	43
Listed Migratory Species:	61

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	97
Whales and Other Cetaceans:	8
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	4
Regional Forest Agreements:	None
Nationally Important Wetlands:	1
EPBC Act Referrals:	3
Key Ecological Features (Marine):	None
Biologically Important Areas:	4
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Acanthiza iredalei rosinae			
Slender-billed Thornbill (Gulf St Vincent) [67080]	Vulnerable	Species or species habitat may occur within area	In feature area
Botaurus poiciloptilus			
Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area	In feature area
Calidris canutus			
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris tenuirostris			
Great Knot [862]	Critically Endangered	Roosting known to occur within area	In buffer area only
Charadrius leschenaultii			
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area	In buffer area only
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area	In feature area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thinornis cucullatus cucullatus			
Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
FISH			
Seriolella brama			
Blue Warehou [69374]	Conservation Dependent	Species or species habitat known to occur within area	In buffer area only
Thunnus maccoyii			
Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In buffer area only
MAMMAL			
Eubalaena australis			
Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
Neophoca cinerea			
Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area	In buffer area only
Pteropus poliocephalus			
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
PLANT			
Caladenia tensa			
Greencomb Spider-orchid, Rigid Spider-orchid [24390]	Endangered	Species or species habitat likely to occur within area	In feature area
Pterostylis xerophila			
Desert Greenhood [7997]	Vulnerable	Species or species habitat may occur within area	In feature area
Senecio macrocarpus			
Large-fruit Fireweed, Large-fruit Groundsel [16333]	Vulnerable	Species or species habitat may occur within area	In feature area
Swainsona pyrophila			
Yellow Swainson-pea [56344]	Vulnerable	Species or species habitat may occur within area	In feature area
Tecticornia flabelliformis			
Bead Glasswort [82664]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
REPTILE			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
SHARK			
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Ardenna grisea Sooty Shearwater [82651]		Species or species habitat may occur within area	In buffer area only
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area	In buffer area only
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Migratory Marine Species			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area	In buffer area only
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In buffer area only
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat may occur within area	In buffer area only
Migratory Terrestrial Species			
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
[Arenaria interpres](#) Ruddy Turnstone [872]		Roosting known to occur within area	In buffer area only
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Roosting known to occur within area	In feature area
[Calidris alba](#) Sanderling [875]		Roosting known to occur within area	In buffer area only
[Calidris canutus](#) Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat known to occur within area	In feature area
[Calidris ruficollis](#) Red-necked Stint [860]		Roosting known to occur within area	In buffer area only
[Calidris subminuta](#) Long-toed Stint [861]		Roosting known to occur within area	In buffer area only
[Calidris tenuirostris](#) Great Knot [862]	Critically Endangered	Roosting known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area	In buffer area only
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area	In buffer area only
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Roosting known to occur within area	In buffer area only
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area	In feature area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area	In buffer area only
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area	In buffer area only
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In buffer area only
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area	In buffer area only
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area	In buffer area only
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area	In buffer area only
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area	In buffer area only
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area	In buffer area only
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area	In buffer area only
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area	In feature area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area	In buffer area only
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]		Species or species habitat may occur within area	In buffer area only
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area	In buffer area only
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area	In feature area
Calidris alba Sanderling [875]		Roosting known to occur within area	In buffer area only
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area overfly marine area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area overfly marine area	In buffer area only
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area overfly marine area	In buffer area only
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area overfly marine area	In buffer area only
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area	In buffer area only
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area overfly marine area	In buffer area only
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Roosting known to occur within area overfly marine area	In buffer area only
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area overfly marine area	In feature area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area overfly marine area	In buffer area only
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area overfly marine area	In buffer area only
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area	In feature area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area overfly marine area	In buffer area only
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area overfly marine area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In buffer area only
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area overfly marine area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area overfly marine area	In feature area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]		Species or species habitat likely to occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area overfly marine area	In buffer area only
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area	In buffer area only
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area	In buffer area only
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area	In buffer area only
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area overfly marine area	In buffer area only
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area	In buffer area only
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area overfly marine area	In buffer area only
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area overfly marine area	In buffer area only
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Species or species habitat may occur within area	In buffer area only
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Thinornis cucullatus as Thinornis rubricollis Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Thinornis cucullatus cucullatus as Thinornis rubricollis rubricollis Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In buffer area only
Tringa brevipes as Heteroscelus brevipes Grey-tailed Tattler [851]		Roosting known to occur within area	In buffer area only
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area overfly marine area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area overfly marine area	In feature area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area overfly marine area	In buffer area only
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area overfly marine area	In buffer area only
Fish			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area	In buffer area only
Campichthys tryoni Tryon's Pipefish [66193]		Species or species habitat may occur within area	In buffer area only
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area	In buffer area only
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In buffer area only
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area	In buffer area only
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area	In buffer area only
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area	In buffer area only
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area	In buffer area only
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area	In buffer area only
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area	In buffer area only
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area	In buffer area only
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In buffer area only
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area	In buffer area only
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area	In buffer area only
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In buffer area only
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area	In buffer area only
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area	In buffer area only
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In buffer area only
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In buffer area only
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area	In buffer area only
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Vanacampus margaritifer			
Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In buffer area only
Vanacampus phillipi			
Port Phillip Pipefish [66284]		Species or species habitat may occur within area	In buffer area only
Vanacampus poecilolaemus			
Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area	In buffer area only
Vanacampus vercoi			
Verco's Pipefish [66286]		Species or species habitat may occur within area	In buffer area only
Mammal			
Arctocephalus forsteri			
Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area	In buffer area only
Arctocephalus pusillus			
Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area	In buffer area only
Neophoca cinerea			
Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area	In buffer area only
Reptile			
Caretta caretta			
Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In buffer area only
Chelonia mydas			
Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Dermochelys coriacea			
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only

Whales and Other Cetaceans			[Resource Information]
Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			

Current Scientific Name	Status	Type of Presence	Buffer Status
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area	In buffer area only
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In buffer area only
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat may occur within area	In buffer area only
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In buffer area only
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In buffer area only

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State	Buffer Status
Adelaide International Bird Sanctuary - Winaityinaityi Pangkara	National Park	SA	In feature area
Unnamed (No.HA1164)	Heritage Agreement	SA	In buffer area only
Unnamed (No.HA687)	Heritage Agreement	SA	In buffer area only
Upper Gulf St Vincent	Marine Park	SA	In buffer area only

Nationally Important Wetlands [Resource Information]

Wetland Name	State	Buffer Status
Clinton	SA	In feature area

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Biologically Important Areas			
Scientific Name	Behaviour	Presence	Buffer Status
Seabirds			
Phalacrocorax fuscescens Black-faced Cormorant [59660]	Foraging	Known to occur	In buffer area only
Sternula nereis Fairy Tern [82949]	Foraging	Known to occur	In buffer area only
Whales			
Eubalaena australis Southern Right Whale [40]	Calving buffer	Known to occur	In buffer area only
Eubalaena australis Southern Right Whale [40]	Seasonal calving habitat	Known to occur	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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Attachment 4

Native Vegetation Management Plan

Groundwork Plus (SA) Pty Ltd

Native Vegetation Clearance Data Report – Dublin Quarry

Clearance under the *Native Vegetation Regulations 2017*

Prepared for: Leinad Land Management Pty Ltd

Date: October 2023

File Reference: 5109.610.002

DOCUMENT CONTROL

PROJECT / DETAILS REPORT

Document Title:	Native Vegetation Clearance Data Report – Dublin Quarry
Principal Author:	Mackenzie Bensch / Louise Jaunay
Client:	Leinad Land Management Pty Ltd
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Extraction Plan - Stage 2	*(Drawing No. 5109.DRG.023A)*
Extraction Plan - Stage 3	*(Drawing No. 5109.DRG.025A)*

ATTACHMENTS

Attachment 1	Fauna Species List
Attachment 2	*Environmental Protection and Biodiversity Conservation Act 1999* Protected Matters Report
Attachment 3	Bushland Assessment Scoresheet

1 Applicant Information

1.1. Application Details

Applicant:	Leinad Land Management Pty Ltd			
Key contact:	Name:	Frank Vouansis, Director Leipzig Australia		
	Contact details:	36 Fullarton Road, Norwood SA 0439 966 443 frank@lepzig.com.au		
Landowner:	Name:	Leinad Land Management Pty Ltd		
	Contact details:	As above		
Site address:	Dublin, SA 5501			
Local Government Area:	Adelaide Plains Council		Hundred:	Dublin
Title ID:	CT 5593/253 CT 5633/660		Parcel ID:	H140400 S302 F175266 A799

1.2. Summary of Proposed Clearance

Purpose of clearance	Clearance required for the extraction of Limestone as a general construction material and general rock product within Mineral Claim (MC) 4557 for the construction industry.
Native Vegetation Regulation	Part 5, Division 1, Regulation 12(28) – Operations
Description of the vegetation under application	7.55 hectares (ha) of *Maireana spp. +/- Nitraria billardierei* open shrubland with emergent *Eucalyptus Dumosa* in poor condition; 26.44 ha of *Nitraria billardierei* shrubland in poor condition; and 6.29 ha of *Maireana spp.* open shrubland in poor condition.
Total proposed clearance - area (ha) and number of trees	40.45 ha of Native Vegetation is proposed to be cleared.
Level of clearance	Level 4
Overlay (planning and design code)	Environment and Food Production Area, Hazards (Bushfire – Medium Risk), Hazards (Flooding – Evidence Required), Limited Land Division, Native Vegetation, Groundwater Dependent Ecosystems (Aquatic and Terrestrial) Water Resources.
Map of proposed clearance area	
Mitigation hierarchy	Initial planning of the MC covered a larger portion of the property, however, after an assessment of the vegetation within the property,

	the MC was significantly reduced to avoid clearance. This has also included positioning the majority of the proposed quarry within cleared cropping areas to limit the amount of native vegetation required to be impacted. Overall, the MC has been situated over an area of previous disturbance to minimise the extent of native vegetation that is required for removal. Consideration to retain native vegetation within the Mining Lease Proposal (MLP) will be given, and where possible, high quality native vegetation will be avoided with buffer zones to ensure the native vegetation is not impacted by quarry activities, as outlined in **Drawing No. 5109.DRG.028 – Native Vegetation Clearance Proposal Map**. The quality of vegetation is degraded due to historical activities at the Site. Vegetation clearance will be minimised to the extent that will allow viable quarry operations. Where clearance is not avoidable, it has been minimised to predominately degraded vegetation. Following the closure of the quarry, the Site will be back-filled with clean construction waste. Proposed final land use will be industrial, with plans to limit the density of development.
SEB Offset proposal	The client intends to pay into the Native Vegetation Fund (NVF), the amount of $430,531.79 (including administration fee of $22,461.85) in staged payments, refer to **Section 6 – Significant Environmental Benefit** for details.

2 Purpose of Clearance

2.1 Description

Groundwork Plus (SA) Pty Ltd (Groundwork Plus) have been engaged by Leinad Land Management Pty Ltd (Leinad), the Client, to undertake a Native Vegetation Assessment for MC 4557 located approximately 2.8 kilometres (km) south of the township of Dublin and approximately 60 km north of the Adelaide CBD (the Site), refer to **Drawing No. 5109.DRG.010 – Site Location Map**. MC 4557 was granted on 30 January 2023, with an expiry date of 29 January 2024. Since the granting of the MC, Site based investigations and stakeholder consultation regarding the proposed operations has commenced and are currently ongoing to further inform the development of MLP. The Native Vegetation Clearance Assessment forms a component of the MLP and has influenced the extraction areas within the Site.

2.2 Background

Portions of the Site have historically been cleared for agricultural grazing and cropping with most areas still cropped and grazed. Native chenopod shrub species have regrown within the grazing land since historical clearance. Remnant native vegetation exists in some portions of the MC, grading from few, isolated trees and shrubs with introduced species to a small section of woodland vegetation.

Quarry Development Plans (QDP's) and proposed stages of clearance are proposed, with the stages forming part of the MLP.

2.2.1 Interim Biogeographical Regionalisation of Australia (IBRA)

A search of the Government of South Australia Enviro Data (2023) application *NatureMaps* (*NatureMaps*), confirmed the Site is located within the Mallala Interim Biogeographical Regionalisation of Australia (IBRA) region and the St Vincent subregion. Eight (8) percent of the subregion has been mapped as remnant vegetation, of which five (5) percent is formally conserved within Department for Environment and Water (DEW) reserves and Heritage Agreements (HA) under the *Native Vegetation Act 1991*.

2.2.2 Climate

Site climate data has been sourced from the Port Parham Bureau of Meteorology (BoM) (Site No. 023076) located approximately 8.6 km north west of the Site. Climate is described as Mediterranean with majority of rainfall between the months of May and September. Average annual rainfall is 352 millimetres (mm).

2.3 General Location Map

The Site is located approximately 60 km north of the Adelaide CBD, refer to **Drawing No. 5052.DRG.010 – Site Location Map** for a visual representation of the project location.

2.4 Details of the Proposal

Vegetation clearance is required for the purpose of Limestone extraction within the Site. The quarry operations and associated QDP's are documented in detail within the MLP.

Due to the size of the parcel of land for Quarry Development, vegetation clearance will be broken down into three (3) Stages, as per the proposed QDP's shown in **Drawing No. 5109.DRG.021A – Extraction Plan - Stage 1**, **Drawing No. 5109.DRG.023A – Extraction Plan - Stage 2** and **Drawing No. 5109.DRG.025A – Extraction Plan - Stage 3**.

2.5 Approvals Required or Obtained

This Vegetation Clearance Data Report has been prepared for inclusion within the MLP for the Site in accordance with the provisions of the *Mining Act 1971*.

A review of *NatureMaps* (2023) indicated that there have not been any previous native vegetation clearance applications for the Site, with the closest application existing approximately 1.8 km to the east of the Site (application No. 2021_3007).

2.6 Native Vegetation Regulation

Provisions for clearance of native vegetation associated with approved mining operations are provided under the *Native Vegetation Regulations 2017*, Part 5, Regulation 12, Division 1, Subclause 28 – Operations – Clearance of vegetation incidental to operations authorised under a *Mining Act 1971* or the *Geothermal Energy Act 2000*.

2.7 Development Application Information (if applicable)

Development approvals are not required for activities associated with the quarry operations undertaken in accordance with an approved MLP.

3 Method

3.1 Flora Assessment

An online search was undertaken for *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) Matters of National Environmental Significance (MNES) along with a review of *NatureMaps* for historical records of any rare or endangered flora species within five (5) km of the Site.

Following a review of the background information and literature, an assessment of the Site was undertaken on 10 May 2023 by Groundwork Plus Accredited Consultant involving a general assessment of the Site and identification of habitat for species of conservation significance.

The proposed works areas were surveyed for:

- Remnant and regrowth native vegetation
- Introduced plant species

Representative photographs of the vegetation within the Site are provided within **Section 4.1 Vegetation Assessment**.

3.2 Fauna Assessment

An online search was undertaken for EPBC Act MNES, as well as a review of *NatureMaps* to determine the presence of any rare or endangered fauna species recorded within five (5) km of the Site, refer to **Attachment 1 – Fauna Species List**. A summary of the key EPBC Act listed species potentially present within the area is found in **Attachment 2 – *Environmental Protection and Biodiversity Conservation Act 1999* Protected Matters Report**. An assessment of the Site was undertaken on 10 May 2023 by Groundwork Plus did not record any rare or endangered species within the Site.

4 Assessment Outcomes

4.1 Vegetation Assessment

The topography of the Site is characterised by low to moderately steeping hills with shallow soil over rock and rocky outcrops. Height elevations of the Site ranges from 12 metres Australian Height Datum (mAHD) in the north eastern section of the Site with lower elevations approaching seven (7) mAHD located to the south west of the Site.

The closest HA to the Site is located approximately two (2) km north (HA 687). Adelaide International Bird Sanctuary National Park – Winaityinaityi Pangkara is located approximately 300 metres (m) west of the Site.

Full assessment of the vegetation attributes and condition scores are provided within **Attachment 3 – Bushland Assessment Scoresheet**.

A total of five (5) native Vegetation Associations were identified across the property:

- *Eucalyptus dumosa +/- Eucalyptus gracilis* mallee over chenopod shrubs;
- *Maireana spp. +/- Nitraria billardierei* open shrubland with emergent *Eucalyptus Dumosa*;
- *Nitraria billardierei* shrubland;
- *Maireana spp.* open shrubland; and
- *Tecticornia spp.* coastal shrubland;

Large sections recently cropped without native vegetation were also present. Quarry development planning has allowed for the *Eucalyptus dumosa +/- Eucalyptus gracilis* mallee over chenopod shrubs vegetation association and the *Tecticornia spp.* coastal shrubland to be avoided from clearance.

The vegetation under application is part of an agricultural property, with surrounding land being used for cropping and grazing. Most significantly, the property is adjacent to coastal vegetation along the western boundary, however, a buffer between the MC and the coastal vegetation has been established to ensure no negative effects on coastal bird habitat.

Remnant vegetation commonly represented throughout the landscape comprises of degraded chenopod shrublands, Eucalyptus Mallee woodlands, and coastal vegetation in fragmented condition.

Weather conditions preceding the survey were cool to warm. Annual germination and growth were still present onsite to enable accurate identification. Dry biomass on the ground layer was low given the current grazing regime. Ambient air temperatures were mild to warm, with no reptile activity noted.

4.1.1 Details of the Vegetation Associations Proposed to be Impacted

Table 1 – Vegetation Association 1

Vegetation Association	Vegetation Association 1; *Nitraria billardierei* open shrubland with emergent *Eucalyptus dumosa* in poor condition.
 Photo Point 1 – Vegetation Association 1, looking south **Drawing No. 5109.DRG.028 – Native Vegetation Clearance Proposal Map** (MGA Zone 54, Latitude 34; 26; 35.381, Longitude 138; 20; 34.293)	
General description	Open shrubland dominated by *Nitraria billardierei* and *Maireana brevifolia* with scattered emergent *Eucalyptus dumosa.* Land subject to historical clearance, with *NatureMaps* pre-European vegetation mapping layers identifying the area as woodland. Vegetation currently subjected to grazing regime, so consists of a much reduced native diversity and high introduced species diversity as a result. Shallow calcareous loam soils over limestone. Several annual species were found to be present, as the region received good rainfall events over the preceding summer months. Dominant species include: *Nitraria billardierei* *Maireana brevifolia* *Enchylaena tomentosa* *Salsola australis.* *Carpobrotus modestus/rossii* *Exocarpus aphylla* **Romulea rosea var. Australia* *Oxalis pes-caprae* **Carrichtera annua* **Lycium ferocissimum* Very little native species showing evidence of flowering and seed set. *Eucalyptus spp.* in poor health but large and small hollows present, providing habitat for fauna species.

Threatened species or community	A search of *NatureMaps* identified nine (9) threatened fauna species and one (1) threatened flora species recorded within the preceding 20 year and within a five (5) km radius of the Site. None were recorded at the time of the Site inspections. No threatened plant communities were recorded in either the desktop assessment or the Site inspection.				
Landscape context score	1.23	**Vegetation condition score**	17.81	**Conservation significance score**	1.10
Unit biodiversity score	24.10	**Area (ha)**	7.55 (all stages)	**Total biodiversity score**	186.78 (all stages)

Table 2 – Vegetation Association 2

Vegetation Association	Vegetation Association 2; *Nitraria billardierei* shrubland in poor condition.
	 Photo Point 2 – Vegetation Association 2, looking south **Drawing No. 5109.DRG.028 – Native Vegetation Clearance Proposal Map** (MGA Zone 54, Latitude 34; 28; 33.560, Longitude 138; 20; 16.455)
General description	Open shrubland with emergent *Nitraria billardierei* amongst introduced herbaceous species. Land subject to historical clearance, with *NatureMaps* pre-European vegetation mapping layers identifying the area as shrubland. Vegetation currently subjected to grazing regime, so consists of a much reduced native diversity and high introduced species diversity as a result. Shallow calcareous loam soils over limestone. Several annual species were found to be present, as the region received good rainfall events over the preceding summer months.

	Species include: *Nitraria billardierei* *Salsola australis* *Sclerolaena spp.* **Romulea rosea var. Australia* **Oxalis pes-caprae* **Carrichtera annua* **Lycium ferocissimum* Very little native species showing evidence of flowering and seed set.				
Threatened species or community	A search of *NatureMaps* identified nine (9) threatened fauna species and one (1) threatened flora species recorded within the preceding 20 year and within a five (5) km radius of the Site. None were recorded at the time of the Site inspections. No threatened plant communities were recorded in either the desktop assessment or the Site inspection.				
Landscape context score	1.23	**Vegetation condition score**	16.23	**Conservation significance score**	1.10
Unit biodiversity score	21.96	**Area (ha)**	26.44 (all stages)	**Total biodiversity score**	580.59 (all stages)

Table 3 – Vegetation Association 3

Vegetation Association	Vegetation Association 3; *Maireana spp.* open shrubland in poor condition.

Photo Point 3 – Vegetation Association 3, looking south east

Drawing No. 5109.DRG.028 – Native Vegetation Clearance Proposal Map

(MGA Zone 54, Latitude 34; 29; 11.724, Longitude 138; 20; 47.360)

General description	Open shrubland with scattered *Maireana brevifolia*. Land subject to historical clearance, with *NatureMaps* pre-European vegetation mapping layers identifying the area as shrubland. Vegetation currently subjected to grazing regime, so consists of a much-reduced native diversity and high introduced species diversity as a result. Overstorey species represented by introduced Aleppo Pines (*Pinus halepensis*) only. Shallow calcareous loam soils over limestone. Several annual species were found to be present, as the region received good rainfall events over the preceding summer months. Species include: *Maireana brevifolia* *Nitraria billardierei* *Salsola australis* *Sclerolaena spp.* **Romulea rosea var. Australia* **Oxalis pes-caprae* **Carrichtera annua* **Lycium ferocissimum* Very little native species showing evidence of flowering and seed set.				
Threatened species or community	A search of *NatureMaps* identified nine (9) threatened fauna species and one (1) threatened flora species recorded within the preceding 20 year and within a five (5) km radius of the Site. None were recorded at the time of the Site inspections. No threatened plant communities were recorded in either the desktop assessment or the Site inspection.				
Landscape context score	1.23	**Vegetation condition score**	5.21	**Conservation significance score**	1.10
Unit biodiversity score	7.05	**Area (ha)**	6.29	**Total biodiversity score**	44.33

4.2 Threatened Species Assessment

A search of *NatureMaps* identified nine (9) threatened fauna species and one (1) threatened flora species recorded within the preceding 20 year and within a five (5) km radius of the Site, refer to **Table 4 – Threatened Species Summary** for the likelihood of each species occurring within the Site.

An EPBC Act protected matters search report listed 35 threatened fauna species and five (5) threatened flora species additional to those identified through *NatureMaps*, refer to **Attachment 2 – *Environmental Protection and Biodiversity Conservation Act 1999* Protected Matters Report**. Only species identified through *NatureMaps* where location and record date are known have been included in the below summary. Aquatic species and species with listed sub-species with known distributions outside of the project area have also been excluded.

Table 4 – Threatened Species Summary

Species (common name)	NP&W Act	EPBC Act	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
Hieraaetus morphnoides (Little Eagle)	V		2014	The Little Eagle is seen over woodland and forested lands and open country, extending into the arid zone. It tends to avoid rainforest and heavy forest.	**Highly Likely**. The species has been recorded approximately 1.8 km south west of the Site in 2014 in similar vegetation.
Neophema elegans elegans (Elegant Parrot)	R		2020	Open habitats, including grasslands, shrublands, mallee, woodlands and thickets, bluebush plains, heathlands, saltmarsh and farmland.	**Highly Likely**. The species has been recorded through the area, with closest most recent sighting in 2020 approximately 1.8 km to the south west of the Site.
Falco subniger (Black Falcon)	R		2014	The Black Falcon favours sparse woodlands, scrubby grasslands and farmlands in the drier areas.	**Highly Likely.** Scattered historical recordings through the area, with closest most recent sighting approximately three (3) km to the south east of the Site.
Calidris canutus rogersi (Red Knot (ssp. *rogersi*))	E		2012	Intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours.	**Possible.** Scattered historical recordings through the area, with closest most recent sighting approximately 2.8 km to the south west of the Site.
Calidris tenuirostris (Great Knot)	E	CR	2012	Sheltered coastal habitats with large intertidal mudflats or sandflats including inlets, bays, harbours, estuaries and lagoons.	**Possible.** Scattered historical recordings through the area, with closest most recent sighting approximately 2.8 km to the south west of the Site.
Coturnix ypsilophora australis (Brown Quail)	V		2006	Found in denser, wetter environments such as wet grassland and shrubland, cereal crops, stubble, coastal scrub or dense vegetation fringing on freshwater wetlands.	**Possible.** Scattered historical recordings through the area, with closest most recent sighting approximately five (5) km to the west of the Site.

Species (common name)	NP&W Act	EPBC Act	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
Pandion haliaetus cristatus (Eastern Osprey)	E		2014	Found in coastal areas, especially the mouths of large rivers, lagoons and lakes and in terrestrial wetlands.	**Possible.** Scattered historical recordings through the area, with closest most recent sighting approximately 3.8 km to the south west of the Site.
Thinornis cucullatus cucullatus (Hooded Plover)	V	VU	2013	Found on sandy beaches between the high water mark and the foredune.	**Possible.** Scattered historical recordings through the area, with closest most recent sighting approximately 3.8 km to the south west of the Site.
Turnix varius varius (Painted Buttonquail)	R		2006	Occupy a range of Eucalypt associations wherever leaf litter is prominent. Prefer broad vegetation groups including woodland, grass woodland and forest.	**Possible.** Scattered historical recordings through the area, with closest most recent sighting approximately five (5) km to the north west of the Site.
Tecticornia flabelliformis (Bead Samphire)	V		2011	Found on small parts of salt clay pans where there is wet saline clay above hardened layers of soil with gypsum.	**Possible.** The species has been recorded approximately 800 m west of the Site in 2011.
Source; 1- BDBSA, 2 - AoLA, 3 – NatueMaps 4 – Observed / recorded in the field, 5 - Protected matters search tool, 6 – others NP&W Act; E= Endangered, V = Vulnerable, R= Rare EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable					

Table 5 – Criteria for the Likelihood of Occurrence of Species Within the Study Area

Likelihood	Criteria
Highly Likely/Known	Recorded in the last 10 years, the species does not have highly specific niche requirements, the habitat is present and falls within the known range of the species distribution or; The species was recorded as part of field surveys.
Likely	Recorded within the previous 20 years, the area falls within the known distribution of the species and the area provides habitat or feeding resources for the species.
Possible	Recorded within the previous 20 years, the area falls inside the known distribution of the species, but the area provides limited habitat or feeding resources for the species. Recorded within 20 - 40 years, survey effort is considered adequate, habitat and feeding resources present, and species of similar habitat needs have been recorded in the area.
Unlikely	Recorded within the previous 20 years, but the area provides no habitat or feeding resources for the species, including perching, roosting or nesting opportunities, corridor for movement or shelter. Recorded within 20 - 40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area. No records despite adequate survey effort.

4.3 Cumulative Impact

The current clearance application encompasses a significant portion of the MC, which will allow for staged extraction and operational areas. Portions of native vegetation have been excluded from the extraction and operational area (the *Eucalyptus dumosa* +/- *Eucalyptus gracilis* mallee and the *Tecticornia spp.* coastal shrubland), refer to **Drawing No. 5109.DRG.028 – Native Vegetation Clearance Proposal Map**. Access to the Site is already established, with access tracks required to be constructed along the boundary of the MC. No further clearance is expected at this stage of the quarry development.

Indirect impacts to surrounding vegetation may include dust deposition, increase in weed abundance and diversity, and general rubbish incursions from operational activities. These will be mitigated through control measures outlined within the MLP.

The clearance of native vegetation will add to the cumulative cleared area of the surrounding landscape, however, this will be minimised to the available resource and largely restricted to areas that have been subject to previous historical clearance.

4.4 Address the Mitigation Hierarchy

a) **Avoidance – outline measures taken to avoid clearance of native vegetation**

Initial planning of the MC covered a larger portion of the property, however, after an assessment of the vegetation within the property, the MC was significantly reduced to avoid clearance. This has also included positioning the majority of the proposed quarry within cleared cropping areas to limit the amount of native vegetation required to be impacted. In particular, avoidance of sensitive coastal samphire vegetation as well as mature mallee vegetation were excluded from the proposed quarry operational areas to protect native flora and fauna.

Overall, the MC has been situated over an area of previous disturbance to minimise the extent of native vegetation that is required for removal. Consideration to retain native vegetation within the MLP will be given, and where possible, high quality native vegetation will be avoided with buffer zones to ensure the native vegetation is not impacted by quarry activities, as outlined in **Drawing No. 5109.DRG.028 – Native Vegetation Clearance Proposal Map**.

b) **Minimisation – if clearance cannot be avoided, outline measures taken to minimise the extent, duration and intensity of impacts of the clearance on biodiversity to the fullest possible extent (whether the impact is direct, indirect or cumulative)**.

The quality of vegetation is degraded due to historical activities at the Site. Vegetation clearance will be minimised to the extent that will allow viable quarry operations. Where clearance is not avoidable, it has been minimised to the most degraded native vegetation within the Site.

c) **Rehabilitation or restoration – outline measures taken to rehabilitate ecosystems that have been degraded, and to restore ecosystems that have been degraded, or destroyed by the impact of clearance that cannot be avoided or further minimised, such as allowing for the re-establishment of the vegetation**.

Following the closure of the quarry, the Site will be back-filled with clean construction waste. Proposed final land use will be industrial, with plans to limit the density of development.

d) **Offset – any adverse impact on native vegetation that cannot be avoided or further minimised should be offset by the achievement of a Significant Environmental Benefit (SEB) that outweighs that impact.**

The client intends to pay into the NVF, the amount required for the SEB, as calculated in **Table 8 – Clearance Area Summary Table**.

4.5 Principles of Clearance (Schedule 1, *Native Vegetation Act 1991*)

The Native Vegetation Council (NVC) will consider Principles 1(b), 1(c) and 1(d) when assigning a level of Risk under Regulation 16 of the *Native Vegetation Regulations, 2017*. The NVC will consider all the principles of clearance of the Act as relevant, when considering an application referred under the *Planning, Development and Infrastructure Act 2016*.

Table 6 – Principles of Clearance

Principle of clearance	Relevant information
Principle 1b - significance as a habitat for wildlife	Relevant information The vegetation under application may provide habitat for fauna species, particularly birds and reptiles. The vegetation is connected with surrounding vegetation, however, due to the level of disturbance that has historically occurred within the Site, it is unlikely to contain any significant habitat for any of the listed species. The presence of listed species within proximity to the Site cannot be discounted. The desktop assessment for threatened fauna species identified three (3) species that may be considered 'highly likely' to use the application area, and six (6) species that may be considered 'possible' to use the application area. No threatened species were recorded at the time of the Site inspections. Refer to **Section 4.2 Threatened Species Assessment** for further details. Threatened Fauna Score (all associations) – 0.1
	Assessment against the principles Seriously at Variance Yes At Variance – No
	Moderating factors that may be considered by the NVC Given the shape, size, and landscape context of the vegetation under application, it is unlikely clearance will lead to a long-term decrease in the size of any fauna populations. Likewise, clearance will not significantly reduce the area of occupancy of any fauna species. The application area is located within a rural area, with existing fragmentation of large remnant vegetation blocks, therefore clearance will not fragment an existing fauna population into two (2) or more populations. The application area consists of vegetation associations that are regionally moderately represented and are not critical habitat for any fauna species. Habitat within the application area is likely to provide for mostly common fauna species. Clearance of the application area will not result in an increase in invasive species that are harmful to a threatened species or result in invasive species becoming established in a threatened species habitat as weed prevalence through the Site is already established. No threatened species have been recorded within the application area. Clearance is unlikely to interfere with the recovery of any threatened fauna species.
Principle 1c - plants of a rare, vulnerable	Relevant information One (1) threatened flora species, *Tecticornia flabelliformis* has previously been recorded within the property, although not within the clearance area.

Principle of clearance	Relevant information
or endangered species	No other threatened flora species were identified within the desktop assessment. Threatened Flora Scores (all associations) – 0
	Assessment against the principles Seriously at Variance No At Variance – No
	Moderating factors that may be considered by the NVC N/A
***Principle 1d - the vegetation comprises the whole or part of a plant community that is Rare, Vulnerable or endangered*:**	No threatened communities under the EPBC Act or threatened ecosystems under the DEW Provisional list were recorded within the application area. Threatened Community Score (all associations) – 1
	Assessment against the principles Seriously at Variance No At Variance – No
	Moderating factors that may be considered by the NVC N/A

Principles of Clearance (h-m) will be considered by comments provided by the local NRM Board or relevant Minister. The Data Report should contain information on these principles where relevant and where sufficient information or expertise is available.

4.6 Risk Assessment

Determine the level of risk associated with the application

Table 7 – Risk Assessment

Total clearance	No. of trees	N/A
	Area (ha)	40.45 ha
	Total biodiversity Score	811.7
Seriously at variance with principle 1(b), 1(c) or 1 (d)		Principle 1(b)
Risk assessment outcome		Level 4

5 Clearance Summary

Table 8 – Clearance Area Summary Table

Stage	Site	Species diversity score	Threatened Ecological community Score	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	SEB Points required	SEB payment	Admin Fee
1	VA1	12	1	0	0.1	24.10	5.69	137.13	1	143.99	$68,940.70	$3,791.74
2	VA1	12	1	0	0.1	24.10	0.27	6.51	1	6.83	$3,271.35	$197.92
2	VA2	8	1	0	0.1	12.98	26.01	571.15	1	599.71	$287,139.12	$15,792.65
3	VA1	12	1	0	0.1	24.10	1.79	43.14	1	45.30	$21,687.85	$1,192.83
3	VA2	2	1	0	0.1	1.72	0.43	9.44	1	9.91	$4,747.01	$261.09
3	VA3	12	1	0	0.1	47.26	6.29	44.33	1	46.54	$22,283.91	$1,225.62
						Total	**40.45**	**811.7**		**852.28**	**$408,069.94**	**$22,461.85**

Table 9 – Totals Summary Table

	Total Biodiversity score	Total SEB points required	SEB Payment	Admin Fee	Total Payment
Application	811.7	852.28	$408,069.94	$22,461.85	$430,531.79

Economies of Scale Factor	0.5
Rainfall (mm)	393

6 Significant Environmental Benefit

A SEB is required for approval to clear under Division 5 of the *Native Vegetation Regulations 2017*. The NVC must be satisfied that as a result of the loss of vegetation from the clearance that an SEB will result in a positive impact on the environment that is over and above the negative impact of the clearance.

ACHIEVING AN SEB

Indicate how the SEB will be achieved by ticking the appropriate box and providing the associated information:

☐ Establish a new SEB Area on land owned by the proponent.

☐ Use SEB Credit that the proponent has established. Provide the SEB Credit Ref. No. _____

☐ Apply to have SEB Credit assigned from another person or body. The application form needs to be submitted with this Data Report.

☐ Apply to have an SEB to be delivered by a Third Party. The application form needs to be submitted with this Data Report.

☒ Pay into the NVF.

PAYMENT SEB

The client intends to pay into the NVF, the amount of $430,531.79 (including administration fee of $22,461.85).

It is proposed clearance activity will be staged and occur in accordance with the QDP's as per **Drawing No. 5109.DRG.021A – Extraction Plan - Stage 1**, **Drawing No. 5109.DRG.023A – Extraction Plan - Stage 2** and **Drawing No. 5109.DRG.025A – Extraction Plan - Stage 3**. As such, Leinad intends to deliver the required offset payment of the appropriate monetary figure into the NVF prior to the commencement of each stage of the QDP as outlined within **Table 10 – SEB Summary**.

Table 10 – SEB Summary

Stage 1	Vegetation Association			Staged SEB Sub-Total
	1	2	3	
Impact Area (ha)	5.69	N/A	N/A	5.69
SEB Fund Payment	$68,940.70			$68,940.70
Administration Fee	$3,791.74			$3,791.74
Total Payment	$72,732.44			$72,732.44
Stage 2				
Impact Area (ha)	0.27	26.01	N/A	26.28
SEB Fund Payment	$3,271.35	$287,139.12		
Administration Fee	$197.92	$15,792.65		
Total Payment	$3,469.27	$302,931.77		$306,401.04
Stage 3				
Impact Area (ha)	1.79	0.43	6.29	8.51
SEB Fund Payment	$21,687.85	$4,747.01	$22,283.91	
Administration Fee	$1,192.83	$261.09	$1,225.62	
Total Payment	$22,880.68	$5,008.10	$23,509.53	$51,398.31
Total SEB Payment				**$430,531.79**

It should be noted that the vegetation clearance SEB offset strategy will be implemented over the course of the long-term quarry development.

DRAWINGS

255000E

258000E

261000E

6183000N

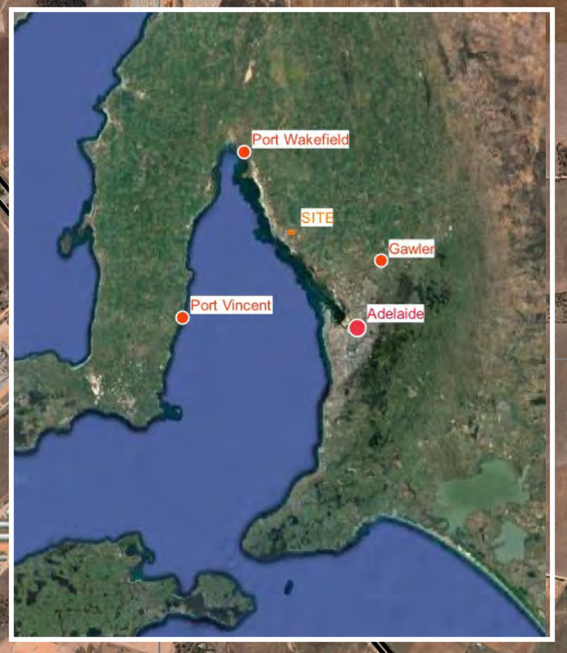
6180000N

Dublin

MC 4557

PORT WAKEFIELD
PORT WAKEFIELD

Adelaide International Bird Sanctuary National Park-Winaityinaityi Pangkara



REV	DESCRIPTION	DATE	BY

Data Sources:
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Topography: UAV Survey 2022-06-02
Cadastre: Data.sa.gov.au; Boundaries are Indicative only, not all boundaries shown
Ecosystem:
Other: SARIG, 2023

Legend:
- CONSERVATION_NpwsaReserves_GDA2020
- MC 4557
- Towns
- Highway Roadline

N

PROJECT: Dublin

CLIENT: Leinad Land Management Pty Ltd

TITLE: Site Location map

GROUNDWORK plus
PH +61 3871 0411
WWW.GROUNDWORKPLUS.COM.AU

SCALE: 1:26,000 When Printed On A3 (0 100 200 300 400 m)

DRAWING NUMBER: 5109.DRG.010

REVISION:

DATE: 20-February-2023 DRAWN: MB

PRINTED: 20-February-2023 CHECKED: MD

DATUM: HORIZONTAL / VERTICAL / ZONE: MGA / AHD / 54

EPSG:7854

256000E

258000E

6182000N

6182000N

256000E

258000E

REV	DESCRIPTION	DATE	BY

Data Sources:
Photography: UAV Survey 10 May 2023; Google Satellite Imagery accessed: 31-August-2023
Topography: UAV Survey 10 May 2023
Cadastre: Data.sa.gov.au;Boundaries are Indicative only, not all boundaries shown

Legend:

- MC 4557
- Stage 1
- Stage 2
- Stage 3
- Nitrebush Shrubland
- Maireana +/- Nitrebush shrubland with emergent Eucalyptus
- Degraded Maireana Shrubland
- Eucalyptus Woodland
- Samphire Salt Flats
- Google Satellite

N

PROJECT: Dublin Quarry

CLIENT: Leinad Land Management Pty Ltd

TITLE: Native Vegetation Clearance Proposal Map

GROUNDWORK plus

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WWW.GROUNDWORKPLUS.COM.AU

SCALE: 1:9,000 When Printed On A3

0 40 80 120 160 m

DRAWING NUMBER: 5109.DRG.028

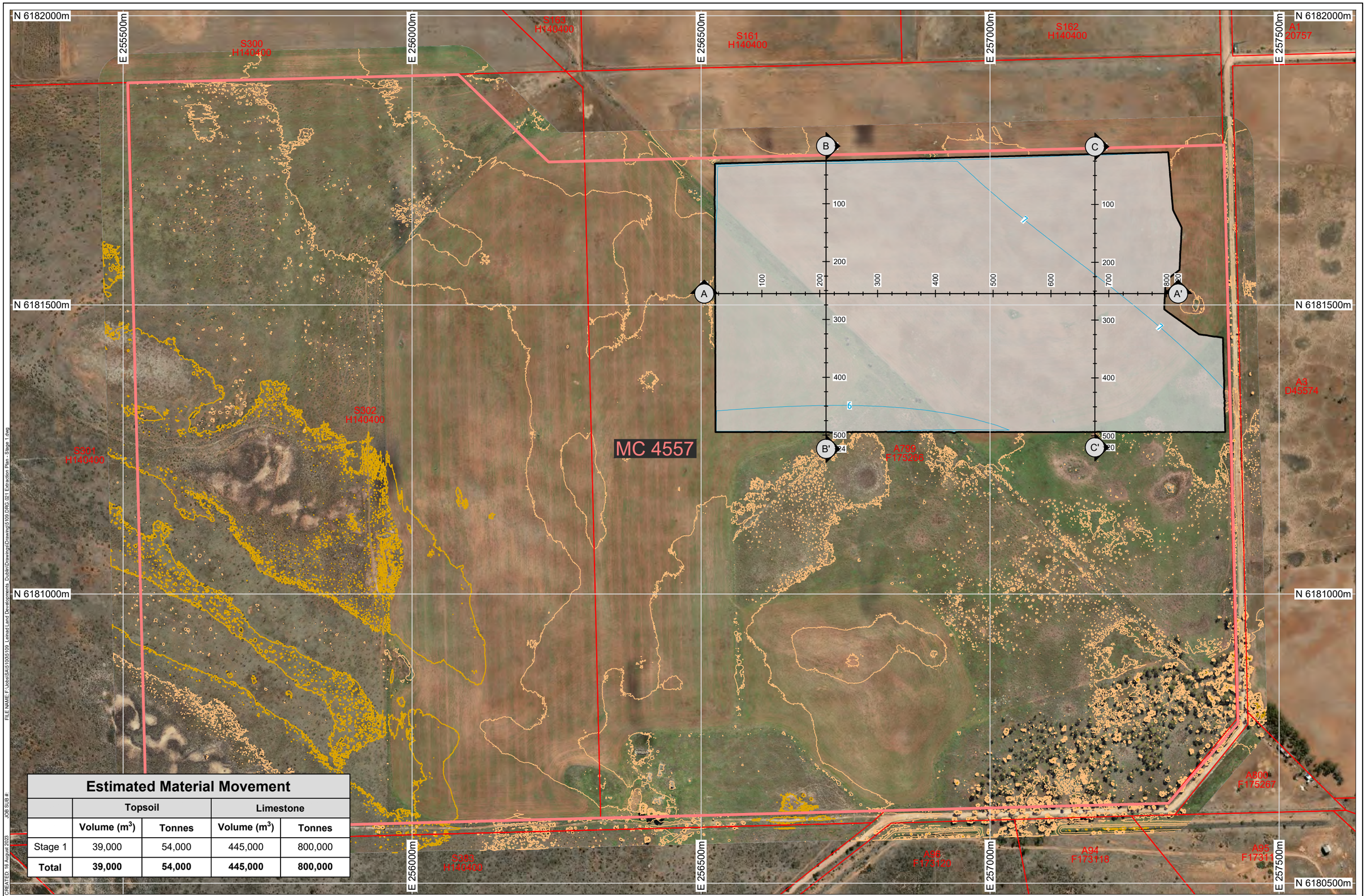
REVISION:

DATE: 31-August-2023 DRAWN: LJ

PRINTED: 31-August-2023 CHECKED:

DATUM: HORIZONTAL / VERTICAL / ZONE EPSG:7854

MGA / AHD / 54



Estimated Material Movement

	Topsoil		Limestone	
	Volume (m^3)	Tonnes	Volume (m^3)	Tonnes
Stage 1	39,000	54,000	445,000	800,000
Total	**39,000**	**54,000**	**445,000**	**800,000**

REV	DESCRIPTION	DATE	BY

Data Sources:
Photography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre: © The Government of South Australia (DIT) 2021
Ecosystem:
Other: © 2023 Microsoft Corporation; © 2023 Maxar; © CNES (2023) Distribution Airbus DS

Legend:
- Cadastral Boundary
- Mineral Claim
- Current Stage Extraction Area

PROJECT: Dublin Pit

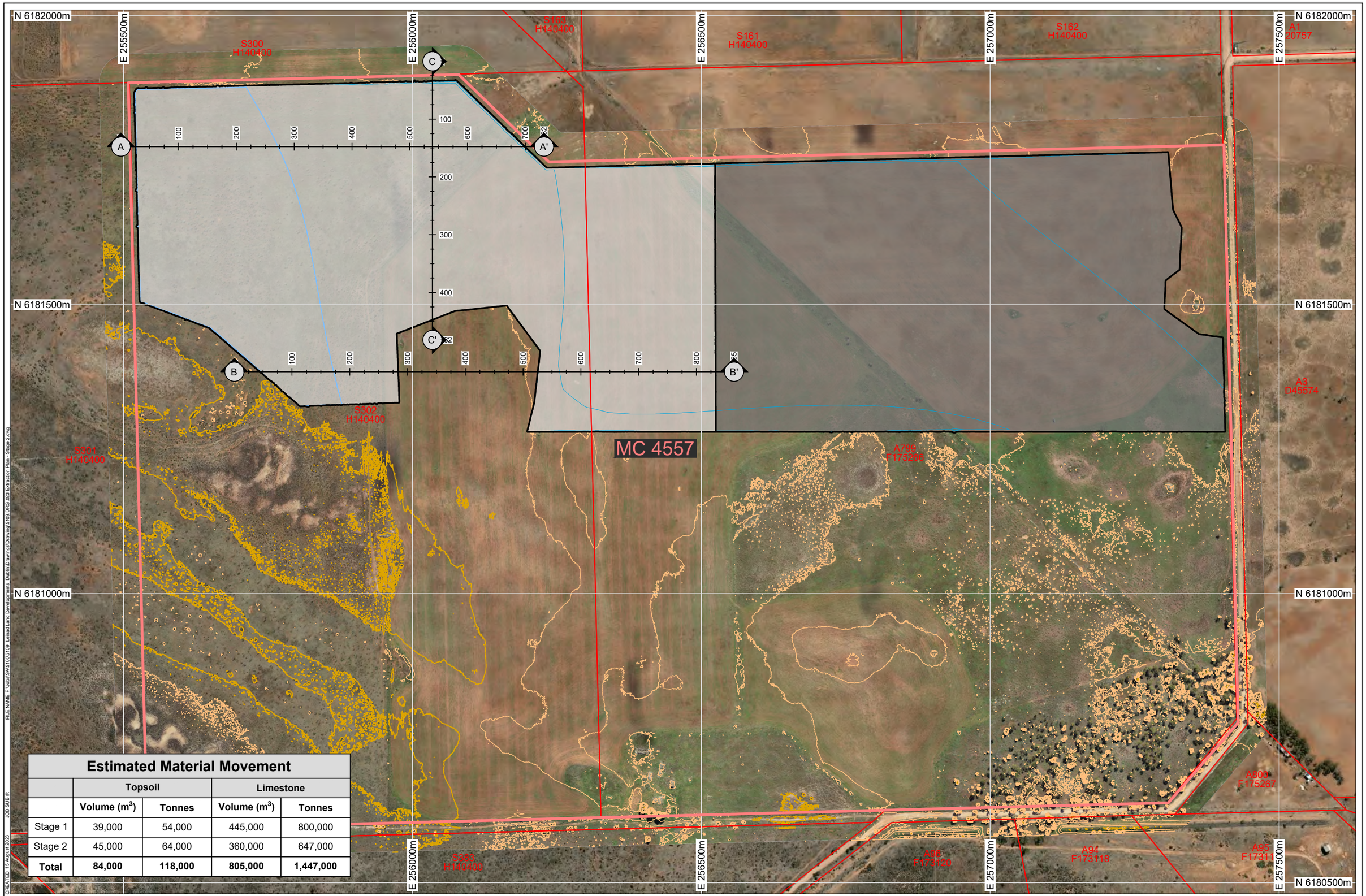
CLIENT: Leinad Land Management Pty Ltd

TITLE: Extraction Plan - Stage 1

GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:6,000 When Printed On A3 (0 — 120m)
DRAWING NUMBER: 5109.DRG.021A
REVISION:
DATE: 16 August 2023 DRAWN: CP
PRINTED: 16 August 2023 CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE: GDA94 / MGA / AHD / 54

FILE NAME: F:\Jobs\SA\5100\5109_Leinad Land Developments_Dublin\Drawings\Drawing\5109.DRG.021.Extraction Plan - Stage 1.dwg
JOB SUB #:
CREATED: 16 August 2023



Estimated Material Movement

	Topsoil		Limestone	
	Volume (m^3)	Tonnes	Volume (m^3)	Tonnes
Stage 1	39,000	54,000	445,000	800,000
Stage 2	45,000	64,000	360,000	647,000
Total	**84,000**	**118,000**	**805,000**	**1,447,000**

REV	DESCRIPTION	DATE	BY

Data Sources:
Photography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre: © The Government of South Australia (DIT) 2021
Ecosystem:
Other: © 2023 Microsoft Corporation; © 2023 Maxar; © CNES (2023) Distribution Airbus DS

Legend:
- Cadastral Boundary
- Mineral Claim
- Current Stage Extraction Area
- Previous Stage Extraction Area

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Extraction Plan - Stage 2

GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:6,000 When Printed On A3 (0 – 120m)
DRAWING NUMBER: 5109.DRG.023A
REVISION:
DATE: 16 August 2023 DRAWN: CP
PRINTED: 16 August 2023 CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE: GDA94 / MGA / AHD / 54

FILE NAME: F:\Jobs\SA\5100\5109_Leinad Land Developments_Dublin\Drawings\Drawing\5109 DRG 023 Extraction Plan - Stage 2.dwg
JOB SUB #:
CREATED: 15 August 2023

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E 257000m
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N 6181500m
N 6181000m
N 6180500m

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S162 H140400
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S302 H140400
S301 H140400
A799 F175266
A800 F175267
A96 F173120
A94 F173118
A95 F17311
S303 H140400

MC 4557

D
B
B'
C
A
A'
C'
D'

100
200
300
400
500
600
700
800

Estimated Material Movement

	Topsoil		Limestone	
	Volume (m^3)	Tonnes	Volume (m^3)	Tonnes
Stage 1	39,000	54,000	445,000	800,000
Stage 2	45,000	64,000	360,000	647,000
Stage 3	35,000	49,000	243,000	438,000
Total	**119,000**	**167,000**	**1,048,000**	**1,885,000**

FILE NAME: F:\Jobs\SA\5100\5109 Leinad Land Developments Dublin\Drawings\Drawing\5109 DRG 025 Extraction Plan - Stage 3.dwg
JOB SUB #
CREATED: 15 August 2023

REV	DESCRIPTION	DATE	BY

Data Sources:
Photography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10
Topography: Groundwork Plus Pty Ltd UAV Survey, Captured 2023-05-10, 1m DSM
Cadastre: © The Government of South Australia (DIT) 2021
Ecosystem:
Other: © 2023 Microsoft Corporation, © 2023 Maxar, © CNES (2023) Distribution Airbus DS

Legend:
- Cadastral Boundary
- Mineral Claim
- Current Stage Extraction Area
- Previous Stage Extraction Area

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Extraction Plan - Stage 3

GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:6,000 When Printed On A3 — 0 — 120m
DRAWING NUMBER: 5109.DRG.025A
REVISION:
DATE: 16 August 2023 | DRAWN: CP
PRINTED: 16 August 2023 | CHECKED: MJ
DATUM: HORIZONTAL / VERTICAL / ZONE: GDA94 / MGA / AHD / 54

ATTACHMENTS

Attachment 1

Fauna Species List

Threatened or Introduced Animal Species Recorded or Observed (Native and Introduced)		Threatened Species				Introduced Species
Species	**Common Name**	**EPBC**	**SA**	**Past Record**	**Observed**	
Thinornis cucullatus cucullatus	Hooded Plover	VU	V	2013		
Coturnix ypsilophora australis	Brown Quail			2006		
Hieraaetus morphnoides	Little Eagle		V	2014		
Neophema elegans	Elegant Parrot		R	2020		
Turnix varius	Painted Buttonquail		R	2006		
Calidris canutus rogersi	Red Knot	sp	E	2012		
Calidris tenuirostris	Great Knot	CR	E	2012		
Pandion haliaetus cristatus	Eastern Osprey		E	**2014**		
Falco subniger	Black Falcon		R	**2014**		

Attachment 2

Environmental Protection and Biodiversity Conservation Act 1999 Protected Matters Report

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 13-Feb-2023

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	43
Listed Migratory Species:	61

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	97
Whales and Other Cetaceans:	8
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	4
Regional Forest Agreements:	None
Nationally Important Wetlands:	1
EPBC Act Referrals:	3
Key Ecological Features (Marine):	None
Biologically Important Areas:	4
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Acanthiza iredalei rosinae			
Slender-billed Thornbill (Gulf St Vincent) [67080]	Vulnerable	Species or species habitat may occur within area	In feature area
Botaurus poiciloptilus			
Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area	In feature area
Calidris canutus			
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris tenuirostris			
Great Knot [862]	Critically Endangered	Roosting known to occur within area	In buffer area only
Charadrius leschenaultii			
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area	In buffer area only
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area	In feature area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thinornis cucullatus cucullatus			
Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
FISH			
Seriolella brama			
Blue Warehou [69374]	Conservation Dependent	Species or species habitat known to occur within area	In buffer area only
Thunnus maccoyii			
Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In buffer area only
MAMMAL			
Eubalaena australis			
Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
Neophoca cinerea			
Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area	In buffer area only
Pteropus poliocephalus			
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
PLANT			
Caladenia tensa			
Greencomb Spider-orchid, Rigid Spider-orchid [24390]	Endangered	Species or species habitat likely to occur within area	In feature area
Pterostylis xerophila			
Desert Greenhood [7997]	Vulnerable	Species or species habitat may occur within area	In feature area
Senecio macrocarpus			
Large-fruit Fireweed, Large-fruit Groundsel [16333]	Vulnerable	Species or species habitat may occur within area	In feature area
Swainsona pyrophila			
Yellow Swainson-pea [56344]	Vulnerable	Species or species habitat may occur within area	In feature area
Tecticornia flabelliformis			
Bead Glasswort [82664]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
REPTILE			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
SHARK			
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Ardenna grisea Sooty Shearwater [82651]		Species or species habitat may occur within area	In buffer area only
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area	In buffer area only
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Migratory Marine Species			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area	In buffer area only
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In buffer area only
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat may occur within area	In buffer area only
Migratory Terrestrial Species			
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
[Arenaria interpres](#) Ruddy Turnstone [872]		Roosting known to occur within area	In buffer area only
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Roosting known to occur within area	In feature area
[Calidris alba](#) Sanderling [875]		Roosting known to occur within area	In buffer area only
[Calidris canutus](#) Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat known to occur within area	In feature area
[Calidris ruficollis](#) Red-necked Stint [860]		Roosting known to occur within area	In buffer area only
[Calidris subminuta](#) Long-toed Stint [861]		Roosting known to occur within area	In buffer area only
[Calidris tenuirostris](#) Great Knot [862]	Critically Endangered	Roosting known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area	In buffer area only
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area	In buffer area only
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Roosting known to occur within area	In buffer area only
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area	In feature area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area	In buffer area only
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area	In buffer area only
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In buffer area only
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area	In buffer area only
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area	In buffer area only
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area	In buffer area only
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area	In buffer area only
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area	In buffer area only
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area	In buffer area only
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area	In feature area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area	In buffer area only
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]		Species or species habitat may occur within area	In buffer area only
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area	In buffer area only
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area	In feature area
Calidris alba Sanderling [875]		Roosting known to occur within area	In buffer area only
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area overfly marine area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area overfly marine area	In buffer area only
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area overfly marine area	In buffer area only
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area overfly marine area	In buffer area only
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area	In buffer area only
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area overfly marine area	In buffer area only
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Roosting known to occur within area overfly marine area	In buffer area only
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area overfly marine area	In feature area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area overfly marine area	In buffer area only
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area overfly marine area	In buffer area only
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area	In feature area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area overfly marine area	In buffer area only
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area overfly marine area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In buffer area only
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area overfly marine area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area overfly marine area	In feature area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]		Species or species habitat likely to occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area overfly marine area	In buffer area only
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area	In buffer area only
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area	In buffer area only
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area	In buffer area only
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area overfly marine area	In buffer area only
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area	In buffer area only
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area overfly marine area	In buffer area only
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area overfly marine area	In buffer area only
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Species or species habitat may occur within area	In buffer area only
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Thinornis cucullatus as Thinornis rubricollis Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Thinornis cucullatus cucullatus as Thinornis rubricollis rubricollis Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In buffer area only
Tringa brevipes as Heteroscelus brevipes Grey-tailed Tattler [851]		Roosting known to occur within area	In buffer area only
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area overfly marine area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area overfly marine area	In feature area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area overfly marine area	In buffer area only
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area overfly marine area	In buffer area only
Fish			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area	In buffer area only
Campichthys tryoni Tryon's Pipefish [66193]		Species or species habitat may occur within area	In buffer area only
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area	In buffer area only
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In buffer area only
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area	In buffer area only
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area	In buffer area only
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area	In buffer area only
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area	In buffer area only
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area	In buffer area only
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area	In buffer area only
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area	In buffer area only
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In buffer area only
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area	In buffer area only
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area	In buffer area only
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In buffer area only
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area	In buffer area only
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area	In buffer area only
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In buffer area only
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In buffer area only
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area	In buffer area only
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Vanacampus margaritifer			
Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In buffer area only
Vanacampus phillipi			
Port Phillip Pipefish [66284]		Species or species habitat may occur within area	In buffer area only
Vanacampus poecilolaemus			
Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area	In buffer area only
Vanacampus vercoi			
Verco's Pipefish [66286]		Species or species habitat may occur within area	In buffer area only
Mammal			
Arctocephalus forsteri			
Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area	In buffer area only
Arctocephalus pusillus			
Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area	In buffer area only
Neophoca cinerea			
Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area	In buffer area only
Reptile			
Caretta caretta			
Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In buffer area only
Chelonia mydas			
Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Dermochelys coriacea			
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only

Whales and Other Cetaceans			[Resource Information]
Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			

Current Scientific Name	Status	Type of Presence	Buffer Status
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area	In buffer area only
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In buffer area only
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat may occur within area	In buffer area only
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In buffer area only
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In buffer area only

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State	Buffer Status
Adelaide International Bird Sanctuary - Winaityinaityi Pangkara	National Park	SA	In feature area
Unnamed (No.HA1164)	Heritage Agreement	SA	In buffer area only
Unnamed (No.HA687)	Heritage Agreement	SA	In buffer area only
Upper Gulf St Vincent	Marine Park	SA	In buffer area only

Nationally Important Wetlands [Resource Information]

Wetland Name	State	Buffer Status
Clinton	SA	In feature area

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Biologically Important Areas			
Scientific Name	Behaviour	Presence	Buffer Status
Seabirds			
Phalacrocorax fuscescens Black-faced Cormorant [59660]	Foraging	Known to occur	In buffer area only
Sternula nereis Fairy Tern [82949]	Foraging	Known to occur	In buffer area only
Whales			
Eubalaena australis Southern Right Whale [40]	Calving buffer	Known to occur	In buffer area only
Eubalaena australis Southern Right Whale [40]	Seasonal calving habitat	Known to occur	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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Attachment 3

Bushland Assessment Scoresheet

Bushland Assessment Scoresheets

(Version - 1 July 2020)

Block	Dublin
Size of Block (Ha)	224.000
Landscapes Region	Northern & Yorke
BCM Region	Northern Agricultural & Yorke Peninsula
IBRA Association	Mallala
IBRA Subregion	St Vincent

ASSESSOR(S)	LJ
DATE OF ASSESSMENT	16/06/2022

Map of the Block (Including the Sites)

Landscape Context Scores

% native veg. remaining in IBRA Assoc.	3
% native veg. remaining in IBRA subregion	8
0 - 10% = 0.05 pts; >10-20% = 0.04 pts; >20-30% = 0.03 pts; >30-60% = 0.02 pts; > 60 = 0 pts — **Score**	0.1

Score received for both IBRA assoc. and subregion then summed

Percent Vegetation Cover (5km radius) (%)	25
0-5% = 0 pts; >5-10% = 0.02 pts; >10-25% = 0.04 pts; >25-50% = 0.06 pts; >50-75% = 0.03 pt; >75-100% = 0 pts — **Score**	0.04

% native veg. protected IBRA Assoc.	2
0-10% = 0.03 pts; >10-20% = 0.02 pts; >20-40% = 0.01 pt; >40% = 0 — **Score**	0.03

Block Shape Cleared perimeter:Area (km/km2)	
Cleared Perimeter (m) =	431
Cleared Perimeter to area ratio	0.19
<6 = 0.03 pts; 6 to <12 = 0.02 pts; 12 to <18 = 0.01 pt — **Score**	0.03

Wetland or Riparian Habitat present	
Riparian zone present (Yes/No) = 0.02 pt	No
Swamp/wetland present (Yes/No) = 0.03 pts (Swamp/wetland may be +/- riparian zone)	Yes
Score	0.03

Note; Blocks will score a minimum Landscape Context Score of 1

LANDSCAPE CONTEXT SCORE (max 1.25)	**1.23**

Plant Species Recorded (Native and Introduced)		Listed Species			Natives only		
Species	**Common Name**	**EPBC**	**SA**	**Not in quadrat**	**Regen**	**Annual Herbs** Spring survey	**Introduced Species**
Nitraria billardierei	Nitre-bush						
Enchylaena tomentosa var.	Ruby Saltbush				Yes		
Maireana brevifolia	Short-leaf Bluebush						
Austrostipa sp.	Spear-grass						
Eucalyptus dumosa	White Mallee						
Salsola australis	Buckbush						
Tecticornia pergranulata ssp. pergranul	Black-seed Samphire						
Lycium ferocissimum	African Boxthorn						*
Romulea rosea var. australis	Common Onion-grass						*
Oxalis pes-caprae	Soursob						*
Cyperus rotundus	Nut-grass						*
Carthamus lanatus	Saffron Thistle						*
Malva parviflora	Small-flower Marshmallow						*
Carrichtera annua	Ward's Weed						*
Onopordum acaulon	Horse Thistle						*
Marrubium vulgare	Horehound						*
Sonchus oleraceus	Common Sow-thistle						*
Carpobrotus modestus/rossii	Native Pigface						
Sclerolaena obliquicuspis	Oblique-spined Bindyi						
Exocarpos aphyllus	Leafless Cherry						

Vegetation Condition Scores

SITE:	Dublin VA1
BCM COMMUNITY	NA 5 Mallee & Woodlands with Open Chenopod & Sclerophyll Shrub Understorey
VEGETATION ASSOCIATION DESCRIPTION	Nitraria billardierei open shrubland with emergent Eucalyptus dumosa
SIZE OF SITE (Ha)	0.27

Benchmarked attributes
(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	10
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	**12.0**
Number of regenerating native species	1
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	**3**

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Romulea rosea var. australis	3	2	6
Oxalis pes-caprae	3	3	9
Carrichtera annua	2	2	4
Lycium ferocissimum	1	4	4
Sonchus oleraceus	2	1	2
	Cover x Threat		25
Weed Score (max 15) from benchmark community			**3**

Native Plant Life Forms	**Cover rating**
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	
Mallee > 5m	1
Mallee < 5m	
Shrubs > 2m	1
Shrubs 0.5 - 2m	2
Shrubs < 0.5	1
Forbs	
Mat Plants	2
Grasses > 0.2m	
Grasses < 0.2m	1
Sedges > 1m	
Sedges < 1m	
Hummock grasses	
Vines, scramblers	
Mistletoe	
Ferns	
Grass-tree	
Total	8

Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2* **8.0**

Non-Benchmarked Attributes
(Scores determined from direct field observations)

Native:exotic Understorey biomass Score (max 5)	**4**

Is the community naturally treeless?	☐
Fallen Timber/Debris (max 5)	**2.5**
Hollow-bearing trees Score (max 5)	**1**
Mature Tree Score (max 8)	**2**
Tree Canopy Cover Score (max 5)	**0**

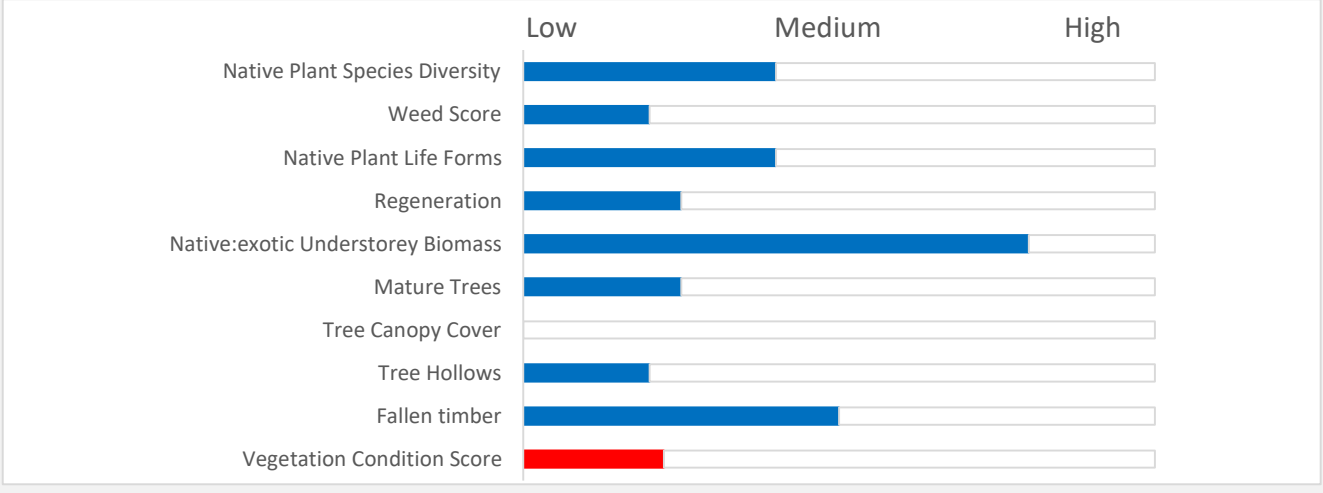
Vegetation Condition Score calculation

Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms Fallen timber/debris + Hollow-bearing trees

- If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24

- If the community is naturally treeless this score is multiplied by 1.29

	28.50
Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - Biomass score - Tree Canopy Cover Score)exp2/2)	30.00
VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80))	**17.81**



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	Yes/No
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) V**ulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score**	1

Number of Threatened Flora Species recorded for the site (within the site)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	0
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	0
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	**0**
Threatened Flora Score	0

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	2
State **Vulnerable** species observed or locally recorded (2.5 pt each)	1
State **Endangered** species observed or locally recorded (5 pt each)	1
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	1
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	1
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	**39.5**
Threatened Fauna Score	**0.1**

CONSERVATION SIGNIFICANCE SCORE	**1.1**

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	**1.23**
VEGETATION CONDITION SCORE	**17.81**
CONSERVATION SIGNIFICANCE SCORE	**1.10**

Vegetation Condition x Landscape Context x Conservation Significance =	
UNIT BIODIVERSITY SCORE	24.10
Total Biodiversity Score (Biodiversity Score x hectares)	6.51

Photo Point and Vegetation Survey Location	Direction of the Photo
	GPS Reference
	Datum
	Zone (52, 53 or 54)
	Easting (6 digits)
	Northing (7 digits)
	Description

What is the purpose of Assessment? Clearance SEB Area Other

Assessment for Clearance

Loss Factor	1.0
Loadings for clearance of protected areas	
Reductions for rehabilitation of impact site	
SEB Points required	**6.83**

Approximate hectares required	0.85
Economies of Scale Factor	0.5
Mean Annual rainfall for the site (mm)	363
Payment into the fund (GST Exclusive)	**$3,271.35**
Administration fee (GST Inclusive)	**$179.92**

Bushland Assessment Scoresheets

(Version - 1 July 2020)

Block	Dublin
Size of Block (Ha)	224.000
Landscapes Region	Northern & Yorke
BCM Region	Northern Agricultural & Yorke Peninsula
IBRA Association	Mallala
IBRA Subregion	St Vincent

ASSESSOR(S)	LJ
DATE OF ASSESSMENT	16/06/2022

Map of the Block (Including the Sites)

Landscape Context Scores

% native veg. remaining in IBRA Assoc.	3
% native veg. remaining in IBRA subregion	8
0 - 10% = 0.05 pts; >10-20% = 0.04 pts; >20-30% = 0.03 pts; >30-60% = 0.02 pts; > 60 = 0 pts — **Score**	0.1

Score received for both IBRA assoc. and subregion then summed

Percent Vegetation Cover (5km radius) (%)	25
0-5% = 0 pts; >5-10% = 0.02 pts; >10-25% = 0.04 pts; >25-50% = 0.06 pts; >50-75% = 0.03 pt; >75-100% = 0 pts — **Score**	0.04

% native veg. protected IBRA Assoc.	2
0-10% = 0.03 pts; >10-20% = 0.02 pts; >20-40% = 0.01 pt; >40% = 0 — **Score**	0.03

Block Shape Cleared perimeter:Area (km/km2)	
Cleared Perimeter (m) =	431
Cleared Perimeter to area ratio	0.19
<6 = 0.03 pts; 6 to <12 = 0.02 pts; 12 to <18 = 0.01 pt — **Score**	0.03

Wetland or Riparian Habitat present	
Riparian zone present (Yes/No) = 0.02 pt	No
Swamp/wetland present (Yes/No) = 0.03 pts (Swamp/wetland may be +/- riparian zone)	Yes
Score	0.03

Note; Blocks will score a minimum Landscape Context Score of 1

LANDSCAPE CONTEXT SCORE (max 1.25)	**1.23**

Plant Species Recorded (Native and Introduced)		Listed Species			Natives only		
Species	**Common Name**	**EPBC**	**SA**	**Not in quadrat**	**Regen**	**Annual Herbs** Spring survey	**Introduced Species**
Nitraria billardierei	Nitre-bush						
Enchylaena tomentosa var.	Ruby Saltbush						
Maireana brevifolia	Short-leaf Bluebush				Yes		
Austrostipa sp.	Spear-grass						
					Yes		
Salsola australis	Buckbush						
Lycium ferocissimum	African Boxthorn						*
Oxalis pes-caprae	Soursob						*
Cyperus rotundus	Nut-grass						*
Solanum elaeagnifolium	Silver-leaf Nightshade						*
Carrichtera annua	Ward's Weed						*
Romulea rosea var. australis	Common Onion-grass						*
Malva parviflora	Small-flower Marshmallow						*
Sonchus oleraceus	Common Sow-thistle						*
Dittrichia graveolens	Stinkweed						*
Chenopodium album	Fat Hen						*
Arctotheca calendula	Cape Weed						*
Marrubium vulgare	Horehound						*

Vegetation Condition Scores

SITE:	Dublin VA2
BCM COMMUNITY	NA 8 Coastal Plain Shrublands
VEGETATION ASSOCIATION DESCRIPTION	Nitraria billardierei shrubland
SIZE OF SITE (Ha)	0.43

Benchmarked attributes
(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	5
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	**8.0**
Number of regenerating native species	2
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	**4.5**

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Romulea rosea var. australis	3	2	6
Malva parviflora	2	1	2
Solanum elaeagnifolium	2	2	4
Lycium ferocissimum	2	4	8
Marrubium vulgare	2	3	6
	Cover x Threat		26
Weed Score (max 15) from benchmark community			**4**

Native Plant Life Forms	**Cover rating**
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	
Mallee > 5m	
Mallee < 5m	
Shrubs > 2m	
Shrubs 0.5 - 2m	2
Shrubs < 0.5	2
Forbs	
Mat Plants	
Grasses > 0.2m	
Grasses < 0.2m	1
Sedges > 1m	
Sedges < 1m	
Hummock grasses	
Vines, scramblers	
Mistletoe	
Ferns	
Grass-tree	
Total	5

Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2* **4.0**

Non-Benchmarked Attributes
(Scores determined from direct field observations)

Native:exotic Understorey biomass Score (max 5)	**3**

Is the community naturally treeless?	☑
Tree attributes not scored for treeless communities or communities with only emergent trees	

Vegetation Condition Score calculation

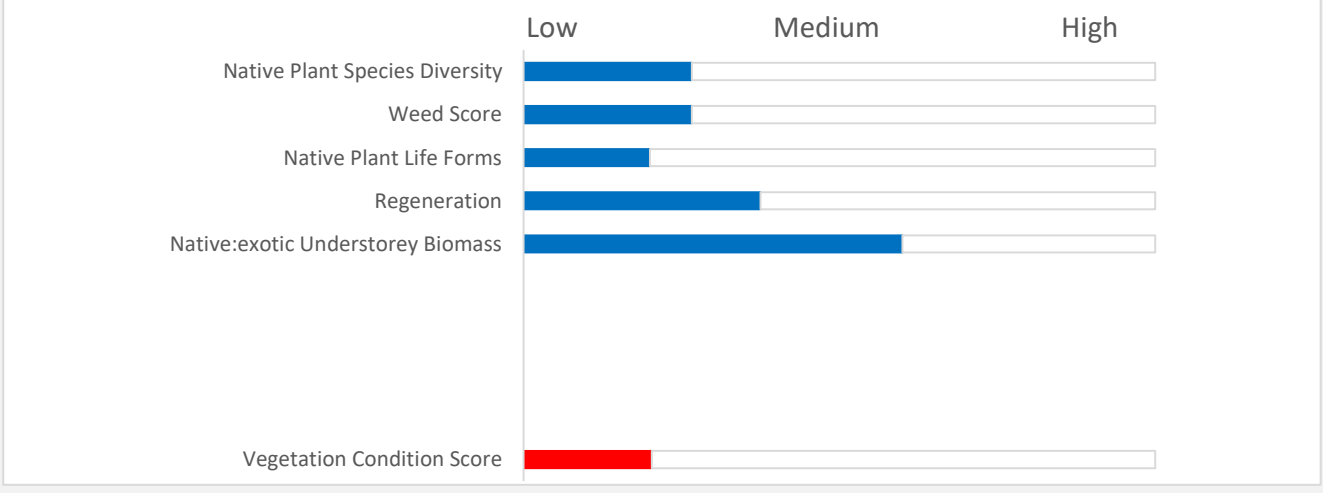
Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms Fallen timber/debris + Hollow-bearing trees

- If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24

- If the community is naturally treeless this score is multiplied by 1.29 21.29

Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - (Biomass score x 2))exp2/2) 19.00

VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80)) **16.23**



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	Yes/No
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) V**ulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score**	1

Number of Threatened Flora Species recorded for the site (within the site)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	0
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	0
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	**0**
Threatened Flora Score	0

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	2
State **Vulnerable** species observed or locally recorded (2.5 pt each)	1
State **Endangered** species observed or locally recorded (5 pt each)	1
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	1
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	1
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	**39.5**
Threatened Fauna Score	**0.1**

CONSERVATION SIGNIFICANCE SCORE	**1.1**

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	**1.23**
VEGETATION CONDITION SCORE	**16.23**
CONSERVATION SIGNIFICANCE SCORE	**1.10**

Vegetation Condition x Landscape Context x Conservation Significance =	
UNIT BIODIVERSITY SCORE	21.96
Total Biodiversity Score (Biodiversity Score x hectares)	9.44

Photo Point and Vegetation Survey Location	Direction of the Photo
	GPS Reference
	Datum
	Zone (52, 53 or 54)
	Easting (6 digits)
	Northing (7 digits)
	Description

What is the purpose of Assessment? Clearance SEB Area Other

Assessment for Clearance

Loss Factor	1.0
Loadings for clearance of protected areas	
Reductions for rehabilitation of impact site	
SEB Points required	**9.91**

Approximate hectares required	1.24
Economies of Scale Factor	0.5
Mean Annual rainfall for the site (mm)	363
Payment into the fund (GST Exclusive)	**$4,747.01**
Administration fee (GST Inclusive)	**$261.09**

Bushland Assessment Scoresheets

(Version - 1 July 2020)

Block	Dublin
Size of Block (Ha)	224.000
Landscapes Region	Northern & Yorke
BCM Region	Northern Agricultural & Yorke Peninsula
IBRA Association	Mallala
IBRA Subregion	St Vincent

ASSESSOR(S)	LJ
DATE OF ASSESSMENT	16/06/2022

Map of the Block (Including the Sites)

Landscape Context Scores

% native veg. remaining in IBRA Assoc.	3
% native veg. remaining in IBRA subregion	8
0 - 10% = 0.05 pts; >10-20% = 0.04 pts; >20-30% = 0.03 pts; >30-60% = 0.02 pts; > 60 = 0 pts — **Score**	0.1

Score received for both IBRA assoc. and subregion then summed

Percent Vegetation Cover (5km radius) (%)	25
0-5% = 0 pts; >5-10% = 0.02 pts; >10-25% = 0.04 pts; >25-50% = 0.06 pts; >50-75% = 0.03 pt; >75-100% = 0 pts — **Score**	0.04

% native veg. protected IBRA Assoc.	2
0-10% = 0.03 pts; >10-20% = 0.02 pts; >20-40% = 0.01 pt; >40% = 0 — **Score**	0.03

Block Shape Cleared perimeter:Area (km/km2)	
Cleared Perimeter (m) =	431
Cleared Perimeter to area ratio	0.19
<6 = 0.03 pts; 6 to <12 = 0.02 pts; 12 to <18 = 0.01 pt — **Score**	0.03

Wetland or Riparian Habitat present	
Riparian zone present (Yes/No) = 0.02 pt	No
Swamp/wetland present (Yes/No) = 0.03 pts (Swamp/wetland may be +/- riparian zone)	Yes
Score	0.03

Note; Blocks will score a minimum Landscape Context Score of 1

LANDSCAPE CONTEXT SCORE (max 1.25)	**1.23**

Plant Species Recorded (Native and Introduced)		**Listed Species**			Natives only		**Introduced Species**
Species	**Common Name**	**EPBC**	**SA**	**Not in quadrat**	**Regen**	**Annual Herbs** Spring survey	
Nitraria billardierei	Nitre-bush						
Enchylaena tomentosa var.	Ruby Saltbush						
Maireana brevifolia	Short-leaf Bluebush				Yes		
Austrostipa sp.	Spear-grass						
Pinus halepensis	Aleppo Pine						*
Salsola australis	Buckbush						
Tecticornia indica ssp. leiostachya	Brown-head Samphire						
Lycium ferocissimum	African Boxthorn						*
Oxalis pes-caprae	Soursob						*
Cyperus rotundus	Nut-grass						*
Solanum elaeagnifolium	Silver-leaf Nightshade						*
Carrichtera annua	Ward's Weed						*
Romulea rosea var. australis	Common Onion-grass						*
Malva parviflora	Small-flower Marshmallow						*
Sonchus oleraceus	Common Sow-thistle						*
Dittrichia graveolens	Stinkweed						*
Chenopodium album	Fat Hen						*
Arctotheca calendula	Cape Weed						*
Marrubium vulgare	Horehound						*

Vegetation Condition Scores

SITE:	Dublin VA3
BCM COMMUNITY	NA 8 Coastal Plain Shrublands
VEGETATION ASSOCIATION DESCRIPTION	Degraded Maireana Shrubland
SIZE OF SITE (Ha)	6.29

Benchmarked attributes
(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	6
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	**10.0**
Number of regenerating native species	1
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	**3**

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Romulea rosea var. australis	3	2	6
Malva parviflora	2	1	2
Solanum elaeagnifolium	2	2	4
Lycium ferocissimum	2	4	8
Marrubium vulgare	2	3	6
	Cover x Threat		26
Weed Score (max 15) from benchmark community			**4**

Native Plant Life Forms	**Cover rating**
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	
Mallee > 5m	
Mallee < 5m	
Shrubs > 2m	
Shrubs 0.5 - 2m	2
Shrubs < 0.5	2
Forbs	
Mat Plants	
Grasses > 0.2m	
Grasses < 0.2m	1
Sedges > 1m	
Sedges < 1m	
Hummock grasses	
Vines, scramblers	
Mistletoe	
Ferns	
Grass-tree	
Total	5

Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2* **4.0**

Non-Benchmarked Attributes
(Scores determined from direct field observations)

Native:exotic Understorey biomass Score (max 5)	

Is the community naturally treeless?	☑
Tree attributes not scored for treeless communities or communities with only emergent trees	

Vegetation Condition Score calculation

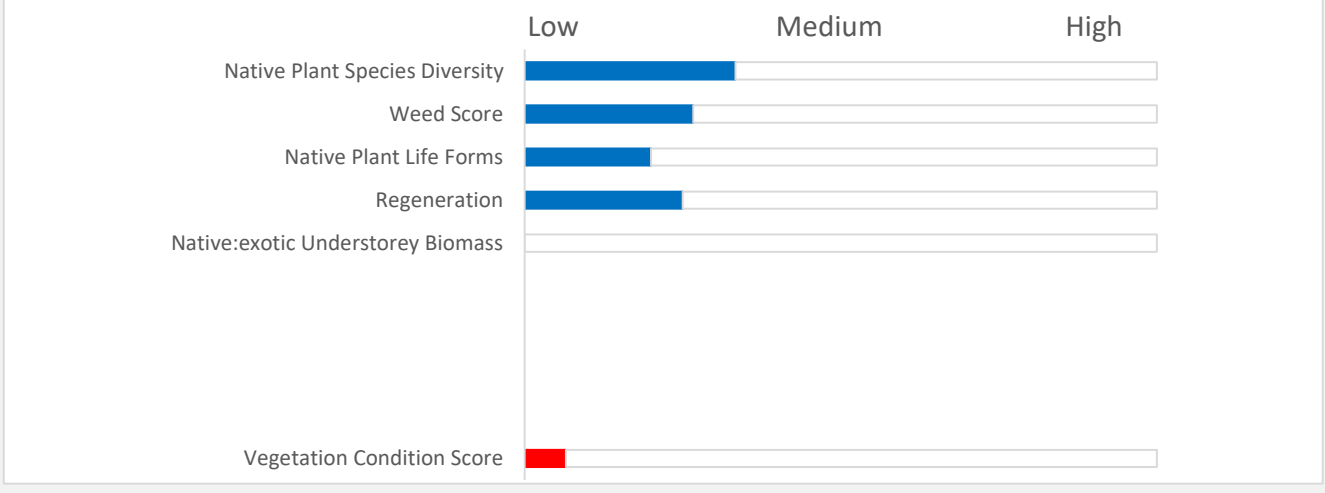
Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms Fallen timber/debris + Hollow-bearing trees

- If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24

- If the community is naturally treeless this score is multiplied by 1.29 21.93

Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - (Biomass score x 2))exp2/2) 61.00

VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80)) **5.21**



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	Yes/No
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) V**ulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score**	1

Number of Threatened Flora Species recorded for the site (within the site)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	0
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	0
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	**0**
Threatened Flora Score	0

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	2
State **Vulnerable** species observed or locally recorded (2.5 pt each)	1
State **Endangered** species observed or locally recorded (5 pt each)	1
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	1
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	1
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	**39.5**
Threatened Fauna Score	**0.1**

CONSERVATION SIGNIFICANCE SCORE	**1.1**

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	**1.23**
VEGETATION CONDITION SCORE	**5.21**
CONSERVATION SIGNIFICANCE SCORE	**1.10**

Vegetation Condition x Landscape Context x Conservation Significance =	
UNIT BIODIVERSITY SCORE	7.05
Total Biodiversity Score (Biodiversity Score x hectares)	44.33

Photo Point and Vegetation Survey Location	Direction of the Photo
	GPS Reference
	Datum
	Zone (52, 53 or 54)
	Easting (6 digits)
	Northing (7 digits)
	Description

What is the purpose of Assessment? Clearance | SEB Area | Other

Assessment for Clearance

Loss Factor	1.0
Loadings for clearance of protected areas	
Reductions for rehabilitation of impact site	
SEB Points required	**46.54**

Approximate hectares required	5.82
Economies of Scale Factor	0.5
Mean Annual rainfall for the site (mm)	363
Payment into the fund (GST Exclusive)	**$22,283.91**
Administration fee (GST Inclusive)	**$1,225.62**

Attachment 5

Visual Assessment Photographic Plates

Photo 1: PL 4 View looking south into MC taken from other structures approximately 1.1 km from northern boundary

Photo 2: PL 7 View looking south east into MC approximately 800 m from north western boundary of MC

Photo 3: PL 8 View south east into MC taken from residence and other structures located approximately 1.6 km north west

Photo 4: PL 9 View looking south east into the MC approximately 1.8 km north west of the MC boundary

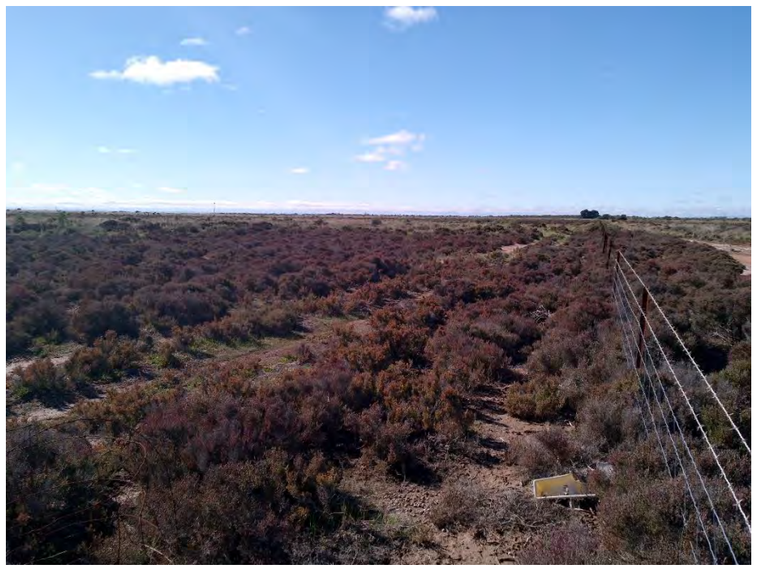


Photo 5: PL 5 View looking east north east taken from Thompsons Beach Road at the south west corner of MC boundary.

Photo 6: PL 5a View looking east north east taken from Thompsons Beach Road at the south west corner of MC boundary.

	Visual Assessment Photos		
Dublin Pit	GROUNDWORK p l u s	Date: May 10, 2023	Ref. 5109.610.004

Photo 7: PL 3 View looking south west from other structures located approximately 660 m from north eastern boundary along Thompsons Beach Road

Photo 8: PL 1 View looking west south west from residences located approximately 300 m along Thomspon Road

Photo 9: PL 6 View looking north from Port Prime Road approximately 340 m south of the MC boundary

Photo 10: PL 6a View looking north from Port Prime Road approximately 340 m south of the MC boundary

Photo 11: PL 2 View looking west north west from other structures located approximately 80 m from south east corner of MC boundary

	Visual Assessment Photos		
Dublin Pit	GROUNDWORK p l u s	Date: May 10, 2023	Ref. 5109.610.004

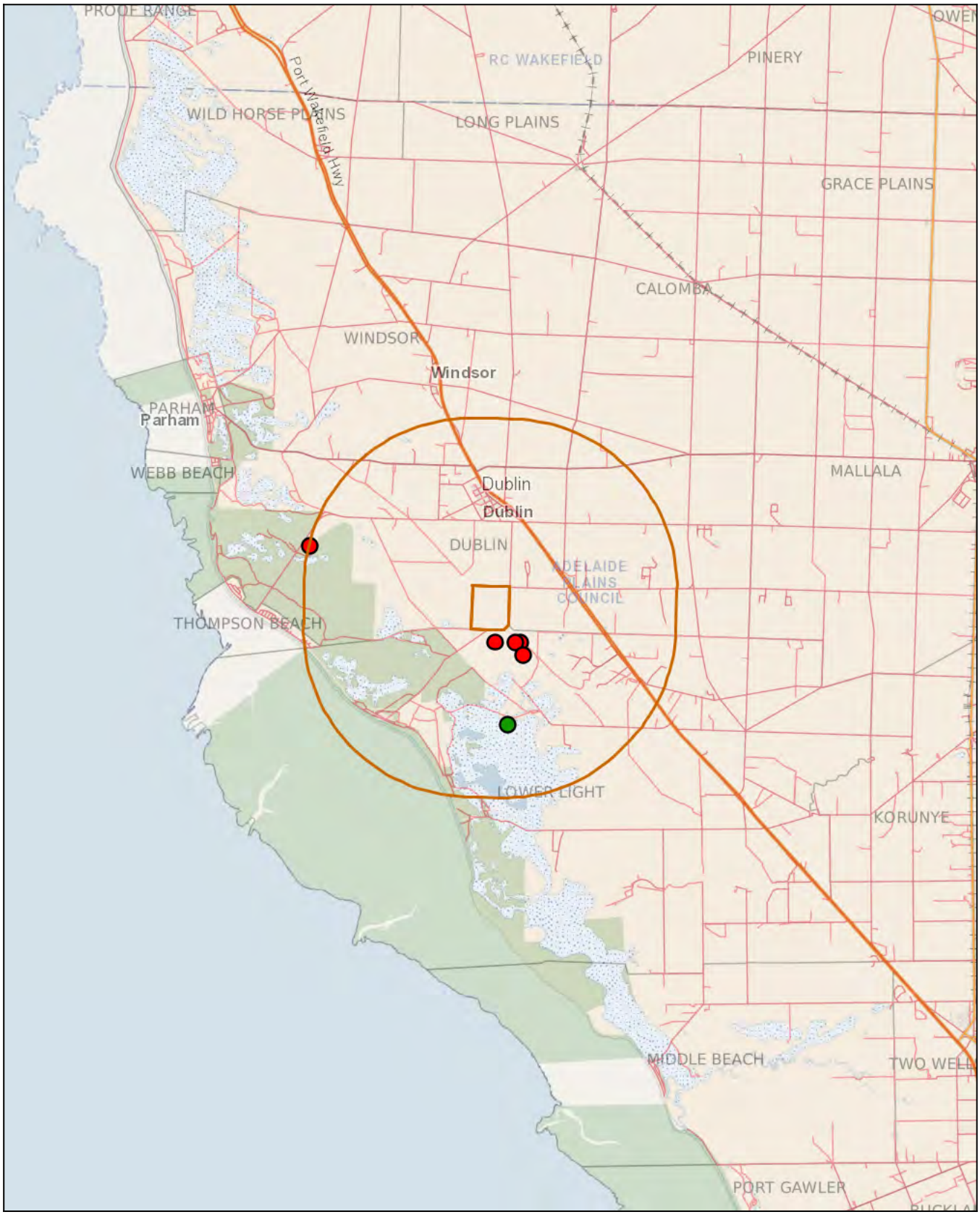
Attachment 6

Confidential - Aboriginal Heritage Sites Search

ABORIGINAL HERITAGE SITES

Government of South Australia

Reference Number:	4489
Buffer Distance (m):	5000



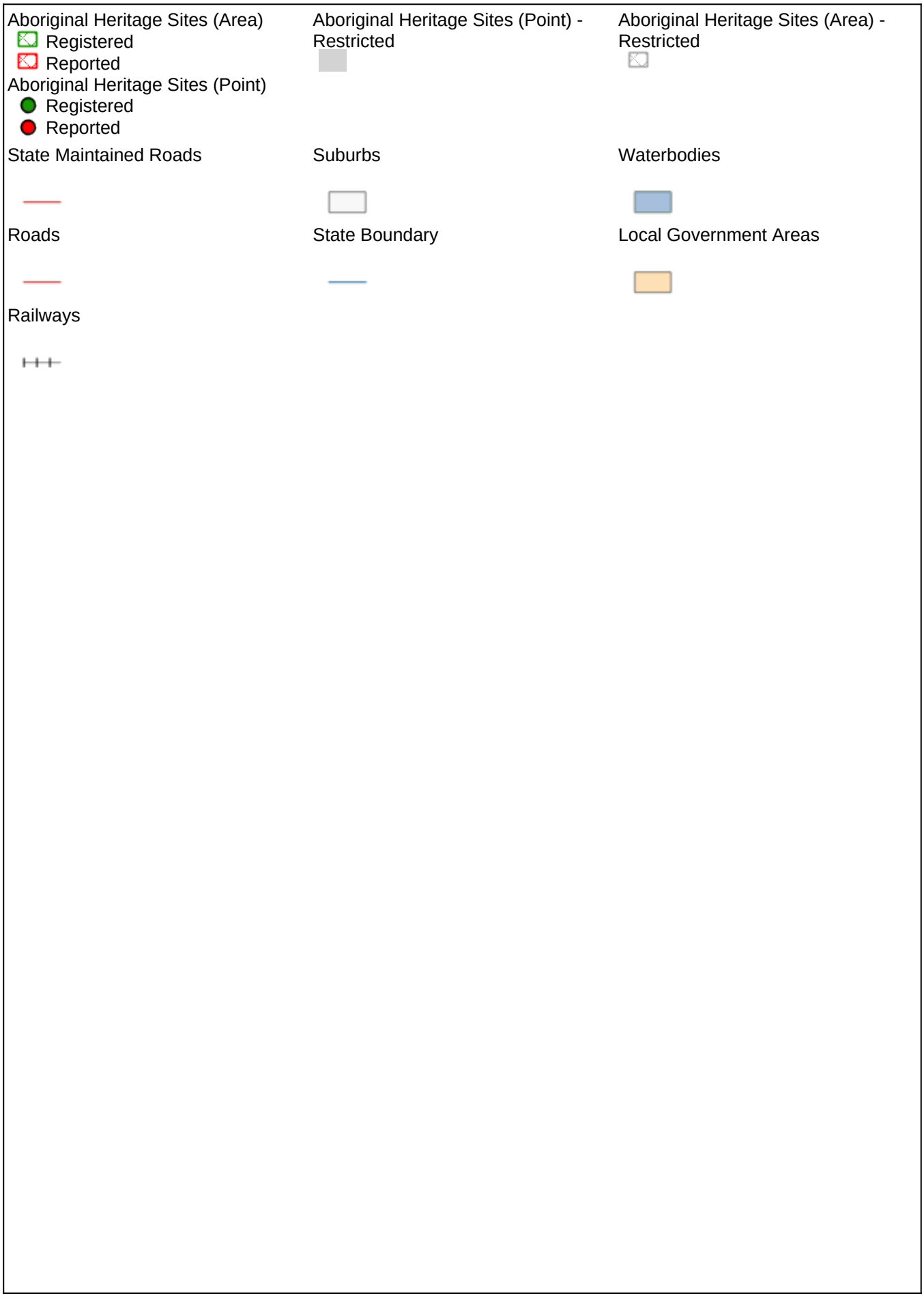
Metres 2,500 5,000 7,500

EPSG:3107 projection

Aboriginal Affairs and Reconciliation| Date: Thu Apr 20 2023 15:29:14 GMT+0930 (ACST)
Level 16, 30 Wakefield Street | GPO Box 464 Adelaide SA 5001
Tel (+61) 08 8303 0738 | www.agd.sa.gov.au | ABN 15 088 976 178

ABORIGINAL HERITAGE SITES

Government of South Australia



ABORIGINAL HERITAGE SITES

Government of South Australia

Mackenzie Bensch
Groundwork Plus
16 Second Street
Nuriootpa 5355 South Australia

Dear Mackenzie

Thank you for the search request dated 13 Feb 2023. The search was based on the title details - Title Type: CT, Volume: 5633, Folio: 660. The address for this parcel is: 25 RUSKIN RD DUBLIN SA 5501. Your reference is 4489.

I advise that the central archive, which includes the Register of Aboriginal Sites and Objects (the Register), administered by Aboriginal Affairs and Reconciliation (AAR), has entries for Aboriginal sites within 5000m of this location.

Cultural Heritage Sites (Point) in the property:

Map Number	Site Number	Site Type	Site Status
6528	2262	Burial	Registered
6529	4561	Archaeological	Reported
6529	4562	Archaeological	Reported
6529	4563	Archaeological	Reported
6529	4564	Archaeological	Reported
6529	5113	Archaeological	Reported

Cultural Heritage Sites (Area) in the property:

Map Number	Site Number	Site Type	Site Status
6529	4561	Archaeological	Reported
6529	4562	Archaeological	Reported
6529	4563	Archaeological	Reported

The enclosed map identifies the approximate site location. It should be noted however that the site indicator does not reflect the actual area of the site; as this will vary from site to site, depending on the site information contained in the Central Archive.

The applicant is advised that sites or objects may exist in the proposed development area, even though the Register does not identify them. All Aboriginal sites and objects are protected under the *Aboriginal Heritage Act 1988* (the Act), whether they are listed in the central archive or not. Land within 200 metres of a watercourse (for example the River Murray and its overflow areas) in particular, may contain Aboriginal sites and objects.

Pursuant to the Act, it is an offence to damage, disturb or interfere with any Aboriginal site, object or remains (registered or not) without the authority of the Premier. If the planned activity is likely to damage, disturb or interfere with a site, object or remains, authorisation of the activity must be first obtained from the Premier under Section 23 of the Act. Section 20 of the Act requires that any Aboriginal sites, objects or remains, discovered on the land, need to be reported to the Premier. Penalties apply for failure to comply with the Act. It should be noted that this Aboriginal heritage advice has not addressed any relevant obligations pursuant to the *Native Title Act 1993*.

Please be aware in this area there are Aboriginal groups/organisations/traditional owners that may have an interest. These may include:

Kaurna Yerta Aboriginal Corporation
Chairperson: Les Wanganeen

Government of South Australia

Address: C/- South Australian Native Title Services Level 4 345 King William Street ADELAIDE SA 5000
Telephone:
Email:
Contact Officer: Tom Jenkin
Telephone: 08 81102800
Email: tomj@nativetitlesa.org info@nativetitlesa.org

Terms and conditions for use of information derived from the central archive:

- Information derived from the central archives is confidential under section 10 of the *Aboriginal Heritage Act 1988* (the Act)
- Under section 35 of the Act, information derived from the central archives must not be divulged contrary to Aboriginal tradition unless authorised under these terms and conditions.
- Breaches of sections 10 and 35 of the Act may attract fines of up to $10,000 or imprisonment for 6 months.
- The Applicant agrees to use the confidential information solely for the approved purpose in line with the specified current or contemplated approved use, subject to any restrictions of use detailed on this request form.
- The Applicant agrees that they are only authorised to disclose or transfer the confidential information to parties listed on this form and in accordance with any restrictions of use detailed on this request form.
- The Applicant agrees that all confidential information must remain marked "confidential", including where the information is shared in accordance with the approved use detailed on this request form.
- The Applicant will keep all information derived from the central archives (either digital or hard copy) in a secure location/format.
- If there has been any unauthorised release or use of any information derived from the central archives other than for the approved purpose and/or approved use in accordance with the restrictions of use, the Applicant will notify AAR immediately.
- All information derived from the central archives (both digital and any hard copies) must be destroyed once no longer required for the approved purpose, unless an updated central archives access information request form has been approved by AAR.

If you require further information, please contact the Aboriginal Heritage Team on telephone (08) 8303 0738 or send to our generic email address AAR.HeritageSites@sa.gov.au

Yours sincerely,

HERITAGE INFORMATION TEAM
ABORIGINAL AFFAIRS & RECONCILIATION

20 April 2023

Attachment 7

Dublin Quarry Imported Fill Management Plan

GROUNDWORK PART OF SLR

Dublin Pit (EML 6560)

Imported Fill Management Plan

Prepared for: Leinad Land Management Pty Ltd

Date: August 2025

File Reference: 5109.610.010

DOCUMENT CONTROL

PROJECT / DETAILS REPORT

Document Title:	Dublin Pit (EML 6560) Imported Fill Management Plan and Recovered Products Plan
Principal Author:	Liam Opitz
Client:	Leinad Land Management Pty Ltd
Reference Number:	5109.610.010

DOCUMENT STATUS

Issue	Description	Date	Author	Reviewer
0	Initial Issue	August 2025	Liam Opitz	Matthew Jones

DISTRIBUTION RECORD

Recipient	
Department for Energy and Mining	1 x Electronic
Environment Protection Agency	1 x Electronic
Leinad Land Management Pty Ltd	1 x Electronic

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Phone: +61 8 8562 4158

Geotechnical Laboratory
Unit 78/109 Leitchs Road, Brendale Qld 4500
Phone: 0417 615 217

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Site Layout Map (Drawing No. 5109.DRG.006R2)

ATTACHMENTS

Attachment 1 Roads Master Specification – RD-PV-SA Supply of Pavement Materials
Attachment 2 Potentially Contaminating Activities Checklist

1 Executive Summary

Leinad Land Management Pty Ltd (Leinad) seek to receive and process Construction and Demolition (C&D) Waste (Mixed) and Waste Derived Fill (WDF) Waste Soil for use in rehabilitation activities of Extractive Minerals Lease (EML) 6560 known as the Dublin Pit. A Mining Lease Proposal (MLP) for Dublin Pit was approved by Department for Energy and Mining (DEM) on 1 April 2025, where the requirement for an Imported Fill Management Plan (IFMP) was outlined in order for Leinad to undertake WDF related activities and a Recovered Products Plan (RPP) for resale of recycled C&D Waste (mixed).

This IFMP / RPP has been developed to inform the development of an Environment Protection Agency (EPA) licence which will allow Leinad to undertake WDF related activities at Dublin Pit. Additionally, a Program for Environment Protection and Rehabilitation (PEPR) is currently under development for Dublin Pit. This IFMP / RPP will be incorporated into the development of the PEPR.

2 Introduction

2.1 Purpose of this Plan

The purpose of this IFMP / RPP is to provide the following details for approval by the EPA:

- For the receival of WDF, detail the acceptance criteria, handling, testing, records management and proposed use of the fill
- A detailed description of the wastes that are received, produced and recycled at the premises.
- The Quality Assurance (QA) / Quality Control (QC) processes that will ensure no unsuitable wastes are received and that the WDF produced for use as a WDF will be suitable.

2.2 Site Background

Groundwork Plus, Part of SLR (Groundwork) has been engaged by Leinad to undertake the development of an IFMP / RPP for WDF activities within EML 6560. The EML is located approximately 50 kilometres (km) north west of Adelaide, and approximately 2.8 km south of the township of Dublin in the Adelaide Plains region of South Australia (the Site).

The proposed quarry operations are intended to target the shallow limestone resource throughout the area and progressively backfill the quarry void with imported clean fill in accordance with the EPA *Standard for the Production and Use of Waste Derived Fill 2013*, establishing a landform that will support the existing use of the land for cropping and grazing whilst also supporting potential future development opportunities for the land.

The land is located within the South Australian Government Greater Adelaide Regional Plan (GARP) and the Adelaide Plains Council growth areas supporting the future development of the Adelaide Plains. Leinad own the land within and to the north of the Site of which strategic planning has commenced for the establishment of a Dublin Green Circular Economy Precinct. An Urban Framework Plan has been developed to guide the long-term and staged development of the new precinct which is proposed to establish an employment zone incorporating the Site and the land north of the Site. With this in mind, the conceptual final landform for the Site has been designed in consideration of the potential future development within and adjacent to the Site, of which the land use within the Site may be varied to commercial and industrial activities in support of the employment zone following the outcomes of a Code Amendment under the *Planning Development and Infrastructure Act 2016*.

2.3 Site Details

The details of the WDF producer and user are outlined below in **Table 1 – Registered Details**

Table 1 – Registered Details

Registered Name	Leinad Land Management Pty Ltd
ABN	67 662 299 461
Primary Location	55 Stanbel Road, Salisbury Plain, South Australia 5109

The Tenement details for Dublin Pit are outlined below in **Table 2 – Tenement Details**.

Table 2 – Tenement Details

Tenement Number	EML 6560
Tenement Holder / Operator	Leinad Land Management Pty Ltd
Registration Grant Date	14/04/2025
Expiry Date	13/04/2039
Legal Area	224.13 ha
Certificate of Title	CT 5633/660
	CT 5593/253

Table 3 – Authorised Contact Personnel Details outlines the authorised contact details for the Site.

Table 3 – Authorised Contact Personnel Details

Contact Name / Position	Frank Vouansis -Director
Phone Number	0439 966 443
Postal Address	36 Fullarton Road, Norwood SA
Email	frank@leipzig.com.au
Contact Name / Position	Daniel Palumbo – Director
Phone Number	0438 289 903
Postal Address	55 Stanbel Road, Salisbury Plains SA
Email	Daniel.palumbo@palumbo.com.au

2.3.1 Hours of Operation

The hours of operation for Dublin Pit are outlined below within **Table 4 – Hours of Operation** Receiving and processing of C&D Waste (mixed) and Waste Soil will occur within these hours.

Table 4 – Hours of Operation

Activity	Day	Hours
General quarry operations including crushing, screening, sales and maintenance.	Monday – Saturday	6:00 am – 6:00 pm
	Sunday (when required)	
Sales, transport and ancillary operations (outside of general quarry operations above (if required))	Monday – Sunday	6:00 pm – 10:00 pm

2.4 Roles and Responsibilities

Leinad has the following responsibilities regarding the receival and reprocessing of C&D Waste (mixed) and Waste Soil onsite:

- Ensuring that all material received meets the relevant requirements within the EPA *Standard for the Production and use of Waste Derived Fill, October 2013* (EPA WDF Standard). This is to be completed through appropriate sampling by a suitably qualified professional.
- In the case that the materials classified as not suitable for reuse or prohibited materials are received at the Site, ensuring that they are isolated, separated and appropriately transported to an EPA authorised facility for disposal.

The Site will be staffed by Leinad employees and suitably qualified site personnel.

2.5 HSE Procedures and Emergency Management

The Site will have an Emergency Preparedness and Response Plan in place. Leinad has a company wide safety portal – SafetyPal for People that manages a wide range of safety documentation, procedures and policies such as:

- HSEQ Policy
- Privacy Policy
- Drug and Alcohol Policy
- Code of Conduct
- Rehabilitation Policy
- Issue Resolution Policy
- Smoke Free Policy
- Heat Management Policy
- Integrated Management Policy.
- Infectious & Communicable Disease Policy.

2.6 Market Demand

The purpose for receiving C&D Waste (mixed) onsite is to support long-term product security, in addition to use for internal quarry development such as haul road development and progressive rehabilitation. Material intended to be received comprises of asphalt profiling, concrete (non-asbestos) and bricks.

3 Material Descriptions

The Site intends to receive the following products for processing, onsite reuse or sale of recycled materials. These waste products are defined under the EPA Guideline *842/19 – Waste definitions*.

3.1 Products to be Received

3.1.1 Waste Derived Fill (Waste Soil)

Waste soil (for direct reuse) which has been excavated at sites where it is no longer required or managed, it is intended to be imported into the Site as WDF (Waste Soil) for use in progressive rehabilitation to achieve the final landform as defined by the approved development plans and PEPR.

Waste soil is defined as material consisting of soil, clay, rock, sand or other natural mineralogical matter. Imported waste soil intended for re-use as WDF must not exceed the Intermediate Waste Soil (IWS) criteria as outlined in Appendix 2 of the EPA WDF Standard. Additionally, imported Waste Soil is to meet the criteria outlined within **Section 4.1.2.1 Acceptance Criteria**.

3.1.2 C&D Waste (mixed)

The Site seeks to receive C&D Waste (mixed) comprising of asphalt profiling, concrete (non-asbestos) and bricks for recycling to produce recycled aggregate products for sale or to be used internally for haul road development and use within progressive rehabilitation areas. It is noted that asphalt profiling is not intended to be implemented within progressive rehabilitation, instead only utilised for haul road development. Under the EPA Guideline *842/19 – Waste Definitions*, the material to be received aligns with the C&D Waste (mixed) classification as it will be able to contain up to five (5) to 25 percent of foreign materials per load. In this context, foreign materials include plastics, electrical wiring, timber, paper, insulation, tins, packaging and other wastes associated with construction or demolition of a building or infrastructure. It does not include municipal solid waste, commercial and industrial waste (general), listed waste, hazardous waste or radioactive waste. Green waste is listed as a foreign material; however, it is not intended to receive green waste on the Site.

Bitumen that is known or suspected to be from before the late 1960s will not be received at the Site. This material potentially contains coal tar and other tar distillates which pose high risk of contamination due to high polyaromatic hydrocarbons (PAH) content in some asphalt pavements.

The volume of C&D Waste (mixed) to be received at the Site is subject to market demand. However, the volume of material to be received to the Site is estimated to be approximately 40,000 tonne per annum (t/a).

3.2 Prohibited Materials

Leinad are responsible for ensuring that prohibited wastes are not received at the Site, refer to **Section 4 Resource Management** for a description of how this will be achieved. The following prohibited materials will not be received at the Site (but not limited to):

- Asbestos and products containing asbestos
- Biosolids or liquid waste

- Green waste and compostable organic waste
- Contaminated materials
- Commercial and industrial wastes
- Domestic waste
- Hazardous waste
- Radioactive waste
- Quarantine waste
- E-waste
- Scheduled waste

3.3 Products to be Sold and Example Output Specifications

The Site is seeking to receive C&D Waste (mixed) to produce products which will support market supply as well as products for internal haul road development and progressive rehabilitation in allowable areas.

The following recycled material products are proposed to be produced from C&D Waste (mixed) at the Site:

- Recycled aggregate product, specifically PM 220 recycled grade aggregate for supply to market.
- Recycled 20 millimetre (mm) non-specification aggregate supplied to market and used for onsite haul road development.

The PM 220 recycled materials provided to the market are tested and are to meet the Class 2 Recycled Pavement Material specifications as per the Department for Infrastructure and Transport's Roads Master Specification (RD-PV-S1 Supply of Pavement Materials) (July 2022) (refer **Attachment 1 – Roads Master Specification – RD-PV-S1 Supply of Pavement Materials**). Product specification reports from materials produced onsite can be provided upon request.

4 Resource Management

Management of all Waste Soil and C&D Waste (mixed) materials received at the Site is subject to the requirements under Section 5.2 and Section 5.3 respectively of the EPA *Standard for the Production and use of Waste Derived Fill*.

4.1 Receival Procedure

4.1.1 Material Testing

Sampling and assessment of the C&D Waste (mixed), where required, will occur at the source where it was generated prior to it being transported to the Site for reuse and recycling. The Site will not receive waste soil or C&D Waste (mixed) from sites where a Potentially Contaminating Activity (PCA) is known to exist.

If asphalt profiling material is suspected as being from earlier than the late 1960s, potentially containing coal tar and other tar distillates, it will be rejected and diverted to an EPA licenced facility. If suspected after acceptance into the Site, the material will need to be isolated and tested as tar free or transported to an EPA licenced facility.

4.1.2 Upon Receipt

At the time of receipt of any material to the Site, a WDF Form will be obtained from the waste generator and / or transporter. A designated area at the Site entrance will be utilised in order to safely check and inspect incoming waste loads prior to being stockpiled in order to minimise the risk of contamination. If a waste load is suspected of being contaminated, the waste load will be rejected. A simplified flowchart of the material receipt process is outlined below in **Figure 1 - Simplified Waste Receipt Process**.

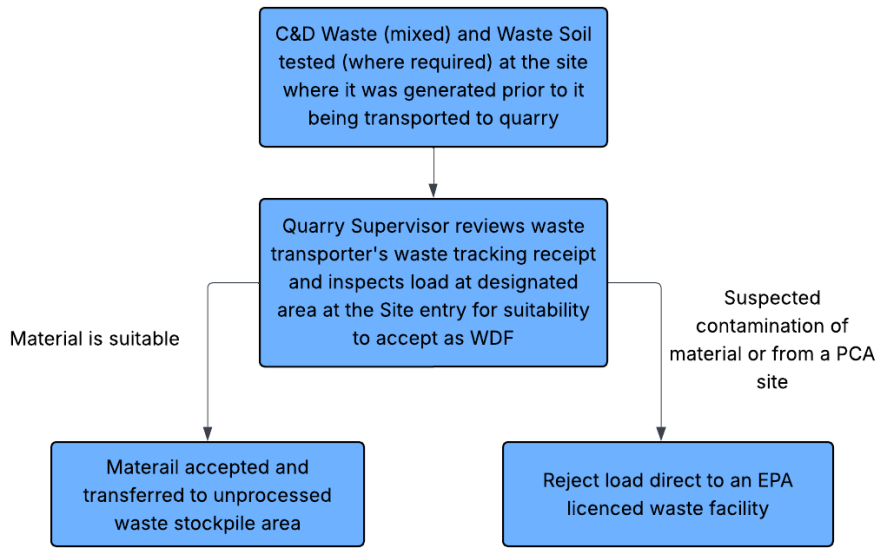

Figure 1 - Simplified Waste Receipt Process

4.1.2.1 Acceptance Criteria

During the inspection of C&D Waste (mixed) loads which is to take place prior to stockpiling, the foreign material content is to be less than 25 percent of the total per load. Additionally, the material is not to be accepted if it is being received from a known contamination site.

WDF (Waste Soil) received onsite must meet the following criteria in order to be used for landform rehabilitation:

- Consist of soil, clay, rock, sand or other natural mineralogical matter
- The material must not contain any other wastes
- The material must not require any processing onsite
- The material must not be IWS
- The material must not include industrial residues, asphalt or asphalt inclusions
- For material being used in rehabilitation zero (0) to one (1) m below the final landform surface:
    - Maximum 100 mm particle size
- For material greater than one (1) m below the final landform surface:
    - Maximum 500 mm particle size for clean fill
    - Can contain crushed and clean concrete and bricks
- Natural rock particles within the material are to be a maximum size of 500 mm.

4.1.3 Transportation, Segregation and Sorting

Transport of waste will be via road truck from an external party to the Site. As mentioned in **Section 4.1.2 Upon Receipt**, a designated inspection area at the entrance of the Site will be utilised to safely check and inspect incoming truck loads prior to stockpiling the material in order to minimise the risk of contamination.

Stockpiles of unprocessed waste will be physically separated from stockpiles of processed waste. Refer to **Section 5 Stockpile Management Plan**.

4.1.4 Processing

The C&D Waste (mixed) material containing concrete (non-asbestos) and bricks, has approximately 10 percent asphalt profiling material added to it and virgin quarry material (20 mm non-spec aggregate). This goes through the crusher on Site to produce a recycled 20 mm non-spec recycled aggregate. This aggregate has virgin quarry sand added to it through the pug mill processing to produce a PM 220 recycled aggregate, and a 20 mm non-spec material which Hallett Resources sells to the market. Refer to Figure 2 – Processing diagram of C&D Waste (mixed) for details.

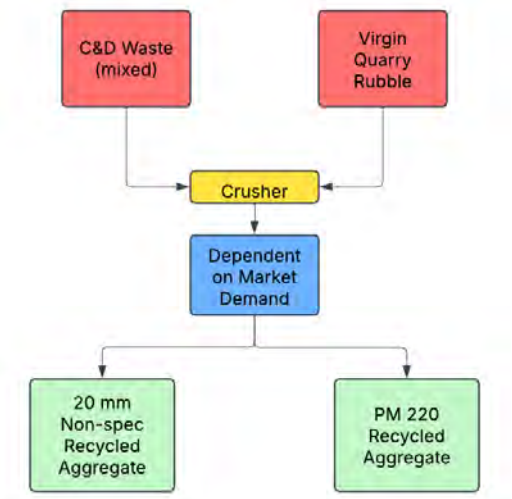

Figure 2 – Processing diagram of C&D Waste (mixed)

4.1.5 Storage and Management

Received C&D Waste (mixed) and WDF (Waste Soil) materials will be stored onsite in stockpiles, where they will remain until ready to be processed / used for rehabilitation. Following the processing outlined within **Section 4.1.4 Processing**, the C&D Waste (mixed) material will be stockpiled in a separate location until required for their associated use. Storage and management of C&D Waste (mixed) and WDF (Waste Soil) will be undertaken as follows:

- For C&D Waste (mixed), kept onsite for a maximum of 12 months and separated from virgin products.
- For Waste Soil, kept in stockpiles onsite for a maximum of six (6) months before being used in rehabilitation.
- Stored in accordance with **Section 5 Stockpile Management Plan**, and in accordance with *EPA Guideline for Stockpile Management* (October 2020).

4.2 Sale

Refer to **Section 3.3 Products to be Sold and Example Output Specifications**.

4.2.1 Compliance of Product

Confirmation of suitability, including any required testing, must occur prior to transfer from the place it is produced to the Site. Product sampling and testing will be undertaken in batches depending upon the market requirements. The sampling will be undertaken at a suitably qualified independent laboratory.

4.3 Storage and Stockpiles

Volumes of stockpiles vary based on market demand. Imported materials will be stored and stockpiled in accordance with **Section 5 Stockpile Management Plan**.

4.4 Control and Management Strategies

As per the PEPR currently under development, the Site will adhere to the following control and management strategies regarding receival of Waste Soil and C&D Waste (mixed):

- All WDF material accepted into Site for use in rehabilitation must meet EPA Standard for the Production and Use of WDF (October 2013).
- Maintain records and details of receipt of all WDF fill material including source site, volume, and contractor / company.
- Undertake visual Inspections Waste Soil loads entering the Site and refuse material which does not meet WDF criteria.
- Acceptance of additional WDF 'Waste Soil' must be accompanied by written, signed, and dated certification from a suitably qualified person stating that the waste constitutes Waste Fill when it exceeds 100 t from a single source site unless otherwise approved by the EPA in writing.
- The receipt of WDF will be undertaken in accordance with the EPA Standard for the Production and Use of WDF.
- All C&D Waste (mixed) recycling undertaken in accordance with the provisions of an approved Recycling Depot EPA Licence and associated plans.

Further control measures are described within **Section 8 Environmental Management Measures**.

5 Stockpile Management Plan

5.1 Stockpile Management Requirements

Volumes of stockpiles at the Site may vary dependent on market demand. As per the EPA *Standard for Stockpile Management*, C&D Waste (mixed) will be required to be stored within an undercover enclosed facility with appropriate ventilation and access, contained on a sealed and bunded surface.

Waste Soil will not be required to be stored within an undercover enclosed facility; however, appropriate management procedures are to be still implemented.

Stockpiles of C&D Waste (mixed) will not be kept onsite for any longer than 12 months before being reprocessed into recycled products for market or internal supply.

Waste Soil will not be stored in stockpiles onsite for any longer than six (6) months before being used for rehabilitation. Waste Soil imported to the Site will be placed in stockpiles within the extraction area, varying between five (5) and 10 m in height. The waste soil will be applied to progressive rehabilitation as soon as those areas become available.

Stockpile management and control measures for quarrying operations undertaken at the Site are outlined within the PEPR currently under development. Details of control measures to be implemented at the Site for stockpiling of imported fill are outlined within **Table 5 – Imported Fill Stockpile Management Control Measures**.

Table 5 – Imported Fill Stockpile Management Control Measures

Objective	Minimise the potential for adverse impacts to the environment as a result of incorrect management of C&D Waste (mixed) and WDF (Waste Soil) stockpiles onsite.
Performance Indicators	• No sediment laden runoff leaving the stockpile area. • No dust from stockpiles leaving the Site and impacting nearby sensitive receptors.

Control Measures	• Adhere to the requirements of the EPA *Guideline for Stockpile Management*, including:
	  o Limiting stockpile height
	  o Placing stockpiles away from surface watercourses, flood zones and groundwater recharge areas.
	• Ensure that stockpiles of unprocessed and processed C&D Waste (mixed) are kept separate.
	• Provide clear signage establishing the various storage / stockpile areas.
	• Install erosion control measures such as silt fences, hay bales, geotextile fabric, diversion drains or other appropriate measures around stockpiles where necessary.
	• Ensure any surface water runoff from waste soil stockpiles is retained within the pit void.

Monitoring	As part of annual monitoring for the Site, confirm the following: • Stockpile heights are below 10 m.

	• Stockpiles of unprocessed C&D Waste have not been kept onsite for any longer than 12 months. • Stockpiles of WDF (Waste Soil) have not been stored onsite for any longer than six (6) months. • Stockpiles do not have any visible evidence of erosion or presence of weeds.

5.2 Stockpile Location Plan

Recycling and reprocessing of C&D Waste (mixed) will be undertaken within the long-term laydown and staging area outlined within **Drawing No. 5109.DRG.006R2 – Site Layout Map**. Stockpiles of C&D Waste (mixed) will also be contained within this area, being near the Site access point for ease of removal and access.

WDF (Waste soil) stockpiles will be placed within the pit void and applied to progressive rehabilitation as soon as area become available.

6 Risk Assessment

6.1 Context

This risk assessment is related only to the receival of WDF (Waste Soil) and receival and processing of C&D (mixed) at the Site. Additional environmental risks associated with Site operations have been addressed within the PEPR currently under development. All quarry operations are regulated under the *Mining Act 1971* and assessed for compliance annually through DEM.

6.2 Site Contamination

Contaminated material is material that exceeds the chemical criteria for waste fill, as designated within Appendix 1 of the EPA WDF Standard and EPA Information Sheet *889/10 Current criteria for the classification of waste – including Industrial and Commercial Waste (Listed) and Waste Soil*, March 2010.

Sampling and assessment of the C&D Waste (mixed) will occur at the Site where it was generated prior to it being transported to Site for reuse and recycling. QA / QC procedures however will be in place onsite to ensure only C&D Waste (mixed) for recycling and reuse is received. Refer to **Section 6.3 Contingency Plan**.

The Site will not receive waste material from sources where PCAs are known to exist. A pre-screening checklist will be utilised to ensure this, refer to **Attachment 2 – Potentially Contaminating Activities Checklist**.

6.3 Contingency Plan

In the event that contaminated material is suspected, the following control measures are to be implemented:

- If asphalt profiling material is suspected as being from before the late 1960s, potentially containing coal tar and other tar distillates, it will be rejected and diverted to an EPA licenced facility.
- If contaminated material is suspected after acceptance to the Site, the material will be isolated, bunded, tested or transported to an EPA licenced facility. A designated isolation area for contaminated materials will be located within the long-term laydown and staging area outlined within **Drawing No. 5109.DRG.006R2 – Site Layout Map**.

6.3.1 Asbestos

Asbestos can be a concern in C&D Waste (mixed). The following control and management measures will be implemented to prevent asbestos entering the Site:

- Signage that clearly states that asbestos is not accepted at the Site
- A Waste Derived Fill Form provided by waste transporter
- A designated inspection area (at weighbridge) to safely check and inspect incoming waste prior to its stockpiling to minimise the risk of asbestos contamination in processed waste materials
- Rejection of waste loads that may contain asbestos to prevent acceptance of asbestos contaminated materials
- Stockpiles of unprocessed waste physically separated from stockpiles of processed waste

- If asbestos was suspected once the waste material has been stockpiled then it must be isolated, and tested. Once testing is complete, the material containing asbestos will be removed from site by a licenced contractor and disposed of at a licenced waste facility, in accordance with EPA Guideline *414/23 Wastes containing asbestos – removal, transport and disposal*.
- Maintain up-to-date waste tracking records
- Annual review of the waste processing system through Annual Compliance Reporting under *Mining Act, 1971*.

6.4 Auditor Protocol

For C&D Waste (mixed) received from a site that has a PCA, if the WDF materials exceed waste fill criteria the Auditor Protocol is triggered, including where:

- There are any other chemical substances or wastes present in the proposed WDF that are not listed in Appendix 1 of the EPA WDF Standard or
- The concentrations of chemical substances exceed the criteria in Appendix 1 of the EPA WDF Standard, but meet the IWS criteria under Appendix 2 of the EPA WDF Standard. Also, refer EPA Information Sheet *889/10 Current criteria for the classification of waste – including Industrial and Commercial Waste (Listed) and Waste Soil*, March 2010.

A site contamination auditor, accredited under the Division 4 of Part 10A of the EP Act, must be engaged. The role of the auditor is to provide the high level of expertise required for assessing higher risk materials proposed for reuse and addressing the relevant controls needed in that regard.

Material exceeding IWS criteria will not be received at the Site.

7 Environmental Impact and Risk Assessment

To identify potential impacts to the environment within and surrounding the Site associated with receiving WDF (Waste Soil) and C&D Waste (mixed), an assessment is outlined below taking into consideration the views and interests of third parties. The risk assessment has been undertaken in accordance with the relevant provision of the *Mining Act 1971* and the *Environment Protection Act 1993*.

The risk assessment has been developed to identify initial risk with importing the products to be received and the residual risk following implementation of relevant control and management strategies for each environmental aspect.

The assessment of potential risk has been adopted as a qualitative risk-based approach, designed to assess risk based upon:

- The likelihood of the impact or event occurring.
- The degree of consequence should the impact or event occur.

The likelihood and consequences are scored between one (1) and five (5) for each potential impact or event. **Table 6 – Definitions of Likelihood** and **Table 7 – Definitions of Consequence** outline the identifiers and scores used in the risk assessment.

Table 6 – Definitions of Likelihood

Rating	Descriptor	Score
Rare	May occur only in exceptional circumstances	1
Unlikely	Could occur but doubtful	2
Possible	Might occur at some time in the future	3
Likely	Will probably occur	4
Almost Certain	Is expected to occur in most circumstances	5

Table 7 – Definitions of Consequence

Rating	Descriptor	Score
Negligible	Impacts not requiring any treatment or management action	1
Minor	Nuisance or insignificant environmental harm requiring minor management action	2
Moderate	Serious environmental impacts, readily manageable at low cost	3
Major	Substantial environmental impacts, manageable but at considerable cost and some disruption	4
Catastrophic	Severe environmental impacts with major consequent disruption and heavy cost	5

The consequence and likelihood scores are then plotted on the Risk Assessment Matrix, refer to Error! Reference source not found.. The final risk level assigned is a product of the likelihood and consequence scores. The higher the risk score, the higher the priority is for management.

Table 8 – Risk Assessment Matrix

Likelihood		Consequence				
		Negligible	**Minor**	**Moderate**	**Major**	**Catastrophic**
		1	**2**	**3**	**4**	**5**
Almost Certain	**5**	5 Medium	10 High	15 High	20 Extreme	25 Extreme
Likely	**4**	4 Low	8 Medium	12 High	16 High	20 Extreme
Possible	**3**	3 Low	6 Medium	9 Medium	12 High	15 High
Unlikely	**2**	2 Low	4 Low	6 Medium	8 Medium	10 High
Rare	**1**	1 Low	2 Low	3 Low	4 Low	5 Medium

The risk assessment completed for receiving Waste Soil and C&D Waste (mixed), in addition to processing of C&D Waste, aims to address potential environmental impacts and mitigation measures for the following environmental components that are reasonably expected to be affected:

- Contaminated Land
- Waste
- Dust
- Noise
- Groundwater
- Surface Water
- Geotechnical Stability / Public Safety

Other environmental aspects (i.e. vegetation, Aboriginal heritage) that are a risk to the broader quarry Site are addressed through the PEPR approval process.

The outcomes of the risk assessment completed are outlined below within **Table 9 – Risk Assessment Outcomes**.

Table 9 – Risk Assessment Outcomes

Environmental Aspect	Potential Environmental Impact	Source Activity	Inherent Risk Rating	Evaluation and Risk Controls	Residual Risk Rating
Contaminated Land	Contamination of the soil onsite which the WDF (Waste Soil) and C&D Waste (mixed) are being stored on.	Receiving materials listed in **Section 3.2 Prohibited Materials** into the Site.	2 x 4 = 8 (**Medium**)	This risk is highly dependent on the location where the C&D Waste (mixed) and WDF (Waste Soil) are sourced from. A designated area at the Site entrance will be utilised to inspect loads prior to receiving onsite, to ensure that it is not from a known contamination site. If a waste load is suspected of being contaminated, it will be rejected and directed to an EPA approved disposal facility. Received materials will be logged and records maintained onsite.	1 x 4 = 4 (**Low**)
Waste	Incorrect management of foreign materials within C&D Waste (mixed)	Receiving C&D Waste (mixed) with excessive foreign materials	3 x 3 = 9 (**Medium**)	C&D Waste (mixed) can contain a maximum of 25 percent foreign materials (i.e. plastics, electrical wiring, timber, paper). Sampling and assessment of the C&D Waste (mixed), where required, will occur at the source site where it was generated prior to it being transported to Site for reuse and / or recycling to ensure it does not exceed this requirement. A designated area at the Site entrance will be utilised to inspect loads prior to receiving onsite. Additionally foreign material will be screened and 'picked' from the C&D Waste (mixed) using an excavator.	2 x 3 = 6 (**Medium**)
Air Quality	Dust generated from C&D Waste (mixed) and WDF (Waste Soil) stockpiles causing nuisance and potential health impacts.	Dust generated from C&D Waste (mixed) and WDF (Waste Soil) stockpiles stored onsite.	3 x 2 = 6 (**Medium**)	Stockpiles of unprocessed and processed C&D Waste (mixed) in addition to WDF (Waste Soil) have the potential to generate airborne dust particles during high wind conditions. The stockpiles of these materials will be wet down to the maximum extent possible in order to prevent dust generation during these increased risk weather events. Additionally, the stockpiles will be limited to a maximum height of five (5) m in accordance with the EPA *Guideline for Stockpile Management*. Movements of material is not to take place during extreme weather days.	2 x 2 = 4 (**Low**)
Noise	Noise pollution emanating from onsite causing public	Noise generated from onsite machinery and	3 x 2 = 6 (**Medium**)	Receiving of C&D Waste (mixed) and WDF (Waste Soil) will require additional hauling and processing activities at the Site. The Site will operate on a campaign basis. Nearby sensitive receptors include residences, commercial infrastructure and conservation reserve. During campaigns, operating hours will be adhered to.	2 x 2 = 4 (**Low**)

Environmental Aspect	Potential Environmental Impact	Source Activity	Inherent Risk Rating	Evaluation and Risk Controls	Residual Risk Rating
	and environmental nuisance.	processing activities.		Additional mitigation measures include positioning stockpiles to act as noise barriers and shutting down Site equipment when not in use.	
Groundwater	Contamination of groundwater.	Receiving materials listed in **Section 3.2 Prohibited Materials** into the Site.	2 x 4 = 8 (**Medium**)	The C&D (Mixed) which will be brought into the Site will be within the permissible levels allowed under the EPA guidelines. A designated area will be utilised at the entrance of the Site to isolate and bund any potentially contaminated materials which enter the Site in order to prevent any contaminated seepage to groundwater, before being directed to an EPA licenced facility for appropriate disposal. Appropriate procedures for the management of hydrocarbons will be implemented in accordance with Section 5.7.2 of PEPR to prevent harm. Classification of the WDF (Waste Soil) will be undertaken prior to acceptance onsite to inform it meet the EPA requirement and identify the suitable use of the soil within the Site.	1 x 3 = 3 (**Low**)
Surface Water	Discharge of surface water off of the Site which has been impacted by received C&D Waste (mixed) and WDF (Waste Soil).	Surface water runoff from C&D Waste (mixed) and WDF (Watse Soil) stockpiling and processing areas	3 x 2= 6 (**Medium**)	The received C&D Waste (mixed) and WDF (Waste Soil) will be stockpiled away from drainage lines and watercourses to reduce potential for erosion impacts. Any surface water runoff from the stockpiles will be retained within the quarry extraction area. Operational strategies include establishment of a perimeter bund or catch drain at the tow of the rehabilitation batter to ensure surface water from areas utilising WDF (Waste Soil) do not flow offsite until the site is rehabilitated and WDF (Waste Soil) areas are covered. Rehabilitated areas using WDF (Waste Soil) are dressed with topsoil and vegetated as per the rehabilitation strategies outlined in the PEPR.	2 x 2 = 4 (**Low**)
Public Safety	Instability of the final landform incorporating WDF (Waste Soil) and C&D (mixed) due to	Inappropriate receiving and handling of fill material (including	2 x 4 = 8 (**Medium**)	As per the EPA *Standard for the Production and Use of Waste Derived Fill*, Leinad is responsible for ensuring the imported fill material is geotechnical stable for the intended use of landform rehabilitation. Receival of inappropriate fill material paired with poor technique when constructing the final landform using imported WDF	1 x 4 = 4 (**Low**)

Environmental Aspect	Potential Environmental Impact	Source Activity	Inherent Risk Rating	Evaluation and Risk Controls	Residual Risk Rating
	incorrect receival, testing, placement and compaction of fill.	placement and compaction).		(Waste Soil) and C&D (mixed) could result in geotechnical failure. In order to prevent this, the following is to be achieved: • For material placed zero (0) to one (1) m below the final landform surface – o Maximum 100 mm particle size • For material placed greater than one (1) m below the final landform surface – o Maximum 500 mm particle size for clean fill material o Use of crushed and clean concrete and bricks can be implemented in this range • Maximum size of 500 mm for natural rock particles contained within the Waste Soil • All fill materials are to be placed and compacted in layers. A final inspection report of the rehabilitated landform will be undertaken by an independent suitably qualified geotechnical engineer to certify the final landform is safe, stable and constructed according to approved development plans.	

8 Environmental Management Measures

Based on the risk assessment undertaken in **Section 7 Environmental Impact and Risk Assessment**, environmental control measures for each of the assessed aspects are outlined below. These are to be implemented to prevent or minimise environmental harm and nuisance impacts in regard to receival of Waste Soil and C&D Waste (mixed).

8.1 Contaminated Land

Objective	To prevent or minimise contamination of land through receiving WDF (Waste Soil) and C&D Waste (mixed).
Performance Indicators	• Compliance with EPA *Standard for the Production and Use of Waste Derived Fill* and the IFMP / RPP.
Controls	• Establish signage which clearly states that asbestos is not accepted at the Site. • Ensure a WDF Form is provided by the material generator / transporter. • Utilise the long-term laydown and staging area in the north eastern corner of EML 6560 as a designated inspection area to safely check and inspect incoming waste prior to being received at the Site. • Ensure waste loads that may be contaminated are rejected and diverted to an EPA licenced facility. • Ensure stockpiles of processed and unprocessed C&D Waste (mixed) are physically separated. • Maintain up-to-date waste tracking records. • Undertake annual reviews of the waste processing system through Annual Compliance Reports (ACR) under the *Mining Act 1971*.

8.2 Waste

Objective	To ensure all statutory requirements are complied with relating to management of WDF including the EPA *Standard for the Production and Use of Waste Derived Fill*.
Performance Indicators	• Compliance with EPA *Standard for the Production and Use of Waste Derived Fill* and the IFMP / RPP.
Controls	• Sampling and assessment of the WDF (Waste Soil) and C&D Waste (mixed) is to occur at the location it was generated prior to it being transported to the Site for reuse and recycling. • Utilise the long-term laydown and staging area in the north eastern corner of EML 6560 as a designated inspection area to safely check and inspect incoming waste prior to being received at the Site.

	• Ensure stockpiles of processed and unprocessed C&D Waste (mixed) are physically separated. • Establish clear signage for the C&D Waste (mixed) storage and stockpile areas.

8.3 Air Quality

Objective	Ensure that particulate and gaseous emissions from WDF material do not cause environmental nuisance or harm to the surrounding community and environment.
Performance Indicators	• No community complaints during operations regarding dust that are not able to be reasonably resolved in accordance with the PEPR. • No impact to adjacent sensitive receptors.
Controls	• Restrict high risk activities during extreme weather events (strong winds, hot, dry weather) where possible to limit dust generation. • Ensure a water cart is available to control dust emissions where required. • Ensure appropriate management of stockpiles to reduce dust generation i.e. manage height, covering and wetting down as necessary. • Ensure appropriate maintenance of vehicles and equipment. • Utilised established haul roads onsite where possible. • Maintain complaints register onsite and respond to any community complaints received.

8.4 Noise

Objective	To ensure noise from operations related to importing, processing and applying WDF does not cause any environmental nuisance or adversely impact nearby sensitive receptors.
Performance Indicators	• No community complaints regarding noise that are not able to be reasonably resolved in accordance with the PEPR.
Controls	• Ensure adherence to approved operating hours. • Positioning stockpiles where possible as noise barriers between noise generating sources and sensitive receptors. • Reduce idling time and shut down equipment when not in use. • Ensure regular maintenance of plant and equipment. • Maintain complaints register onsite and respond to any community complaints received.

8.5 Groundwater

Objective	Ensure that potential impacts to groundwater quality caused by importation of WDF are prevented or minimised.
Performance Indicators	• No adverse impacts to groundwater quality.
Controls	• A designated isolation area for potentially contaminated materials will be on a hardstand / pad. If a suspected contaminated load is received into the Site, it will be bunded to prevent any contaminated material seepage. • Undertake groundwater monitoring as prescribed in the PEPR and reported through Annual Compliance Reporting under the *Mining Act 1971* to ensure a minimum two (2) m buffer is maintained between the pit floor and highest seasonal groundwater level.

8.6 Surface Water

Objective	Ensure impacts to surface water quality, flows and drainage caused by importation of WDF are prevented or minimised.
Performance Indicators	• Sediment laden runoff from C&D Waste (mixed) and WDF (Waste Soil) processing and stockpile areas is prevented from entering nearby waterbodies / stormwater.
Controls	• Ensure stockpiles are located away from drainage lines and have erosion control devices installed downstream of stockpiles. • Continually monitor weather forecasts to identify and appropriately prepare for rain events. • Inspect and maintain sediment control areas regularly and following high rainfall events. • Ensure any surface water runoff from the WDF stockpiles is retained within the quarry extraction area.

8.7 Public Safety

Objective	Ensure that the final landform is geotechnically safe and stable, suitable for the intended post-mining land use.
Performance Indicators	• The imported fill material meets the requirements to be classified as 'WDF suitable for quarry rehabilitation'.

Controls	• Ensure that the imported fill material is appropriately weighed, stockpiled and documented onsite.
	• For material placed zero (0) to one (1) m below the final landform surface –
	  o Maximum 100 mm particle size.
	• For material placed greater than one (1) m below the final landform surface –
	  o Maximum 500 mm particle size for clean fill material

	○ Use of crushed and clean concrete and bricks can be implemented in this range. • Maximum size of 500 mm for natural rock particles contained within the Waste Soil. • All fill materials are to be placed and compacted in layers. • A final inspection report of the rehabilitated landform will be undertaken by an independent suitably qualified geotechnical engineer to certify the final landform is safe, stable and constructed according to approved development plans.

DRAWINGS

256000E

257000E

6181700

6180700

Legend:

- EML Boundary
- Cadastral Boundaries
- Stage 1
- Stage 2
- Stage 3
- Topsoil Stockpile
- Heavy Mobile Equipment Laydown
- Long Term Laydown and Staging Area
- Site Entry and Exit
- Site Office
- Site Carpark
- Mobile Plant
- Product Stockpile Area
- Groundwater Monitoring Wells
- All Road Linework
- Direction of Quarrying
- Degraded Maireana Shrubland
- Eucalyptus Woodland
- Maireana +/- Nitrebush shrubland with emergent Eucalyptus
- Nitrebush Shrubland
- Samphire Salt Flats

THOMPSONROAD

THOMPSONS BEACHROAD

EML 6560

PORT PRIMEROAD

EML 6477

REV	DESCRIPTION	DATE	BY
1	Addition of Groundwater Monitoring Wells	Mar 2024	LJ
2	Updated Tenement number following approval of EML.	22/04/2025	LO

Data Sources:
Photography: UAV Survey 10-May-2023, Google Satellite Imagery accessed: 22-April-2025
Topography:
Cadastre: Data.sa.gov.au;Boundaries are Indicative only, not all boundaries shown
Ecosystem:
Other: SARIG, 2025

N

PROJECT: Dublin Pit

CLIENT: Leinad Land Management Pty Ltd

TITLE: Site Layout Map

GROUNDWORK PART OF SLR
PH +61 3871 0411
WWW.GROUNDWORKPLUS.COM.AU

SCALE: 1:6,600 When Printed On A3 (0 30 60 90 120 m)

DRAWING NUMBER: 5109.DRG.006

REVISION: 2

DATE: 22-April-2025 DRAWN: CL

PRINTED: 22-April-2025 CHECKED: MJ

DATUM: HORIZONTAL / VERTICAL / EPSG:7854

MGA / AHD / 54

ATTACHMENTS

Attachment 1

Roads Master Specification – RD-PV-SA Supply of Pavement Materials

Master Specification
Part RD-PV-S1

Supply of Pavement Materials

September 2024

Government of South Australia
Department for Infrastructure and Transport

Build.
Move.
Connect.

Document Information

Document Information	
K Net Number:	13544166
Document Version:	1
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Document Amendment Record

Version	Change Description	Date
0	Initial issue	31/08/2023
1	Updated cover page and amendment to Table RD-PV-S1 15-5, Table RD-PV-S1 15-6, Table RD-PV-S1 15-13 and Table RD-PV-S1 15-31.	30/09/2024

Document Management

 This is a controlled document and it will be updated and reissued as approved changes are made.

Contents

RD-PV-S1 Supply of Pavement Materials

1 General

a) This Master Specification Part sets out the requirements for the supply and delivery of pavement materials (including crushed quarry products, natural gravel, sand, and recycled materials) to be used in the construction of roadworks, bridgeworks, railways, and other applications associated with construction including:

i) the documentation requirements, as set out in section 2;

ii) the requirements for identification, as set out in section 3;

iii) the requirements for dedicated stockpiling, as set out in section 4;

iv) the requirements for acceptance of material, as set out in section 5;

v) the quality of material requirements, as set out in section 6;

vi) the sampling and testing requirements, as set out in section 7;

vii) the requirements for recycled materials, as set out in section 8;

viii) the requirements for performance based pavement materials, as set out in section 9;

ix) the requirements for stabilised and Wet-Mixed Materials (plant mixed), as set out in section 10;

x) the requirements for rail ballast, as set out in section 11;

xi) the requirements for asphalt aggregates and sand, as set out in section 12;

xii) the Hold Point requirements, as set out in section 13;

xiii) the verification and testing requirements, as set out in section 14; and

xiv) the pavement material specifications, as set out in Appendix 1: Pavement material specifications.

b) The supply and delivery of pavement materials must comply with the Reference Documents, including:

i) AS 1141 Methods for sampling and testing aggregates;

ii) AS 1289 Methods of testing soils for engineering purposes;

iii) AS 1289 Methods of testing soils for engineering purposes

iv) AS 1672.1 Limes and limestones, Part 1: Limes for building;

v) AS/NZS 2350.8 Methods of testing portland, blended and masonry cements, Method 8: Fineness index by air permeability method;

vi) AS 2891.3.3 Methods of sampling and testing asphalt, Method 3.3: Binder content and aggregate grading - Pressure filter method;

vii) AS 2758 Aggregates and rock for engineering purposes;

viii) AS 2758.7 Aggregates and rock for engineering purposes, Part 7: Railway ballast;

ix) AS/NZS 2891.3.3 Methods of sampling and testing asphalt Binder content and aggregate grading - Pressure filter method;

x) AS/NZS 3582.1 Supplementary cementitious materials, Part 1: Fly ash;

xi) AS 3582.2 Supplementary cementitious materials, Part 2: Slag — Ground granulated blast-furnace;

xii) AS 3583.3 Methods of test for supplementary cementitious materials for use with portland cement, Method 3: Determination of loss on ignition;

xiii) AS 3972 General purpose and blended cements;

xiv) AS 5101.4 Methods for preparation and testing of stabilized materials, Method 4: Unconfined compressive strength of compacted materials;

xv) Austroads Technical Specification ATS-3050 Supply of Recycled Crushed Glass Sand;

xvi) ISO 3310-1 Test sieves - Technical requirements and testing - Part 1: Test sieves of metal wire cloth;

xvii) ISO 3310-2 Test sieves — Technical requirements and testing — Part 2: Test sieves of perforated metal plate;

xviii) TfNSW Test Method T239 Fractured faces of coarse aggregate (available from https://standards.transport.nsw.gov.au/);

xix) RMS T276 Foreign materials content of recycled crushed concrete;

xx) SA EPA Waste derived fill (blast furnace slag) specification;

xxi) Department Test Procedure TP134 Particle Size Distribution - Standard Method of Analysis by Sieving (available from: https://dit.sa.gov.au/standards/test_procedures);

xxii) Department Test Procedure TP183 Determination of Permanent Deformation and Resilient Modulus Characteristics of Unbound Granular Materials Under Drained Conditions (available from: https://dit.sa.gov.au/standards/test_procedures);

xxiii) Department Test Procedure TP184 Determination of Texas Triaxial Classification of Unbound Granular Pavement Materials (available from: https://dit.sa.gov.au/standards/test_procedures);

xxiv) Department Test Procedure TP226 Sampling of Soils, Aggregates and Rocks (available from: https://dit.sa.gov.au/standards/test_procedures);

xxv) Department Test Procedure TP240 Elongation Index (available from: https://dit.sa.gov.au/standards/test_procedures);

xxvi) Department Test Procedure TP244 Percent Flat Particles (available from: https://dit.sa.gov.au/standards/test_procedures);

xxvii) Department Test Procedure TP705 Determination of Aggregate Stripping Value by the One Day Plate Stripping Test (available from: https://dit.sa.gov.au/standards/test_procedures);

xxviii) VicRoads Standard Document 801 Material Sources for the Production of Crushed Rock and Aggregates (VicRoads specifications are available from: http://webapps.vicroads.vic.gov.au/VRNE/csdspeci.nsf);

xxix) Main Roads WA Specification 6706/02/1312 Materials Engineering Laterite Gravel Specification for Truck Arrester Bed; and

xxx) Main Roads Test Method WA 223.1 Crushing Test Value.

c) All pavement material products must comply with the requirements specified in Appendix 1: Pavement material specifications.

d) If recycled materials are to be used pursuant to section 8, for any purpose other than construction of roadworks, additional environmental and physical requirements may be necessary.

e) This Master Specification Part does not consider the suitability of recycled materials for any other purpose than for use in roadworks.

2 Documentation

2.1 Construction Documentation

In addition to the requirements of PC-CN3 “Construction Management”, the Construction Documentation must include:

a) a quality plan which complies with the requirements set out in Table RD-PV-S1 2-1;

b) the test results as required by section 6.3a);

c) a procedure for determining the stripping performance of the sealing aggregates in both wet and dry states, as required by section 6.3b);

d) the secondary mineralisation information required by section 6.4c);

e) the sampling procedures required by section 7.1b);

f) the RCG quality records as required by section 8.3c);

g) blast furnace slag written statement of compliance as required in section 8.4d);

h) the pavement material mix design, as required by section 9c);

i) the recycled material product information, as required in section 10.2b);

j) the strength based stabilised material information, as required in section 10.3a);

k) evidence of suitability of proposed proprietary chemical binders, including procedures for the use, dosage and handling of the binder, as required by Table RD-PV-S1 10-1;

l) a methodology for control, measurement, and quality assurance of the specified power form binder content, as required by section 10.5.2b);

m) a methodology for control and quality assurance of the liquid binder content, as required by section 10.5.3b);

n) a methodology for control and quality assurance of the respective combination binder contents, as required by section 10.5.4b);

o) procedures for verifying the additive content for each 150 t of treated material, as required by section 10.5.6;

p) where the Contractor proposes to develop procedures for sampling of stabilised materials, details of procedures for verifying the additive content for each 150 t of treated material, as required by section 10.6.2b);

q) details of the proposed retarder and usage rate to be used with blended cement binders, as required by section 10.7a);

r) nominated time periods for delivery of binders to the site, as required by section 10.10e);

s) where basic igneous source rock is used for the production of ballast, details of the maximum acceptable level of secondary mineralisation of the source rock and procedures for monitoring the product during quarrying and production, as required by section 11c);

t) where asphalt aggregates are to be produced, details of the process control system required by section 12b); and

u) evidence that micaceous materials aggregate particles will maintain long term strength and not exfoliate when subject to processing, as required by section 15.19.1 of Appendix 1: Pavement material specifications.

Table RD-PV-S1 2-1 Quality plan procedure requirements

Material	Quality plan details required and procedures to be documented
All materials	Random selection of sample increments (in accordance with the requirements of section 7).
	Representative splitting of bulk samples (in accordance with the requirements of section 7).
	Handling and storage of the pavement material product, including the avoidance of intermixing, contamination, or deterioration which may affect the product properties.
	Inspection of bins, stockpile pads, and trucks for contamination and operational efficiency
	Requirements for inspection and testing of processes and products (including the Inspection and Test Plan).
Material sourced from quarries	Plant calibration and maintenance, including weighing equipment, flow meters, and proportioning systems (where installed).
	Primary, secondary, and tertiary crusher inspection, wear adjustment, and maintenance.
	Screen deck inspection, wear adjustment, and maintenance.
	Use and handling of explosives.
	Assessment of quarry face and shot rock.
	Moisture control of shot rock.
	Handling processes for shot rock.
	Requirements for labelling of storage bays and silos.
Sealing aggregate	Stripping performance (in accordance with the requirements of section 6.3).
Asphalt aggregates	Additional process control elements (in accordance with the requirements of section 2.1b) and section 12).
Basic igneous source rock	Control of secondary mineralisation (in accordance with the requirements of section 6.4 and section 11c)).
Recycled Crushed Concrete	Control of constituent materials, including supplementary materials (in accordance with the requirements of section 8.2).
RCG	Quality control and compliance testing (in accordance with the requirements of section 8.3)
Stabilised materials	Chemical binder properties (in accordance with the requirements of section 10.4).
	Contractor developed test procedures (where applicable) (in accordance with the requirements of section 10.6.2).
	Control of binder content (in accordance with the requirements of section 10.5).
	Use of retarder (in accordance with the requirements of section 10.7).
	Working time for other binders (in accordance with the requirements of section 10.10).

2.2 Quality Management Records

In addition to the requirements of PC-QA1 “Quality Management Requirements” or PC-QA2 “Quality Management Requirements for Major Projects” (as applicable), the Quality Management Records must include:

a) NATA endorsed test results for the bulk sample as required in section 5b)ii);

b) aggregate wet and dry test results required in section 6.3d);

c) sampling and test results required in section 7.2; and

d) the verification requirements set out in section 14.

3 Identification

a) In addition to the requirements of PC-QA1 “Quality Management Requirements” or PC-QA2 “Quality Management Requirements for Major Projects” (as applicable), the Contractor must

ensure that the pavement materials are produced in identifiable Work Lots not greater than the following:

i) sealing and asphalt aggregates, arrestor bed material: 500 t; and

ii) other pavement materials: 1,000 t.

b) The Contractor must ensure that a Work Lot of the pavement material is produced under uniform conditions from the same source material or the same constituent components and be essentially homogeneous with respect to composition and general appearance.

c) A Work Lot of the pavement material may be prepared from more than one day's production.

4 Dedicated stockpiles

The Contractor must establish dedicated stockpiles of pavement material conforming to the following requirements:

a) the location of each Work Lot must be accurately identified until conformance of the Work Lot with this Master Specification Part has been verified;

b) any non-conforming Work Lots placed into these stockpiles must be removed;

c) where the stockpile contains more than one Work Lot, the stockpile must be constructed in horizontal layers with each successive layer fully contained within the area of the upper surface of the preceding layer;

d) levelling of each layer must be carried out in a manner to minimise segregation and material breakdown; and

e) once a dedicated stockpile has been completed, further material must not be added to the stockpile.

5 Acceptance of material

a) Acceptance of pavement materials will be undertaken on a Work Lot basis and the total quantity of pavement material in the Work Lot will be subject to acceptance or rejection.

b) The pavement material in a Work Lot will be accepted if:

i) the pavement material has been produced and stockpiled in accordance with this Master Specification Part; and

ii) the test results endorsed by a NATA accredited laboratory for the bulk sample confirm compliance with the requirements specified in this Master Specification Part, and results submitted as part of the Quality Management Records.

6 Quality of materials

6.1 General

The Contractor must ensure that the pavement materials satisfy the following quality requirements:

a) all material must be clean, sound, hard, and durable;

b) mica, shale and similar laminated materials, adherent coatings, any foreign material, or nodular rounded (spherical) particles must not be present in form or sufficient quantity to produce adverse effect upon the usage and performance of the material;

c) products must be produced from natural rock or sand deposits, as appropriate, except where otherwise permitted in this Master Specification Part;

d) recycled materials must conform to the requirements detailed in section 8, which are specific to use in roadworks; and

e) all materials must be free from plant material (including seeds) from declared plants, as declared under the *Landscape South Australia Act 2019* (SA).

6.2 Properties

The Contractor must ensure that the pavement materials satisfy the following requirements:

a) additive contents must be within the tolerances stated in section 10.5, in the case of plant mixed materials; and

b) for all materials specifications, square aperture sieves, which conform to the requirements of ISO 3310-1 Test sieves - Technical requirements and testing - Part 1: Test sieves of metal wire cloth and ISO 3310-2 Test sieves — Technical requirements and testing — Part 2: Test sieves of perforated metal plate, must be used for the determination of grading for particle sizes 75 mm and finer. Coarser sizes must be determined by linear measurement.

6.3 Aggregate stripping

The Contractor must:

a) implement a testing program to prevent the adverse stripping performance of sealing aggregates and provide the test results as part of the Construction Documentation;

b) include a procedure for determining the stripping performance of the sealing aggregates in both wet and dry states as part of the Construction Documentation;

c) include pre-coating agents and adhesion agents in the testing program; and

d) report the wet and dry test results and submit as part of the Quality Management Records.

6.4 Secondary mineralisation

a) This section 6.4 applies where basic igneous source rock (as defined in AS 2758 Aggregates and rock for engineering purposes) is used for the production of a pavement material.

b) The Contractor must ensure that secondary mineralisation is not present in the pavement material to the extent that it adversely affects the pavement material's durability or long term performance.

c) The Construction Documentation must:

   i) indicate the level and nature of secondary mineralisation of the source rock, including a description of the potential of the secondary mineralisation to cause material degradation;

   ii) include procedures for monitoring the quality of the product and component materials during quarrying and production, addressing the control and monitoring of secondary mineralisation;

   iii) include rock type and durability classifications (i.e. sound, marginal or unsound rock) in accordance with VicRoads Standard Document 801 Material Sources for the Production of Crushed Rock and Aggregates; and

   iv) address any other information requested by the Principal or required by the Contract Documents.

7 Sampling and testing

7.1 Sampling

a) The Contractor must arrange for sampling of pavement materials to be carried out by an NATA accredited laboratory in accordance with the requirements of Department Test Procedure TP226 Sampling of Soils, Aggregates and Rocks.

b) The Contractor must include in the Construction Documentation procedures for the random selection of sample increments appropriate to the sampling method used and the process of splitting and recombining to produce 2 samples equally representative of the bulk sample.

c) Preparation of samples for testing must be undertaken in accordance with the requirements of AS 1289.1 Methods of testing soils for engineering purposes.

d) Unless otherwise approved in the Construction Documentation, the NATA accredited laboratory must split each bulk sample to produce an audit sample to be held by the NATA accredited laboratory for a period no less than 14 days after submission of test results.

e) Audit samples for sealing aggregates must be held until the end of the Defects Liability Period and the sample supplied to the Principal upon request.

7.2 Testing

a) Notwithstanding Department Test Procedure TP226 Sampling of Soils, Aggregates and Rocks, the Contractor must ensure that quality control testing for each pavement material product is undertaken on a sample representing each production Work Lot and testing records must be submitted as part of the Quality Management Records.

b) The Contractor must ensure that the quality control tests listed for each pavement material product listed in Appendix 1: Pavement material specifications is performed on the sample representing each Work Lot in accordance with the testing frequency specified in Table RD-PV-S1 7-1.

Table RD-PV-S1 7-1 Assurance minimum testing frequencies

Test procedure	Property	Minimum test frequency
Spall(4)		
AS 1141.11.1	Particle size distribution	One test per 5 Work Lots
Rail ballasts(4)		
AS 1141.11.1	Particle size distribution	One test per 5 Work Lots
AS 1141.23	Los Angeles value	One test per 5 Work Lots
Rail ballast(4)		
AS 1141.4	Bulk density	2 tests for the first Work Lot, and one test per Work Lot thereafter
AS 1141.6.1	Particle density	2 tests for the first Work Lot, and one test per Work Lot thereafter
a) AS 1141.11.1; and b) AS 1141.12.	Particle size distribution	2 tests for the first Work Lot, and one test per Work Lot thereafter
AS 1141.22	Wet / dry strength	2 tests for the first Work Lot, and one test per Work Lot thereafter
AS 1141.23	Los Angeles value	2 tests for the first Work Lot, and one test per Work Lot thereafter
AS 1141.14	Misshapen particles	2 tests for the first Work Lot, and one test per Work Lot thereafter
Quarried pavement materials(4)		
TP134	Particle size distribution	One test per Work Lot
a) AS 1289.3.1.2; b) AS 1289.3.2.1; c) AS 1289.3.3.1; and d) AS 1289.3.4.1.	Atterberg limits	One test per Work Lot
AS 1141.23	Los Angeles value	One test per Work Lot(3)
TP183	Resilient modulus / deformation	One test per 100 Work Lots (performance based only)
TP184	Triaxial compression	One test per 100 Work Lots (performance based only)
Recycled pavement materials(4)		
TP134	Particle size distribution	One test per Work Lot

Test procedure	Property	Minimum test frequency
a) AS 1289.3.1.2; b) AS 1289.3.2.1; c) AS 1289.3.3.1; and d) AS 1289.3.4.1.	Atterberg limits	One test per Work Lot
RMS T276	Foreign materials content	One test per Work Lot
AS 2891.3.3	Bitumen content	One test per Work Lot(3)
AS 1141.23	Los Angeles value	One test per Work Lot(3)
TP183	Resilient modulus / deformation	One test per 100 Work Lots (performance based only)
TP184	Triaxial compression	One test per 100 Work Lots (performance based only)
Stabilised pavement material(4)		
TP134 Particle Size Distribution - Standard Method of Analysis by Sieving	Particle size distribution	One test per Work Lot
a) AS 1289.3.1.2; b) AS 1289.3.2.1; c) AS 1289.3.3.1; and d) AS 1289.3.4.1.	Atterberg limits	One test per Work Lot
AS 1141.23	Los Angeles value	One test per Work Lot(3)
Construction Documentation	Binder content	One test per 150 t (refer section 10.5)
AS 5101.4	Unconfined compressive strength (strength control)	2 tests per 150 t (refer section 10.6)
AS 5101.4	Unconfined compressive strength (Binder content control)	One test per 10 000 t
Sealing aggregates(4)		
AS 1141.11.1	Particle size distribution	One test per Work Lot
AS 1141.15	Flakiness index	One test per Work Lot
TP244	% flat particles	One test per Work Lot
AS 1141.14	Misshapen particles	One test per Work Lot
AS 1141.23	Los Angeles value	One test per Work Lot(3)
a) AS 1141.42; and b) AS 1141.40.	Polished aggregate friction	One test annually(2)
TP705	Aggregate stripping	One test annually(2)
a) AS 1141.20.1; or b) AS 1141.20.2.	Average least dimension - direct	3 tests per Work Lot
AS 1141.20.3	Average least dimension - calculated	One test per Work Lot
Asphalt aggregates(4)		
AS 1141.11.1	Particle size distribution	One test per Work Lot
AS 1141.15	Flakiness index	One test per Work Lot
TP240	Elongation index	One test per Work Lot
AS 1141.23	Los Angeles value	One test per Work Lot(3)
a) AS 1141.5; b) AS 1141.6.1; and c) AS 1141.6.2	Water absorption and densities	One test per 10 Work Lots
AS 1141.24	Sulphate soundness	One test per 10 Work Lots(3)
AS 1141.30	Unsound and marginal stone contents	One test per Work Lot(1)(3)
a) AS 1141.42; and b) AS 1141.40.	Polished aggregate friction	One test annually(2) (refer section 12h))
Sands(4)		
TP134	Particle size distribution	One test per Work Lot
a) AS 1289.3.1.2; b) AS 1289.3.2.1; c) AS 1289.3.3.1; and d) AS 1289.3.4.1.	Atterberg limits	One test per Work Lot(3)
AS 1141.34	Organic impurities	One test per Work Lot(3)

Test procedure	Property	Minimum test frequency
Mineral filler for asphalt, other than hydrated lime(4)		
AS 1141.11.1	Particle size distribution	One per contract
AS/NZS 1141.17	Voids in dry compacted filler	One per contract
AS 1289.B1.3	Moisture content	One per week
AS 2350.8	Specific surface	One per contract
AS 3583.3	Loss on ignition	One per contract
AS 1141.8	Water soluble fraction	One per week
Additional requirements for basic igneous source rock(4)		
AS 1141.26	Secondary mineral content	One test every 2 years
AS 1141.29	Accelerated soundness index	One test every 2 years
AS 1141.30.1	Unsound and marginal stone contents	3 tests per Work Lot
Arrestor bed material(4)		
TP134	Particle size distribution	One test per Work Lot
TfNSW Test Method T239	Fractured faces	One test per Work Lot
AS 1141.14	Misshapen particles	One test per Work Lot
WA 223.1	Crushing and cracking	One test per contract
AS 1141.23	Los Angeles value	One test per Work Lot
Main Roads WA Specification 6706/02/1312 Materials Engineering Laterite Gravel Specification for Truck Arrester Bed	Slump angle	One test per Work Lot
AS 1141.4	Bulk density	One test per contract

Table notes:
(1) Testing for unsound and marginal stone contents under section 15.21 (if required) will include this test in the total number required per Work Lot.
(2) The Principal reserves the right to obtain material and undertake annual testing as necessary.
(3) Refer to section 7.3 for more information.
(4) Refer to the section listed for further information about the testing frequency.

7.3 Reduced rate of testing

a) The Contractor may adopt a reduced frequency of testing where approval has been granted under the guidelines for the Department's prequalification scheme for the supply of pavement materials (Refer to: https://www.dit.sa.gov.au/contractor_documents/prequalification).

b) Subject to the guidelines for the Department's prequalification scheme for the supply of pavement materials, the Contractor may apply for a reduced frequency of testing for the Project in accordance with PC-QA1 "Quality Management Requirements" or PC-QA2 "Quality Management Requirements for Major Projects" (as applicable).

c) Acceptance of a reduced rate of testing does not derogate from the Contractor's obligation to ensure that all pavement material supplied conforms with the requirements of this Master Specification Part and the Contract Documents.

8 Recycled materials

8.1 General

a) Where pavement materials derived from natural quarried sources have been specified in the Contract Documents, the Contractor may:

i) use recycled pavement materials derived from traditional recycled material, or blends of traditional recycled material and quarried pavement materials; and

ii) submit a proposal to use pavement materials derived from alternative recycled materials, or blends of alternative recycled materials, traditional recycled materials, and quarried pavement materials.

b) Proposals to use pavement materials derived from alternative recycled materials as contemplated by section 8.1a)ii) will constitute a **Hold Point**. Pavement materials derived from alternative recycled materials must not be used until this Hold Point has been released.

c) Proposals to use pavement materials derived from alternative recycled materials as contemplated by section 8.1a)ii) must be supported by the following information, in addition to the information required under section 9:

   i) the source of the alternative recycled materials and where it is processed;

   ii) proposed location for use of the alternative recycled materials (within the corridor / Project area as well as within the pavement profile);

   iii) proposed quantity (percentage replacement as well as overall tonnage);

   iv) information necessary to demonstrate that the alternative recycled material does not present an unacceptable risk of environmental harm, including (as appropriate):

      A. classification against EPA waste fill criteria (or other criteria deemed appropriate for the source of the material and the proposed reuse);

      B. findings of relevant research undertaken into any potential environmental issues associated with use of the material (including leaching potential and risk of micro-plastic pollution), and details of any proposed management strategies; and

      C. report from suitably qualified contamination consultant verifying that the proposed re-use is acceptable;

   v) end of pavement-life disposal options, including whether the material can be recycled effectively; and

   vi) any available information on whole-of-life carbon footprint.

d) Where performance based materials are used and the constituent source materials vary (e.g. Recycled Crushed Concrete, and Recycled Crushed Concrete with RCG), the Contractor must prepare a separate mix design for each proposed composition in accordance with section 9.

8.2 Recycled Crushed Concrete

a) The Contractor must ensure that pavement products comprising Recycled Crushed Concrete or blends of:

   i) naturally sourced quarried material;

   ii) traditional recycled materials; and

   iii) Recycled Crushed Concrete,

   comply with the designated quality requirements for class 1, 2, or 3 recycled pavement materials detailed in Appendix 1: Pavement material specifications.

b) The Contractor must ensure that no more than 20% by mass of supplementary source materials or traditional recycled materials (other than Recycled Crushed Concrete or blast furnace slag which may be added up to 100%) are incorporated into class 1, 2, or 3 recycled pavement materials, and the constituent proportions remain unchanged during production.

8.3 Recycled crushed glass (RCG)

a) The Contractor must ensure that RCG for use as a granular material in pavement materials:

   i) satisfies the requirements of Austroads Technical Specification ATS-3050 Supply of Recycled Crushed Glass Sand; and

   ii) is free from asbestos.

b) The Contractor must ensure that all RCG material is sufficiently clean for the intended use.

c) The Contractor must submit to the Principal details of the RCG, as part of the Construction Documentation, including:

i) source of raw materials and sensitivity of mix to input streams;

ii) production plant, method of production, and method of controlling the quality of the final RCG product;

iii) evidence that the source and method proposed are suitable for the required quantity and quality of RCG;

iv) evidence (including test results) that the RCG satisfies the requirements of Austroads Technical Specification ATS 3050 Supply of Recycled Crushed Glass Sand;

v) management of test repeatability, uniformity (no segregation), and the method of mixing of the raw materials and blending with other source materials; and

vi) any other information requested by the Principal or required by the Contract Documents.

d) Subject to the overall specification and quality requirements detailed in Appendix 1: Pavement material specifications being satisfied, the Contractor may blend RCG with:

i) asphalt aggregate;

ii) class 1, 2, and 3 recycled pavement materials; and

iii) sands,

in accordance with the requirements of this section 8.

e) RCG may be incorporated into pavement materials in the proportions specified in Table RD-PV-S1 8-1.

f) For class 1, 2, and, 3 recycled pavement materials, the Contractor must ensure that the total constituent proportions of supplementary source materials (brick, tile, and asphalt) and RCG combined (refer section 8.2) will not exceed 20%, noting the limits on permissible RCG proportions in Table RD-PV-S1 8-1.

g) The Contractor must ensure that cement is not used as a stabiliser or binding agent for materials containing RCG.

Table RD-PV-S1 8-1 RCG in pavement materials

Base product	% RCG permitted
Class 1 recycled pavement materials	Max 5%
Class 2 recycled pavement materials	Max 10%
Class 3 recycled pavement materials	Max 15%
Asphalt aggregates	Refer RD-BP-S2 “Supply of Asphalt”
Sand	Max 100%

8.4 Blast furnace slag

a) The Contractor must ensure that pavement material products comprising blast furnace slag or blends of quarried material, traditional recycled materials, or blast furnace slag comply with the designated quality requirements for class 1, 2, or 3 recycled pavement materials as detailed in Appendix 1: Pavement material specifications.

b) The Contractor must ensure that blast furnace slag used in recycled pavement materials referred to in this section 8.4 is not granulated or ground.

c) The Contractor must ensure that blast furnace slag meets the requirements of the SA EPA Waste derived fill (blast furnace slag) specification.

d) The Contractor must submit as part of the Construction Documentation, a written statement of compliance certifying that the blast furnace slag complies with the chemical criteria of the SA EPA Waste derived fill (blast furnace slag) specification.

9 Performance based pavement materials

a) This section 9 specifies the requirements for performance based materials, which are designed and manufactured to meet particular levels of in-service pavement performance.

b) Performance based materials may only be used where permitted in the Contract Documents.

c) Where the Contractor proposes to design a pavement material to meet pavement performance criteria, the Contractor must ensure that the following requirements are satisfied, and details must be submitted as part of the Construction Documentation:

i) the Contractor must determine the mix design properties for the product based on the full suite of tests identified in the mix design limits of the product specification;

ii) with the exception of resilient modulus / deformation testing and triaxial compression testing, results from testing a minimum of 10 samples of product must be used to determine the average test value. This value will be the nominated mix design value for that test property or sieve size. Each sample must be representative of a minimum of 100 t of product;

iii) mix designs must comply with the limits specified in mix design limits of each product specification;

iv) the Contractor must submit a reference sample of the product;

v) resilient modulus / deformation testing and triaxial compression testing must be performed in duplicate on a sample representative of the submitted mix design and reference sample;

vi) the Contractor may be requested to submit further evidence of conformance to resilient modulus and triaxial compression requirements on samples representative of the extremes of the permissible grading envelope for manufacturing, or field trial evidence of acceptable performance where the mix design is within one standard deviation of the mix design limit for any specified sieve size;

vii) the Contractor must submit supporting mix design or specification conformance documentation, including results for the full suite of tests identified in the mix design limits of the product specification. Subject to the product meeting all requirements of the product specification, the Principal will register the mix design and apply the manufacturing tolerance to the mix design for product quality control purposes; and

viii) the Contractor must not supply material under a mix design specification until written approval and the manufacturing tolerances have been received. Approval will remain current for a period not exceeding 2 years. The approval may be withdrawn in the event of unsatisfactory field performance of the material, or if the reference sample is no longer representative of delivered material.

10 Stabilised and wet-mixed materials (plant mixed)

10.1 General

a) The Contractor must ensure that stabilised materials (which includes the addition of cement, fly ash, lime, bitumen, other binders, or combinations of binders) and Wet-Mixed Materials comply with this section 10.

b) The Contractor must ensure that stabilised materials and Wet-Mixed Materials specified by binder content basis are tested for binder content in accordance with section 10.5.

c) The Contractor must ensure that stabilised materials and Wet-Mixed Materials specified on a strength basis are tested for unconfined compressive strength in accordance with section 10.6.

d) The Contractor must ensure that the addition of cement, fly ash, bitumen, lime, or slag and water is described by a naming convention as given in the following examples:

i) SPM2/20QGC4 20 mm class 2, 4% cement stabilised quarried pavement material;

ii) SPM1/30RMC4MPa 30 mm class 1, 4 MPa cement stabilised recycled pavement material;

iii) SPM2/40QGB3 40 mm class 2, 3% bitumen stabilised quarried pavement material;

iv) SPM2/20QGL1F2 20 mm class 2 stabilised quarried pavement material with 1% lime and 2% fly ash; and

v) SPM2/30QGL1S4 30 mm class 2 stabilised quarried pavement material with 1% lime and 4% slag.

e) The Contractor must ensure that Wet-Mixed Materials are identified by the suffix “W”, as illustrated in the following examples:

i) PM1/20QGW 20 mm class 1 quarried pavement material wet-mix (grading based); and

ii) PM1/20RMW 20 mm class 1 recycled pavement material wet-mix (performance based).

10.2 Recycled material products

a) The Contractor must ensure that the following are not added to recycled pavement material products without prior approval:

i) cement;

ii) fly ash;

iii) lime;

iv) slag;

v) bitumen; or

vi) other binders.

b) Where the Contractor proposes to produce a stabilised recycled product, the Contractor must ensure that the following requirements are satisfied and details must be submitted as part of the Construction Documentation:

i) the Contractor must submit evidence of compliance of the product to the full suite of tests detailed in the product material specifications (Appendix 1: Pavement material specifications) for stabilised pavement material;

ii) the Contractor must submit a reference sample of the untreated recycled material, which will be representative of a minimum of 10 samples of product, and a sample of the proposed binder; and

iii) the Contractor must undertake unconfined compressive strength testing on 3 pairs of specimens at each binder content and curing age detailed in the product specification. samples prepared for testing will be representative of the reference sample.

10.3 Strength based stabilised material

a) Where the use of a stabilised material meeting strength-based acceptance criteria is allowed in the Contract Documents, the Contractor must ensure that the following requirements are satisfied, and details must be submitted as part of the Construction Documentation:

i) the Contractor must submit evidence of compliance of the product to the full suite of tests detailed in Appendix 1: Pavement material specifications for stabilised pavement material (strength control);

ii) the Contractor must submit a reference sample of the unestablished material, which will be representative of a minimum of 10 samples of product, and a sample of the proposed binder; and

iii) the Contractor must undertake unconfined compressive strength testing on 3 pairs of specimens at the binder contents and curing age required to meet the full range of strength targets detailed in the product specification. samples prepared for testing will be representative of the reference sample.

b) Strength based stabilised material must not be supplied without the prior approval of the Principal.

10.4 Binders

The Contractor must ensure that binders and additives comply with the requirements of Table RD-PV-S1 10-1.

Table RD-PV-S1 10-1 Binder properties

Material	Properties
Bitumen	Class 170 residual bitumen to RD-BP-S1 “Supply of Bituminous Material” or other approved special foam binder.
Cement	Blended cement complying with AS 3972 General purpose and blended cements.
Lime	Hydrated lime or quick lime complying with AS 1672.1 Limes and limestones Limes for building. Quick lime must be fully slaked.
Fly ash	Fine, medium, or coarse fly ash meeting the requirements of AS/NZS 3582.1 Supplementary cementitious materials, Part 1: Fly ash.
Slag	Ground granulated blast furnace slag will meet the requirements of AS 3582.2 Supplementary cementitious materials Slag - Ground granulated blast-furnace.
Chemicals	Proprietary chemical binders may be used provided documented evidence as to their suitability is submitted. Procedures for the use, dosage and handling of the binder must be included as part of the Construction Documentation.
Water	Water must be potable.

10.5 Additive content determination

The Contractor must ensure that all pavement material additives comply with the requirements of this section 10.5.

10.5.1 Bitumen

a) The bitumen content of the treated material must be supplied, as a target percentage of dry mass. The bitumen content may vary up to ±0.25% from that ordered.

b) The bitumen content must be determined in accordance with AS 2891.3.3 Binder Content and Aggregate Grading - Pressure Filter Method.

10.5.2 Powder form binders

a) The powder form binder content of the treated material must be supplied, expressed as a target percentage of dry mass. The powder form binder content may vary up to ±0.5% from that ordered.

b) The Contractor must identify as part of the Construction Documentation a methodology for control, measurement, and quality assurance of the specified powder form binder content.

10.5.3 Liquid binders

a) Liquid binders must be supplied as a minimum percentage of the dry mass of untreated product or by loose volume of untreated product.

b) As part of the Construction Documentation the Contractor must identify a methodology for control and quality assurance of the liquid binder content.

10.5.4 Combination binders

a) Combination binders must be supplied as a minimum percentage of the dry mass of untreated product or by loose volume of untreated product.

b) The Contractor must identify as part of the Construction Documentation a methodology for control and quality assurance of the respective combination binder contents.

10.5.5 Water

The moisture content of bitumen, cement, lime, or fly ash treated material when combined with water, and water by itself ordered as a wet mixed product, must be ordered expressed as a percentage of dry mass. The moisture content may vary up to ±1.0% from that ordered.

10.5.6 Test frequency

The Contractor must include as part of the Construction Documentation procedures for verifying the additive content for each 150 t of treated material.

10.6 Strength determination testing

10.6.1 Powder form binders, liquid binders and combination binders

The Contractor must ensure that the strength of powder form binders, liquid binders and combination binders are determined in accordance with the following:

a) the strength of the treated material must be as specified, expressed as a target unconfined compressive strength in MPa. The average strength of the test cylinders for each test may vary up to -0.5 MPa, +1.0 MPa as specified;

b) strength must be determined in accordance with the requirements of AS 5101.4 Methods for preparation and testing of stabilized materials Unconfined compressive strength of compacted materials; and

c) a contingency representative sample of the untreated material used in the production of plant treated material must be taken from each day's production.

10.6.2 Test frequency

a) The Contractor must ensure that samples of stabilised materials are tested for strength at a rate not less than 2 tests (4 test cylinders) per 150 t.

b) Where Contractor developed procedures for testing are proposed, the Contractor must include, as part of the Construction Documentation, procedures for verifying the additive content for each 150 t of treated material.

10.7 Addition of retarder

a) The Contractor must ensure that a retarder is used with blended cement binders. The proposed retarder and usage rate must be nominated as part of the Construction Documentation.

b) The Contractor must ensure that the Contractor's mixing plant is fitted with a measuring device to allow accurate measurement of the amount of retarder being added to the mix.

10.8 Mixing

The Contractor must ensure that the following mixing requirements are satisfied:

a) the quarry material, selected additive (if specified), or water must be mixed at a central mixing plant of the pugmill type;

b) the mixing plant contemplated by section 10.8a) may be either a batch or continuous type;

c) the mass of charge in a batch mixer or the rate of feed to a continuous type mixer must not exceed that which will permit complete mixing of all material;

d) mixing of material must be continued until the quarry material, binder, retarder, and water (as applicable) are evenly distributed through the mass and a uniform mixture of unchanging appearance is obtained; and

e) sufficient mixing capacity must be provided to produce enough mixture to permit placing up to 200 t of mixture on the road bed per hour.

10.9 Transporting

a) The Contractor must ensure that, during transportation of the pavement materials, the load is completely covered with a tarpaulin or similar heavy cover to protect the pavement material against the effect of sun and rain.

b) The Contractor must ensure that the cover required by section 10.9a) is not removed until the load is about to be tipped.

10.10 Time requirements

The Contractor must ensure that the following time related requirements are satisfied with respect to pavement materials:

a) cement treated material must be delivered to the road bed or construction site within a time sufficient to enable all spreading, shaping, and compaction to be carried out within 2.75 hours of the introduction of cement to the untreated material;

b) blends of lime and fly ash or lime treated material must be delivered to the road bed or construction site on the same day as the introduction of lime or fly ash to the moist material;

c) bitumen treated material may be stockpiled for a period not exceeding 4 weeks;

d) wet mix material must be delivered to the road bed or construction site and placed or compacted in a time that ensures that the moisture content of the material remains within the specified tolerance of that at which it was ordered;

e) other binders must be delivered to the site within time periods detailed as part of the Construction Documentation; and

f) the time of binder addition must be recorded on the cart-note for each load of stabilised material.

11 Rail ballast

a) The Contractor must ensure that the production of rail ballast complies with this section 11.

b) The Contractor must undertake petrographic analyses of the rail ballast source rock to the extent that all mineralogical variations of the rock are examined.

c) Where basic igneous source rock is used for the production of rail ballast, the Contractor must indicate as part of the Construction Documentation the maximum acceptable level of secondary mineralisation of the source rock and procedures for monitoring the product during quarrying and production.

d) Notwithstanding that the source rock may comply with other requirements of this Master Specification Part, the Contractor must ensure that rail ballast does not contain minerals in a concentration that may be detrimental to the overall performance of the rail ballast in service.

e) The Contractor must ensure that the rail ballast is managed at all stages to prevent material contamination, segregation, and degradation. The Contractor must avoid unnecessary handling of the rail ballast, such as repeated mechanical handling and dropping of material.

f) Where the rail ballast is to be used under steel sleepers, the rail ballast must comply with classification RAIL60S as set out in Appendix 1: Pavement material specifications.

12 Asphalt aggregates and sand

a) Where asphalt aggregates are to be produced, the Contractor must develop and implement a process control system which includes:

   i) a description of the flow of materials and the processes carried out on them, from input materials to the plant through to delivery of aggregates to the asphalt plant;

   ii) a flow diagram and identification of the key elements of the manufacturing process requiring monitoring, measurement, or verification; and

   iii) constant monitoring and statistical analysis of records to verify process capability and product characteristics.

b) The Contractor must provide details of the process control system required by section 12a) to the Principal as part of the Construction Documentation.

c) The Contractor must ensure that the production of asphalt aggregates and sand complies with this section 12.

d) The Contractor must ensure that the production process provides material to meet the grading requirements for the appropriate aggregate size to produce a particular asphalt type.

e) Once the asphalt mix design has been completed, the grading of the aggregate to be supplied will be known as the nominated grading.

f) The Contractor must ensure that the production tolerances for the assessment of conformity to the design comply with Appendix 1: Pavement material specifications.

g) The Contractor must determine the associated properties of each aggregate type in accordance with the property limits as shown in Appendix 1: Pavement material specifications, and thereafter be referred to as the nominated property; for example, Los Angeles nominated property.

h) Polished aggregate friction value assessment of any size product from a particular source must be undertaken on aggregates within the 6.7 mm to 9.5 mm (exclusive) size fraction of the same product source in accordance with AS 1141.40 Methods for sampling and testing aggregates Polished aggregate friction value - Vertical road-wheel machine.

i) RCG may be incorporated into asphalt aggregates and sand, in accordance with section 8.

13 Hold Points

Table RD-PV-S1 13-1 details the review period or notification period, and type (documentation or construction quality) for each Hold Point referred to in this Master Specification Part.

Table RD-PV-S1 13-1 Hold Points

Section reference	Hold Point	Documentation or construction quality	Review period or notification period
8.1b)	Proposal to use pavement material derived from alternative recycled material	Documentation	10 Business Days review

14 Verification requirements and records

The Contractor must supply written verification as part of the Quality Management Records that the testing undertaken pursuant to this Master Specification Part demonstrates compliance with the requirements of this Master Specification Part.

15 Appendix 1: Pavement material specifications

Table RD-PV-S1 15-1 Pavement material specification - list of products

Identification Number	Source	Mix design	Product
Spalls			
SP300	Quarry	No	300 mm spalls
Road ballast			
RB100	Quarry	No	100 mm road ballast
RB65	Quarry	No	65 mm road ballast
Rail ballast			
RAIL50	Quarry	No	50 mm rail ballast
RAIL60	Quarry	No	60 mm rail ballast
RAIL60S	Quarry	No	60 mm ail ballast (steel sleepers)
Class 3 recycled pavement materials			
PM3/20RG	Recycled	No	20 mm class 3 recycled pavement material [grading based]
PM3/40RG	Recycled	No	40 mm class 3 recycled pavement material [grading based]
PM3/55RG	Recycled	No	55 mm class 3 recycled pavement material [grading based]
PM3/75RG	Recycled	No	75 mm class 3 recycled pavement material [grading based]
Class 3 quarried pavement materials			
PM3/20QG	Quarry	No	20 mm class 3 quarried pavement material [grading based]
PM3/40QG	Quarry	No	40 mm class 3 quarried pavement material [grading based]
PM3/55QG	Quarry	No	55 mm class 3 quarried pavement material [grading based]
PM3/75QG	Quarry	No	75 mm class 3 quarried pavement material [grading based]
Class 2 recycled pavement materials			
PM2/20RG	Recycled	No	20 mm class 2 recycled pavement material [grading based]
PM2/30RG	Recycled	No	30 mm class 2 recycled pavement material [grading based]
PM2/40RG	Recycled	No	40 mm class 2 recycled pavement material [grading based]
PM2/20RM	Recycled	Yes	20 mm class 2 recycled pavement material [performance based]
PM2/30RM	Recycled	Yes	30 mm class 2 recycled pavement material [performance based]
Class 2 quarried pavement materials			
PM2/20QG	Quarry	No	20 mm class 2 quarried pavement material [grading based]
PM2/30QG	Quarry	No	30 mm class 2 quarried pavement material [grading based]
PM2/40QG	Quarry	No	40 mm class 2 quarried pavement material [grading based]
PM2/20QM	Quarry	Yes	20 mm class 2 quarried pavement material [performance based]
PM2/30QM	Quarry	Yes	30 mm class 2 quarried pavement material [performance based]
Class 1 recycled pavement materials			
PM1/20RG	Recycled	No	20 mm class 1 recycled pavement material [grading based]
PM1/30RG	Recycled	No	30 mm class 1 recycled pavement material [grading based]

Identification Number	Source	Mix design	Product
PM1/40RG	Recycled	No	40 mm class 1 recycled pavement material [grading based]
PM1/20RM	Recycled	Yes	20 mm class 1 recycled pavement material [performance based]
PM1/30RM	Recycled	Yes	30 mm class 1 recycled pavement material [performance based]
Class 1 quarried pavement materials			
PM1/20QG	Quarry	No	20 mm class 1 quarried pavement material [grading based]
PM1A/20QG	Quarry	No	20 mm class 1 heavy duty quarried pavement material
PM1B/20QG	Quarry	No	20 mm class 1 heavy duty quarried pavement material
PM1/30QG	Quarry	No	30 mm class 1 quarried pavement material [grading based]
PM1/40QG	Quarry	No	40 mm class 1 quarried pavement material [grading based]
PM1/20QM	Quarry	Yes	20 mm class 1 quarried pavement material [performance based]
PM1/30QM	Quarry	Yes	30 mm class 1 quarried pavement material [performance based]
Stabilised pavement materials			
Refer section 10.1 for examples of nomenclature for this class of pavement material.			
Sealing aggregate			
SA20-14	Quarry	No	20 / 14 mm sealing aggregate
SA16-10	Quarry	No	16 / 10 mm sealing aggregate
SA14-10	Quarry	No	14 / 10 mm sealing aggregate
SA10-7	Quarry	No	10 / 7 mm sealing aggregate
SA7-5	Quarry	No	7 / 5 mm sealing aggregate
SA5-2	Quarry	No	5 / 2 mm sealing aggregate
Sand			
Sa - A	Recycled / quarry / pit	No	Type A sand
Sa - B	Recycled / quarry / pit	No	Type B sand
Sa - C	Recycled / quarry / pit	No	Type C sand
Sa - D	Recycled / quarry / pit	No	Type D sand
Asphalt aggregate			
Refer to the relevant product material specifications in Appendix 1: Pavement material specifications for requirements of source materials and product quality control.			
Mineral filler for asphalt, other than hydrated lime			
Refer to the relevant product material specifications in Appendix 1: Pavement material specifications for requirements of product quality control.			
Additional requirements for basic igneous source of rock			
Arrester bed material			

15.1 Spalls

15.1.1 Source materials

The Contractor must ensure that spalls source materials:

a) are natural quarried material;

b) are free from laminations or weak cleavages;

c) of such character that they will not disintegrate from the action of the sea, sand, or weather; and

d) do not include recycled material.

15.1.2 Product quality control

Table RD-PV-S1 15-2 Spalls quality control tests

Product		**300 mm Spalls SP300**
Test procedure	**Manufacturing tolerance**	
	Sieve size (mm)	**Percent passing (%)**
Particle size distribution AS 1141.11.1	300	100
	125	0 - 30
	75	0 - 2

Table notes:
(1) For all materials specifications, square aperture sieves conforming to ISO 3310-1 Test sieves - Technical requirements and testing - Part 1: Test sieves of metal wire cloth and ISO 3310-2 Test sieves — Technical requirements and testing — Part 2: Test sieves of perforated metal plate must be used for the determination of grading for particle sizes 75 mm and finer. Coarser sizes must be determined by linear measurement.

15.2 Road ballast

15.2.1 Source materials

The Contractor must ensure that all road ballast source materials:

a) are natural quarried material; and

b) do not include recycled material.

15.2.2 Product quality control

Table RD-PV-S1 15-3 Road ballast quality control tests

Product		**100 mm ballast RB-100**	**65 mm ballast RB-65**
Test procedure	**Manufacturing tolerance**		
Particle size distribution AS 1141.11.1	**Sieve size (mm)**	**Percent passing (%)**	
	125	100	-
	106	90 - 100	-
	75	-	100
	63	-	95 - 100
	53	-	40 - 70
	37.5	0 - 5	0 - 15
	19	-	0 - 2
AS 1141.23	Los Angeles abrasion grading A	Maximum 45%	

Table notes:
(1) For all materials specifications, square aperture sieves conforming to ISO 3310-1 Test sieves - Technical requirements and testing - Part 1: Test sieves of metal wire cloth and ISO 3310-2 Test sieves — Technical requirements and testing — Part 2: Test sieves of perforated metal plate must be used for the determination of grading for particle sizes 75 mm and finer. Coarser sizes must be determined by linear measurement.

15.3 Rail ballast

15.3.1 Source materials

a) The Contractor must ensure that all rail ballast source materials:

i) are natural quarried material; and

ii) do not include:

A. recycled materials; or

B. river gravel or crushed river gravel.

b) The Contractor must ensure that all testing is undertaken on representative rail ballast samples and not the source rock within the quarry. The sampling procedure must ensure that the samples are representative of the materials supplied and have not been affected by segregation during handling and transport.

15.3.2 Product quality control

Table RD-PV-S1 15-4 Rail ballast quality control tests(1)

Product		**RAIL50**	**RAIL60**	**RAIL60S (Used under steel sleepers)**
Test procedure	**Manufacturing tolerance**			
Particle size distribution AS 1141.11.1	**Sieve size (mm)**	**Percent passing (%)**		
	63	-	100	100
	53	100	85 - 100	95 -- 100
	37.5	70 - 100	20 - 65	35 - 70
	26.5	-	0 - 20	15 -30
	19	40 - 60	0 - 5	5 - 15
	13.2	-	0 - 2	0 -10
	9.5	10 - 30	-	0 - 1
	4.75	0 - 20	0 - 1	-
	1.18	0 - 10	-	-
	0.075	0 - 1	0 - 1	0 - 1
AS 1141.4	Bulk density	Minimum 1200 kg/m^3		
AS 1141.6.1	Particle density	Minimum 2500 kg/m^3		
AS 1141.22	Wet / dry strength(2)	Minimum 150 kN wet strength, Maximum 30% wet / dry strength variation		
AS 1141.23	Los Angeles abrasion grading B(3)(4)	Track carrying <6 Mt (gross) per annum: max 30% Track carrying >6 Mt (gross) per annum: max 25%		
AS 1141.14(3)	Misshapen particles %(5)	Max 30%		

Table notes:

(1) Refer to section 11 for further details.

(2) Samples must be prepared from an appropriately sized fraction of ballast from delivered Work Lots. Wet and dry strength testing must be carried out on the fraction of material passing 26.5 mm sieve and retained on 19 mm sieve.

(3) Los Angeles testing must be carried out on the fraction of ballast passing 19 mm sieve and retained on 9.5 mm sieve.

(4) In accordance with AS 2758.7 Aggregates and rock for engineering purposes, Part 7: Railway ballast, the ballast itself may be crushed to provide an appropriately graded test within the size range for Los Angeles testing only.

(5) Misshapen particles must be determined on the fraction of ballast retained on the 9.5 mm test sieve using a 2:1 calliper ratio. The report must indicate each of % flat, elongated, and flat and elongated particles.

15.4 Class 3 recycled pavement material [grading based]

15.4.1 Source materials

a) Class 3 recycled pavement source materials may be natural quarried material, blast furnace slag, Recycled Crushed Concrete, or any combination of them.

b) Supplementary source materials may comprise brick, tile, and asphalt or RCG in accordance with section 8.3.

c) The Contractor must ensure that asbestos or asbestos fibre is not incorporated into the pavement material product under any circumstances.

d) The Contractor must ensure that no more than 20% by mass of total supplementary source materials are incorporated and the constituent proportions must remain unchanged during production.

15.4.2 Product quality control

Table RD-PV-S1 15-5 Class 3 recycled pavement material [grading based] quality control tests

Product		**20 mm Class 3 PM 3/20RG**	**40 mm Class 3 PM 3/40RG**	**55mm Class 3 PM 3/55RG**	**75 mm Class 3 PM 3/75RG**
Test procedure	**Manufacturing tolerance**				
Particle size distribution TP134	**Sieve size (mm)**	**Percent passing (%)**			
	75	-	-	-	100
	53	-	100	100	75 - 95
	37.5	-	90 - 100	75 - 95	-
	26.5	100	-	-	50 - 75
	19	90 - 100	60 - 85	50 - 75	-
	13.2	-	-	-	-
	4.75	40 - 65	25 - 50	20 - 45	20 - 40
	0.075	5 - 15	3 - 11	3 - 11	3 - 11
AS 1289.3.1.2	Liquid limit	Maximum 35%			
AS 1289.3.3.1	Plasticity index	Maximum 15%			
AS 1289.3.4.1	Linear shrinkage	Maximum 8%			
RMS T276	Type II foreign materials	Maximum 1%			
	Type III Foreign materials excluding bitumen	Maximum 0.5%			
AS/NZS 2891.3.3	Bitumen content	Maximum 1%			
AS 1141.23	Los Angeles abrasion grading A	N/A	Maximum 45%		
	Los Angeles abrasion grading B	Maximum 45%	N/A		

Table notes:
(1) The recycled pavement material must have a uniform grading and must not be graded from the coarse 1/3 of the grading envelope to the fine 1/3 of the grading envelope, or vice versa.

15.5 Class 3 quarried pavement material [grading based]

15.5.1 Source materials

a) The Contractor must ensure that class 3 quarried pavement source materials are natural quarried material.

b) The Contractor must ensure that no recycled material is included in class 3 quarried pavement material.

15.5.2 Product quality control

Table RD-PV-S1 15-6 Class 3 quarried pavement material [grading based] quality control tests

Product		**20 mm Class 3 PM 3/20QG**	**40 mm Class 3 PM 3/40QG**	**55 mm Class 3 PM 3/55QG**	**75 mm Class 3 PM 3/75QG**
Test procedure	**Manufacturing tolerance**				
Particle size distribution TP134	**Sieve size (mm)**	**Percent passing (%)**			
	75	-	-	-	100
	53	-	100	100	75 - 95
	37.5	-	90 - 100	75 - 95	-
	26.5	100	-	-	50 - 75
	19	90 - 100	60 - 85	50 - 75	-
	13.2	-	-	-	-
	4.75	40 - 65	25 - 50	20 - 45	20 - 40
	0.075	5 - 15	3 - 11	3 - 11	3 - 11
AS 1289.3.1.2	Liquid limit	Maximum 35%			
AS 1289.3.3.1	Plasticity index	Maximum 15%			
AS 1289.3.4.1	Linear shrinkage	Maximum 8%			
AS 1141.23	Los Angeles abrasion grading A	N/A	Maximum 45%		
	Los Angeles abrasion grading B	Maximum 45%	N/A		

Table notes:
(1) The quarried pavement material must have a uniform grading and must not be graded from the coarse 1/3 of the grading envelope to the fine 1/3 of the grading envelope, or vice versa.

15.6 Class 2 recycled pavement material [grading based]

15.6.1 Source materials

a) Class 2 recycled pavement source materials may be natural quarried material, blast furnace slag, Recycled Crushed Concrete, or any combination of them.

b) Supplementary source materials may comprise brick, tile, and asphalt or RCG in accordance with section 8.3.

c) The Contractor must ensure that asbestos or asbestos fibre is not incorporated into the pavement material product under any circumstances.

d) The Contractor must ensure that no more than 20% by mass of total supplementary source materials may be incorporated and the constituent proportions must remain unchanged during production.

15.6.2 Product quality control

Table RD-PV-S1 15-7 Class 2 recycled pavement material [grading based] quality control tests

Product		**20 mm Class 2 PM 2/20RG**	**30 mm Class 2 PM 2/30RG**	**40 mm Class 2 PM 2/40RG**
Test procedure	**Manufacturing tolerance**			
Particle size distribution TP134	**Sieve size (mm)**	**Percent passing (%)**		
	53	-	-	100
	37.5	-	100	90 - 100
	26.5	100	90 - 100	74 - 96
	19	90 - 100	77 - 95	62 - 86
	13.2	74 - 96	-	-
	9.5	61 - 85	51 - 75	42 - 66
	4.75	42 - 66	35 - 57	28 - 50
	2.36	28 - 50	24 - 44	20 - 39
	0.425	11 - 27	9 - 22	8 - 21
	0.075	4 - 14	4 - 12	3 - 11
AS 1289.3.1.2	Liquid limit	Maximum 28%		
AS 1289.3.3.1	Plasticity index	Minimum 1% - maximum 8%		
AS 1289.3.4.1	Linear shrinkage	Maximum 4%		
RMS T276	Type II foreign materials	Maximum 1%		
	Type III foreign materials excluding bitumen	Maximum 0.5%		
AS/NZS 2891.3.3	Bitumen content	Maximum 1%		
AS 1141.23	Los Angeles abrasion grading A	N/A		Maximum 45%
	Los Angeles abrasion grading B	Maximum 45%		N/A

Table notes:
(1) The recycled pavement material must have a uniform grading and must not be graded from the coarse 1/3 of the grading envelope to the fine 1/3 of the grading envelope, or vice versa.

15.7 Class 2 recycled pavement material [performance based]

15.7.1 Source materials

a) Class 2 recycled pavement source materials may be natural quarried material, blast furnace slag, Recycled Crushed Concrete, or any combination of them.

b) Supplementary source materials may comprise brick, tile, and asphalt or RCG in accordance with section 8.3.

c) The Contractor must ensure that asbestos or asbestos fibre is not incorporated into the product under any circumstances.

d) The Contractor must ensure that no more than 20% by mass of total supplementary source materials may be incorporated and the constituent proportions must remain unchanged during production.

15.7.2 Nominated mix design parameters

Table RD-PV-S1 15-8 Class 2 recycled pavement material [performance based] quality control tests - mix design limits

Product		20 mm Class 2 PM 2/20RM	30 mm Class 2 PM 2/30RM
Test procedure	**Manufacturing tolerance**		
Particle size distribution TP134	**Sieve size (mm)**	**Percent passing (%)**	
	37.5	-	100
	26.5	100	90 - 100
	19	90 - 100	80 - 95
	2.36	30 - 60	25 - 55
	0.075	5 - 20	5 - 20
AS 1289.3.1.2	Liquid limit	Maximum 30%	
AS 1289.3.3.1	Plasticity index	Minimum 1% - maximum 10%	
AS 1289.3.4.1	Linear shrinkage	Maximum 5%	
TP183	Resilient modulus	Minimum 250 MPa	
	Deformation	Maximum 10-7	
AS 1141.23	Los Angeles abrasion grading B	Contractor nominated value	
TP184	Triaxial compression	Cohesion max 250 kPa, friction angle Min 40°	
RMS T276	Type II foreign materials	Maximum 1%	
	Type III foreign materials excluding bitumen	Maximum 0.5%	
AS/NZS 2891.3.3	Bitumen content	Maximum 1%	

15.7.3 Product quality control

Table RD-PV-S1 15-9 Class 2 recycled pavement material [performance based] quality control tests

Normal	Manufacturing tolerance	
Particle size distribution TP134	**Sieve size (mm)**	**Variation in percent passing**
	37.5	0
	26.5	0 (PM2/20), ±6 (PM2/30)
	19	±6
	9.5	±9
	2.36	±8
	0.075	±3
AS 1289.3.1.2	Liquid limit	+3
AS 1289.3.3.1	Plasticity index	+2
AS 1289.3.4.1	Linear shrinkage	+1
AS 1141.23	Los Angeles abrasion grading B	+3

15.8 Class 2 quarried pavement material [grading based]

15.8.1 Source material

The Contractor must ensure that class 2 quarried pavement source materials are natural quarried material and do not include recycled material.

15.8.2 Product quality control

Table RD-PV-S1 15-10 Class 2 quarried pavement material [grading based] quality control tests

Product		**20 mm Class 2 PM 2/20QG**	**30 mm Class 2 PM 2/30QG**	**40 mm Class 2 PM 2/40QG**
Test procedure	**Manufacturing tolerance**			
Particle size distribution TP134	**Sieve Size (mm)**	**Percent passing (%)**		
	53	-	-	100
	37.5	-	100	90 - 100
	26.5	100	90 - 100	74 - 96
	19	90 - 100	77 - 95	62 - 86
	13.2	74 - 96	-	-
	9.5	61 - 85	51 - 75	42 - 66
	4.75	42 - 66	35 - 57	28 - 50
	2.36	28 - 50	24 - 44	20 - 39
	0.425	11 - 27	9 - 22	8 - 21
	0.075	4 - 14	4 - 12	3 - 11
AS 1289.3.1.2	Liquid limit	Maximum 28%		
AS 1289.3.3.1	Plasticity index	Minimum 1% - maximum 8%		
AS 1289.3.4.1	Linear shrinkage	Maximum 4%		
AS 1141.23	Los Angeles abrasion grading A	N/A		Maximum 45%
	Los Angeles abrasion grading B	Maximum 45%		N/A

Table notes:
(1) The quarried pavement material must have a uniform grading and must not be graded from the coarse 1/3 of the grading envelope to the fine 1/3 of the grading envelope, or vice versa.

15.9 Class 2 quarried pavement material [performance based]

15.9.1 Source materials

The Contractor must ensure that class 2 quarried pavement source materials are natural quarried material and do not include recycled material.

15.9.2 Nominated mix design parameters

Table RD-PV-S1 15-11 Class 2 quarried pavement material [performance based] quality control tests - mix design limits

Product		**20 mm Class 2 PM 2/20QM**	**30 mm Class 2 PM 2/30QM**
Test procedure	**Manufacturing tolerance**		
Particle size distribution TP134	**Sieve size (mm)**	**Percent passing (%)**	
	37.5	-	100
	26.5	100	90 - 100
	19	90 - 100	80 - 95
	9.5	-	-
	2.36	30 - 60	25 - 55
	0.075	5 - 20	5 - 20
AS 1289.3.1.2	Liquid limit	Maximum 30%	
AS 1289.3.3.1	Plasticity index	Minimum 1% - maximum 10%	
AS 1289.3.4.1	Linear shrinkage	Maximum 5%	
TP183	Resilient modulus	Minimum 250 MPa	
	Deformation	Maximum 10-7	
AS 1141.23	Los Angeles abrasion grading B	Contractor nominated value	
TP184	Triaxial compression	Cohesion max 250 kPa, friction angle min 40°	

15.9.3 Product quality control

Table RD-PV-S1 15-12 Class 2 quarried pavement material [performance based] quality control tests

Test procedure	**Manufacturing tolerance**	
Particle size distribution TP134	**Sieve size (mm)**	**Variation in percent passing**
	37.5	0
	26.5	0 (PM2/20), ±6 (PM2/30)
	19	±6
	9.5	±8
	2.36	±6
	0.075	±2
AS 1289.3.1.2	Liquid limit	+3
AS 1289.3.3.1	Plasticity index	+2
AS 1289.3.4.1	Linear shrinkage	+1
AS 1141.23	Los Angeles abrasion grading B	+3

Table notes:
(1) Refer to the Contractor's current mix design certificate to assess compliance.

15.10 Class 1 recycled pavement material [grading based]

15.10.1 Source materials

a) Class 1 recycled pavement source materials may be natural quarried material, blast furnace slag, Recycled Crushed Concrete, or any combination of them.

b) Supplementary source materials may comprise brick, tile, and asphalt or RCG in accordance with section 8.3.

c) The Contractor must ensure that asbestos or asbestos fibre is not incorporated into the pavement material product under any circumstances.

d) The Contractor must ensure that no more than 20% by mass of total supplementary source materials are incorporated and the constituent proportions must remain unchanged during production.

15.10.2 Product quality control

Table RD-PV-S1 15-13 Class 1 recycled pavement material [grading based] quality control tests

Product		**20 mm Class 1 PM 1/20RG**	**30 mm Class 1 PM 1/30RG**	**40 mm Class 1 PM 1/40RG**
Test procedure	**Manufacturing tolerance**			
Particle size distribution TP134	**Sieve size (mm)**	**Percent passing (%)**		
	53	-	-	100
	37.5	-	100	95 - 100
	26.5	100	95 - 100	79 - 91
	19	95 - 100	79 - 93	65 - 83
	13.2	77 - 93	-	-
	9.5	63 - 83	53 - 73	44 - 64
	4.75	44 - 64	36 - 56	29 - 49
	2.36	29 - 49	25 - 43	20 - 38
	0.425	13 - 23	10 - 21	8 - 18
	0.075	5 - 11	4 - 10	3 - 9
AS 1289.3.1.2	Liquid limit	Maximum 25%		
AS 1289.3.3.1	Plasticity index	Minimum 1% - maximum 6%		
AS 1289.3.4.1	Linear shrinkage	Maximum 3%		
AS 1141.23	Los Angeles abrasion grading A	N/A		Maximum 30%
	Los Angeles abrasion grading B	Maximum 30%		N/A
RMS T276	Type II foreign materials	Maximum 1%		
	Type III foreign materials excluding bitumen	Maximum 0.5%		
AS/NZS 2891.3.3	Bitumen content	Maximum 1%		

Table notes:
(1) The recycled pavement material must have a uniform grading and must not be graded from the coarse 1/3 of the grading envelope to the fine 1/3 of the grading envelope, or vice versa.

15.11 Class 1 recycled pavement material [performance based]

15.11.1 Source materials

a) Class 1 recycled pavement source materials may be natural quarried material, blast furnace slag, Recycled Crushed Concrete, or any combination of them.

b) Supplementary source materials may comprise brick, tile, and asphalt or RCG in accordance with section 8.3.

c) The Contractor must ensure that asbestos or asbestos fibre is not incorporated into the pavement material product under any circumstances.

d) The Contractor must ensure that no more than 20% by mass of total supplementary source materials are incorporated and the constituent proportions must remain unchanged during production.

15.11.2 Nominated mix design parameters

Table RD-PV-S1 15-14 Class 1 recycled pavement material [performance based] quality control tests - mix design limits

Product		20 mm Class 1 PM 1/20RM	30 mm Class 1 PM 1/30RM
Test procedure	**Manufacturing tolerance**		
Particle size distribution TP134	**Sieve size (mm)**	**Percent passing (%)**	
	37.5	-	100
	26.5	100	-
	19	95 - 100	80 - 95
	9.5	65 - 85	50 - 75
	2.36	30 - 50	25 - 45
	0.075	5 - 15	5 - 15
AS 1289.3.1.2	Liquid limit	Maximum 25%	
AS 1289.3.3.1	Plasticity index	Minimum 1% - maximum 6%	
AS 1289.3.4.1	Linear shrinkage	Maximum 3%	
TP183	Resilient modulus	Minimum 300 MPa	
	Deformation	Maximum 10-8	
AS 1141.23	Los Angeles abrasion grading B	Contractor nominated value	
TP184	Triaxial compression	Cohesion max 150 kPa, friction angle min 40°	
RMS T276	Type II foreign materials	Maximum 1%	
	Type III foreign materials excluding bitumen	Maximum 0.5%	
AS/NZS 2891.3.3	Bitumen content	Maximum 1%	

15.11.3 Process quality control

Table RD-PV-S1 15-15 Class 1 recycled pavement material [performance based] quality control tests

Test procedure	Manufacturing tolerance	
Particle size distribution TP134	**Sieve size (mm)**	**Variation in percent passing**
	37.5	0
	26.5	0 (PM1/20), ±6 (PM1/30)
	19	±6
	9.5	±9
	2.36	±8
	0.075	±3
AS 1289.3.1.2	Liquid limit	+3
AS 1289.3.3.1	Plasticity index	+2
AS 1289.3.4.1	Linear shrinkage	+1
AS 1141.23	Los Angeles abrasion grading B	+3

Table notes:
(1) Refer to the Contractor's current mix design certificate to assess compliance.

15.12 Class 1 quarried pavement material [grading based]

15.12.1 Source materials

The Contractor must ensure that class 1 quarried pavement source materials are natural quarried material and no recycled material is included.

15.12.2 Product quality control

Table RD-PV-S1 15-16 Class 1 quarried pavement material [grading based] quality control tests

Product		**20 mm Class 1 PM 1/20QG**	**30 mm Class 1 PM 1/30QG**	**40 mm Class 1 PM 1/40QG**
Test procedure	**Manufacturing tolerance**			
Particle size distribution TP134	**Sieve size (mm)**	**Percent passing (%)**		
	53	-	-	100
	37.5	-	100	95 - 100
	26.5	100	95 - 100	79 - 91
	19	95 - 100	79 - 93	65 - 83
	13.2	77 - 93	-	-
	9.5	63 - 83	53 - 73	44 - 64
	4.75	44 - 64	36 - 56	29 - 49
	2.36	29 - 49	25 - 43	20 - 38
	0.425	13 - 23	10 - 21	8 - 18
	0.075	5 - 11	4 - 10	3 - 9
AS 1289.3.1.2	Liquid limit	Maximum 25%		
AS 1289.3.3.1	Plasticity index	Minimum 1% - maximum 6%		
AS 1289.3.4.1	Linear shrinkage	Maximum 3%		
AS 1141.23	Los Angeles abrasion grading A	N/A		Maximum 30%
	Los Angeles abrasion grading B	Maximum 30%		N/A

Table notes:
(1) The quarried pavement material must have a uniform grading and must not be graded from the coarse 1/3 of the grading envelope to the fine 1/3 of the grading envelope, or vice versa.

15.13 Class 1 quarried pavement material [performance based]

15.13.1 Source materials

The Contractor must ensure that class 1 quarried pavement source materials are natural quarried material and no recycled material is included.

15.13.2 Nominated mix design parameters

Table RD-PV-S1 15-17 Class 1 recycled pavement material [performance based] quality control tests - mix design limits

Product		**20 mm Class 1 PM 1/20QM**	**30 mm Class 1 PM 1/30QM**
Test procedure	**Manufacturing tolerance**		
Particle size distribution TP134	**Sieve size (mm)**	**Percent passing(%)**	
	37.5	-	100
	26.5	100	-
	19	95 - 100	80 - 95
	9.5	65 - 85	50 - 75
	2.36	30 - 50	25 - 45
	0.075	5 - 15	5 - 15
AS 1289.3.1.2	Liquid limit	Maximum 25%	
AS 1289.3.3.1	Plasticity index	Minimum 1% - maximum 6%	
AS 1289.3.4.1	Linear shrinkage	Maximum 3%	
TP183	Resilient modulus	Minimum 300 MPa	
	Deformation	Maximum 10-8	
AS 1141.23	Los Angeles abrasion grading 'B'	Contractor nominated value	
TP184	Triaxial compression	Cohesion max 150 kPa, friction angle min 45°	

15.13.3 Product quality control

Table RD-PV-S1 15-18 Class 1 quarried pavement material [performance based] quality control tests

Test procedure	**Manufacturing tolerance**	
Particle size distribution TP134	**Sieve size (mm)**	**Variation in percent passing**
	37.5	0
	26.5	0 (PM1/20), ±6 (PM1/30)
	19	±6
	9.5	±8
	2.36	±6
	0.075	±2
AS 1289.3.1.2	Liquid limit	+3
AS 1289.3.3.1	Plasticity index	+2
AS 1289.3.4.1	Linear shrinkage	+1
AS 1141.23	Los Angeles abrasion grading B	+3

Table notes:
(1) Refer to the Contractor's current mix design certificate to assess compliance.

15.14 Class 1 heavy duty quarried pavement material [grading based]

15.14.1 Source materials

The Contractor must ensure that class 1 heavy duty quarried pavement source materials are natural quarried material and no recycled material is included.

15.14.2 Product quality control

Table RD-PV-S1 15-19 Class 1 heavy duty quarried pavement material [grading based] quality control tests (20 mm class 1A PM1A/20QG)

Product		**20 mm Class 1APM1A/20QG**		
Test procedure	**Manufacturing tolerance [grading based]**			
Particle size distribution TP134	**Percent passing**		**Percent retained**	
	Sieve size (mm)	**%**	**Sieve size (mm)**	**%**
	37.5	-	-	-
	26.5	100	26.5 - 19.0	0 - 5
	19.0	95 - 100	19.0 - 13.2	7 - 18
	13.2	78 - 92	13.2 - 9.5	10 - 16
	9.5	63 - 83	9.5 - 4.75	14 - 24
	4.75	44 - 64	4.75 - 2.36	10 - 20
	2.36	30 - 48	2.36 - 0.425	14 - 28
	0.425	14 - 22	0.425 - 0.075	6 - 13
	0.075	7 - 11	-	-
AS 1289.3.1.2	Liquid limit	Maximum 25%		
AS 1289.3.3.1	Plasticity index	Minimum 2% - maximum 6%		
AS 1289.3.4.1	Linear shrinkage	Maximum 3%		
AS 1141.23	Los Angeles abrasion grading B	Maximum 25%		

Table notes:
(1) The quarried pavement material must have a uniform grading and must not be graded from the coarse 1/3 of the grading envelope to the fine 1/3 of the grading envelope, or vice versa.

Table RD-PV-S1 15-20 Class 1 heavy duty quarried pavement material [grading based] quality control tests (20 mm Class 1B PM1B/20QG)

Product		**20 mm class 1B PM1A/20QG**		
Test procedure	**Manufacturing tolerance [grading based]**			
Particle size distribution TP134	**Percent passing**		**Percent retained**	
	Sieve size (mm)	**%**	**Sieve size (mm)**	**%**
	37.5	-	37.5	-
	26.5	100	26.5 - 19.0	0 - 5
	19.0	95 - 100	19.0 - 13.2	7 - 18
	13.2	78 - 92	13.2 - 9.5	10 - 16
	9.5	63 - 83	9.5 - 4.75	14 - 24
	4.75	44 - 64	4.75 - 2.36	10 - 20
	2.36	29 - 48	2.36 - 0.425	15 - 29
	0.425	13 - 21	0.425 - 0.075	7 - 14
	0.075	5 - 9	0.075	5 - 9
AS 1289.3.1.2	Liquid limit	Maximum 25%		
AS 1289.3.3.1	Plasticity index	Minimum 2% - maximum 6%		
AS 1289.3.4.1	Linear shrinkage	Maximum 3%		
AS 1141.23	Los Angeles abrasion grading B	Minimum 25% - maximum 30%		

Table notes:
(1) The quarried pavement material must have a uniform grading and must not be graded from the coarse 1/3 of the grading envelope to the fine 1/3 of the grading envelope, or vice versa.

15.15 Stabilised pavement material [binder control]

15.15.1 Source materials

a) The Contractor must ensure that stabilised pavement source materials are quarried pavement material or, where approved in accordance with this Master Specification Part, recycled pavement material.

b) The Principal may specify in the Contract Documents class 1 quarried, class 1 recycled, or performance based pavement materials as an alternative to class 2 pavement material (grading based).

c) When class 1 materials are specified in the Contract Documents, product quality control criteria for the appropriate class 1 pavement material must apply.

15.15.2 Raw feed product quality control

Table RD-PV-S1 15-21 Stabilised pavement material [binder control] quality control tests

Product		**20 mm Class 2 PM 2/20(1)**	**30 mm Class 2 PM 2/30(1)**	**40 mm Class 2 PM 2/40(1)**
Test procedure	**Manufacturing tolerance [grading based]**			
Particle size distribution TP134	**Sieve size (mm)**	**Percent passing (%)**		
	53	-	-	100
	37.5	-	100	90 - 100
	26.5	100	90 - 100	74 - 96
	19	90 - 100	77 - 95	62 - 86
	13.2	74 - 96	-	-
	9.5	61 - 85	51 - 75	42 - 66
	4.75	42 - 66	35 - 57	28 - 50
	2.36	28 - 50	24 - 44	20 - 39
	0.425	11 - 27	9 - 22	8 - 21
	0.075	4 - 14	4 - 12	3 - 11
AS 1289.3.1.2	Liquid limit	Maximum 28%		
AS 1289.3.3.1	Plasticity index	Minimum 1% - maximum 8%		
AS 1289.3.4.1	Linear shrinkage	Maximum 4%		
AS 1141.23	Los Angeles abrasion grading A	N/A		Maximum 45%
	Los Angeles abrasion grading B	Maximum 45%		N/A

Table notes:
(1) Raw feed material must be: PM2/20QG, PM2/30QG, PM2/40QG, or, with prior approval, PM2/20RG, PM2/30RG or PM2/40RG.

15.15.3 Stabilised product quality control

Table RD-PV-S1 15-22 Stabilised pavement material [binder control] - Product quality control

Test	**Product**	**Refer section 10.5 for nomenclature**
Construction Documentation	Target binder Content (% dry mass)	Within the tolerance specified in section 10.5 of the binder content specified in the material description in accordance with section 10.1
AS 5101.4	Unconfined compressive strength (96% MDD - 7 days curing)	Reported value
AS 5101.4	Unconfined compressive strength (96% MDD - 28 days curing)	Strength must not be less than the value specified in the material description in accordance with section 10.1

15.16 Stabilised pavement material [strength control]

15.16.1 Source material

a) The Contractor must ensure that the stabilised pavement source materials are quarried pavement material or, where approved in accordance with this Master Specification Part, recycled pavement material.

b) The Principal may specify in the Contract Documents class 1 quarried, class 1 recycled, or performance based pavement materials as an alternative to class 2 pavement material (grading based).

c) When class 1 materials are specified in the Contract Documents, product quality control criteria for the appropriate class 1 pavement material must apply.

15.16.2 Raw feed product quality control

Table RD-PV-S1 15-23 Stabilised pavement material [strength control] quality control tests

Product		**20 mm Class 2 PM 2/20(1)**	**30 mm Class 2 PM 2/30(1)**	**40 mm Class 2 PM 2/40(1)**
Test procedure	**Manufacturing tolerance [grading based]**			
Particle size distribution TP134	**Sieve size (mm)**	**Percent passing (%)**		
	53	-	-	100
	37.5	-	100	90 - 100
	26.5	100	90 - 100	74 - 96
	19	90 - 100	77 - 95	62 - 86
	13.2	74 - 96	-	-
	9.5	61 - 85	51 - 75	42 - 66
	4.75	42 - 66	35 - 57	28 - 50
	2.36	28 - 50	24 - 44	20 - 39
	0.425	11 - 27	9 - 22	8 - 21
	0.075	4 - 14	4 - 12	3 - 11
AS 1289.3.1.2	Liquid limit	Maximum 28%		
AS 1289.3.3.1	Plasticity index	Minimum 1% - maximum 8%		
AS 1289.3.4.1	Linear shrinkage	Maximum 4%		
AS 1141.23	Los Angeles abrasion grading A	N/A		Maximum 45%
	Los Angeles abrasion grading B	Maximum 45%		N/A

Table notes:
(1) Raw feed material must be: PM2/20QG, PM2/30QG, PM2/40QG, or, with prior approval, PM2/20RG, PM2/30RG or PM2/40RG.

15.16.3 Stabilised product quality control

Table RD-PV-S1 15-24 Stabilised pavement material [strength control] product quality control

Test	**Product**	**Refer section 10.5 for nomenclature**
Construction Documentation	Target binder content (% dry mass)	Within the tolerance specified in section 10.5 of the binder content specified in the material description in accordance with section 10.1.
AS 5101.4	Unconfined compressive strength (96% MDD - 7 days curing)	Reported value
AS 5101.4	Unconfined compressive strength (96% MDD - 28 days curing)	Strength must not be less than the value specified in the material description in accordance with section 10.1.

15.17 Sealing aggregate

15.17.1 Source materials

The Contractor must ensure that all sealing aggregate source materials are natural quarried material which do not include any recycled material.

15.17.2 Product quality control

Table RD-PV-S1 15-25 Sealing aggregate quality control tests

Product		SA 20-14	SA 16-10	SA14-10	SA 10-7	SA 7-5	SA 5-2
Test procedure	**Manufacturing tolerance [grading based]**						
AS 1141.11.1	**Sieve size (mm)**	**Percent passing (%)**					
	26.5	100	-	-	-	-	-
	19	95 - 100	100	-	-	-	-
	16	35 - 65	65 - 90	100	-	-	-
	13.2	0 - 10	15 - 40	90 - 100	100	-	-
	9.5	0 - 2	0 - 8	0 - 15	85 - 100	100	-
	6.7	-	0 - 2	0 - 2	0 - 15	80 - 100	100
	4.75	-	-	-	0 - 3	0 - 20	80 - 100
	2.36	-	-	-	-	0 - 5	0 - 10
	1.18	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
AS 1141.15	Flakiness index	Maximum 25%				Reported value	N/A
TP244	% Flat particles	N/A				Maximum 35%	N/A
AS 1141.14(3)	Misshapen particles %	Reported value			N/A		
AS 1141.23	Los Angeles abrasion grading H	Maximum 25%		N/A			
	Los Angeles abrasion grading J	N/A		Maximum 25%	N/A		
	Los Angeles abrasion grading K	N/A			Maximum 25%	Maximum 30%	Maximum 30%(1)
AS 1141.42 and AS 1141.40(1)	PAFV(4)	Minimum 48(2)	Minimum 45(2)				
TP705(1)	Aggregate stripping	Maximum 15% wet and maximum 5% dry					
AS 1141.20.1	ALD - direct	Reported value				N/A	
AS 1141.20.2		N/A				Reported value	
AS 1141.20.3	ALD - calculated	Reported value				N/A	

Table notes:

(1) Sample must be prepared from an appropriately sized fraction of identical source rock.

(2) A minimum value of 55 must apply to sites requiring high skid resistance.

(3) Calliper ratio = 2:1; report each of % flat, elongated, and flat and elongated particles.

(4) Sites requiring high skid resistance are defined as having traffic volumes exceeding 2500 vehicle per day and either of the following:

- roads with curves <250 m radius; or
- gradients >5% and >50 m long

This does not apply for signalised intersections, pedestrian crossings and railway level crossings, roundabouts or curves with radius <100 m where site specific high friction treatments are required.

15.18 Sand

15.18.1 Source materials

a) RCG can be incorporated into, or replace, sand products in accordance with section 8.3 of type:

i) Type A and B washed or unwashed natural pit, river, or crushed quarry material;

ii) Type C crushed quarry product; or

iii) Type D natural pit material, dune sand, or crushed quarry product.

b) The Contractor must ensure that no other recycled material is included in sand products.

c) Where sand includes RCG, the product must be described by a naming convention as given in the following example:

i) Sa-C-G15 Sa-C sand blended with 15% RCG.

15.18.2 Product quality control

Table RD-PV-S1 15-26 Sand quality control tests

Product		**Sa-A**	**Sa-B**	**Sa-C**	**Sa-D**
Test procedure	**Manufacturing tolerance**				
Particle size distribution TP134	Sieve size (mm)	Percent passing			
	9.5	100	100	-	-
	6.7	-	-	100	95 - 100
	4.75	95 - 100	95 - 100	70 - 100	-
	2.36	75 - 100	75 - 100	35 - 100	-
	1.18	55 - 90	45 - 90	-	-
	0.600	35 - 70	30 - 70	-	-
	0.425	-	-	25 - 70	-
	0.300	20 - 40	20 - 42	-	-
	0.150	5 - 20	15 - 30	-	-
	0.075	0 - 10	5 - 20	8 - 23	0 - 10
AS 1289.3.1.2	Liquid limit	Non-plastic	Maximum 25%		Non-plastic
AS 1289.3.3.1	Plasticity index		Maximum 6%		
AS 1289.3.4.1	Linear shrinkage		Maximum 3%		
AS 1141.34	Organic impurities	Satisfactory			

15.19 Asphalt aggregate

15.19.1 Source material

a) The Contractor must ensure that asphalt aggregate source materials are natural quarried material, except for quarry sand which may be blended, or substituted, with RCG in accordance with section 8.3.

b) The Contractor must ensure that highly micaceous materials (such as granite and gneiss) are not used for asphalt aggregates unless the Contractor can provide evidence in the Contraction Documentation that the aggregate particles will maintain long term strength and not exfoliate when subject to processing through an asphalt plant (or equivalent).

c) The Contractor must ensure that materials of the same size from 2 or more sources are not mixed.

15.19.2 Product quality control

Table RD-PV-S1 15-27 provides percentage tolerances for the assessment of conformity of aggregate and sand production.

Table RD-PV-S1 15-27 Asphalt aggregate percentage passing tolerances

Product	Small aggregate (D ≤ 20)[1]	Large aggregate (D > 20)[1]	Natural sand	Quarry sand
Sieve size	**Percentage passing tolerance**			
One sieve less than D*	±8	-	-	-
Closest sieve to d*	±2.5	±5	-	-
2.36 mm sieve	-	-	±5	±5
1.18 mm sieve	±0.5	±0.5	±4	±4
0.075 mm sieve	-	-	±3	±3

Table notes:
(1) Where aggregate size D-d, e.g. 10-7.

Table RD-PV-S1 15-28 Asphalt aggregate quality control tests

Product[5]		Coarse fraction (-37.5 mm, +19.0 mm)	Medium fraction (-19.0 mm, +6.7 mm)	Fine fraction (-6.7 mm, +2.36 mm)	Natural sand	Quarry sand
Test procedure	**Manufacturing tolerance**					
AS 1141.24	Sulphate soundness	Maximum 12			Maximum 15	
AS 1141.30.1	Unsound and marginal stone Content	Maximum 5% (unsound stone)[6]			N/A	
AS 1141.30.1		Maximum 10% (marginal and unsound stone)				
AS 1141.15	Flakiness index	Maximum 30		N/A		
Department Test Procedure TP240	Elongation index	Maximum 35		N/A		
AS 1141.23	Los Angeles abrasion	Maximum 35%	Maximum 25%	Maximum 30%		
AS 1289.3.1.2	Liquid limit	N/A			NP	Max 25
AS 1289.3.3.1	Plasticity index					Max 6[1]
AS 1289.3.4.1	Linear shrinkage					Max 3
AS1141.34	Organic impurities	N/A			Satisfactory	
AS 1141.42; and AS 1141.40[2]	PAFV[4]	N/A	Minimum 48[3]	N/A		
AS 1141.5; AS 1141.6.1 and AS 1141.6.2	Water absorption and densities	Report only				

Table notes:

(1) Sand may be non-plastic.

(2) Sample must be prepared from an appropriately sized fraction of identical source rock.

(3) A minimum value of 55 must apply to all OGA and SMA mixes. A minimum value of 55 must also apply to specified sites requiring high skid resistance.

(4) Aggregates within -9.5 mm to +6.7 mm fraction, prepared in accordance with AS 1141.40 Methods for sampling and testing aggregates Polished aggregate friction value - Vertical road-wheel machine.

(5) Product for asphalt aggregates refers to the fractions of individual asphalt aggregate products used in the asphalt mix; common asphalt aggregate products include 20/14 mm, 10/7 mm and 7/2 mm.

(6) Refer to section15.21 for criteria which takes precedence where basic igneous source rock is used.

15.20 Mineral filler for asphalt, other than hydrated lime

15.20.1 Product quality control

Table RD-PV-S1 15-29 Mineral filler for asphalt, other than hydrated lime quality control tests

Test procedure	Manufacturing tolerance	
AS 1141.11.1	Gradings (0.60, 0.3, and 0.075 mm sieves) (%)	Report only
AS 1141.17	Voids in dry compacted filler (%)	Report only
AS 1289.B1.3	Moisture content (%)	3% maximum
AS 2350.8	Specific surface (m^2/kg)	Report only
AS 3583.3	Loss on ignition (% by mass)	4% maximum
AS 1141.8	Water soluble fraction (% by mass)	20% maximum

15.21 Additional requirements for basic igneous source rock

a) This section 15.21 applies where basic igneous source rock (as defined in AS 2758 Aggregates and rock for engineering purposes) is used for the production of a pavement material.

b) The Contractor must ensure that the presence of secondary minerals does not have a deleterious effect of the pavement material's intended performance.

c) The Contractor must ensure that basic igneous source rock is classified in accordance with Table RD-PV-S1 15-30.

d) The Contractor must ensure that unsound and marginal basic igneous source rock in that fraction of the product retained on a 4.75 mm AS sieve does not exceed the percentages listed in Table RD-PV-S1 15-31.

Table RD-PV-S1 15-30 Basic igneous source rock classifications

Rock classification	Secondary mineral content (%) AS1141.26	Accelerated soundness index AS 1141.29
Sound rock	<25	>94
Marginal rock	26-30	90-93
Unsound rock	>30	<90

Table RD-PV-S1 15-31 Basic igneous source rock marginal and unsound rock percentages

Material class	Total of marginal and unsound rock % (max)	Unsound rock % (max)
PM 1	10	5
PM 2	10	7
PM 3	20	10
Sealing and asphalt aggregate	10	3

15.22 Arrestor bed material

15.22.1 Source material

a) The Contractor must ensure that arrestor bed material has a smooth surface and is relatively spherical, well-rounded, hard, and durable.

b) The Contractor must ensure that arrestor bed source materials:

i) are from a natural source (such as river gravel);

ii) are uncrushed, unblended, and from a single quarry;

iii) do not include recycled material; and

iv) are free of deleterious inclusions such as concrete, bitumen, bricks, and organic matter.

15.22.2 Product quality control

Table RD-PV-S1 15-32 Arrestor bed material quality control tests

Test procedure	Manufacturing tolerance	
Particle size distribution TP134	**Sieve size (mm)**	**Percent passing (%)**
	19	100
	9.5	0 - 5
	0.075	Maximum 2
TfNSW Test Method T239	Fractured faces	Maximum 10%
AS 1141.14(1)	Misshapen particles %	Maximum 10%
WA 223.1	Crushing	Maximum 5%
AS 1141.23	Los Angeles value grading B	Report only
WA 223.1	Cracking	Maximum 5%
Main Roads WA Specification 6706/02/1312 Materials Engineering Laterite Gravel Specification for Truck Arrester Bed(2)	Slump angle	Maximum 30°
AS 1141.4	Bulk density	Maximum 3.4 t/m^3

Table notes:
(1) Calliper ratio = 2:1; report each of % flat, elongated, and flat and elongated particles.
(2) Also report measured radius points and height of slump; repeat the test for a non-inverted cone.

Attachment 2

Potentially Contaminating Activities Checklist

Contaminating Activities (PCA) Pre-Screening Checklist

Activity	Definition	Yes	No
Activities undertaken in course of business			
Abrasive blasting	Operation of works for abrasive blast cleaning or disposal of abrasive blasting material (including mobile abrasive blasting works and abrasive blast cleaning carried out in fully enclosed booths but excluding abrasive blast cleaning undertaken for residential purposes)		
Acid sulphate soil generation	Oxidation of iron sulphide in potential acid sulphate soil material (sulphidic material) resulting in formation of actual acid sulphate soil material or sulphuric material		
Agricultural activities	Any of the following activities undertaken in the course of agriculture: (a) burial of animals or parts of animals; (b) burial of other waste; (c) irrigation using wastewater; (d) intensive application or administration of a listed substance to animals, plants, land or water (excluding routine spraying, in accordance with manufacturers' instructions, of pesticides used in broad-acre farming)		
Airports, aerodromes or aerospace industry	Operation of premises for commercial or charter aircraft take-off and landing or manufacture, repair or maintenance of commercial or charter aircraft or aircraft equipment		
Animal burial	Burial of animals or parts of animals other than in the course of agriculture		
Animal dips or spray race facilities	Operation of animal dips or spray race facilities		
Animal feedlots	Operation of confined yards or areas for holding of animals and feeding of animals principally by mechanical means or by hand		
Animal saleyards	Operation of yards at which cattle, sheep or other animals are gathered and confined for the purpose of their sale, auction or exchange (including associated transport loading facilities and associated wastewater disposal)		
Asbestos disposal	Disposal of asbestos or asbestos products		
Asphalt or bitumen works	Operation of works for manufacture of asphalt or bitumen		
Battery manufacture, recycling or disposal	Assembly, disassembly, manufacture or recycling of batteries (excluding storage of batteries for sale)		
Breweries	Production of beer by infusion, boiling or fermentation		
Brickworks	Production of bricks (including glazing of bricks)		

Activity	Definition	Yes	No
Bulk shipping facilities	Operation of facilities for bulk handling of agricultural crop products, rock, ores, minerals or liquid organic chemical substances to or from wharf or wharfside facility (including sea-port grain terminals)		
Cement works	Operation of works for production of cement clinker or grinding of cement clinker using argillaceous and calcareous material		
Ceramic works	Operation of works for manufacture of tiles, pipes, pottery goods, refractories or other ceramic products		
Charcoal manufacture	Manufacture of charcoal		
Coal handling or storage	Handling of coal, coke or carbonaceous material by any means or storage of coal, coke or carbonaceous reject material		
Coke works	Production, quenching, cutting, crushing or grading of coke		
Compost or mulch production or storage	Production or storage of compost, mulch or garden soils		
Concrete batching works	Operation of works for production of concrete or concrete products manufactured by inclusion of cement, sand, rock, aggregate or similar materials		
Curing or drying works	Operation of works for smoking, drying or curing meat, fish or other edible products by application of heat or smoke		
Defence works	Operation of military defence establishments (including training areas)		
Desalination plants	Operation of desalination plants		
Dredge spoil disposal or storage	Disposal of dredge spoil onto land or storage of dredge spoil		
Drum reconditioning or recycling works	Operation of works for reconditioning or recycling of metal or plastic drums		
Dry cleaning	Operation of premises for dry cleaning		
Electrical or electronics component manufacture	Manufacture of electrical or electronics components		
Electrical substations	Operation of electrical substations		
Electrical transformer or capacitor works	Operation of works for manufacture, repair, storage or disposal of electrical transformers, capacitors or associated equipment or fluids		
Electricity generation or power plants	Operation of electricity generation or power plants		
Explosives or pyrotechnics facilities	Operation of facilities for manufacture of explosives or pyrotechnics		

Activity	Definition	Yes	No
Fertiliser manufacture	Manufacture of agricultural fertiliser		
Fibreglass manufacture	Manufacture of fibreglass products		
Fill or soil importation	Importation, to premises of a business, of soil or other fill originating from a site at which another potentially contaminating activity has taken place		
Fire extinguisher or retardant manufacture	Manufacture of fire extinguishers or fire retardants		
Fire stations	Underground storage of fuel at fire stations		
Fire training areas	Operation of premises for fire training involving the use of liquid fuel, fire accelerants, aqueous film forming foam or similar substances		
Foundry	Manufacture of metal products by injecting or pouring molten metal into moulds		
Fuel burning facilities	Burning of solid or liquid fuel (including for generation of power or steam at rate of heat release exceeding 1MW)		
Furniture restoration	Restoration of furniture		
Gasworks	Operation of gasworks or gas holders		
Glass works	Operation of works for manufacture of glass products		
Glazing	Glazing of ceramics or pottery		
Hat manufacture or felt processing	Manufacture of hats or processing of felt		
Incineration	Incineration within the meaning of Schedule 1 Part A clause 3(1) of the Act		
Iron or steel works	Operation of works for manufacture of iron or steel		
Laboratories	Operation of laboratories		
Landfill sites	Operation of sites for disposal of waste onto or into land		
Lime burner	Manufacture (by means of kiln) of cement or lime from limestone (including associated storage of waste)		
Metal coating, finishing or spray painting	Finishing, treating or coating of metal (including anodising, galvanising, pickling, electroplating, heat treatment, powder coating, enamelling and spray painting)		
Metal forging	Forging of metal products		
Metal processing, smelting, refining or metallurgical works	Operation of works for melting (by means of furnace) of ferrous or non-ferrous metal or smelting or reduction of ores to produce metal		
Mineral processing, metallurgical laboratories or mining or extractive industries	Chemical or physical extraction or processing of metalliferous ores, storage of mining or exploration waste (for example, in tailings dams, overburden or waste rock dumps) mining or processing of minerals or		

Activity	Definition	Yes	No
	operation of laboratories or pilot facilities for processing or testing of minerals		
Mirror manufacture	Manufacture of mirrors		
Motor vehicle manufacture	Manufacture of motor vehicles		
Motor vehicle racing or testing venues	Operation of facilities designed and used for motor vehicle competitions or motor vehicle speed or performance trials		
Motor vehicle repair or maintenance	Operation of premises for repair or maintenance of motor vehicles or parts of motor vehicles (including engine reconditioning works)		
Motor vehicle wrecking yards	Operation of yards for wrecking or dismantling of motor vehicles or parts of motor vehicles		
Mushroom farming	Farming of mushrooms		
Oil recycling works	Operation of works for recycling of oil		
Oil refineries	Operation of works for refining of crude petroleum oil or shale		
Paint manufacture	Manufacture (including blending, mixing and formulation) of paint		
Pest control works	Operation of premises for storage of pesticides or filling or washing of tanks used in pest control operations		
Plastics manufacture works	Operation of works for manufacture (including blending, mixing and formulation) of plastics or plastic components (excluding processing and moulding of plastics manufactured elsewhere)		
Printing works	Operation of printing works		
Pulp or paper works	Operation of works for manufacture of timber pulp or paper		
Railway operations	Railway operations within the meaning of Schedule 1 Part A clause 7(2) of Act		
Rubber manufacture or processing	Manufacture or processing of rubber or rubber products		
Scrap metal recovery	Recovery (including cleaning) of scrap metal		
Service stations	Operation of retail fuel outlets		
Ship breaking	Wrecking or dismantling of ships		
Spray painting	Spray painting other than spray painting of metal		
Tannery, fellmongery or hide curing	Operation of works for preservation or treatment of animal skins or hides		
Textile operations	Manufacture or dyeing of fabrics or materials		
Transport depots or loading sites	Operation of transport depots or loading sites		
Tyre manufacture or retreading	Manufacture or retreading of tyres		

Activity	Definition	Yes	No
Vermiculture	Cultivation of earthworms for production of earthworms or earthworm castings		
Vessel construction, repair or maintenance	Operation of works or facilities (whether on water or land) for construction, repair or maintenance of vessels		
Waste depots	Reception, storage or treatment (including recycling) of waste or disposal of waste to land or water		
Wastewater storage, treatment or disposal	Storage (including in tanks, lagoons and ponds) or treatment (including recycling) of wastewater or disposal of wastewater to land or water		
Water discharge to underground aquifer	Direct discharge of water from surface of land to underground aquifer		
Wetlands or detention basins	Operation of bodies of water less than 6 metres deep for collection and management of stormwater or other wastewater for urban amenity, flood mitigation or ecological or other environmental purposes		
Wineries or distilleries	Operation of works for processing grapes or other produce to make wine or spirits		
Wood preservation works	Operation of works involving treatment or preservation of timber using chemicals		
Woolscouring or wool carbonising works	Operation of works involving cleaning or carbonising of wool other than in course of handicraft business where wool is further processed for retail sale		
Works depots	Operation of works depots by councils or utilities		
Domestic Activities			
Fill or soil importation	Importation, to domestic premises, of soil or other fill originating from a site at which another potentially contaminating activity has taken place		
Liquid organic chemical substances—storage	Storage of more than 500 litres of liquid organic chemical substances in underground or aboveground tanks or vessels at a discrete premises (excluding storage of oil for domestic heating at the premises)		

Listed Substances	
Acidic solutions	Lime sludges or slurries
Acids	Liquid organic chemical substances
Adhesives (excluding solid inert polymeric materials)	Manganese compounds
Alkali metals	Medical waste within the meaning of Schedule 1 Part B of the Act
Alkaline earth metals	Mercaptans
Alkaline solutions	Mercury compounds
Alkalis	Mutagens
Antimony	Nickel compounds
Antimony compounds	Nickel solutions
Antimony solutions	Nitrates Organic halogen compounds (excluding solid inert polymeric materials)
Arsenic	Organic phosphates
Arsenic compounds	Organic solvents
Arsenic solutions	Organometallic residues
Asbestos	Oxidising agents
Barium compounds	Paint sludges or residues
Barium solutions	Perchlorates
Beryllium	Peroxides
Beryllium compounds	Pesticides
Boron	Pharmaceutical wastes or residues
Boron compounds	Phenolic compounds (excluding solid inert polymeric materials)
Cadmium	Phosphorus
Cadmium compounds	Phosphorus compounds
Cadmium solutions	Poisons within the meaning of the *Drugs Act 1908*
Calcium carbide	Polychlorinated biphenyls
Carbon disulphide	Radionuclides
Carcinogens	Reactive chemicals
Chlorates	Reducing agents
Chromium compounds	Selenium
Chromium solutions	Selenium compounds
Copper compounds	Selenium solutions
Copper solutions	Silver compounds
Cyanide complexes	Silver solutions
Cyanides	Solvent recovery residues
Cyanide solutions	Sulphides
Cytotoxic wastes	Sulphide solutions
Dangerous substances within the meaning of the Dangerous Substances Act 1979	Surfactants
Distillation residues	Teratogens
Equipment containing mercury	Thallium
Fluoride compounds	Thallium compounds
Halogens	

Listed Substances	
Heterocyclic organic compounds containing oxygen, nitrogen or sulphur Isocyanate compounds (excluding solid inert polymeric materials) Laboratory chemicals Lead compounds Lead solutions	Thallium solutions Vanadium compounds Zinc compounds Zinc solutions