Work Authority WA127
Work Plan (WA) PLN-001686

Licence Ownership Details	
Licensee	Hanson Construction Materials Pty Ltd
Registered Address	Level 14, 35 Clarence Street Sydney New South Wales 2000

Mineral Resources (Sustainable Development) Act 1990

Tenement Number: WA127

Plan Number: PLN-001686

Work Plan Statutorily Endorsed

Signed: _____

Delegate of the Department Head

Date: 01/05/2024

Plan Summary Details	
Project Name	Yannathan Increased Extraction Area and Depth Work Plan Variation
Plan Description	Please refer to the attached Part 1 Work Plan Summary Report

Area Details	
Property Name	Yannathan Quarry
Address	870 and 910 Westernport Road
Suburb / Town	Yannathan
Postcode	3981
Land Tenure (ownership) details	
Land Tenure Type	The site is owned by operator (freehold)
Depth Limitations	Yes
Depth Limits	50 ft (15.24m) for parts of 870 Westernport Road

Resource Type	
WA Commodity	Sand
WA Primary Commodity	Sand
Total Resource Estimate	5,548,000.00
Unit of Measure	Tonnes

Proposed Final Depth of Extraction	
Estimated Max Terminal Depth	39.00 metres

Batter Slope Angle	degrees

Top soil, overburden and subsoil disturbance	
Est Volume of Top Soil	312,000.00
Unit of Measure Top Soil	Cubic metres
Est Depth of Top Soil	0.45 metres
Est Volume of Overburden	1,184,000.00
Unit of Measure Overburden	Cubic metres
Est Depth of Overburden	1.70 metres
Area of Disturbance	69.50 hectares

Operation Type	
Operation Type	Dry open pit; Dredging
Operation Type – Other	

Plant, Equipment and Method
Refer to Section 3.9 of Part 1 Summary Report

Operating Hours (24 Hour)			
	Above Ground Operations	**Sales**	**Processing**
Mon-Fri Start	6:00	6:00	6:00
Mon-Fri End	18:00	18:00	22:00
Sat Start	6:00	6:00	6:00
Sat End	18:00	18:00	22:00
Sun Start	N/A	N/A	N/A
Sun End	N/A	N/A	N/A
Public Holiday Activity	Yes	Yes	Yes
Operational hours Clarification	No work on Christmas Day, Boxing Day or Good Friday, maintenance may be conducted outside these hours		

Attachments Provided (as part of) Work Plan

Work Plan Specific Conditions - 20240501
Part 2 Drawing set - 20231222
Part 1 Summary Report_no appendices - 20231222
Part 3 Risk Assessment - 20231222
Part 5 Rehab Plan - 20231222
Part 4 CEP - 20231222

Appendices

Appendix A Certificates of Title - 20231222
Appendix B Planning Property Reports - 20231222
Appendix C SRW Licence - 20231222
Appendix D Surface Water Management Plan - 20231222
Appendix E Hydrogeological assessment - 20231222
Appendix F Flora and Fauna Assessment - 20231222
Appendix G Cultural Heritage - 20231222
Appendix H1 Geotechnical Report1 - 20231222
Appendix H2 Geotech App A1 - 20231222
Appendix H3 Geotech App A2 - 20231222
Appendix H4 Geotech App A3 - 20231222
Appendix H5 Geotech App B1-B5 - 20231222
Appendix H6 Geotech App C Slope Analysis - 20231222
Appendix H7 Geotech App D Risk Tables - 20231222
Appendix H8 Geotech App E Fill Spec - 20231222
Appendix H9 Geotech GCMP - 20231222
Appendix I Slimes Management Plan - 20231222
Appendix J Air Quality (Dust) - 20231222
Appendix K Noise - 20231222
Appendix L Greenhouse Gas and Climate Change - 20231222
Appendix M Correspondence with Regulators - 20231222

WORK PLAN SPECIFIC CONDITIONS

Work Authority WA127

Mineral Resources (Sustainable Development) Act 1990

Tenement Number: WA27

Plan Number: PLN-001686

Work Plan Statutorily Endorsed

Signed: _____

Delegate of the Department Head

Date: 01/05/2024

EARTH RESOURCES REGULATOR

1. Prior to any excavation works commencing, the work authority holder must provide confirmation of the minimum temporary buffer distance between the existing waterway channel and the excavation. At the same time, update the Ground Control Management Plan with the correct buffer distance.

2. The work authority holder must engage a suitably qualified and experienced person(s) to prepare and submit within 3 months of approval of the WPV, to the satisfaction of Earth Resources Regulator, report(s) detailing:

    a. A geotechnical assessment of the stability of the overall terminal slope design and assessment of the risk that this may pose to sensitive receptors such as, but not limited to, the Westernport Road and waterways.

    b. A geotechnical assessment of the long-term stability of the overall rehabilitated (backfilled) slope design and assessment of the risk that this may pose to sensitive receptors such as, but not limited to, the Westernport Road and waterways.

    c. If the assessed risk of instability that the terminal slope or rehabilitated (backfilled) slope in the long-term, is found to be unacceptable to ERR, then a work plan variation must be lodged to vary the approved extraction limit and vary the approved rehabilitation plan.

3. The work authority holder must complete a stability assessment (to the satisfaction of the department) every five years following approval of the WPV (or at a lesser frequency if considered necessary by a competent geotechnical engineer or engineering geologist) on the performance of the terminal and rehabilitated batters against design. These reports must be provided to ERR within a month of finalisation.

4. The work authority holder must within 12 months of this approval, provide to the satisfaction of the department an assessment of the post closure residual risks that will require monitoring, maintenance, treatment or other ongoing land management activities including who will be responsible for undertaking the activities and the cost to undertake the activities after rehabilitation is complete and the work authority surrendered. Note that a qualified person may be required to undertake certain activities.

MELBOURNE WATER

1. Prior to commencement of works, a Drainage and Stormwater Management Strategy must be submitted to Melbourne Water for approval, which calculates the catchment area, drainage outfall locations, new drainage works, existing drainage infrastructure and details of flow levels and flood levels for the 100-year ARI storm event. The subdivision will need to cater for flooding and waterway enhancement works and the drainage strategy will need to highlight how it is intended to deal with the existing waterway, flood levels and flow that run through the property.
2. Prior to commencement of works the Owner shall enter into and comply with an agreement with Melbourne Water Corporation for the acceptance of surface and storm water from the subject land directly or indirectly into Melbourne Water's drainage systems and waterways, the provision of drainage works and other matters in accordance with the statutory powers of Melbourne Water Corporation.
3. Prior to the commencement of works a separate application to Melbourne Water must be made and approved of any new or modified storm water connection to Melbourne Water's drains or watercourses. Prior to accepting an application, evidence must be provided demonstrating that Council considers that it is not feasible to connect to the local drainage system.

DEPARTMENT OF ENERGY ENVIRONMENT AND CLIMATE ACTION – PLANNING AND ENVIRONMENTAL ASSESSMENT

1. Before works start, the WA holder must advise all persons undertaking the vegetation removal or works on site of all relevant WA conditions, planning permit conditions and associated statutory requirements or approvals.
2. The total area of native vegetation approved to be removed as part of this variation is 0.070 hectares, comprised of:
    a. 1 large scattered tree.
3. To offset the proposed clearing under this WA in accordance with the Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017), the holder must secure general offset of 0.015 general habitat units:
    a. Located within the Port Phillip and Westernport Catchment Management boundary or Cardinia Shire Council municipal area.
    b. With a minimum strategic biodiversity score of at least 0.352.

The offset(s) secured must also protect 1 large tree.

4. Before any native vegetation is removed evidence that the required offset has been secured must be provided to the satisfaction of the responsible authority. This evidence must be one or both of the following:
    a. An established first party offset site including a security agreement signed by both parties, and a management plan detailing the 10-year management actions and ongoing management of the site, and/or
    b. Credit extract(s) allocated to the permit from the Native Vegetation Credit Register.

5. A copy of the offset evidence must be endorsed by the responsible authority for the planning permit and will form part of that permit. Within 30 days of endorsement of the offset evidence, a copy of the endorsed offset evidence must be provided to Planning and Environment Assessment at DEECA.

6. Where the offset includes a first party offset(s), the permit holder must provide an annual offset site report to the responsible authority by the anniversary date of the execution of the offset security agreement, for a period of 10 consecutive years. After the tenth year, the landowner must provide a report at the reasonable request of a statutory authority.

7. Within 6 months of the conclusion of the permitted clearing of native vegetation the offset requirements can be reconciled with the written agreement of the responsible authority and DEECA.

8. A suitably qualified wildlife handler or zoologist is to be present when felling trees/removing native vegetation (including planted and regrowth vegetation and when removing constructed dams/wetlands) to ensure affected wildlife is not harmed. If displaced wildlife that cannot be relocated on site to an appropriate location away from the construction footprint, or injured wildlife is captured, please contact DEECA on 136 186 for further advice.

9. Within the area of native vegetation to be retained and any tree protection zone associated with the permitted use and/or development, the following is prohibited:

    a. Any vehicle or pedestrian access, trenching or soil excavation, and

    b. Storage or dumping of any soils, materials, equipment, vehicles, machinery, or waste products, and

    c. Entry or exit pits for underground services, and

    d. Any other actions or activities that may result in adverse impacts to retained native vegetation.

10. Prior to work commencing the work authority holder must develop a Vegetation Management Plan which includes a risk management plan with measures to ensure:

    a. Compliance with Conditions 1, 8 and 9.

    b. Management controls for potential risk events generated by quarrying activities that may impact flora and fauna on and offsite.

    c. Appropriate monitoring of the effectiveness of management controls in mitigating impacts to sensitive biodiversity receptors on and offsite.

    d. Appropriate adaptive management measures applied based on the outcomes of monitoring.

    e. Maps showing the WA boundary, extraction zones, works exclusion buffer zones, the location of ‘No Go’ zones and tree protection zones.

11. Prior to work commencing the work authority must develop a Waterway Realignment and Landscape Plan (or equivalent) that includes measure to ensure:

    a. Management controls for potential risk events generated by quarrying activities that may impact on flora and fauna on and offsite.

ENVIRONMENT PROTECTION AUTHORITY

Groundwater.

1. The work authority holder must undertake additional groundwater monitoring and provide ERR with a report, including risk treatment plan (as applicable), demonstrating in consultation with the EPA, that:

    a. Any potential impacts of removing the confining black sand layer, including the potential impact of dredged material on the groundwater from the lower sand aquifer.

    b. Installation of monitoring bores in the Southwest section of the site, where acidic pH is reported. This should follow publication EPA Pub 668 and EPA Pub 2033. Given the proximity of the offsite bore in this area, monitoring of that location is also required.

    c. On-going monitoring of the groundwater must be undertaken, and the new bores commissioned and monitored prior to extension of the quarry. A groundwater quality monitoring plan must be developed, with clear target analytes and frequency of sampling. In addition, a groundwater Trigger Action Response Plan (TARP) must be developed for groundwater quality.

Air Quality.

3. Ensure on-site monitoring includes the collection of data for respirable crystalline silica (RCS) ensuring petrographic analysis is conducted by a NATA accredited lab. The authority holders must provide the department with a report, including a risk treatment plan (as applicable), demonstrating, that respirable crystalline levels are below the relevant standards and that the risks of respirable crystalline silica to sensitive receptors have been eliminated or minimised as far as reasonably practicable.

Permissions.

4. Seek advice from EPA's Permissioning Unit through submission of a permission pathway form as it relates to a potential requirement for an A18 Permit (Discharge or deposit of waste to aquifer) and obtain any permit required for activities defined under the workplan.

Noise.

5. Noise, including vibration, must be managed for construction, operation, rehabilitation, and closure activities in accordance with the GED. This involves applying controls and measures to eliminate the risk of harm to human health and the environment, and wherever elimination is not reasonably practicable, the risk is to be minimised so far as reasonably practicable. Concurrently, noise must not be emitted, from a place or premises that is not a residential premises, if it is 'unreasonable noise' (section 166 of the EP Act 2017).

SOUTHERN RURAL WATER

1. Prior to the commencement of works the work authority holder must seek advice from Southern Rural Water (SRW) in relation to a suitable groundwater quality monitoring plan, with triggers and actions developed to ensure:

    a. That there are no unacceptable offsite impacts.

    b. That data is collected to inform an estimation of future evaporation from the site and where applicable seek SRW advice as it relates to a larger groundwater licence to cover the losses.

c. That the origin of the low pH groundwater at and around the site is naturally occurring or whether the quarry has contributed to the low pH.

d. That a groundwater monitoring network is expanded to ensure that the upper shallow aquifer and the lower shallow aquifer are both monitored around the perimeter of the proposed quarry property.

2. Groundwater quality data must be collated annually and reports made available to the relevant authorities including any subsequent licences.

3. The Work Authority holder shall implement controls to ensure that there is no polluted seepage from the work site into groundwater or surface water resource.

4. The Work Authority holder must prepare a contingency plan to deal with surface water or groundwater pollution and clean up should it occur.

5. Any significant variation in groundwater levels around the site boundary will require the need for a detailed hydrogeological report to be prepared and forwarded to Southern Rural Water for assessment.

6. The works shall not interfere or impact on any waterway without the responsible authority approval.

7. Sediment runoff from the site shall be retained on site during and after operations. Controls particularly on steep slopes are to be in accordance with the Environment Protection Authority (EPA recommendations detailed in the construction techniques for sediment control No 275, May 1991. Sediment control structures such as sediment basin, sediment fences and sediment traps must be installed prior to the commencement of operations and maintained post development.

8. Fuels/Oils or other deleterious substances are prevented from entering the groundwater resource and any waterway.

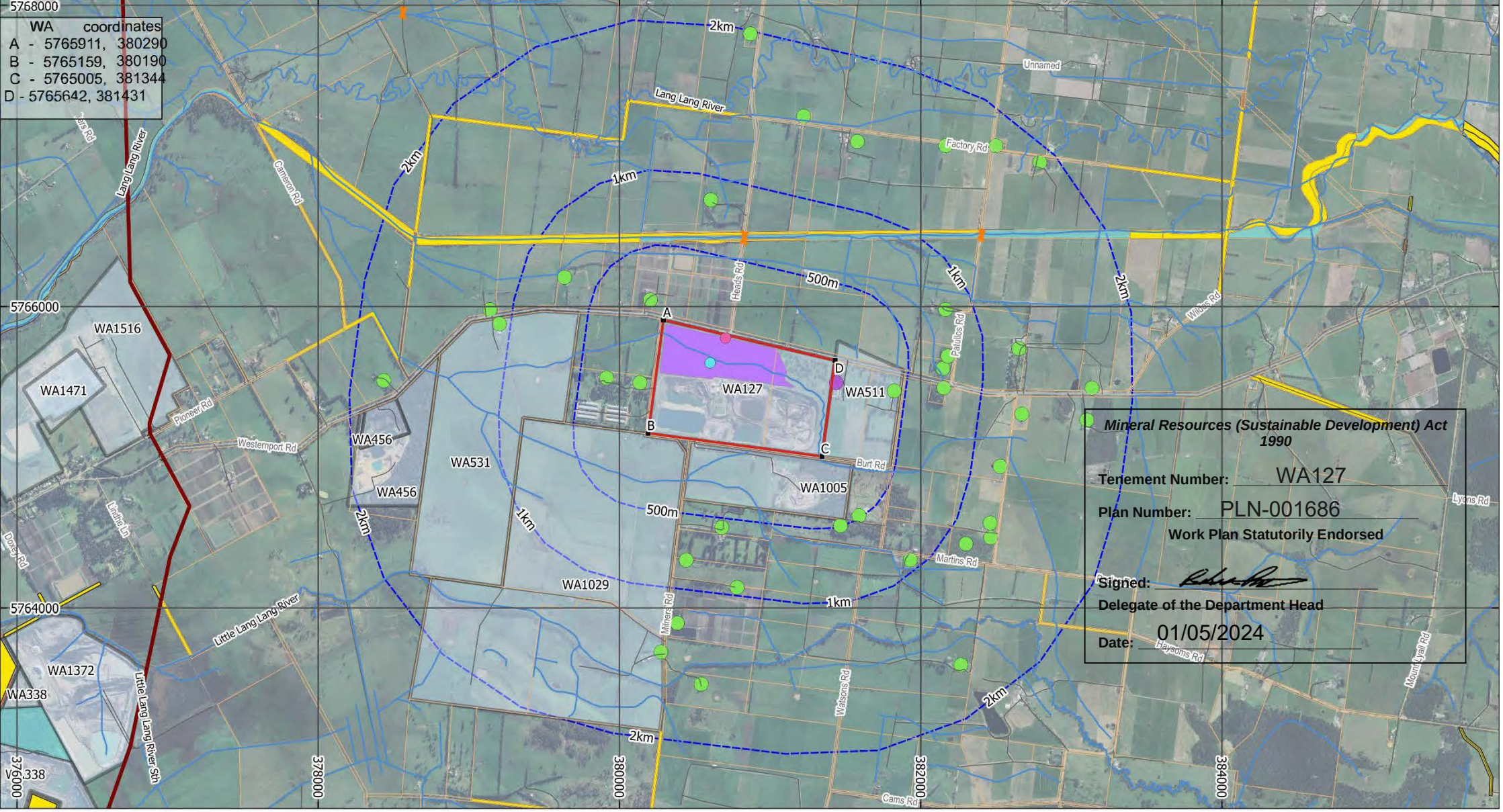
HIGH VOLTAGE POWER LINE EASEMENT

1. Any works in the vicinity of any power line are subject to the provision of the relevant Power Supply Authority Regulations.

2. In addition, if explosives are used, care must be exercised to prevent damage to the power line by fly rock. Where such damage occurs, the Work Authority holder shall be held responsible.

3. No excavation shall take place closer than 7m to any structure or to the centreline of any power line without the written approval of the relevant authority.

4. Workers are to be trained in the dangers of using earth moving equipment in close proximity to power lines. 1.5 Should the extraction process produce any pollution (whether it be dust, dirt or smoke) affecting the electricity supply insulators, the relevant authority will be compensated by Work Authority holder for all restoration work to maintain safety and reliability of electricity supply.



Mineral Resources (Sustainable Development) Act 1990

Tenement Number: WA127

Plan Number: PLN-001686

Work Plan Statutorily Endorsed

Signed:

Delegate of the Department Head

Date: 01/05/2024

Legend

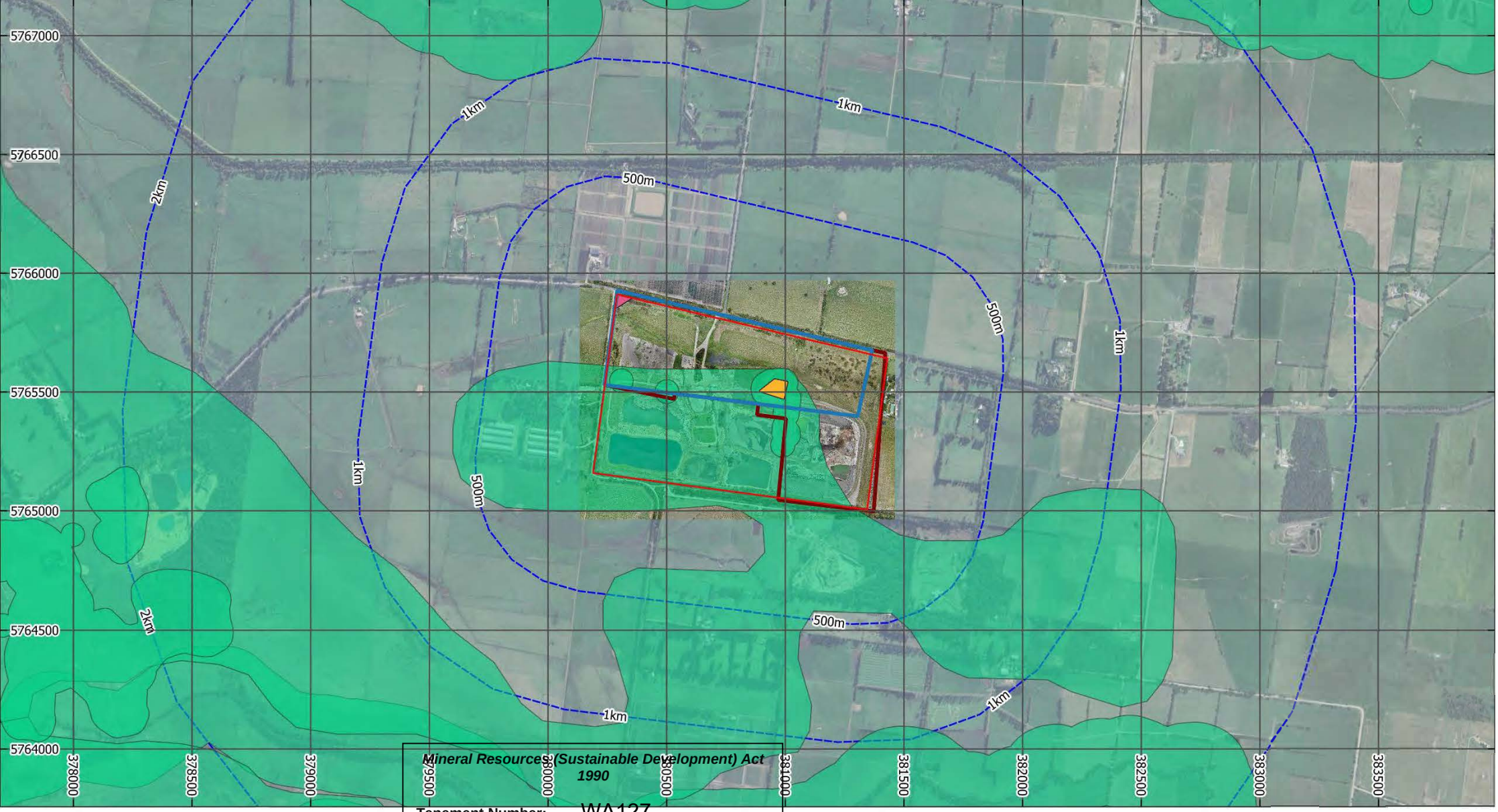
- Site Boundary
- WA Coordinates
- Office and Carpark
- Site Access
- Watercourses
- Boarding kennel
- Residences within 2km
- Cadastral Boundary
- Crown Land
- Nature Reserve
- Parks and Gardens (local)
- Reserved Land
- Local Work Authorities
- Onshore Gas Pipelines
- Bridges
- Extension Area
- Proposed extension area

0 0.5 1 1.5 2 2.5 km

1:23,700 @ A3

WP01 - Location Plan
Project: WA127 Yannathan Quarry
Prepared for: Hanson Construction Materials
Prepared by: JG
Date: 28/09/2022 Rev B

RICARDO



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Work Plan Statutorily Endorsed

Signed: _____

Delegate of the Department Head

Date: 01/05/2024

Legend

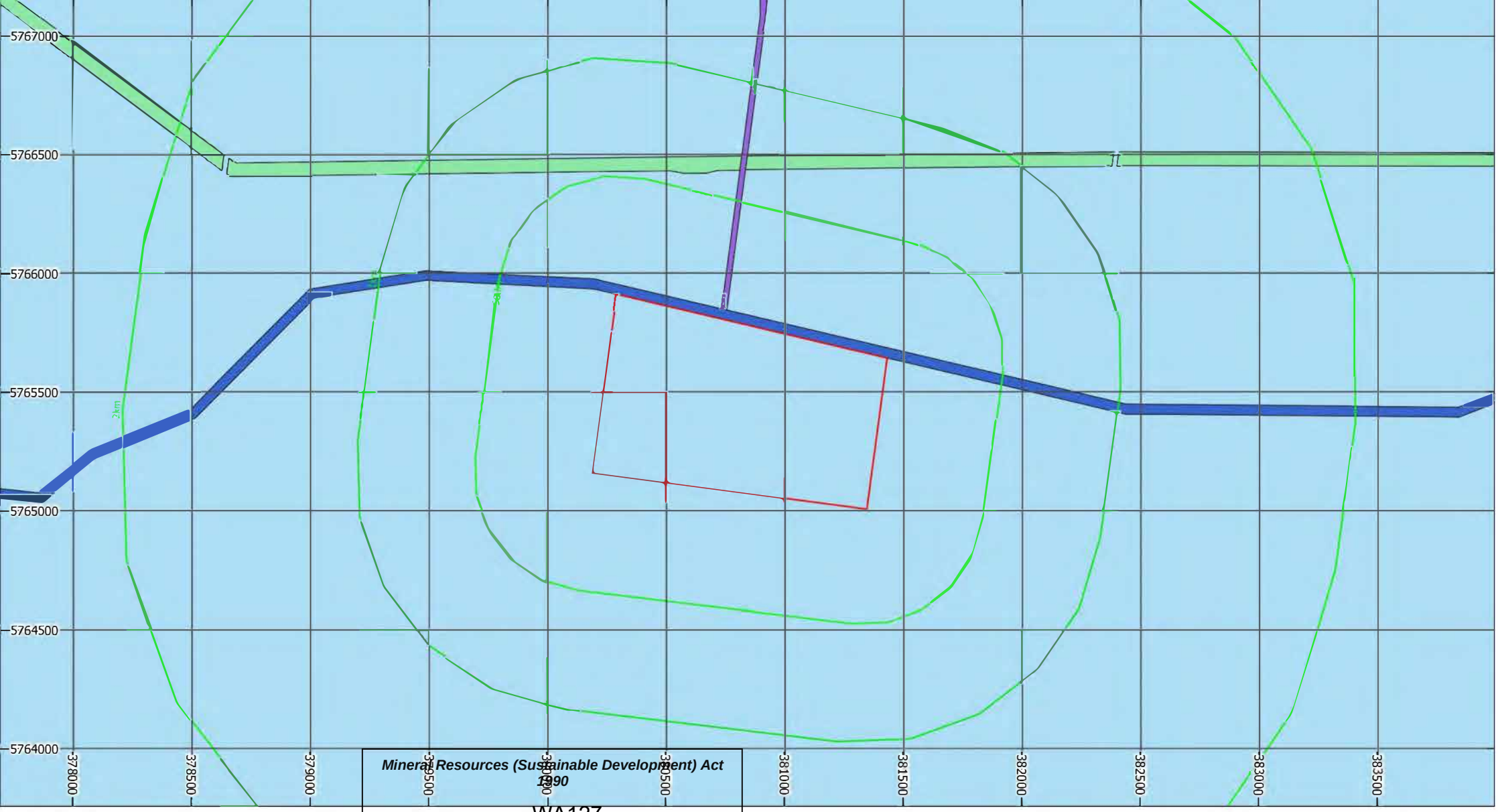
- Site Boundary
- CHMP Activity Area 2022
- CHMP area 2012
- Proposed Protected Area
- Current Protected Area
- Cultural Heritage Sensitivity

0 500 1,000 1,500 2,000 m

1:15,000 @ A3

WP01a Location - Cultural heritage
Project: WA127 Yannathon Quarry
Prepared for: Hanson Construction Materials
Prepared by: KM
Date: 12/01/2023 Rev A

RICARDO



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Work Plan Statutorily Endorsed

Signed: _____

Delegate of the Department Head

Date: 01/05/2024

Legend

Zoning

- Public Use Zone - Service and Utility
- Green Wedge Zone - Schedule 1
- Transport Zone 3 - Significant Municipal Road
- Transport Zone 2 - Principal Road Network

0 500 1,000 1,500 2,000 m

1:15,000 @ A3

WP01b Location - Zoning
Project: WA127 Yannathon Quarry
Prepared for: Hanson Construction Materials
Prepared by: KM
Date: 12/01/2023 Rev A

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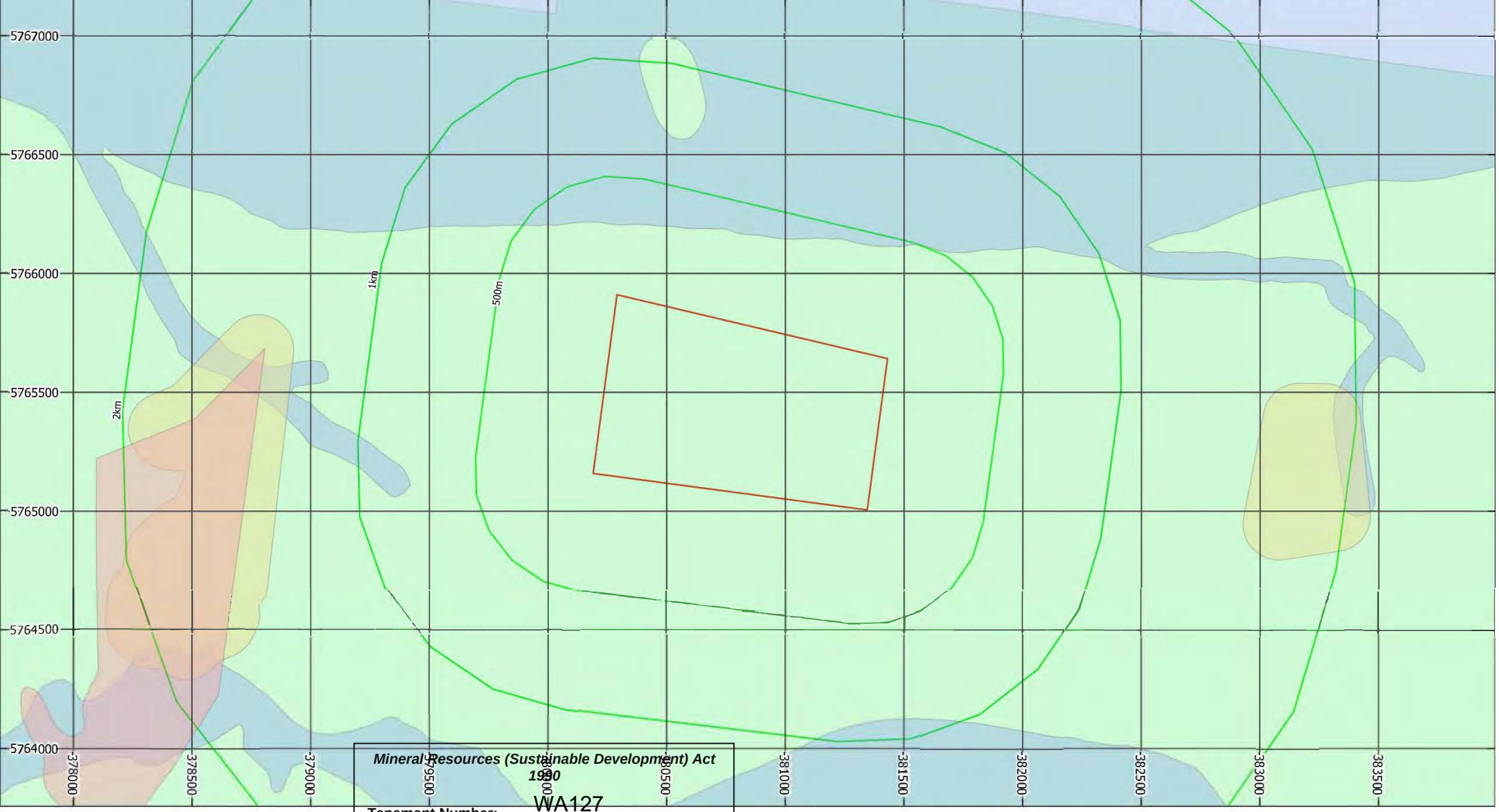

Mineral Resources (Sustainable Development) Act 1990

Tenement Number: WA127

Plan Number: PLN-001686

Work Plan Statutorily Endorsed

Signed: _____

Delegate of the Department Head

Date: 01/05/2024

Legend

Overlays

- Bushfire Management Overlay
- Environmental Significance Overlay - Schedule 3
- Heritage Overlay (HO43)
- Land Subject to Inundation Overlay
- Significant Landscape Overlay - Schedule 3

0 500 1,000 1,500 2,000 m

1:15,000 @ A3

WP01c Location - Overlays
Project: WA127 Yannathon Quarry
Prepared for: Hanson Construction Materials
Prepared by: KM
Date: 12/01/2023 Rev A

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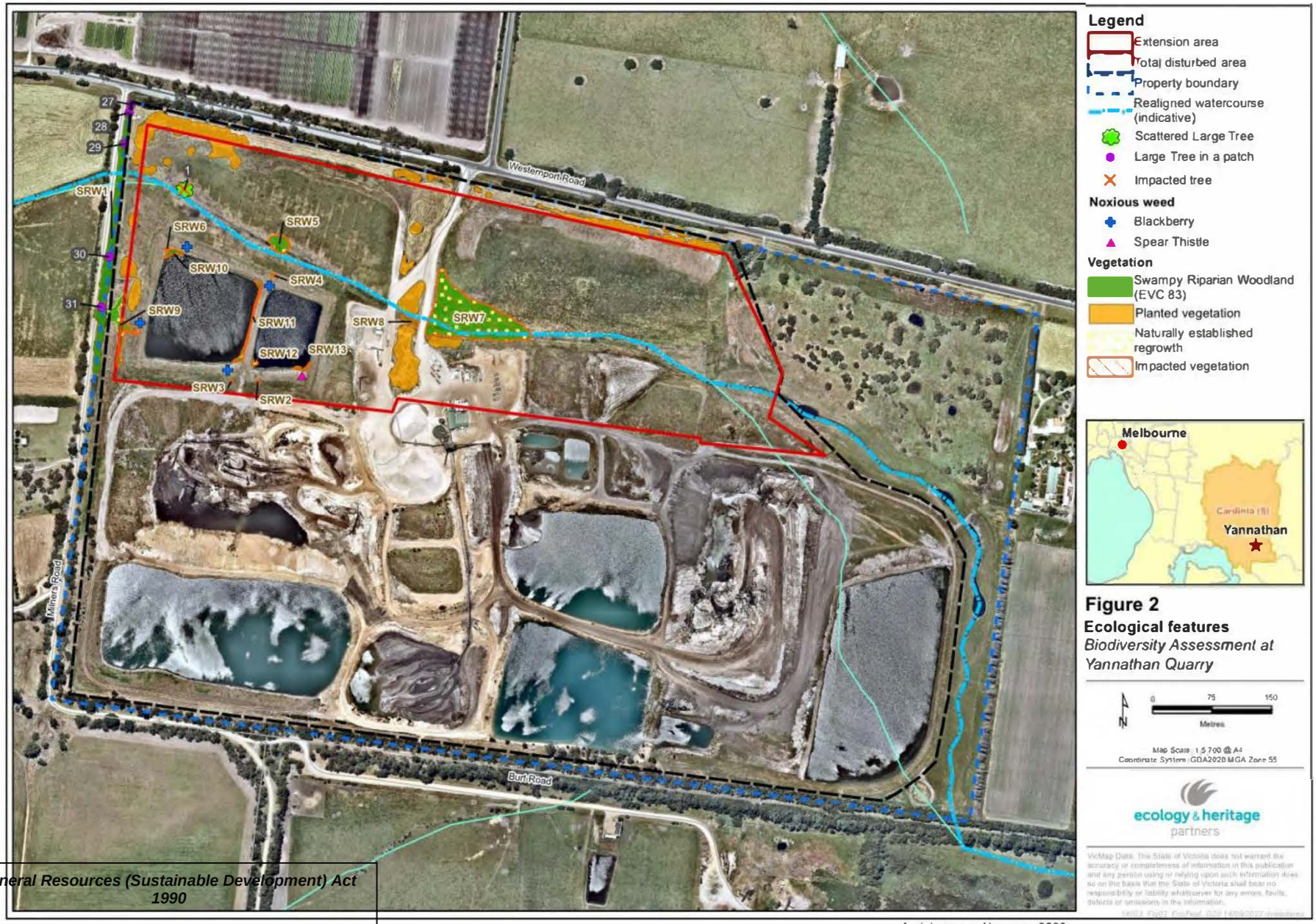

Figure 2

Ecological features

Biodiversity Assessment at Yannathan Quarry

Aerial source: Nearmap 2020

Mineral Resources (Sustainable Development) Act 1990

Tenement Number: WA127

Plan Number: PLN-001686

Work Plan Statutorily Endorsed

Signed: _____

Delegate of the Department Head

Date: 01/05/2024

WP01d Location - Vegetation
Project: WA127 Yannathan Quarry
Prepared for: Hanson Construction Materials
Prepared by: KM
Date: 02/02/2023 Rev A

RICARDO

Site Boundary

Bore location

- Active
- Inactive / Decommissioned
- Proposed

Dust monitoring locations

- Current drainage
- Future drainage

Mineral Resources (Sustainable Development) Act 1990

Tenement Number: WA127

Plan Number: PLN-001686

Work Plan Statutorily Endorsed

Signed: _____

Delegate of the Department Head

Date: 01/05/2024

0 100 200 300 400 m

WP01e Location - Monitoring Locations
Project: WA127 Yannathan Quarry
Prepared for: Hanson Construction Materials
Prepared by: KM
Date: 14/12/2023 Rev B

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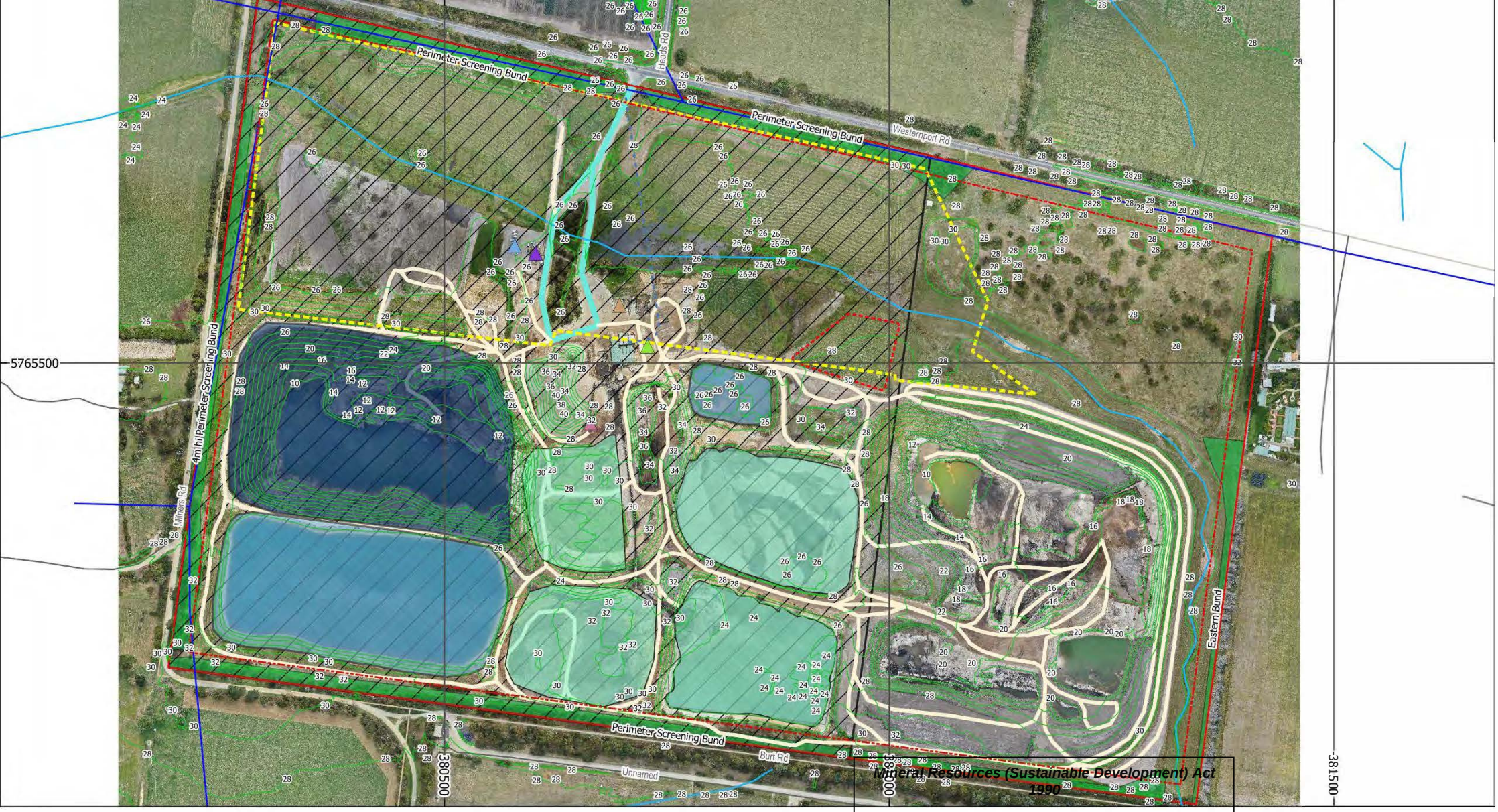

Legend

- Site Boundary
- Water storage pond
- Western extraction pit
- Under rehabilitation
- Proposed extension area
- Cultural Heritage protected area
- Depth Limit
- Carpark
- Office
- Processing Plant
- Sales area
- Weighbridge
- Landscaping
- Truck Route
- Site Access Tracks

Electrical Utilities

- Primary
- Secondary
- 20m perimeter buffer
- Topograsphc contours

Maximum depth: 9 mAHD

Mineral Resources (Sustainable Development) Act 1990

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Signed: _____

Delegate of the Department Head

Date: 01/05/2024

0 100 200 300 400 500 m

1:4,000 @ A3

WP02 - Site Map (existing)
Project: WA127 Yannathon Quarry
Prepared for: Hanson Construction Materials
Prepared by: KM
Date: 30/5/2023 Rev D

RICARDO

Legend

- Site Boundary
- Future local drainage
- Current local drainage
- Vegetation
- Existing Cultural Heritage protected area
- Proposed future Cultural Heritage Area
- Development Stage Boundary
- Proposed extension area
- Site Features
- 20m perimeter buffer

Maximum depth: -9 mAHD

0 100 200 300 400 500 m

1:4,000 @ A3

Mineral Resources (Sustainable Development) Act 1990

Tenement Number: WA127

Plan Number: PLN-001686

Work Plan Statutorily Endorsed

Signed: _____

Delegate of the Department Head

Date: 01/05/2024

WP03 - Site Map (proposed)
Project: WA127 Yannathan Quarry
Prepared for: Hanson Construction Materials
Prepared by: KM
Date: 30052023 Rev D

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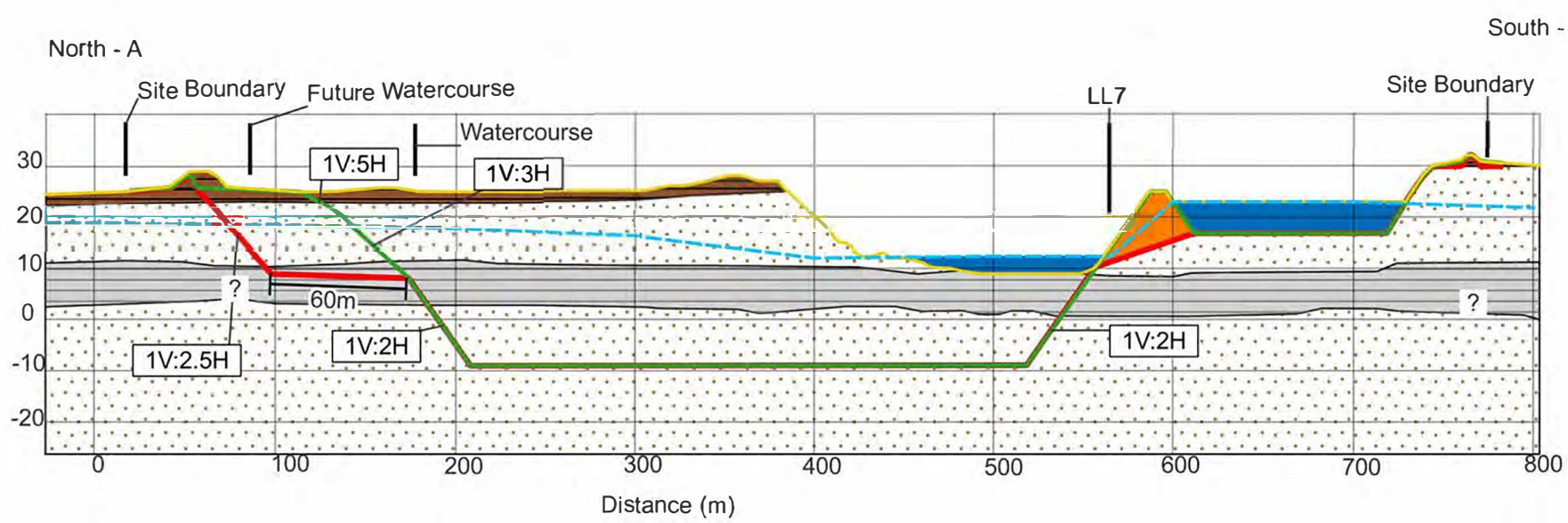
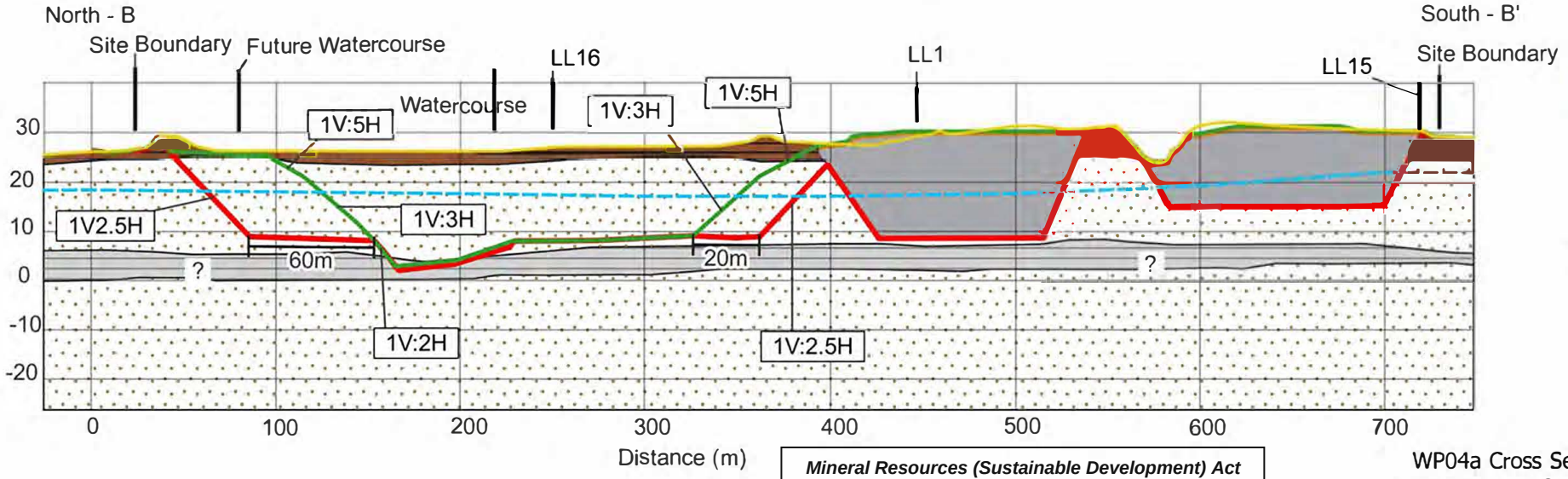
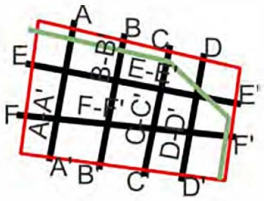




Lithology

- Organic Clay
- Clay
- Fill
- Sand
- Water Storage
- Filter Cake
- Future Water Storage
- Future Fill
- Future Filter Cake
- Slimes Dam
- Terminal Landform
- Rehabilitated Landform
- Current Landform
- Inferred Groundwater Level October 2022
- Realigned Watercourse
- WPV Sections
- Site Boundary



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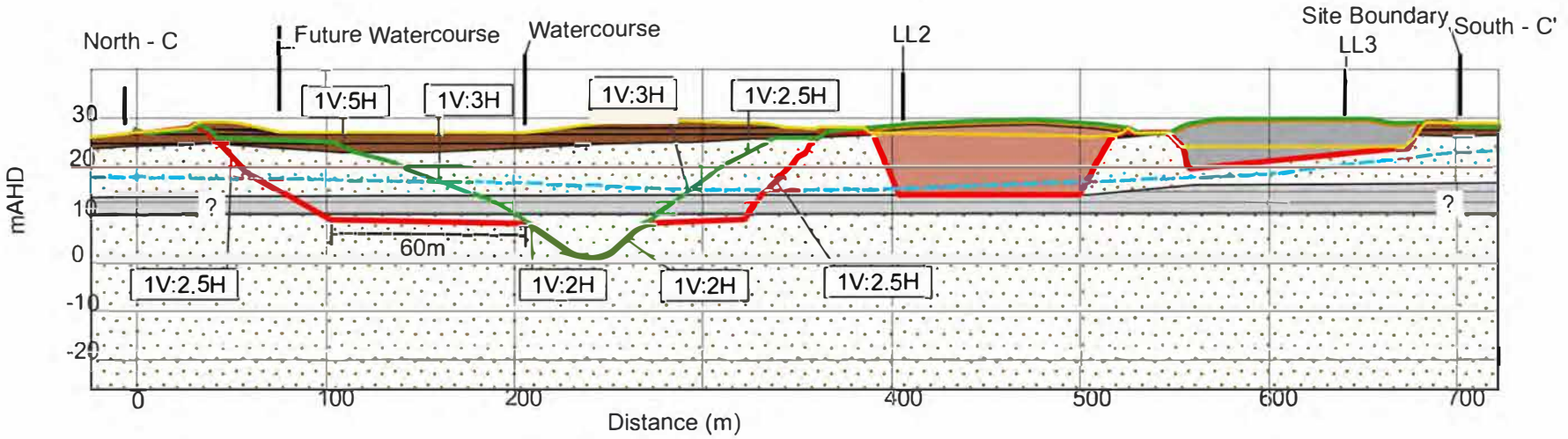
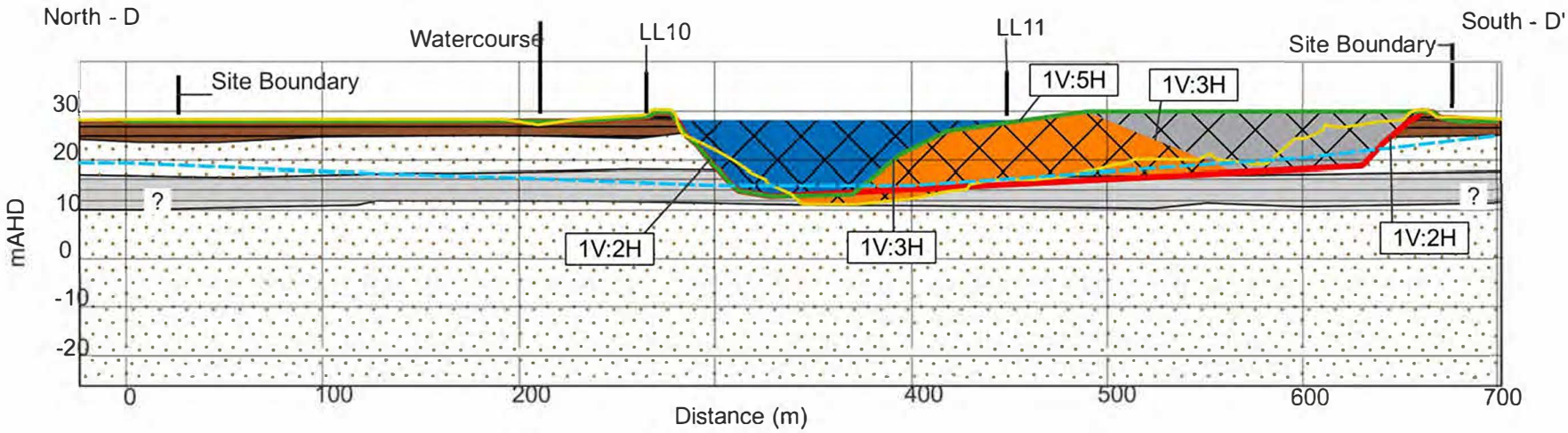
Delegate of the Department Head

Date: 01/05/2024

WP04a Cross Sections
Project: WA127 Yannathan Quarry
Prepared for: Hanson Construction Materials
Prepared by: KM, JB
Date: 14/12/2023 Rev C

RICARDO



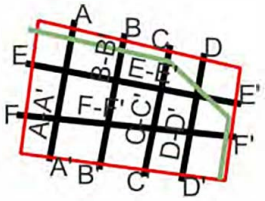


Lithology

- Organic Clay
- Clay
- Fill
- Sand
- Water Storage
- Filter Cake
- Future Water Storage
- Future Fill
- Future Filter Cake
- Slimes Dam

- Terminal Landform
- Rehabilitated Landform
- Current Landform
- Inferred Groundwater Level October 2022

- Realigned Watercourse
- WPV Sections
- Site Boundary



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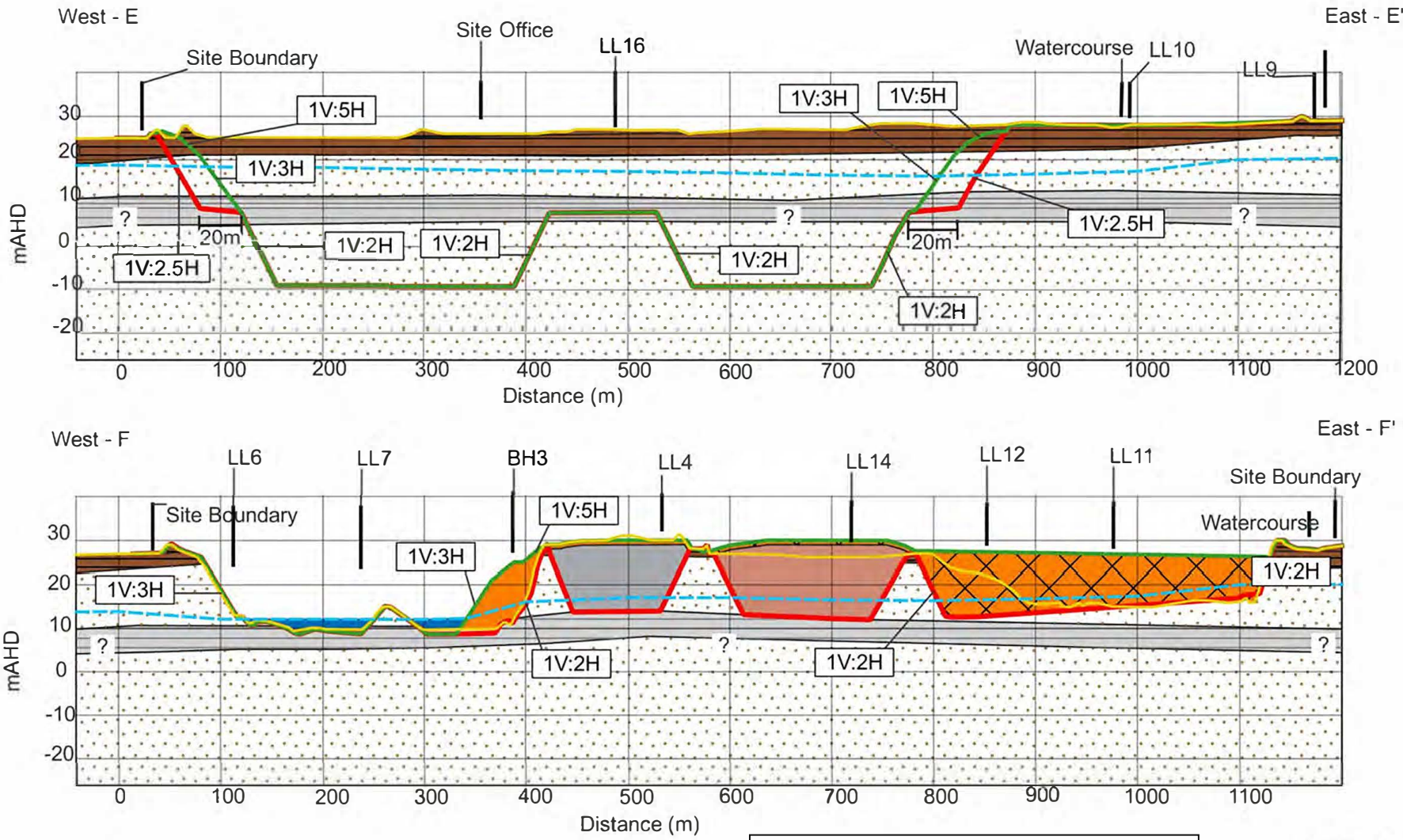
Delegate of the Department Head

Date: 01/05/2024

WP04b Cross Sections
Project: WA127 Yannathan Quarry
Prepared for: Hanson Construction Materials
Prepared by: KM, JB
Date: 14/12/2023 Rev C

RICARDO

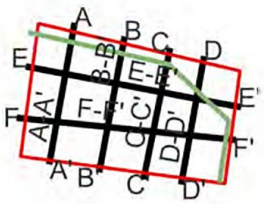


Lithology

- Organic Clay
- Clay
- Fill
- Sand
- Water Storage
- Filter Cake
- Future Water Storage
- Future Fill
- Future Filter Cake
- Slimes Dam

- Terminal Landform
- Rehabilitated Landform
- Current Landform
- Inferred Groundwater Level October 2022

- Realigned Watercourse
- WPV Sections
- Site Boundary



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Delegate of the Department Head

Date: 01/05/2024

WP04c Cross Sections
Project: WA127 Yannathan Quarry
Prepared for: Hanson Construction Materials
Prepared by: KM, JB
Date: 14/12/2023 Rev C

RICARDO

Legend

- Site Boundary
- Access
- Conservation
- Cultural heritage area
- Dam
- Drainage
- Landscaping
- Dam banks

Mineral Resources (Sustainable Development) Act 1990

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Signed: _____

Delegate of the Department Head

01/05/2024

Date: _____

0 100 200 300 400 500 m

1:4,100 @ A3

WP05 - Rehabilitation
Project: WA127 Yannathon Quarry
Prepared for: Hanson Construction Materials
Prepared by: KM
Date: 30/05/2023 Rev C

RICARDO

Mineral Resources (Sustainable Development) Act 1990

Tenement Number: WA127

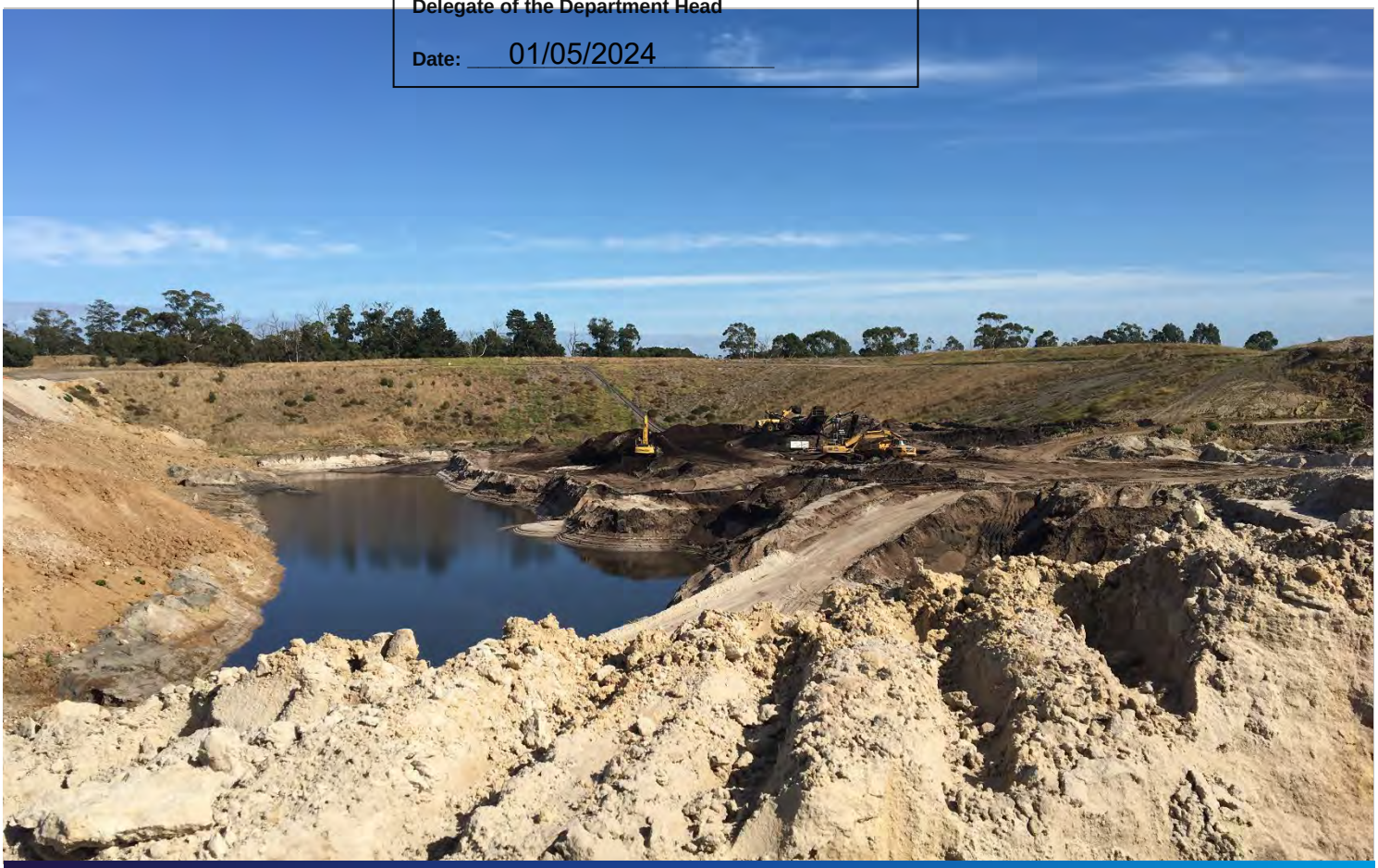
Plan Number: PLN-001686

Work Plan Statutorily Endorsed

Signed: _____

Delegate of the Department Head

Date: 01/05/2024



WA127 YANNATHAN PART 1 SUMMARY REPORT

Increased Area and Depth Application

Client: Hanson Construction Materials

Ricardo ref. 30765 Issue: 6 21/12/2023

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Glossary

TERM	DEFINITION
AEMO	Australian Energy Market Operator
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ARR	Australian rainfall and runoff
ASS	Acid Sulfate Soil
BLCAC	Bunurong Land Council Aboriginal Corporation
BGL	Below Ground Level
CASS	Coastal Acid Sulfate Soil
CCD	Community Contact Database
CEP	Community Engagement Plan
CHMP	Cultural Heritage Management Plan
COF	Consequence of failure
COR	Cost of Retrofitting
DELWP	Department of Environment, Land, Water and Planning
DEECA	Department of Energy Environment and Climate Action
DJPR	Department of Jobs, Precincts and Regions
EPA	Environment Protection Authority
EPBC	Environment Protection and Biodiversity Conservation
ERR	Earth Resources Regulation
ERS	Environment Reference Standard
FoS	Factor of Safety
GCMP	Ground Control Management Plan
GHG	Greenhouse gas
HU	Habitat Unit
MRSDA	Mineral Resources (Sustainable Development) Act
OHS	Occupational Health and Safety
$PM_{2.5}$	Particulate Matter 2.5 µm or less in diameter
PM_{10}	Particulate Matter 10 µm or less in diameter
RCP	Representative Concentration Pathways
RMP	Risk Management Plan
RRAM	Resource Rights Allocation and Management

TERM	DEFINITION
RL	Reduced Level
RMP	Risk Management Plan
SEMP	Site Environment Management Plan
SFARP	So far as reasonably practicable
SRW	Southern Rural Water
TARP	Trigger Action Response Plan
TDS	Total dissolved solids
WA	Work Authority
WMIS	Water Management Information System

1. INTRODUCTION

Hanson Construction Materials Pty Ltd (Hanson) operates the Yannathan extraction and processing operations at 870 and 910 Westernport Road, Yannathan, VIC 3981 (the Site). The site is operated under the existing Work Authority (WA127), and extraction of material at the site commenced in July 2004.

Ricardo Energy Environment and Planning Pty Ltd (Ricardo) has been commissioned by Hanson to prepare Work Plan Variation documentation for submission to the Earth Resources Regulation (ERR) branch of Department of Energy, Environment and Climate Action (DEECA), formerly the Department of Jobs, Precincts and Regions (DJPR) for Site.

The Work Plan comprises five Parts:

- Part 1: Summary Report (this report)
- Part 2: Drawing Set
- Part 3: Risk Assessment
- Part 4: Community Engagement Plan
- Part 5: Rehabilitation Plan

This report is **Part 1: Summary Report**.

1.1 APPLICATION DETAILS

Application details for RRAM are summarised below.

Information for upload	
Plan ID	PLN-001686
Tenement Name:	WA127
Plan Type:	Work Plan (WA)
Project Name:	Yannathan Increased Extraction Area and Depth Work Plan Variation
Plan Description:	Please refer to the attached Work Plan Summary Report

The Drawing Set for this application is contained in **Part 2: Drawing Set** and contains:

WP01 Location Plan

WP01a Location – Cultural Heritage

WP01b Location – Zoning

WP01c Location – Overlays

WP01d Location – Vegetation

WP01e Location – Monitoring locations

WP02 Site Map - Existing

WP03 Site Map - Proposed

WP04 Sections (a-c)

WP05 Rehabilitation

1.2 LOCATION

The site is located at 870 and 910 Westernport Road, Yannathan as shown in **Figure 1-1**. The site has good access to the Bass Highway to supply the Melbourne market. The site is in a rural area, the township of Lang

Lang is located approximately 6km west of the site. Yannathan is a hamlet approximately 2.5 km north of the site comprising a hall and sporting facilities and approximately five houses.

Figure 1-1 Site Location

Table 1-1 Site areas

Description	Area (ha)
Total Work Authority Area	80.16
Additional extraction area	22.25
Total area of disturbance	69.55

1.3 TENURE

The site is wholly owned by Hanson. There are two titles over the site as shown in **Figure 1-2**. Copies of the titles are contained in **Appendix A**. The Planning Property reports for these properties are contained in **Appendix B**.

The original ground elevation for 870 Westernport Road varied between 30 and 26 mAHD. The title for 870 Westernport Road contains a depth limit of 15.24m. There is no depth limit on the title for 910 Westernport Road. The current Work Plan has an extraction limit of 9 m AHD (Australian Height Datum).

Figure 1-2 Titles

1.4 EXISTING APPROVALS

The site is operated under Work Authority WA127, and Planning Permit T140140-1 (amended 16th April 2015). The most recent Work Plan Variation was approved on 10th November 2014.

Hanson has a Licence for groundwater extraction from Southern Rural Water (SRW) for 19.5 ML/a which is via transfer annually. This covers groundwater contained in the product which is sold. A copy of this Licence is contained in **Appendix C**.

The most recent Work Plan Variation was approved on 10th November 2014. An Administrative Update was approved on 28th April 2023.

Application details for RRAM are summarised below.

Information for upload	
Property Name	Yannathan Quarry
Address:	870 and 910 Westernport Road
Suburb / Town	Yannathan
Postcode	3981
Land ownership type	The site is owned by the operator (freehold)
Depth Limitations	Yes
Depth Limit:	50 ft (15.24 m) for 870 Westernport Road

2. BACKGROUND

2.1 SITE HISTORY

WA127 was originally granted by the Department of Natural Resources and Environment to H.A & K.I Bulach in 1989. The site was also issued with a planning permit to allow sand extraction in 1992.

In 1997, Pioneer Concrete purchased the freehold from H and K Bulach for the property on the east side of the site in 1998. Pioneer Concrete was subsequently purchased by Hanson Construction Materials. A variation to WA127 was submitted in 2013 extending the limit of extraction to both Hanson properties.

The Work Authority was last varied in February 2013. The variation extended the limit of extraction to include the adjacent east site property, but excluded extraction activities on the northern part of the site.

2.2 VARIATION TO WORK PLAN

This variation proposes to extend the area of extraction to the northern portion of the site and to increase the depth of extraction from 9 mAHD to -9 mAHD over the entire approved extraction area. The area of the proposed extension contains a waterway which will need to be relocated as part of the extension.

This application will also increase the hours of operation for the processing plant to 6 am to 10 pm Monday to Saturday, which is currently approved on a temporary basis. There have been five temporary six month extensions of operating hours.

The site currently has an area which contains artefacts of cultural heritage significance stored from a previous Cultural Heritage Management Plan. It is proposed to relocate this to the north-western corner of the site.

The following aspects of the existing approved Work Plan are varied.

Table 2-1 Change identification

Work Plan Approved 6 February 2014		This Work Plan Variation
1.3	Extraction area	Includes an additional extraction area of 22.2 Ha within WA127, maximum area of disturbance 69.5 Ha (including the area approved by Administrative Update)
1.3	Maximum extraction depth to RL9	Increases the maximum extraction depth to RL-9
2.2	Sand used exclusively for Hanson concrete manufacture in the Melbourne metropolitan market	Includes the use of sand in a wider range of Hanson products
2.3	Reserves of 2,300,000m^3	Remaining resource, including additional extraction area and depth, of 5,548,000 tonnes
2.3	Production of 250,000 tonnes per annum	Approximately 400,000 tonnes per annum subject to demand
3.2	Buffer areas 20m to Milners Road, 53m on eastern boundary due to watercourse	These buffers will remain the same, with a 20m buffer from Westernport Road with the additional extraction area. A new cultural heritage protection area is to be established in the northwest corner of the site after extraction and backfilling of the adjacent area is completed in Stage 19/20 (subject to approval by BLCAC). The distance to subsequent extraction areas will then be >100m.
3.3	Rural fencing around property	Rural fencing around property and around diverted waterway

Work Plan Approved 6 February 2014		This Work Plan Variation
3.4	Access road from Westernport Road	The site entrance will remain the same, but the internal access road will moved to the east to allow extraction of underlying resources
4.1	Hours of operation 6am to 6pm Monday to Saturday excluding Christmas day, Boxing Day and Good Friday. Maintenance may occur outside these hours.	Operating hours will remain the same for vehicles leaving the site, but operating hours will be extended to 6am to 10pm for processing Monday to Saturday (excluding Christmas day, Boxing Day and Good Friday).
4.2	Topsoil and overburden returned to worked out pit	No change
4.3	Working method allows for excavation and dredging	No change
4.4	Slopes rehabilitated to 1V:2H in initial (pre 2014 WPV) area, the 1V:5H above final (pit lake) water levels, 1V:2H below final water levels. Working face slopes not specified (note that working face slopes are battered within weeks / months with clay overburden to limit groundwater ingress).	No change to existing approved areas. For proposed additional area: • Rehabilitated slopes 1V:5H above final water levels, 1V:3H below final water levels where dry excavated / battered, 1V:2H for dredged slopes • Working face slopes 1V:2.5H for dry excavation, 1V:2H for dredged slopes
5	Material processing plant / methodology and disposal of filter cake	No change
6.1	Mobile plant: • 2 front end wheel loaders • 2 dump trucks • 1 excavator • 1 water truck	Mobile plant: • 3 front end wheel loaders • 4 dump trucks • 3 excavators • 1 water truck
6.2	Dredging equipment	No change
6.3	Fixed plant and buildings	No change
6.4	Utilities	Underground powerlines within the site may be relocated and replaced with underground or overhead lines.
7.1	Noise studies were relevant to the previously proposed development and legislation	Noise studies have been updated for the currently proposed development and current legislation. Appropriate controls are proposed.
7.2	Dust studies were relevant to the previously proposed development and legislation	Dust studies have been updated for the currently proposed development and current legislation. Appropriate controls are proposed.
7.3	Visual amenity	No change. There will be minimal impacts to visual amenity from this development. The existing landscaped mound and tree screening on the site boundaries will be maintained.
7.4	Traffic	No change to current route
7.5	Site drainage. The previous work plan included relocation of a drain to the east of the site	The remainder of the drain not already relocated will be relocated adjacent to the northern boundary.

Work Plan Approved 6 February 2014		This Work Plan Variation
7.6	Pumping of up to 19.5 ML of groundwater under a licence with Southern Rural Water	No change
7.6	Monthly monitoring of groundwater for static water level, conductivity, temperature and pH.	No change to monitoring parameters but additional wells will be installed to monitor deeper groundwater.
7.7	Flora and fauna studies were relevant to the previously proposed development and legislation.	Flora and fauna studies have been updated for the currently proposed development and current legislation. If required, environmental off-sets for removal of vegetation will be obtained.
7.8	Cultural heritage. A voluntary Cultural Heritage Management Plan was prepared.	A new Cultural Heritage Management Plan has been approved by the Bunurong Land Council Aboriginal Corporation. It is proposed to relocate the current Protected Area to the north west of the site.
7.9	A monitoring plan was proposed	The monitoring will be updated as detailed in supporting reports.
8	A Community Engagement Plan was provided	An updated Community Engagement Plan is provided
9.1	Final landform. It was proposed that excavated pits would become water bodies when groundwater levels recovered.	The overall concept is similar, noting the final form will be one larger water body in view of the additional area of excavation.
	Post closure land use is agriculture.	Post closure land use will be conservation.
9.2	A landscaping plan was provided including screening trees on the property boundaries, tree planting in the centre and north east of the site, and grazing land in the north.	No change to the overall concept, however grazing land will largely be replaced by water bodies.
9.3	Progressive rehabilitation including returning filter cake to the worked out pit.	No change.
9.4	Future use of grazing and similar agricultural purposes.	Future use for conservation due to the reduced agricultural land available.
Drawings		
2609/1 and 2609/2	Drawings reflect the (then) current and proposed scenarios of that application	Drawings updated to reflect current and proposed layouts, The batter profiles are flatter than what was proposed in the previous WPV. The watercourse is diverted further north.
2690/3	Rehab concept shows two lakes separated by a woodlot with agricultural areas in the northern part of the site.	The rehabilitation concept shows landform will comprise one large lake encompassing the area originally intended for agricultural use. The rehabilitated batter profile is now different.

Since the submission of the first version of this Work Plan variation on 14 October 2022, an Administrative Update was submitted for a smaller extension area including part of this area (**Figure 2-1**) but only to a depth of 9mAHD consistent with the current Work Plan. This Administrative Update was approved by ERR on 28 April 2028. This Work Plan Variation incorporates the area / depth variation covered by the Administrative Update.

Figure 2-1 Administrative Update and Proposed Extension Areas

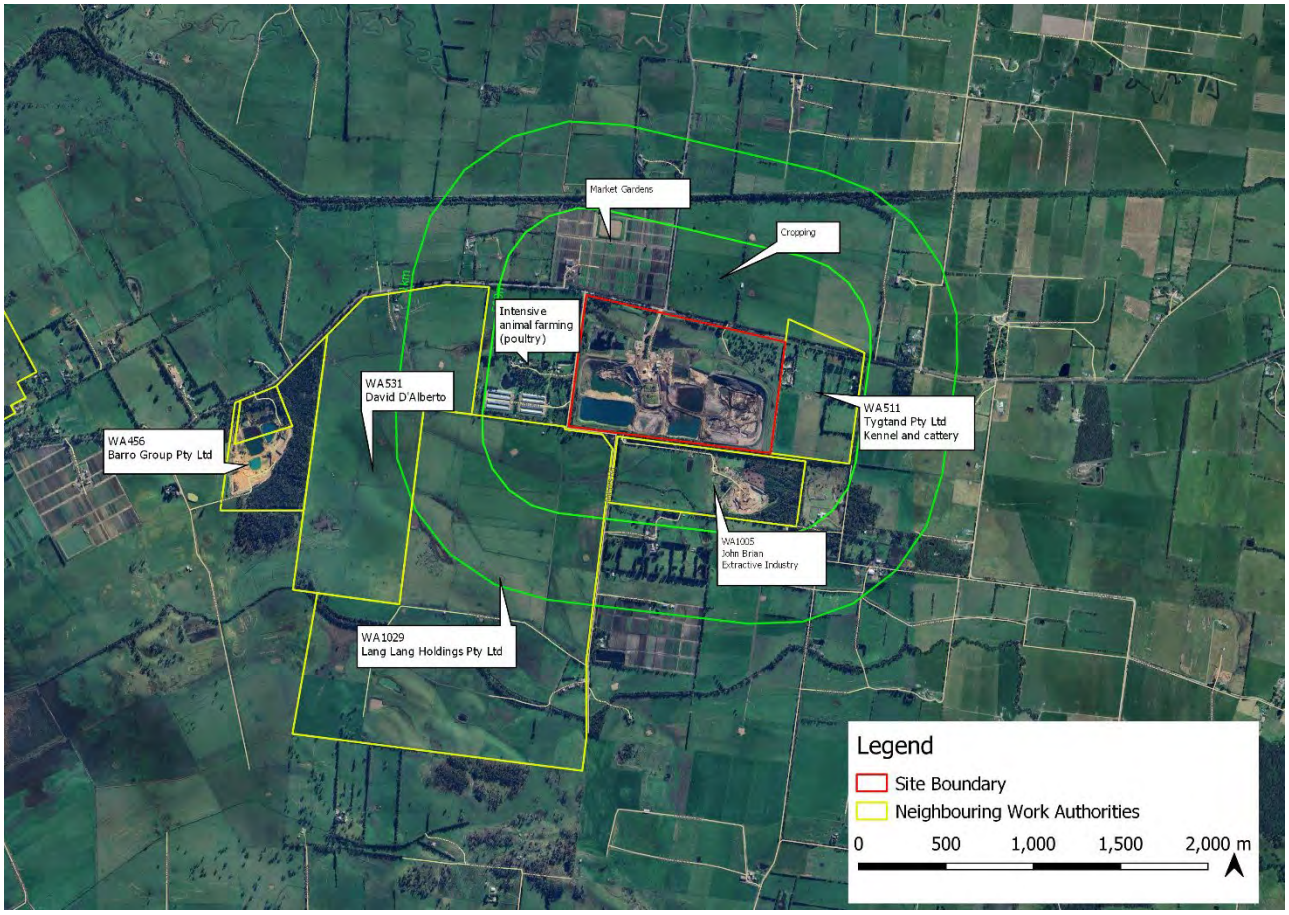
2.3 SURROUNDING LAND USE

The following land uses surround the site:

Table 2-2 Surrounding land use

Direction	Comment
North	Agricultural uses. A residential farmhouse is located approximately 740 m from the north-western corner of the site. A former residential building to the north of the site is used as an office for the market garden, not a residence. However, it is understood that a caretaker stays overnight from time to time.
East	Land immediately east of the site is currently a kennel boarding and cattery facility and a farm with on-site residence. There is also a current work authority (WA511) over the property.
South	Current work authorities (WA1005 and WA1029) exist over the properties immediately south of the Site.
West	An intensive poultry farming facility with on-site residence and caretaker residence exists immediately west of the site.

Figure 2-2 Site and Surrounds



2.3.1 Potential Receptors

Potential receptors are tabulated below.

Table 2-3 Potential receptors

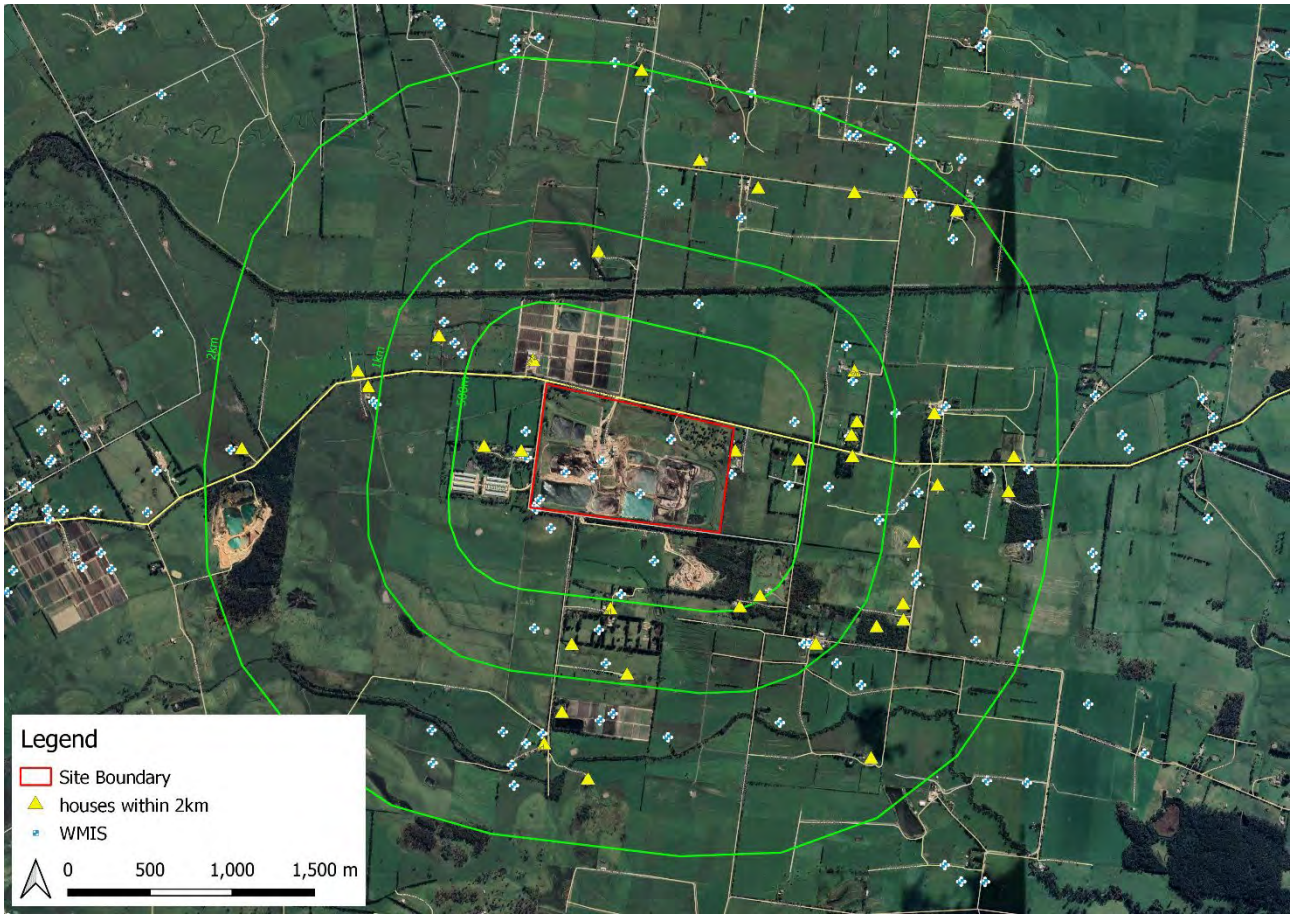
Type	Comment
Roads	The Westernport Highway borders the northern boundary of the site. The route for all trucks is westwards along the Westernport Highway, through the Lang Lang township to the Bass Highway. The main intersection in Lang Lang and the intersection with the Bass Highway are roundabouts.
Bridges	There are two bridges within 2 km of the site, both cross an east-west flowing drain approximately 600m north of the northern boundary of the site The location is shown in **Drawing WP01**.
Pipelines	There are no pipelines identified in a dial-before-you-dig request along public roads in the immediate vicinity of the site. There is a large pipeline located 4km west of the site as shown on Drawing WP01 in **Part 2 Drawing Set**.
Powerlines	Dial-before-you-dig indicates high voltage overhead powerlines along the southern side of Westernport Road (northern site boundary) and the eastern side of Milners Road (western site boundary). A high voltage underground cable extends from Westernport Road to the processing plant (**Figure 2-3**). The Australian Energy Market Operator website indicates there are no transmission lines 132kV-500kV are present - the nearest is a 500kV line at Clyde North approximately 15 km north of the site.
Easements	No easements are shown on the title plans.

Type	Comment
Reserves	There are no reserves within 2km of the site boundary. The nearest reserve is the Yannathan Recreation Reserve approximately 2.3 km north of the northern site boundary.
Waterways	There is an extensive series of drains and channels across the area associated with the dewatering of the Koo Wee Rup swamp prior to the 1950's.
Groundwater	The site is underlain by an extensive sequence of sediments, groundwater is relatively shallow (Segment A). The location of registered bores in the Water Management Information System (WMIS) is shown in **Figure 2-4**.
Heritage sites	The nearest registered heritage site is the Glen Afton Stud located at 210 Heads Road, Yannathan, approximately 2.2 km north of the site.
Crown Land	The closest crown land is along the realigned Lang Lang River approximately 650m north of the northern site boundary. Refer to WP01 in the **Part 2 Drawing Set.**
Communities	The location of residences within 2km of the site is shown in **Figure 2-4**. Yannathan is a small rural area approximately 3km north of the site with a population of 272 in the 2021 Census. The township comprises a town hall and recreation reserve and a few houses. Lang Lang has a population of just over 2500 people (2021 Census), located 6.5 km west of the site. The trucks from the quarry travel through Lang Lang to the Bass Highway. Note the hours of operation for quarry sales are not changing as part of this variation (6am – 6pm Monday to Saturday). The application will extend the hours of processing onsite to 6am - 10 pm Monday to Saturday.

Figure 2-3 Services

Source: Dial-before-you-dig (Jun2021, Dec 2022)

Figure 2-4 Receptors



2.4 PLANNING

The site is within the Cardinia local government area. The zones and overlays of the site and surrounding area are presented in **WP01b and WP01c in Part 2 Drawing Set.** The site and surrounding area are in a Green Wedge Zone and are covered by a Significant Landscape Overlay.

2.5 TOPOGRAPHY

The site is situated on a relatively flat plan. A ridge of hills trending northeast to southwest are located approximately 4 km to the southeast. Regional topography is presented in **Figure 2-5** and for the site in **Figure 2-6**.

Figure 2-5 Regional topography

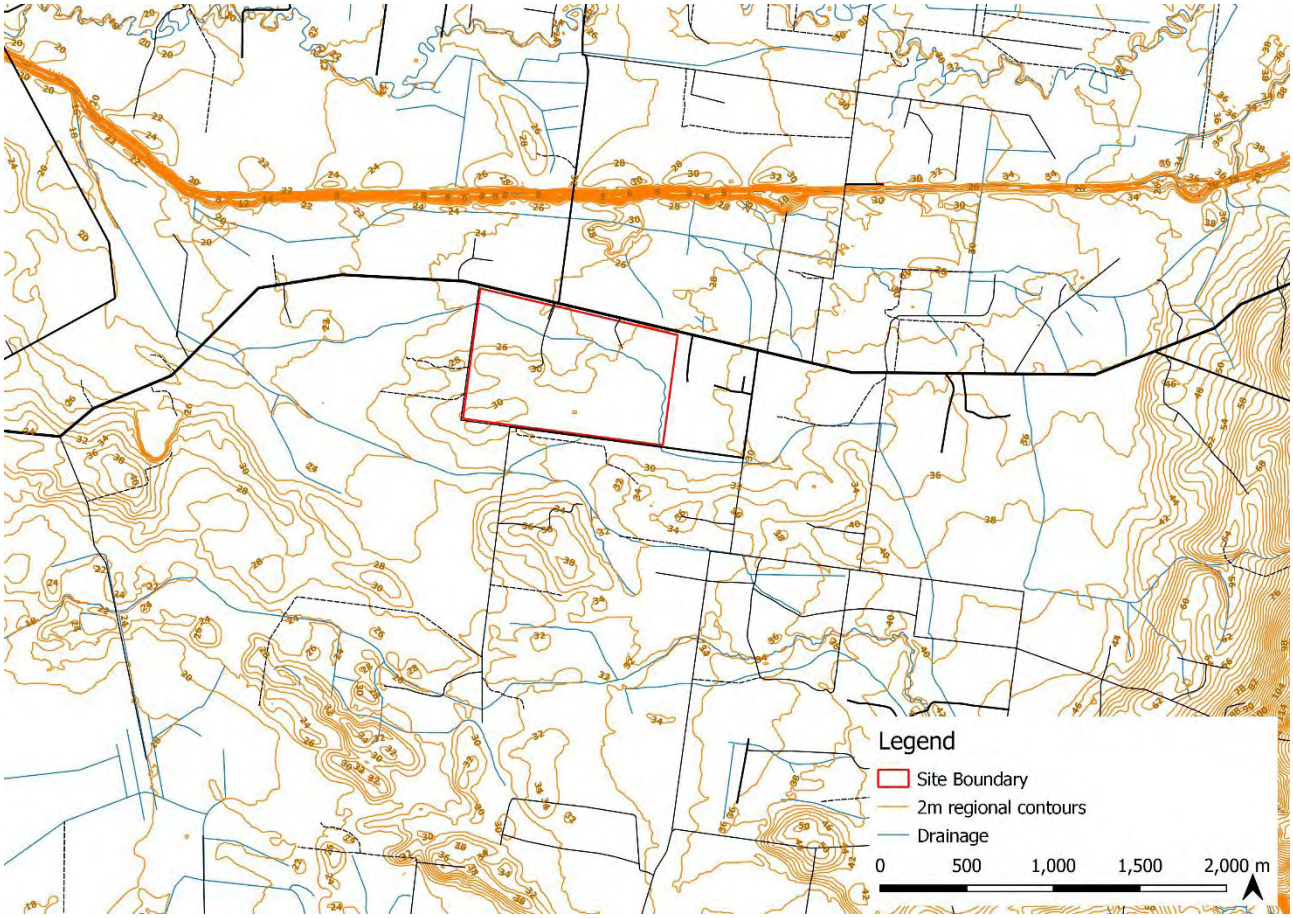
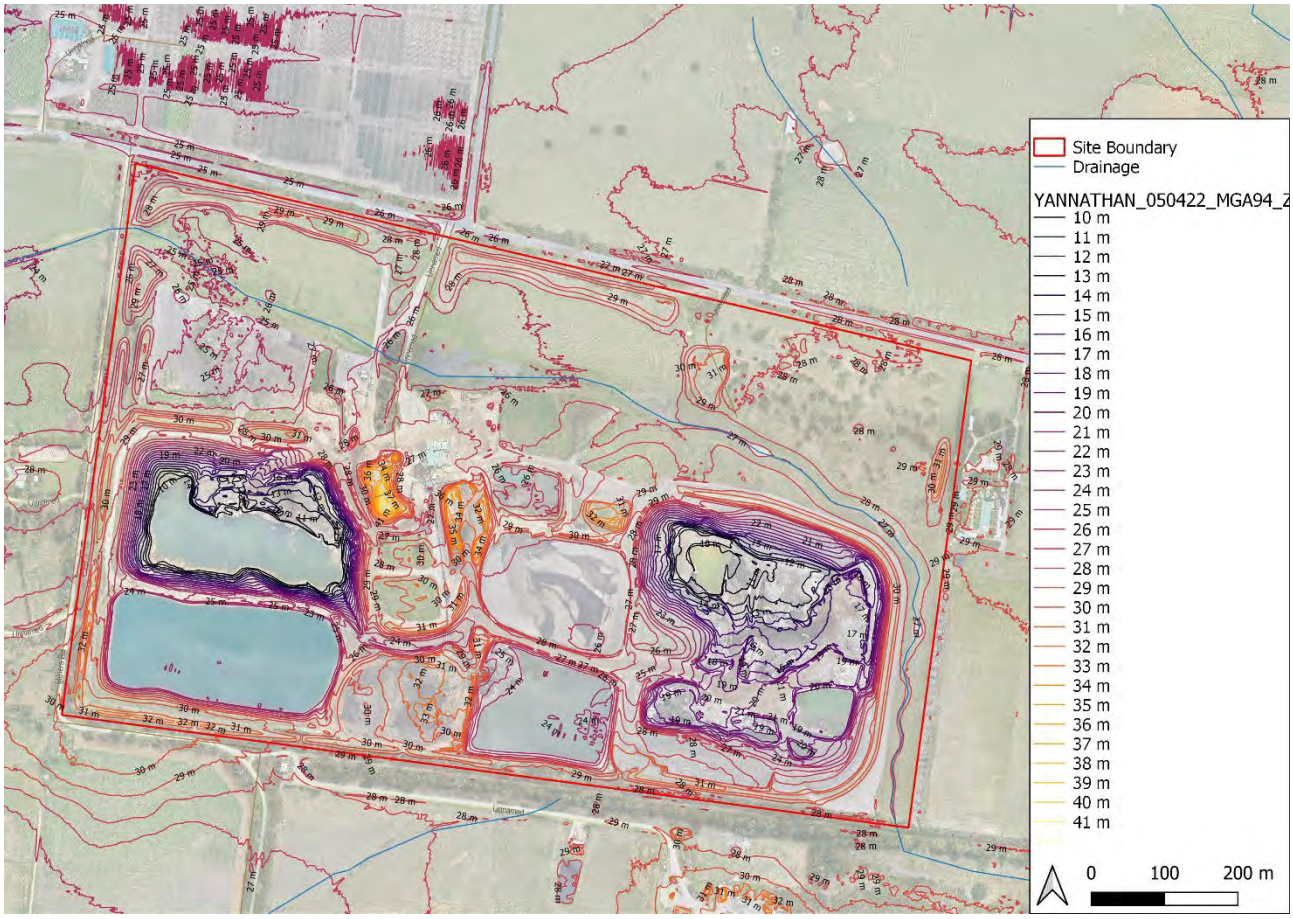


Figure 2-6 Current site topography



2.6 DRAINAGE

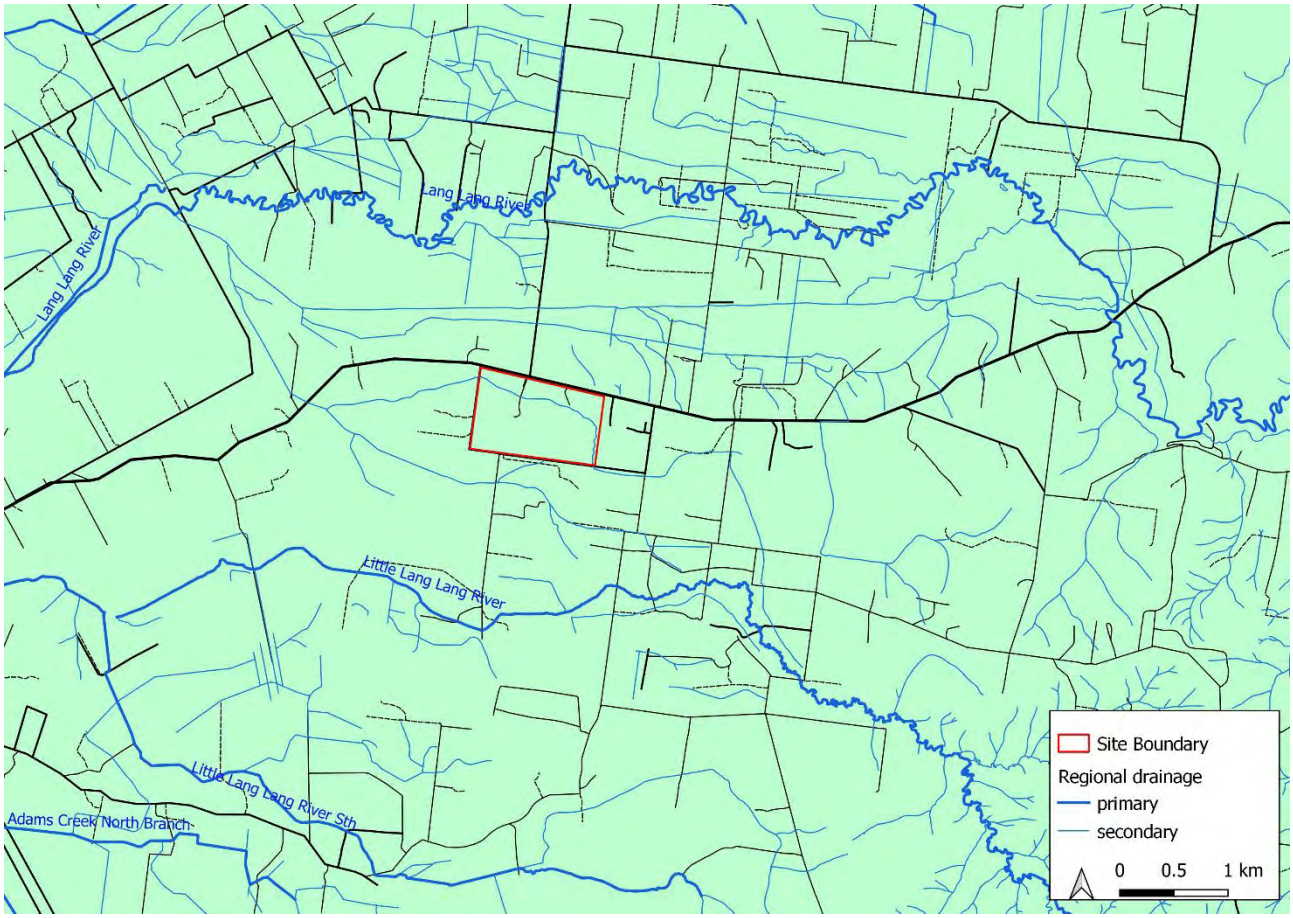
The site is on the edge of the former Koo Wee Rup swamp which was drained to enable agriculture by construction of a network of drains across the area. These works reduced the local watertable so that the land could be farmed. The current drainage network is shown in **Figure 2-7**.

The Lang Lang River and the Little Lang Lang River are north and south of the site respectively and flow roughly east to west. The drainage line that flows through the site ultimately discharges to the Lang Lang River.

The drainage line that flows through the Site was previously relocated to the east to facilitate extraction in the Eastern Pit. This was included in the previous Work Plan Variation. The process of relocating the drainage line was successful and can be adopted in future extensions.

The watercourse that runs through the site will be relocated to the north so that sand beneath the current watercourse can be extracted. It is proposed to firstly extract the sand to the north then place a clay buttress in the void upon which the new drainage line will be constructed. This is discussed in detail in the Surface Water Management Plan (**Appendix D**). Modelling within the Surface Water Management Plan was conducted in consultation with Melbourne Water, and a concept design for the proposed channel has been provided. The design has been lodged with Melbourne Water.

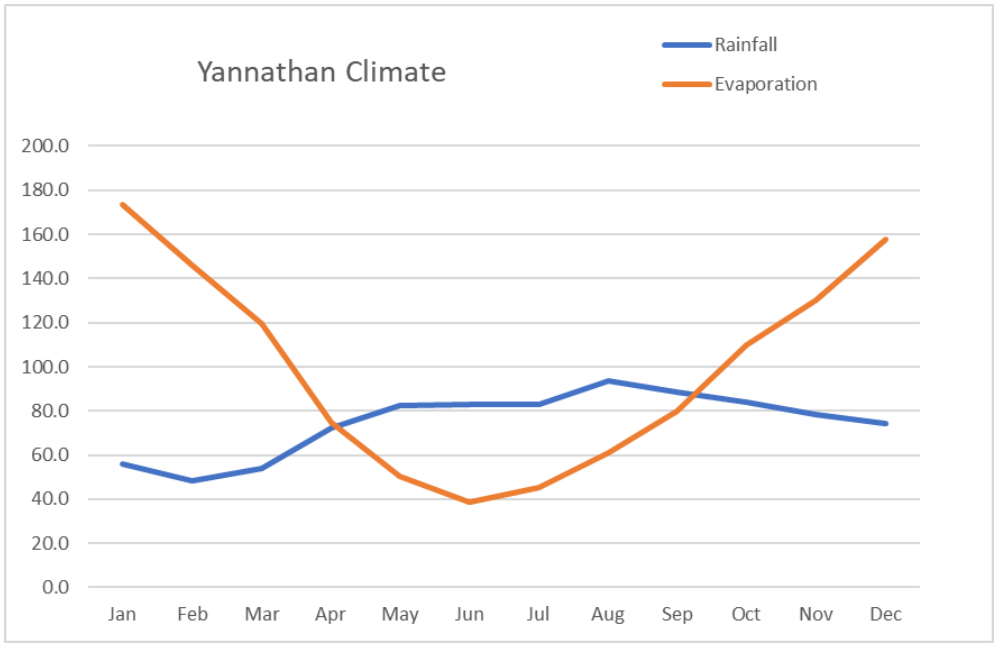
Figure 2-7 Drainage



2.7 CLIMATE

Average monthly rainfall varies from 48.3 mm in February to 93.7 mm in August. Evaporation is highest in January (173.7 mm).

Figure 2-8 Monthly evaporation and precipitation

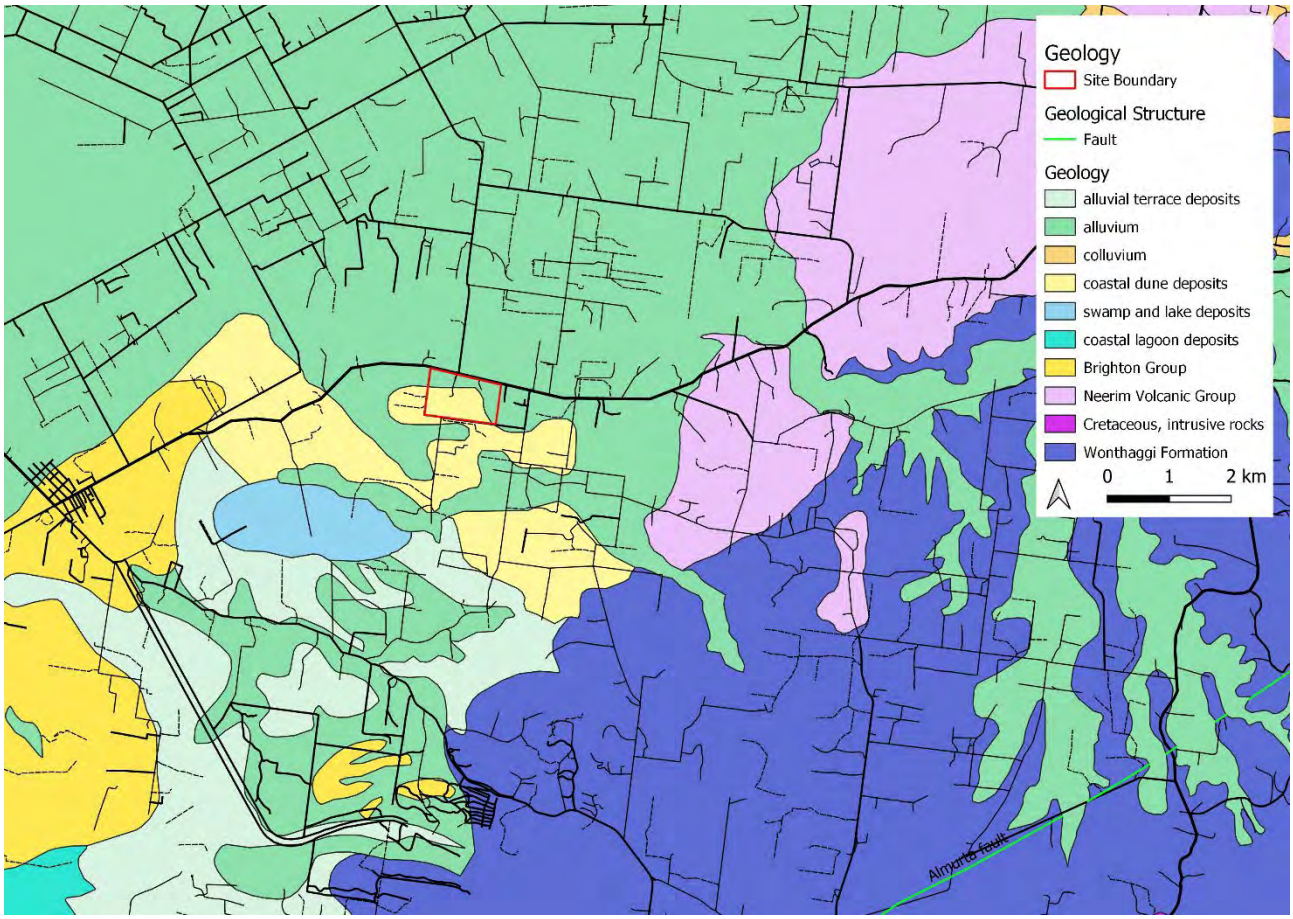


Source: SILO | LongPaddock | Queensland Government

2.8 GEOLOGY

The geological sequence of the area of the Lang Lang lowlands consists of a Quaternary unit of gravel and clay underlain by a series of Tertiary fluviatile sediments. The Tertiary sediments are a large potential resource for coarse concrete sand. The surface geology of the site and surrounding areas is shown in **Figure 2-9**.

Figure 2-9 Regional geology



Drilling onsite indicates a relatively uniform geological profile across the site comprising:

- Uppermost dunal and swampy sediments comprising silts and clays to a depth on average of around 3m inferred to be of Quaternary age
- Interbedded sands, silts and gravels approximately 10m thick, inferred to be of Tertiary age.
- Dense grey-black silts, clays and lignite of limited thicknesses at depth (sometimes absent)
- Sands

The organic unit (referred to as “Dense grey black silts” above) increase the geotechnical stability of the pits as identified in **Appendix H.** These organic sands are not lignite**.**

The Tertiary Sediments comprise a confined aquifer system which yields supplies of groundwater. Generally, the water table is close to the surface on the Lang Lang Plain.

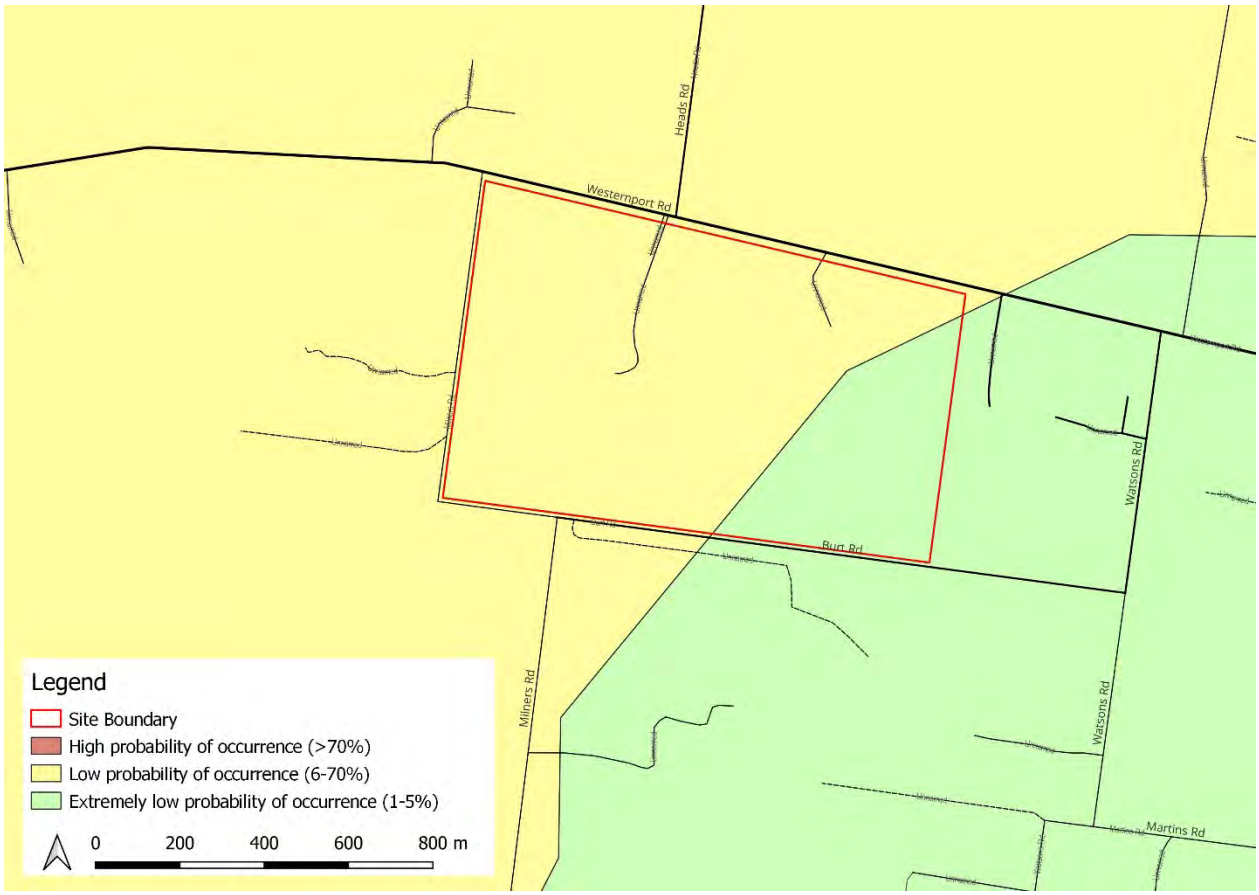
Drilling has revealed the sand deposit is thickest in the southern part of the site, thinning to the north where clay occurs at depths exceeding 8 metres. The base of the sand has a relatively constant elevation.

The drill samples show the sands are two sized with a coarse grading fining with depth. The two-size sand contains up to 20% coarse fraction and 30% of very fine sand. Testing reveals the coarse sand can be blended with the fine sand to be used in concrete manufacture.

2.8.1 Acid sulfate soils

The probability of occurrence of acid sulfate soils (ASS) is shown in **Figure 2-10**. The site has a low to extremely low probability of occurrence of ASS.

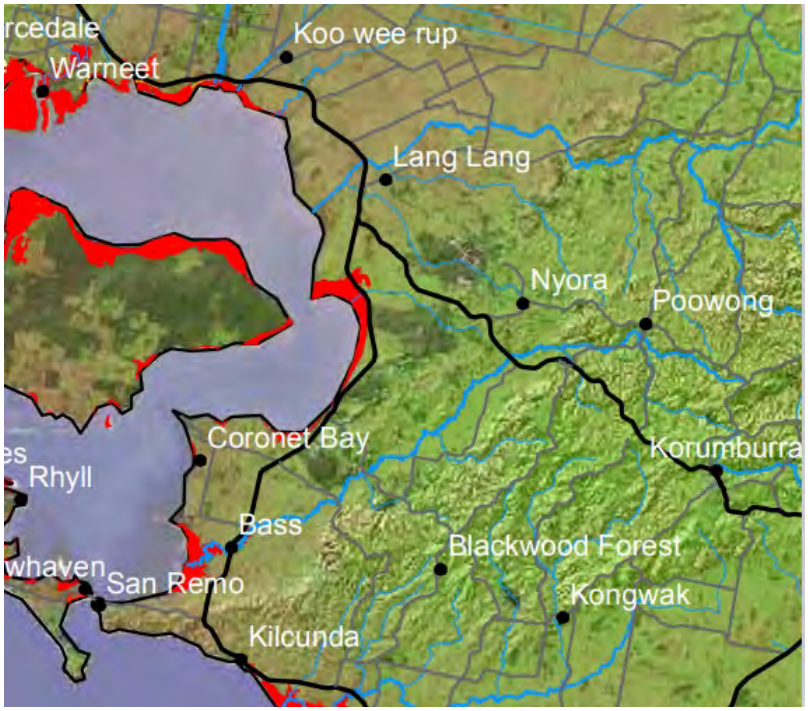
Figure 2-10 Acid Sulfate soil likelihood



Source: Atlas of Australian Acid Sulfate soils (CSIRO)

The location of Coastal Acid Sulfate Soil (CASS) is shown below, the map indicates the site does not have CASS.

Figure 2-11 Areas with potential for Coastal Acid Sulfate Soil



Source: CASS_map3.pdf (agriculture.vic.gov.au), Victoria Resources Online

2.9 HYDROGEOLOGY

The first hydrogeological assessment was undertaken by Dames and Moore (Dames and Moore 1999). This study followed an earlier investigation and included additional groundwater bore installation, slope stability assessments, groundwater monitoring and aquifer testing. The current groundwater monitoring network comprises seven active monitoring bores.

Groundwater monitoring commenced with a network of eight monitoring bores. As operations have moved from pit to pit some bores have been decommissioned and other new bores have been added. The current monitoring network is shown below, additional bores will be installed if the proposed extension proceeds. Groundwater flows from south-east to north-west across the site and standing water levels range from approximately 19 mAHD to 25 mAHD.

The electrical conductivity indicates indicative salinities less than 2,000 mg/L and frequently less than 500 mg/L Total Dissolved Solids (TDS). The Environment Reference Standard (ERS) defines the Environmental Values that need to be protected based on TDS concentration.

The ERS classifies the groundwater at the site into Segment A1, so the following Environmental Values are required to be protected:

- Water dependent ecosystems and species
- Potable water supply
- Agriculture and irrigation (irrigation)
- Agriculture and irrigation (stock watering)
- Industrial and commercial use
- Water based recreation (primary contact recreation)
- Traditional owner cultural values
- Buildings and structures

The site monitors groundwater wells monthly for groundwater depth and water quality (pH, electrical conductivity).

The site is not in a defined mineral springs area so Potable mineral water supply is not an applicable environmental value for the site. Similarly, the area has a low geothermal potential so this is also not applicable for this site.

Further information on site hydrogeology is detailed in the attached hydrogeological study (**Appendix E**).

Figure 2-12 Groundwater monitoring network

The hydrogeological report includes a detailed water balance for the proposed extension.

2.10 FLORA AND FAUNA

Ecology & Heritage Partners was commissioned to undertake an ecological assessment of the proposed extension area. The assessment (**Appendix F**) was undertaken to identify and characterise the vegetation on-site, determine the presence (or likelihood thereof) of any significant flora and fauna species and/or ecological communities, and address any implications under Commonwealth and State environmental legislation.

Thirty flora species (13 native and 17 non-native) were recorded within the study area during the field assessment. Two flora species listed as protected under the Flora and Fauna Guarantee Act 1988 were present within the study area. No additional significant flora species were recorded in the study area. Based on the highly modified nature of the study area, historical and ongoing land-uses, landscape context and the proximity of previous records, significant flora species are considered unlikely to occur within the study area due to the absence of suitable habitat and high levels of disturbance.

No significant fauna species are considered likely to occur within the study area, due to the lack of suitable habitat features (e.g. wetlands, structurally diverse vegetation, hollow bearing trees), and modified state of the study area through previous removal of vegetation for agricultural use.

The vegetation proposed to be removed is within Location 2 (as defined in DELWP 2017), with one Large scattered tree (with an extent of 0.0703 hectares) proposed to be removed. As such, the permit application falls under the Intermediate Assessment pathway.

The offset requirement for native vegetation removal is 0.015 General Habitat Units (HUs) and one Large Tree.

Ecology & Heritage Partners notes that a planning permit for native vegetation removal is not required, subject to approval of a Work Plan Variation under the MRSD Act. No other requirements were identified for native vegetation removal with regard to the EPBC Act 1999 or Flora and Fauna Guarantee Act 1988.

2.11 CULTURAL HERITAGE

A Cultural Heritage Management Plan (CHMP) was prepared as part of the previous Work Plan Variation. The proposed extension area which is the subject of this application received minimal investigations since at that time the area was not proposed for extraction. Artefacts discovered during that investigation were reburied in a Place northeast of the processing plant (**WP01c in Part 2 Drawing Set**).

A new CHMP has been prepared for this application (**Appendix G**). The investigations were undertaken to Complex level. No artefacts were identified. The CHMP contains salvage requirements for the existing Place. The CHMP was approved by Bunurong Land Council Aboriginal Corporation (BLCAC) on 30 January 2023 (**Appendix G**).

2.12 TRAFFIC

Current operations include the transport of approximately 400,000 tonnes per annum of quarry product. By Section 173 agreement with Council, loaded trucks exit the site via Westernport Road to the South Gippsland Highway. There will be no traffic movement changes with this variation.

The carpark is located just west of the office and is accessed from the main entrance on Westernport Road. There are 25 carparks available which is more than adequate for visitors and staff which require only 15.

3. QUARRY INFORMATION

3.1 MARKETS AND RESERVES

Hanson Construction Materials (Hanson) employs over 59,000 people worldwide. Hanson is a leader in building and construction material across Australia supplying a comprehensive range of high-quality concrete, aggregates and sand.

Victoria's building industry outlook is for ongoing growth, the House Industry Association is predicting a continuous housing market boom. This is on top of major State funded infrastructure products. The Yannathan Quarry is an important source of sand into this market. In order to meet the demand for raw materials, and supply projects of state significance, new resources need to be approved.

Information for upload	
WA Commodity	Sand
WA Commodity Primary:	Sand
WA Total Resource Estimate	5,548,000 tonnes
Unit of Measure	Tonnes
Estimated Max Terminal Depth	39
Batter Slope Angle	28%
Est Volume of Top Soil	312,000
Unit of measure Top Soil	m^3
Est. depth of Top Soil	0.45 m
Est. volume of Overburden	1,184,000 m^3
Unit of Measure Overburden	m^3
Est. Depth of Overburden	1.70 m
Area of Disturbance	69.5 Ha
Max Disturbance at any time:	69.5 Ha

Note: Batter slope angle is for the terminal slope and includes dry and dredged slopes including the bench width. The overall slope will be flatter on the northern boundary to accommodate additional buttress with for the watercourse.

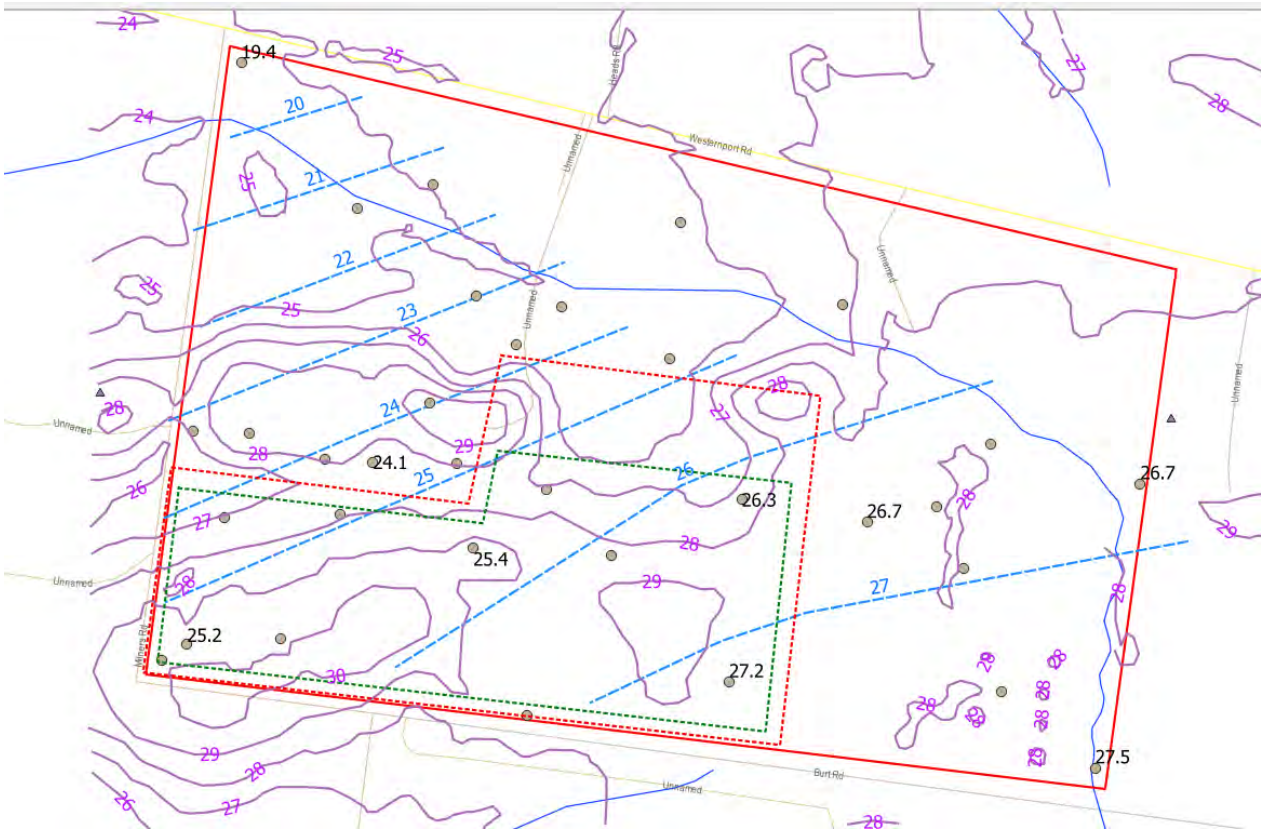
Production may vary but will generally be about 400,000 tonnes per annum depending on product demand.

The area which has been / is being extracted is approximately 39 ha, there are some areas within the existing approved extraction area that have not yet been extracted (eg beneath processing plant). The additional area of extraction requested as part of this application is 22.25 ha.

3.2 STAGING

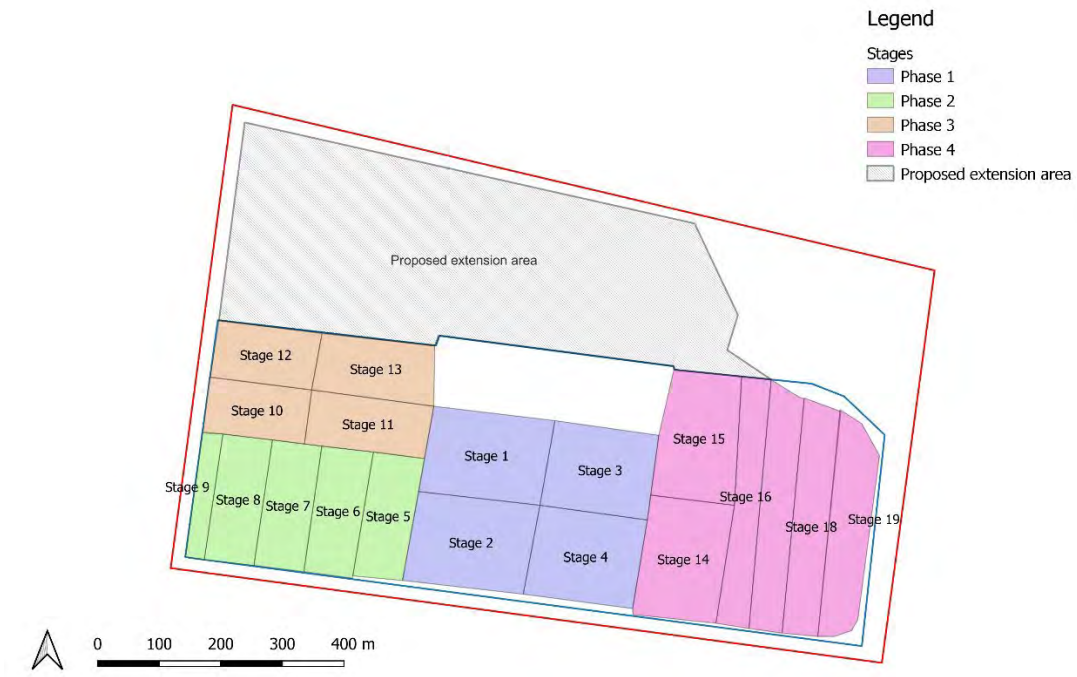
Prior to January 2004 the site was not developed. **Figure 3-1** shows the original surface topography, together with the original Work Authority and Extraction Boundaries (dotted). The groundwater levels and inferred initial water levels from January 2004 are also presented.

Figure 3-1 Pre-development January 2004



The approved quarry area comprises of 18 Stages, which have been divided into 4 Phases. The Stages and Phases of development are shown in **Figure 3-2.** The proposed Phase 5 additional extraction area is also shown.

Figure 3-2 Development Stages and Phases



Extraction in the proposed extension area considers:

- Extraction of resource to the north of the West Pit to a depth of 9mAHD in the area covered by the recent Administrative Update (**Figure 2-1**).
- Extraction of accessible resource to the north of the site, and reinstatement of this area prior to relocation of the current waterway.
- Relocation of the internal Access Road from the site entrance to the process area and associated power lines to enable extraction of sand from beneath the current alignment.

The phasing will generally be as follows subject to operational conditions and feed quality:

- The current underground power supply will be relocated to align with the current Access Road. Thereafter the area north of the existing waterway and east of the existing Access Road will be excavated. At the same time, the existing eastern and western extraction area will extend north and / or to increased depths.
- The excavated area north of the existing waterway and east of the current Access Road will be reinstated to the agreed geotechnical specification, and the Access Road / power lines relocated to the east over the reinstated area.
- The area to the north of the existing waterway and west of the relocated Access Road will be excavated and reinstated to the agreed geotechnical specification. Excavations from the existing eastern and western extraction areas will continue to extend north and / or to increased depths.
- When the proposed area for the realigned waterway has been completed, the new waterway will be constructed, and the existing waterway diverted to the proposed alignment. Extraction from the eastern and western areas will then proceed to the final extent and depths.
- Concurrent with the above, the dam in the southwestern corner of the site will be used for the storage of fines. The final form of the dams (reinstated or pit lakes) will be subject to the amount of fines recovered.
- The final extraction stage will include removal of the existing processing plant, and excavation of this area potentially with off-site processing.

The terminal and rehabilitated land forms are shown in **Figure 3-3** and **Figure 3-4** respectively.

Figure 3-3 Terminal Landform

Figure 3-4 Rehabilitated Landform

3.3 PIT DESIGN

The pit design is based on the following considerations:

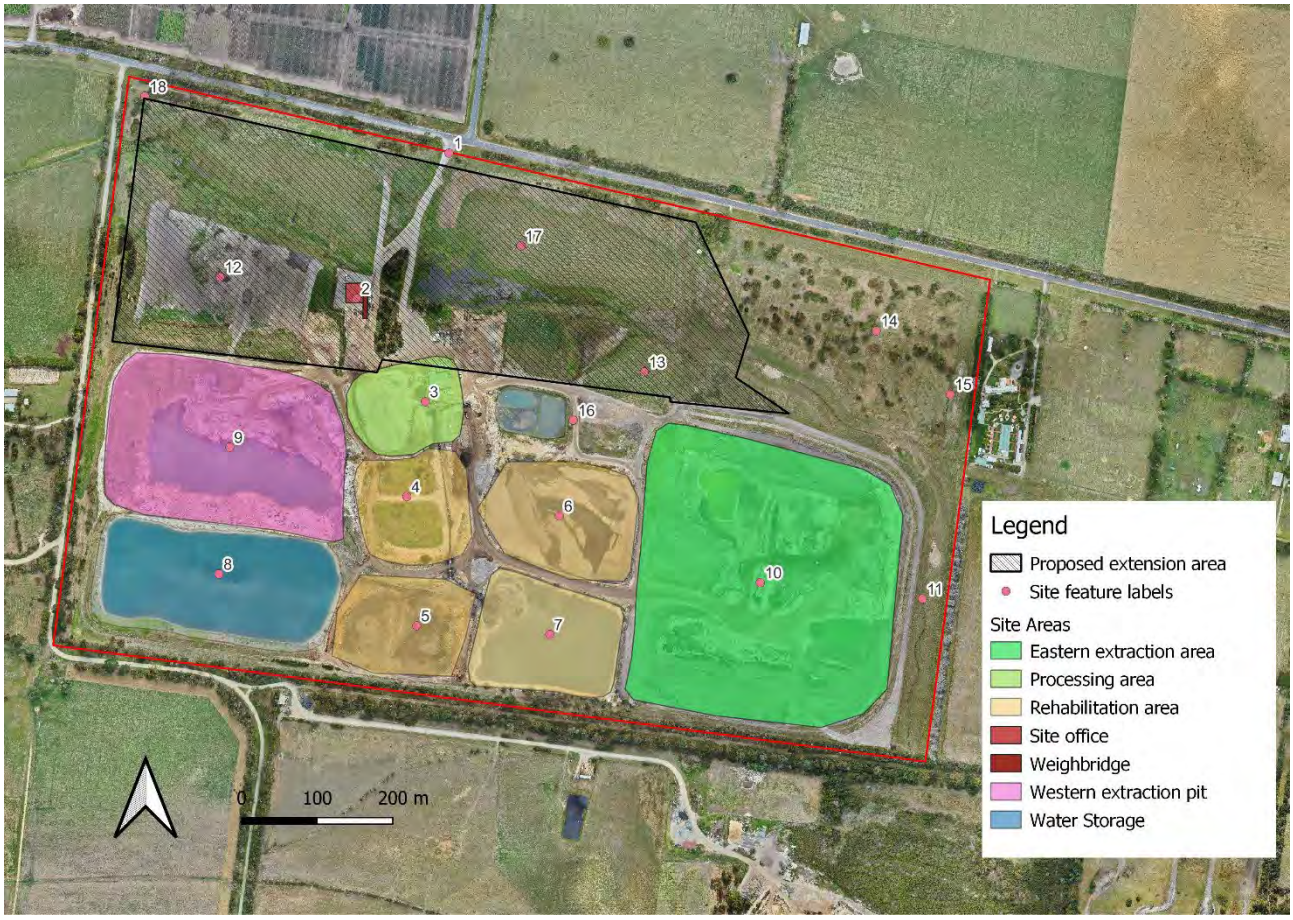
- Site specific requirements
  - Buffer requirements (**Section 3.4.3**)
  - Watertable elevation (**Section 4.3**)
  - Location and sensitivity of potential receptors (refer **Section 2**)
- Existing operations
  - Staging (**Section 3.2**)
  - Geotechnical aspects – batters and benches (**Section 3.7**)
  - Sequencing of extraction to incorporate moving the waterway (**Section 3.2**)

The proposed final depth is -9mAHD in current and proposed extraction areas. The upper portions will be extracted using dry quarry methods in the same way as the current operations, deeper sand will be extracted using a dredge. Further information regarding the Extractive Method is presented in **Section 3.5**. including the profiles (batters and benches in **Sections 3.5.3 and 3.5.5)**.

3.4 SITE LAYOUT

The existing site layout is shown in **Figure 3-5**. The former water storage ponds south of the processing plant are currently being rehabilitated using filter cake from the processing plant.

Figure 3-5 Site Layout



The following table describes the history, current use and proposed use/rehabilitation of various site features as numbered above.

Table 3-1 Features of the Site

Feature	Name / current use	History	Future use / rehabilitation
1	Entrance and access road	This location has been the main quarry entrance since quarrying commenced.	Will continue to be used as the main quarry entrance until the final stage of quarrying.
2	Office and car park	This location has been the office since quarrying commenced. The carpark was constructed around 2019.	Will continue to be used as the office and carpark during the operational phases, infrastructure will be removed during final phases of extraction.
3	Processing plant and Sales area	The processing plant and sales area has been in this location since quarrying commenced. The workshop was relocated to this area around 2019.	Processing will continue to occur in this location until the last stage of quarrying where product will be processed offsite. Infrastructure will be removed concurrently with the final stage of quarrying as sand is extracted from this area.
4	Rehabilitated area	This was the first area to be extracted. Extraction was completed prior to July 2008, and at this time filtercake was being deposited I this dam. By 2011 The dam was nearly full and vegetation was re-establishing around the perimeter. Filling of the void was completed by 2014, fully grassed with access track over the filtercake by2016.	This area has been capped and revegetated. Post closure this will be used for conservation.
5	Area under rehabilitation	Extraction was completed by 2008, was being used as water storage in 2010	This area has been capped and revegetated. Post closure this area will be used for conservation.
6	Slimes dam	Extraction was occurring in 2008 to 2010. Dam is used as a slimes storage dam for operational management of the fines treatment process when belt presses are non-operational. This will be discontinued.	This area will be capped and revegetated. Post closure this area will be used for conservation.
7	Area under rehabilitation	Extraction was occurring in 2008, to 2010. Converted to water storage dam in 2011. Deposition of filter cake into this dam commenced in 2022 and is currently occurring.	This area will be capped and revegetated. Post closure this area will be used for conservation.
8	SW Water Storage Dam	Extraction commenced in 2010, nearing completion by 2013. Northern and eastern walls of dam were constructed by 2016. Dam has been a water storage dam from 2016 to present.	This dam will continue to be used for water storage and will remain open water in the rehabilitated landform. The northern dam wall may be partially removed to form a continuous water body with that which will be formed in the current West Pit.
9	West Pit	Extraction commences in the western part of this area in 2015 and has continued to the present.	Under this application the depth of the pit will be increased and quarrying will advance northwards into the area formerly occupied by the turkey nest dams (Feature 12) and further north once the waterway has been relocated. On the final stage of quarrying the dams in the northern part of the east pit and west pit will be merged by the removal of sand beneath the offices and processing plant. Sand will be processed offsite during this final stage. The merging of the dams will create the final landform.
10	East Pit	Extraction commenced in 2016 and has continued to the present.	Under this application the depth of the pit will be increased and quarrying will advance northwards into the area adjacent to the conservation area in the north east corner of the site. Before this can occur the cultural heritage protection area (Feature 13) will be moved in accordance with the requirements of the CHMP. The waterway will also be moved to filled land north of its current location. For future quarry development, dams will be constructed across the centre and north of the east pit. The southern area will be used for filter cake storage,

Feature	Name / current use	History	Future use / rehabilitation
			and the northern area for water storage. At completion of quarrying, the southern area will be capped and revegetated for conservation purposes, and the northern area will remain open water.
11	Engineered drainage line - Reach A	Construction was nearing completion in November 2017, completed in 2018.	Feature will remain as it currently exists.
12	Former Turkey nest water storage dams	Turkey nest dams were constructed in 2015 for water storage. The dams were decommissioned late 2021. This area was approved for extraction under the Administrative Update.	This feature is within the proposed extension area, refer to Feature 17.
13	Cultural Heritage Protected area	Area was fenced off in accordance with the initial CHMP around 2016-17 and artefacts identified in the initial CHMP were relocated to an unmarked location within this area.	The cultural heritage protection area will be moved in accordance with the requirements of the CHMP. A potential location in the north west corner of the site has been discussed with BLCAC however they do not wish to commit to a future location at this time.
14	Conservation area	The former residence in the western part of this area was removed by 2009 but a shed remained. This part of the site has continued to be used for agricultural purposes.	The conservation values of this area will be maintained through the operation, and the land use retained through the post closure period.
15	Eastern bund	Constructed in 2020 to protect the amenity of the neighbour.	Feature will remain as it currently exists.
16	Eastern pit extension	The western part of this area was used for water storage dams in 2008. The eastern part of this area is currently being extracted.	This feature will become part of the East dam which will ultimately merge with the West dam in the final stage of quarrying to create the final landform.
17	Proposed extension area	Has retained agricultural land use to now with the exception of the construction of the turkey nest dams (see Feature 12).	The sand on the northern margin will be extracted first and the land will be refilled so that the waterway can be relocated to this area. A 20m buffer to the existing waterway will be maintained during this initial stage. Once the waterway has be extracted the quarrying will proceed northwards from the current East and West pits. On the final stage of quarrying the dams on the east and west will be merged by the removal of sand beneath the offices and processing plant. Sand will be processed offsite during this final stage. The merging of the dams will create the final landform.
18	Proposed cultural heritage protection area	The area currently contains a perimeter bund.	It is proposed to relocate the cultural heritage protection area to this location. However BLCAC do not wish to commit to a future location at this time.

3.4.1 Fencing

Fencing is provided as follows:

- A rural fence surrounds the site, with entrance gates off Westernport Road. An additional gate is available in the south-western corner of the site. This is used for boundary maintenance and emergency access.
- An area where aboriginal artefacts are currently buried also has a stockproof fence. It is proposed to relocate these artefacts to the north-west corner of the site during expansion works (subject to BLCAC approval), and this area will also be fenced.

3.4.2 Access roads

An internal access road runs from the site entrance to the site office / weighbridge and processing area. This may be relocated during excavation of the northern area but the entrance point will remain in its current location.

Other internal roads, including haul roads from the working pit to the processing plant, and supplementary tracks to transfer processed materials to stockpiles, will be established as required through the life of the project.

3.4.3 Buffers

Consistent with existing approvals, buffers will be maintained as follows:

- No excavation within 7m of any power infrastructure / centreline of any power line.
- No excavation within 20m of any site boundary or watercourse.

BLCAC were not willing to confirm the location of the future artefact repository in the CHMP and requested that this decision be deferred. A preferred location has been identified but there is the potential for this to change. BLCAC have not identified buffer distances to this location. A new cultural heritage protection area is to be established in the northwest corner of the site after extraction and backfilling of the adjacent area is completed in Stage 19/20. The distance to subsequent extraction areas will then be >100m. The CHMP has been approved.

3.4.4 Hazardous materials storage

Diesel fuel is stored on-site in a 10,000 litre tank fitted with a bowser. The tank is bunded to 120% capacity, is roofed and locked.

A bunded store is used for smaller quantities of oils / lubricants.

3.5 EXTRACTION METHODS

3.5.1 Topsoil and overburden management

Topsoil and overburden will be stripped prior to extraction of the resource. Topsoil will be placed into perimeter bunds for use in future rehabilitation or will be used directly for placement over storage area caps or over the surface of the reconstructed drainage corridor for the re-establishment of vegetation. If topsoil is required to be temporarily stockpiled the topsoil will be placed in stockpiles/bunds no greater than 2m in height (to preserve the soil biology).

Overburden will be used as it is extracted for backfill of excavated areas to allow the construction of the new drainage line or be placed against perimeter batters. Some material will be stockpiled on the cap of the southern storage area for use in rehabilitation of the northern face of the storage area at the completion of extraction. Please refer to the **Part 5 Rehabilitation Plan** for more information regarding this.

3.5.2 Quarry development and extractive method

The current extraction method is dry excavation by mechanical means, including by excavator / dump truck, with excavations being dewatered by pumping from the base of operating pits. After excavation, operating faces are buttressed with clay from on-site to maintain slope stability / reduce the ingress of groundwater.

For deeper excavations proposed in this Work Plan Variation, dredging techniques may be implemented. This will reduce the volume of water management requirements.

There are minimal overburden storages at the current time, as this material is transferred directly for use in clay buttressing and progressive rehabilitation. It is considered that this practice will continue with material either used for clay buttressing, or for reinstatement of the proposed waterway / access road to the north of the site and progressive rehabilitation.

3.5.3 Working face slopes

Current working face slopes (Phases 1 – 4 to RL 9 mAHD) are 1V:2H with no benches, noting these slopes are buttressed with clay to limit groundwater ingress. The following will be implemented for the additional extraction area and below 9 mAHD further to geotechnical analysis (**Appendix H**):

- Where dry excavation is used, slopes will be excavated to 1V:2.5H to a maximum depth of 16-18 mBGL. A bench of at least 38m at the base will be provided and the terminal slope buttressed with clay with a slope of 1V:3H.

- For deeper excavations, the extraction method will either be dredging with a terminal slope of 1V:2H.

3.5.4 Terminal depth

The terminal depth is currently 9 mAHD. This work plan variation seeks to increase the depth of excavation to -9 mAHD.

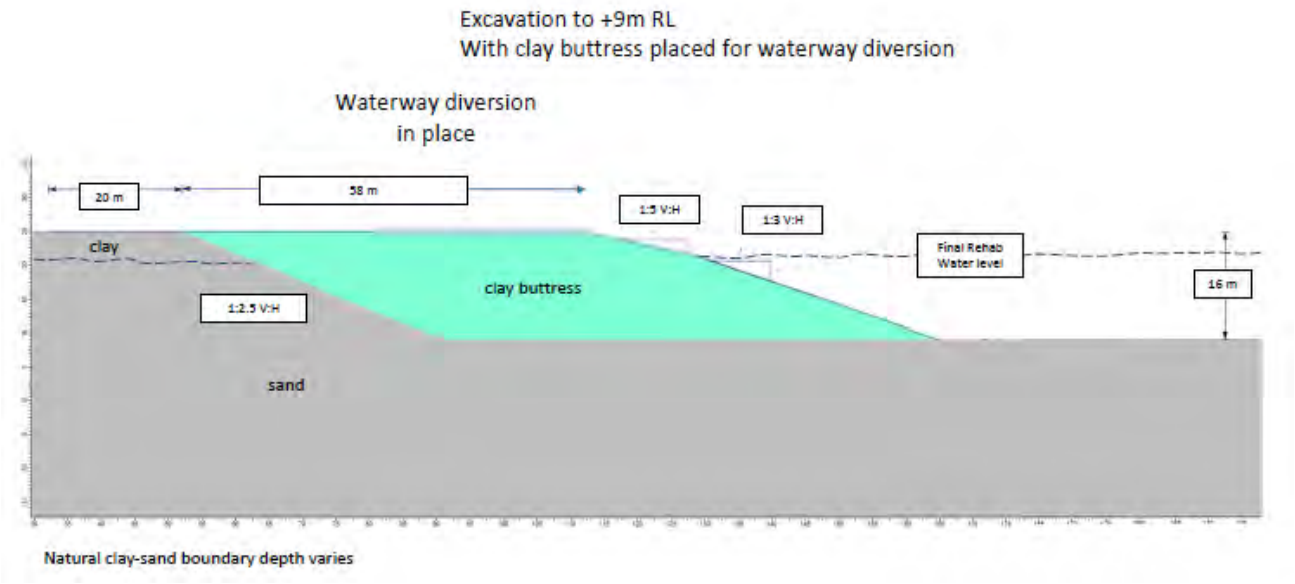
3.5.5 Rehabilitated slopes

For existing approved extraction areas, the final slope is 1V:5H from the natural surface to just below the waterline, and 1V to 2H below the waterline of recovered pit lakes. This will be maintained for the additional extraction areas, noting that rehabilitated slopes below the waterline will be 1V:3H where dry excavation techniques have been used, and 1V:2H where dredging has been used.

The rehabilitation method for dry excavated terminal slopes will be by placement of clay overburden, to a nominal thickness of 30m at the site surface. This will be conducted as soon as practical after the terminal excavation, to minimise groundwater ingress into the pit. The clay batter will be trimmed at the surface to the rehabilitated 1V:5H slope to the expected final pit water level.

When excavations to the north of the site are completed, an approximately 58m wide area running east-west will be reinstated to allow diversion of the existing waterway. This will require compaction to reduce future settlement risks. A fill specification and compaction methodology for the construction of the waterway diversion is provided as Appendix D of the geotechnical assessment (**Appendix H**). A cross section of the terminal and rehabilitated slopes through the waterway extracted from the geotechnical assessment is provided in **Figure 3-6**.

Figure 3-6 Cross Section Northern Boundary prior to commencement of dredging



Source: CMW 2023

3.6 SLIMES MANAGEMENT

To support the Work Plan Variation, a Slimes Management Plan (**Appendix I**) has been prepared with reference to ERR Technical Guideline “Design and Management of Tailings Storage Facilities” 2017, noting this is not strictly required under this guideline for disposal of tailings into open pits.

In this document the following terminology is used:

- **Slimes**. A slurry product from the process plant with particle sizes generally less than sand.

- **Filter cake**. Slimes that have been dewatered by a belt press, having approximately 50% water content. This is a spadeable product that is able to be handled on a belt conveyor.
- **Oversize material**. Material mechanically screened, e.g. cobbles, boulders from feed material prior to entering the process plant. Oversize material will be deposited into cells with filter cake.

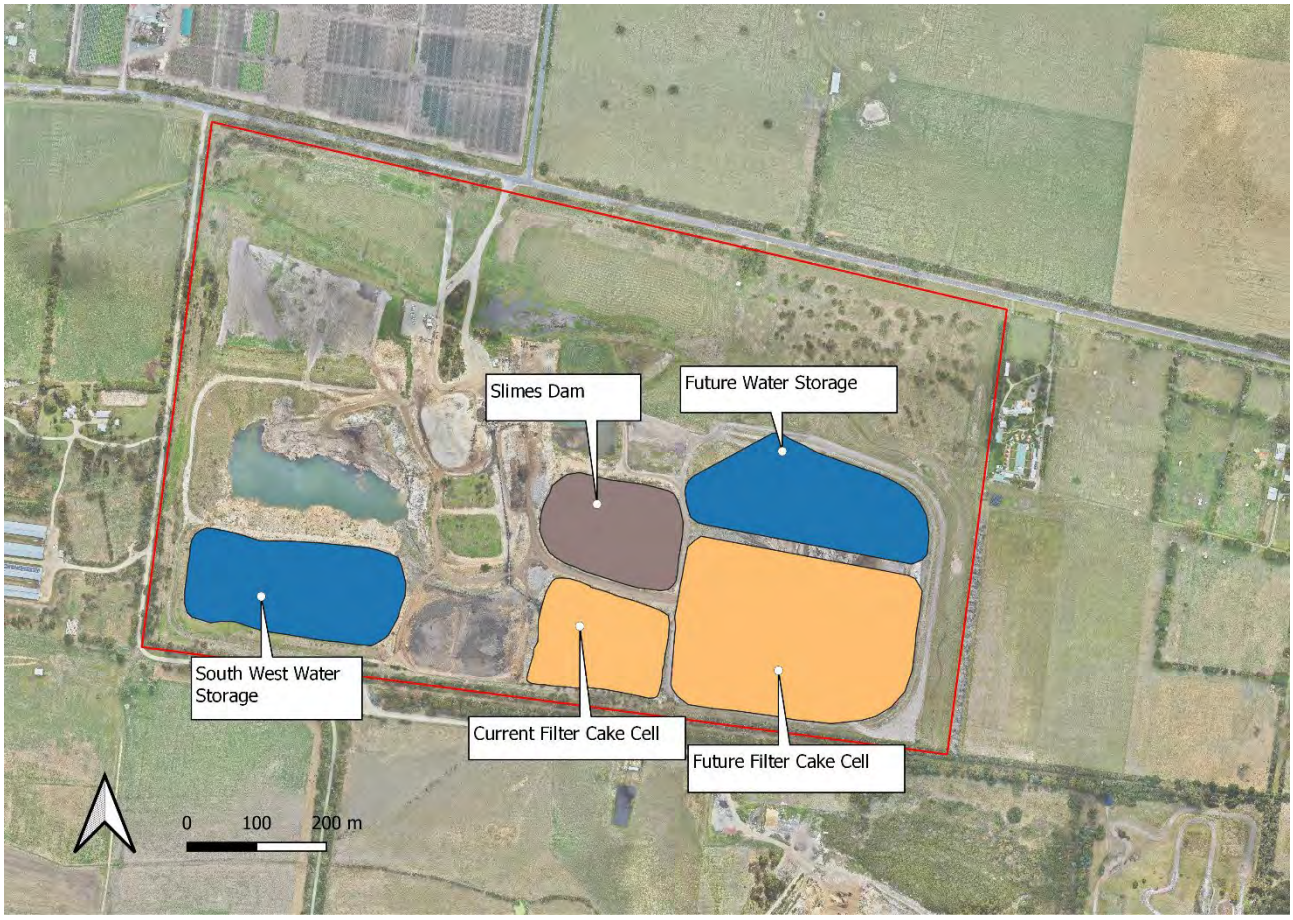
3.6.1 Current and Proposed Storage Dams

Filter cake from the processing plant is currently deposited in a disused cell to the south of the production plant. The cell will be continually dewatered to manage any water ingress. When filling of this cell is complete, it is proposed to construct a new storage cell in the current east pit, and deposit filter cake / oversize material in the empty cell, with on-going removal of any water ingress until filling is complete.

Current Work Authority Condition 25.1 requires all reasonable measures to minimise the generation of slimes. This is addressed with the belt presses, and slimes are only generated when the belt presses are unavailable. Consequently, only one cell (the “Slimes Dam”) has been required over the life of the quarry.

The location of the proposed storage cells are shown in **Figure 3-7**, cross sections are presented in **Part 2: Drawing Set** of this Work Plan Variation.

Figure 3-7 Current and Proposed Storage Dams



3.6.2 Dam Construction

The construction of free standing walls was established by reviewing historical photographs / surveys (where available) and discussions with the Quarry Manager. The construction details are summarised in **Table 3-2**.

Table 3-2 Dam Wall Construction

Cell	Dam Wall Construction	Comments
Current Filter Cake Cell	East wall: originally excavated to a maximum of 1V:1H on either side. Battered to 1V:2H with clay overburden.	South: not excavated (site boundary). West: former cell backfilled with filter cake / oversize material. North: current Slimes Dam.
Current Water Storage Dam in south-west corner of the site	North wall: fully excavated in several phases and reformed to 1V:2H on either side with clay overburden. Formed with lifts of 2-3m. No compaction testing, but subsequent use as haul road would have provided additional compaction.	East: former cell backfilled with filter cake / oversize material. South and west: not excavated (site boundary).
Current Slimes Dam	East wall: originally excavated to a maximum of 1V:1H on either side. Battered to 1V:2H with clay overburden Proposed North Wall. Currently 1V:1H on south side. Battered to 1V:2H with clay overburden. Currently not excavated immediately to north, but future excavations will allow a minimum 15m buffer prior to excavating at 1V:2.5H and battering with clay to 1V:3H	South: current filter cake / oversize cell. West: former cell backfilled with filter cake / oversize material.
Proposed Filter Cake Cell, current East Pit	North wall: an engineered wall with be constructed across the pit from overburden material. South of this wall will have a 1V:2.5H batter (to be filled), north of this wall will have a 1V:3H batter (rehabilitation profile).	East and south: not excavated. West: current filter cake / oversize cell and Slimes Dam.
Proposed Water Storage Dam, current East Pit	North west wall: an engineered wall with be constructed across the pit from overburden material. This wall will have a 1V:3H batter (rehabilitation profile).	North east and east: not excavated. South: wall to be constructed for new filter cake / oversize cell (see above). West: current Slimes Dam.

All dams are constructed in disused quarry cells below the surrounding ground levels and current / proposed waterway alignments (refer cross sections in **Part 2: Drawing Set** of this Work Plan Variation). Therefore, in the unlikely event of a loss of containment from a dam, any materials will only flow into adjacent quarry pits and not off-site via waterways or overland flow. Further ANCOLD assessments of dam failure consequences are discussed in the geotechnical assessment (**Appendix H**). The geotechnical assessment notes that on 22 September 2021 there was a magnitude 5.9 earthquake at Mansfield that resulted in approximately 70% of the acceleration of a 1:500 year earthquake at Yannathan. This event resulted in no significant ground deformation at the Yannathan site.

3.6.3 Estimated Volumes of Filter Cake and Oversize Materials

The expected saleable product volumes are 400,000 tonnes per year. The total volumes of all materials generated over the life of the quarry are summarised in **Table 3-3**. Detailed assumptions are provided in the Slimes Management Plan (**Appendix I**).

Table 3-3 Estimates of Material Volumes

Material Description	Volume to be Generated (m^3)	Comments
All Material	6,165,000	Includes material from proposed extension area and currently unextracted material from currently approved Work Plan area
Overburden	1,405,331	To be used for construction of batters, dams and capping
Dune Sand	370,573	To be used for rehabilitation
Material Processed:	4,389,096	
- Saleable product	3,451,425	Based on current production rates, 3% moisture content
- Filter cake	239,405	Based on current production rates from belt press, spadeable, 50% moisture content
- Oversize material	698,265	Based on current production rates, cobbles / boulders etc removed during screening

3.6.4 Material Volumes

Clay overburden and some oversize material will be used in the construction of: rehabilitation batters; a 58m wide area to allow diversion of the current watercourse to the north of the property; additional dams; and capping of cells containing filter cake / oversize materials or the Slimes Dam. A mass balance of the volume of overburden and oversize materials required is shown in **Table 3-4**.

Table 3-4 Materials Mass Balance Estimate

Material Description	Volume (m^3)	Comments
Material required for Construction:		
- Batters and waterway diversion	1,142,080	Allows engineered construction for waterway diversion (60m width) and rehabilitation batters to 1 vertical : 3 horizontal
- New dams across East Pit	457,470	Allows 1 additional cell for storage of filter cake / oversize material and 1 additional water storage dam
- Capping of slimes / filter cake / oversize material cells	203,325	Allows 1.5m cap as used in previously rehabilitated cells
	1,802,875	**Total construction material required**
Material available:		
- Overburden	1,405,331	From stripping to be completed
- Stockpiled Overburden	192,000	Currently stockpiled in base of East Pit
- Oversize	205,544	Required from production
	1,802,875	**Material to be used in construction**
	492,721	Remaining oversize to be placed in cells with filter cake

If the remaining oversize materials are placed into cells with filter cake, rather than crushed and sold, the estimated volumes and resulting moisture content are shown in **Table 3-5**.

Table 3-5 Filter Cake / Oversize Material Estimates

Material Description	Volume (m^3)	Tonnes[1]	Comments
Filter Cake	239,405	478,810	At 50% moisture content by weight
-Filter cake solids		239,405	
-Filter cake moisture		239,405	
Oversize Material	492,721	985,443	Cobbles, boulders etc, minimal water content
Total	732,127	1,464,253	Includes 239,405t water = 16.3% moisture

1. Assumes 2 tonnes per m^3 for (recompacted) solids

Historically, filter cake has been deposited into disused cells at the site. The material was of sufficient quality to settle and effectively fill a number of dams. This notwithstanding, future cells will be dewatered prior to filling with filter cake, and pumping maintained to remove any groundwater ingress / rain water. When complete, the cells will be capped with a nominal 1.5m layer of clay and topsoil prior to revegetation.

Slimes in the Slimes Dam will be allowed to settle, and when sufficiently consolidated the cell will be capped with nominally a 1.5m layer of clay and topsoil prior to revegetation.

All proposed cells have perimeter bunds that diverts surface water away from the pits.

The estimates in **Table 3-5** demonstrate that the overall moisture content of filter cake and oversize material can be managed to be less than 20%.

3.6.5 Estimated Storage Capacities

The available storage for filter cake / oversize materials are estimated in **Table 3-6**. Estimated water storage capacities have also been noted for completeness.

Table 3-6 Estimated Future Storage Capacities of Cells

Description	Volume (m^3)	Comments
Filter Cake / Oversize Storage		
Available Storage		
- Existing cell	59,438	Assumes 50% of original capacity remaining
- Future cell in East Pit	620,000	
- Total	679,438	
Required Storage	732,127	Excess material allows for mounding of filter cake / oversize material prior to capping to allow future surface drainage, as for previously capped cells
Other Storage		
Existing Water Storage	284,640	To south west of site
Existing Water Storage	N/A	To east of production plant. Area to be excavated
Additional Water Storage	312,500	To be constructed in East Pit
Slimes Dam	14,700	Cell near capacity. Disposal of slimes to be discontinued

Overall, it is estimated that the construction of an additional cell in the East Pit will allow sufficient storage for filter cake and oversize material forecast to be generated during quarry activity at the site. Additional water storage will also be provided in the East Pit to allow for future water management.

3.6.6 Slimes and Filter Cake Quality

The CSIRO Atlas of Acid Sulphate Soils (ASS) indicates that the site has a low to extremely low probability of occurrence of ASS. The site is not in an area of coastal acid sulphate soils. As such, the risk of slimes or filter cake forming acid sulphate soils is considered low.

The feed materials are naturally occurring sands and clays, and the only additives are coagulants and flocculants added to aid the dewatering process.

The following coagulants and flocculants are used on site in the processing plant:

- Flocculant “Magnafloc® 5250”, (polyacrylamide).
- Coagulant “Magnafloc® 1425”, 2-Propen-1-aminium, N,N-dimethyl-N-2-propenyl-, chloride, homopolymer (“poly DADMAC”).

Polyacrylamide and polyDADMAC are widely used as coagulants / flocculants for effluent treatment, in paper manufacture and water purification. Both chemicals are endorsed by the National Health and Medical Research Council (NHMRC) for use in drinking water treatment (NHMRC, 2011). Polyacrylamide may also be used as a soil conditioner in agriculture, and as a surfactant in herbicides (Reber et al, 2007). At the Yannathan site they are used as coagulants / flocculants to assist in the removal of undersized material (“fines”) to produce a filter cake. The filter cake is currently used to fill extracted pits in addition to oversize material. Currently, the filter cake (including residual coagulant / flocculant) is disposed by conveyor to the pond south of the processing plant.

In 2021, the following quantities were used at the site:

- Polyacrylamide 59,201kg
- PolyDADMAC 173,880L (10%-50% w/w solution)

A groundwater monitoring event (GME) in October 2022 (Appendix C of the Hydrogeological Assessment appended to this report) included analysis of potential degradation products in groundwater wells, and water accumulating in the cell to which filter cake was being deposited. This included:

- Total Organic Carbon (TOC).
- Total Kjeldahl Nitrogen (TKN).
- Nitrogen containing non-organic compounds (nitrate, nitrite, ammonia).
- Acrylamide
- Chloride

The GME report concluded that that coagulants and flocculants used in processing were not resulting in unacceptable impacts to water within the cell that filter cake was disposed in, or groundwater.

3.7 GEOTECHNICAL RISK

In accordance with ERR requirements (Geotechnical guideline for terminal and rehabilitated slopes, Extractive Industry projects’, September 2020) for developments with extractions >15m or with a lake as a final landform, a Geotechnical Assessment was conducted by geotechnical consultants CMW Geosciences (**Appendix H**) to optimise the balance between resource extraction and management of geotechnical risk.

CMW conducted a site visit to assess existing operations, and using previous testing, conducted a desktop study to develop a geological and geotechnical model. A subsequent field program was undertaken to obtain additional site data in early 2023. Additional information was obtained from a nearby site investigation to inform parameters used for the modelling of deeper layers, specifically the organic sand which forms the floor of the existing excavations. Consideration for seismic conditions was also provided.

CMW’s conclusions were:

1. *A desktop study was conducted including a detailed review of relevant site information, existing mapping data and site hydrogeological investigations. The study was supported by a site walkover by the author of this report. The results of laboratory testing of organic sand from a 30 m deep drillhole at Lang Lang sand quarry 5 km southwest of this site has also been included in the desktop review.*

2. An initial site geological and geotechnical model has been developed based on the results of the desktop review.

3. Site investigation comprised three days of cone penetration testing (CPT) which was conducted across the site in January 2023. The results of the investigations have been used in assessing design strength parameters for analysis of natural clay and sand layers and for constructed batters.

4. Slope stability analyses have been conducted using batter geometry profiles discussed during the site walkover and in communication with the client. Limit-equilibrium analyses of rotational slope failure and sliding of the clay buttress under the effect of water pressure have been conducted. The upper slopes (+9m RL to surface) would be excavated at 1:2.5 (V:H) and buttressed during site stripping with clay fill at terminal/rehabilitated faces, at a gradient of 1:3 (V:H). A gradient of 1:5 (V:H) would be incorporated in the slope from surface to the expected rehabilitated water level. Water inflow from sand faces and water pressure on the clay buttress will increase as excavation depth increases. It is recommended that these parameters are carefully recorded as the excavation proceeds below +9 mRL so that models and assumptions can be confirmed with the observations. Deepening of the excavation to -9 mRL by dredging has been included in the analysis. The dredged lower slopes can be excavated at 1:2 (V:H). Slope stability analysis has been conducted on a representative land bridge/embankment adjacent to placed filter cake. Filter cake properties were derived from CPT through a previously deposited impoundment. Limit-equilibrium and finite element analysis showed acceptable stability could be achieved will the typical geometry used at the site.

5. The factors of safety (FoS) of the upper slope (+9 mRL to surface) with a clay buttress emplaced are above 1.6 for static conditions. The sand slopes prior to buttressing have FoS less than 1.6 and are assessed as acceptably stable based on the site experience of placing buttresses progressively with site extraction. Operational upper slopes in sand at a gradient of 1:2.5 are expected to be stable on the basis that limited faces are exposed prior to placing of clay buttressing on terminal/rehabilitated slopes. The lower slope could be excavated by dredging at a gradient of 1:2 (V:H). The dredging boom geometry should be assessed to identify a series of cutting faces that will conform to the overall recommended gradient.

6. The stability of the proposed design batter geometries for the operational, terminal and rehabilitation geometries has been assessed in accordance with the Department of Jobs, Precincts and Regions (DJPR) 2020 'Geotechnical guideline for terminal and rehabilitated slopes – Extractive Industry Projects'.

7. The slopes of embankments for impoundments of water and fine waste materials have also been assessed with reference to the ANCOLD (2012, 2019) guideline on tailings dams. The recommended slopes meet stability requirements.

8. The slope stability analyses also show that the recommended slopes are stable for a 1 in 500 year seismic event based on Geoscience Australia data.

9. The geotechnical risk assessment has identified suitable risk treatment protocols for identified hazards. The residual risks are considered to be low or medium.

10. Preliminary consideration of the erodibility of the proposed rehabilitation slope design indicate that a final slope with low erosion potential can be achieved at the site.

11. This geotechnical assessment report outlines the findings and recommendations, which support a Work Plan Variation for the proposed expansion area.

12. A Ground Control Management Plan (GCMP) incorporating trigger action response plans (TARPs) is provided as a separate report.

13. A fill specification to facilitate construction of the diverted waterway is included as an Appendix to this report.

13 a. It is understood that the waterway is to be located over clay buttressing placed along the northern perimeter of the proposed expansion area. The clay fill, if placed in accordance with the specifications provided, is expected to provide an appropriate limit to infiltration to allow the constructed waterway to perform in a similar way to natural waterways in the area. The thickness of the clay buttress is expected to prevent water infiltration to represent a risk to the excavation in the expansion area. An artificial lining of the waterway channel is not recommended if the fill specifications for material selection, methods of compaction and testing are achieved.

13 b. Monitoring requirements to ensure that the constructed waterway is not creating a risk to the excavation area include visual observations and surveying as outlined in the risk assessment in this report and GCMP.

In addition, CMW has provided:

- A separate Ground Control Management Plan (**Appendix H**) incorporating trigger action response plans (TARPs).
- A fill specification to facilitate relocation of the waterway and monitoring requirements to ensure that the constructed waterway does not create a risk to the excavation area.

3.8 WATER MANAGEMENT

3.8.1.1 Groundwater

Groundwater flowing into excavations is currently minimised by battering the terminal slopes with clay to limit groundwater ingress. Rainwater falling into the pits, and groundwater migrating upwards from the base of the pits, is managed in on-site dams. In addition to evaporation, some water is lost in exported product, and some is used for dust suppression. Overall, there is no current requirement for discharge of extracted water.

To assess the impact of a highly conservative case of excavating to -9 mAHD with dry excavations, over an increased area, a numerical groundwater model was commissioned (Groundwater Solutions 2021).

The groundwater modelling suggests that the impact to neighbouring groundwater bores would be acceptable even with dewatering to -9 mAHD. However, it was decided to dry excavate only to 9 mAHD (the current depth limit) and recover material from 9mAHD to -9mAHD by dredging.

To assess the impacts from a scenario involving dry excavation to 9 mAHD, and dredging to -9 mAHD, a hydrogeological assessment and water balance was conducted (**Appendix E**). The water balance considered a likely extraction sequence, and associated excavations / dams available for water storage.

The water balance considered the following inflows to on-site waterbodies:

- Incident rainfall to dams
- Lateral inflows from the upper sands during the dry excavation stage
- Upwards Inflow through the organic layer while clay fill is placed against the walls
- Lateral inflow from the lower sands during the dredging stages

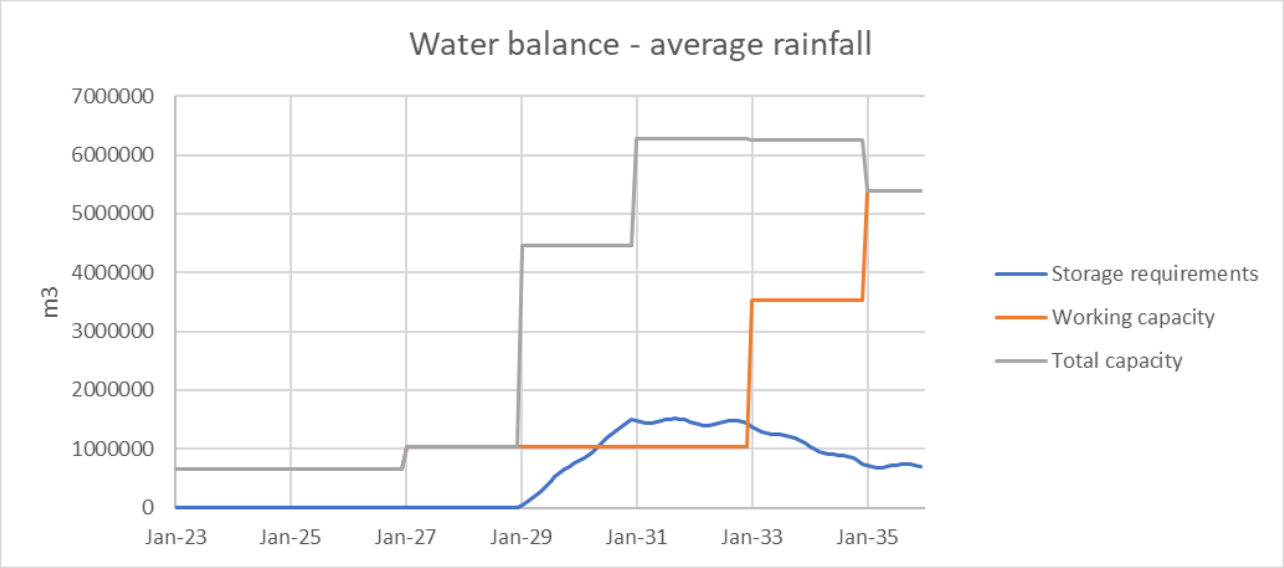
Note: water pumped to the processing plant during dredging is returned to ponds so there is no nett change in storage.

The following outflows for the onsite waterbodies were assessed:

- Evaporation from dams
- Outflow from water storages to aquifer
- Processing usage
- Dust suppression

The following figure illustrates the outcomes of the water balance calculations for average rainfall conditions each year.

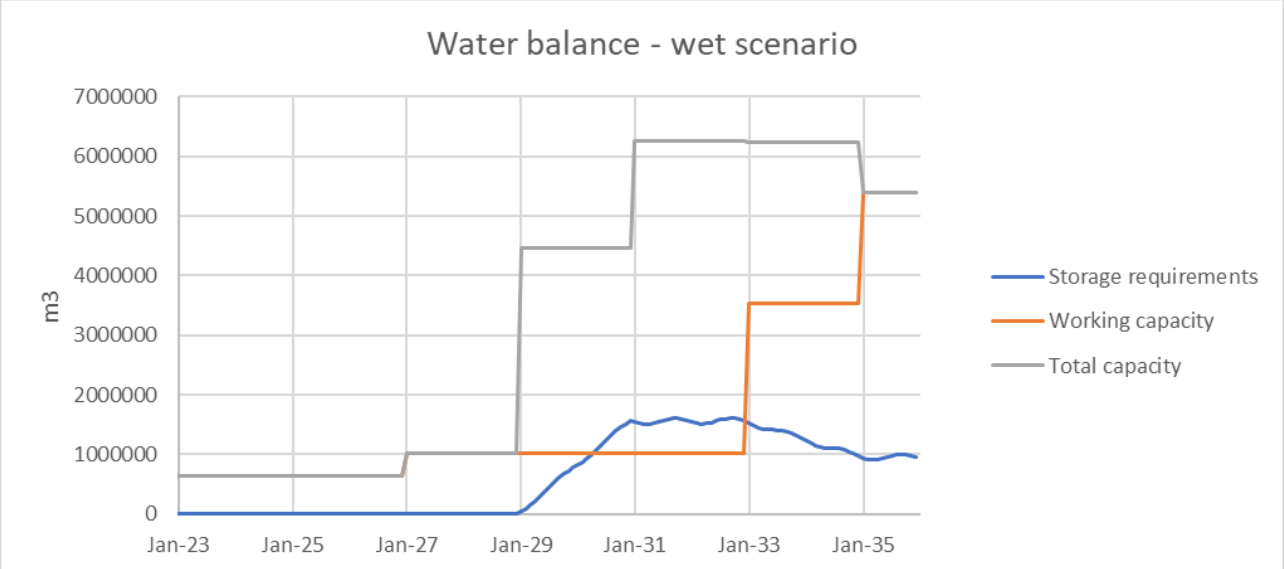
Figure 3-8 Water balance - average rainfall



It has been assumed each stage will have a duration of two years. The results show that the water storage requirements for the duration of the operation is able to be managed within the working capacity of the dams. If capacity became an issue Hanson has additional capacity available in the dredge pond.

To test the sensitivity of the water balance model a wet scenario was also modelled. In this scenario rainfall was increased by 10% and evaporation decreased by 5% for each month of the entire model from 2023 to 2035. This is a highly improbable situation however does serve to demonstrate the capacity of the system to handle extreme events and potential climate change extremes.

Figure 3-9 Water balance - wet scenario



It is therefore concluded that no additional groundwater extraction allocations will be needed and that there is ample storage onsite such that offsite disposal will not be required. SRW has been engaged through the preparation of this document. The hydrogeological report (**Appendix E**) has been forwarded to SRW for comment.

3.8.1.2 Surface Water

There is currently a drainage line which flows through the proposed extension area. It is proposed to relocate the drainage line to the north to facilitate extraction. The extraction will be undertaken in a staged manner so that the northern area will be extracted and refilled and the new waterway will be constructed over the filled

area. The precise sequencing may vary depending on the resource extent and gradings, while preliminary resource drilling indicates resource is present some areas may not be economical to extract so some of the realigned waterway may be on natural land. For this reason the extraction sequence has not been specified herein. The sequencing will depend on:

- Required batter profiles (**Appendix H)**
- Surface Water Management Plan (**Appendix D)**
- Extraction and economics
- Market requirements

3.9 PROCESSING METHODS

The current / expected plant and processing methods are described below, noting equipment may be replaced by equipment of at least the same standard over time.

3.9.1 Fixed processing plant

The location of processing plant is shown in **Figure 3-5**.

The plant is a three-stage system comprising an initial feed and screening section, followed by a sand production section and finally a separate treatment plant for reject clay and silt. The plant accepts the extracted sand and clay mixed material which is screened and then water added, and the resultant slurry agitated to further remove large hard particles. The slurry then enters settling tanks to separate the fine clays from the sand component. The sand is then dried and further processed into fine and coarse fractions and blended as required. The clay slurry if flocculated and dried for placement back into the extracted area.

Dump trucks deliver the extracted material to the plant and place this either into either of two raw material feed bins or stockpiled for processing at a later stage. A conveyor then feeds screens which remove primary oversize material. Water is then added to the material in an attrition cell to break up and clean the sand particles. The resultant slurry is again screened to remove secondary oversize material. The slurry is then discharged into a settling tank for transfer to a classifier to separate the course and fine sand fractions as required.

The coarse sand slurry travels through the bottom of the classifier onto a dewatering screen and then discharged onto a conveyor. The overflow slurry from the classifier containing the fines fraction is pumped through a series of cyclones. The semi dried material then passes through a second drying screen and transferred to a holding bin where the fine sand is blended at a controlled rate onto the coarse sand conveyor for delivery to the product storage stockpiles.

3.9.1.1 Fines management

The silt and clay effluent produced by the wash process is transferred to a separate treatment plant for dewatering. Flocculant and coagulant is added to the slurry in a tank and the resultant thickened slurry is dewatered via a belt press. The dewatered cake is mixed with the oversize material and placed back into completed areas of the excavated pit (not an operational pit) via a waste conveyor for progressive rehabilitation. Filter cake will not be placed into operational dredge pits. The water removed from the effluent along with water from the dewatering screens is recycled back into the processing plant for reuse in the washing process,

3.9.2 Mobile plant

The existing mobile plant will be retained for the expanded operation. This includes front end loaders to load feed material and sales product as required; excavators to extract and load raw material and dump trucks to transport the raw material to the processing plant.

3.9.3 Dredging equipment

The equipment for the dredging operation may comprise a pontoon mounted dredge / sand pump, a floating discharge pipeline to convey the dredged flow to shore and a dewatering unit prior to feeding dredged material to the processing plant.

The dredge may utilise a cutter head to loosen the material in the excavated pit below the water line and a suction tube located beneath the cutter and connected directly to a wear resistant pump to capture the disturbed material. The cutter head and suction inlet will be attached to a ladder suspended from a gantry at the fore of the pontoon. The pump will discharge the dredged material directly to shore via the floating pipeline.

The dredged flow will be conveyed by the pipeline firstly to a screen on the shore to remove any primary oversize material and will then be dewatered prior to feeding into the processing plant. The solids component will be fed to a conveyor that will transfer the solids to the attrition cell in the processing plant.

Excess water will be transferred by a separate pipeline back to the excavated pit.

3.9.4 Ancillary plant and buildings

Ancillary fixed plant and buildings comprise:

- A weighbridge and an office / amenities building located beyond the product stockpile area on the outgoing access road, and
- A workshop located adjacent to the product stockpile area.

These will be removed during the final stages of quarrying to allow extraction of the sand resource beneath these areas.

3.9.5 Derelict and redundant plant

Any redundant plant will be removed promptly from site if it is no longer required.

3.10 GENERAL OPERATIONS

3.10.1 Utilities

Three phase power is transmitted from an external overhead supply near the site entrance off Westernport Road by an underground line to a substation on site located near the processing plant. This line will require relocation to enable excavation of the northern area, and it may be replaced by either underground or overground lines.

From the substation, power is distributed underground to the processing plant, workshop and the weighbridge, office and amenities buildings.

Water for use in the amenities is provided by rainwater collected in on-site storage tanks. Water for use in the processing plant and elsewhere on site is obtained from the water storages within the excavated pit.

3.10.2 Drainage

Drainage from the undeveloped areas to the north and east of the site flow into a current waterway which enters the site from the south-east and leaves via a culvert under Milners Road to the west (**Appendix D**). The eastern extent of this waterway was diverted to facilitate the current eastern extraction area. The intent is to relocate the remaining waterway towards the north to facilitate further extraction.

Water falling in and around current pits drains into the pits. This area is expected to increase towards the north of the site as the operation expands.

3.10.3 Occupational Health and Safety

Hanson is committed to the occupational health and safety of people legally entering the site. The company has a safety policy and inducts its workers and visitors to the site by addressing the safety features applicable to this site. All operations will be undertaken in accordance with the OHS Act (2004).

3.10.4 Traffic

As discussed in **Section 2.12**, current operations include the transport of approximately 400,000 tonnes per annum of quarry product. By Section 173 agreement with Council, loaded trucks exit the site via Westernport Road to the South Gippsland Highway, there will be no significant changes with this variation.

The carpark is located on the western side of the office, accessed from the main entrance to Westernport Road as shown on **Figure 3-5**. The site has parking for twenty five (25) cars/passenger vehicles. Carparks required for staff and visitors total fifteen (15).

3.10.5 Site Security

The site is fully fenced with a stockproof fence which is in keeping with fencing on surrounding properties. The front gate is securely locked when the site is not operating.

Clear instructions are posted at the front gate as shown below.

Figure 3-10 Signage at front gate

3.10.6 Lighting

The site mostly operates during daylight hours. In winter, operations commencing at 6:00am and concluding at 6:00pm will require lights for a short period of time. Mobile lighting systems are not required.

Fixed lighting systems are located on the processing plant in the centre of the site. The lights are shaded and focus the lightbeam downwards. A Viewshed analysis is presented in **Figure 3-11** for the lighting systems at the processing plant.

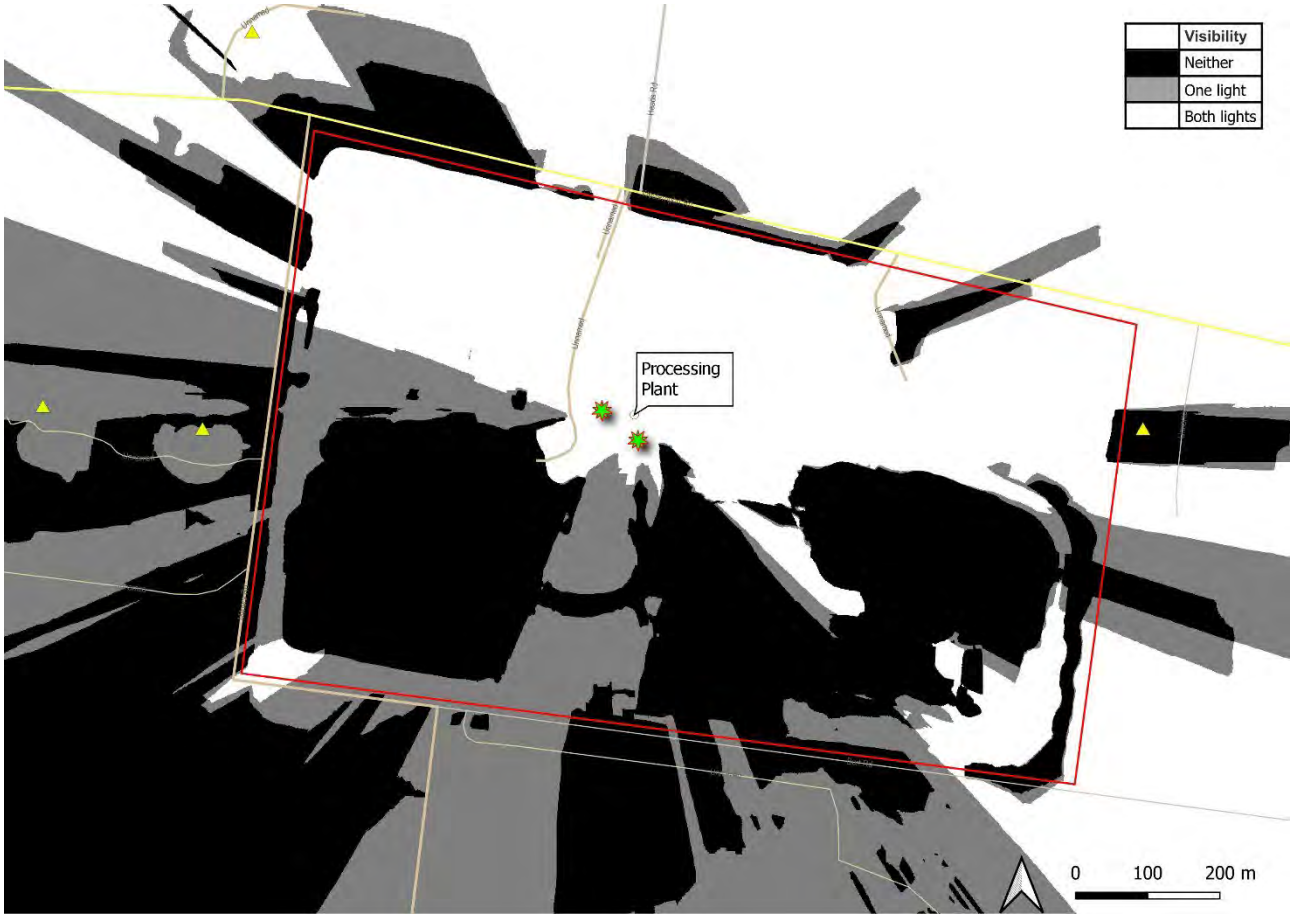
There are two external lights at the processing plant, both raised above the surrounding landscape. One is where quarried material is fed into a hopper before being conveyed to the plant. The second illuminates the sales area.

The Viewshed analysis only shows shielding from earthen features, Screening by vegetation is not shown in this analysis, only earthen/structural features are picked up by the topographic survey. The Viewshed analysis shows that the residence at the Cattery and Kennels east of the site is shielded by the bund adjacent to the eastern site boundary that was installed initially as a noise control measure.

The product stockpiles and perimeter bund on the western boundary provide some screening for residences to the west, it should be noted that the assessment includes only earthen features. The western perimeter also contains well established vegetation which would provide a more complete screening.

The bund along the northern boundary screens road users along Westernport Road for most of the northern boundary. This is another location where the vegetation would provide additional screening. The caretaker's accommodation on the market garden site would also benefit from the additional screening by perimeter vegetation.

Figure 3-11 Viewshed analysis



3.10.7 Operating Hours

The site currently has a Secondary Consent (Cardinia Shire Council, 17 April 2023) to operate the processing plant between the hours of 6am – 10pm until 17 October 2023. The consent notes that this excludes the dispatch of quarry vehicles to and from the site (after 6pm). The site will continue to operate these hours, subject to on-going Council approval. It is noted that quarry lighting systems are on timers, turning on at 5:30am and off at 10:30pm when an afternoon shift is operating, or 6:30pm when an afternoon shift is not operating.

Maintenance essential to plant operation may occur outside these hours.

Information for upload	Monday – Friday		Saturday		Sunday		Work on Public Holiday
	Start	Finish	Start	Finish	Start	Finish	
Above ground	6.00	18.00	6.00	18.00	None	None	Yes
Sales	6.00	18.00	6.00	18.00	None	None	Yes

Information for upload	Monday – Friday		Saturday		Sunday		Work on Public Holiday
	Start	Finish	Start	Finish	Start	Finish	
Processing	6.00	22.00	6.00	22.00	None	None	Yes
Operating Hours Clarification	No work on Christmas Day, Boxing Day or Good Friday, maintenance may be conducted outside these hours						

4. ENVIRONMENTAL ASPECTS

The studies undertaken to support this section of the application have identified controls to minimise potential impacts So Far As Reasonably Practicable (SFARP) in accordance with EPA requirements. As such Hanson commits to their implementation SFARP.

4.1 DUST

An Air Quality Impact Assessment was conducted by Edge Group (**Appendix J**), correspondence with EPA is contained in **Appendix M**. This was consistent with a Level 2 Assessment, as defined in EPA Publication 1961 (2022) for a medium mine or quarry with between 150,000 t/yr and 500,000 t/yr extraction in a rural area with residences within 500m.

The Air Quality Impact Assessment provides the results of modelling using the Environment Protection Authority Victoria's (EPA) approved regulatory dispersion model, AERMOD; and provides discussion on the predicted results. The impact of the following parameters were modelled: carbon monoxide, nitrogen dioxide, particulate matter 2.5 µm or less in diameter ($PM_{2.5}$), particulate matter 10 µm or less in diameter (PM_{10}), and total suspended particles.

The pollutants above were modelled under generally worst-case/conservative conditions. The modelling identified that respective regulatory criteria adopted in the assessment were not exceeded at the nearest sensitive (residential or office) receptors modelled for all parameters except $PM_{2.5}$ (including consideration of background concentrations, as required).

For $PM_{2.5}$, a risk assessment was conducted following the methodology in EPA Publication 1943 (2022). The outcome was a "moderate" risk ranking, i.e. "although there is some risk of nuisance dust, it is possible it can be practically and effectively managed". This is consistent with the fact that no complaints have been identified from existing operations in the last six years. A complaint in 2015 was ultimately found to be vexatious.

In addition to the Air Quality Impact Assessment, to ensure that dust is managed as far as reasonably practical, a dust Site Environmental Management Plan (SEMP) was compiled (**Appendix J**). The SEMP includes:

- Roles and responsibilities.
- Existing and proposed dust suppression controls.
- Emergency actions.
- A dust monitoring plan.
- Triggers and contingencies.
- Monitoring data management and reporting.

The results of the modelling concluded:

- The pollutants NOx, CO, PM_{10} and $PM_{2.5}$ were modelled under generally representative to worst-case/conservative conditions
- The adopted EPA criteria were not exceeded at receptor locations for NOx, CO or PM_{10}
- $PM_{2.5}$ exceeded criteria for one of the two averaging periods
- The risk assessment undertaken according to EPA methodologies concluded it was unlikely there would be any potential human health or amenity impacts for normal operations.

Recommended monitoring presented in the SEMP has been added to the Monitoring Program contained in Part 3 Risk Assessment.

4.2 NOISE

A noise emission assessment of the proposed operations has been conducted by Watson Moss Growcott (**Appendix K**). The report includes:

- Determination of noise limits in accordance with the Noise Protocol EPA Publication 1826.4.

- Modelling of noise levels at potentially affected residential locations resulting from the quarry including the proposed extraction area extension, using a three-dimensional noise modelling software package.
- Consideration of modelled noise levels in terms of noise limits and other guidance under the Environment Protection Act 2017.
- Determination of required noise control measures, if necessary, to achieve compliance with relevant noise criteria at noise sensitive locations.

The EPA time periods are:

- Day Monday to Saturday 7:00 am to 6:00 pm
- Evening: Monday to Saturday 6:pm to 10:00 pm, Sunday and public holidays 7:00 am to 10:00 pm
- Night: All days 10:00 pm to 7:00 am

The receptors are zoned GWZ1, which dictates the required levels are 46, 41 and 36 dB(A) for the day, evening and night periods respectively, subject to adjustments.

It was concluded that implementation of appropriate strategies and noise controls can allow operation of the quarry with the proposed new extraction area to proceed in compliance with the Noise Protocol noise limits. Consideration has also been given to additional measures that could reduce noise emission so far as reasonably practicable, consistent with the General Environmental Duty under the Act.

The report concludes that it would be reasonable for the processing plant to continue as it has been operating, with the possibility of considering engineering and administrative controls should disturbance associated with low frequency noise arise in future. These controls include:

- Limiting extraction between 6am and 7am to areas where an excavator can operate at a level nominally 6 m below the natural surface level (or 3 m below natural surface with a 3 m noise bund).
- Installing a noise bund along the western side of the haul route to the western extraction areas, extending from the entry point of the existing and now depleted southwestern pit to just south of the ephemeral watercourse that crosses the site through the proposed new extraction area.
- All mobile equipment operating at the site should be fitted with broadband reverse alarms, which vary their noise output according to the ambient noise level. These reversing alarms should be selected for the lowest noise level consistent with safe operation.
- If necessary, not operating the process plant between 6am and 7am.
- If necessary, not operating the process plant after 8 pm if there are westerly breezes.

Increasing the height of bunds along the eastern and western boundaries from 2-3m to 4m height, subject to available space, would further attenuate noise. However, it is understood that previous proposals for bunds of this height have not been able to obtain planning consent, and this could require removal of mature trees in certain areas.

4.3 GROUNDWATER

Water management is discussed in **Section 3.8** and a hydrogeological assessment provided as **Appendix E**. Groundwater modelling suggests that the impact to neighbouring groundwater bores would be acceptable even with dewatering to -9 mAHD. However, the volumes to be extracted would be difficult to manage, require a large increase in the extraction licence, for which it may be difficult to obtain a sufficient allocation. For this reason, it was decided to dry excavate only to 9 mAHD (the current depth limit) and recover material from 9 mAHD to -9 mAHD by dredging.

A water balance was conducted (**Appendix E**) based on extraction by excavator to nominally 9 mAHD, and by dredging to -9 mAHD. It was concluded that no additional groundwater extraction allocations will be needed and that there is ample storage onsite such that offsite disposal will not be required.

On the above basis, impacts to groundwater are considered acceptable. The recommendations of the report will be implemented.

4.4 SURFACE WATER

Previous site development included the relocation of an existing drain to facilitate extraction of the current Eastern Pit. This Work Plan Variation includes relocation of the remaining surface water drain to the northern boundary of the site. It is proposed to firstly extract the sand to the north then place a clay buttress in the void upon which the new drainage line will be constructed. This is discussed in detail in the Surface Water Management Plan (**Appendix D**). Modelling within the Surface Water Management Plan was conducted in consultation with Melbourne Water, and a concept design for the proposed channel has been provided.

The proposed development does not require discharge of extracted groundwater to surface water. A buffer of 20m from waterways will be maintained.

Specific design requirements requested by Melbourne Water include:

- The proposed waterway corridor remain under natural conditions
- Works be undertaken under low flow conditions
- Provision of maintenance access to waterway
- Inclusion of a landscape concept plan
- Waterway have similar width to the corridor for Reach A (existing engineered drainage on eastern side of site beside the East Pit)
- Information regarding the long term rehabilitation of the site be included

The report contained in **Appendix D** responds to these comments and the document is currently with Melbourne Water.

The controls to be implemented are listed in the Erosion and Sedimentation Risk Treatment Plan and the Stormwater Risk Treatment Plan in **Part 3 Risk Assessment**.

4.5 FLORA AND FAUNA

The flora and fauna assessment for the proposed extension is contained in **Appendix F.**

Thirty flora species (13 native and 17 non-native) were recorded within the study area during the field assessment. Significant flora species were considered unlikely to occur because of the highly modified nature of the study area, historical and ongoing land-uses, landscape context and the absence of suitable habitat and high levels of disturbance. Vegetation within the study area did not meet the condition thresholds that define any significant ecological communities.

No significant fauna species are considered likely to occur within the study area, due to the lack of suitable habitat features (e.g. wetlands, structurally diverse vegetation, hollow bearing trees), and modified state of the study area through previous removal of vegetation for agricultural use and construction of two large water retention basins (no longer present).

The offset requirement for native vegetation removal is 0.015 General Habitat Units (HUs) and one Large Tree.

Referral under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* is not required. The study area occurs within private property, therefore a permit under the Flora and Fauna Guarantee Act 1988 is not required.

4.6 WEEDS AND VERMIN

The active areas of the site are currently unvegetated. Vegetated areas include:

- Rehabilitated quarry areas south of the processing plant
- Perimeter screening vegetation on bunds
- Vegetation (predominantly grasses) on unquarried areas north of the approved extraction areas and along the engineered waterway
- Self-sown and planted vegetation in the north eastern corner of the site.

Weed seeds are windborne from offsite, weeds may also be introduced from vehicle wheels. There is a quarterly noxious weed inspection and control program in place.

Vermin are drawn by food and refuge. The only food sources for vermin will be from lunchroom waste which will stored in vermin proof bins between collections. If vermin numbers increase to an unacceptable level then an eradication program will be undertaken on a campaign basis.

4.6.1 Herbicide use

The majority of the site drains to the pit and under the proposed change very little water will drain to the waterways. Vegetation in areas which do drain to the creek will be managed predominantly by mechanical means (eg slashing). Very small volumes of herbicide will be required and will be used in accordance with relevant usage instructions so little would ultimately find its way to the waterway.

4.7 CULTURAL HERITAGE

There is an existing cultural heritage protected area within the proposed extraction area (VAHR 8021-0374). This will be relocated prior to the commencement of extraction in this area. BLCAC have requested the location of the new protected area be identified only once other approvals are in place. The preferred location is in the north western corner of the site on the northern side of the relocated waterway.

The following management conditions are extracted from the CHMP in **Appendix G.** Further explanation for each condition is provided in pages 1-9 of the CHMP.

4.7.1 General Cultural Heritage Management Conditions

- Condition 1: Adherence to the Cultural Heritage Management Plan (CHMP) Before, During and After the Activity
- Condition 2: Cultural Heritage Induction to be Undertaken Before the Activity
- Condition 3: Protocol for Handling Sensitive Information Before, During and After the Activity
- Condition 4: Site Inspections
- Condition 5: Development of an Interpretive Strategy
- Condition 6: No High Impact Activities Permitted in Conservation Area
- Condition 7: Contingency Plans

4.7.2 Specific Cultural Heritage Management Conditions

- Condition 8: Relocation of Object Collections VAHR 8021-0369-2; VAHR 8021-0370-2; VAHR 8021-0371-2; VAHR 8021-0372-2; VAHR 8021-0373-2; VAHR 8021-0374-2
- Condition 9: Partial Salvage of VAHR 8021-0374
  - Condition 9.1: Mechanical Salvage Program Methodology
  - Condition 9.2: Manual Salvage Program Methodology
- Condition 10: Preparation of Salvage Report for VAHR 8021-0374
- Condition 11: Variations to the Salvage Methodology & Other Management Conditions
- Condition 12: Custody and Management of Artefacts from VAHR 8021-0374 and Object Collections VAHR 8021-0369-2; VAHR 8021-0370-2; VAHR 8021-0371-2; VAHR 8021-0372-2; VAHR 8021-0373-2; VAHR 8021-0374-2

4.8 FIRE

The site is in a rural area, surrounding land use is described in **Section 2.3**. The site to the north is an irrigated market garden, but there is potential for fires originating on properties to the east south and west. The most likely source of fires offsite is from sparks/cigarettes thrown from vehicles on public roadways.

Potential ignition sources onsite include equipment and vehicles. Under the proposed extension the risk of fire starting onsite will be reduced. Much of the WA area is devoid of vegetation and dams contain water which could be used for fire fighting should the need arise, noting the site water truck is fitted with a water cannon. Under the extension proposed under this WPV much of the currently vegetated area will be quarried further increasing the area that will not sustain fire.

In the post closure scenario there will be a large waterbody that will occupy most of the site. The largest area of vegetation will be the rehabilitated filtercake storage dams on the southern and southeastern boundary – well away from the roadways.

4.9 EROSION AND SEDIMENTATION

The site contains an existing waterway which flows from south-east to north-west across the site. The waterway was previously relocated to a new engineered waterway on the eastern boundary of the site to facilitate extraction in the East Pit. As part of this application it is proposed to relocate the northern part of the waterway to extracted and filled land along the northern boundary of the Site (refer to **Appendix D**). The catchment area of the waterway excludes the pits which will have a perimeter bund which will function to prevent inflows to the pit and prevent flows from dams entering the waterway.

Pit batters are regularly inspected, and signs of erosion are promptly addressed on the pit batters. The outer pit batters are also lined with at least 20m of clay which protects the batters from erosion. Further control measures are listed in **Part 3 Risk Assessment**.

As required by Melbourne Water (**Appendix M)** construction works will be undertaken during periods of low flow to minimise sediment in stormwater during the construction stage. A geomorphological study was undertaken as part of the conceptual design to ensure the landform performs as closely as possible to a natural stream in this catchment.

4.10 GREENHOUSE GAS

A greenhouse gas (GHG) assessment has been conducted for on-going operations (**Appendix L**). The GHG assessment makes the following assumptions:

- Production of sand at a rate of 400,000 tonnes per annum. The expected life of the pit is expected to be approximately 15 years, but for the purpose of this assessment a conservative pit life of 30 years has been assumed (i.e. until 2052).
- Mobile plant will continue to use diesel as a fuel for the life of the facility (no electrification)
- The dredge will replace two excavators, three articulated dumpers and one front end loader
  - One excavator and one articulated dumper are still required to manage site stability (e.g. clay placement on batters, managing site roads)
  - Two front end loaders are required to handle processed product
- Decarbonisation of the grid will happen according to a high emissions reduction scenario (80% by 2050)
- Emissions due to transport of material from the site were considered out of scope

The two main sources of GHG emissions were diesel usage in mobile plant, and electricity consumption primarily for processing plant operation but including ancillary uses such as office facilities.

The emissions sources outlined above have been assessed. Diesel and electricity usage figures obtained from the site were converted to emissions using the *National Greenhouse Accounts Factors*[1], specifically Table 4 (Diesel Oil) and Table 46 (latest estimate Full Cycle Emission Factor for electricity in Victoria).

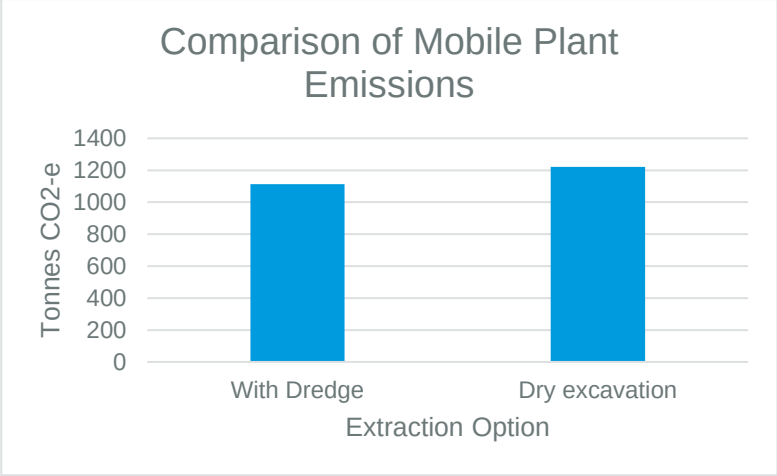
The two main sources of GHG emissions were diesel usage in mobile plant, and electricity consumption primarily for processing plant operation but including ancillary uses such as office facilities.

4.10.1 GHG from mobile plant

The use of a dredge to extract material from the pit decreases emissions slightly compared to the current dry excavation method. A comparison of emissions from mobile plant in different scenarios is presented in **Figure 4-1** below.

[1] National Greenhouse Accounts Factors: 2022 - DCCEEW

Figure 4-1 Mobile Plant Scenarios



The dredge excavation option will be the primary method at the site in future due to the depth of excavation required and has been assumed in this assessment. Overall, GHG emissions from mobile plant are forecast to remain consistent during the site's lifespan at about 1,114t CO_2-e per annum.

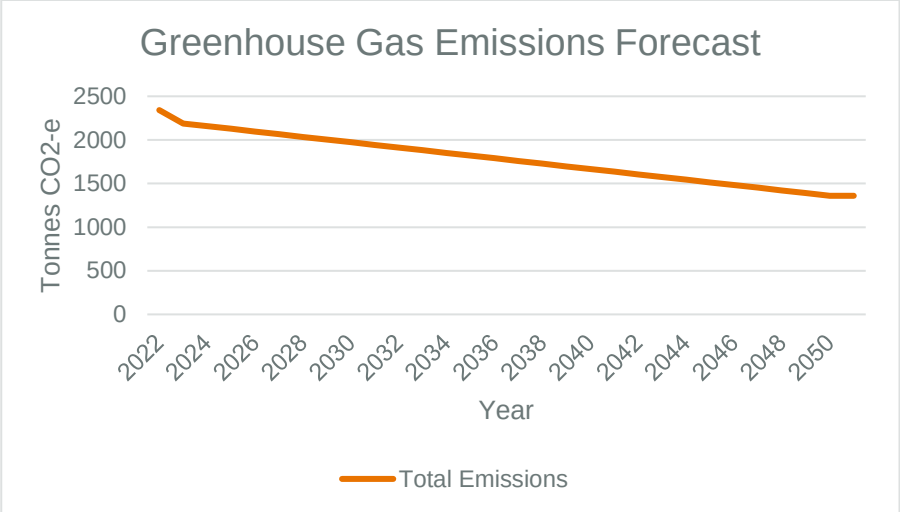
4.10.2 GHG emissions from to electricity use

Electricity use is assumed to remain constant at the 2021 rate of 1,227,665 kWh per annum. However, greenhouse gas emissions per kWh are forecast to fall due to decarbonisation of the electricity grid. Therefore, in 2022, electricity was forecast to generate approximately 1,225t CO2-e while in 2052, emissions from electricity usage drop to only 245t CO2-e.

4.10.3 Overall GHG assessment

The emissions (from mobile plant and electricity usage) are presented in **Figure 4-2** below. The forecast shows the effect of decarbonisation of the electricity grid, while mobile plant usage is forecast to remain consistent, with an assumed production of 400,000tpa of material until 2052. Overall, greenhouse gas production is forecast to fall from 2,341t CO_2-e in 2022 to 1,359t CO_2-e in 2052.

Figure 4-2 Emissions forecast



4.11 CLIMATE CHANGE

The *Guidelines for Assessing the Impact of Climate Change on Water Availability in Victoria* (DELWP, Nov 2020) provide detailed local predictions for the years 2040 and 2065 for temperature, potential evapotranspiration, rainfall, runoff and groundwater recharge, for each river basin in Victoria.

This data is provided for two Representative Concentration Pathways (RCPs) incorporating different scenarios of greenhouse gas emissions and concentrations over time. This report has assumed the mid-point projection of the highest climate change scenario (RCP8.5) to provide a conservative estimate of impacts. Expected changes, relative to a 1995 baseline in the relevant catchment (Bunyip River basin), are presented in **Table 4-1** below.

Table 4-1 Local Catchment Climate Change Impacts

Aspect	Change	
	2040	2065
Average Annual Temperature	+1.2ºC	+2.1ºC
Potential evapotranspiration	+4.3%	+7.3%
Annual Streamflow	-13.7%	-19.1%

Annual total rainfall is not an appropriate measure of water management challenges at a local scale, and the changes in seasonality of rainfall predicted in the guidelines are less relevant than the runoff assessment presented in **Section 4.11.2** below.

Groundwater recharge is also not a suitable metric for this assessment as groundwater is being actively managed and extracted at this site, changing the local conditions such that general aquifer recharge rates are not relevant.

The key changes induced by climate change that will impact the operation of Yannathan Quarry are:

- Longer fire seasons – 60% more high fire danger days
- More intense downpours
- Increased evapotranspiration

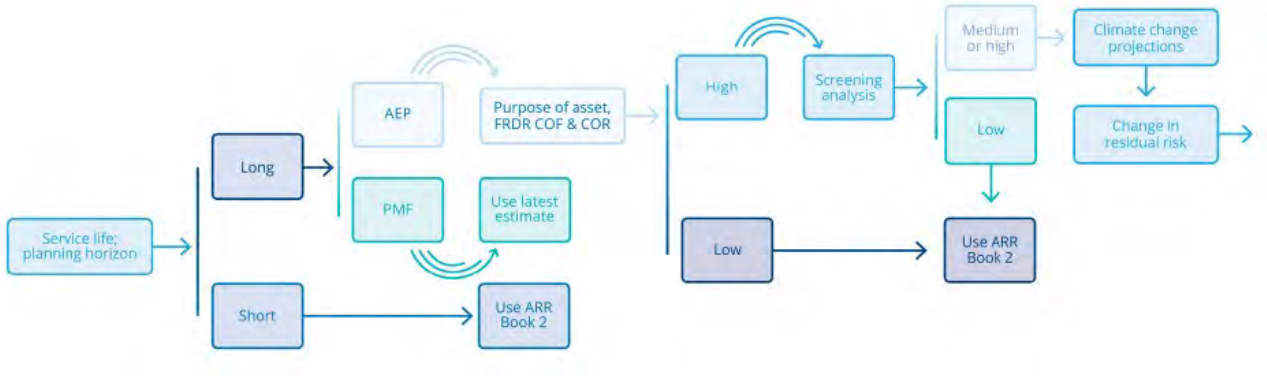
4.11.1 Longer fire seasons

The potential increased number of high fire danger days will pose an increased risk of fires affecting the site's operations and of grass fires on the site's buffer, rehabilitated and undeveloped areas. Fires in the area may cause interruptions to the site's operations and fire damage to plant and equipment, which would be expected to occur at a higher frequency under a future climate scenario. This change does not change the actions required to address the risk as these remain similar regardless of the frequency.

4.11.2 More intense downpours

An assessment of the impacts of climate change on the volume and intensity of runoff was undertaken using the methodology in Chapter 6 of Australian Rainfall and Runoff: A guide to Flood Estimation (Ball, et al., 2019) (known as the ARR). The methodology is outlined in **Figure 4-3** below.

Figure 4-3 Climate Change Risk Assessment Methodology



Source: Figure 1.6.2, Chapter 6, Australian Rainfall and Runoff: A guide to Flood Estimation

A service life assumption for the facility of 30 years was adopted based on the expected reserves available at the site and the proposed rate of extraction. This is defined as a long horizon in the ARR, finishing in 2052.

The applicable design standard is assumed to be the Annual Exceedance Probability (AEP), as the site is not flood prone (being outside the Land Subject to Inundation Overlay which is to the north of the site) and the key design issue is management of runoff into the pit rather than flooding risk.

Therefore the facility was assessed for its Consequence of Failure (COF). The COF is assessed according to the following descriptions.

- *Low consequence* - some probability that asset performance will be impacted but the delivery of services will be only partially or temporarily compromised, or alternative sources of services (e.g. availability of different power sources) are readily available.
- *Medium consequence* - moderate to large probability that performance of important but non-critical assets and delivery of services will be impacted or fail for a short period of time.
- *High consequence* - moderate to large probability that performance will be impacted or fail, leading to disruption to delivery of essential services (where alternative sources of services are not readily available). This category generally relates to high value assets, or assets of significant economic or welfare importance.

It is assessed that the COF is Low. The system is capable of managing the water generated by single rainfall events through storage located in the pit and asset performance is unlikely to be more than partially or temporarily compromised by the presence of additional surface water. It is therefore suggested that no allowance for climate change-related rainfall increases is required, and an assessment of the Cost of Retrofitting (COR) is not relevant.

4.11.3 Increased evapotranspiration

The increase in evapotranspiration will assist the site's water balance by improving the rainfall / evapotranspiration balance and reducing the need to manage and discharge water to surface water receptors.

4.11.4 Summary

Yannathan Quarry will be impacted by climate change in three key areas:

1. Increased fire danger
    - It is suggested that fire management measures continue to be adopted at the site
2. Increased intensity of rainfall events

- No additional management measures are suggested due to the low consequence of failure and built in buffering in the system.

3. Increased evapotranspiration
    - This change will assist in managing the water balance at the site, minimising the requirement to discharge water to surface water bodies.

4.12 SUMMARY ENVIRONMENTAL ASPECTS

In summary, traffic impacts associated with this Work Plan Variation are not expected to change from current operations. Detailed studies have been conducted to consider impacts to dust generation, noise, groundwater, surface water, greenhouse gases and climate change. These studies suggest that environmental aspects can be managed to meet Hanson's General Environmental Duty under the Environment Protection Act 2017.

5. SUPPORTING PLANS

5.1 RISK MANAGEMENT PLAN

A Risk Management Plan (RMP) has been prepared by Ricardo for the proposed quarry extension. The RMP has been prepared in accordance with ERR's guideline document *Preparation of Work Plans and Work Plan Variations.* The process is summarised in **Figure 5-1**.

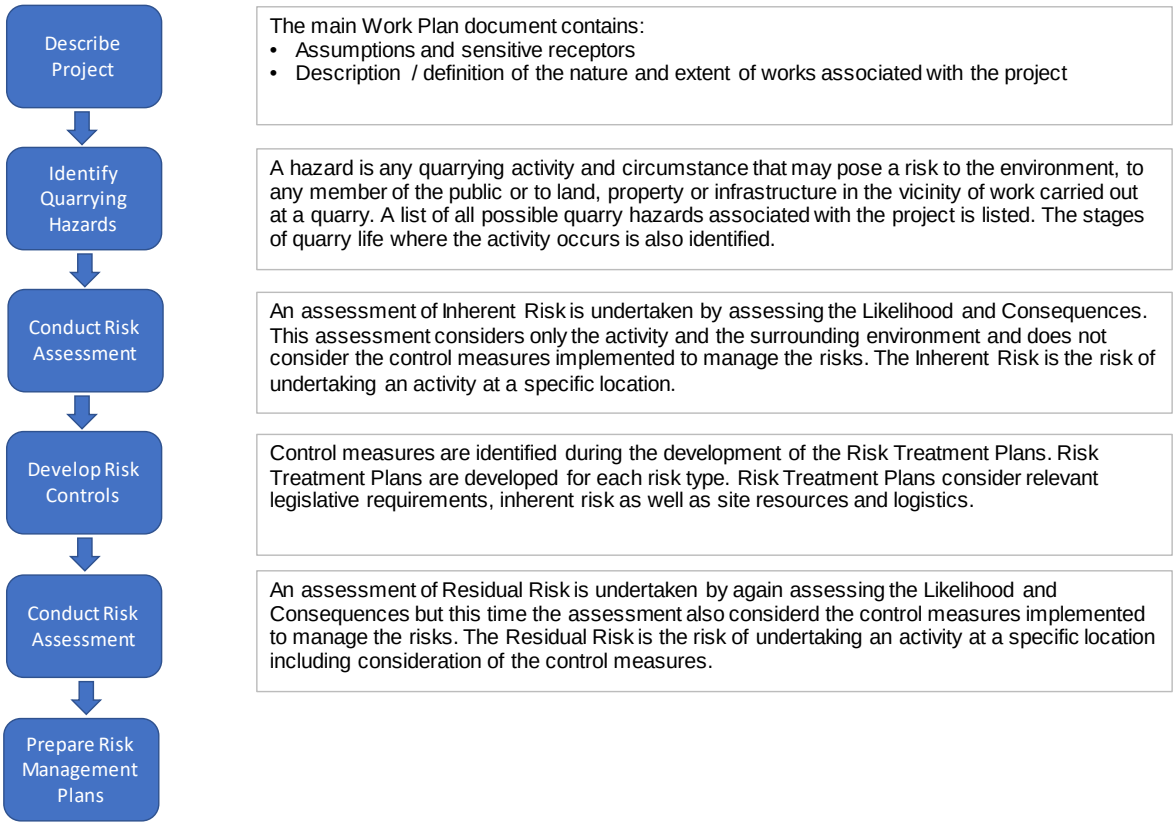


Figure 5-1 Risk Management Process

Individual Risk Management Plans were prepared for the following aspects:

- Dust
- Silt dust and clay on roads
- Erosion and sedimentation
- Fire
- Fuel, lubricants and hazardous materials
- Imported materials
- Noise
- Pests weeds and diseases
- Rubbish
- Site Access
- Stormwater
- Geotechnical
- Other

The Risk report is contained in **Part 3 Risk Assessment**. Further to implementation of controls identified in the Risk Management Plans, residual risks were all rated low or medium.

Roles and responsibilities for implementation of the risk management plan are provided in **Table 5-1**.

Table 5-1 Roles and Responsibilities, Risk Management

Position	Responsibility
Quarry Manager	The Quarry Manager reports to the regional Supply Chain Manager, Aggregates and has overall accountability for: quarry operations and budgets; compliance with regulatory requirements (including implementation of the Risk Management Plan); staff training; and community and regulator engagement. Specific responsibilities include: • Ensure the requirements of the Risk Management Plan are fulfilled, including: • Oversight of operations. • Review of compliance data. • Staff training. • Compliance with operational procedures. • Program initiation and signoff (e.g. monitoring). • Response to Regulatory and Community Stakeholders as required. • Financial responsibility to ensure budgetary resources are available when needed to complete works.
Quarry Supervisor	The Quarry Supervisor reports to the Quarry Manager and is responsible for day to day organisation and running of the quarry operation. This includes control of: all personnel on-site (including employees, contractors, suppliers, visitors etc); stripping and extraction operations; and fixed and mobile plant operation and maintenance. Specific responsibilities include: • Scheduling and managing compliance tasks with staff. • Site inspections and documentation of issues and corrective actions. • Coordination of works. • Procurement of materials/plants as needed. • Compliance reporting.
Site Staff	All site staff have responsibility to implement the Risk Management Plan and report areas of non-compliance: • Undertake works as directed by Quarry Manager or Supervisor. • Report areas of non-compliance if observed.

5.2 COMMUNITY ENGAGEMENT

A Community Engagement Plan (CEP) has been prepared by LH Strategic Communications (2022) which documents historic engagement, identifies the key stakeholders and presents the engagement plan for ongoing liaison with the local community.

The purpose of the CEP is to:

- Identify stakeholders, including values, concerns, attitudes and expectations
- Detail the stakeholder consultation undertaken to date, including engagement goals, timeline, activity, and feedback received
- Develop a framework that seeks and encourages stakeholder input

- Develop a process that actively and effectively responds to stakeholder feedback, including outcome reporting
- Implement an engagement process that is open, honest, inclusive, responsive and accountable
- Ensure that community and stakeholder feedback is addressed and documented
- Identify a strategy to maintain engagement with the community and stakeholders following approval. The following stakeholders were identified

Hanson has placed great importance on addressing community and environmental issues over the operating life of the quarry.

The Yannathan Quarry Manager has regularly met with various local residents and government stakeholders to consult and identify any community and environmental issues associated with the quarry's past development and current operational activities.

During the life of the existing quarry, the Quarry Manager has been proactive in his engagement with the local community by responding immediately to any direct engagement. He has always been available to discuss issues of concern or potential impacts to the local area. Regular engagement is conducted with the market garden farmer to the north-west of the site, the kennels and cattery to the east, and the poultry farmers to the west. All concerns or issues raised during these engagements have been resolved promptly and collaboratively. To date, there have been no documented complaints against the quarry.

The following stakeholders were identified:

- Minister for Resources
- Member for Bass
- Earth Resources Regulation
- Department of Energy Environment and Climate Action
- EPA Victoria
- Cardinia Shire Council
- Councillor for Western Port Ward, Cardinia Shire Council
- First Peoples – State Relations
- Heritage Victoria
- Southern Rural Water
- Melbourne Water
- WorkSafe Victoria
- Country Fire Authority, South East Region District 8
- Facility neighbours Including: Tanderry Farm (poultry farm); Yannathan Park Boarding Kennels; Lang Lang Holdings; and Residents of Milners Road
- Local community

Key methods and tools for informing and consulting the community and stakeholders include:

- Email / letter distribution to stakeholders registered on the Yannathan Quarry CCD
- Personalised email / letter in response to specific query or request for information
- Fact Sheets.

Key methods and tools for involving and collaborating with the community and stakeholders include:

- Personal one-on-one visits
- Open house community information sessions, pop up displays in community hub locations or site tours, if required.

The CEP also documents the complaints management process, evaluation requirements and feedback mechanisms. The CEP is contained in **Part 4 Community Engagement Plan**.

5.3 REHABILITATION PLAN

A rehabilitation plan is provided as Part 5 of this WPV application. The Rehabilitation Plan was compiled with reference to the "*Regulatory Practice Strategy for the Rehabilitation of Earth Resources Sites*" (ERR 2020) and "*Preparation of Rehabilitation Plans Guideline for Extractive Industry Projects*" (ERR 2021).

5.3.1 Proposed land uses

The previous work plan proposed an agricultural end use for the site. However, the area of land available for this use on completion of extraction proposed in this Work Plan Variation will be significantly less than for the previous application. In addition, Melbourne Water requires the waterway to be fenced, further reducing the area available for agricultural purposes. So, whilst an agricultural end use may technically be possible and would also compliment the surrounding land uses, it may be limited under this application.

Therefore, with lakes occupying a large portion of the footprint, the best end use for the Site is considered to be for conservation. This is suitable within the green wedge zone and complementary to the surrounding land uses.

The large waterbodies within the rehabilitated site can also serve as an emergency water supply for firefighting when needed, or be utilised for projects such as floating solar farms.

5.3.2 Rehabilitated landform

The rehabilitated landform is shown in **Figure 3-4**. The rehabilitated landform has considered geotechnical requirements for rehabilitated slopes as detailed in **Section 3.6**, in order to achieve a safe, stable and sustainable landform that is able to support the proposed conservation end-use.

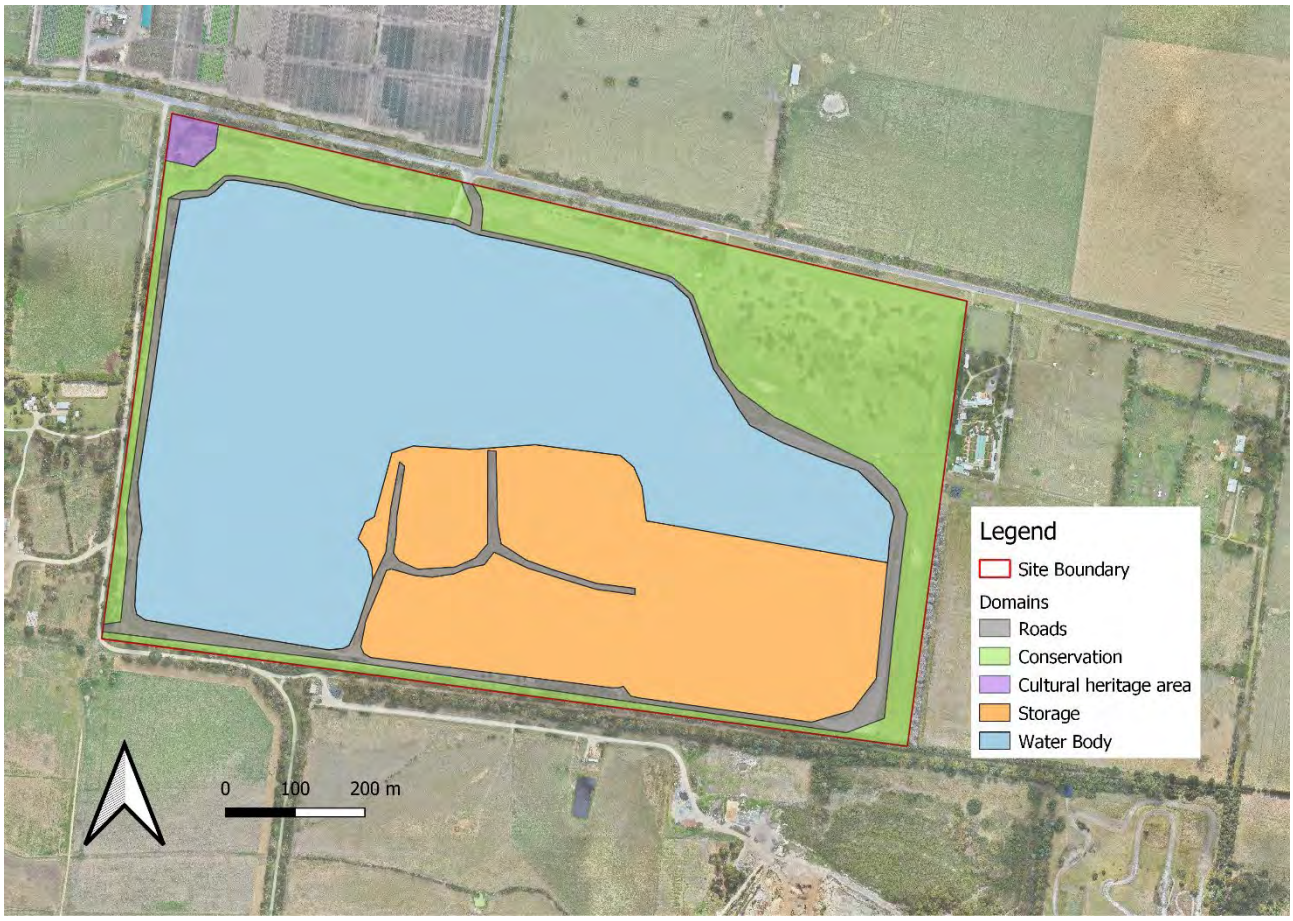
It is noted that the excavated pits are expected to fill with water to the pre-development level of approximately 24mAHD, forming a lake over a large proportion of the site as shown in the rehabilitation concept in **Figure 5-2**.

Figure 5-2 Rehabilitation Concept

5.3.3 Rehabilitation domains

The nominated rehabilitation domains are shown in **Figure 5-3**.

Figure 5-3 Rehabilitation Domains



The rehabilitation plan defines or each domain: rehabilitation objectives; rehabilitation criteria; and rehabilitation milestones.

5.3.4 Risk Assessment for rehabilitated land

Post-rehabilitation risks are considered in the Rehabilitation Plan. Residual risks further to implementation of control measures are low for all identified rehabilitation hazards.

5.4 REGULATORY ENGAGEMENT

The Initial Information package was submitted to ERR in 2020 at the start of the pandemic. At this time onsite meetings were not possible so ERR provided a list of agencies for liaison prior to submission in lieu of a formal initial site meeting.

In parallel with this application Ricardo and Hanson had been negotiating with Council for the extension of operating hours for the processing plant. As the hours are currently a permit condition it was agreed that a Work Plan Variation from ERR was needed before Council could amend the planning permit. Council was however willing to approve the hours extension on a temporary basis under secondary consent while the WPV was sought. To this end an initial site meeting was undertaken via Microsoft Teams in October 2021. This meeting was attended by the following agencies:

- ERR
- EPA
- Council

Throughout the preparation of this application the project team has consulted agencies as follows:

5.4.1 Southern Rural Water

An initial meeting was held to identify the issues that needed to be addressed in this application. The key issues were:

- Potential for increased drawdown at neighbouring bores
- Ability to obtain an extraction licence (and EPA discharge licence)

Discussions were held with the market garden to the north who were at that time seeking a SRW licence, the potential for them to receive extracted water (subject to appropriate licences) was discussed but the owner ultimately declined the offer.

The hydrogeological report in this application has been submitted for review by SRW The letter from SRW documenting their requirements is contained in **Appendix M**.

Response to their feedback is as follows:

Table 5-2 Responses to SRW comments 7 Oct 2022

Comment	Hanson Response
We note that the expansion proposal is now for dredging and you have indicated that the volumes of product removed, and the associated groundwater, will remain within the existing licence volume of 19.8ML/year. Based on this information no increase in groundwater licence is necessary. In order to evidence this, please can you confirm in writing the current and projected annual product volumes, and the calculation of water taken. Please can you also confirm any other proposed consumptive uses of groundwater, e.g. dust suppression, vehicle washing or irrigation, and if these are proposed, whether they fit within the licence limit.	Water is drawn from the ponds which also receive incident rainfall. The percentage of total inflow that is derived from rainfall varies from 30 to 100% averaging 50% over the life of the operation (assuming average rainfall). The water balance in the hydrogeological study assumed water use for dust suppression of 27 m^3/day for 25 days per month from December to March inclusive, which equates to 2.7ML which based on 50% from rainfall would be 1.35ML/a on average that is derived from groundwater. The moisture content of sand sold is typically 3-7% by weight. The anticipated tonnage is 400,000 tonnes/year so the mass of the water sold with product is 28,000 tonnes. 1 ML of water weighs 1000 tonnes so this equates to 28ML of which 50% is groundwater. There is no irrigation and vehicle/plant washdowns are minimal. It is therefore considered that the consumption of groundwater will remain within the existing licence. Overall, groundwater use is expected to be within the groundwater extraction licence limits. The Hydrogeological Report has been updated to note the above (Section 5.1.6).
I note from your report and the discussion on the 4th October that there are no farm dams on the property that will be impacted and that the existing drainage line will be diverted around the quarry extension. Based on this information there are no surface water licensing implications from a SRW perspective.	It is confirmed there are no farm dams onsite. The conceptual design of the diversion of the existing drainage line around the northern perimeter of the excavation is currently resting with Melbourne Water.
SRW recommends that the existing groundwater monitoring network is reviewed and expanded to ensure that the upper shallow aquifer and the lower shallow aquifer are both monitored around the perimeter of the proposed quarry property. This is particularly important	When the extension is approved additional monitoring bores will be installed into the lower shallow aquifer and will be incorporated into the monitoring network. The proposed monitoring program is contained in the Risk Management Plan.

Comment	Hanson Response
given the number of stock and domestic and licensed bores in the vicinity. Groundwater level data should be collated annually and reports made available to the relevant authorities.	
SRW recommends that the proponent undertakes a risk assessment of the proposed quarrying activities in respect of potential water quality changes that may occur, including but not limited to chemicals on site, chemicals used in the processing of aggregates, and the disturbance caused by the dredging activity.	Groundwater related risks are included in the revised Hydrogeological Review. Since the initial risk assessment was prepared, in response to this query an investigation was undertaken regarding the potential issues related to the use of coagulants and flocculants. No coagulant or flocculant impacts were identified in groundwater bore samples nor in the water in ponds where the filter cake is placed. This report is included as an appendix to the Hydrogeological Review.
The groundwater quality data in the report indicates that the groundwater ph at the western end of the site (ph 4 – 5). is lower than the background (ph 6 – 7). SRW suggests that the cause of the low ph is identified and this issue is included in the risk assessment. Is there any risk of quarrying increasing the groundwater acidity and will this impact offsite?	Two bores monitor the groundwater quality on the up-hydraulic gradient side of the site (LL8 and LL9) which reported pH values of 4.5 and 4.21 pH units respectively. While regionally the pH of background groundwater may be higher at this site the background pH varies between 4-6 pH units. The pH of groundwater from the ponds is comparable.
A suitable water quality monitoring plan, with triggers and actions should be developed to ensure no unacceptable offsite impacts. Groundwater quality data should be collated annually and reports made available to the relevant authorities	A copy of the groundwater monitoring program is contained in **Part 3 Risk Management Plan.**

An email was received from SRW on 8th August 2023 with further requested amendments, the response is as follows:

Table 5-3 SRW response 21 December 2023

Item	SRW Comment -Email Dated 8 Aug 2023	Ricardo Response - Report V5
1	**Water balance and groundwater licence allocation** Overall, it appears that the current groundwater licence allocation is sufficient for the proposed quarry expansion and deepening, based on the reported water balance. However there is still some detail in the water balance calculation that is unclear/not provided. Please can you provide the inputs and calculations used to produce the water balance estimates (Section 5 and Appendix E), including: • the spreadsheet used to produce the outputs for Appendix E • details of the input values used to produce the estimated rainfall and evaporation volumes - including the pond areas used in those calculations It should also be noted that SRW is currently in discussion with DEECA regarding groundwater licensing of quarries in terms of inflows, losses, use and return waters. The findings and recommendations of those discussions may change how licensable volumes are determined in the future.	Spreadsheet will be included in the package to be sent to SRW. It is to be noted that this is for one possible quarrying scenario and that deposit variability and market demand may vary the quarrying sequence.

Item	SRW Comment -Email Dated 8 Aug 2023	Ricardo Response - Report V5
2	**Groundwater monitoring network** SRW agrees with the recommendation in the Yannathan Hydrogeological Assessment (Section 7 Conclusions and Recommendations) to install a total of 3 additional monitoring wells into the lower shallow aquifer: near LL8 , near LL13 and near LL19 to monitor potential effects of dredging the deeper aquifer. It is understood that these additional bores will be added to the monitoring program. SRW also notes that it is intended to install the additional monitoring bores following approval of the proposed extension. It is recommended that they be installed as soon as practicable to allow the collection of 'baseline data' prior to dredging of the deeper aquifer. Please note that Attachment A provided with the letter regarding SRW feedback (Ricardo, May 4 5 2023) states only 2 additional monitoring bores are proposed. This should be amended to be consistent with the three additional bores recommended in the hydro report.	An additional monitoring bore added to plan which is included in the monitoring program contained in the risk assessment (and attached to this doc). Two additional bores on the northern site boundary have also been added in response to recommendations from the geotechnical study. So the number of additional monitoring bores is five. If the application is not approved the additional bores would be an unnecessary additional expense for Hanson. For this reason the additional bores will be installed upon approval of the WPV. The existing monitoring network will continue to provide the pre-development baseline data.
3	**Water levels, water quality and groundwater monitoring program** It is noted that numerical modelling has predicted that quarry activities will create drawdowns that will affect a number of existing, off-site, consumptive use bores. Modelled drawdowns are up to 10m in two bores and upwards of 5 m in several other bores. The significance of the predicted drawdown magnitudes on bore users and their available drawdown is unclear. It is also noted that the cause of the low pH groundwater at the Site, and potential impacts to the groundwater resource, remains somewhat unclear to SRW. Given the modelled drawdown impacts and uncertainty regarding the low pH groundwater, SRW recommends that the groundwater monitoring program defines appropriate monitoring, triggers, actions and contingency measures to effectively mitigate potential groundwater level and quality impacts. An annual report should be provided for review by relevant Regulators; including the Environment Protection Authority and SRW.	The modelling was undertaken to evaluate implications of extraction of sand using dry quarrying practices beneath the organic layer. As a result of the modelling it was decided to move to wet extraction (ie dredging) below the organic sand layer. This message has evidently not come through clearly in the report, so for the avoidance of confusion the model has been removed from the Hydrogeological Assessment. The discussion regarding the modelling has also been reduced. It is therefore concluded that the impacts of quarrying wet below the organic layer are expected to be similar to current dry excavation operations. Local groundwater inflow is directed towards the pits. Monitoring data indicates the pH of water in the pits is comparable to the pH of groundwater in the surrounding monitoring bores. Given that groundwater flows towards the pits the low pH is background not related to quarry activities.
4	**Post closure** Can you also confirm the open water final landform and the predicted long term net losses due to evaporation.	The final landform may vary depending on the sand content of the extracted material and the volumes of filtercake produced. There is some flexibility in the rehabilitation concept so the numbers provided should be considered indicative only. A new section has been added addressing the post-closure water balance.

5.4.2 Melbourne Water

Melbourne Water is the agency responsible for oversight of the surface water management. Their requirements are guided by the Healthy Waterways Strategy which seeks to re-establish drainage as close to pre-development drainage as possible.

Two draft reports have been submitted and reviewed by Melbourne Water with a third draft now under their review. The most recent correspondence from Melbourne Water is contained in **Appendix M** (please note the cited Plan Reference provided by Melbourne Water is incorrect).

Key points from Melbourne Water's comments include:

- Greater detail regarding the staging to ensure floodwaters do not enter the pit
- Further information regarding the rehabilitated landform
- Assurance from geotechnical consultants regarding the stability of the filled land
- Assessment of the area of the local catchment and model outputs of Melbourne Water's model
- Actions in the event of flooding
- Inclusion of a geomorphic study

5.4.3 EPA

5.4.3.1 Dust

EPA representatives have been consulted through the dust modelling process. The EPA dust guideline is still a relatively new document and a greater level of engagement is now required. EPA has provided guidance on the selection of meteorological input data for the modelling and have provided advice in relation to EPA's new expectations for dust monitoring which Hanson is currently exploring. The dust study was prepared by Edge Group. Representatives from Hanson, Edge Group and Ricardo met with EPA on 2nd August 2022 to agree the datasets to be used for the dust modelling and to identify other EPA requirements.

5.4.3.2 Noise

In recent years the hours of operation have been subject to a rolling Council approval. In an endeavour to formalise this a Work Plan Variation was required by ERR. An initial site meeting for this was held on 28 October 2021 which was attended by a representative from EPA's Southern metro region. EPA required the application to refer to the Environment Reference Standard. There were also discussions regarding impact of existing operations on neighbours (no complaints) and the existing noise controls implemented.

Since this time additional guidelines have been released by EPA and the noise report contained in **Appendix** K follows the current EPA procedures outlined therein.

5.4.4 Bunurong Land Council Aboriginal Corporation

A Cultural Heritage Management Plan has been prepared for this application, with meetings with Bunurong staff as required by this process at the following project milestones:

- Project initiation
- Completion of Desktop Review
- Completion of the Standard Assessment
- Completion of the Complex Assessment
- Agreement of management conditions

The CHMP has been approved by BLCAC.

The desktop assessment concluded that there is potential for Aboriginal cultural heritage to be present in the activity area due to the presence of the inland dune formation (Qd1) and the presence of a previously registered site within the activity area.

The standard assessment concluded that a complex assessment was needed to more fully understand the archaeological potential of the low-lying paddocks within the activity area. During the complex assessment a total of 12 2x1m machine excavation trenches were excavated across the activity area, no Aboriginal cultural material was located.

The management conditions are grouped under the following headings:

- Adherence to the Cultural Heritage Management Plan (CHMP) Before, During and After the Activity
- Cultural Heritage Induction to be Undertaken Before the Activity
- Protocol for Handling Sensitive Information Before, During and After the Activity

- Site Inspections
- Development of an Interpretive Strategy
- No High Impact Activities Permitted in Conservation Area (referring to the land in the north eastern corner of the site)
- Contingency Plans
- Relocation of Object Collections VAHR 8021-0369-2; VAHR 8021-0370-2; VAHR 8021-0371-2; VAHR 8021-0372-2; VAHR 8021-0373-2; VAHR 8021-0374-2
- Partial Salvage of VAHR 8021-0374
- Mechanical Salvage Program Methodology
- Manual Salvage Program Methodology
- Preparation of Salvage Report for VAHR 8021-0374
- Variations to the Salvage Methodology & Other Management Conditions
- Custody and Management of Artefacts from VAHR 8021-0374 and Object Collections VAHR 8021-0369-2; VAHR 8021-0370-2; VAHR 8021-0371-2; VAHR 8021-0372-2; VAHR 8021-0373-2; VAHR 8021-0374-2

Refer to the CHMP for a complete description of the management requirements.

Figure 5-4 CHMP Conditions map

Source: Heritage Insight

6. REFERENCES

Ball, J., Babister, M., Nathan, R., Weeks, W., Weinmann, E., Retallick, M., & Testoni, I. (2019). *Australian Rainfall and Runoff: A Guide to Flood Estimation.* Commonwealth of Australia (Geoscience Australia).

Commonwealth Government. (1999). *Environment Protection and Biodiversity Conservation Act 1999.*

Dames and Moore. (1999). *Hydrogeological Assessment Proposed Sand Quarry: Milners Road Yannathan South, Victoria.*

DELWP. (December 2017). *Guidelines for the removal, destruction or lopping of native vegetation.*

DELWP. (Nov 2020). *Guidelines for Assessing the Impact of Climate Change on Water Availability in Victoria.* Department of Environment, Land, Water and Planning.

Department of Sustainability and Environment. (2009). *Victorian Coastal Acid Sulfate Soils Strategy.*

Department of the Environment and Energy. (2021). *National Greenhouse Accounts Factors.*

Earth Resources Regulation. (2020). *Geotechnical guideline for terminal and rehabilitated slopes.* ERR, Department of Jobs, Precincts and Regions.

Earth Resources Regulation. (2020). *Preparation of Work Plans and Work Plan Variations, Guideline for Extractive Industry Projects.* ERR, Department of Jobs, Precincts and Regions.

Earth Resources Regulation. (2020). *Regulatory Practice Strategy for the Rehabilitation of Earth Resources Sites.* Department of Jobs, Precincts and Regions.

Earth Resources Regulation. (2021). *Preparation of Rehabilitation Plans Guideline for Extractive Industry Projects.* Department of Jobs, Precincts and Regions.

Earth Resources Regulation. (Undated). *Community Engagement Guidelines for Mining and Mineral Exploration in Victoria.*

Earth Resources Tenements. (19 Feb 2013). *Variation to Work Authority (WA127).*

EPA Victoria. (1991). *Construction techniques for Sediment Pollution Control.* Publication 275.

EPA Victoria. (1996). *Environmental Guidelines for Major Construction Sites.* EPA Publication 480.

EPA Victoria. (2006). *Hydrogeological Assessment (Groundwater Quality) Guidelines.* Publication 668.

EPA Victoria. (2009). *Guidelines for Risk Assessment of Wastewater Discharge to Waterways.* EPA Publication 1287.

EPA Victoria. (2010). *Guidance for the Determination and Assessment of Mixing Zones.* Publication 1344.

EPA Victoria. (2015). *Bunding.* EPA Publication 347.1.

EPA Victoria. (2020). *Erosion, sediment and dust: Treatment train.* EPA Publication 1893.

EPA Victoria. (2020). *Managing soil disturbance.* EPA Publication 1894.

EPA Victoria. (2020). *Managing stockpiles.* EPA Publication 1895.

EPA Victoria. (2020). *Managing truck and other vehicle movement.* EPA Publication 1897.

EPA Victoria. (2020). *Mining and quarrying - Guide to preventing harm to people and the environment.* EPA Publication 1823.

EPA Victoria. (2021). *Managing noise from reversing alarms.* EPA Publication 1890.

EPA Victoria. (2021). *Managing truck noise.* EPA Publication 1891.

EPA Victoria. (2021). *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues.* EPA Publication 1826.4.

EPA Victoria. (2022). *Guideline for Assessing and Minimising Air Pollution in Victoria.* Publication 1961.

EPA Victoria. (October 2017). *Demonstrating Best Practice.* Publication 1517.1.

Groundwater Solutions. (2021). *Hanson Yannathan Quarry, Numerical Groundwater Modelling Report.*

Hanson. (2013). *Amended Work Plan, Work Authority 127, Yannathan, approved 6 February 2014.*

Heritage Insight. (2022). *Proposed Expansion at Yannathan Quarry, Yannathan. Cultural Heritage Management Plan.*

LH Strategic Communication. (2022). *Yannathan Quarry, Part 4 Community Engagement Plan.*

NHMRC. (2011). *Australian Drinking Water Guidelines V3.8 Updated Sept 2022.*

Reber, A. K. (2007). *Thermodynamic stability of polyacrylamide and poly (N,N-dimethyl acrylamide). .* Wiley InterScience (www.interscience.wiley.com) DOI: 10.1002/pat.949.

Roam Consulting. (2011). *Projections of Electricity Generation in Australia to 2050.*

Victorian Government. (1958). *Country Fire Authority Act.*

Victorian Government. (1988). *Flora and Fauna Guarantee Act 1988.* No. 47 of 1988.

Victorian Government. (1989). *Water Act.* Incorporating amendments as at 28 October 2010 .

Victorian Government. (1990). *Mineral Resources (Sustainable Development) Act 1990.* No. 92 of 1990 as amended at 1 July 2021.

Victorian Government. (1994). *Catchment and Land Protection Act.*

Victorian Government. (2004). *Occupational Health and Safety Act.*

Victorian Government. (2006). *Aboriginal Heritage Act.*

Victorian Government. (2017). *Environment Protection Act.* Victorian Government Gazette.

Victorian Government. (2018). *Aboriginal Heritage Regulations 2018.*

Victorian Government. (2019). *Mineral Resources (Sustainable Development) (Extractive Industries) Regulations 2019.* S.R. No. 137/2019.

Victorian Government. (2021). *Environment Protection Regulations.* S.R. No.47/2021.

Victorian Government. (2021). *Environment Reference Standard.* Victorian Government Gazette No S 245 26 May 2021 (as amended by Evironment Reference Standard No S158 Tuesday 29 March 2022).

Appendix A Certificates of Title

Appendix B Planning Property Reports

Appendix C SRW Licence

Appendix D Surface Water Management Plan

Appendix E Hydrogeological Assessment

Appendix F Flora and Fauna Assessment

Appendix G Cultural Heritage

Appendix H Geotechnical Assessment and GCMP

Appendix I Slimes Management Plan

Appendix J Air Quality (Dust)

Appendix K Noise

Appendix L Greenhouse Gas and Climate Change

Appendix M Correspondence with Regulators

Mineral Resources (Sustainable Development) Act 1990

Tenement Number: WA127

Plan Number: PLN-001686

Work Plan Statutorily Endorsed

Signed: _____

Delegate of the Department Head

Date: 01/05/2024

RISK ASSESSMENT AND MANAGEMENT

WA127

Client: Hanson Construction Materials

Ricardo ref. 30765 Issue: 4 29/11/2023

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Glossary

Acronym	Definition
ADWG	Australian Drinking Water Guidelines
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
CaLP	Catchment and Land Protection
CHMP	Cultural Heritage Management Plan
CMA	Catchment Management Authority
CMPA	Construction Material Processors Association
DEECA	Department of Energy Environment and Climate Action (formerly DELWP / DJPR)
DELWP	Department of Environment, Land, Water and Planning
DJPR	Department of Jobs, Precincts and Regions
DJSIR	Department of Jobs Skills Industry and Regions (formerly DJPR)
DSE	Department of Sustainability and Environment (now DELWP)
EC	Electrical Conductivity
EPA	Environment Protection Authority
EPBC	Environment Protection and Biodiversity Conservation
ERR	Earth Resources Regulation
ERS	Environment Reference Standard
GW	Groundwater
HazSub	Hazardous substances
IWRG	Industrial Waste Resource Guidelines
NEPM (ASC)	National Environment Protection (Assessment of Site Contamination) Measure
NHMRC	National Health and Medical Research Council
NTU	Nephelometric Turbidity Units
OHS	Occupational Health and Safety
PAH	Polycyclic Aromatic Hydrocarbons
QA/QC	Quality Assurance / Quality Control
RAP	Registered Aboriginal Party
SEPP	State Environment Protection Policy
SRW	Southern Rural Water

Acronym	Definition
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TRH	Total Recoverable Hydrocarbons
TSP	Total suspended particles
UPSS	Underground Petroleum Storage System
WA	Work Authority
WDE	Water dependent ecosystems
WHO	World Health Organisation
WMIS	Water Management Information System

1. INTRODUCTION

Ricardo Energy Environment and Planning (Ricardo) has been engaged by Hanson Construction Materials Pty ltd (Hanson) to prepare a Risk Management Plan as part of a variation to the Work Plan for the Yannathan Sand Quarry, located at 870 – 910 Westernport Road, Yannathan (the Site). The purpose of the variation is to extend the area and depth of excavation within the existing Work Authority area.

The Risk Management Plan is a component of the overall Work Plan (Part 3 Risk Assessment), which has been submitted to the Earth Resource Regulation (ERR) branch of the Department of Energy Environment and Climate Action (DEECA) (formerly Department of Jobs, Precincts and Regions (DJPR)). As such, this report should be read in conjunction with the main Work Plan document (Part 1 Summary Report).

ERR's risk assessment process was most recently revised in December 2020. This Risk Management Plan has been developed in accordance with the requirements for risk assessments outlined in *Preparation of Work Plans and Work Plan Variations* (ERR 2020).

1.1 RISK MANAGEMENT PROCESS

The assessment of risk is the process of finding, recognising, and describing:

- The quarrying hazards within the Work Plan area.
- A clear pathway to one or more receptors; and
- The potential impacts on the receptor if the hazard occurs.

This then forms the basis for identification of risk management controls, the development of aspect-specific risk management plans and monitoring requirements.

A Risk Event comprises:

- Activity - which creates risks (e.g., clearing of overburden).
- Hazards – activities or features which have the potential to impact receptors (e.g., use of machinery).
- Risk type – nature of impact (e.g., dust); and
- Receptor – impacted party / feature.

The key tasks for planning the management of risk are presented in **Figure 1-1**.

Figure 1-1 Risk management process

The main Work Plan document contains:
- Assumptions and sensitive receptors
- Description / definition of the nature and extent of works associated with the project

A summary of the potential Receptors is contained in **Section 2**.

A hazard is any quarrying activity and circumstance that may pose a risk to the environment, to any member of the public or to land, property or infrastructure in the vicinity of work carried out at a quarry. A list of all possible quarry hazards associated with the project is contained in **Section 3**. The stages of quarry life where the activity occurs is also identified.

An assessment of Inherent Risk is undertaken by assessing the Likelihood and Consequences. This assessment considers only the activity and the surrounding environment and does not consider the control measures implemented to manage the risks. The Inherent Risk is the risk of undertaking an activity at a specific location. The assessment is presented in **Section 4**.

Control measures are identified during the development of the Risk Treatment Plans. Risk Treatment Plans are developed for each risk type. Risk Treatment Plans consider relevant legislative requirements, inherent risk as well as site resources and logistics. Risk treatment plans are contained in **Section 4**.

An assessment of Residual Risk is undertaken by again assessing the Likelihood and Consequences but this time the assessment also considerd the control measures implemented to manage the risks. The Residual Risk is the risk of undertaking an activity at a specific location including consideration of the control measures. The assessment is presented in **Section 3**.

2. RECEPTOR IDENTIFICATION

2.1 DESCRIPTION OF SITE

2.1.1 Site location

The Site is located approximately 80 km south-east of the Melbourne CBD and is approximately 6 km east-north-east of Lang Lang as shown on **Figure 2-1**.

Figure 2-1 Site location

2.1.2 Site features and description

The site is accessed from Westernport Road near the intersection with Heads Road. The site comprises two operating pits (East Pit and West Pit), a processing plant and associated stockpile/sales areas, a number of former extraction areas (some rehabilitated with filter cake from the processing plant, others as water storage dams), associated offices and a weighbridge.

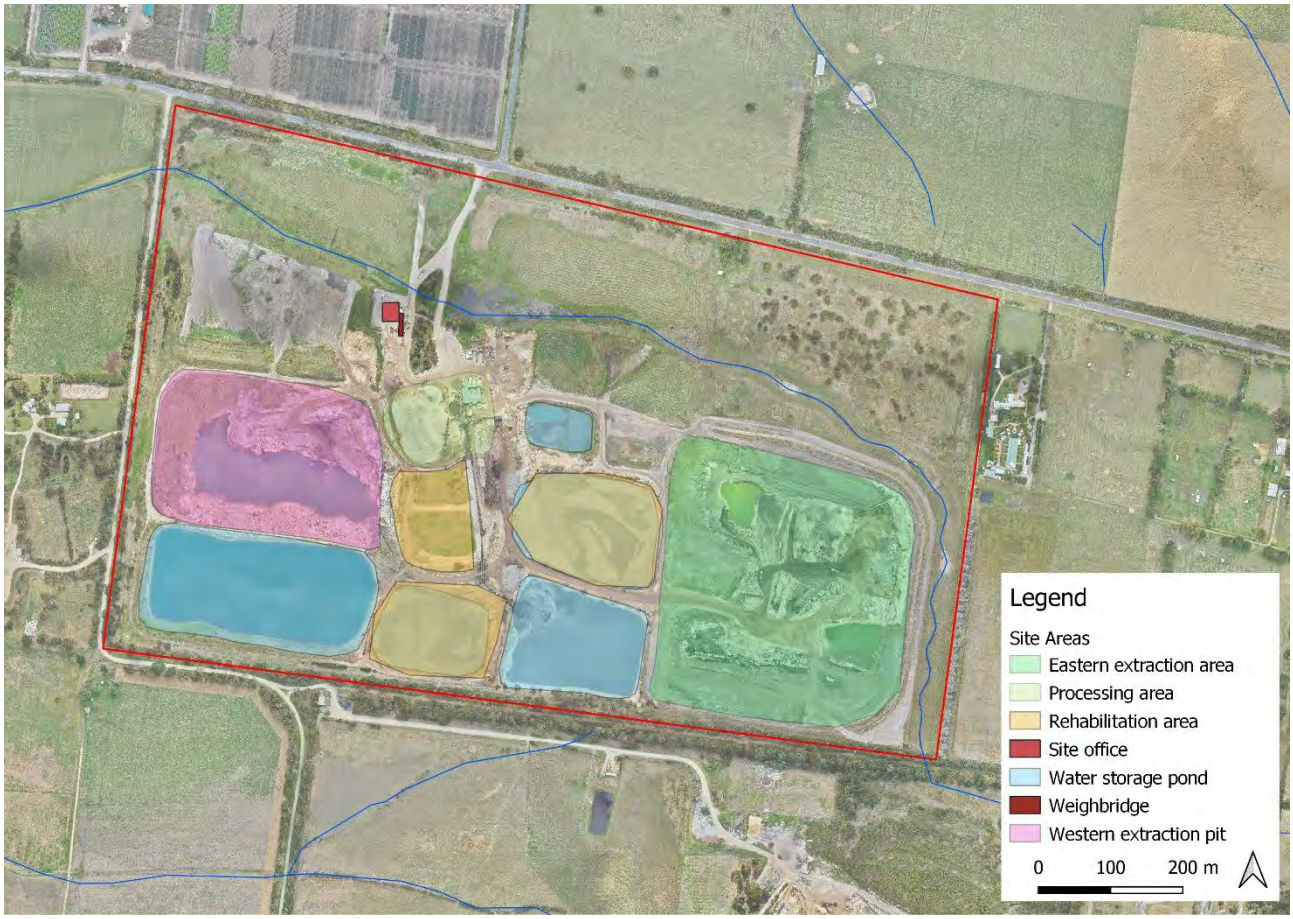
The application seeks approval to extend the area of extraction to the north and to increase the depth of extraction from RL 9 mAHD to RL-9 mAHD. This will involve relocating the existing watercourse that runs through the proposed extension area. It is proposed to quarry the northernmost areas while the watercourse is in its current location then construct a new watercourse over filled land prior to diverting the waterway to allow extraction of the southern part of the extension area.

The groundwater at the site is relatively shallow. Currently the extraction extends below watertable using dry quarry methods which is facilitated by the placement of clay (sourced onsite) against the pit batters which restricts groundwater inflow. The geology of the site includes an organic rich layer at around 9 mAHD which is the base of extraction currently permitted. This application seeks to extend the quarry through the organic layer

into the underlying sands. It is proposed to undertake the deeper extraction using a dredge to minimise drawdown impacts on neighbouring bores and to ensure that water can be managed onsite without offsite discharges.

A plan of the Site is presented in **Figure 2-2**.

Figure 2-2 Site plan



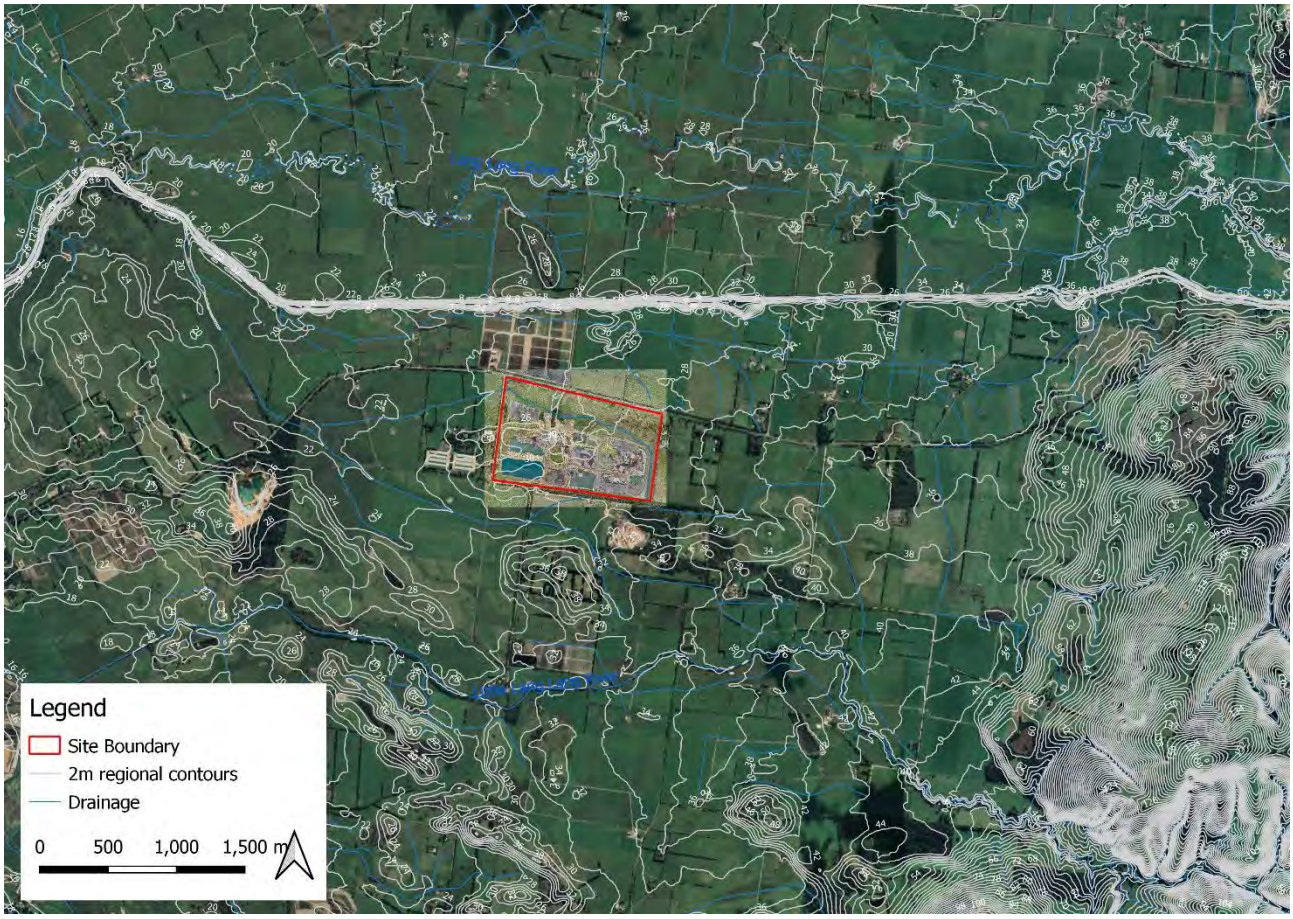
The final stage of quarrying operations will extract the sand beneath the processing and stockpile area. During this final stage, sand down to the organic layer will be extracted and will be trucked to another Hanson sand quarry for processing.

The final landform will comprise a large lake encompassing the extension area (bar the new waterway), the East Pit, West Pit and current processing areas (**Figure 2-3**). The area south of the processing plant and the southwest pit will have been refilled with filtercake and revegetated.

Figure 2-3 Rehabilitation concept

The site is situated on a broad plain between the relocated Lang Lang River approximately 650m north of the site and a north-east to south-west trending range of hills approximately 3km south-east of the site (**Figure 2-4**).

Figure 2-4 Regional physiography



Drainage is in a generally north-westerly direction draining from the hills south-east of the site. Historic drainage works undertaken during the 1930's to make the naturally swampy land arable created the linear drainage feature north of the site.

2.1.3 Surrounding land use

Surrounding land use is summarised as follows:

Table 2-1 Surrounding land use

Direction	Comment
North	Agricultural uses. A residential farmhouse is located approximately 740m from the north-western corner of the site. A former residential building to the north of the site is used as an office for the market garden, not a residence However, it is understood that a caretaker stays overnight from time to time.
East	Land immediately east of the site is currently a kennel boarding and cattery facility and a farm with on-site residence. There is also a current work authority (WA511) over the property.
South	Current work authorities (WA1005 and WA1029) exist over the properties immediately south of the Site.
West	An intensive poultry farming facility with on-site residence exists immediately west of the site.

Figure 2-5 Surrounding land use

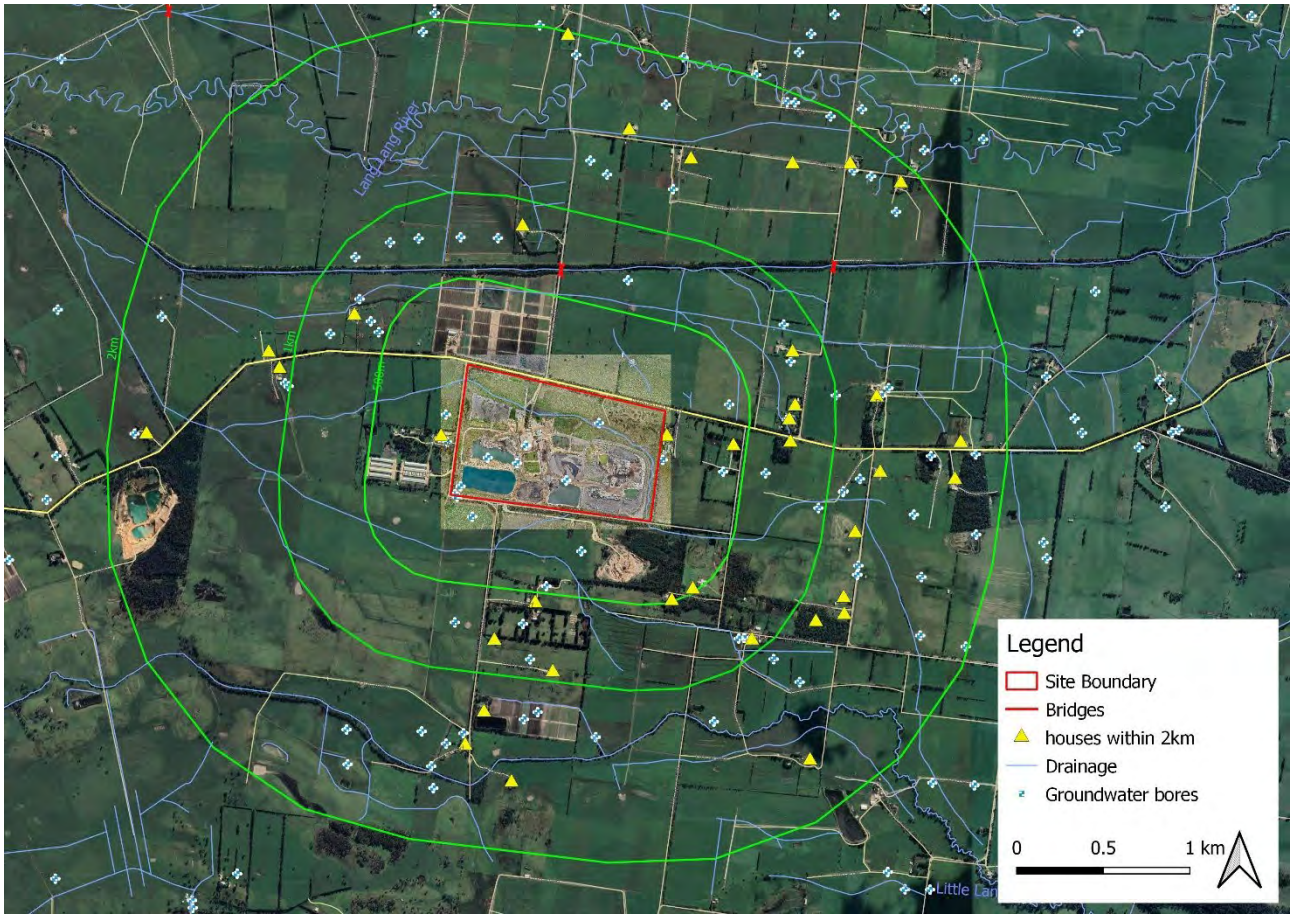
2.2 HUMAN RECEPTORS

The location of residences within 2km of the site is shown in **Figure 2-6**. The closest residences are at the poultry farm to the west and the cattery and kennels to the east. A former residence is now used as an office for the market garden located north of the site.

The nearest locations of other sensitive human receptors are:

- School: 52 Westernport Road in Lang Lang
- Pre-school: 5 Whitstable St Lang Lang
- Medical Centre: 5 Whitstable St Lang Lang

Figure 2-6 Receptor locations within 2km



2.2.1 Land or property receptors

Westernport Road is an arterial road running along the northern boundary of the site. Milners Road is a minor road running along the western and part of the southern site boundaries. Burt Road is a short road on the southern boundary.

Electricity services are located on Westernport Road. The nearest bridge crosses the Lang Lang River over 500m north of the site.

2.3 ENVIRONMENTAL RECEPTORS

2.3.1 Groundwater

The geomorphology of the site comprises Quaternary aged low relief dunes and a drainage line traversing from the south-east corner to the north-west corner. This drainage line was relocated to the east to facilitate development of the East Pit.

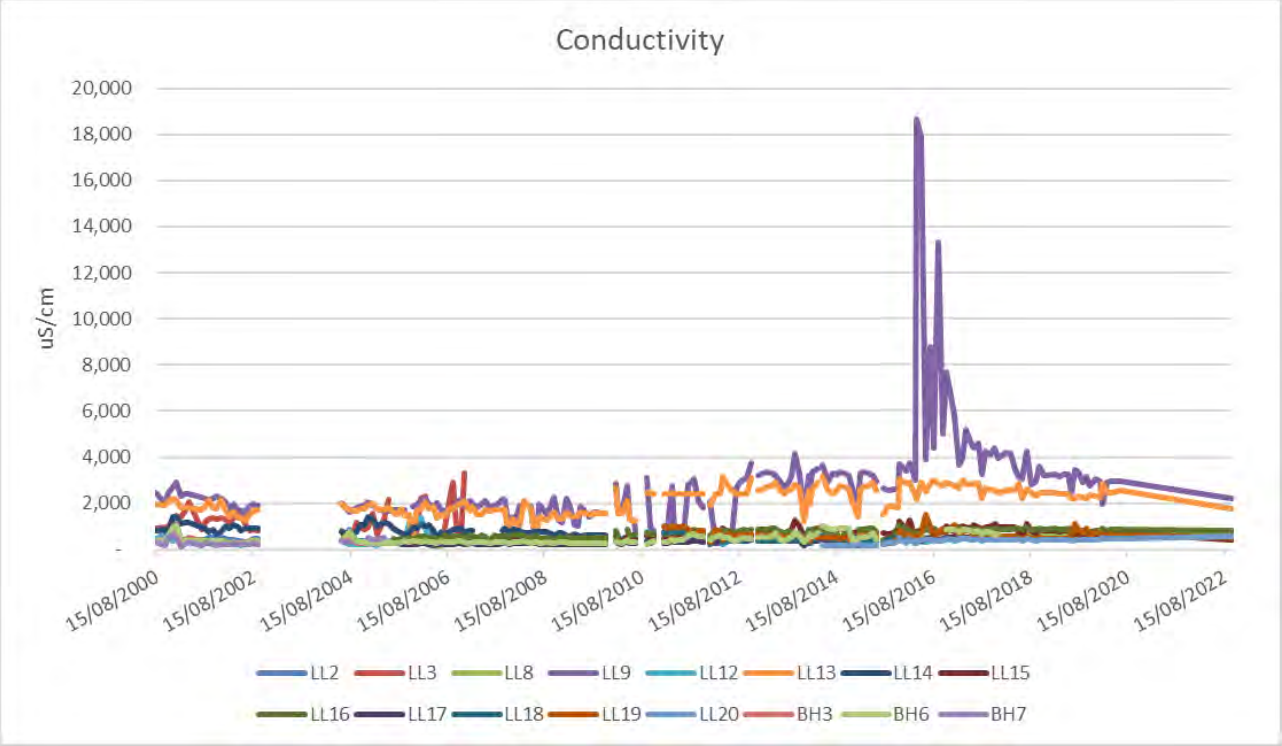
The geological sequence of the area of the Lang Lang lowlands consists of a Quaternary unit of gravel and clay underlain by a series of Tertiary fluviatile sediments. Drilling has revealed the sand deposit is thickest in the southern part of the site, thinning to the north where a clay occurs at depths exceeding 8 metres. The base of the upper sand has a relatively constant elevation. This overlies a dense organic-rich sand which in turn overlies a second sand unit extending to depth.

The Tertiary Sediments comprise a confined aquifer system which yields supplies of groundwater. Generally, the water table is close to the surface on the Lang Lang Plain.

Further information on the hydrogeological configuration of the site is provided in the **Hydrogeological Assessment**, an appendix to **Part 1 Summary Report**.

The electrical conductivity of groundwater at the site is shown in **Figure 2-7**. Note that Bore LL9 is located on the eastern site boundary which is up-hydraulic gradient of the site. As such the elevated electrical conductivity values reported are not considered to be associated with site activities.

Figure 2-7 Electrical conductivity of groundwater



The electrical conductivity indicates indicative salinities less than 2,000 mg/L and frequently less than 500 mg/L Total Dissolved Solids (TDS). The Environment Reference Standard (ERS) defines the Environmental Values that need to be protected based on TDS concentration.

The ERS classifies the groundwater at the site into Segment A1, so the following Environmental Values are required to be protected:

- Water dependent ecosystems and species
- Potable water supply
- Agriculture and irrigation (irrigation)
- Agriculture and irrigation (stock watering)
- Industrial and commercial use
- Water based recreation (primary contact recreation)
- Traditional owner cultural values
- Buildings and structures

The site is not in a defined mineral springs area so Potable mineral water supply is not an applicable environmental value for the site. Similarly, the area has a low geothermal potential so this is also not applicable for this site.

The Water Management Information System (WMIS) indicates there are 84 bores within 2 km of the current Site of which three are listed as “Not Used”. The bores within the buffer zone are displayed in **Figure 2-6** and their use type is presented in **Table 2-2**.

Table 2-2 Groundwater bore information

Bore Use	No of Bores
Domestic	29
Stock	49
Irrigation	4
Dairy	4
Dewatering	1
Investigation	5
State Observation Network	5
Observation	7
Non groundwater	8
Not known	8

Note: Some bores have multiple uses

2.3.2 Surface water

The proposed extension area contains a drainage line which flows from south-east to north-west across the site. As outlined in **Section 2.1.2** it is proposed to relocate the drainage line to filled land in the northern perimeter of the site so that sand beneath the drainage line can be extracted. This has been the subject of a detailed review and a conceptual design for the new waterway has been prepared. Please refer to the Surface Water Management Plan which is contained in an appendix of the **Part 1 Summary Report.**

Work will be undertaken in a staged approach whereby the northernmost areas will be quarried and backfilled while the watercourse is in its current location then the new watercourse will be constructed over the filled land prior to diverting the waterway to allow extraction of the southern part of the extension area.

Under the ERS the site falls into the Central Foothills and Coastal Plains segment. The following Environmental Values are required to be protected:

- Water dependent ecosystems and species (slightly to moderately modified)
- Agriculture and irrigation
- Human consumption of aquatic foods
- Industrial and commercial
- Water based recreation (primary contact recreation)
- Water based recreation (secondary contact recreation)
- Water based recreation (aesthetic enjoyment)
- Traditional owner cultural values

The drainage line ultimately discharges into the Lang Lang River which discharges into Westernport Bay west of Lang Lang. The water is not sourced for a domestic water supply so Human consumption after appropriate treatment is not a relevant Environmental Value for surface water on this site. Similarly, there are no aquaculture operations downstream of the site so Aquaculture is not a relevant Environmental Value.

2.3.3 Flora and fauna

The site had been cleared of native vegetation when the site was purchased by Hanson. Existing vegetation onsite is regrowth or screening plantings.

A flora and fauna survey has been undertaken, contained as an appendix in **Part 1 Summary Report**.

2.3.4 Air environment

The site is in a rural area with surrounding land being used for intensive animal production/husbandry and market garden activities. The air environment is potentially impacted by dust from quarrying and truck movements prior to the dredging phase. Once extraction enters the dredging phase there will be minimal dust emissions from extraction activities.

2.3.5 Cultural heritage

A Cultural Heritage Management Plan (CHMP) has been prepared for the proposed extension. This is contained as an appendix to **Part 1 Summary Report**. No artefacts were identified within the extension area.

A previous CHMP for the current extraction areas did identify artefacts and these were reburied within a protected area which lies within the proposed area of the extension. It is proposed to relocate the artefacts to the north-western corner of the site where some informative signage is proposed for the public to learn of the pre-European settlement history of the area. The current CHMP contains management recommendations for the relocation process and further investigation to be undertaken within the protected area.

2.4 RECEPTOR SUMMARY

- Human receptors:
  - Neighbouring residents.
  - General public on Westernport, Milners and Burt Roads; and
  - Visitors and Staff on-site.
- Property
- Environmental receptors:
  - Groundwater environmental values and groundwater users.
  - Surface water environmental values.
  - Flora and Fauna.
  - Air environment.
- Cultural Heritage

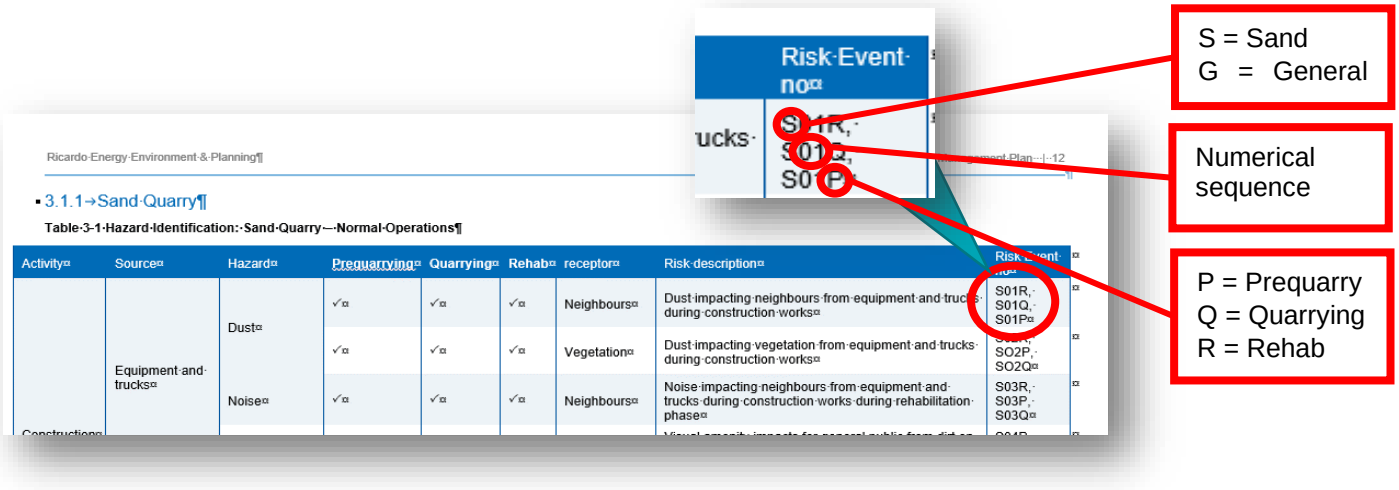
3. HAZARD IDENTIFICATION

Hazard identification information is presented in a tabular format which include the following for Quarrying Operations (**Table 3-1**) and General Operations (**Table 3-2** and **Table 3-3**):

- site activities.
- potential hazards.
- risk types.
- potential receptors; and
- stages of the operation when the activity occurs.

The coding system for each risk event is described in **Figure 3-1**.

Figure 3-1 Risk event code key



3.1 SAND QUARRY

The following tables present the site-wide risks that have been evaluated. The level of risk for those hazards marked with an asterisk differ as a result of the change in works outlined in this WPV. The change in risk may be an increase, decrease or a change of the location.

Table 3-1 Hazard Identification: Sand quarry - normal operations

Activity	Source	Hazard	Prequarrying	Quarrying	Rehab	Receptor	Risk description	Risk Event no
Construction	Equipment and trucks	Dust	✓	✓	✓	Neighbours	Dust impacting neighbours from equipment and trucks during construction works *	S01R, S01Q, S01P
			✓	✓	✓	Vegetation	Dust impacting vegetation from equipment and trucks during construction works	S02R, SO2P, SO2Q
		Noise	✓	✓	✓	Neighbours	Noise impacting neighbours from equipment and trucks during construction works *	S03R, S03P, S03Q
		Amenity	✓	✓	✓	Roadways / general public	Visual amenity impacts for general public from dirt on public roads during construction works	S04P, S04Q, S04R
		Public safety	✓	✓	✓	Public health	Dirt and mud on roads creating a safety hazard for other road users	S67P, S67Q, S67R
	Roadways and stockpiles	Sediment	✓	✓	✓	Surface water	Sediment impacting surface waters from roadways and stockpiles	S05P, S05Q, S05R
	Stormwater storage ponds and drainage	Sediment	✓	✓	✓	Surface water	Sediment impacting surface waters from construction and modification of stormwater storage ponds and drainage channels	S06P, S06Q, S06R
Land clearing / topsoil removal	Equipment	Noise	✓			Neighbours	Noise impacting neighbours from equipment during land clearing / topsoil removal works *	S07P
		Amenity	✓			Roadways / general public	Visual amenity impacts for general public from dirt on public roads during land clearing works	S08P

Activity	Source	Hazard	Prequarrying	Quarrying	Rehab	Receptor	Risk description	Risk Event no
	Clearing areas	Vegetation removal	✓			Vegetation	Damage to vegetation during land clearing / topsoil removal works *	S09P
			✓			Fauna	Damage to fauna during land clearing / topsoil removal works during prequarrying phase	S37P
		Visual impacts	✓			Neighbours	Visual amenity impacts to neighbours during land clearing / topsoil removal works *	S10P
		Cultural Heritage	✓		✓	Artefacts	Damage to cultural heritage artefacts during Land clearing / topsoil removal works *	S11P
		Sediment	✓			Surface water	Sediment impacting surface waters during land clearing / topsoil removal works *	S12P
			✓			Aquatic ecosystems	Sediment impacts to aquatic ecosystems during land clearing / topsoil removal works *	S13P
Overburden stripping	Stockpiles	Dust	✓			Neighbours	Dust impacting neighbours from stockpiles during overburden stripping during prequarrying phase	S14P
		Sediment	✓			Surface water	Sediment impacting surface waters from stockpiles during overburden stripping works during prequarrying phase *	S15P
			✓			Aquatic ecosystems	Sediment impacting aquatic ecosystems from stockpiles during overburden stripping works during prequarrying phase *	S16P
	Equipment	Noise	✓			Neighbours	Noise impacting neighbours from equipment during overburden stripping works during prequarrying phase *	S17P
		Amenity	✓			Roadways / general public	Visual amenity impacts for general public from dirt on public roads during overburden removal works during prequarrying phase	S18P
Pit development	Dewatering	Water level declines		✓		Vegetation	Water management activities lowering the watertable beyond the reach of plant roots *	S39Q
				✓		Groundwater users	Water management activities creating Increased groundwater drawdown *	S58Q
		Surface water discharge		✓		Surface water	Greater groundwater inflow than anticipated necessitating off-site discharge impacting stream hydrology	S59Q

Activity	Source	Hazard	Prequarrying	Quarrying	Rehab	Receptor	Risk description	Risk Event no
				✓		Ecology	Greater groundwater inflow than anticipated necessitating off-site discharge impacting water dependent ecosystems	S60Q
		Noise	✓	✓		Neighbours	Pumps from dewatering creating noise beyond the site boundary *	S42P, S42Q
Excavation	Product excavation and transport onsite	Dust		✓		Neighbours	Dust impacting neighbours from product excavation and transport onsite during dry extraction *	S19Q
		Noise		✓		Neighbours	Noise impacting neighbours from product excavation and transport onsite during dry extraction *	S20Q
		Sediment		✓		Surface water	Sediment impacting surface waters from product excavation and transport onsite during dry extraction	S22Q
				✓		Land	Erosion of the pit face from stormwater discharges *	S61Q
		Contamination		✓		Groundwater	Contamination of groundwater from spills during quarrying phase *	S38Q
		Geotechnical parameters		✓		Westernport and Milners Road, neighbours' property	Rotational failure of exposed face at northern boundary prior to placement of clay buttress and waterway diversion	S68Q
				✓		Westernport and Milners Road, neighbours' property	Settlement/subsidence due to excessive water table depression prior to buttress placement	S67Q
				✓		Westernport and Milners Road, neighbours' property	Slumping or heave at operational slope toe	S70Q
				✓	✓	Land	Slope failure of batters due to erosion	S71Q, S71R
Excavation	Surcharging crest	Geotechnical instability		✓		Westernport and Milners Road, neighbours' property	Overloading crest with machinery and plant during operations *	S57Q
Backfilling	Filter cake	Dust			✓	Neighbours	Uncontrolled dust during handling of dry slimes	S66R

Activity	Source	Hazard	Prequarrying	Quarrying	Rehab	Receptor	Risk description	Risk Event no
	Fill material	Geotechnical stability		✓		Westernport and Milners Road, neighbours' property	Rotational failure or buttress sliding of exposed face at northern boundary after placement of clay buttress	S72Q
				✓		Land	Settlement/subsidence due to excessive water table depression after buttress placement	S73Q
				✓	✓	Westernport and Milners Road, neighbours' property	Settlement/subsidence due to excessive water table depression after buttress placement	S63Q, S62R
	Storage dams	Embankment failure		✓	✓	Internal site activities only	Embankment fails and impounded water or solid waste released to adjacent pit area	S75Q. S75R
Waterway diversion	Water	Surface water		✓		Surface water	Waterway diversion failure leading to loss of streamflow	S74Q
Processing	Sand washing	Sediment		✓		Surface water	Sediment impacting surface waters from sand washing during processing	S24Q
		Contamination		✓		Groundwater	Contamination of groundwater from filtercake during quarrying phase	S21Q
	Screening	Dust		✓		Neighbours	Dust impacting neighbours from screening during processing works	S25Q
		Noise		✓		Neighbours	Noise impacting neighbours from screening during processing	S26Q
		Sediment		✓		Surface water	Sediment impacting surface waters from screening during processing	S27Q
		Contamination		✓		Groundwater	Contamination of groundwater from spills in the processing area	S28Q
				✓		Land	Contamination of land from spills in the processing area	S29Q
				✓		Surface water	Contamination of surface water from spills in the processing area	S30Q

Activity	Source	Hazard	Prequarrying	Quarrying	Rehab	Receptor	Risk description	Risk Event no
		Dust		✓		Human health	Processing activities releasing respirable particles which are inhaled by people	G41P
	Stockpiles	Sediment		✓		Surface water	Erosion of stockpiles causing silting of surface waters	S31Q
		Dust		✓		Neighbours	Dust impacting neighbours from stockpiles during processing during quarrying phase	S43Q
	Loading of product	Noise		✓		Neighbours	Noise impacting neighbours from loading of product during processing	S32Q
		Dust		✓		Neighbours	Dust impacting neighbours from loading of product during processing	S33Q
Product transport	Roadways	Dust		✓		Neighbours	Dust impacting neighbours from transporting product during processing	S34Q
		Noise		✓		Neighbours	Noise impacting neighbours from transporting product during processing	S35Q
		Amenity		✓		Roadways / general public	Visual amenity impacts for general public from dirt on public roads during product transport	S36Q
		Sediment		✓		Surface water	Sediment impacting surface waters from roadways	S44Q

3.2 GENERAL OPERATIONS

Table 3-2 Hazard identification: site management - normal operations

Activity	Source	Hazard	Receptor	Prequarrying	Quarrying	Rehab	Risk description	Risk Event no
After Dark Operations	Light	Light trespass	Neighbours		✓		Light trespass impacting neighbours from lighting during after dark operations *	G13Q
Site maintenance	Foxes, cats, dogs, rabbits	Burrows	Land	✓	✓	✓	Burrows impacting land from rabbits and foxes *	G05P, G05Q, G05R
		Predation	Native fauna	✓	✓	✓	Predation of native fauna by foxes, cats, and dogs *	G06P, G06Q, G06R
	Weeds	Weed Infestations	Neighbour's property	✓	✓	✓	Weed infestations impacting neighbour's property during operations *	G07P, G07Q, G07R

Activity	Source	Hazard	Receptor	Prequarrying	Quarrying	Rehab	Risk description	Risk Event no
			Native flora	✓	✓	✓	Weed infestations impacting native flora during operations *	G08P, G08Q, G08R
		Chemical usage	Surface water	✓	✓	✓	Chemical usage impacting surface waters	G09P, G09Q, G09R
			Land	✓	✓	✓	Chemical usage impacting land	G10P, G10Q, G10R
	Exhaust fumes from vehicles and equipment	Exhaust fumes						
			Neighbours	✓	✓	✓	Fumes from vehicle and machinery exhaust polluting the air	G34P, G34Q, G34R
	Odour from chemicals	Odour	Neighbours	✓	✓	✓	Odour released from chemical storage	G38P, G38Q, G38R
	Vehicle maintenance	Wastewater discharge	Surface water	✓	✓	✓	Wastewater from washing vehicles and machines flowing to surface water bodies	G39P, G39Q, G39R
	Sewage	Tank leakage	Groundwater	✓	✓	✓	Leaking septic tank contaminating groundwater	G40P, G40Q, G40R
Vehicle Maintenance	Spills	Contamination	Soil	✓	✓	✓	Contamination impacts to soil from chemical spills during vehicle maintenance works	G01P, G01Q, G01R
			Groundwater	✓	✓	✓	Contamination impacts to groundwater from chemical spills during vehicle maintenance works	G02P, G02Q, G02R
			Surface water	✓	✓	✓	Contamination impacts to surface waters from chemical spills during vehicle maintenance works	G03P, G03Q, G03R
			Ecosystems	✓	✓	✓	Contamination impacts to ecosystems from chemical spills during vehicle maintenance works	G04P, G04Q, G04R
Waste Management	Waste storage areas	Vermin	Native fauna	✓	✓	✓	Vermin impacts on native fauna from waste storage and disposal	G11P, G11Q, G11R
	Buildings	Litter	Waterways	✓	✓	✓	Litter impacts on surface waters from waste storage and disposal	G12P, G12Q, G12R
			Soil			✓	Litter finding its way into the ground / soil and contaminating	G31P, G31Q, G31R

3.3 ABNORMAL OPERATIONS

Table 3-3 Hazard identification: abnormal operations

Activity	Source	Hazard	Receptor	Prequarrying	Quarrying	Rehab	Risk description	Risk Event no
Abnormal events	Fire	Property damage	Neighbours		✓		Plant/machinery/hot works igniting a fire and escaping the site	G14Q
	Flood	Erosion	Waterways	✓	✓	✓	Erosion of waterways during flood *	G16R, G16P, G16Q
		Contamination	Land	✓	✓	✓	Chemical / fuel from stormwater pond pump impacting land during pumping after heavy rainfall event	G19R, G19P, G19Q
			Surface water	✓	✓	✓	Chemical / fuel from pumps impacting waterways during pumping after heavy rainfall event	G20R, G20P, G20Q
	Security breach	Unauthorised access						
			Public safety	✓	✓	✓	Public safety jeopardised from unauthorised persons during security breach	G22R, G22P, G22Q
			Public safety		✓	✓	Deep waterbodies posing drowning risk for trespassers	G43Q, G43R

4. RISK ASSESSMENT

4.1 APPROACH

Risk is based on an assessment of Likelihood and consequence in accordance with the following risk assessment matrix.

Table 4-1 Risk assessment matrix

Almost Certain	Medium	High	Very High	Very High	Very High
Likely	Medium	Medium	High	Very High	Very High
Possible	Low	Medium	Medium	High	Very High
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Medium	Medium	High
	Insignificant	**Minor**	**Moderate**	**Major**	**Critical**

The following tables define the levels of Likelihood and consequence based on ERR's risk assessment framework in the Workplan guidelines (ERR 2020).

Table 4-2 Likelihood assessment

Rating	Description	Probability of event occurring
Almost certain	The risk is expected to occur in most circumstances	90-100%
Likely	The risk event will probably occur in most circumstances	70-90%
Possible	The risk event might occur at some time	30-70%
Unlikely	The risk event could occur at some time	5-30%
Rare	Highly unlikely, but the risk event may occur in exceptional circumstances	0-5%

Table 4-3 Consequence assessment

	Consequence	Critical	Major	Moderate	Minor	Insignificant
Consequence for " any member of the public" – public health, safety, amenity, and Aboriginal heritage	**Public health and safety** Fatalities, injuries, or illnesses due to exposure to a hazard.	Fatalities, life-threatening injuries or illnesses or injuries resulting in permanent disablement. Public exposed to a severely debilitating chronic health impact or life-threatening hazard.	Injuries or illness requiring surgery or resulting in long-term disablement. Public exposed to a hazard that results in hospitalisation for treatment from injury or illness.	Injuries or illness requiring treatment by a physician or hospitalisation. Public exposed to a hazard that results in injuries or health effects requiring treatment by a physician.	Injuries or illness requiring first aid treatment. Public exposed to a hazard that could cause injuries or adverse health effects requiring first aid treatment.	Injury or ailment that does not require medical or first aid treatment.
	Public amenity Community or multiple individuals experience loss of amenity from dust, odour, fumes, noise, or other similar hazards.	Continuously experience significant losses of amenity over periods of weeks or longer.	Regularly experience (weekly-monthly basis) significant losses of amenity for multiple days on end.	Regularly experience (weekly-monthly basis) significant loss of amenity.	Infrequently experience (no more than monthly) a small effect on the amenity.	Infrequently experience (no more than monthly) a marginal reduction in the amenity.
	Aboriginal heritage Destruction of places and/or associated cultural values with Aboriginal cultural heritage.	Destruction of place(s) and/or associated cultural values of exceptional value. A place identified by Aboriginal Victoria and/or cultural values identified by Traditional Owners of exceptional value that the destruction would be catastrophic.	Destruction of a rare occurrence place(s) and/or associated cultural values. A place with a large number and diverse range of cultural materials. A place with stratified deposits and/or surface spatial patterning that reflects the way in which the cultural materials were deposited.	Destruction of a common occurrence place(s) and/or associated cultural values. A place with a limited range of cultural heritage materials and a place in fair to good condition with some degree of disturbance evident.	Destruction of a place(s) and/or associated cultural values in a deteriorated condition with a high degree of disturbance evident and some cultural heritage remaining.	No impact on Aboriginal cultural heritage sites.
	Heritage Damage works or disruption to a place, object or historical archaeological site listed on the Commonwealth National Heritage List, Victorian Heritage Register, Victorian Heritage Inventory, or local Heritage Overlay.	Irreversible damage, or destruction.	Damage and removal, or relocation or removal of associated elements.	Works to features that will not alter the cultural heritage significance.	Isolated damage to regionally or locally significant features that is readily rectified.	
Consequences for " land, property and infrastructure " beyond the boundary of the licence or work authority area	**Land and land uses** Loss of production from primary production land or loss of annual-seasonal primary production. Environmental damage to National Park, other conservation reserve or other public land.	Permanent loss of production from primary production land >10 ha. Loss of annual-seasonal primary production from >100 ha of land. Irreversible or long-term environmental damage (with rehabilitation taking years or longer) to >1 ha of National Park or other conservation reserve.	Permanent loss of production from primary production land <10 ha. Loss of annual-seasonal primary production from 10-100 ha of land. Irreversible or long-term environmental damage to <1 ha of National Park or other conservation reserve or to ≥10 ha of other public land. Reversible damage to ≥1 ha of National Park or other conservation reserve or to ≥10 ha of other public land.	Loss of annual-seasonal primary production from <10 ha of land. Short-term (days-weeks). Disruption to 10-100 ha of primary production land. Reversible damage to <1 ha of National Park or other conservation reserve or to <10 ha of other public land.	Minor damage to agricultural land or public land not requiring active rehabilitation. Temporary and small-scale disruption to agricultural production (days, 1-10 ha)	Total damage to private or public property or infrastructure <$1k. .
	Public and private property Damage to private or public property or infrastructure or loss of income	Total damage >$10 million. Total loss of value of private property equivalent to >$10 million.	Total damage $1-10 million. Total loss of value of private property equivalent to $1-10 million.	Total damage $50k-$1 million. Total loss of value of private property equivalent to $50k-$1 million.	Total damage $1-50k. Total loss of value of private property equivalent to $1-50k.	Total damage <$1k. Total loss of value of private property equivalent to <$1k.
	Services provided by infrastructure Negative impact to important community services (e.g., transport, energy, health, telecommunications, education, water)	Services suspended or significantly disrupted for extended period (weeks or longer).	Services suspended or significantly disrupted for days or experiencing minor disruptions for long periods (weeks or longer).	Services suspended or significantly disrupted for up to 1 day or experiencing minor disruptions for weeks.	Services suspended or significantly disrupted for short period (hours).	Services maintained but experiencing minor disruptions or delays.
Consequences for " the environment" – air, water, soil, vegetation, flora, and fauna species other than for planned and approved disturbances	**Environmental contamination event** Environmental contamination event (of air, soil-land and/or water)	A State-level incident response is required. Incident response, clean-up and rehabilitation expected to run for years and/or cost ≥$10 million.	A regional emergency management incident response required. Clean-up and rehabilitation expected to run for months and/or cost $1-10 million.	Clean-up and rehabilitation expected to run for weeks and cost $10k-$1 million.	Clean-up and rehabilitation may be required but can be completed within days.	Hazard event with minimal environmental impact and no noticeable effect beyond the immediate occurrence or expression of the hazard.
	Native vegetation, flora species or fauna species Environmental contamination event or other form of environmental damage that impacts native vegetation, flora, or fauna species	Damage leading to bioregional, State, or national extinction of listed threatened species of native flora or fauna or vegetation community. Irreversible or long-term (years) damage or environment harm to ≥10 ha of native vegetation (not listed threatened vegetation community) or to ≥1 ha listed threatened native vegetation community.	Damage leading to local extinction of listed threatened species of native flora or fauna or vegetation community. Deaths of up to ~100 listed threatened flora or fauna species or native mammals. Major damage or environment harm to 1-10 ha of native vegetation (not listed threatened vegetation community) or to <1 ha listed threatened native vegetation	Damage leading to deaths of a small number of listed threatened flora or fauna species or native mammals. Reversible damage or environmental harm to <10 ha of non-listed native vegetation community or <1 ha of listed native vegetation community.	Damage to <1 ha of native vegetation (not listed threatened vegetation community) that can be recovered in weeks to months. Damage that affects native fauna populations but does not kill individuals or disrupt breeding or other important ecological processes.	Hazard event with minimal environmental impact and no noticeable effect beyond the immediate occurrence or expression of the hazard.

	Consequence	Critical	Major	Moderate	Minor	Insignificant
		Deaths of hundreds (or more) of listed native flora or fauna species or native mammals. Contamination or other environmental damage leading to deaths of native fauna well beyond (>1 km) the boundaries of the operation.	community that will be irreversible or take years to recover from.			
	Surface water or groundwater Contamination of surface water/groundwater aquifer	Contamination leading to disruption of beneficial uses as defined by SEPP (Waters) for more than a year.	Contamination leading to disruption of beneficial uses as defined by SEPP (Waters) for up to one year.	Localised contamination leading to disruption of beneficial uses as defined by SEPP (Waters) for weeks to months.	Contamination of natural waterway or wetland occurs, but water quality remains within applicable EPA or ANZECC guidelines for existing beneficial uses. Water extraction or diversion reduces surface water flows or groundwater available for environmental uses, but with no detectable effect on dependent species or ecosystems and carried out within terms of water licence.	Hazard event with minimal environmental impact and no noticeable effect beyond the immediate occurrence or expression of the hazard.

Note: The new Environment Protection Act (2017) came into force on 1 July 2021. SEPP(Waters) has been replaced by the Environmental Reference Standard (ERS). Similarly the ANZECC Guidelines are replaced by the ANZG guidelines.

4.2 RISK EVALUATION

The following table presents ERR's Risk rating acceptability.

Table 4-4 Risk rating acceptability

Risk level	Description
Very High	Totally unacceptable level of risk. Control measures must be put in place to reduce the risk to lower levels.
High	Generally unacceptable level of risk. Control measures must be put in place to reduce the risk to lower levels or seek specific guidance from ERR.
Medium	May be acceptable provided the risk has been minimised as far as reasonably practicable.
Low	Acceptable level of risk provided the risk cannot be eliminated.
Eliminated	The risk is eliminated.

Source: ERR 2020

The Risk register is contained in **Appendix A** presenting the assessment of risk for the quarry operations and the site functional support areas (e.g., workshops): The Risk register is presented in the format specified by ERR in the 2020 Workplan guideline.

A total of 147 risks were identified and evaluated. All residual risks were found to be of Medium or Low risk or were Eliminated. Extracts from the Risk register are reproduced in the Risk treatment plans in the following section.

4.3 RISK MANAGEMENT

In preparing the risk treatment plans presented in Section 5, consideration has been given to the Hierarchy of controlling hazards and risks presented below.

Figure 4-1 Hierarchy of controlling hazards and risks

Source: EPA Publication 1695.1

In short, preference is given to controls which are the most effective – that is those that eliminate the hazard. If it is not possible to eliminate the hazard then controls are implemented to reduce the risk – either by reducing likelihood or the consequence magnitude. Administrative Controls are implemented only when more effective controls are not practicable.

The process for reducing the risk is iterative as shown in **Figure 4-2**.

Figure 4-2 Risk management process

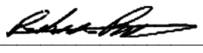
Source: EPA Publication 1695.1

Mineral Resources (Sustainable Development) Act 1990

Tenement Number: WA127

Plan Number: PLN-001686

Work Plan Statutorily Endorsed

Signed: 

Delegate of the Department Head

Date: 01/05/2024

5. RISK TREATMENT PLANS

5.1 RISK TREATMENT PLAN - DUST

5.1.1 Scope

This risk treatment plan is for the control of dust. A specialist study has been completed by Edge Group and is contained as an appendix to **Part 1 Summary Report**.

5.1.2 Sensitive receptors

The sensitive receptors associated with this hazard include:

Table 5-1 Receptors - dust

Receptor	Location and Proximity	Potential Impact to Receptor	Evidence supporting assessment
Vegetation	Onsite	Impact amenity, reduced photosynthesis/ transpiration/ respiration of plants	Site inspection records, monitoring data
Neighbours	200m west of West Pit and 190m north-east of East Pit	Dust in houses and over gardens, aggravate respiratory illness	Site inspection records, complaint records, monitoring data
General Public	Westernport and Milners Roads, neighbouring properties	Discharge of hazardous air pollutants	Dust deposition data

5.1.3 Risks

5.1.3.1 Inherent risk assessment

Table 5-2 Inherent risk – dust

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S01P	Dust impacting neighbours from equipment and trucks while undertaking construction works during prequarrying phase	Prequarrying	Unlikely	Minor	Low
S01Q	Dust impacting neighbours from equipment and trucks while undertaking construction works during quarrying phase	Quarrying	Unlikely	Minor	Low
S01R	Dust impacting neighbours from equipment and trucks during construction works during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
S02P	Dust impacting vegetation from equipment and trucks during construction works during prequarrying phase	Prequarrying	Rare	Minor	Low
S02Q	Dust impacting vegetation from equipment and trucks during construction works during quarrying phase	Quarrying	Rare	Minor	Low
S02R	Dust impacting vegetation from equipment and trucks during construction works during rehabilitation phase	Rehabilitation	Rare	Minor	Low
S14P	Dust impacting neighbours from stockpiles during overburden stripping during prequarrying phase	Prequarrying	Unlikely	Minor	Low

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S19Q	Dust impacting neighbours from product excavation and transport onsite during dry extraction	Quarrying	Possible	Moderate	Medium
S66R	Uncontrolled dust during handling of filter cake impacting neighbours	Rehabilitation	Rare	Insignificant	Low
S25Q	Dust impacting neighbours from screening during processing during quarrying phase	Quarrying	Unlikely	Minor	Low
S43Q	Dust impacting neighbours from stockpiles during processing during quarrying phase	Quarrying	Possible	Minor	Medium
S33Q	Dust impacting neighbours from loading of product during processing during quarrying phase	Quarrying	Rare	Insignificant	Low

5.1.3.2 Control measures to address hazard

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 5-3 Control measures - dust

Control ID	Control Description	Risk Event ID	Performance measure
D01	Locate the operational area of the site (including active stockpiles) at least 100 m from any sensitive receptor.	S19Q, S33Q, S01P, S01Q, S25Q, S14P, S25Q, S66R, S01R	100 m buffer retained between operational areas and sensitive receptors.
D02	Seal/gravel onsite roads located within 250 m of a sensitive receptor to minimise dust generation.	S02P	Roads <250 m to a sensitive receptor are sealed/gravelled.
D03	Establish, signpost and enforce speed limits to minimise dust generation from vehicles on unsealed roads.	S19Q, S02P, S02R, S02Q, S01R, S01Q, S01P	25 km/h maximum speed on unsealed roads.
D04	Limit vehicle movements to sealed / watered areas or stop vehicle movements during windy conditions.	S19Q, S02Q, S02R, S01Q, S02P	Vehicle movements limited to sealed/watered roads under windy conditions
D06	Cover vehicles carrying dusty materials (soil, sand, rocks etc) when transferring material to/from the site.	S19Q, S01P, S01R, S02P, S01Q, S02Q	90% vehicles have loads covered when exiting site to transfer materials.
D08	Install and use wheel wash and/or rumble grids at vehicle exit points.	S01P, S01Q, S01R, S01R	Wheel wash / rumble grid installed at all site exits.
D10	Develop and implement a dust monitoring program where there are dust-sensitive receptors located within 1 km of the Work Authority area.	S02P, S14P, S66R, S02R, S19Q, S25Q, S01Q, S43Q, S33Q, S02Q	Dust monitoring program developed and being implemented.
D11	Availability onsite of at least 2,000 L of water per hectare of disturbed land for dust control.	S02P, S66R, S02Q, S02R, S01R, S43Q, S02Q, S19Q, S01Q, S25Q, S33Q, S01P, S14P	2,000L of water / ha disturbed land held onsite.
D12	Water unpaved site roads to control dust emissions.	S01R, S01Q, S02P, S01P, S02Q, S02R	Unpaved roads watered as required to prevent dust generation.
D13	Provide field personnel with information and training on the measures used to prevent dust generation and emissions at the site.	S33Q, S66R, S43Q, S02P, S01P, S02Q, S01Q, S01R, S02Q, S02R, S25Q, S19Q	100% personnel trained within 1 month of start date

Control ID	Control Description	Risk Event ID	Performance measure
D14	Maintain existing vegetation (outside of the minimum cleared area required for an activity) in its original condition to act as a dust screen.	S25Q, S01P, S33Q, S02Q, S19Q, S02P, S01Q	Uncleared, retained vegetation maintained in undisturbed state.
D17	Plan and construct the final landform to minimise dust generation.	S02P, S33Q, S01Q, S01P, S25Q	Landform is stabilised (e.g. geotextiles, mulch mats).
D19	Maintain active soil and overburden stockpiles with stable slopes to minimise surface dust and erosion.	S02Q, S25Q, S33Q, S14P, S43Q, S02P	Stockpiles graded to < 1:2 (H:V).
D20	Physically mark out the boundaries of the work area to identify permitted / prohibited areas of soil disturbance, vegetation clearing etc	S02Q, S02P, S01P	100% of work boundaries are marked and protected.
D21	Promptly vegetate rehabilitated areas	S66R	Final landform planted within a year
D23	Use water sprays where needed in operational areas	S43Q, S33Q, S25Q, S19Q, S02P, S02Q, S14P, S66R	Sprays installed and operational
D24	Spray and extraction systems are maintained in an operable condition	S43Q, S66R, S14P, S19Q, S33Q, S25Q	Water management infrastructure is operational
D25	Install vegetated bunds on perimeter near receptors	S01P, S01Q, S01R, S14P	Perimeter bunds installed
D26	Increased monitoring frequency on hot, dry or windy days	S01Q, S14P, S33Q, S25Q, S66R, S19Q, S14P, S34Q, S01Q, S01P, S01R	Monitoring frequency

5.1.3.3 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 5-4 Residual risk - dust

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
S01P	Dust impacting neighbours from equipment and trucks while undertaking construction works during prequarrying phase	Prequarrying	Rare	Minor	Low
S01Q	Dust impacting neighbours from equipment and trucks while undertaking construction works during quarrying phase	Quarrying	Rare	Minor	Low
S01R	Dust impacting neighbours from equipment and trucks during construction works during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
S02P	Dust impacting vegetation from equipment and trucks during construction works during prequarrying phase	Prequarrying	Rare	Insignificant	Low
S02Q	Dust impacting vegetation from equipment and trucks during construction works during quarrying phase	Quarrying	Rare	Insignificant	Low
S02R	Dust impacting vegetation from equipment and trucks during construction works during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
S14P	Dust impacting neighbours from stockpiles during overburden stripping during prequarrying phase	Prequarrying	Rare	Insignificant	Low
S19Q	Dust impacting neighbours from product excavation and transport onsite during dry extraction	Quarrying	Unlikely	Minor	Low
S66R	Uncontrolled dust during handling of filter cake impacting neighbours	Rehabilitation	Rare	Insignificant	Low
S25Q	Dust impacting neighbours from screening during processing during quarrying phase	Quarrying	Rare	Minor	Low
S43Q	Dust impacting neighbours from stockpiles during processing during quarrying phase	Quarrying	Unlikely	Minor	Low
S33Q	Dust impacting neighbours from loading of product during processing during quarrying phase	Quarrying	Rare	Insignificant	Low

5.1.4 Compliance standards and acceptance criteria

The compliance standards are the key best practice standards or guidelines that will be achieved with the control measures in place.

Table 5-5 Compliance standards - dust

Performance standard	Environmental value	Assessment Criteria	Required studies
Environmental Reference Standard (Ambient Air)	Life, health and well-being of humans and other forms of life, Local amenity and aesthetic enjoyment, Visibility, buildings and property, climate systems consistent with human development	"PM_{10} – 50 µg/m^3 – 1 day average; 20µg/m^3 – 1 year average.	Air quality model - Continuous representative 24-hour PM_{10} and $PM_{2.5}$ data for a 12-month period, representative analysis of crystalline silica ($PM_{2.5}$ fraction) and heavy metal content of PM_{10} plus site specific parameters

5.1.5 Monitoring and reporting

Table 5-6 Summary of monitoring and reporting requirements - dust

Monitoring aspect	Reporting details
OHS records	Employee health
Vegetation health	Site Inspection, continuous monitoring
Visible and detected dust	Site Inspection, continuous monitoring
Complaints	Comments recorded

5.1.6 Relevant industry publications

- Mining and quarrying – Guide to preventing harm to people and the environment. (EPA Victoria 2020)
- Erosion, sediment, and dust: Treatment train (EPA Victoria 2020)
- Managing soil disturbance (EPA Victoria 2020)
- *Managing stockpiles* (EPA Victoria 2020)
- Managing truck and other vehicle movement (EPA Victoria 2020)

- Working within or adjacent to waterways (EPA Victoria 2020)
- Dust Management Guidelines (CMPA 2007)
- Guideline for assessing and minimising air pollution in Victoria (EPA Victoria 2022)

5.2 RISK TREATMENT PLAN – SILT, DUST AND CLAY ON ROADS

5.2.1 Scope

This risk treatment plan is for the control of silt, dust and clay on roads.

5.2.2 Sensitive receptors

The sensitive receptors associated with this hazard include:

Table 5-7 Receptors – silt, dust and clay on roads

Receptor	Location and Proximity	Potential Impact to Receptor	Evidence supporting assessment
Neighbours	200m west of West Pit and 190m north-east of East Pit	Dust in houses and over gardens, aggravate respiratory illness	Site inspection records, complaint records, monitoring data
Roadways / general public	10m north of northern boundary (Westernport Rd)	Contamination with dirt and mud	Complaints register, site inspection records
Surface water	Onsite waterway	Clogging / silting up waterways	Site inspection records
Public safety on Westernport Road	10m north of northern boundary (Westernport Rd)	Public health	Incident reports

5.2.3 Risks

5.2.3.1 Inherent risk assessment

Table 5-8 Inherent risk – silt, dust and clay on roads

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S04P	Visual amenity impacts for general public from dirt on public roads during construction works during prequarrying phase	Prequarrying	Unlikely	Minor	Low
S04Q	Visual amenity impacts for general public from dirt on public roads during construction works during quarrying phase	Quarrying	Unlikely	Minor	Low
S04R	Visual amenity impacts for general public from dirt on public roads during construction works during rehabilitation phase	Rehabilitation	Rare	Minor	Low
S67P	Dirt and mud on roads creating a safety hazard for other road users	Prequarrying	Unlikely	Moderate	Medium
S67Q	Dirt and mud on roads creating a safety hazard for other road users	Quarrying	Possible	Moderate	Medium
S67R	Dirt and mud on roads creating a safety hazard for other road users	Rehabilitation	Unlikely	Moderate	Medium
S08P	Visual amenity impacts for general public from dirt on public roads during land clearing works during prequarrying phase	Prequarrying	Rare	Insignificant	Low

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S18P	Visual amenity impacts for general public from dirt on public roads during overburden removal works during prequarrying phase	Prequarrying	Unlikely	Minor	Low
S34Q	Dust impacting neighbours from transporting product during processing during quarrying phase	Quarrying	Rare	Insignificant	Low
S36Q	Visual amenity impacts for general public from dirt on public roads during product transport during quarrying phase	Quarrying	Unlikely	Minor	Low
S44Q	Sediment impacting surface waters from roadways during product transport	Quarrying	Unlikely	Minor	Low

5.2.3.2 Control measures to address hazard

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 5-9 Control measures – silt, dust and clay on roads

Control ID	Control Description	Risk Event ID	Performance measure
M01	Install and use vehicle wash downs and rumble grids at vehicle exit points. Wash down facilities to include containment and treatment of wastewater.	S67P, S67Q, S67R	Vehicle wash / rumble grid installed at all site exits.
M03	Seal/gravel onsite roads located within 250 m of a sensitive receptor to minimise mud generation.	S34Q, S36Q, S44Q	
M04	Provide a facility for the wash down / cleaning of plant and equipment, including containment of wastewater for appropriate treatment and/or disposal. Facility used by vehicles entering/leaving site if have been or will be used off road.	S34Q, S36Q	Vehicle/plant wash down facility available and used for vehicles entering/ leaving site
M05	Cover vehicles carrying dusty materials (soil, sand, rocks etc) when transferring material to/from the site.	S34Q	100% vehicles have loads covered when exiting site to transfer materials.

5.2.3.3 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 5-10 Residual risk – silt, dust and clay on roads

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
S04P	Visual amenity impacts for general public from dirt on public roads during construction works during prequarrying phase	Prequarrying	Rare	Minor	Low
S04Q	Visual amenity impacts for general public from dirt on public roads during construction works during quarrying phase	Quarrying	Rare	Insignificant	Low

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
S04R	Visual amenity impacts for general public from dirt on public roads during construction works during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
S67P	Dirt and mud on roads creating a safety hazard for other road users	Prequarrying	Rare	Minor	Low
S67Q	Dirt and mud on roads creating a safety hazard for other road users	Quarrying	Unlikely	Minor	Low
S67R	Dirt and mud on roads creating a safety hazard for other road users	Rehabilitation	Rare	Minor	Low
S08P	Visual amenity impacts for general public from dirt on public roads during land clearing works during prequarrying phase	Prequarrying	Rare	Insignificant	Low
S18P	Visual amenity impacts for general public from dirt on public roads during overburden removal works during prequarrying phase	Prequarrying	Rare	Minor	Low
S34Q	Dust impacting neighbours from transporting product during processing during quarrying phase	Quarrying	Rare	Insignificant	Low
S36Q	Visual amenity impacts for general public from dirt on public roads during product transport during quarrying phase	Quarrying	Rare	Minor	Low
S44Q	Sediment impacting surface waters from roadways during product transport	Quarrying	Rare	Minor	Low

5.2.4 Compliance standards and acceptance criteria

The compliance standards are the key best practice standards or guidelines that will be achieved with the control measures in place.

Table 5-11 Compliance standards – silt, dust and clay on roads

Performance standard	Environmental value	Assessment Criteria	Required studies
Environmental Reference Standard (Water - Surface Waters)		“Turbidity75th %ile <= 30 NTU	

5.2.5 Monitoring and reporting

Table 5-12 Summary of monitoring and reporting requirements – silt, dust and clay on roads

Monitoring aspect	Reporting details
Complaints register	Frequency and response to complaints
Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available
Visible and detected dust	Site Inspection, continuous monitoring

5.2.6 Relevant industry publications

- Mining and quarrying – Guide to preventing harm to people and the environment. (EPA Victoria 2020)
- Erosion, sediment, and dust: Treatment train (EPA Victoria 2020)
- Managing truck and other vehicle movement (EPA Victoria 2020)
- Construction techniques for sediment pollution control (EPA Victoria 1991)
- Civil construction, building and demolition guide (EPA Victoria 2020)

5.3 RISK TREATMENT PLAN – EROSION AND SEDIMENTATION

5.3.1 Scope

This risk treatment plan is for the control of erosion and sedimentation.

5.3.2 Sensitive receptors

The sensitive receptors associated with this hazard include:

Table 5-13 Receptors – erosion and sedimentation

Receptor	Location and Proximity	Potential Impact to Receptor	Evidence supporting assessment
Land	Onsite	Damage to batters	Site inspection records
Surface water	Onsite waterway	Clogging / silting up waterways	Site inspection records
Waterways	Onsite waterway	Erosion of creeklines	Site inspection records

5.3.3 Risks

5.3.3.1 Inherent risk assessment

Table 5-14 Inherent risk – erosion and sedimentation

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S61Q	Erosion of the pit face from stormwater runoff	Quarrying	Likely	Minor	Medium
S24Q	Sediment impacting surface waters from sand washing during processing during quarrying phase	Quarrying	Rare	Insignificant	Low
S31Q	Erosion of stockpiles causing silting of surface waters during quarrying phase	Quarrying	Rare	Insignificant	Low
G16P	Erosion of waterways during flood during prequarrying phase	Prequarrying	Possible	Minor	Medium
G16Q	Erosion of waterways during flood during quarrying phase	Quarrying	Possible	Moderate	Medium
G16R	Erosion of waterways during flood during rehabilitation phase	Rehabilitation	Possible	Minor	Medium

5.3.3.2 Control measures to address hazard

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 5-15 Control measures – erosion and sedimentation

Control ID	Control Description	Risk Event ID	Performance measure
E02	Excavate topsoil from areas to be disturbed to a minimum depth of 150 mm below the natural surface and placed in stockpiles not exceeding 2m high.	S31Q	Topsoil < 150mm preserved for use. Stockpiles < 2m high.

Control ID	Control Description	Risk Event ID	Performance measure
E03	Install interception drains upstream and downstream of areas of disturbed ground, including stockpiles and unsealed roads, to minimise surface water flow onto such areas and contain sediment impacted water.	G16P, S61Q, G16R, G16Q	Interception drains constructed and operating effectively.
E04	Retain onsite sediment impacted surface water for suitable treatment.	G16P, G16Q	No turbid water (> 30 NTU) discharged to a waterway.
E07	Locate soil and overburden stockpiles away from waterways as far as practicable to minimise risk of sediments discharge to waterways.	G16R, G16Q, G16P	Stockpiles located ≥ 50 m from any waterway.
E08	Stabilise soil and overburden stockpiles (e.g. seeded / roughened / mulched) and other disturbed areas as soon as practicable.	G16Q	Soil and overburden stockpiles and other disturbed areas stabilised if not used for 1 year
E09	Develop and implement an inspection and maintenance program for sediment and erosion control features developed for the operation.	G16R, G16Q, S22Q, G16P, S61Q, S31Q	Inspection and maintenance program developed and being implemented.
E10	Construct earthen drains to minimise the erosion / scouring.	G16P, G16R, G16Q, S31Q, S22Q	
E11	Install velocity check structures in drainage lines where required to minimise scouring.	G16P, S31Q, G16R, G16Q, S22Q	
E12	Maintain the angle of an exposed working face or stockpile within the angle of repose for the specific material.	S31Q, S22Q	
E13	Maintain the vertical face of the operating area to reduce sediment runoff.	S61Q	
E14	Locate operational activities outside of any areas designated as a Floodplain, Land Subject to Inundation and/or Special Water Supply Catchment.	S31Q	No buildings are located within the 100 yr flood zone.
E15	Capture process wastewater (e.g. from screening, sizing or washing activities) onsite for appropriate treatment, reuse and/or disposal.	S31Q	No turbid water (> 30 NTU) discharged to a waterway.
E16	Stabilise areas of disturbed land as soon as practicable to minimise erosion.	G16Q, G16P, G16R, S31Q, S22Q	70% groundcover established within 30 days.
E17	Plan and construct the final landform to minimise erosion and sediment runoff.	G16R	
E18	Install silt fences in drainage lines where the sediment particles are expected to be coarse (>0.02 mm).	G16Q, G16R, G16P	

5.3.3.3 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 5-16 Residual risk – erosion and sedimentation

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
S61Q	Erosion of the pit face from stormwater runoff	Quarrying	Possible	Minor	Medium

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
S24Q	Sediment impacting surface waters from sand washing during processing during quarrying phase	Quarrying	Rare	Insignificant	Low
S31Q	Erosion of stockpiles causing silting of surface waters during quarrying phase	Quarrying	Rare	Insignificant	Low
G16P	Erosion of waterways during flood during prequarrying phase	Prequarrying	Unlikely	Minor	Low
G16Q	Erosion of waterways during flood during quarrying phase	Quarrying	Unlikely	Minor	Low
G16R	Erosion of waterways during flood during rehabilitation phase	Rehabilitation	Unlikely	Minor	Low

5.3.4 Compliance standards and acceptance criteria

The compliance standards are the key best practice standards or guidelines that will be achieved with the control measures in place.

Table 5-17 Compliance standards – erosion and sedimentation

Performance standard	Environmental value	Assessment Criteria	Required studies
Environmental Reference Standard (Water – Surface Waters)		"Turbidity75th %ile <= 30 NTU	

5.3.5 Monitoring and reporting

Table 5-18 Summary of monitoring and reporting requirements – erosion and sedimentation

Monitoring aspect	Reporting details
Monitoring aspect	Monitoring details
Pit batters	Evidence of erosion
Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available
Stormwater infrastructure	Infrastructure functionality

5.3.6 Relevant industry publications

- Mining and quarrying – Guide to preventing harm to people and the environment. (EPA Victoria 2020)
- Erosion, sediment, and dust: Treatment train (EPA Victoria 2020)
- Managing truck and other vehicle movement (EPA Victoria 2020)
- Construction techniques for sediment pollution control (EPA Victoria 1991)
- Civil construction, building and demolition guide (EPA Victoria 2020)

5.4 RISK TREATMENT PLAN – FIRE

5.4.1 Scope

This risk treatment plan is for the control of fire.

5.4.2 Sensitive receptors

The sensitive receptors associated with this hazard include:

Table 5-19 Receptors – fire

Receptor	Location and Proximity	Potential Impact to Receptor	Evidence supporting assessment
Property	Neighbouring properties	Loss of equipment and infrastructure	Incident register

5.4.3 Risks

5.4.3.1 Inherent risk assessment

Table 5-20 Inherent risk – fire

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
G14Q	Plant/machinery/hot works igniting a fire and escaping the site	Quarrying	Unlikely	Minor	Low

5.4.3.2 Control measures to address hazard

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 5-21 Control measures – fire

Control ID	Control Description	Risk Event ID	Performance measure
F02	No hot work to be undertaken in the open air on days of Total Fire Ban.	G14Q	No ignition sources used on Total Fire ban days.
F03	No hot work to be undertaken in the open air during the fire danger period without a permit from CFA.	G14Q	Hot works only carried out in open air with a CFA permit.
F04	Check the National Fire Danger Rating for the area of the site each work day during the prescribed fire danger period. Communicate the hazard rating and any specific instructions to site personnel.	G14Q	Fire Danger Rating checked daily and communicated
F05	Provide fire-fighting equipment in all onsite vehicles and mobile plant at least during the statutory fire danger period and maintain the equipment in good working order.	G14Q	Fire-fighting equipment in all vehicles.
F06	Provide fire-fighting equipment in all site buildings and maintain it in good working order.	G14Q,	Fire-fighting equipment in all site buildings.
F07	Flammable and combustible wastes will be removed from the site as soon as practicable.	G14Q	No flammable waste is stockpiled onsite.
F11	Do not work in defined bushfire prone areas under Code Red conditions.	G14Q	No work in bushfire prone area on Code Red days.

Control ID	Control Description	Risk Event ID	Performance measure
F12	Inspect the undersides of vehicles to ensure they are kept free of vegetation and combustible debris.	G14Q	

5.4.3.3 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 5-22 Residual risk – fire

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
G14Q	Plant/machinery/hot works igniting a fire and escaping the site	Quarrying	Rare	Minor	Low

5.4.4 Compliance standards and acceptance criteria

There are no compliance standards for fire.

5.4.5 Monitoring and reporting

Table 5-23 Summary of monitoring and reporting requirements – fire

Monitoring aspect	Reporting details
Monitoring aspect	Monitoring details
Incident records	Occurrence

5.4.6 Relevant industry publications

- Country Fire Authority Act (1958)
- Country Fire Authority Regulations (2015)
- Metropolitan Fire Brigades Act (1958)
- Planning and Environment Act (1987)

5.5 RISK TREATMENT PLAN – FUEL, LUBRICANTS AND HAZARDOUS MATERIALS

5.5.1 Scope

This risk treatment plan is for the control of fuel, lubricants and hazardous materials.

5.5.2 Sensitive receptors

The sensitive receptors associated with this hazard include:

Table 5-24 Receptors – fuels, lubricants and hazardous materials

Receptor	Location and Proximity	Potential Impact to Receptor	Evidence supporting assessment
Air	Site and surrounds	Airborne contaminants	Maintenance records
Ecosystems	Onsite waterway	Contamination, reduced resilience	SW monitoring data
Groundwater	Onsite	Contamination from spills	Site inspection records
Groundwater	Onsite	Contamination of groundwater from fuel chemical spills	Site inspection records
Groundwater	Onsite	Contamination of groundwater from fuel chemical spills	Site inspection records
Groundwater	Onsite	Leakage of septic tank liquids into groundwater	GW monitoring data if available
Groundwater	Onsite	Spills	Site inspection records
Land	Onsite	Contamination from spills	Site Inspection records
Land	Onsite	Contamination of land from pump fuel spill	Site Inspection records
Land	Onsite	Excess herbicides contaminating land	Site inspection records
Soil	Onsite	Contamination from fuel chemical spills	Site inspection records
Soil	Onsite	Contamination of soil from fuel chemical spills	Site inspection records
Staff	Onsite	Physical health impacts from inhaling fumes	OHS records
Staff	Onsite	Staff wellbeing	Site inspection records
Surface water	Onsite waterway	Contamination from spills	SW monitoring data
Surface water	Onsite waterway	Contamination of surface water from fuel chemical spills	SW monitoring data
Surface water	Onsite waterway	Contamination of surface water from pump fuel spill	SW monitoring data
Surface water	Onsite waterway	Excess herbicides washing into creeks and waterbodies	SW monitoring data
Surface water	Onsite waterway	Wastewater contaminating surface water from vehicle and machine wash down and maintenance	Site inspection reports

5.5.3 Risks

5.5.3.1 Inherent risk assessment

Table 5-25 Inherent risk – fuels, lubricants and hazardous materials

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S38Q	Contamination of groundwater from spills during quarrying phase	Quarrying	Unlikely	Minor	Low

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
G09P	Chemical usage impacting surface waters during operations during prequarrying phase	Prequarrying	Rare	Insignificant	Low
G09Q	Chemical usage impacting surface waters during operations during quarrying phase	Quarrying	Rare	Insignificant	Low
G09R	Chemical usage impacting surface waters during operations during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
G09C	Chemical usage impacting surface waters during operations post closure phase	Post-closure	Rare	Insignificant	Low
G10P	Chemical usage impacting land during operations during prequarrying phase	Prequarrying	Rare	Insignificant	Low
G10Q	Chemical usage impacting land during operations during quarrying phase	Quarrying	Rare	Insignificant	Low
G10R	Chemical usage impacting land during operations during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
G10C	Chemical usage impacting land during operations during post-closure phase	Post-closure	Rare	Insignificant	Low
G34P	Fumes from vehicle and machinery exhaust polluting the air	Prequarrying	Likely	Insignificant	Medium
G34Q	Fumes from vehicle and machinery exhaust polluting the air	Quarrying	Likely	Insignificant	Medium
G34R	Fumes from vehicle and machinery exhaust polluting the air	Rehabilitation	Likely	Insignificant	Medium
G38P	Odour released from chemical storage	Prequarrying	Rare	Insignificant	Low
G38Q	Odour released from chemical storage	Quarrying	Rare	Insignificant	Low
G38R	Odour released from chemical storage	Rehabilitation	Rare	Insignificant	Low
G39P	Wastewater from washing vehicles and machines flowing to surface water bodies	Prequarrying	Rare	Minor	Low
G39Q	Wastewater from washing vehicles and machines flowing to surface water bodies	Quarrying	Rare	Minor	Low
G39R	Wastewater from washing vehicles and machines flowing to surface water bodies	Rehabilitation	Rare	Minor	Low
G40P	Leaking septic tank contaminating groundwater	Prequarrying	Unlikely	Insignificant	Low
G40Q	Leaking septic tank contaminating groundwater	Quarrying	Unlikely	Insignificant	Low
G40R	Leaking septic tank contaminating groundwater	Rehabilitation	Unlikely	Insignificant	Low
G01P	Contamination impacts to soil from chemical spills during vehicle maintenance works during prequarrying phase	Prequarrying	Unlikely	Insignificant	Low
G01Q	Contamination impacts to soil from chemical spills during vehicle maintenance works during quarrying phase	Quarrying	Possible	Insignificant	Low
G01R	Contamination impacts to soil from chemical spills during vehicle maintenance works during rehabilitation phase	Rehabilitation	Unlikely	Insignificant	Low
G02P	Contamination impacts to groundwater from chemical spills during vehicle maintenance works during prequarring phase	Prequarrying	Rare	Insignificant	Low

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
G02Q	Contamination impacts to groundwater from chemical spills during vehicle maintenance works during quarrying phase	Quarrying	Rare	Insignificant	Low
G02R	Contamination impacts to groundwater from chemical spills during vehicle maintenance works during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
G03P	Contamination impacts to surface waters from chemical spills during vehicle maintenance works during prequarrying phase	Prequarrying	Unlikely	Insignificant	Low
G03Q	Contamination impacts to surface waters from chemical spills during vehicle maintenance works during quarrying phase	Quarrying	Unlikely	Insignificant	Low
G03R	Contamination impacts to surface waters from chemical spills during vehicle maintenance works during rehabilitation phase	Rehabilitation	Unlikely	Insignificant	Low
G04P	Contamination impacts to ecosystems from chemical spills during vehicle maintenance works during prequarrying phase	Prequarrying	Rare	Insignificant	Low
G04Q	Contamination impacts to ecosystems from chemical spills during vehicle maintenance works during quarrying phase	Quarrying	Rare	Insignificant	Low
G04R	Contamination impacts to ecosystems from chemical spills during vehicle maintenance works during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
G19P	Chemical / fuel from pumps impacting land during pumping after heavy rainfall event during prequarrying	Prequarrying	Unlikely	Insignificant	Low
G19Q	Chemical / fuel from pumps impacting land during pumping after heavy rainfall event during quarrying	Quarrying	Unlikely	Insignificant	Low
G19R	Chemical / fuel from pumps impacting land during pumping after heavy rainfall event during rehabilitation	Rehabilitation	Unlikely	Insignificant	Low
G20P	Chemical / fuel from pumps impacting waterways during pumping after heavy rainfall event during prequarrying	Prequarrying	Rare	Insignificant	Low
G20Q	Chemical / fuel from pumps impacting waterways during pumping after heavy rainfall event during quarrying	Quarrying	Rare	Insignificant	Low
G20R	Chemical / fuel from pumps impacting waterways during pumping after heavy rainfall event during rehabilitation	Rehabilitation	Rare	Insignificant	Low
S28Q	Contamination of groundwater from spills in the processing area during quarrying phase	Quarrying	Unlikely	Minor	Low
S29Q	Contamination of land from spills in the processing area during quarrying phase	Quarrying	Possible	Minor	Medium
S30Q	Contamination of surface water from spills in the processing area during quarrying phase	Quarrying	Unlikely	Insignificant	Low

5.5.3.2 Control measures to address hazard

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 5-26 Control measures – fuels, lubricants and hazardous materials

Control ID	Control Description	Risk Event ID	Performance measure
C01	Limit the volume of hazardous substances stored onsite to the minimum required for the activity.	G04R, S38Q, G02Q, G02R, G20R, G03P, G03Q, G03R, G02P, G19R, G20Q, G09P, G19Q, G09Q, G09R, G19P, G10P, G10Q, G10R, G20P, G04Q, G01Q, G04P, G01P, G01R	
C02	Provide impervious secondary containment for all HazSub storage areas.	G39P, G10R, G10Q, G10P, G01Q, G01P, G39Q, G39R, G01R, G02Q, G02P, G02R	Bunding sufficient to hold 125% of the total volume of HazSub is provided.
C03	Protect HazSub storage areas from rainfall and stormwater ingress.	G02R, G09P, G01Q, G09Q, G03R, G02Q, G09R, G01R, G10P, G03Q, G01P, G02P, G10Q, G03P, G10R	HazSub storage areas are roofed or otherwise enclosed.
C04	Locate HazSub storage away from areas of protected habitat and/or waterways.	G09Q, G09P, G04P, G04R, G09R, G40P, G03Q, G40R, G40Q, G03P, G03R, G04Q	50 m buffer distance maintained between HazSub storage areas and protected habitat and/or waterways.
C05	Label all containers of hazardous substances (including decanted substances and wastes) with the name of the material and the correct hazard symbol.	G10P, G02P, G01P, G03P, G10R, G01Q, G03R, G09R, G01R, G09P, G02R, G10Q, G02Q, G03Q, G09Q	All containers of HazSub are correctly labelled.
C06	Provide and maintain spill kits at all HazSub storage and handling areas.	G01Q, G02R, G10P, G39R, G02P, G39Q, G10Q, G01P, G39P, G01R, G02Q, G10R, G20P, G19P, G20R, G20Q, G19R, G19Q	Spill kits present at all HazSub storage and handling areas.
C07	Remediate and report spills of hazardous substances as soon as they are identified.	G10P, G01R, G19Q, G20R, S38Q, G02P, G02R, G02Q, G19P, G20Q, G19R, G01P, G01Q, G20P, G10R, G10Q	Spills and contaminated areas remediated and reported within 24 hours of discovery.
C08	Inspect and maintain spill control equipment, (e.g. bunds, oil water interceptors, sediment traps, ponds etc) to ensure sufficient capacity is available to contain contaminated run-off.	G39P, G20R, G19R, G02R, G09Q, G19Q, G03P, G03Q, G20Q, G39Q, G09P, G03R, G20P, G39R, G09C, G19P, G01P, G10Q, G09R, G02Q, G10P, G10R, G01Q, G01R, S38Q, G10C, G02P	Visual inspection.
C10	Contain process waste waters (e.g. from screening, sizing, or washing activities) for treatment, reuse and/or disposal as required.	G03Q, G02R, G03P, G02P, G02Q	Containment structures are sufficient to contain the total volume of wastewater.
C11	Underground tanks / sumps for the storage of hazardous substances (such as fuel, waste oils, effluent) are not installed at the site.	G01P, G01R, G01Q, G02Q, G02R, G02P	No underground storage structures are present
C12	Provide spill protection around areas used for onsite refuelling and/or maintenance.	G19R, G39P, G01P, G03R, G20P, G39Q, G01R, G39R, G20Q, G03Q, G19Q, G19P, G20R, S38Q, G01Q, G03P	All equipment maintenance areas are protected against leaks and spills.
C13	Field personnel provided with information and training on spill control measures to prevent the discharge of contaminants from the site.	G01P, G04R, G04Q, G20Q, G02Q, G20R, G03R, G03Q, S38Q, G04P, G02P, G20P, G01R, G02R, G01Q, G03P, G19R, G10P, G10R, G09P, G09C, G09R, G39Q, G10C, G10Q, G19Q, G19P, G09Q, G39P, G39R	Personnel with relevant training on site or available during operating hours.

Control ID	Control Description	Risk Event ID	Performance measure
C14	Discharge to surface water bodies shall not exceed the trigger values in ANZECC Guidelines/ERS for the applicable segment of the environment and its environmental values.	G20P, G20R, G09P, G03Q, G09R, G03R, G03P, G09C, G20Q, G09Q	Water discharges to surface water bodies or groundwater satisfy applicable ANZECC/ERS standards.
C15	Any discharge of treated or process water to the environment will be subject to EPA licencing.	G03P, G03Q	Any discharge of treated or process water to the environment is licenced.
C16	Maintain a register of hazardous and flammable substances held on site.	G02Q, G10R, G01R, G01P, G02R, G01Q, G10P, G10Q, G02P	Register established and maintained.
C17	Document and report to EPA any spill of hazardous or flammable substances stored or used on site.	G09C, G01Q, G03P, G09P, G02R, G10R, G09Q, G02Q, G10Q, G03Q, G01P, S38Q, G02P, G10C, G03R, G01R, G09R, G10P	Record of spill reports maintained.
C18	Select less hazardous substances for use onsite where practicable.	G04R, G10Q, G04Q, G02R, G01P, G09R, G10R, G09Q, G03P, G09C, G03R, G01R, G01Q, G02Q, G10C, G03Q, G10P, G02P, G04P, G09P	
C21	Limit activities involving the handling or generation of hazardous substances to the extent practicable (e.g. vehicle maintenance activities conducted offsite).	G09R, G10C, G10R, G01Q, G01R, G03R, G09P, G03P, G01P, G09C, G03Q, G10P, G10Q, G09Q	
C22	Provide spill protection for areas where hazardous wastes are generated or stored, (e.g. empty fuel or chemical containers, contaminated sediments).	G39P, G10Q, G09R, G01P, G10P, G01R, G03P, G39Q, G39R, G03Q, G10R, G09Q, G09P, G01Q, G03R	
C23	An assessment for potential contamination and disposal in accordance with EPA requirements for waste materials, including materials generated from spill control activities	G01R, G01P, G10P, G10Q, G01Q, G03Q, G19R, G03R, G19Q, G20P, G03P, G09P, G20Q, G19P, G09Q, G10R, G20R, G09R	
C24	Construction and maintenance of onsite drainage to limit surface water flow onto / off areas where hazardous substances are stored or handled.	G03R, G03P, G03Q, G09P, G09R, G09Q	
C26	If required, design, installation and certification in accordance with AS4897 (Design, Installation and Operation of UPSS) for new underground tanks / sumps for the storage of hazardous substances (such as fuel, waste oils, effluent).	G01P, G02P, G01R, G02Q, G02R, G01Q	
C28	Service and tune machinery regularly	G34P, G34Q, G34R,	Conformance to maintenance schedule
C29	Ensure storage/workshop areas are well ventilated	G38R, G38P, G38Q	
C31	Implement targeted monitoring where impact is suspected	S30Q, S28Q, S29Q	
C01	Limit the volume of hazardous substances stored onsite to the minimum required for the activity.	G04R, S38Q, G02Q, G02R, G20R, G03P, G03Q, G03R, G02P, G19R, G20Q, G09P, G19Q, G09Q, G09R, G19P, G10P, G10Q, G10R, G20P, G04Q, G01Q, G04P, G01P, G01R	

5.5.3.3 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 5-27 Residual risk – fuels, lubricants and hazardous materials

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
S38Q	Contamination of groundwater from spills during quarrying phase	Quarrying	Unlikely	Insignificant	Low
S28Q	Contamination of groundwater from spills in the processing area during quarrying phase	Quarrying	Rare	Minor	Low
S29Q	Contamination of land from spills in the processing area during quarrying phase	Quarrying	Possible	Insignificant	Low
S30Q	Contamination of surface water from spills in the processing area during quarrying phase	Quarrying	Rare	Insignificant	Low
G09P	Chemical usage impacting surface waters during operations during prequarrying phase	Prequarrying	Rare	Insignificant	Low
G09Q	Chemical usage impacting surface waters during operations during quarrying phase	Quarrying	Rare	Insignificant	Low
G09R	Chemical usage impacting surface waters during operations during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
G09C	Chemical usage impacting surface waters during operations post closure phase	Post-closure	Rare	Insignificant	Low
G10P	Chemical usage impacting land during operations during prequarrying phase	Prequarrying	Rare	Insignificant	Low
G10Q	Chemical usage impacting land during operations during quarrying phase	Quarrying	Rare	Insignificant	Low
G10R	Chemical usage impacting land during operations during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
G10C	Chemical usage impacting land during operations during post-closure phase	Post-closure	Rare	Insignificant	Low
G34P	Fumes from vehicle and machinery exhaust polluting the air	Prequarrying	Likely	Insignificant	Medium
G34Q	Fumes from vehicle and machinery exhaust polluting the air	Quarrying	Likely	Insignificant	Medium
G34R	Fumes from vehicle and machinery exhaust polluting the air	Rehabilitation	Likely	Insignificant	Medium
G38P	Odour released from chemical storage	Prequarrying	Rare	Insignificant	Low
G38Q	Odour released from chemical storage	Quarrying	Rare	Insignificant	Low
G38R	Odour released from chemical storage	Rehabilitation	Rare	Insignificant	Low
G39P	Wastewater from washing vehicles and machines flowing to surface water bodies	Prequarrying	Rare	Insignificant	Low
G39Q	Wastewater from washing vehicles and machines flowing to surface water bodies	Quarrying	Rare	Insignificant	Low
G39R	Wastewater from washing vehicles and machines flowing to surface water bodies	Rehabilitation	Rare	Insignificant	Low
G40P	Leaking septic tank contaminating groundwater	Prequarrying	Unlikely	Insignificant	Low
G40Q	Leaking septic tank contaminating groundwater	Quarrying	Unlikely	Insignificant	Low

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
G40R	Leaking septic tank contaminating groundwater	Rehabilitation	Unlikely	Insignificant	Low
G01P	Contamination impacts to soil from chemical spills during vehicle maintenance works during prequarrying phase	Prequarrying	Rare	Insignificant	Low
G01Q	Contamination impacts to soil from chemical spills during vehicle maintenance works during quarrying phase	Quarrying	Unlikely	Insignificant	Low
G01R	Contamination impacts to soil from chemical spills during vehicle maintenance works during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
G02P	Contamination impacts to groundwater from chemical spills during vehicle maintenance works during prequarring phase	Prequarrying	Rare	Insignificant	Low
G02Q	Contamination impacts to groundwater from chemical spills during vehicle maintenance works during quarrying phase	Quarrying	Rare	Insignificant	Low
G02R	Contamination impacts to groundwater from chemical spills during vehicle maintenance works during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
G03P	Contamination impacts to surface waters from chemical spills during vehicle maintenance works during prequarrying phase	Prequarrying	Rare	Insignificant	Low
G03Q	Contamination impacts to surface waters from chemical spills during vehicle maintenance works during quarrying phase	Quarrying	Rare	Insignificant	Low
G03R	Contamination impacts to surface waters from chemical spills during vehicle maintenance works during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
G04P	Contamination impacts to ecosystems from chemical spills during vehicle maintenance works during prequarrying phase	Prequarrying	Rare	Insignificant	Low
G04Q	Contamination impacts to ecosystems from chemical spills during vehicle maintenance works during quarrying phase	Quarrying	Rare	Insignificant	Low
G04R	Contamination impacts to ecosystems from chemical spills during vehicle maintenance works during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
G19P	Chemical / fuel from pumps impacting land during pumping after heavy rainfall event during prequarrying	Prequarrying	Rare	Insignificant	Low
G19Q	Chemical / fuel from pumps impacting land during pumping after heavy rainfall event during quarrying	Quarrying	Rare	Insignificant	Low
G19R	Chemical / fuel from pumps impacting land during pumping after heavy rainfall event during rehabilitation	Rehabilitation	Rare	Insignificant	Low
G20P	Chemical / fuel from pumps impacting waterways during pumping after heavy rainfall event during prequarrying	Prequarrying	Rare	Insignificant	Low

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
G20Q	Chemical / fuel from pumps impacting waterways during pumping after heavy rainfall event during quarrying	Quarrying	Rare	Insignificant	Low
G20R	Chemical / fuel from pumps impacting waterways during pumping after heavy rainfall event during rehabilitation	Rehabilitation	Rare	Insignificant	Low

5.5.4 Compliance standards and acceptance criteria

The compliance standards are the key best practice standards or guidelines that will be achieved with the control measures in place.

Table 5-28 Compliance standards – fuels, lubricants and hazardous materials

Performance standard	Environmental value	Assessment Criteria	Required studies
Environment Reference Standard (Water – Groundwater)	Water dependent ecosystems & species	ERS Division 3 Part 5	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Water – Groundwater)	Potable water acceptable	Indicators specified in the ADWG	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Water – Groundwater)	Irrigation	Indicators specified for irrigation and water for general on-farm use in the ANZG	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Water – Groundwater)	Stockwater	Indicators specified for livestock drinking water quality in the ANZG	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Waters – Groundwater)	Industrial and commercial	Indicators specific to the particular industrial or commercial activity and their use of water	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Waters – Groundwater)	Water-based recreation (primary contact recreation)	E. coli	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Waters – Groundwater)	Water-based recreation (primary contact recreation)	Chemical hazards, aesthetic effects	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Waters – Groundwater)	Traditional Owners Cultural Values	in consultation with Traditional Owners and may be informed by the process identified in the ANZG for determining cultural and spiritual values "	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Waters – Groundwater)	Buildings and Structures	pH, sulphate, chloride, redox potential, salinity or any chemical substance or waste that may have a detrimental impact on the structural integrity of buildings or other structures	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Land)	Human health	Inorganic and organic contaminants in Appendix A of Schedule B2 of the NEPM (ASC) and any other contaminants present at the site as determined by the current use or site history assessed in accordance with the NEPM (ASC)	An Environmental Assessment is required if contamination is suspected
Environment Reference Standard (Land)	Buildings and structures	pH, sulfate, chloride, redox potential, salinity or any chemical substance or waste that may have a detrimental impact on the structural integrity of buildings or other structures	An Environmental Assessment is required if contamination is suspected
Environment Reference Standard (Land)	Highly modified ecosystems	Inorganic and organic contaminants in Appendix A of Schedule B2 of the NEPM (ASC) and any other contaminants present at the site as determined by the current use or site history assessed in accordance with the NEPM (ASC)	An Environmental Assessment is required if contamination is suspected
Environment Reference Standard (Water – Surface water)	Aquaculture	Faecal (thermotolerant) coliforms (median from 5 samples)	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water – Surface water)	Water dependent ecosystems & species - highly modified	ANZG Ecosystem Guidelines (highly modified) and additional indicators are specified in Tables 5.8 and 5.9 of the ERS.	If Inherent risk is High or Very High a hydrological study is required

Performance standard	Environmental value	Assessment Criteria	Required studies
Environment Reference Standard (Water – Surface water)	Agriculture and irrigation (irrigation)	Indicators specified for irrigation and water for general on-farm use in the ANZG	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water – Surface water)	Water-based recreation (primary contact)	E. coli¸ enterococci	Water quality objectives to be derived from a risk assessment approach following industry best practice and guidance published or approved by EPA
Environment Reference Standard (Water – Surface water)		Tot P 75th %: <= 110 ug/L; Tot N 75th %: <= 1300 ug/L; DO 25th %: >= 70 %sat; DO max: 130 %sat; Turbidity 75th %: <= 35 NTU; EC 75th%: <= 500 uS/cm; pH 25th%: >= 6.4 pH units; pH 75th%: <= 7.9 pH units; Toxicants: 90% protection;	
Environment Reference Standard (Water – Surface water)	Cultural & Spiritual Values	No generic investigation levels or thresholds for cultural and spiritual values have been adopted. A qualitative assessment of potential impacts to this beneficial use is recommended. Current default based around WDE protection & water-based recreation (	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water – Surface water)	Traditional Owners Cultural Values	Objectives must be developed in consultation with Traditional Owners and may be informed by the process identified in the ANZG for determining cultural and spiritual values	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water – Surface water)	Water-based recreation (aesthetic enjoyment)	Harmful algae, chemical hazards, aesthetic effects	"
Environment Reference Standard (Water – Surface water)	Water-based recreation (secondary contact)	Harmful algae, chemical hazards, aesthetic effects	"
Environment Reference Standard (Water – Surface water)	Agriculture and irrigation (stock)	Indicators specified for livestock drinking water quality in the ANZG	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water – Surface water)	Water-based recreation (primary contact)	Harmful algae, chemical hazards, aesthetic effects	"
Environment Reference Standard (Water – Surface water)	Human consumption of aquatic foods	Indicators specified for metal contaminants, non-metal contaminants, natural toxicants, and mercury in Schedule 19 (Maximum levels of contaminants and natural toxicants) of the Food Standards Code	If Inherent risk is High or Very High a hydrological study is required
Environmental Reference Standard (Water – Surface water)	Industrial and commercial	Indicators specific to the particular industrial or commercial activity and their use of water	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water – Surface water)	Aquaculture	Indicators specified for metal contaminants, non-metal contaminants, natural toxicants, and mercury in Schedule 19 (Maximum levels of contaminants and natural toxicants) of the Food Standards Code	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water – Surface water)	Aquaculture	Off-favour compounds	If Inherent risk is High or Very High a hydrological study is required

Performance standard	Environmental value	Assessment Criteria	Required studies
Environment Reference Standard (Water – Surface water)	Aquaculture	Toxicants	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water – Surface water)	Aquaculture	Physical and chemical stressors	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water – Surface water)	Human consumption after appropriate treatment	Indicators specified in the ADWG	Applicable for water supply in special water supply catchments in Schedule 5 of the Catchment and Land Protection Act 1994 or the Safe Drinking Water Act 2003.If Inherent risk is High or Very High a hydrological study is required.
Environment Reference Standard (Water – Surface water)	Water-based recreation (secondary contact)	E. coli¸ enterococci	Water quality objectives to be derived from a risk assessment approach following industry best practice and guidance published or approved by EPA

5.5.5 Monitoring and reporting

Table 5-29 Summary of monitoring and reporting requirements – fuels, lubricants and hazardous materials

Monitoring aspect	Reporting details
Monitoring aspect	Monitoring details
Containment and treatment	Wastewater management
GW sampling and analysis	Organic indicators
Maintenance records	Servicing frequency
OHS records	Occurrence
Site Inspection	Occurrence of odour
Site Inspection	Occurrence of odours
Surface water	Surface water sampling and analysis
Vegetation health	Site inspection
Visible evidence of spill	Site inspection
Visible impact	Site inspection

5.5.6 Relevant industry publications

- Environment Protection (Scheduled Premises & Exemptions) Regulations (2017)
- Environment Protection (Industrial Waste Resource) Regulations (2009)
- AS1940 – Storage and Handling of Flammable and Combustible Liquids
- Mining and quarrying – Guide to preventing harm to people and the environment. (EPA Victoria 2020)
- Liquid Storage and Handling Guidelines. (EPA 2018)
- Environment Protection Regulations – (Victorian Government 2021)
- Environment Reference Standard – EPA 2021
- Notifiable contamination guideline – Duty to notify of contaminated land - (EPA 2021)
- Assessing and controlling contaminated land risks: A guide to meeting the duty to manage for those in management or control of land (EPA 2021)

5.6 RISK TREATMENT PLAN – NOISE

5.6.1 Scope

This risk treatment plan is for the control of noise.

A specialist study has been undertaken by Watson Moss Growcott. This is contained as an appendix to **Part 1 Summary Report.**

5.6.2 Sensitive receptors

The sensitive receptors associated with this hazard include:

Table 5-30 Receptors – noise

Receptor	Location and Proximity	Potential Impact to Receptor	Evidence supporting assessment
Neighbours	200m west of West Pit and 190m north-east of East Pit	Increased noise	Complaint Register, Site inspection records
Neighbours	200m west of West Pit and 190m north-east of East Pit	Noise disturbance	Complaint Register, Site inspection records
Neighbours	200m west of West Pit and 190m north-east of East Pit	Noise pollution	Complaint Register, Site inspection records

5.6.3 Risks

5.6.3.1 Inherent risk assessment

Table 5-31 Inherent risk – noise

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S03P	Noise impacting neighbours from equipment and trucks during construction works during prequarrying phase	Prequarrying	Possible	Minor	Medium
S03Q	Noise impacting neighbours from equipment and trucks during construction works during quarrying phase	Quarrying	Possible	Minor	Medium
S03R	Noise impacting neighbours from equipment and trucks during construction works during rehabilitation phase	Rehabilitation	Rare	Minor	Low
S07P	Noise impacting neighbours from equipment during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Unlikely	Minor	Low
S17P	Noise impacting neighbours from equipment during overburden stripping works during prequarrying phase	Prequarrying	Possible	Minor	Medium
S42P	Pumps from dewatering creating noise beyond the site boundary	Prequarrying	Rare	Insignificant	Low
S42Q	Pumps from dewatering creating noise beyond the site boundary	Quarrying	Rare	Insignificant	Low
S20Q	Noise impacting neighbours from product excavation and transport onsite during dry extraction	Quarrying	Possible	Minor	Medium
S26Q	Noise impacting neighbours from screening during processing during quarrying phase	Quarrying	Likely	Moderate	High

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S32Q	Noise impacting neighbours from loading of product during processing during quarrying phase	Quarrying	Unlikely	Insignificant	Low
S35Q	Noise impacting neighbours from transporting product during processing during quarrying phase	Quarrying	Possible	Moderate	Medium

5.6.3.2 Control measures to address hazard

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 5-32 Control measures – noise

Control ID	Control Description	Risk Event ID	Performance measure
N01	Locate noise generating plant and equipment away from noise sensitive receptors or land uses.	S26Q, S42Q, S42P, S32Q	Minimum 200 m buffer distance maintained between operational areas and noise sensitive receptors.
N02	Plan the site layout to screen operational areas from noise sensitive receptors.	S42Q, S32Q, S42P, S26Q, S20Q, S03Q	Locations with noise generating activities effectively screened from noise sensitive receptors.
N03	Maintain (active) site roads in good condition.	S03Q, S03P, S03R, S35Q	
N04	Fit internal combustion engines with suitable mufflers and maintain equipment in good repair.	S07P, S26Q, S32Q, S20Q, S03R, S17P, S03Q, S03P	All internal combustion engines are fitted with a functional muffler.
N05	Fit mobile noise generating equipment with noise attenuation devices (e.g. enclosures, baffles, silencers etc) and maintain equipment in good repair.	S03R, S07P, S26Q, S17P, S03P, S20Q, S42P, S42Q, S03Q, S32Q	Noise abatement devices fitted to all mobile noise generating plant.
N06	Limit offsite materials haulage activities to standard operating hours.	S17P, S35Q, S03Q, S07P	
N07	Turn off plant, equipment and vehicles when not in use.	S03P, S26Q, S17P, S03Q, S03R, S07P, S32Q, S20Q	No plant, equipment or vehicles remain on when not in use.
N09	Installed security alarms will be the silent type connected to a security service.	S07P, S17P, S32Q, S03Q, S03P, S03R, S26Q	No audible security alarms are used.
N10	Fit all pneumatic tools with an effective silencer on the air exhaust port.	S26Q	All pneumatic tools fitted with exhaust silencers.
N11	No broadcast or loudspeaker system, telephone ringer or other external alarm will be used, except as a warning alarm for blasting (when required).	S32Q, S26Q	No external broadcast systems are used.
N12	Develop and implement noise monitoring program where there are noise-sensitive receptors located within 500 m of the Work Authority area.	S07P, S32Q, S03R, S20Q, S03P, S03Q, S42P, S17P, S42Q, S35Q, S26Q	Noise monitoring program developed and being implemented.
N13	Extraction in the northern areas between 0600-0700 to be below 6 mbgl, or below 3 mbgl with a 3m high bund between pit and receptor	S20Q, S17P, S26Q, S42P, S03P, S32Q, S03Q, S42Q, S07P, S03R	Operations restricted between 0600-0700

Control ID	Control Description	Risk Event ID	Performance measure
N14	Maintain noise generating equipment (e.g. crushers, earth moving equipment) in good working order and accordance with the manufacturer's specifications.	S32Q, S26Q	
N15	Noise bund 3m high on western side of haul route to west pit	S07P, S03Q, S17P, S20Q, S35Q, S32Q, S26Q, S03P	Effective screening at western receptor
N16	Provide personnel with information and training on the site's noise mitigation measures.	S35Q, S17P, S42Q, S42P, S07P, S03Q, S26Q, S03P, S20Q, S32Q, S03R	100% personnel trained within 1 month of start date.
N17	Specify low noise generating equipment when selecting equipment for use onsite.	S20Q, S42Q, S17P, S32Q, S03Q, S26Q, S07P, S42P, S03P, S35Q	
N21	Use broadband reversing alarms	S32Q, S26Q	
N22	Locate working areas, loading areas and stockpiles to minimise the need for vehicles (with reversing alarms) to reverse onsite.	S26Q, S32Q, S35Q	

If necessary the following additional controls can be implemented:

- Not operating the processing plant between 6am and 7am
- Not operating the processing plant after 8pm if there are westerly breezes

5.6.3.3 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 5-33 Residual risk – noise

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
S03P	Noise impacting neighbours from equipment and trucks during construction works during prequarrying phase	Prequarrying	Unlikely	Minor	Low
S03Q	Noise impacting neighbours from equipment and trucks during construction works during quarrying phase	Quarrying	Unlikely	Minor	Low
S03R	Noise impacting neighbours from equipment and trucks during construction works during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
S07P	Noise impacting neighbours from equipment during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Rare	Minor	Low
S17P	Noise impacting neighbours from equipment during overburden stripping works during prequarrying phase	Prequarrying	Unlikely	Minor	Low
S42P	Pumps from dewatering creating noise beyond the site boundary	Prequarrying	Rare	Insignificant	Low
S42Q	Pumps from dewatering creating noise beyond the site boundary	Quarrying	Rare	Insignificant	Low

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
S20Q	Noise impacting neighbours from product excavation and transport onsite during dry extraction	Quarrying	Unlikely	Minor	Low
S26Q	Noise impacting neighbours from screening during processing during quarrying phase	Quarrying	Possible	Minor	Medium
S32Q	Noise impacting neighbours from loading of product during processing during quarrying phase	Quarrying	Unlikely	Insignificant	Low
S35Q	Noise impacting neighbours from transporting product during processing during quarrying phase	Quarrying	Possible	Minor	Medium

5.6.4 Compliance standards and acceptance criteria

The compliance standards are the key best practice standards or guidelines that will be achieved with the control measures in place.

Table 5-34 Compliance standards – noise

Performance standard	Environmental value	Assessment Criteria	Required studies
Environment Reference Standard (Ambient sound)	Sleep during the night		If Inherent risk is High or Very High a noise study is required

5.6.5 Monitoring and reporting

Table 5-35 Summary of monitoring and reporting requirements – noise

Monitoring aspect	Reporting details
Complaint register, site inspection records	Frequency and response to complaints noise observed near receptors

5.6.6 Relevant industry publications

- *SEPP N-1* (Victorian Government) as part of body of knowledge
- SEPP N-1 and NIRV Explanatory notes (EPA Publication 1412) as part of body of knowledge
- Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues (EPA Publication 1826)
- Noise guidelines: Assessing low frequency noise (EPA Publication 1996)
- Mining and quarrying – Guide to preventing harm to people and the environment (EPA Publication 1823)
- Noise Management Guidelines (CMPA 2016)
- Noise: mufflers or exhaust silencers (EPA Publication 1888)
- Noise: vibration isolation (EPA Publication 1892)
- Managing noise from reversing alarms (EPA Publication 1890)
- *Managing truck noise* (EPA Publication 1891)
- Noise: barriers and enclosures (EPA Publication 1886)

5.7 RISK TREATMENT PLAN – PESTS, WEEDS AND DISEASES

5.7.1 Scope

This risk treatment plan is for the control of pests, weeds and diseases.

5.7.2 Sensitive receptors

The sensitive receptors associated with this hazard include:

Table 5-36 Receptors – pests, weeds and diseases

Receptor	Location and Proximity	Potential Impact to Receptor	Evidence supporting assessment
Land	Onsite	Destabilises ground making it susceptible to erosion	Site inspection records
Native fauna	Onsite	Reduced habitat for fauna.	Site inspection records, fauna assessment data
Native fauna	Onsite and neighbouring properties	Predators may extend their range to neighbouring properties and bushland	Site inspection records, complaint register
Native flora	Onsite and neighbouring properties	Establishment of weed populations, especially in adjacent bushland	Site inspection reports
Neighbour's property	Site surrounds	Establishment of weed populations	Complaints register

5.7.3 Risks

5.7.3.1 Inherent risk assessment

Table 5-37 Inherent risk – pests, weeds and diseases

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S37P	Damage to fauna during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Unlikely	Insignificant	Low
G05P	Burrows impacting land from rabbits and foxes during prequarrying phase	Prequarrying	Unlikely	Insignificant	Low
G05Q	Burrows impacting land from rabbits and foxes during quarrying phase	Quarrying	Unlikely	Insignificant	Low
G05R	Burrows impacting land from rabbits and foxes during rehabilitation phase	Rehabilitation	Unlikely	Insignificant	Low
G05C	Burrows impacting land from rabbits and foxes during post-closure phase	Post-closure	Possible	Insignificant	Low
G06P	Predation of native fauna by foxes, cats and dogs during prequarrying phase	Prequarrying	Possible	Insignificant	Low
G06Q	Predation of native fauna by foxes, cats and dogs during quarrying phase	Quarrying	Possible	Insignificant	Low

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
G06R	Predation of native fauna by foxes, cats and dogs during rehabilitation phase	Rehabilitation	Possible	Insignificant	Low
G06C	Predation of native fauna by foxes, cats and dogs during post closure phase	Post-closure	Possible	Insignificant	Low
G07P	Weed infestations impacting neighbour's property during operations during prequarrying phase	Prequarrying	Unlikely	Minor	Low
G07Q	Weed infestations impacting neighbour's property during operations during quarrying phase	Quarrying	Unlikely	Minor	Low
G07R	Weed infestations impacting neighbour's property during operations during rehabilitation phase	Rehabilitation	Unlikely	Minor	Low
G07C	Weed infestations impacting neighbour's property during operations during post closure phase	Post-closure	Possible	Minor	Medium
G08P	Weed infestations impacting native flora during operations during prequarrying phase	Prequarrying	Rare	Minor	Low
G08Q	Weed infestations impacting native flora during operations during quarrying phase	Quarrying	Rare	Minor	Low
G08R	Weed infestations impacting native flora during operations during rehabiltiation phase	Rehabilitation	Rare	Minor	Low
G08C	Weed infestations impacting native flora during operations during post-closure phase	Post-closure	Possible	Minor	Medium

5.7.3.2 Control measures to address hazard

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 5-38 Control measures – pests, weeds and diseases

Control ID	Control Description	Risk Event ID	Performance measure
P02	Identify and map areas within the Work Authority boundary that contain declared noxious weeds (under the CaLP Act) and establish exclusion zones.	G08R, G08Q, G07Q, G08P, G07R, G07C, G07P, G08C	Areas containing declared weed species are not disturbed by site activities.
P03	Eradicate or control any declared noxious weeds or established pest animals present on the Work Authority area	G08Q, G07C, G08C, G08P, G07P, G07R, G07Q, G08R	Infestations of declared noxious weeds and established pest animals are controlled.
P04	Identify pest species habitats within the Work Authority boundary (as per the CaLP Act) and remove refuge areas (burrows, hollow logs) where practicable.	G06R, G08C, G07C, G07R, G07P, G05C, G08P, G07Q, G05Q, G06Q, G08R, G05R,	Pest animal habitats are removed / destroyed.

Control ID	Control Description	Risk Event ID	Performance measure
		G06P, G08Q, G05P, G06C	
P09	Inspect rehabilitated areas to assess the health of the vegetation and to check for erosion, pest animal browsing damage and weed infestation.	G08Q, S37P, G08R, G07P, G08P, G07C, G08C, G07R, G07Q	Rehabilitation areas are monitored at least seasonally and emerging weed or pest animal populations are controlled.
P10	Pesticides and/or herbicides will only be used to control species and at rates prescribed on the label.	G07P, G07R, G08Q, G07Q, G08R, G08C, G07C, G08P	No off-label use of pesticides or herbicides.
P11	Maintain a map or other register with locations within Work Authority area with infestations of declared noxious weeds.	G06C, G05Q, G06P, G05R, G07C, G07P, G06R, G06Q, G05P, G05C, G08C, G08Q, G08R, G07Q, G08P, G07R	Registers established and maintained.
P13	Protect rehabilitation areas until vegetation is successfully re-established.	G05R, G05Q, S37P, G05P, G05C	
P14	Identify and apply any local biosecurity protocols applicable to the area.	G08R, G07R, G08Q, G07C, G07Q, G08C, G07P, G08P	
P15	Consult with DELWP regarding suitable eradication techniques for onsite feral animals if needed.	G05C, G06P, G05Q, G05R, G06C, G06Q, G05P, G06R	
P17	Use seeds / seedlings from locally occurring native species for reseeding during site rehabilitation activities.	S37P, G08R, G07C, G08P, G07P, G07Q, G08C, G07R, G08Q	Site rehabilitation undertaken with locally occurring native species.
P21	Provide personnel with information and training on the measures used to prevent the spread of weed and pest species at the site.	G07P, G07Q, G08P, G08R, G07R, G08C, G08Q, G07C	100% of personnel trained within 1 month of commencing work.
P22	Use enrichment techniques in areas where germination has failed (e.g. establishment of new plants in un-stocked areas, or spot sowing seed into small cultivated patches).	S37P	
P23	Monitor vegetation cover post closure to ensure adequate overall survival.	S37P	
P26	Plant out buffer areas with native vegetation	S37P	

5.7.3.3 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 5-39 Residual risk – pests, weeds and diseases

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
S37P	Damage to fauna during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Rare	Insignificant	Low
G05P	Burrows impacting land from rabbits and foxes during prequarrying phase	Prequarrying	Rare	Insignificant	Low
G05Q	Burrows impacting land from rabbits and foxes during quarrying phase	Quarrying	Rare	Insignificant	Low

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
G05R	Burrows impacting land from rabbits and foxes during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
G05C	Burrows impacting land from rabbits and foxes during post-closure phase	Post-closure	Unlikely	Insignificant	Low
G06P	Predation of native fauna by foxes, cats and dogs during prequarrying phase	Prequarrying	Unlikely	Insignificant	Low
G06Q	Predation of native fauna by foxes, cats and dogs during quarrying phase	Quarrying	Unlikely	Insignificant	Low
G06R	Predation of native fauna by foxes, cats and dogs during rehabilitation phase	Rehabilitation	Unlikely	Insignificant	Low
G06C	Predation of native fauna by foxes, cats and dogs during post closure phase	Post-closure	Unlikely	Insignificant	Low
G07P	Weed infestations impacting neighbour's property during operations during prequarrying phase	Prequarrying	Rare	Minor	Low
G07Q	Weed infestations impacting neighbour's property during operations during quarrying phase	Quarrying	Rare	Minor	Low
G07R	Weed infestations impacting neighbour's property during operations during rehabilitation phase	Rehabilitation	Rare	Minor	Low
G07C	Weed infestations impacting neighbour's property during operations during post closure phase	Post-closure	Unlikely	Minor	Low
G08P	Weed infestations impacting native flora during operations during prequarrying phase	Prequarrying	Rare	Minor	Low
G08Q	Weed infestations impacting native flora during operations during quarrying phase	Quarrying	Rare	Minor	Low
G08R	Weed infestations impacting native flora during operations during rehabiltiation phase	Rehabilitation	Rare	Minor	Low
G08C	Weed infestations impacting native flora during operations during post-closure phase	Post-closure	Unlikely	Minor	Low

5.7.4 Compliance standards and acceptance criteria

The compliance standards are the key best practice standards or guidelines that will be achieved with the control measures in place.

Table 5-40 Compliance standards – pests, weeds and diseases

Performance standard	Assessment Criteria	Required studies
Planning and Environment Act (1987). Public Health and Wellbeing Act (2008). Agricultural and Veterinary Chemicals (Control of Use) Act (1992). Agricultural and Veterinary Chemicals (Control of Use) Regulations (2007) Catchment and Land Protection Act (1994)	Environment Protection and Biodiversity Conservation Act lists. Flora and Fauna Guarantee Act lists	If undisturbed land is impacted undertake an Ecological study to identify potential sensitive receptors.

5.7.5 Monitoring and reporting

Table 5-41 Summary of monitoring and reporting requirements – pests, weeds and diseases

Monitoring aspect	Reporting details
Monitoring aspect	Monitoring details
Complaint register	Frequency and response
Fauna present onsite	Wildlife survey
Presence of burrows	Site inspection
Site inspections, complaint register	Occurrence
Weed infestations	Site Inspections

5.7.6 Relevant industry publications

- Planning for biodiversity (DELWP 2017)

5.8 RISK TREATMENT PLAN – RUBBISH

5.8.1 Scope

This risk treatment plan is for the control of rubbish.

5.8.2 Sensitive receptors

The sensitive receptors associated with this hazard include:

Table 5-42 Receptors – rubbish

Receptor	Location and Proximity	Potential Impact to Receptor	Evidence supporting assessment
Native fauna	Onsite and neighbouring properties	Foraging by fauna (native and feral) from unsecured waste receptacles causing spread of disease	Site inspection records
Soil	Onsite	Pollution of soils, decreased amenity	Site inspection records
Waterways	Onsite waterway	Pollution of waterways, decreased amenity	Site inspection records

5.8.3 Risks

5.8.3.1 Inherent risk assessment

Table 5-43 Inherent risk – rubbish

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
G11P	Vermin impacts on native fauna from waste storage and disposal during prequarrying phase	Prequarrying	Unlikely	Insignificant	Low
G11Q	Vermin impacts on native fauna from waste storage and disposal during quarrying phase	Quarrying	Unlikely	Insignificant	Low
G11R	Vermin impacts on native fauna from waste storage and disposal during rehabilitation phase	Rehabilitation	Unlikely	Insignificant	Low
G12P	Litter impacts on surface waters from waste storage and disposal during prequarrying phase	Prequarrying	Rare	Minor	Low
G12Q	Litter impacts on surface waters from waste storage and disposal during quarrying phase	Quarrying	Rare	Minor	Low
G12R	Litter impacts on surface waters from waste storage and disposal during rehabilitation phase	Rehabilitation	Rare	Minor	Low
G31P	Litter finding its way into the ground / soil and contaminating	Prequarrying	Rare	Insignificant	Low
G31Q	Litter finding its way into the ground / soil and contaminating	Quarrying	Rare	Insignificant	Low
G31R	Litter finding its way into the ground / soil and contaminating	Rehabilitation	Rare	Insignificant	Low

5.8.3.2 Control measures to address hazard

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 5-44 Control measures – rubbish

Control ID	Control Description	Risk Event ID	Performance measure
R01	Limit the volume and permitted timeframe for wastes to be stored onsite.	G11R, G11P, G12R, G11Q, G12P, G12Q	Waste materials not held on-site for more than 1 month.
R05	Use appropriately licenced off-site services / facilities to recycle or dispose of site generated wastes.	G31P, G31Q, G31R, G11P, G11Q, G11R, G12P, G12Q, G12R	Wastes and recyclables collected by licenced service provider.
R07	Protect waste storage areas from rainfall and stormwater ingress.	G12P, G12Q, G12R	Waste storage areas are protected from water ingress.
R08	Locate waste storage away from areas of protected habitat and/or waterways.	G31Q, G31P, G31R	50 m buffer distance maintained between waste storage areas and protected habitat and/or waterways.
R09	Provide sealed bins for the onsite storage of domestic wastes (e.g. from lunch rooms)	G12Q, G31Q, G31R, G11R, G12R, G11P, G11Q, G31P, G12P	Sealed bins provided.
R15	Construct and maintain onsite drainage to limit surface water flow onto / off areas where wastes are stored or handled.	G12P, G12R, G12Q	
R16	Field personnel provided with information and training on waste management measures to prevent the discharge of contaminants from the site.	G31P, G31Q, G12Q, G12R, G12P, G31R	

5.8.3.3 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 5-45 Residual risk – rubbish

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
G11P	Vermin impacts on native fauna from waste storage and disposal during prequarrying phase	Prequarrying	Rare	Insignificant	Low
G11Q	Vermin impacts on native fauna from waste storage and disposal during quarrying phase	Quarrying	Rare	Insignificant	Low
G11R	Vermin impacts on native fauna from waste storage and disposal during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
G12P	Litter impacts on surface waters from waste storage and disposal during prequarrying phase	Prequarrying	Rare	Insignificant	Low
G12Q	Litter impacts on surface waters from waste storage and disposal during quarrying phase	Quarrying	Rare	Insignificant	Low
G12R	Litter impacts on surface waters from waste storage and disposal during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
G31P	Litter finding its way into the ground / soil and contaminating	Prequarrying	Rare	Insignificant	Low
G31Q	Litter finding its way into the ground / soil and contaminating	Quarrying	Rare	Insignificant	Low
G31R	Litter finding its way into the ground / soil and contaminating	Rehabilitation	Rare	Insignificant	Low

5.8.4 Compliance standards and acceptance criteria

The compliance standards are the key best practice standards or guidelines that will be achieved with the control measures in place.

Table 5-46 Compliance standards – rubbish

Performance standard	Assessment Criteria
Environment Protection Act (2017) and Regulations	Environment Reference Standard

5.8.5 Monitoring and reporting

Table 5-47 Summary of monitoring and reporting requirements – rubbish

Monitoring aspect	Reporting details
Monitoring aspect	Monitoring details
Drains, sediment traps and waterways	Site inspection
Roadways and staff amenity areas	Site inspection
Waste containment	Site inspection

5.8.6 Relevant industry publications

- Regulating litter and other waste: toolkit (EPA Publication 1927)
- Stormwater and protecting our waterways (EPA Publication 1304.1)

5.9 RISK TREATMENT PLAN – SITE ACCESS

5.9.1 Scope

This risk treatment plan is for the control of site access.

5.9.2 Sensitive receptors

The sensitive receptors associated with this hazard include:

Table 5-48 Receptors – site access

Receptor	Location and Proximity	Potential Impact to Receptor	Evidence supporting assessment
General Public	Onsite	Trespassers drowning	Security reports
General Public	Onsite	Trespassers injuring themselves	Security reports

5.9.3 Risks

5.9.3.1 Inherent risk assessment

Table 5-49 Inherent risk – site access

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
G22P	Public safety jeopardised from unauthorised persons during security breach during prequarrying	Prequarrying	Unlikely	Minor	Low
G22Q	Public safety jeopardised from unauthorised persons during security breach during quarrying phase	Quarrying	Unlikely	Minor	Low
G22R	Public safety jeopardised from unauthorised persons during security breach during rehabilitation phase	Rehabilitation	Unlikely	Minor	Low
G43Q	Deep waterbodies posing drowning risk for trespassers during quarrying phase	Quarrying	Rare	Major	Medium
G43R	Deep waterbodies posing drowning risk for trespassers during rehabilitation phase	Rehabilitation	Rare	Major	Medium
G43C	Deep waterbodies posing drowning risk for trespassers during post-closure phase	Post-closure	Rare	Major	Medium

5.9.3.2 Control measures to address hazard

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 5-50 Control measures – site access

Control ID	Control Description	Risk Event ID	Performance measure
A01	Identify and mark the boundary of the Work Authority (WA) area with boundary posts which are: > 1 m above ground level, painted white with a high visibility paint; marked with the WA number on the top 20cm	G22P, G22Q, G22R	The site boundary is identified with compliant boundary markers.

Control ID	Control Description	Risk Event ID	Performance measure
A02	Provide signage at the main site entrance that identifies: the name of the WA holder, WA number, name and contact details of the site manage, emergency contact details for the WA holder.	G22Q, G22P, G22R	Site contact details are displayed.
A03	Provide and maintain fencing around the working area and other potentially hazardous areas (such as sediment ponds, water storage dams and tailings dams).	G22P, G22Q, G22R	WA area boundary and any hazardous areas are identified and secured.
A04	Lock or otherwise control access through gates.	G43Q, G22R, G22P, G43C, G22Q, G43R	Site gates locked or otherwise secured.
A05	Install temporary fencing around trenches and excavations which are unattended and left open.	G22Q, G22R, G22P	Temporary fencing installed around open, unattended trenches.
A08	Install warning signs at strategic locations to identify working areas and potentially hazardous areas.	G43C, G43R, G43Q	

5.9.3.3 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 5-51 Residual risk – site access

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
G22P	Public safety jeopardised from unauthorised persons during security breach during prequarrying	Prequarrying	Rare	Minor	Low
G22Q	Public safety jeopardised from unauthorised persons during security breach during quarrying phase	Quarrying	Rare	Minor	Low
G22R	Public safety jeopardised from unauthorised persons during security breach during rehabilitation phase	Rehabilitation	Rare	Minor	Low
G43Q	Deep waterbodies posing drowning risk for trespassers during quarrying phase	Quarrying	Rare	Major	Medium
G43R	Deep waterbodies posing drowning risk for trespassers during rehabilitation phase	Rehabilitation	Rare	Major	Medium
G43C	Deep waterbodies posing drowning risk for trespassers during post-closure phase	Post-closure	Rare	Major	Medium

5.9.4 Compliance standards and acceptance criteria

There are no compliance standards relevant to site access.

5.9.5 Monitoring and reporting

Table 5-52 Summary of monitoring and reporting requirements – site access

Monitoring aspect	Reporting details
Security reports	Occurrence

5.9.6 Relevant industry publications

- Code of practice for small quarries (ERR 2010)

5.10 RISK TREATMENT PLAN – STORMWATER

5.10.1 Scope

This risk treatment plan is for the control of stormwater.

A specialist study has been undertaken by Engeny. This is contained in an appendix to **Part 1 Summary Report.**

5.10.2 Sensitive receptors

The sensitive receptors associated with this hazard include:

Table 5-53 Receptors – stormwater

Receptor	Location and Proximity	Potential Impact to Receptor	Evidence supporting assessment
Aquatic ecosystems	Onsite waterway	Clogging / silting up waterways	Site inspection records
Surface water	Onsite waterway	Clogging / silting up stormwater infrastructure	Site inspection records
Surface water	Onsite waterway	Clogging / silting up waterways	Site inspection records

5.10.3 Risks

5.10.3.1 Inherent risk assessment

Table 5-54 Inherent risk – stormwater

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S05P	Sediment impacting surface waters from roadways and stockpiles during construction works during prequarrying phase	Prequarrying	Rare	Minor	Low
S05Q	Sediment impacting surface waters from roadways and stockpiles during construction works during quarrying phase	Quarrying	Unlikely	Minor	Low
S05R	Sediment impacting surface waters from roadways and stockpiles during rehabilitation phase	Rehabilitation	Rare	Minor	Low
S05C	Sediment impacting surface waters from roadways and stockpiles during post-closure phase	Post-closure	Rare	Insignificant	Low
S06P	Sediment impacting surface waters from construction and modification of stormwater storage ponds and drainage channels during prequarrying	Prequarrying	Possible	Minor	Medium
S06Q	Sediment impacting surface waters from construction and modification of stormwater storage ponds and drainage channels during quarrying	Quarrying	Possible	Minor	Medium
S06R	Sediment impacting surface waters from construction and modification of stormwater storage ponds and drainage channels during rehabilitation	Rehabilitation	Unlikely	Minor	Low

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S12P	Sediment impacting surface waters during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Possible	Minor	Medium
S13P	Sediment impacts to aquatic ecosystems during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Unlikely	Insignificant	Low
S15P	Sediment impacting surface waters from stockpiles during overburden stripping works during prequarrying phase	Prequarrying	Unlikely	Insignificant	Low
S16P	Sediment impacting aquatic ecosystems from stockpiles during overburden stripping works during prequarrying phase	Prequarrying	Unlikely	Insignificant	Low
S22Q	Sediment impacting surface waters from product excavation and transport onsite during dry extraction during quarrying phase	Quarrying	Unlikely	Minor	Low
S27Q	Sediment impacting surface waters from screening during processing during quarrying phase	Quarrying	Rare	Insignificant	Low

5.10.3.2 Control measures to address hazard

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 5-55 Control measures – stormwater

Control ID	Control Description	Risk Event ID	Performance measure
S02	Install diversion drainage structures up-gradient of working areas to prevent clean surface water from entering the site and becoming contaminated.	S27Q, S24Q, S15P, S13P, S05P, S16P, S12P, S05C, S05Q, S05R	Surface water diversion structures installed and effectively intercepting surface water before it reaches operating areas.
S03	Construct and maintain diversion structures to limit impacts on downstream / offsite surface water flows. (e.g. alteration of drainage pathways, change in flow).	S16P, S15P, S05P, S24Q, S13P, S05Q, S12P, S27Q, S05C, S05R	Downstream environmental flow is maintained.
S04	Design onsite diversion drains to accommodate the surface water flows for a 1 in 10 yr storm event, based on the area of the up-gradient catchment area.	S05R, S05Q, S05C, S05P, S15P, S12P, S24Q, S27Q	Diversion drains designed for 1 in 10 yr storm event
S05	Construct and maintain in-ground diversion drains to minimise the flow rate of entrained surface water.	S05C, S05P, S05Q, S15P, S05R, S24Q, S27Q, S12P	
S06	Construct and maintain above-ground diversion berms to withstand the calculated surface water volumes and velocity.	S05P, S05Q, S27Q, S05R, S05C, S15P, S12P, S24Q	
S09	Design and install onsite water storage / sediment ponds to retain surface water runoff from disturbed areas until the sediment has fallen out of suspension.	S05R, S16P, S05Q, S27Q, S05C, S13P, S06P, S24Q, S06R, S06Q	Ponds have capacity to contain rainfall for a 1 in 10 yr storm event.
S10	Obtain ‘Take & Use Licence’ is obtained from the relevant Rural Water Corporation and a “Works on Waterways” permit is obtained from a	S05C, S05P, S12P, S27Q, S15P, S24Q, S05Q, S05R	Licences and permits for water diversion and works on waterways are obtained as required.

Control ID	Control Description	Risk Event ID	Performance measure
	CMA for activities involving works on waterways.		
S11	Install diversion drains so that the gradient and orientation restrict fast flowing surface water.	S05P, S06P, S05Q, S15P, S24Q, S27Q, S06R, S06Q, S05R, S05C, S12P	
S12	Construct diversion drains to follow the natural drainage lines and topography of the site and retain existing vegetated areas.	S24Q, S05C, S15P, S05P, S05Q, S27Q, S16P, S12P, S05R, S13P	
S15	Include community's feedback on detailed design where appropriate	S12P, S06Q, S06P, S06R	

5.10.3.3 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 5-56 Residual risk – stormwater

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
S05P	Sediment impacting surface waters from roadways and stockpiles during construction works during prequarrying phase	Prequarrying	Rare	Insignificant	Low
S05Q	Sediment impacting surface waters from roadways and stockpiles during construction works during quarrying phase	Quarrying	Rare	Minor	Low
S05R	Sediment impacting surface waters from roadways and stockpiles during rehabilitation phase	Rehabilitation	Rare	Insignificant	Low
S05C	Sediment impacting surface waters from roadways and stockpiles during post-closure phase	Post-closure	Rare	Insignificant	Low
S06P	Sediment impacting surface waters from construction and modification of stormwater storage ponds and drainage channels during prequarrying	Prequarrying	Unlikely	Minor	Low
S06Q	Sediment impacting surface waters from construction and modification of stormwater storage ponds and drainage channels during quarrying	Quarrying	Unlikely	Minor	Low
S06R	Sediment impacting surface waters from construction and modification of stormwater storage ponds and drainage channels during rehabilitation	Rehabilitation	Rare	Minor	Low
S12P	Sediment impacting surface waters during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Unlikely	Minor	Low
S13P	Sediment impacts to aquatic ecosystems during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Rare	Insignificant	Low
S15P	Sediment impacting surface waters from stockpiles during overburden stripping works during prequarrying phase	Prequarrying	Rare	Insignificant	Low

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
S16P	Sediment impacting aquatic ecosystems from stockpiles during overburden stripping works during prequarrying phase	Prequarrying	Rare	Insignificant	Low
S22Q	Sediment impacting surface waters from product excavation and transport onsite during dry extraction during quarrying phase	Quarrying	Rare	Minor	Low
S27Q	Sediment impacting surface waters from screening during processing during quarrying phase	Quarrying	Rare	Insignificant	Low

5.10.4 Compliance standards and acceptance criteria

The compliance standards are the key best practice standards or guidelines that will be achieved with the control measures in place.

Table 5-57 Compliance standards – stormwater

Performance standard	Environmental value	Assessment Criteria	Required studies
Environment Reference Standard (Water)	Water-based recreation (primary contact)	E. coli¸ enterococci	Water quality objectives to be derived from a risk assessment approach following industry best practice and guidance published or approved by EPA
Environment Reference Standard (Water)	Agriculture and irrigation (irrigation)	Indicators specified for irrigation and water for general on-farm use in the ANZG	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water)	Agriculture and irrigation (stock)	Indicators specified for livestock drinking water quality in the ANZG	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water)	Human consumption of aquatic foods	Indicators specified for metal contaminants, non-metal contaminants, natural toxicants, and mercury in Schedule 19 (Maximum levels of contaminants and natural toxicants) of the Food Standards Code	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water)	Aquaculture	"Faecal (thermotolerant) coliforms (median from 5 samples)	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water)	Aquaculture	Physical and chemical stressors	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water)	Aquaculture	Toxicants	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water)	Aquaculture	Off-favour compounds	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water)	Water dependent ecosystems & species - highly modified	ANZG Ecosystem Guidelines (highly modified) and additional indicators are specified in Tables 5.8 and 5.9 of the ERS.	If Inherent risk is High or Very High a hydrological study is required

Performance standard	Environmental value	Assessment Criteria	Required studies
Environment Reference Standard (Water)	Industrial and commercial	Indicators specific to the particular industrial or commercial activity and their use of water	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water)	Human consumption after appropriate treatment	Indicators specified in the ADWG	Applicable for water supply in special water supply catchments in Schedule 5 of the Catchment and Land Protection Act 1994 or the Safe Drinking Water Act 2003.If Inherent risk is High or Very High a hydrological study is required.
Environment Reference Standard (Water)	Water-based recreation (primary contact)	"Harmful algae, chemical hazards, aesthetic effects	"
Environment Reference Standard (Water)	Water-based recreation (secondary contact)	E. coli¸ enterococci	Water quality objectives to be derived from a risk assessment approach following industry best practice and guidance published or approved by EPA
Environment Reference Standard (Water)	Water-based recreation (secondary contact)	"Harmful algae, chemical hazards, aesthetic effects	"
Environment Reference Standard (Water)	Water-based recreation (aesthetic enjoyment)	"Harmful algae, chemical hazards, aesthetic effects	"
Environment Reference Standard (Water)	Traditional Owners Cultural Values	Objectives must be developed in consultation with Traditional Owners and may be informed by the process identified in the ANZG for determining cultural and spiritual values	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water)	Cultural & Spiritual Values	No generic investigation levels or thresholds for cultural and spiritual values have been adopted. A qualitative assessment of potential impacts to this beneficial use is recommended. Current default based around WDE protection & water-based recreation (	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water)		Tot P 75th %: <= 110 ug/L; Tot N 75th %: <= 1300 ug/L; DO 25th %: >= 70 %sat; DO max: 130 %sat; Turbidity 75th %: <= 35 NTU; EC 75th%: <= 500 uS/cm; pH 25th%: >= 6.4 pH units; pH 75th%: <= 7.9 pH units; Toxicants: 90% protection;	

5.10.5 Monitoring and reporting

Table 5-58 Summary of monitoring and reporting requirements – stormwater

Monitoring aspect	Reporting details
Monitoring aspect	Monitoring details

Monitoring aspect	Reporting details
Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available

5.10.6 Relevant industry publications

- Mining and quarrying – Guide to preventing harm to people and the environment. (EPA Victoria 2020)
- Erosion, sediment, and dust: Treatment train, (EPA Victoria 2020)
- Managing truck and other vehicle movement, (EPA Victoria 2020)
- Construction techniques for sediment pollution control, (EPA Victoria 1991)
- Civil construction, building and demolition guide, (EPA Victoria 2020)

5.11 RISK TREATMENT PLAN – WATER

5.11.1 Scope

This risk treatment plan is for the control of imported materials.

A Hydrogeological assessment has been prepared by Ricardo This is contained in an appendix to **Part 1 Summary Report** of the Work Plan.

5.11.2 Sensitive receptors

The sensitive receptors associated with this hazard include:

Table 5-59 Receptors – water

Receptor	Location and Proximity	Potential Impact to Receptor	Evidence supporting assessment
Ecology	Onsite waterway	Declining health	Site inspection records SW monitoring data
Ecosystems	Onsite waterway	Increased salinity	SW monitoring data
Groundwater	Onsite and offsite to the west and northwest	Increased salinity	SW monitoring data
Groundwater	Onsite	Contamination from filtercake (pH)	GW Monitoring data
Surface water	Onsite waterway	Surface water quality	SW monitoring
Vegetation	Site and surrounds	Decline in groundwater levels	Site inspection records, groundwater level data if available

5.11.3 Risks

5.11.3.1 Inherent risk assessment

Table 5-60 Inherent risk – water

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S21Q	Contamination of groundwater from filtercake	Quarrying	Unlikely	Minor	Low
S39Q	Water management activities lowering the watertable beyond the reach of plant roots	Quarrying	Possible	Minor	Medium
S58Q	Water management activities creating increased groundwater drawdown	Quarrying	Possible	Minor	Medium
S40Q	Water management activities impacting on the watertable and increasing salinity which affects groundwater conditions	Quarrying	Possible	Minor	Medium
S41Q	Water management activities impacting on the watertable and increasing salinity which affects plant growth	Quarrying	Possible	Moderate	Medium
S59Q	Greater groundwater inflow than anticipated necessitating off-site discharge	Quarrying	Rare	Minor	Low
S60Q	Greater groundwater inflow than anticipated necessitating off-site discharge	Quarrying	Rare	Minor	Low

5.11.3.2 Control measures to address hazard

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 5-61 Control measures – water

Control ID	Control Description	Risk Event ID	Performance measure
W01	Ensure an appropriate "Works on Waterways" permit is obtained from a CMA/water authority as required.	S60Q	Permits for works on waterway obtained as required.
W04	Develop and implement an inspection and maintenance program for sediment and erosion control features.	S59Q, S60Q	Inspection and maintenance program developed and being implemented.
W06	Monitor groundwater levels	S39Q, S58Q	Monitoring records are available
W07	Monitor vegetation health	S60Q, S41Q, S39Q	Site inspection records are available
W08	Provide supplementary watering as required	S39Q	Site activity records are available
W09	Monitoring of water quality in waterway	S60Q, S59Q	Monitoring records are available
W11	Monitor groundwater quality	S41Q, S40Q	Monitoring records are available
W12	Monitor water quality in ponds	S60Q, S59Q, S40Q, S41Q	Monitoring records are available
W13	Installation of clay lining on perimeter bunds	S41Q, S39Q, S40Q	Clay liner installed
W14	Implement targeted monitoring where impact is suspected	S21Q	

5.11.3.3 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 5-62 Residual risk – water

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
S21Q	Contamination of groundwater from filtercake	Quarrying	Unlikely	MInor	Low
S39Q	Water management activities lowering the watertable beyond the reach of plant roots	Quarrying	Unlikely	Minor	Low
S58Q	Water management activities creating increased groundwater drawdown	Quarrying	Unlikely	Minor	Low
S40Q	Water management activities impacting on the watertable and increasing salinity which affects groundwater conditions	Quarrying	Unlikely	Minor	Low
S41Q	Water management activities impacting on the watertable and increasing salinity which affects plant growth	Quarrying	Unlikely	Minor	Low
S59Q	Greater groundwater inflow than anticipated necessitating off-site discharge	Quarrying	Rare	Minor	Low
S60Q	Greater groundwater inflow than anticipated necessitating off-site discharge	Quarrying	Rare	Minor	Low

5.11.4 Compliance standards and acceptance criteria

The compliance standards are the key best practice standards or guidelines that will be achieved with the control measures in place.

Table 5-63 Compliance standards – water

Performance standard	Environmental value	Assessment Criteria	Required studies
Environment Reference Standard (Water)	Buildings and Structures	pH, sulphate, chloride, redox potential, salinity or any chemical substance or waste that may have a detrimental impact on the structural integrity of buildings or other structures	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Water)	Traditional Owners Cultural Values	"Indicators must be developed in consultation with Traditional Owners and may be informed by the process identified in the ANZG for determining cultural and spiritual values	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Water)	Water-based recreation (primary contact recreation)	Chemical hazards, aesthetic effects	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Water)	Water-based recreation (primary contact recreation)	E. coli	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Water)	Industrial and commercial	"Indicators specific to the particular industrial or commercial activity and their use of water	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Water)	Stockwater	Indicators specified for livestock drinking water quality in the ANZG	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Water)	Irrigation	Indicators specified for irrigation and water for general on-farm use in the ANZG	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Water)	Potable water acceptable	Indicators specified in the ADWG	If Inherent risk is High or Very High a hydrogeological study is required
Environment Reference Standard (Water)	Water dependent ecosystems & Species	ERS Division 3 Part 5	If Inherent risk is High or Very High a hydrogeological study is required

5.11.5 Monitoring and reporting

Table 5-64 Summary of monitoring and reporting requirements – water

Monitoring aspect	Reporting details
Monitoring aspect	Monitoring details
Groundwater bores	Groundwater levels
Surface water	Surface water sampling and analysis
Surface water, groundwater	Water quality sampling and analysis
Vegetation health	Site inspection
Vegetation health, groundwater level	Site inspection, review of monitoring data if available
Water storage ponds	Pond levels

5.11.6 Relevant industry publications

- *Soil Sampling* (EPA Publication IWRG702)
- Water and soil sampling and analysis (EPA Publication IWRG701)
- Acid sulfate soil and rock, (EPA Publication 655.1)
- Waste disposal categories – characteristics and thresholds (EPA Publication 1828)
- Guide to classifying industrial waste (EPA Publication 1968)
- *Managing stockpiles* (EPA Publication 1895)
- Erosion sediment and dust: Treatment train (EPA Publication 1893)
- Imported Materials Management Guideline (ERR 2020)

5.12 RISK TREATMENT PLAN – GEOTECHNICAL STABILITY

5.12.1 Scope

This risk treatment plan is for the control of geotechnical stability.

A specialist study has been undertaken by CMW Geosciences. This is contained in an appendix to **Part 1 Summary Report.**

5.12.2 Sensitive receptors

The sensitive receptors associated with this hazard include:

Table 5-65 Receptors – geotechnical stability

Receptor	Location and Proximity	Potential Impact to Receptor	Evidence supporting assessment
Westernport and Milners Roads, neighbours' properties	Beyond boundaries to N, W and E	Land subsidence/collapse	Site inspection records
Surface water ecosystems	Downstream (west of site	Flow reduction	Site inspection records

5.12.3 Risks

5.12.3.1 Inherent risk assessment

Table 5-66 Inherent risk – geotechnical stability

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S68Q	Large (eg full slope height) arc-shaped failure surface developing in slope at the northern face,Depth limited by presence of existing waterway. Include consideration of seismic hazard.	Quarrying	Unlikely	Major	Medium
S69Q	Movement of adjacent land, beyond buffer zone if excessive settlement occurs. In particular, northern boundary - Westernport Road	Quarrying	Possible	Moderate	Medium
S70Q	Excavation cuts an unstable slope geometry with effect of high water pressure in ground	Quarrying	Unlikely	Major	Medium
S71Q	Tunnel/piping erosion leading to slope and crest collapse degrading the slope condition	Quarrying	Unlikely	Moderate	Medium
S71R	Tunnel/piping erosion leading to slope and crest collapse degrading the slope condition	Rehabilitation	Unlikely	Moderate	Medium
S71C	Tunnel/piping erosion leading to slope and crest collapse degrading the slope condition	Post-closure	Unlikely	Moderate	Medium
S72Q	Large (eg full slope height) arc-shaped failure surface developing in slope at the northern face at maximum depth after waterway diversion. Includes consideration of seismic hazard	Quarrying	Unlikely	Major	Medium
S73Q	Movement of adjacent land, beyond buffer zone if excessive settlement occurs. In particular northern boundary - Westernport Road	Quarrying	Unlikely	Moderate	Medium
S63R	Settlement/subsidence due to excessive water table depression after buttress placement	Rehabilitation	Unlikely	Moderate	Medium
S63C	Settlement/subsidence due to excessive water table depression after buttress placement	Quarrying, Post-closure	Unlikely	Moderate	Medium
S75Q	Embankment fails and impounded water or solid waste released to adjacent pit area	Quarrying	Unlikely	Major	High

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S74Q	Excessive infiltration leading to loss of stream flow and increasing water pressure in slope	Quarrying	Unlikely	Major	Medium
S63Q	Settlement/subsidence due to excessive water table depression after buttress placement	Quarrying	Unlikely	Moderate	Medium
S57Q	Overloading crest with machinery and plant	Quarrying	Unlikely	Minor	Low

5.12.3.2 Control measures to address hazard

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 5-67 Control measures – geotechnical stability

Control ID	Control Description	Performance measure	Risk Event ID
G06	Establish vegetation over crest		S71C, S71Q, S71R
G14	Manage groundwater levels in accordance with site specific geotechnical advice		S63Q, S63R
G17	Maintain 20m buffer zone from crest of upper batter slope to edge of property		S69Q
G18	Adhere to pit design geometry so long as material and groundwater behave as modelled		S69Q
G28	Monitor road condition and slope crests and faces		S63R, S63Q, S63C
G32	Selection of representative material properties		S68Q
G33	Inspection of slope face and crest for cracking and signs of distress		S72Q, S68Q
G34	Limit sand extraction depth at northern margin to allow installation of clay batter (and waterway diversion)		S68Q
G35	Place clay buttress such that sand excavation faces are exposed over a limited face length and for a limited time.		S68Q
G36	Monitor water pressure		S70Q, S72Q
G37	Install clay buttresses to permit early detection of incipient failure by monitoring the occurrence of cracking.		S71Q
G37	Install clay buttresses to permit early detection of incipient failure by monitoring the occurrence of cracking.		S72Q, S71C, S71R, S71Q
G38	Observations to be made throughout excavation with a record of any implied change in material c' through the change of batter angle recorded and a Geotechnical Engineer contacted for advice where deemed necessary.		S69Q
G40	Monitor condition of road and batters and crest for settlement.		S73Q
G41	Locate the waterway diversion on the clay buttress so that a thick zone of clay provides a hydraulic barrier.		S74Q

Control ID	Control Description	Performance measure	Risk Event ID
G42	Ensure construction/materials specification for batter and substrate of diversion channel are appropriate.		S74Q
G44	Ground control management plan to include observations and responses to incipient water pressure failure effects.		S70Q

5.12.3.3 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 5-68 Residual risk – geotechnical stability

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
S68Q	Large (eg full slope height) arc-shaped failure surface developing in slope at the northern face,Depth limited by presence of existing waterway. Include consideration of seismic hazard.	Quarrying	Rare	Minor	Low
S69Q	Movement of adjacent land, beyond buffer zone if excessive settlement occurs. In particular, northern boundary - Westernport Road	Quarrying	Rare	Moderate	Medium
S70Q	Excavation cuts an unstable slope geometry with effect of high water pressure in ground	Quarrying	Rare	Moderate	Medium
S71Q	Tunnel/piping erosion leading to slope and crest collapse degrading the slope condition	Quarrying	Rare	Minor	Low
S71R	Tunnel/piping erosion leading to slope and crest collapse degrading the slope condition	Rehabilitation	Rare	Minor	Low
S71C	Tunnel/piping erosion leading to slope and crest collapse degrading the slope condition	Post-closure	Rare	Minor	Low
S72Q	Large (eg full slope height) arc-shaped failure surface developing in slope at the northern face at maximum depth after waterway diversion. Includes consideration of seismic hazard	Quarrying	Rare	Minor	Low
S73Q	Movement of adjacent land, beyond buffer zone if excessive settlement occurs. In particular northern boundary - Westernport Road	Quarrying	Rare	Minor	Low
S63R	Settlement/subsidence due to excessive water table depression after buttress placement	Rehabilitation	Rare	Minor	Low

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
S63C	Settlement/subsidence due to excessive water table depression after buttress placement	Quarrying, Post-closure	Rare	Minor	Low
S75Q	Embankment fails and impounded water or solid waste released to adjacent pit area	Quarrying	Rare	Major	Medium
S74Q	Excessive infiltration leading to loss of stream flow and increasing water pressure in slope	Quarrying	Rare	Minor	Low
S63Q	Settlement/subsidence due to excessive water table depression after buttress placement	Quarrying	Rare	Minor	Low
S57Q	Overloading crest with machinery and plant	Quarrying	Rare	Minor	Low

5.12.4 Compliance standards and acceptance criteria

The compliance standards are the key best practice standards or guidelines that will be achieved with the control measures in place.

Table 5-69 Compliance standards – geotechnical stability

Performance standard	Environmental value	Assessment Criteria	Required studies
Mineral Resources (Sustainable Development) Act			Geotechnical Assessment is required if Total Depth of excavation is >15m
ERR Geotechnical guidelines			
Melbourne Water requirements			

5.12.5 Monitoring and reporting

Table 5-70 Summary of monitoring and reporting requirements – geotechnical stability

Monitoring aspect	Reporting details
Quality control of construction	Record evidence that clay batter constructed according to Specifications.
Signs of erosion	Monitor according to GCMP.
Signs of excess infiltration	Site inspection
Signs of instability	Records of regular inspections of faces and crests according to GCMP
Signs of instability	Road condition according to GCMP
Signs of instability	Faces and excavation toe condition according to GCMP, including methods to constrain dredge advance toward terminal faces

5.12.6 Relevant industry publications

- Geotechnical guideline for terminal and rehabilitated slopes – Extractive Industry projects (ERR 2020)

5.13 RISK TREATMENT PLAN – OTHER

5.13.1 Scope

This risk treatment plan is for the control of other risks including those associated with:

- Cultural Heritage.
- Land clearance
- Light

Specialist studies relevant to this Risk Treatment Plan include a Cultural Heritage Management Plan (CHMP) prepared by Heritage Insight which is an appendix to **Part 1 Summary Report.**

5.13.2 Sensitive receptors

The sensitive receptors associated with this hazard include:

Table 5-71 Receptors – other

Receptor	Location and Proximity	Potential Impact to Receptor	Evidence supporting assessment
Artefacts	Onsite	Damage of artefacts	Site inspection records, cultural heritage records
Neighbours	200m west of West Pit and 190m north-east of East Pit	Disturbance during night time	Complaints register
Neighbours	200m west of West Pit and 190m north-east of East Pit	Loss of amenity	Complaint register, site inspection reports
Surface water	Onsite waterway	Contamination from spills	SW monitoring data
Vegetation	Onsite	Loss of vegetation	Site inspection records, vegetation assessment data

5.13.3 Risks

5.13.3.1 Inherent risk assessment

Table 5-72 Inherent risk – other

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S09P	Damage to vegetation during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Almost certain	Insignificant	Medium
S10P	Visual amenity impacts to neighbours during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Likely	Moderate	High
S11P	Damage to cultural heritage artefacts during Land clearing / topsoil removal works during prequarrying phase	Prequarrying	Unlikely	Insignificant	Low
G13Q	Light trespass impacting neighbours from lighting during after dark operations during quarrying phase	Quarrying	Rare	Minor	Low

5.13.3.2 Control measures to address hazard

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 5-73 Control measures – other

Control ID	Control Description	Risk Event ID	Performance measure
Oth1	Vegetate buffer areas to provide screening	S10P, G13Q	
Oth2	Construct earthen screening bunds	S10P, G13Q	
Oth5	Plan and stage vegetation clearing and earthworks to limit the total surface area of land exposed at one time.	S10P, S09P	
Oth7	Ensure staff are trained in the procedures to be implemented if artefacts are identified	S11P	
Oth8	Implement targeted monitoring where impact is suspected	G35R, G35Q, G35P, G34R, S11P, G34Q, G34P	

5.13.3.3 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 5-74 Residual risk – other

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
S09P	Damage to vegetation during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Almost certain	Insignificant	Medium
S10P	Visual amenity impacts to neighbours during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Unlikely	Minor	Low
S11P	Damage to cultural heritage artefacts during Land clearing / topsoil removal works during prequarrying phase	Prequarrying	Rare	Insignificant	Low

5.13.4 Compliance standards and acceptance criteria

The compliance standards are the key best practice standards or guidelines that will be achieved with the control measures in place.

Table 5-75 Compliance standards – other

Performance standard	Environmental value	Assessment Criteria	Required studies
Aboriginal Heritage Act 2006;			If disturbed area is an area of cultural heritage sensitivity a Cultural Heritage Management Plan (CHMP) is required.
Heritage Act 2017			If heritage listed sites are located on the WA then approvals are required from Heritage Victoria

5.13.5 Monitoring and reporting

Table 5-76 Summary of monitoring and reporting requirements – other

Monitoring aspect	Reporting details
Areas and types of veg removed	Site Inspection
CHMP compliance	Site inspection
Complaints register	Frequency and response to complaints
Visual amenity	Site Inspection

5.13.6 Relevant industry publications

- Permitted clearing of native vegetation, Biodiversity assessment guidelines (Department of Environment and Primary Industries 2013)
- Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy (Department of Sustainability, Environment, Water, Population and Communities 2012)
- Victoria's Native Vegetation Management – a framework for action (Department of Sustainability and Environment (undated))
- Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017)
- Applicant's guide – applications to remove, destroy or lop native vegetation (DELWP 2018)
- Exemptions from requiring a planning permit to remove, destroy or lop native vegetation (DELWP 2017)
- Assessor's handbook – Applications to remove, destroy or lop native vegetation (DELWP 2018)
- Victorian Aboriginal Affairs Framework 2018-2023 (Aboriginal Victoria (undated))
- Guidelines for conducting and reporting on Aboriginal cultural heritage investigations (other than cultural heritage management plans (Aboriginal Victoria 2012)

6. MONITORING AND REPORTING - SUMMARY

The potential impacts of the extraction operations will be monitored. The Risk Management Plan has identified several aspects that will require monitoring during the life of the quarry. Monitoring is undertaken via either:

- Routine daily site inspections undertaken by site staff; or
- Periodic targeted monitoring of aspects by technical professionals.

6.1 OPERATIONAL AND REHABILITATION STAGES

6.1.1 Site inspections

The following aspects will be monitored during weekly site inspections:

- Responses to complaints and incident reports – any aspect.
- Dust:
  - Effectiveness of mitigation measures
  - Wind direction and speed.
  - Visible dust associated with vehicle movements.
  - Dust from stockpiles or exposed areas.
  - Dust on vegetation and adjacent to access routes and active areas.
  - Volumes of water available for dust mitigation;
- Traffic management:
  - Road condition.
  - Compliance with site speed limits and other traffic management requirements; and
  - Frequency and timing of vehicle movements.
- Surface drainage:
  - Sediment traps.
  - Areas of erosion (width, depth and location)
  - Water diversion drains.
  - Stockpiles.
  - Receiving waterways; and
  - Records of maintenance works.
- Groundwater
  - Inflow rates/ water levels in pit lakes

The following additional aspects will be monitored during monthly site inspections:

- Noise:
  - Location of plant and equipment relative to receptors.
  - Noise levels at receptors;
  - Vehicle/equipment service records (monthly).
- Visual impact:
  - Vegetation in perimeter buffer areas;
- Waste and litter:
  - Perimeter fences for litter.
  - Bin security and capacity;
  - Evidence of the presence of vermin.
- Contamination:
  - Security of chemical storage areas.
  - Update of hazardous materials inventory.

  - Replenish spill kits (if required).
  - Evidence of spills;
  - Check sump/interceptor.

- Pests
  - Security of perimeter fencing.
  - Evidence of new burrows;
  - Check site and surrounding properties for weed infestations.

- Vegetation
  - Percentage of area established
  - Areas requiring further plantings

6.1.1.1 Geotechnical stability

Monitoring requirements for areas of potential geotechnical instability are contained in the GCMP which is included in Appendix H of **Part 1 Summary Report**. The GCMP is the primary document outlining geotechnical monitoring requirements. This section presents an overview of the requirements.

Face/batter/berm inspections should consider a number of elements, including:

- Tension cracking at or within a short distance (15m) of the crest;
- Loss of material from the crest or face;
- Observed signs of dredging causing undercutting at the toe of the face beyond the gradients described in sections above;
- Excessive spalling/fragmentation/breaking down of material;
- Excessive rilling/water erosion of the face;
- Excessive local ponding of water in parts of the area planned for or occupied by the waterway diversion.

Monitoring requirements are allocated to site operational roles and include:

- Audits of operational staff
- Annual review of the Geotechnical Risk Assessment and Ground Control Management Plan
- Daily Tool Box meetings for operational staff
- Daily pre-start and end of shift inspections of crest and 15m behind the crest
- Monitoring during works
- Review of groundwater monitoring data
- Monitoring of the extracted material for changes in composition
- Periodic review of observed performance against the failure as a function of material parameters

Survey requirements

Survey stakes are to be placed to mark out the crest of the 20m buffer zone prior to the commencement of excavation in the zone of expansion. These markers should be monitored (surveyed for X, Y and Z) on a monthly basis to provide a baseline data set against which movement at the crest can be subsequently monitored.

A spot level topographic survey within the buffer zone should be undertaken every month during extraction and continue at this frequency until full rehabilitation of the pit is achieved.

Topographic survey of the formed batters and benches will be required on a monthly basis in order to ensure that the actual geometry does not exceed the design model.

It is recommended that a drone survey is flown of the entire area of excavation every two months, including up to 20m beyond the edge of the property to visually assess for evidence of movement beyond the site margin.

An ongoing survey drawing and/or database should be maintained with all of the above information for the life cycle of the quarry.

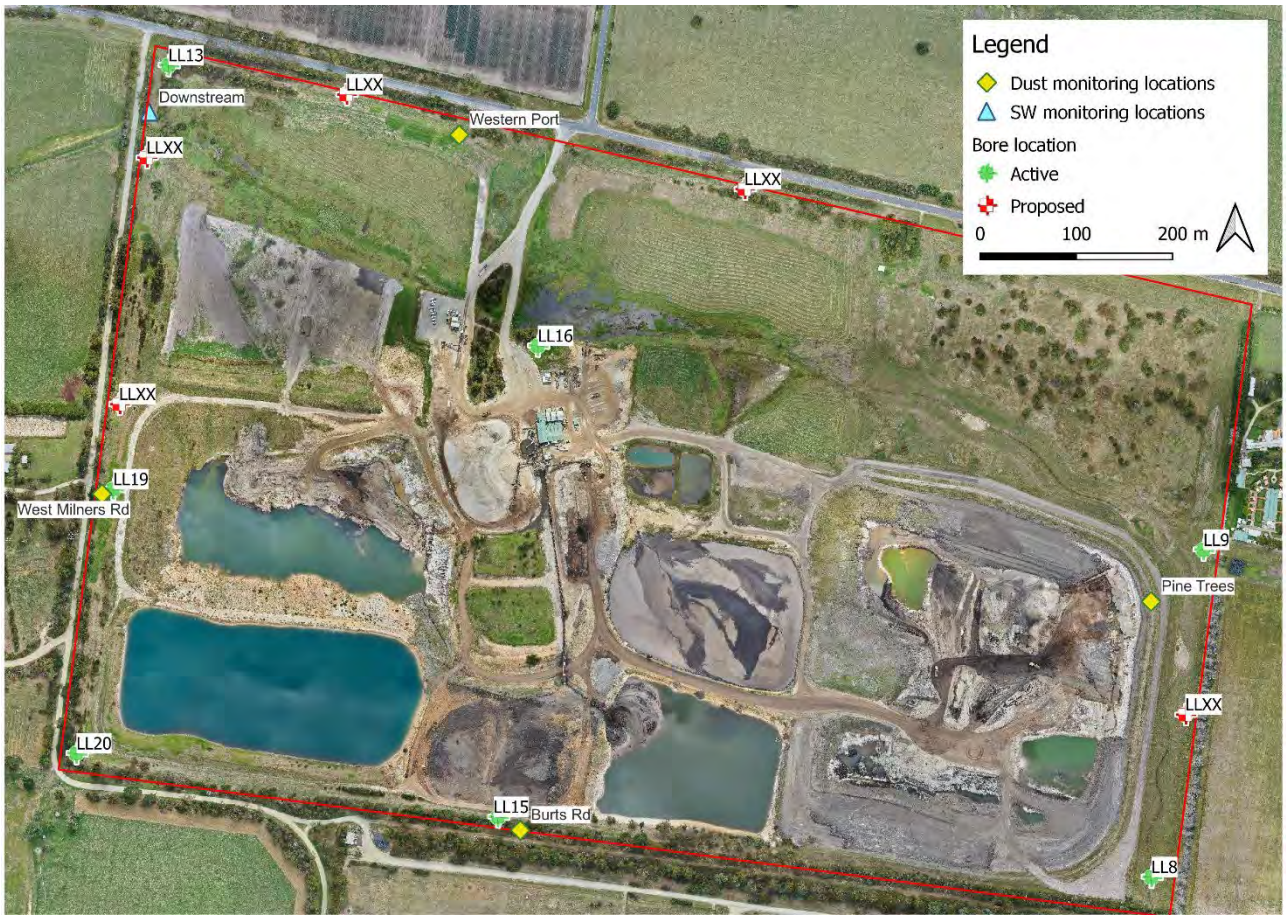
Surveying of dredge tethering locations and bathymetric surveys are required to monitor the extent of sand extraction at terminal faces.

6.1.2 Periodic monitoring

This risk management plan includes dust monitoring, groundwater monitoring and surface water monitoring.

Monitoring locations relevant to quarrying operations are presented in **Figure 6-1.**

Figure 6-1 Monitoring locations



Sampling procedures are contained in **Appendix B**.

6.1.2.1 Groundwater

The groundwater monitoring program includes seven groundwater monitoring wells. In accordance with SRW requirements an additional five monitoring bores indicative locations are shown in **Figure 6-1** to the lower shallow aquifer below the organic layer. The sampling requirements (including sampling techniques and quality assurance/quality control (QA/QC)) samples are included in **Appendix B.**

The objectives of the monitoring is to:

- Increase the understanding of the site conceptual model
- Provide groundwater level information for ongoing site management and tracking of groundwater levels
- Provide groundwater quality data to identify potential impacts on the environmental values of groundwater
- Identify the development of potentially hazardous geotechnical conditions around the pit

The groundwater monitoring program prior to closure includes the following:

- Groundwater level – weekly readings recorded as Standing Water Level (SWL) which is the depth of water table below monitoring point. Reduced levels (RWL) are to be calculated from the SWL and the surveyed elevation of the monitoring point at top of casing (TOC)
- Field parameters to be recorded annually during sampling and purging of bores includes pH, electrical conductivity (EC), dissolved oxygen concentration (DO), temperature and redox potential (Eh)

- Groundwater quality – Groundwater samples are to be collected annually in accordance with Groundwater Sampling Guidelines (EPA Publication 669.1)
- Laboratory analysis for Total Dissolved Solids (TDS), major cations (Ca, Mg, Na, K), major anions (Cl, SO_4 alkalinity), and the following metals: (total and soluble) Fe, Mn, Cu, Pb, Zn, Al and As
- Data quality samples including duplicates, field blanks and rinsates are to be analysed for the same analyte suite as the samples.

Management Response

The following table summarises the response required from Hanson management team in the event that unacceptable impacts are identified by the groundwater monitoring program.

Table 6-1 Groundwater management responses

Parameter	Trigger	Actions
Groundwater level	Unacceptable groundwater level decline	Placement of additional clay on pit batters. Additional monitoring at receptor bores
Groundwater chemistry	Impacts on environmental values are confirmed	Additional monitoring at receptor bores Investigations to identify source and extent of contamination Address/rectify source of contamination Investigate options and need for remedial actions. Investigate using alternative chemical products

6.1.2.2 Surface water

Two monitoring locations are identified on **Figure 6-1.**

The locations include an Upstream and Downstream location at the entry and exit points of the watercourse respectively. Monitoring is to be undertaken annually when the drainage line is flowing. The following parameters will be recorded in the field:

- pH.
- Electrical Conductivity (EC); and
- Visual appearance.

Samples collected annually and will be analysed for the following:

- Turbidity (Lab).
- Major cations and anions.
- Total Recoverable Hydrocarbons (TRH).
- Nutrients – ammonia, nitrate, nitrite, total Kjeldahl nitrogen, total phosphorus.

6.1.2.3 Dust

The SEMP for dust is contained as an appendix to the Part 1 Summary Report. This section provides an overview of the dust monitoring requirements.

Dust monitoring is to be undertaken in three forms:

- Visual observations – monitoring is described in **Section 6.1**
- Gravimetric sampling – ambient (deposition) sampling of total suspended particles (TSP)
- Real time sampling

Depositional dust monitoring will continue at the existing dust monitoring locations shown on **Figure 6-1**. on a quarterly basis at four locations. Parameters to be monitored include Dust Deposition, PM_{10} and $PM_{2.5}$.

The location of the Real time dust monitor will be agreed with EPA following approval of the WPV.

Table 6-2 Dust acceptance criteria

Pollutant	Air Quality Criterion	Allowable exceedances	Source
PM_{10}	165 µg/m^3 (10 minute average)	0	*Guideline for Assessing and Minimising Air Pollution in Victoria (for air pollution managers and specialists)*. EPA Publication 1961 February 2022
	150 µg/m^3 (15 minute average)	0	
	120 µg/m^3 (30 minute average)	0	
	80 µg/m^3 (1 hour average)	0	
	50 µg/m^3 (1 day average)	0	Environment Reference Standard (ERS)
	20 µg/m^3 (1 year average)	0	
$PM_{2.5}$	25 µg/m^3 (1 day average)	0	
	8 µg/m^3 (1 year average)	0	

Hanson will install a continuous real-time dust monitor on the northern site boundary. Hanson is currently evaluating equipment options.

6.2 AFTERCARE PERIOD

The aftercare period is 10 years. The frequency of monitoring will decrease progressively through this period provided no issue arise that cannot be managed by routine maintenance.

6.2.1 Site inspections

The following aspects will be noted during site inspections:

- Geotechnical stability
  - Water level in pit lake
  - Banks of waterbody
    - Erosion
    - Tension cracking at or within a short distance (15m) of the waters edge
  - Drainage line – erosion, subsidence
- Dust
  - areas of poor/no vegetation regrowth
  - responses to complaints and incident reports
- Surface drainage
  - Sediment traps.
  - Areas of erosion (width, depth and location)
  - Water diversion drains.
  - Receiving waterways; and
  - Records of maintenance works.
- Visual impact:
  - Vegetation in perimeter buffer areas;
  - Height of grass in cultural heritage area
- Pests
  - Security of perimeter fencing.
  - Evidence of new burrows;
  - Check site and surrounding properties for weed infestations.

- Vegetation
  - Percentage of area established
  - Areas requiring further plantings

6.2.2 Periodic monitoring

6.2.2.1 Groundwater

LL16 will be destroyed during the final stages of extraction, however the remainder of the monitoring network will continue to be monitored through to the aftercare period.

Water level monitoring will reduce to quarterly for the first five years of the aftercare period and then annually for the remaining five years. Sampling and analysis will be undertaken biennially (every two years). The parameter list remains as for the operational and rehabilitation periods.

6.2.2.2 Surface water

Sampling from the Upstream and Downstream locations will be undertaken biennially (every 2 years) through the aftercare period. The parameter list remains as for the operational and rehabilitation periods.

6.2.2.3 Dust

Real time dust monitoring will be discontinued. Dust deposition monitoring will continue at the dust deposition gauges for the first five years of the aftercare period. Land use change in surrounding areas will be noted.

6.3 REPORTING

The annual monitoring report documents the monitoring undertaken, results and their interpretation. The report includes:

- New collected since the previous annual report
- An assessment of the data quality for new data
- Additional data from neighbouring sites, if available
- An assessment of groundwater level trends
- Identification of groundwater and surface water quality trends
- Review of dust data in the context of site activities and changes to surrounding land use
- Evaluation of impacts to environmental values of groundwater
- In-depth review of the monitoring program.
- Identification of opportunities for improvement; and
- Development of a plan for the next subsequent year.

The report will be provided to regulatory agencies upon request.

7. REFERENCES

Aboriginal Victoria. (2012). *Guidelines for conducting and reporting on Aboriginal cultural heritage investigations (other than cultural heritage management plans.* Aboriginal Victoria.

Aboriginal Victoria. (undated). *Victorian Aboriginal Affairs Framework 2018-2023.* Aboriginal Victoria.

ANZECC. (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Australian and New Zealand Environment.

California EPA. (2015). *Public Health Goal for Chemical Substances in Drinking Water.*

CMPA. (2007). *Dust Management.*

CMPA. (2016). *Noise Management Guidelines.*

Commonwealth Government. (1999). *Environment Protection and Biodiversity Conservation Act 1999.*

DELWP. (2017). *Planning for biodiversity.*

Department of Environment, Land Water and Planning. (2018). *Applicant's guide - applications to remove, destroy or lop native vegetation.* DELWP.

Department of Environment, Land, Water and Planning. (2017). *Exemptions from requiring a planning permit to remove, destroy or lop native vegetation.* DELWP.

Department of Environment, Land, Water and Planning. (2018). *Assessor's handbook - Applications to remove, destroy or lop native vegetation.* DELWP.

Department of Envirpnment, Land, Water and Planning. (2018). *Guidelines for the removal, destruction or lopping of native vegetation.* DELWP.

Department of Primary Industries. (2013). *Permitted clearing of native vegetation, Biodiversity assessment guidelines.* Department of Primary Industries.

Department of Sustainability and Environment. (undated). *Victoria's Native Vegetation Managmeent - a framework for action.* Department of Sustainability and Environment.

DSE. (2012). *Code of Practice for Bushfire Managment on Public Land.*

Earth Resources Regulation. (2010). *Code of Practice for Small Quarries.* Department of Primary Industries.

Earth Resources Regulation. (2020). *Geotechnical guideline for terminal and rehabilitated slopes.* ERR, Department of Jobs, Precincts and Regions.

Earth Resources Regulation. (2020). *Imported Materials Management Guideline.* ERR, Department of Jobs, Precincts and Regions.

Earth Resources Regulation. (2020). *Preparation of Work Plans and Work Plan Variations, Guideline for Extractive Industry Projects.* ERR, Department of Jobs, Precincts and Regions.

EPA Victoria. (1991). *Construction techniques for Sediment Pollution Control.* Publication 275.

EPA Victoria. (2007). *Protocol for Environmental Management State Environment Protection Policy (Air Quality Management) Mining and Extractive Industries.* EPA Publication 1191.

EPA Victoria. (2009). *Acid sulfate soil and rock.* EPA Publication 665.1.

EPA Victoria. (2009). *Soil Sampling.* IWRG 702.

EPA Victoria. (2009). *Water and soil sampling and analysis.* IWRG701.

EPA Victoria. (2011). *SEPP N-1 and NIRV Explanatory Notes.* Publication 1412.

EPA Victoria. (2015). *Stormwater and protecting our waterways.* Publication 1304.1.

EPA Victoria. (2018). *Assessing and controlling risk: A guide for business.* EPA Publication 1695.1.

EPA Victoria. (2018). *Liquid storage and handling guidelines.* Publication 1698.

EPA Victoria. (2020). *Civil construction, building and demolition guide.* EPA Publication 1834.

EPA Victoria. (2020). *Erosion, sediment and dust: Treatment train.* EPA Publication 1893.

EPA Victoria. (2020). *Managing soil disturbance.* EPA Publication 1894.

EPA Victoria. (2020). *Managing stockpiles.* EPA Publication 1895.

EPA Victoria. (2020). *Managing truck and other vehicle movement.* EPA Publication 1897.

EPA Victoria. (2020). *Mining and quarrying - Guide to preventing harm to people and the environment.* EPA Publication 1823.

EPA Victoria. (2020). *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues.* Publication 1826.1.

EPA Victoria. (2020). *Regulating litter and other waste: toolkit.* Publication 1927.

EPA Victoria. (2020). *Waste Classification.* EPA Publication1828.1.

EPA Victoria. (2020). *Working within or adjacent to waterways.* EPA Publication 1896.

EPA Victoria. (2021). *Assessing and controlling contaminated land risks: A guide to meeting the duty to manage for those in management or control of land.* EPA Publication 1977.

EPA Victoria. (2021). *Guide to classifying waste.* Publication 1968.

EPA Victoria. (2021). *Guideline for assessing and minimising air pollution in Victoria - Draft.* EPA Publicatio 1961.

EPA Victoria. (2021). *Managing noise from reversing alarms.* EPA Publication 1890.

EPA Victoria. (2021). *Managing truck noise.* EPA Publication 1891.

EPA Victoria. (2021). *Noise guideline - assessing low frequency Noise.* EPA Publication 1996.

EPA Victoria. (2021). *Noise: barriers and enclosures.* EPA Publication 1886.

EPA Victoria. (2021). *Noise: mufflers or exhaust silencers.* EPA Publication 1888.

EPA Victoria. (2021). *Noise: vibration isolation.* EPA Publication 1892.

EPA Victoria. (2021). *Notifiable contamination guideline - Duty to notify of contaminated land - draft.* EPA Publication 2008.1.

EPA Victoria. (2021). *Waste disposal categories - characteristics and thresholds.* EPA Publication 1928.2.

EPA Victoria. (2022). *Groundwater Sampling Guidelines.* EPA Publication 669.1.

EPA Victoria. (n.d.). *Soil Hazard Categorisation and Management.* IWRG621.

Heads of EPA Australia and New Zealand. (2020). *PFAS National Environmental Management Plan Version 2.0.*

Health Canada. (2020). *Guidelines for Canadian Drinking Water Quality.* Ottawa, Ontario.: Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, .

National Environment Protection Council. (1999 (as amended 2013)). *National Environment Protection (Assessment of Site Contamination) Measure.*

NHMRC. (2008). *Guidelines for Managing Risks in Recreational Water.* National Health and Medical Research Council.

NHMRC. (2011). *Australian Drinking Water Guidelines Paper 6.* National Health and Medical Research Council.

NZ Ministry of Health. (2018). *Drinking-water Standards for New Zealand 2005 (revised 2018).* Wellington Ministry of Health.

Standards Asustralia. (2009). *Piling - Design and installation.* AS 2159-2009.

Standards Australia. (2017). *AS 1940:2017 The Storage and Handling of Flammable and Combustible Liquids.* Standards Australia .

US EPA. (1992). *Health Advisories for Drinking Water Contaminants.* Lewis Publishers.

US EPA. (n.d.). *Drinking water Contaminants Lists.* https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations.

Victorian Government. (1958). *Country Fire Authority Act.*

Victorian Government. (1958). *Metropolitan Fire Brigades Act.*

Victorian Government. (1987). *Planning and Environment Act.* Victorian Government Gazette No. 45 of 1987.

Victorian Government. (1988). *Flora and Fauna Guarantee Act 1988.* No. 47 of 1988.

Victorian Government. (1989). *State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1.* Victoria Government Gazette No S.31.

Victorian Government. (1992). *Agricultural and Veterinary Chemicals (Control of Use) Act.*

Victorian Government. (1994). *Catchment and Land Protection Act.*

Victorian Government. (1995). *Heritage Act 1995.* Act No. 93/1995.

Victorian Government. (2001). *State Environment Protection Policy (Air Quality Management).* Victoria Government Gazette No. S 240.

Victorian Government. (2002 (as gazetted in 2013)). *State Environment Protection Policy (Prevention and Management of Contaminated Land).*

Victorian Government. (2003). *Safe Drinking Water Act.*

Victorian Government. (2006). *Aboriginal Heritage Act.*

Victorian Government. (2007). *Agricultural and Veterinary Chemicals (Control of Use) Regulations.*

Victorian Government. (2008). *Public Health and Wellbeing Act.*

Victorian Government. (2015). *Country Fire Authority Regulations.*

Victorian Government. (2017). *Environment Protection Act.* Victorian Government Gazette.

Victorian Government. (2018). *State Environment Protection Policy (Waters).*

Victorian Government. (2021). *Environment Protection Regulations.* S.R. No.47/2021.

Victorian Government. (2021). *Environment Reference Standard.* Victorian Government Gazette No S 245 26 May 2021 (as amended by Evironment Reference Standard No S158 Tuesday 29 March 2022).

Victorian Government. (2021). *Notice of making of a Determination in accordance with Regulation 5(5) of the Environment Protection Act 2021.* Victorian Government Gazette No S 301 Friday 18 June 2021.

World Health Organisation. (2011). *Guidelines for Drinking-water Quality - fourth edition.* World Health Organisation.

Appendix A Risk register

Activity	Source	Hazard	Risk Event no	Risk description	Stage	Receptor	Location and proximity	Impact	Evidence inherent risk	Inherent LIkelihood	Inherent Consequence	Inherent Risk	Controls	Performance standards	Residual Likelihood	Residual Consequence	Residual Risk	Monitoring aspect	Monitoring details	Risk Treatment Plan
Construction	Equipment and trucks	Dust	S01P	Dust impacting neighbours from equipment and trucks while undertaking construction works during prequarrying phase	Prequarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Dust in houses and over gardens, aggravate respiratory illness	Site inspection records, complaint records, monitoring data	Unlikely	Minor	Low	More monitoring in hot dry weather; Staff training at induction (dust); Clear delineation of operational areas; Final landform design considers dust; Maintain existing vegetation; Water unpaved roads; Water for dust suppression; Wheel wash / rumble grids; Cover loads to/from offsite; Speed limits for vehicles; Distance operational areas from receptors; Perimeter bunds; Perimeter vegetation; Minimise cleared areas;	ERS	Rare	Minor	Low	Visible and detected dust, complaints	Site Inspection, continuous monitoring, complaint comments recorded	Yes
Construction	Equipment and trucks	Dust	S01Q	Dust impacting neighbours from equipment and trucks while undertaking construction works during quarrying phase	Quarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Dust in houses and over gardens, aggravate respiratory illness	Site inspection records, complaint records, monitoring data	Unlikely	Minor	Low	More monitoring in hot dry weather; Perimeter vegetation; Dust monitoring; Final landform design considers dust; Maintain existing vegetation; Staff training at induction (dust); Water unpaved roads; Water for dust suppression; Wheel wash / rumble grids; Cover loads to/from offsite; Restrict vehicle movements to sealed/watered roads; Speed limits for vehicles; Perimeter bunds; Distance operational areas from receptors;	ERS	Rare	Minor	Low	Visible and detected dust, complaints	Site Inspection, continuous monitoring,of complaint comments recorded	Yes
Construction	Equipment and truck movements	Dust	S01R	Dust impacting neighbours from equipment and trucks during construction works during rehabilitation phase	Rehabilitation	Neighbours	200m west of West Pit and 190m north-east of East Pit	Dust in houses and over gardens, aggravate respiratory illness	Site inspection records, complaint records, monitoring data	Rare	Insignificant	Low	More monitoring in hot dry weather; Wheel wash / rumble grids; Distance operational areas from receptors; Staff training at induction (dust); Water unpaved roads; Water for dust suppression; Speed limits for vehicles; Perimeter bunds; Cover loads to/from offsite;	ERS	Rare	Insignificant	Low	Visible and detected dust, complaints	Site Inspection, continuous monitoring, complaint comments recorded	Yes
Construction	Equipment and trucks	Dust	S02P	Dust impacting vegetation from equipment and trucks during construction works during prequarrying phase	Prequarrying	Vegetation	Onsite	Impact amenity, reduced photosynthesis/ transpiration/ respiration of plants	Site inspection records, complaint records, monitoring data	Rare	Minor	Low	Staff training at induction (dust); Clear delineation of operational areas; Stable stockpile slopes; Final landform design considers dust; Maintain existing vegetation; Water unpaved roads; Water for dust suppression; Cover loads to/from offsite; Restrict vehicle movements to sealed/watered roads; Speed limits for vehicles; Seal/gravel roads near receptors; Water sprays; Dust monitoring; Minimise cleared areas;	ERS	Rare	Insignificant	Low	Vegetation health	Site Inspection, continuous monitoring	Yes
Construction	Equipment and trucks	Dust	S02Q	Dust impacting vegetation from equipment and trucks during construction works during quarrying phase	Quarrying	Vegetation	Onsite	Impact amenity, reduced photosynthesis/ transpiration/ respiration of plants	Site inspection records, monitoring data	Rare	Minor	Low	Maintain existing vegetation; Stable stockpile slopes; Staff training at induction (dust); Water for dust suppression; Dust monitoring; Cover loads to/from offsite; Restrict vehicle movements to sealed/watered roads; Water sprays; Clear delineation of operational areas; Speed limits for vehicles; Water unpaved roads;	ERS	Rare	Insignificant	Low	Vegetation health	Site Inspection, continuous monitoring	Yes
Construction	Equipment and truck movements	Dust	S02R	Dust impacting vegetation from equipment and trucks during construction works during rehabilitation phase	Rehabilitation	Vegetation	Onsite	Impact amenity, reduced photosynthesis/ transpiration/ respiration of plants	Site inspection records, monitoring data	Rare	Minor	Low	Speed limits for vehicles; Dust monitoring; Water for dust suppression; Restrict vehicle movements to sealed/watered roads; Water unpaved roads; Staff training at induction (dust);	ERS	Rare	Insignificant	Low	Vegetation health	Site Inspection, continuous monitoring	Yes
Construction	Equipment and trucks	Noise	S03P	Noise impacting neighbours from equipment and trucks during construction works during prequarrying phase	Prequarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Noise pollution	Complaint Register, Site inspection records	Possible	Minor	Medium	Preference quiet equipment purchases; Staff training at induction (noise); Noise bund 3m high beside western haul road Engines to have suitable mufflers; Restrict extraction between 0600-0700 Monitor noise; No audible security alarms; Turn off equipment when not in use; Mobile equipment to have noise attenuation devices; Coordinate equipment use; Maintain site roads; Maintain site roads;	ERS	Unlikely	Minor	Low	Complaint register, site inspection records	Frequency and response to complaints noise observed near receptors	Yes
Construction	Equipment and trucks	Noise	S03Q	Noise impacting neighbours from equipment and trucks during construction works during quarrying phase	Quarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Noise pollution	Complaint Register, Site inspection records	Possible	Minor	Medium	Turn off equipment when not in use; Limit offsite haulage to standard operating hours; Mobile equipment to have noise attenuation devices; Engines to have suitable mufflers; Maintain site roads; Screen receptors from noise; Coordinate equipment use; Monitor noise; Preference quiet equipment purchases; Noise bund 3m high beside western haul road Staff training at induction (noise); No audible security alarms; Restrict extraction between 0600-0700	ERS	Unlikely	Minor	Low	Complaint register, site inspection records	Frequency and response to complaints noise observed near receptors	Yes
Construction	Equipment and truck movements	Noise	S03R	Noise impacting neighbours from equipment and trucks during construction works during rehabilitation phase	Rehabilitation	Neighbours	200m west of West Pit and 190m north-east of East Pit	Noise disturbance	Complaint Register, Site inspection records	Rare	Minor	Low	Restrict extraction between 0600-0700 Monitor noise; Coordinate equipment use; Turn off equipment when not in use; Staff training at induction (noise); Engines to have suitable mufflers; Mobile equipment to have noise attenuation devices; Maintain site roads; No audible security alarms;	ERS	Rare	Insignificant	Low	Complaint register, site inspection records	Frequency and response to complaints noise observed near receptors	Yes
Construction	Equipment and trucks	Amenity	S04P	Visual amenity impacts for general public from dirt on public roads during construction works during prequarrying phase	Prequarrying	Roadways / general public	10m north of northern boundary (Westernport Rd)	Contamination with dirt and mud	Complaints register, site inspection records	Unlikely	Minor	Low	Washdowns and rumble grids;	No complaints, roads clean	Rare	Minor	Low	Complaints register	Frequency and response to complaints	Yes
Construction	Equipment and trucks	Amenity	S04Q	Visual amenity impacts for general public from dirt on public roads during construction works during quarrying phase	Quarrying	Roadways / general public	10m north of northern boundary (Westernport Rd)	Contamination with dirt and mud	Complaints register, site inspection records	Unlikely	Minor	Low	Washdowns and rumble grids;	No complaints, roads clean	Rare	Insignificant	Low	Complaints register	Frequency and response to complaints	Yes

Mineral Resources (Sustainable Development) Act 1990

Tenement Number: WA127

Plan Number: PLN-001686

Work Plan Statutorily Endorsed

Signed: _____

Delegate of the Department Head

Date: 01/05/2024

Activity	Source	Hazard	Risk Event no	Risk description	Stage	Receptor	Location and proximity	Impact	Evidence inherent risk	Inherent LIkelihood	Inherent Consequence	Inherent Risk	Controls	Performance standards	Residual Likelihood	Residual Consequence	Residual Risk	Monitoring aspect	Monitoring details	Risk Treatment Plan
Construction	Equipment and trucks	Public safety	S67P	Dirt and mud on roads creating a safety hazard for other road users	Prequarrying	Public safety on Westernport Road	10m north of northern boundary (Westernport Rd)	Public health	Incident reports	Unlikely	Moderate	Medium	Washdowns and rumble grids;	No incidents	Rare	Minor	Low	Site inspections (including entrance)	Occurrence of mud or dirt on public road	Yes
Construction	Equipment and trucks	Public safety	S67Q	Dirt and mud on roads creating a safety hazard for other road users	Quarrying	Public safety on Westernport Road	10m north of northern boundary (Westernport Rd)	Public health	Incident reports	Possible	Moderate	Medium	Washdowns and rumble grids;	No incidents	Unlikely	Minor	Low	Site inspections (including entrance)	Occurrence of mud or dirt on public road	Yes
Construction	Equipment and trucks	Public safety	S67R	Dirt and mud on roads creating a safety hazard for other road users	Rehabilitation	Public safety on Westernport Road	10m north of northern boundary (Westernport Rd)	Public health	Incident reports	Unlikely	Moderate	Medium	Washdowns and rumble grids;	No incidents	Rare	Minor	Low	Site inspections (including entrance)	Occurrence of mud or dirt on public road	Yes
Construction	Equipment and trucks	Amenity	S04R	Visual amenity impacts for general public from dirt on public roads during construction works during rehabilitation phase	Rehabilitation	Roadways / general public	10m north of northern boundary (Westernport Rd)	Contamination with dirt and mud	Complaints register, site inspection records	Rare	Minor	Low	Washdowns and rumble grids;	No complaints, roads clean	Rare	Insignificant	Low	Complaints register	Frequency and response to complaints	Yes
Construction	Roadways and stockpiles	Sediment	S05P	Sediment impacting surface waters from roadways and stockpiles during construction works during prequarrying phase	Prequarrying	Surface water	Onsite waterway	Clogging / silting up waterways	Site inspection records	Rare	Minor	Low	Design drains to accommodate expected flow; Design drains to minimise flow; Design drains to accommodate 1 in 10 yr event; Install diversion drains; Scour protection on dam outlet; Maintain diversion structures; Obtain licences and permits for water use; Design drains following natural lines; Restrict flow velocity in drains;	ERS	Rare	Insignificant	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes
Construction	Roadways and stockpiles	Sediment	S05Q	Sediment impacting surface waters from roadways and stockpiles during construction works during quarrying phase	Quarrying	Surface water	Onsite waterway	Clogging / silting up waterways	Site inspection records	Unlikely	Minor	Low	Design drains to minimise flow; Obtain licences and permits for water use; Restrict flow velocity in drains; Design drains following natural lines; Manage dam outflows; Scour protection on dam outlet; Maintain stormwater dams; Design drains to accommodate expected flow; Sediment ponds; Design drains to accommodate 1 in 10 yr event; Maintain diversion structures; Install diversion drains;	ERS	Rare	Minor	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes
Construction	Roadways and stockpiles	Sediment	S05R	Sediment impacting surface waters from roadways and stockpiles during rehabilitation phase	Rehabilitation	Surface water	Onsite waterway	Clogging / silting up waterways	Site inspection records	Rare	Minor	Low	Design drains to minimise flow; Install diversion drains; Design drains following natural lines; Restrict flow velocity in drains; Obtain licences and permits for water use; Sediment ponds; Scour protection on dam outlet; Design drains to accommodate expected flow; Design drains to accommodate 1 in 10 yr event; Maintain diversion structures; Manage dam outflows; Maintain stormwater dams;	ERS	Rare	Insignificant	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes
Construction	Roadways and stockpiles	Sediment	S05C	Sediment impacting surface waters from roadways and stockpiles during post-closure phase	Post-closure	Surface water	Onsite waterway	Clogging / silting up waterways	Site inspection records	Rare	Insignificant	Low	Restrict flow velocity in drains; Maintain diversion structures; Design drains following natural lines; Install diversion drains; Obtain licences and permits for water use; Sediment ponds; Scour protection on dam outlet; Maintain stormwater dams; Design drains to accommodate expected flow; Design drains to minimise flow; Design drains to accommodate 1 in 10 yr event; Manage dam outflows; Washdowns and rumble grids;	ERS	Rare	Insignificant	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes
Construction	Stormwater Storage Ponds and drainage	Sediment	S06P	Sediment impacting surface waters from construction and modification of stormwater storage ponds and drainage channels during prequarrying	Prequarrying	Surface water	Onsite waterway	Clogging / silting up stormwater infrastructure	Site inspection records	Possible	Minor	Medium	Incorporate community views where practical; Scour protection on dam outlet; Sediment ponds; Restrict flow velocity in drains; Manage dam outflows;	ERS	Unlikely	Minor	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes
Construction	Stormwater Storage Ponds and drainage	Sediment	S06Q	Sediment impacting surface waters from construction and modification of stormwater storage ponds and drainage channels during quarrying	Quarrying	Surface water	Onsite waterway	Clogging / silting up stormwater infrastructure	Site inspection records	Possible	Minor	Medium	Incorporate community views where practical; Manage dam outflows; Restrict flow velocity in drains; Sediment ponds; Scour protection on dam outlet;	ERS	Unlikely	Minor	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes
Construction	Stormwater Storage Ponds and drainage	Sediment	S06R	Sediment impacting surface waters from construction and modification of stormwater storage ponds and drainage channels during rehabilitation	Rehabilitation	Surface water	Onsite waterway	Clogging / silting up stormwater infrastructure	Site inspection records	Unlikely	Minor	Low	Manage dam outflows; Scour protection on dam outlet; Sediment ponds; Restrict flow velocity in drains; Incorporate community views where practical;	ERS	Rare	Minor	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes
Land clearing / topsoil removal	Equipment	Noise	S07P	Noise impacting neighbours from equipment during land	Prequarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Noise pollution	Complaint Register, Site inspection records	Unlikely	Minor	Low	Staff training at induction (noise); Noise bund 3m high beside western haul road Engines to have suitable mufflers; Mobile equipment to have noise attenuation devices; Limit offsite	ERS	Rare	Minor	Low	Complaint register, site inspection records	Frequency and response to complaints noise	Yes

Activity	Source	Hazard	Risk Event no	Risk description	Stage	Receptor	Location and proximity	Impact	Evidence inherent risk	Inherent LIkelihood	Inherent Consequence	Inherent Risk	Controls	Performance standards	Residual Likelihood	Residual Consequence	Residual Risk	Monitoring aspect	Monitoring details	Risk Treatment Plan
				clearing / topsoil removal works during prequarrying phase									haulage to standard operating hours; Turn off equipment when not in use; No audible security alarms; Restrict extraction between 0600-0700 Coordinate equipment use; Preference quiet equipment purchases; Monitor noise;(noise); Noise bunding;						observed near receptors	
Land clearing / topsoil removal	Equipment	Amenity	S08P	Visual amenity impacts for general public from dirt on public roads during land clearing works during prequarrying phase	Prequarrying	Roadways / general public	10m north of northern boundary (Westernport Rd)	Contamination with dirt and mud	Complaints register, site inspection records	Rare	Insignificant	Low	Washdowns and rumble grids;	No complaints, roads clean	Rare	Insignificant	Low	Complaints register	Frequency and response to complaints	Yes
Land clearing / topsoil removal	Clearing areas	Vegetation removal	S09P	Damage to vegetation during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Vegetation	Onsite	Loss of vegetation	Site inspection records, vegetation assessment data	Almost certain	Insignificant	Medium	Fauna inspections prior to veg clearance; Stage veg to minimise exposed area;	EPBC, FFG, P&E Acts	Almost certain	Insignificant	Medium	Areas and types of veg removed	Site Inspection	Yes
Land clearing / topsoil removal	Clearing areas	Vegetation removal	S37P	Damage to fauna during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Native fauna	Onsite	Reduced habitat for fauna.	Site inspection records, fauna assessment data	Unlikely	Insignificant	Low	Revegetate buffers with native veg; Limit veg to minimise exposed area; Inspect rehabilitated areas; Protect rehabilitated areas; Use local species for rehabilitation; Enhance germination in reveg areas; Monitor vegetation re-establishment; Fauna inspections prior to veg clearance;	EPBC, FFG Acts	Rare	Insignificant	Low	Fauna present onsite	Wildlife survey	Yes
Land clearing / topsoil removal	Clearing areas	Visual impacts	S10P	Visual amenity impacts to neighbours during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Loss of amenity	Complaint register, site inspection reports	Likely	Moderate	High	Stage veg to minimise exposed area; Earthen screening bunds; Vegetate buffers;	No complaints reported	Unlikely	Minor	Low	Visual amenity	Site Inspection	Yes
Land clearing / topsoil removal	Clearing areas	Cultural Heritage	S11P	Damage to cultural heritage artefacts during Land clearing / topsoil removal works during prequarrying phase	Prequarrying	Artefacts	Onsite	Damage of artefacts	Site inspection records, cultural heritage records	Unlikely	Insignificant	Low	Targeted monitoring; Staff training at induction (cultural heritage);	Cultural Heritage Management Plan/ Aboriginal Heritage Act 2006	Rare	Minor	Low	CHMP compliance	Site inspection	Yes
Land clearing / topsoil removal	Clearing areas	Sediment	S12P	Sediment impacting surface waters during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Surface water	Onsite waterway	Clogging / silting up waterways	Site inspection records	Possible	Minor	Medium	Restrict flow velocity in drains; Design drains to accommodate 1 in 10 yr event; Incorporate community views where practical; Install diversion drains; Maintain diversion structures; Design drains to minimise flow; Design drains to accommodate expected flow; Obtain licences and permits for water use; Design drains following natural lines; Scour protection on dam outlet;	ERS	Unlikely	Minor	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes
Land clearing / topsoil removal	Clearing areas	Sediment	S13P	Sediment impacts to aquatic ecosystems during land clearing / topsoil removal works during prequarrying phase	Prequarrying	Aquatic ecosystems	Onsite waterway	Clogging / silting up waterways	Site inspection records	Unlikely	Insignificant	Low	Design drains following natural lines; Sediment ponds; Scour protection on dam outlet; Maintain diversion structures; Install diversion drains; Manage dam outflows;	ANZG Ecosystem guidelines, ERS	Rare	Insignificant	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes
Overburden stripping	Stockpiles	Dust	S14P	Dust impacting neighbours from stockpiles during overburden stripping during prequarrying phase	Prequarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Dust in houses and over gardens, aggravate respiratory illness	Site inspection records, complaint records, monitoring data	Unlikely	Minor	Low	More monitoring in hot dry weather; Water for dust suppression; Stable stockpile slopes; Dust monitoring; Stabilise unused stockpiles; Distance operational areas from receptors; Maintain water management infrastructure; Water sprays; Perimeter vegetation; Perimeter bunds;	ERS	Rare	Insignificant	Low	Visible and detected dust, complaints	Site Inspection, continuous monitoring, complaint comments recorded	Yes
Overburden stripping	Stockpiles	Sediment	S15P	Sediment impacting surface waters from stockpiles during overburden stripping works during prequarrying phase	Prequarrying	Surface water	Onsite waterway	Clogging / silting up waterways	Site inspection records	Unlikely	Insignificant	Low	Maintain stormwater dams; Design drains following natural lines; Restrict flow velocity in drains; Obtain licences and permits for water use; Design drains to minimise flow; Scour protection on dam outlet; Maintain diversion structures; Design drains to accommodate expected flow; Design drains to accommodate 1 in 10 yr event; Install diversion drains;	ERS	Rare	Insignificant	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes
Overburden stripping	Stockpiles	Sediment	S16P	Sediment impacting aquatic ecosystems from stockpiles during overburden stripping works during prequarrying phase	Prequarrying	Aquatic ecosystems	Onsite waterway	Clogging / silting up waterways	Site inspection records	Unlikely	Insignificant	Low	Manage dam outflows; Install diversion drains; Sediment ponds; Scour protection on dam outlet; Maintain diversion structures; Design drains following natural lines;	ANZG Ecosystem guidelines, ERS	Rare	Insignificant	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes
Overburden stripping	Equipment	Noise	S17P	Noise impacting neighbours from equipment during overburden stripping works during	Prequarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Noise pollution	Complaint Register, Site inspection records	Possible	Minor	Medium	Limit offsite haulage to standard operating hours; Preference quiet equipment purchases; Mobile equipment to have noise attenuation devices; Engines to have suitable mufflers; Turn off equipment when not in use; No audible security alarms; Monitor noise; Restrict extraction between 0600-0700 Noise	ERS	Unlikely	Minor	Low	Complaint register, site inspection records	Frequency and response to complaints noise observed near receptors	Yes

Activity	Source	Hazard	Risk Event no	Risk description	Stage	Receptor	Location and proximity	Impact	Evidence inherent risk	Inherent LIkelihood	Inherent Consequence	Inherent Risk	Controls	Performance standards	Residual Likelihood	Residual Consequence	Residual Risk	Monitoring aspect	Monitoring details	Risk Treatment Plan
				prequarrying phase									bund 3m high beside western haul road Staff training at induction (noise); Coordinate equipment use; Coordinate equipment use;							
Overburden stripping	Equipment	Amenity	S18P	Visual amenity impacts for general public from dirt on public roads during overburden removal works during prequarrying phase	Prequarrying	Roadways / general public	10m north of northern boundary (Westernport Rd)	Contamination with dirt and mud	Complaints register, site inspection records	Unlikely	Minor	Low	Washdowns and rumble grids;	No complaints, roads clean	Rare	Minor	Low	Complaints register	Frequency and response to complaints	Yes
Quarry development	Dewatering	Groundwater level declines	S39Q	Water management activities lowering the watertable beyond the reach of plant roots	Quarrying	Vegetation	Site and surrounds	Decline in groundwater levels	Site inspectio records, groundwater level data if available	Possible	Minor	Medium	Monitor vegetation health; Monitor groundwater level; Additional watering; Clay liner on perimeter batters	No impact on vegetation	Unlikely	Minor	Low	Vegetation health, groundwater level	Site inspection, review of monitoring data if available	Yes
Quarry development	Dewatering	Groundwater level declines	S58Q	Water management activities creating increased groundwater drawdown	Quarrying	Groundwater users	50m west of western site boundary	Decline in groundwater levels	Monitoring bore data	Possible	Minor	Medium	Monitor groundwater level;	No large drawdown	Unlikely	Minor	Low	Groundwater bores	Groundwater levels	Yes
Quarry development	Dewatering	Contamination	S40Q	Water management activities impacting on the watertable and increasing salinity which affects groundwater conditions	Quarrying	Groundwater	Onsite and offsite to the west and northwest	Increased salinity	SW monitoring data	Possible	Minor	Medium	Monitor groundwater quality Monitor pond quality Clay liner on perimeter batters	ERS	Unlikely	Minor	Low	Surface water, groundwater	Water quality sampling and analysis	Yes
Quarry development	Dewatering	Contamination	S41Q	Water management activities impacting on the watertable and increasing salinity which affects plant growth	Quarrying	Ecosystems	Onsite waterway	Increased salinity	SW monitoring data	Possible	Moderate	Medium	Monitor pond quality Monitor groundwater quality Monitor vegetation health; Clay liner on perimeter batters	ANZG Ecosystem guidelines, ERS	Unlikely	Minor	Low	Surface water	Surface water sampling and analysis	Yes
Quarry development	Dewatering	Surface water discharge	S59Q	Greater groundwater inflow than anticipated necessitating off-site discharge	Quarrying	Surface water	Onsite waterway	Surface water quality	SW monitoring	Rare	Minor	Low	Monitor pond quality Monitor SW quality; Coordinate discharges with high flows; Inspection and maintenance for control structures; Stabilise land around discharge points; Obtain licence for wastewater discharges; Maintain records of discharges;	ERS	Rare	Minor	Low	Water storage ponds	Pond levels	Yes
Quarry development	Dewatering	Surface water discharge	S60Q	Greater groundwater inflow than anticipated necessitating off-site discharge	Quarrying	Ecology	Onsite waterway	Declining health	Site inspection records SW monitoring data	Rare	Minor	Low	Monitor vegetation health; Maintain records of discharges; Obtain permits for works on waterways; Obtain licence for wastewater discharges; Inspection and maintenance for control structures; Monitor pond quality Stabilise land around discharge points; Monitor SW quality;	ERS	Rare	Minor	Low	Vegetation health	Site inspection	Yes
Quarry development	Dewatering	Noise	S42P	Pumps from dewatering creating noise beyond the site boundary	Prequarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Increased noise	Complaint Register, Site inspection records	Rare	Insignificant	Low	Restrict extraction between 0600-0700 Mobile equipment to have noise attenuation devices; Locate noisy equipment away from receptors; Monitor noise; Staff training at induction (noise); Preference quiet equipment purchases; Screen receptors from noise;	ERS	Rare	Insignificant	Low	Complaint register, site inspection records	Frequency and response to complaints noise observed near receptors	Yes
Quarry development	Dewatering	Noise	S42Q	Pumps from dewatering creating noise beyond the site boundary	Quarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Increased noise	Complaint Register, Site inspection records	Rare	Insignificant	Low	Mobile equipment to have noise attenuation devices; Preference quiet equipment purchases; Screen receptors from noise; Staff training at induction (noise); Locate noisy equipment away from receptors; Monitor noise; Restrict extraction between 0600-0700	ERS	Rare	Insignificant	Low	Complaint register, site inspection records	Frequency and response to complaints noise observed near receptors	Yes
Excavation	Product excavation and transport onsite	Dust	S19Q	Dust impacting neighbours from product excavation and transport onsite during dry extraction	Quarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Dust in houses and over gardens, aggravate respiratory illness	Site inspection records, complaint records, monitoring data	Possible	Moderate	Medium	More monitoring in hot dry weather; Speed limits for vehicles; Maintain existing vegetation; Staff training at induction (dust); Water for dust suppression; Dust monitoring; Perimeter vegetation; Restrict vehicle movements to sealed/watered roads; Distance operational areas from receptors; Maintain water management infrastructure; Water sprays; Cover loads to/from offsite;	ERS	Unlikely	Minor	Low	Visible and detected dust, complaints	Site Inspection, continuous monitoring, complaint comments recorded	Yes
Excavation	Product excavation and transport onsite	Noise	S20Q	Noise impacting neighbours from product excavation and transport onsite during dry extraction	Quarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Noise disturbance	Complaint Register, Site inspection records	Possible	Minor	Medium	Restrict extraction between 0600-0700 Monitor noise; Turn off equipment when not in use; Mobile equipment to have noise attenuation devices; Engines to have suitable mufflers; Screen receptors from noise; Noise bund 3m high beside western haul road Staff training at induction (noise); Coordinate equipment use; Preference quiet equipment purchases;	ERS	Unlikely	Minor	Low	Complaint register, site inspection records	Frequency and response to complaints noise observed near receptors	Yes
Excavation	Product excavation and transport onsite	Sediment	S22Q	Sediment impacting surface waters from product excavation and transport onsite during dry extraction during quarrying phase	Quarrying	Surface water	Onsite waterway	Clogging / silting up waterways	Site inspection records	Unlikely	Minor	Low	Flow velocity check structures; Vegetation works sympathetic to quarry plan; Inspection and monitoring of stormwater controls; Reduce flow velocity along drains; Consider natural angle of repose for stockpiles; Stabilise disturbed land promptly;	ERS	Rare	Minor	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes

Activity	Source	Hazard	Risk Event no	Risk description	Stage	Receptor	Location and proximity	Impact	Evidence inherent risk	Inherent Likelihood	Inherent Consequence	Inherent Risk	Controls	Performance standards	Residual Likelihood	Residual Consequence	Residual Risk	Monitoring aspect	Monitoring details	Risk Treatment Plan
Excavation	Stormwater	Erosion	S61Q	Erosion of the pit face from stormwater runoff	Quarrying	Land	Onsite	Damage to batters	Site inspection records	Likely	Minor	Medium	Vertical faces to reduce sediment runoff; Inspection and monitoring of stormwater controls; Interception drains upstream of stockpiles;	Minimal erosion observed	Possible	Minor	Medium	Pit batters	Evidence of erosion	Yes
Excavation	Product excavation and transport onsite	Contamination	S38Q	Contamination of groundwater from spills during quarrying phase	Quarrying	Groundwater	Onsite	Spills	Site inspection records	Rare	Minor	Low	Staff training at induction (HazSub); Spill protection in refuelling areas; Inspect spill control measures; Minimise stored volumes of HazSub; Record spills; Prompt spill remediation;	ERS	Unlikely	Insignificant	Low	Visible evidence of spill	Site inspection	Yes
Excavation	Geotechnical parameters	Rotational failure of exposed face at northern boundary prior to placement of clay buttress and waterway diversion	S68Q	Large (eg full slope height) arc-shaped failure surface developing in slope at the northern face,Depth limited by presence of existing waterway. Include consideration of seismic hazard.	Quarrying	Westernport and Milners Road, neighbours' property	Adjacent properties	Geotechnical instability	Site inspection reports	Unlikely	Major	Medium	Representative material properties; Visual monitoring of faces; Inspect slope and crest for cracking; Limit extraction to allow buttress construction; Minimise exposure of sand faces;	ERR Geotechnical Guidelines	Rare	Minor	Low	Signs of instability	Records of regular inspections of faces and crests according to GCMP	Yes
Excavation	Geotechnical parameters	Settlement/subsidence due to excessive water table depression prior to buttress placement	S69Q	Movement of adjacent land, beyond buffer zone if excessive settlement occurs. In particular, northern boundary - Westernport Road	Quarrying	Westernport and Milners Road, neighbours' property	Adjacent properties	Geotechnical instability	Site inspection reports	Possible	Moderate	Medium	Maintain 20m buffer; Monitor c' and seek geotech advice; Ongoing survey of pit	ERR Geotechnical Guidelines	Rare	Moderate	Medium	Signs of instability	Records of regular inspections of crests and road condition according to GCMP	Yes
Excavation	Geotechnical parameters	Slumping/heave at operational slope toe	S70Q	Excavation cuts an unstable slope geometry with effect of high water pressure in ground	Quarrying	Westernport and Milners Road, neighbours' property	Adjacent properties	Geotechnical instability	Site inspection reports	Unlikely	Major	Medium	Monitor water pressure; Monitor boom arm extents of dredge; GCMP to include TARP for water pressure	ERR Geotechnical Guidelines	Rare	Moderate	Medium	Signs of instability	Records of regular inspections of faces and excavation toe condition according to GCMP, including methods to constrain dredge advance toward terminal faces	Yes
Excavation	Geotechnical parameters	Slope failure of batters during operaton due to erosion	S71Q	Tunnel/piping erosion leading to slope and crest collapse degrading the slope condition	Quarrying	Westernport and Milners Road, neighbours' property	Onsite	Geotechnical instability	Site inspection reports	Unlikely	Moderate	Medium	Install clay buttress; Vegetate crest;	RR Geotechnical Guidelines	Rare	Minor	Low	Quality control of construction, Signs of erosion	Record evidence that clay batter constructed according to Specifications. Monitor according to GCMP.	Yes
Excavation	Geotechnical parameters	Slope failure of batters during rehabilitatoin due to erosion	S71R	Tunnel/piping erosion leading to slope and crest collapse degrading the slope condition	Rehabilitation	Westernport and Milners Road, neighbours' property	Onsite	Geotechnical instability	Site inspection reports	Unlikely	Moderate	Medium	Install clay buttress; Vegetate crest;	RR Geotechnical Guidelines	Rare	Minor	Low	Quality control of construction, Signs of erosion	Record evidence that clay batter constructed according to Specifications. Monitor according to GCMP.	Yes
Landform	Geotechnical parameters	Slope failure of batters due to erosion	S71C	Tunnel/piping erosion leading to slope and crest collapse degrading the slope condition	Post-closure	Westernport and Milners Road, neighbours' property	Beyond boundaries to N, W and E	Geotechnical instability	Site inspection reports	Unlikely	Moderate	Medium	Install clay buttress; Vegetate crest;	ERR Geotechnical Guidelines	Rare	Minor	Low	Quality control of construction, Signs of erosion	Record evidence that clay batter constructed according to Specifications. Monitor according to GCMP.	Yes
Backfilling	Fill materials	Rotational failure or buttress sliding of exposed face at northern boundary after placement of clay buttress	S72Q	Large (eg full slope height) arc-shaped failure surface developing in slope at the northern face at maximum depth after waterway diverson. Includes consideration of seismic hazard	Quarrying	Westernport and Milners Road, neighbours' property	Adjacent property	Geotechnical instability	Site inspection reports	Unlikely	Major	Medium	Monitor water pressure; Install clay buttress; Inspect slope and crest for cracking;	ERR Geotechnical Guidelines	Rare	Minor	Low	Quality control of construction, Signs of instability	Record evidence that clay batter constructed according to Specifications. Records of regular inspections of faces and crests according to GCMP	Yes
Backfilling	Fill materials	Settlement/subsidence due to excessive water table depression after buttress placement	S73Q	Movement of adjacent land, beyond buffer zone if excessive settlement occurs. In particular northern boundary - Westernport Road	Quarrying	Westernport and Milners Road, neighbours' property	Adjacent property	Geotechnical instability	Site inspection reports	Unlikely	Moderate	Medium	Monitor road, batters and crest	ERR Geotechnical Guidelines	Rare	Minor	Low	Signs of instability	Records of regular inspections of crests and road condition according to GCMP	Yes
Excavation	Groundwater level fluctuation	Geotechnical instability	S63R	Settlement/subsidence due to excessive water table depression after buttress placement	Rehabilitation	Westernport and Milners Roads, neighbours' properties	Beyond boundaries to N, W and E	Land subsidence/collapse	Site inspection records	Unlikely	Moderate	Medium	Monitor road conditions;	No subsidence observed	Rare	Minor	Low	Ground surface	Cracking, subsidence	Yes
Landform	Groundwater level fluctuation	Geotechnical instability	S63C	Settlement/subsidence due to excessive water table depression after buttress placement	Quarrying, Post-closure	Westernport and Milners Roads, neighbours' properties	Beyond boundaries to N, W and E	Land subsidence/collapse	Site inspection records	Unlikely	Moderate	Medium	Monitor road conditions;	No subsidence observed	Rare	Minor	Low	Ground surface	Cracking, subsidence	Yes
Backfilling	Water	Waterway diversion failure	S74Q	Excessive infiltration leading to loss of stream flow and	Quarrying	Ecosystems	Onsite and downstream waterway	Flow reduction	Site inspection records	Unlikely	Major	Medium	Put waterway onto clay buttress; Review construction/materials specification	ERR Geotechnical Guidelines, Melbourne	Rare	Minor	Low	Quality control of construction, Signs of	Record evidence that clay batter constructed according to Specifications	Yes

Activity	Source	Hazard	Risk Event no	Risk description	Stage	Receptor	Location and proximity	Impact	Evidence inherent risk	Inherent LIkelihood	Inherent Consequence	Inherent Risk	Controls	Performance standards	Residual Likelihood	Residual Consequence	Residual Risk	Monitoring aspect	Monitoring details	Risk Treatment Plan
				increasing water pressure in slope										Water requirements				excess infiltration		
Waste management	Containment embankment	Slope failure of embankments impounding water or solid waste during operation due to erosion	S75Q	Embankment fails and impounded water or solid waste released to adjacent pit area	Quarrying	Internal site activities only	Onsite	Geotechnical instability	Site inspection reports	Unlikely	Major	High	Use parameters determined onsite;	ERR Geotechnical Guidelines	Rare	Major	Medium	Quality control of construction, Signs of excess infiltration	Record evidence that clay batter constructed according to Specifications. Monitor according to GCMP	No
Excavation	Groundwater level fluctuation	Geotechnical parameters	S63Q	Settlement/subsidence due to excessive water table depression after buttress placement	Quarrying	Westernport and Milners Roads, neighbours' properties	Beyond boundaries to N, W and E	Land subsidence/collapse	Site inspection records	Unlikely	Moderate	Medium	Monitor road conditions; Manage groundwater levels;	No subsidence observed	Rare	Minor	Low	Ground surface	Cracking, subsidence	Yes
Excavation	Surcharging crest	Geotechnical instability	S57Q	Overloading crest with machinery and plant	Quarrying	Westernport and Milners Roads, neighbours property	Beyond boundaries to N, W and E	land subsidence/collapse	Site inspection records	Unlikely	Minor	Low	Limit plant access to crest; Visual monitoring of faces; Limit pedestrian access to crest; No stockpiles within 3m of crest; Limit light vehicle access to crest;	No unnecessary materials on crest	Rare	Minor	Low	Wall stability	Site inspection	Yes
Backfilling	Filter cake	Dust	S66R	Uncontrolled dust during handling of filter cake impacting neighbours	Rehabilitation	Neighbours	200m west of West Pit and 190m north-east of East Pit	Dust in houses and over gardens, aggravate respiratory illness	Site inspection records, complaint records, monitoring data	Rare	Insignificant	Low	More monitoring in hot dry weather; Maintain water management infrastructure; Water sprays; Distance operational areas from receptors; Dust monitoring; Water for dust suppression; Staff training at induction (dust); Vegetate final landform;	ERS	Rare	Insignificant	Low	Visible and detected dust, complaints	Site Inspection, continuous monitoring, complaint comments recorded	Yes
Processing	Sand washing	Sediment	S24Q	Sediment impacting surface waters from sand washing during processing during quarrying phase	Quarrying	Surface water	Onsite waterway	Clogging / silting up waterways	Site inspection records	Rare	Insignificant	Low	Design drains to minimise flow; Manage dam outflows; Design drains following natural lines; Restrict flow velocity in drains; Obtain licences and permits for water use; Sediment ponds; Scour protection on dam outlet; Maintain stormwater dams; Design drains to accommodate expected flow; Design drains to accommodate 1 in 10 yr event; Maintain diversion structures; Install diversion drains;	ERS	Rare	Insignificant	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes
Processing	Sand washing	Contamination	S21Q	Contamination of groundwater from filtercake during quarrying phase	Quarrying	Groundwater	Onsite	Contamination from filtercake (pH)	GW Monitoring data	Unlikely	Minor	Low	Targeted monitoring;	ERS	Unlikely	Minor	Low	pH	Sampling and analysis of groundwater	Yes
Processing	Screening	Dust	S25Q	Dust impacting neighbours from screening during processing during quarrying phase	Quarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Dust in houses and over gardens, aggravate respiratory illness	Site inspection records, complaint records, monitoring data	Unlikely	Minor	Low	More monitoring in hot dry weather; Dust monitoring; Water for dust suppression; Final landform design considers dust; Staff training at induction (dust); Stable stockpile slopes; Distance operational areas from receptors; Maintain water management infrastructure; Water sprays; Dust suppression devices for equipment; Maintain existing vegetation;	ERS	Rare	Minor	Low	Visible and detected dust, complaints	Site Inspection, continuous monitoring, complaint comments recorded	Yes
Processing	Screening	Noise	S26Q	Noise impacting neighbours from screening during processing during quarrying phase	Quarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Noise disturbance	Complaint Register, Site inspection records	Likely	Moderate	High	Monitor noise; No loudspeaker systems; Locate noisy equipment away from receptors; Screen receptors from noise; Engines to have suitable mufflers; Mobile equipment to have noise attenuation devices; Turn off equipment when not in use; Equipment mainenance; Pneumatic tools to have effective silencer; Locate processing in base of pit; Restrict extraction between 0600-0700 Noise bund 3m high beside western haul road Staff training at induction (noise); Preference quiet equipment purchases; Equipment in acoustically protected enclosure; Use broadband reversing alarms Plan site to avoid reversing; No audible security alarms;	ERS	Possible	Minor	Medium	Complaint register, site inspection records	Frequency and response to complaints noise observed near receptors	Yes
Processing	Screening	Sediment	S27Q	Sediment impacting surface waters from screening during processing during quarrying phase	Quarrying	Surface water	Onsite waterway	Clogging / silting up waterways	Site inspection records	Rare	Insignificant	Low	Install diversion drains; Design drains following natural lines; Manage dam outflows; Maintain diversion structures; Design drains to accommodate 1 in 10 yr event; Obtain licences and permits for water use; Design drains to minimise flow; Design drains to accommodate expected flow; Maintain stormwater dams; Sediment ponds; Restrict flow velocity in drains; Scour protection on dam outlet;	ERS	Rare	Insignificant	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes
Processing	Screening	Contamination	S28Q	Contamination of groundwater from spills in the processing area during quarrying phase	Quarrying	Groundwater	Onsite	Contamination from spills	Site inspection records	Unlikely	Minor	Low	Targeted monitoring;	ERS	Rare	Minor	Low	Visible evidence of spill	Site inspection	Yes
Processing	Screening	Contamination	S29Q	Contamination of land from spills in the processing area during quarrying phase	Quarrying	Land	Onsite	Contamination from spills	Site Inspection records	Possible	Minor	Medium	Targeted monitoring;	ERS	Possible	Insignificant	Low	Visible evidence of spill	Site inspection	Yes
Processing	Screening	Contamination	S30Q	Contamination of surface water from spills in the processing area during quarrying phase	Quarrying	Surface water	Onsite waterway	Contamination from spills	SW monitoring data	Unlikely	Insignificant	Low	Targeted monitoring;	ERS	Rare	Insignificant	Low	Surface water	Surface water sampling and analysis	Yes
Processing	Stockpiles	Sediment	S31Q	Erosion of stockpiles causing silting of surface waters during quarrying phase	Quarrying	Surface water	Onsite waterway	Clogging / silting up waterways	Site inspection records	Rare	Insignificant	Low	Consider natural angle of repose for stockpiles; Operating areas away from floodways/ LSIO; Flow velocity check structures; Stabilise distrurbed land promptly; Separate 150mm topsoil in stockpiles	ERS	Rare	Insignificant	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes
Processing	Stockpiles	Dust	S43Q	Dust impacting neighbours from stockpiles during	Quarrying	Neighbours	200m west of West Pit and	Dust from stockpiles impacting	Site inspection records,	Possible	Minor	Medium	Water sprays; Water for dust suppression; Stabilise unused stockpiles; Stable stockpile slopes; Staff training at induction (dust); Dust	ERS	Unlikely	Minor	Low	Visible dust	Site Inspection	Yes

Activity	Source	Hazard	Risk Event no	Risk description	Stage	Receptor	Location and proximity	Impact	Evidence inherent risk	Inherent LIkelihood	Inherent Consequence	Inherent Risk	Controls	Performance standards	Residual Likelihood	Residual Consequence	Residual Risk	Monitoring aspect	Monitoring details	Risk Treatment Plan
				processing during quarrying phase			190m north-east of East Pit	neighbours amenity and health	complaint records				monitoring; More monitoring in hot weather; Maintain water management infrastructure;							
Processing	Loading of product	Noise	S32Q	Noise impacting neighbours from loading of product during processing during quarrying phase	Quarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Noise disturbance	Complaint Register, Site inspection records	Unlikely	Insignificant	Low	No audible security alarms; Staff training at induction (noise); Preference quiet equipment purchases; Use broadband reversing alarms Plan site to avoid reversing; Equipment mainenance; Restrict extraction between 0600-0700 Monitor noise; Locate noisy equipment away from receptors; Screen receptors from noise; No loudspeaker systems; Mobile equipment to have noise attenuation devices; Turn off equipment when not in use; Engines to have suitable mufflers; Noise bund 3m high beside western haul road	ERS	Unlikely	Insignificant	Low	Complaint register, site inspection records	Frequency and response to complaints noise observed near receptors	Yes
Processing	Loading of product	Dust	S33Q	Dust impacting neighbours from loading of product during processing during quarrying phase	Quarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Dust in houses and over gardens, aggravate respiratory illness	Site inspection records, complaint records, monitoring data	Rare	Insignificant	Low	More monitoring in hot dry weather; Distance operational areas from receptors; Stable stockpile slopes; Final landform design considers dust; Maintain existing vegetation; Staff training at induction (dust); Water for dust suppression; Dust suppression devices for equipment; Maintain water management infrastructure; Water sprays; Dust monitoring;	ERS	Rare	Insignificant	Low	Visible and detected dust, complaints	Site Inspection, continuous monitoring, complaint comments recorded	Yes
Product transport	Roadways	Dust	S34Q	Dust impacting neighbours from transporting product during processing during quarrying phase	Quarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Dust in houses and over gardens, aggravate respiratory illness	Site inspection records, complaint records, monitoring data	Rare	Insignificant	Low	Washdown of plant and equipment; Seal / gravel roads near receptors; Cover dusty loads;	ERS	Rare	Insignificant	Low	Visible and detected dust	Site Inspection, continuous monitoring	Yes
Product transport	Roadways	Noise	S35Q	Noise impacting neighbours from transporting product during processing during quarrying phase	Quarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Noise pollution	Complaint Register, Site inspection records	Possible	Moderate	Medium	Staff training at induction (noise); Plan site to avoid reversing; Preference quiet equipment purchases; Noise bund 3m high beside western haul road Monitor noise; Limit offsite haulage to standard operating hours; Maintain site roads; Transport routes avoid receptors;	ERS	Possible	Minor	Medium	Complaint register, site inspection records	Frequency and response to complaints noise observed near receptors	Yes
Product transport	Roadways	Amenity	S36Q	Visual amenity impacts for general public from dirt on public roads during product transport during quarrying phase	Quarrying	Roadways / general public	10m north of northern boundary (Westernport Rd)	Contamination with dirt and mud	Complaints register, site inspection records	Unlikely	Minor	Low	Washdown of plant and equipment; Washdowns and rumble grids; Seal / gravel roads near receptors; Seal roads either side of wheelwash;	No complaints, roads clean	Rare	Minor	Low	Complaints register	Frequency and response to complaints	Yes
Product transport	Roadways	Sediment	S44Q	Sediment impacting surface waters from roadways during product transport	Quarrying	Surface water	Onsite waterway	Clogging / silting up waterways	Site inspection records	Unlikely	Minor	Low	Seal / gravel roads near receptors; Washdowns and rumble grids; Seal roads either side of wheelwash;	ERS	Rare	Minor	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes
After Dark Operations	Light	Light trespass	G13Q	Light trespass impacting neighbours from lighting during after dark operations during quarrying phase	Quarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Disturbance during night time	Complaints register	Rare	Minor	Low	Vegetate buffers; Earthen screening bunds;	No complaints	Rare	Insignificant	Low	Complaints register	Frequency and response to complaints	Yes
Site maintenance	Rabbits and foxes	Burrows	G05P	Burrows impacting land from rabbits and foxes during prequarrying phase	Prequarrying	Land	Onsite	Destabilises ground making it susceptible to erosion	Site inspection records	Unlikely	Insignificant	Low	Identify pests and remove refuges; Protect rehabilitated areas; Consult regulator about eradication methods; Map areas of noxious weeds;	No active burrows	Rare	Insignificant	Low	Presence of burrows	Site inspection	Yes
Site maintenance	Rabbits and foxes	Burrows	G05Q	Burrows impacting land from rabbits and foxes during quarrying phase	Quarrying	Land	Onsite	Destabilises ground making it susceptible to erosion	Site inspection records	Unlikely	Insignificant	Low	Identify pests and remove refuges; Consult regulator about eradication methods; Protect rehabilitated areas; Map areas of noxious weeds;	No active burrows	Rare	Insignificant	Low	Presence of burrows	Site inspection	Yes
Site maintenance	Rabbits and foxes	Burrows	G05R	Burrows impacting land from rabbits and foxes during rehabilitation phase	Rehabilitation	Land	Onsite	Destabilises ground making it susceptible to erosion	Site inspection records	Unlikely	Insignificant	Low	Identify pests and remove refuges; Consult regulator about eradication methods; Protect rehabilitated areas; Map areas of noxious weeds;	No active burrows	Rare	Insignificant	Low	Presence of burrows	Site inspection	Yes
Site maintenance	Rabbits and foxes	Burrows	G05C	Burrows impacting land from rabbits and foxes during post-closure phase	Post-closure	Land	Onsite	Destabilises ground making it susceptible to erosion	Site inspection records	Possible	Insignificant	Low	Protect rehabilitated areas; Identify pests and remove refuges; Map areas of noxious weeds; Consult regulator about eradication methods;	No active burrows	Unlikely	Insignificant	Low	Presence of burrows	Site inspection	Yes
Site maintenance	Foxes, cats and dogs	Predation	G06P	Predation of native fauna by foxes, cats and dogs during prequarrying phase	Prequarrying	Native fauna	Onsite and neighbouring properties	Predators may extend their range to neighboring properties and bushland	Site inspection records, complaint register	Possible	Insignificant	Low	Identify pests and remove refuges; Consult regulator about eradication methods; Map areas of noxious weeds;	No predation from introduced pest species	Unlikely	Insignificant	Low	Site inspections, complaint register	Occurrence	Yes
Site maintenance	Foxes, cats and dogs	Predation	G06Q	Predation of native fauna by foxes, cats and dogs during quarrying phase	Quarrying	Native fauna	Onsite and neighbouring properties	Predators may extend their range to neighboring properties and bushland	Site inspection records, complaint register	Possible	Insignificant	Low	Identify pests and remove refuges; Map areas of noxious weeds; Consult regulator about eradication methods;	No predation from introduced pest species	Unlikely	Insignificant	Low	Site inspections, complaint register	Occurrence	Yes
Site maintenance	Foxes, cats and dogs	Predation	G06R	Predation of native fauna by foxes, cats and dogs during rehabilitation phase	Rehabilitation	Native fauna	Onsite and neighbouring properties	Predators may extend their range to neighboring properties and bushland	Site inspection records, complaint register	Possible	Insignificant	Low	Map areas of noxious weeds; Consult regulator about eradication methods; Identify pests and remove refuges;	No predation from introduced pest species	Unlikely	Insignificant	Low	Site inspections, complaint register	Occurrence	Yes

Activity	Source	Hazard	Risk Event no	Risk description	Stage	Receptor	Location and proximity	Impact	Evidence inherent risk	Inherent LIkelihood	Inherent Consequence	Inherent Risk	Controls	Performance standards	Residual Likelihood	Residual Consequence	Residual Risk	Monitoring aspect	Monitoring details	Risk Treatment Plan
Site maintenance	Foxes, cats and dogs	Predation	G06C	Predation of native fauna by foxes, cats and dogs during post closure phase	Post-closure	Native fauna	Onsite and neighbouring properties	Predators may extend their range to neighboring properties and bushland	Site inspection records, complaint register	Possible	Insignificant	Low	Identify pests and remove refuges; Map areas of noxious weeds; Consult regulator about eradication methods;	No predation from introduced pest species	Unlikely	Insignificant	Low	Site inspections, complaint register	Occurrence	Yes
Site maintenance	Weeds	Weed Infestations	G07P	Weed infestations impacting neighbour's property during operations during prequarrying phase	Prequarrying	Neighbour's property	Site surrounds	Establishment of weed populations	Complaints register	Unlikely	Minor	Low	Eradicate noxious weeds and pests; Identify pests and remove refuges; Inspect rehabilitated areas; Use prescribed rates of pesticides and herbicides; Map areas of noxious weeds; Use local species for rehabilitation; Staff training at induction (pests and weeds); Implement biosecurity protocols; Identify noxious weeds;	No complaints	Rare	Minor	Low	Complaint register	Frequency and response	Yes
Site maintenance	Weeds	Weed Infestations	G07Q	Weed infestations impacting neighbour's property during operations during quarrying phase	Quarrying	Neighbour's property	Site surrounds	Establishment of weed populations	Complaints register	Unlikely	Minor	Low	Eradicate noxious weeds and pests; Identify pests and remove refuges; Inspect rehabilitated areas; Use prescribed rates of pesticides and herbicides; Map areas of noxious weeds; Implement biosecurity protocols; Use local species for rehabilitation; Identify noxious weeds; Staff training at induction (pests and weeds);	No complaints	Rare	Minor	Low	Complaint register	Frequency and response	Yes
Site maintenance	Weeds	Weed Infestations	G07R	Weed infestations impacting neighbour's property during operations during rehabilitation phase	Rehabilitation	Neighbour's property	Site surrounds	Establishment of weed populations	Complaints register	Unlikely	Minor	Low	Identify noxious weeds; Eradicate noxious weeds and pests; Staff training at induction (pests and weeds); Use local species for rehabilitation; Implement biosecurity protocols; Map areas of noxious weeds; Use prescribed rates of pesticides and herbicides; Identify pests and remove refuges; Inspect rehabilitated areas;	No complaints	Rare	Minor	Low	Complaint register	Frequency and response	Yes
Site maintenance	Weeds	Weed Infestations	G07C	Weed infestations impacting neighbour's property during operations during post closure phase	Post-closure	Neighbour's property	Site surrounds	Establishment of weed populations	Complaints register	Possible	Minor	Medium	Identify pests and remove refuges; Eradicate noxious weeds and pests; Inspect rehabilitated areas; Use prescribed rates of pesticides and herbicides; Map areas of noxious weeds; Implement biosecurity protocols; Use local species for rehabilitation; Staff training at induction (pests and weeds); Identify noxious weeds;	No complaints	Unlikely	Minor	Low	Complaint register	Frequency and response	Yes
Site maintenance	Weeds	Weed Infestations	G08P	Weed infestations impacting native flora during operations during prequarrying phase	Prequarrying	Native flora	Onsite and neighbouring properties	Establishment of weed populations , especially in adjacent bushland	Site inspection reports	Rare	Minor	Low	Implement biosecurity protocols; Inspect rehabilitated areas; Identify noxious weeds; Eradicate noxious weeds and pests; Identify pests and remove refuges; Map areas of noxious weeds; Use local species for rehabilitation; Staff training at induction (pests and weeds); Use prescribed rates of pesticides and herbicides;	No established weed infestations	Rare	Minor	Low	Weed infestations	Site Inspections	Yes
Site maintenance	Weeds	Weed Infestations	G08Q	Weed infestations impacting native flora during operations during quarrying phase	Quarrying	Native flora	Onsite and neighbouring properties	Establishment of weed populations , especially in adjacent bushland	Site inspection reports	Rare	Minor	Low	Implement biosecurity protocols; Use local species for rehabilitation; Map areas of noxious weeds; Use prescribed rates of pesticides and herbicides; Inspect rehabilitated areas; Identify pests and remove refuges; Eradicate noxious weeds and pests; Identify noxious weeds; Staff training at induction (pests and weeds);	No established weed infestations	Rare	Minor	Low	Weed infestations	Site Inspections	Yes
Site maintenance	Weeds	Weed Infestations	G08R	Weed infestations impacting native flora during operations during rehabiltiation phase	Rehabilitation	Native flora	Onsite and neighbouring properties	Establishment of weed populations , especially in adjacent bushland	Site inspection reports	Rare	Minor	Low	Implement biosecurity protocols; Identify noxious weeds; Staff training at induction (pests and weeds); Use local species for rehabilitation; Map areas of noxious weeds; Inspect rehabilitated areas; Identify pests and remove refuges; Eradicate noxious weeds and pests; Use prescribed rates of pesticides and herbicides;	No established weed infestations	Rare	Minor	Low	Weed infestations	Site Inspections	Yes
Site maintenance	Weeds	Weed Infestations	G08C	Weed infestations impacting native flora during operations during post-closure phase	Post-closure	Native flora	Onsite and neighbouring properties	Establishment of weed populations , especially in adjacent bushland	Site inspection reports	Possible	Minor	Medium	Use prescribed rates of pesticides and herbicides; Identify noxious weeds; Eradicate noxious weeds and pests; Inspect rehabilitated areas; Map areas of noxious weeds; Implement biosecurity protocols; Use local species for rehabilitation; Staff training at induction (pests and weeds); Identify pests and remove refuges;	No established weed infestations	Unlikely	Minor	Low	Weed infestations	Site Inspections	Yes
Site maintenance	Weeds	Chemical usage	G09P	Chemical usage impacting surface waters during operations during prequarrying phase	Prequarrying	Surface water	Onsite waterway	Excess herbicides washing into creeks and waterbodies	SW monitoring data	Unlikely	Insignificant	Low	Staff training at induction (HazSub); Minimise stored volumes of HazSub; Prevent rainfall and stormwater ingress; Distance HazSub storage from waterways and veg; Correct labelling; Inspect spill control measures; ERS compliance; Record spills; Select less hazardous products; Minimise handling of HazSub; Spill protection in HazSub storage areas; Divert stormwater around HazSub storage areas; Identify correct disposal options;	ERS	Rare	Insignificant	Low	Surface water	Surface water sampling and analysis	Yes
Site maintenance	Weeds	Chemical usage	G09Q	Chemical usage impacting surface waters during operations during quarrying phase	Quarrying	Surface water	Onsite waterway	Excess herbicides washing into creeks and waterbodies	SW monitoring data	Rare	Insignificant	Low	Record spills; Divert stormwater around HazSub storage areas; Prevent rainfall and stormwater ingress; Distance HazSub storage from waterways and veg; Correct labelling; Inspect spill control measures; ERS; Minimise stored volumes of HazSub; Select less hazardous products; Minimise handling of HazSub; Spill protection in HazSub storage areas; Identify correct disposal options; Staff training at induction (HazSub);	ERS	Rare	Insignificant	Low	Surface water	Surface water sampling and analysis	Yes
Site maintenance	Weeds	Chemical usage	G09R	Chemical usage impacting surface waters during operations during rehabilitation phase	Rehabilitation	Surface water	Onsite waterway	Excess herbicides washing into creeks and waterbodies	SW monitoring data	Rare	Insignificant	Low	Staff training at induction (HazSub); Minimise stored volumes of HazSub; Prevent rainfall and stormwater ingress; Distance HazSub storage from waterways and veg; Correct labelling; Inspect spill control measures; Record spills; Select less hazardous products; Minimise handling of HazSub; Spill protection in HazSub storage areas; Identify correct	ERS	Rare	Insignificant	Low	Surface water	Surface water sampling and analysis	Yes

Activity	Source	Hazard	Risk Event no	Risk description	Stage	Receptor	Location and proximity	Impact	Evidence inherent risk	Inherent LIkelihood	Inherent Consequence	Inherent Risk	Controls	Performance standards	Residual Likelihood	Residual Consequence	Residual Risk	Monitoring aspect	Monitoring details	Risk Treatment Plan
													disposal options; Divert stormwater around HazSub storage areas; ERS compliance;							
Site maintenance	Weeds	Chemical usage	G09C	Chemical usage impacting surface waters during operations post closure phase	Post-closure	Surface water	Onsite waterway	Excess herbicides washing into creeks and waterbodies	SW monitoring data	Rare	Insignificant	Low	Minimise handling of HazSub; Select less hazardous products; Record spills; ERS compliance; Staff training at induction (HazSub); Inspect spill control measures;	ERS	Rare	Insignificant	Low	Surface water	Surface water sampling and analysis	Yes
Site maintenance	Weeds	Chemical usage	G10P	Chemical usage impacting land during operations during prequarrying phase	Prequarrying	Land	Onsite	Excess herbicides contaminating land	Site inspection records	Unlikely	Insignificant	Low	Correct labelling; Minimise stored volumes of HazSub; Prevent rainfall and stormwater ingress; Spill Kits; Prompt spill remediation; Inspect spill control measures; HazSub register; Record spills; Identify correct disposal options; Select less hazardous products; Spill protection in HazSub storage areas; Minimise handling of HazSub; Staff training at induction (HazSub); Impervious secondary containment;	Only weeds impacted, ERS	Rare	Insignificant	Low	Vegetation health	Site inspection	Yes
Site maintenance	Weeds	Chemical usage	G10Q	Chemical usage impacting land during operations during quarrying phase	Quarrying	Land	Onsite	Excess herbicides contaminating land	Site inspection records	Rare	Insignificant	Low	Spill protection in HazSub storage areas; Spill Kits; Prompt spill remediation; Inspect spill control measures; Staff training at induction (HazSub); HazSub register; Record spills; Minimise handling of HazSub; Identify correct disposal options; Minimise stored volumes of HazSub; Select less hazardous products; Impervious secondary containment; Correct labelling; Prevent rainfall and stormwater ingress;	Only weeds impacted, ERS	Rare	Insignificant	Low	Vegetation health	Site inspection	Yes
Site maintenance	Weeds	Chemical usage	G10R	Chemical usage impacting land during operations during rehabilitation phase	Rehabilitation	Land	Onsite	Excess herbicides contaminating land	Site inspection records	Rare	Insignificant	Low	HazSub register; Minimise stored volumes of HazSub; Impervious secondary containment; Prevent rainfall and stormwater ingress; Correct labelling; Spill Kits; Prompt spill remediation; Record spills; Select less hazardous products; Minimise handling of HazSub; Spill protection in HazSub storage areas; Staff training at induction (HazSub); Identify correct disposal options; Inspect spill control measures;	Only weeds impacted, ERS	Rare	Insignificant	Low	Vegetation health	Site inspection	Yes
Site maintenance	Weeds	Chemical usage	G10C	Chemical usage impacting land during operations during post-closure phase	Post-closure	Land	Onsite	Excess herbicides contaminating land	Site inspection records	Rare	Insignificant	Low	Select less hazardous products; Inspect spill control measures; Record spills; Minimise handling of HazSub; Staff training at induction (HazSub);	Only weeds impacted, ERS	Rare	Insignificant	Low	Vegetation health	Site inspection	Yes
Operations	Exhaust fumes from vehicles and equipment	Exhaust fumes	G34P	Fumes from vehicle and machinery exhaust polluting the air	Prequarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Airborne contaminants	Maintenance records	Likely	Insignificant	Medium	Targeted monitoring; Regular servicing;	Minimal emissions	Likely	Insignificant	Medium	Maintenance records	Servicing frequency	Yes
Operations	Exhaust fumes from vehicles and equipment	Exhaust fumes	G34Q	Fumes from vehicle and machinery exhaust polluting the air	Quarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Airborne contaminants	Maintenance records	Likely	Insignificant	Medium	Targeted monitoring;	Minimal emissions	Likely	Insignificant	Medium	Maintenance records	Servicing frequency	Yes
Operations	Exhaust fumes from vehicles and equipment	Exhaust fumes	G34R	Fumes from vehicle and machinery exhaust polluting the air	Rehabilitation	Neighbours	200m west of West Pit and 190m north-east of East Pit	Airborne contaminants	Maintenance records	Likely	Insignificant	Medium	Regular servicing; Targeted monitoring; Targeted monitoring;	Minimal emissions	Likely	Insignificant	Medium	Maintenance records	Servicing frequency	Yes
Operations	Odour from chemicals	Odour	G38P	Odour released from chemical storage	Prequarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Odours released from chemical storage	Site inspection records	Rare	Insignificant	Low	Well ventilated workshop;	ERS	Rare	Insignificant	Low	Odour at site boundary	Odour at site boundary	Yes
Operations	Odour from chemicals	Odour	G38Q	Odour released from chemical storage	Quarrying	Neighbours	200m west of West Pit and 190m north-east of East Pit	Odours released from chemical storage	Site inspection records	Rare	Insignificant	Low	Well ventilated workshop;	ERS	Rare	Insignificant	Low	Odour at site boundary	Odour at site boundary	Yes
Operations	Odour from chemicals	Odour	G38R	Odour released from chemical storage	Rehabilitation	Neighbours	200m west of West Pit and 190m north-east of East Pit	Odours released from chemical storage	Site inspection records	Rare	Insignificant	Low	Well ventilated workshop;	ERS	Rare	Insignificant	Low	Odour at site boundary	Odour at site boundary	Yes
Operations	Vehicle maintenance	Wastewater discharge	G39P	Wastewater from washing vehicles and machines flowing to surface water bodies	Prequarrying	Surface water	Onsite waterway	Wastewater contaminating surface water from vehicle and machine wash down and maintenance	Site inspection reports	Rare	Minor	Low	Inspect spill control measures; Spill protection in refuelling areas; Spill protection in HazSub storage areas; Staff training at induction (HazSub); Spill Kits; Impervious secondary containment; Tanks >1200K self bunded;	No untreated discharges	Rare	Insignificant	Low	Containment and treatment	Wastewater management	Yes
Operations	Vehicle maintenance	Wastewater discharge	G39Q	Wastewater from washing vehicles and machines flowing to surface water bodies	Quarrying	Surface water	Onsite waterway	Wastewater contaminating surface water from vehicle and machine wash down and maintenance	Site inspection reports	Rare	Minor	Low	Spill Kits; Impervious secondary containment; Spill protection in HazSub storage areas; Tanks >1200K self bunded; Inspect spill control measures; Spill protection in refuelling areas; Staff training at induction (HazSub);	No untreated discharges	Rare	Insignificant	Low	Containment and treatment	Wastewater management	Yes
Operations	Vehicle maintenance	Wastewater discharge	G39R	Wastewater from washing vehicles and machines flowing to surface water bodies	Rehabilitation	Surface water	Onsite waterway	Wastewater contaminating surface water from vehicle and machine wash down and maintenance	Site inspection reports	Rare	Minor	Low	Spill Kits; Impervious secondary containment; Inspect spill control measures; Staff training at induction (HazSub); Tanks >1200K self bunded; Spill protection in HazSub storage areas; Spill protection in refuelling areas;	No untreated discharges	Rare	Insignificant	Low	Containment and treatment	Wastewater management	Yes
Operations	Sewage	Tank leakage	G40P	Leaking septic tank contaminating groundwater	Prequarrying	Groundwater	Onsite	Leakage of septic tank liquids into groundwater	GW monitoring data if available	Unlikely	Insignificant	Low	Distance HazSub storage from waterways and veg;	ERS	Unlikely	Insignificant	Low	GW sampling and analysis	Organic indicators	Yes

Activity	Source	Hazard	Risk Event no	Risk description	Stage	Receptor	Location and proximity	Impact	Evidence inherent risk	Inherent LIkelihood	Inherent Consequence	Inherent Risk	Controls	Performance standards	Residual Likelihood	Residual Consequence	Residual Risk	Monitoring aspect	Monitoring details	Risk Treatment Plan
Operations	Sewage	Tank leakage	G40Q	Leaking septic tank contaminating groundwater	Quarrying	Groundwater	Onsite	Leakage of septic tank liquids into groundwater	GW monitoring data if available	Unlikely	Insignificant	Low	Distance HazSub storage from waterways and veg;	ERS	Unlikely	Insignificant	Low	GW sampling and analysis	Organic indicators	Yes
Operations	Sewage	Tank leakage	G40R	Leaking septic tank contaminating groundwater	Rehabilitation	Groundwater	Onsite	Leakage of septic tank liquids into groundwater	GW monitoring data if available	Unlikely	Insignificant	Low	Distance HazSub storage from waterways and veg;	ERS	Unlikely	Insignificant	Low	GW sampling and analysis	Organic indicators	Yes
Vehicle Maintenance	Spills	Contamination	G01P	Contamination impacts to soil from chemical spills during vehicle maintenance works during prequarrying phase	Prequarrying	Soil	Onsite	Contamination from fuel chemical spills	Site inspection records	Unlikely	Insignificant	Low	Spill protection in refuelling areas; No USTs; Contain drilling fluids; Inspect spill control measures; Prompt spill remediation; Spill Kits; Staff training at induction (HazSub); Prevent rainfall and stormwater ingress; Spill protection in HazSub storage areas; Correct labelling; HazSub register; Record spills; Select less hazardous products; Use biodegradable drilling fluids; Minimise handling of HazSub; Identify correct disposal options; USTs comply with AS4897; Minimise stored volumes of HazSub; Impervious secondary containment; Tanks >1200K self bunded;	ERS	Rare	Insignificant	Low	Visible impact	Site inspection	Yes
Vehicle Maintenance	Spills	Contamination	G01Q	Contamination impacts to soil from chemical spills during vehicle maintenance works during quarrying phase	Quarrying	Soil	Onsite	Contamination from fuel chemical spills	Site inspection records	Possible	Insignificant	Low	Spill protection in refuelling areas; Contain drilling fluids; Prompt spill remediation; Spill Kits; Prevent rainfall and stormwater ingress; Minimise stored volumes of HazSub; Staff training at induction (HazSub); No USTs; Impervious secondary containment; Correct labelling; USTs comply with AS4897; Record spills; Select less hazardous products; Use biodegradable drilling fluids; Tanks >1200K self bunded; Minimise handling of HazSub; Spill protection in HazSub storage areas; Identify correct disposal options; Inspect spill control measures; HazSub register;	ERS	Unlikely	Insignificant	Low	Visible impact	Site inspection	Yes
Vehicle Maintenance	Spills	Contamination	G01R	Contamination impacts to soil from chemical spills during vehicle maintenance works during rehabilitation phase	Rehabilitation	Soil	Onsite	Contamination of soil from fuel chemical spills	Site inspection records	Unlikely	Insignificant	Low	Minimise stored volumes of HazSub; Spill Kits; Correct labelling; Prompt spill remediation; Impervious secondary containment; Prevent rainfall and stormwater ingress; Minimise handling of HazSub; Inspect spill control measures; Select less hazardous products; USTs comply with AS4897; Spill protection in HazSub storage areas; Tanks >1200K self bunded; Use biodegradable drilling fluids; Staff training at induction (HazSub); Record spills; No USTs; HazSub register; Spill protection in refuelling areas; Identify correct disposal options;	ERS	Rare	Insignificant	Low	Visible impact	Site inspection	Yes
Vehicle Maintenance	Spills	Contamination	G02P	Contamination impacts to groundwater from chemical spills during vehicle maintenance works during prequarring phase	Prequarrying	Groundwater	Onsite	Contamination of grounewater from fuel chemical spills	Site inspection records	Rare	Insignificant	Low	Prevent rainfall and stormwater ingress; Impervious secondary containment; Correct labelling; Spill Kits; Prompt spill remediation; Inspect spill control measures; Contain process waters; No USTs; Staff training at induction (HazSub); HazSub register; Record spills; Select less hazardous products; Tanks >1200K self bunded; USTs comply with AS4897; Minimise stored volumes of HazSub;	ERS	Rare	Insignificant	Low	Visible evidence of spill	Site inspection	Yes
Vehicle Maintenance	Spills	Contamination	G02Q	Contamination impacts to groundwater from chemical spills during vehicle maintenance works during quarrying phase	Quarrying	Groundwater	Onsite	Contamination of groundwater from fuel chemical spills	Site inspection records	Rare	Insignificant	Low	Tanks >1200K self bunded; USTs comply with AS4897; Record spills; Minimise stored volumes of HazSub; HazSub register; Staff training at induction (HazSub); No USTs; Contain process waters; Inspect spill control measures; Prompt spill remediation; Spill Kits; Correct labelling; Prevent rainfall and stormwater ingress; Impervious secondary containment; Select less hazardous products;	ERS	Rare	Insignificant	Low	Visible evidence of spill	Site inspection	Yes
Vehicle Maintenance	Spills	Contamination	G02R	Contamination impacts to groundwater from chemical spills during vehicle maintenance works during rehabiltiation phase	Rehabilitation	Groundwater	Onsite	Contamination of groundwater from fuel chemical spills	Site inspection records	Rare	Insignificant	Low	Contain process waters; Minimise stored volumes of HazSub; Impervious secondary containment; Correct labelling; Spill Kits; Prompt spill remediation; Tanks >1200K self bunded; USTs comply with AS4897; No USTs; Staff training at induction (HazSub); Prevent rainfall and stormwater ingress; HazSub register; Record spills; Select less hazardous products; Inspect spill control measures;	ERS	Rare	Insignificant	Low	Visible evidence of spill	Site inspection	Yes
Vehicle Maintenance	Spills	Contamination	G03P	Contamination impacts to surface waters from chemical spills during vehicle maintenance works during prequarrying phase	Prequarrying	Surface water	Onsite waterway	Contamination of surface water from fuel chemical spills	SW monitoring data	Unlikely	Insignificant	Low	Correct labelling; Minimise stored volumes of HazSub; Prevent rainfall and stormwater ingress; Divert stormwater around HazSub storage areas; EPA Licensing of process water discharges; Staff training at induction (HazSub); Contain process waters; Contain drilling fluids; Identify correct disposal options; Distance HazSub storage from waterways and veg; SEPP (Waters) compliance; Spill protection in HazSub storage areas; Record spills; Select less hazardous products; Use biodegradable drilling fluids; Tanks >1200K self bunded; Minimise handling of HazSub; Inspect spill control measures; Spill protection in refuelling areas;	ERS	Rare	Insignificant	Low	Surface water	Surface water sampling and analysis	Yes
Vehicle Maintenance	Spills	Contamination	G03Q	Contamination impacts to surface waters from chemical spills during vehicle maintenance works during quarrying phase	Quarrying	Surface water	Onsite waterway	Contamination of surface water from fuel chemical spills	SW monitoring data	Unlikely	Insignificant	Low	Spill protection in refuelling areas; EPA Licensing of process water discharges; Divert stormwater around HazSub storage areas; Identify correct disposal options; Spill protection in HazSub storage areas; Minimise handling of HazSub; Tanks >1200K self bunded; Use biodegradable drilling fluids; Contain drilling fluids; Record spills; Minimise stored volumes of HazSub; ERS compliance;	ERS	Rare	Insignificant	Low	Surface water	Surface water sampling and analysis	Yes

Activity	Source	Hazard	Risk Event no	Risk description	Stage	Receptor	Location and proximity	Impact	Evidence inherent risk	Inherent LIkelihood	Inherent Consequence	Inherent Risk	Controls	Performance standards	Residual Likelihood	Residual Consequence	Residual Risk	Monitoring aspect	Monitoring details	Risk Treatment Plan
													Staff training at induction (HazSub); Contain process waters; Inspect spill control measures; Correct labelling; Distance HazSub storage from waterways and veg; Prevent rainfall and stormwater ingress; Select less hazardous products;							
Vehicle Maintenance	Spills	Contamination	G03R	Contamination impacts to surface waters from chemical spills during vehicle maintenance works during rehabilitation phase	Rehabilitation	Surface water	Onsite waterway	Contamination of surface water from fuel chemical spills	SW monitoring data	Unlikely	Insignificant	Low	Divert stormwater around HazSub storage areas; Spill protection in refuelling areas; Use biodegradable drilling fluids; Tanks >1200K self bunded; Record spills; Minimise handling of HazSub; ERS compliance; Staff training at induction (HazSub); Select less hazardous products; Inspect spill control measures; Correct labelling; Identify correct disposal options; Minimise stored volumes of HazSub; Prevent rainfall and stormwater ingress; Spill protection in HazSub storage areas; Distance HazSub storage from waterways and veg;	ERS	Rare	Insignificant	Low	Surface water	Surface water sampling and analysis	Yes
Vehicle Maintenance	Spills	Contamination	G04P	Contamination impacts to ecosystems from chemical spills during vehicle maintenance works during prequarrying phase	Prequarrying	Ecosystems	Onsite waterway	Contamination, reduced resilience	SW monitoring data	Rare	Insignificant	Low	Staff training at induction (HazSub); Use biodegradable drilling fluids; Select less hazardous products; Distance HazSub storage from waterways and veg; Minimise stored volumes of HazSub;	ANZG Ecosystem guidelines, ERS	Rare	Insignificant	Low	Surface water	Surface water sampling and analysis	Yes
Vehicle Maintenance	Spills	Contamination	G04Q	Contamination impacts to ecosystems from chemical spills during vehicle maintenance works during quarrying phase	Quarrying	Ecosystems	Onsite waterway	Contamination, reduced resilience	SW monitoring data	Rare	Insignificant	Low	Minimise stored volumes of HazSub; Use biodegradable drilling fluids; Staff training at induction (HazSub); Select less hazardous products; Distance HazSub storage from waterways and veg;	ANZG Ecosystem guidelines, ERS	Rare	Insignificant	Low	Surface water	Surface water sampling and analysis	Yes
Vehicle Maintenance	Spills	Contamination	G04R	Contamination impacts to ecosystems from chemical spills during vehicle maintenance works during rehabilitation phase	Rehabilitation	Ecosystems	Onsite waterway	Contamination, reduced resilience	SW monitoring data	Rare	Insignificant	Low	Minimise stored volumes of HazSub; Distance HazSub storage from waterways and veg; Staff training at induction (HazSub); Select less hazardous products; Use biodegradable drilling fluids;	ANZG Ecosystem guidelines, ERS	Rare	Insignificant	Low	Surface water	Surface water sampling and analysis	Yes
Waste Management	Waste storage areas	Vermin	G11P	Vermin impacts on native fauna from waste storage and disposal during prequarrying phase	Prequarrying	Native fauna	Onsite and neighbouring properties	Foraging by fauna (native and feral) from unsecured waste receptacles causing spread of disease	Site inspection records	Unlikely	Insignificant	Low	Minimise onsite waste storage; Provide sealed bins;	No uncontained waste	Rare	Insignificant	Low	Waste containment	Site inspection	Yes
Waste Management	Waste storage areas	Vermin	G11Q	Vermin impacts on native fauna from waste storage and disposal during quarrying phase	Quarrying	Native fauna	Onsite and neighbouring properties	Foraging by fauna (native and feral) from unsecured waste receptacles causing spread of disease	Site inspection records	Unlikely	Insignificant	Low	Minimise onsite waste storage; Provide sealed bins; Disposal to licensed facilities;	No uncontained waste	Rare	Insignificant	Low	Waste containment	Site inspection	Yes
Waste Management	Waste storage areas	Vermin	G11R	Vermin impacts on native fauna from waste storage and disposal during rehabilitation phase	Rehabilitation	Native fauna	Onsite and neighbouring properties	Foraging by fauna (native and feral) from unsecured waste receptacles causing spread of disease	Site inspection records	Unlikely	Insignificant	Low	Provide sealed bins; Disposal to licensed facilities; Minimise onsite waste storage;	No uncontained waste	Rare	Insignificant	Low	Waste containment	Site inspection	Yes
Waste Management	Buildings	Litter	G12P	Litter impacts on surface waters from waste storage and disposal during prequarrying phase	Prequarrying	Waterways	Onsite waterway	Pollution of waterways, decreased amenity	Site inspection records	Rare	Minor	Low	Cover waste storage areas; Disposal to licensed facilities; Provide sealed bins; Staff training at induction (waste); Limit stormwater flow in waste areas; Minimise onsite waste storage;	No visible litter in waterways	Rare	Insignificant	Low	Drains, sediment traps and waterways	Site inspection	Yes
Waste Management	Buildings	Litter	G12Q	Litter impacts on surface waters from waste storage and disposal during quarrying phase	Quarrying	Waterways	Onsite waterway	Pollution of waterways, decreased amenity	Site inspection records	Rare	Minor	Low	Limit stormwater flow in waste areas; Provide sealed bins; Cover waste storage areas; Disposal to licensed facilities; Minimise onsite waste storage; Staff training at induction (waste);	No visible litter in waterways	Rare	Insignificant	Low	Drains, sediment traps and waterways	Site inspection	Yes
Waste Management	Buildings	Litter	G12R	Litter impacts on surface waters from waste storage and disposal during rehabilitation phase	Rehabilitation	Waterways	Onsite waterway	Pollution of waterways, decreased amenity	Site inspection records	Rare	Minor	Low	Disposal to licensed facilities; Minimise onsite waste storage; Cover waste storage areas; Provide sealed bins; Limit stormwater flow in waste areas; Staff training at induction (waste);	No visible litter in waterways	Rare	Insignificant	Low	Drains, sediment traps and waterways	Site inspection	Yes
Waste management	Buildings	Litter	G31P	Litter finding its way into the ground / soil and contaminating	Prequarrying	Soil	Onsite	Pollution of soils, decreased amenity	Site inspection records	Rare	Insignificant	Low	Provide sealed bins; Disposal to licensed facilities; Staff training at induction (waste); Store waste away from receptors;	No visible litter	Rare	Insignificant	Low	oadways and staff amenity areas	Site inspection	Yes
Waste management	Buildings	Litter	G31Q	Litter finding its way into the	Quarrying	Soil	Onsite	Pollution of soils,	Site inspection records	Rare	Insignificant	Low	Staff training at induction (waste); Store waste away from receptors; Disposal to licensed facilities; Provide sealed bins;	No visible litter	Rare	Insignificant	Low	oadways and staff amenity areas	Site inspection	Yes

Activity	Source	Hazard	Risk Event no	Risk description	Stage	Receptor	Location and proximity	Impact	Evidence inherent risk	Inherent LIkelihood	Inherent Consequence	Inherent Risk	Controls	Performance standards	Residual Likelihood	Residual Consequence	Residual Risk	Monitoring aspect	Monitoring details	Risk Treatment Plan
				ground / soil and contaminating				decreased amenity												
Waste management	Buildings	Litter	G31R	Litter finding its way into the ground / soil and contaminating	Rehabilitation	Soil	Onsite	Pollution of soils, decreased amenity	Site inspection records	Rare	Insignificant	Low	Provide sealed bins; Disposal to licensed facilities; Staff training at induction (waste); Store waste away from receptors;	No visible litter	Rare	Insignificant	Low	oadways and staff amenity areas	Site inspection	Yes
Abnormal events	Fire	Neighbour's property	G14Q	Plant/machinery/ hot works igniting a fire and escaping the site	Quarrying	Neighbours	Adjacent properties	Loss of equipment and infrastructure	Incident register	Unlikely	Minor	Low	Fire fighting equipment in buildings; Check underside of vehicles for grass; Fire fighting equipment in vehicles; Flammable and combustible waste removed asap; No "hot work" on Total Fire Bans; No work in bushfire areas on Code Red days; Check Fire Danger Rating daily;	No onsite fires	Rare	Minor	Low	Incident records	Occurrence	Yes
Abnormal events	Flood	Erosion	G16P	Erosion of waterways during flood during prequarrying phase	Prequarrying	Waterways	Onsite waterway	Erosion of creeklines	Site inspection records	Possible	Minor	Medium	Interception drains upstream of stockpiles; Treat sediment impacted water; Design sedimentation ponds; Locate stockpiles away from waterways; Reduce flow velocity along drains; Flow velocity check structures; Stabilise disturbed land promptly; Silt fences; Inspection and monitoring of stormwater controls;	EPA Publication 1893	Unlikely	Minor	Low	Stormwater infrastructure	Infrastructure functionality	Yes
Abnormal events	Flood	Erosion	G16Q	Erosion of waterways during flood during quarrying phase	Quarrying	Waterways	Onsite waterway	Erosion of creeklines	Site inspection records	Possible	Moderate	Medium	Design sedimentation ponds; Flow velocity check structures; Interception drains upstream of stockpiles; Treat sediment impacted water; Stabilise disturbed land promptly; Stabilise stockpiles and disturbed areas; Reduce flow velocity along drains; Silt fences; Locate stockpiles away from waterways; Inspection and monitoring of stormwater controls;	EPA Publication 1893	Unlikely	Minor	Low	Stormwater infrastructure	Infrastructure functionality	Yes
Abnormal events	Flood	Erosion	G16R	Erosion of waterways during flood during rehabilitation phase	Rehabilitation	Waterways	Onsite waterway	Erosion of creeklines	Site inspection records	Possible	Minor	Medium	Stabilise disturbed land promptly; Interception drains upstream of stockpiles; Locate stockpiles away from waterways; Inspection and monitoring of stormwater controls; Flow velocity check structures; Final landform design considers erosion; Silt fences; Reduce flow velocity along drains;	EPA Publication 1893	Unlikely	Minor	Low	Stormwater infrastructure	Infrastructure functionality	Yes
Abnormal events	Flood	Contamination	G19P	Chemical / fuel from pumps impacting land during pumping after heavy rainfall event during prequarrying	Prequarrying	Land	Onsite	Contamination of land from pump fuel spill	Site Inspection records	Unlikely	Insignificant	Low	Spill Kits; Identify correct disposal options; Staff training at induction (HazSub); Prompt spill remediation; Inspect spill control measures; Spill protection in refuelling areas; Minimise stored volumes of HazSub;	ERS	Rare	Insignificant	Low	Visible evidence of spill	Site inspection	Yes
Abnormal events	Flood	Contamination	G19Q	Chemical / fuel from pumps impacting land during pumping after heavy rainfall event during quarrying	Quarrying	Land	Onsite	Contamination of land from pump fuel spill	Site Inspection records	Unlikely	Insignificant	Low	Identify correct disposal options; Staff training at induction (HazSub); Spill protection in refuelling areas; Inspect spill control measures; Prompt spill remediation; Spill Kits; Minimise stored volumes of HazSub;	ERS	Rare	Insignificant	Low	Visible evidence of spill	Site inspection	Yes
Abnormal events	Flood	Contamination	G19R	Chemical / fuel from pumps impacting land during pumping after heavy rainfall event during rehabilitation	Rehabilitation	Land	Onsite	Contamination of land from pump fuel spill	Site Inspection records	Unlikely	Insignificant	Low	Prompt spill remediation; Identify correct disposal options; Minimise stored volumes of HazSub; Spill Kits; Inspect spill control measures; Staff training at induction (HazSub); Spill protection in refuelling areas;	ERS	Rare	Insignificant	Low	Visible evidence of spill	Site inspection	Yes
Abnormal events	Flood	Contamination	G20P	Chemical / fuel from pumps impacting waterways during pumping after heavy rainfall event during prequarrying	Prequarrying	Surface water	Onsite waterway	Contamination of surface water from pump fuel spill	SW monitoring data	Rare	Insignificant	Low	ERS compliance; Minimise stored volumes of HazSub; Spill Kits; Prompt spill remediation; Inspect spill control measures; Staff training at induction (HazSub); Identify correct disposal options; Spill protection in refuelling areas;	ERS	Rare	Insignificant	Low	Surface water	Surface water sampling and analysis	Yes
Abnormal events	Flood	Contamination	G20Q	Chemical / fuel from pumps impacting waterways during pumping after heavy rainfall event during quarrying	Quarrying	Surface water	Onsite waterway	Contamination of surface water from pump fuel spill	SW monitoring data	Rare	Insignificant	Low	Staff training at induction (HazSub); Identify correct disposal options; SEPP (Waters) compliance; Spill protection in refuelling areas; Prompt spill remediation; Spill Kits; Minimise stored volumes of HazSub; Inspect spill control measures;	ERS	Rare	Insignificant	Low	Surface water	Surface water sampling and analysis	Yes
Abnormal events	Flood	Contamination	G20R	Chemical / fuel from pumps impacting waterways during pumping after heavy rainfall event during rehabilitation	Rehabilitation	Surface water	Onsite waterway	Contamination of surface water from pump fuel spill	SW monitoring data	Rare	Insignificant	Low	Minimise stored volumes of HazSub;	ERS	Rare	Insignificant	Low	Surface water	Surface water sampling and analysis	Yes
Abnormal events	Security breach	Unauthorised access	G22P	Public safety jeopardised from unauthorised persons during security breach during prequarrying	Prequarrying	General Public	Onsite	Trespassers injuring themselves	Security reports	Unlikely	Minor	Low	Mark WA boundary; Signage at entrance; Safe 3rd party access; Fence potential hazards; Control site access; Fence dangerous areas; Signage at entrance;	No incidents of unauthorised access	Rare	Minor	Low	Security reports	Occurrence	Yes
Abnormal events	Security breach	Unauthorised access	G22Q	Public safety jeopardised from unauthorised persons during security breach during quarrying phase	Quarrying	General Public	Onsite	Trespassers injuring themselves	Security reports	Unlikely	Minor	Low	Control site access; Mark WA boundary; Fence dangerous areas; Fence potential hazards; Inform neighbours of pending blasts; Safe 3rd party access; Signage at entrance;	No incidents of unauthorised access	Rare	Minor	Low	Security reports	Occurrence	Yes

Activity	Source	Hazard	Risk Event no	Risk description	Stage	Receptor	Location and proximity	Impact	Evidence inherent risk	Inherent LIkelihood	Inherent Consequence	Inherent Risk	Controls	Performance standards	Residual Likelihood	Residual Consequence	Residual Risk	Monitoring aspect	Monitoring details	Risk Treatment Plan
Abnormal events	Security breach	Unauthorised access	G22R	Public safety jeopardised from unauthorised persons during security breach during rehabilitation phase	Rehabilitation	General Public	Onsite	Trespassers injuring themselves	Security reports	Unlikely	Minor	Low	Fence potential hazards; Control site access; Signage at entrance; Mark WA boundary; Fence dangerous areas;	No incidents of unauthorised access	Rare	Minor	Low	Security reports	Occurrence	Yes
Abnormal events	Security breach	Unauthorised Access	G43Q	Deep waterbodies posing drowning risk for trespassers during quarrying phase	Quarrying	General Public	Onsite	Trespassers drowning	Security reports	Rare	Major	Medium	Onsite signage; Control site access; Safe 3rd party access;	No incidents of unauthorised access	Rare	Major	Medium	Security reports	Occurrence	Yes
Abnormal events	Security breach	Unauthorised access	G43R	Deep waterbodies posing drowning risk for trespassers during rehabilitation phase	Rehabilitation	General Public	Onsite	Trespassers drowning	Security reports	Rare	Major	Medium	Onsite signage; Safe 3rd party access; Control site access;	No incidents of unauthorised access	Rare	Major	Medium	Security reports	Occurrence	Yes
Abnormal events	Security breach	Unauthorised access	G43C	Deep waterbodies posing drowning risk for trespassers during post-closure phase	Post-closure	General Public	Onsite	Trespassers drowning	Security reports	Rare	Major	Medium	Control site access; Onsite signage; Safe 3rd party access;	No incidents of unauthorised access	Rare	Major	Medium	Security reports	Occurrence	Yes

Appendix B Monitoring procedures

Periodic Monitoring Program: Dust

Dust Monitoring Procedure

Item	Description
Purpose	This procedure describes the operating principles, installation, operation, and maintenance of the dust monitoring devices.
Standards / relevant legislation	AS/NZS 3580.10.1:2016 *Methods for sampling and analysis of ambient air – Method 10.1: Determination of particulate matter – Deposited matter – Gravimetric method.*
Definitions	NATA – National Association of Testing Authorities, Australia
Procedure	Depositional dust samples should be collected in accordance with AS/NZS 3580.10.1. Key steps from the standard are identified below.
Location	Sampling locations are shown in **Figure 6-1**
Gauge Positioning	The gauge will be positioned 2 +/- 0.2m above the ground where possible. Factors such as tampering need to be considered when positioning.
Period of exposure	Exposure times for the samples will be 90 +/- 2 days.
Procedure for collecting	1. Clean bottles are sourced from a NATA accredited laboratory. Bottles should be carefully stored to prevent breakage. 2. At the collection interval wash and brush any matter on the funnel into the gauge using a minimum quantity of distilled water and a small clean bush. 3. Remove the funnel and seal with a cap. Label the bottle with location, date and time information and send to the laboratory within 30 days of collection. 4. Replace the gauge with a new bottle and clean funnel.
Analysis	Analysis of dust concentration should be performed by a NATA accredited laboratory. Hanson will engage the current monitoring contractor to undertake the laboratory analysis and interpretation of the results.
Recording	Hanson's current monitoring contractor will produce a report with the results from the analysis

Periodic Monitoring Program: Groundwater

Groundwater Monitoring Procedure

Item	Description
Purpose	This procedure describes the operating principles, installation, operation, and maintenance of the groundwater monitoring devices.
Standards / relevant legislation	EPA Victoria *Sampling and Analysis of Waters, wastewaters, soils, and wastes* IWRG701 EPA Victoria *Groundwater Sampling Guidelines* EPA Publication 669.1
Preparations	• Field instruments are to be calibrated prior to travel to site with calibration records kept with field records. • Prepare / review Health and Safety Plan for the task. • Ensure appropriate PPE is worn, use clean nitrile gloves while sampling. • Document weather conditions prior to commencement of monitoring. • On arrival at site hold 'toolbox' meeting and review and sign Health and Safety Plan
Personal Protective Equipment	• Nitrile gloves. • Steel cap footwear. • Long sleeves and trousers. • Safety glasses. • Sun hat and sunscreen. • First aid kit. • Charged mobile phone.
Decontamination	Equipment: • Phosphate free detergent (Decon 90, or equivalent). • De-ionised water. • Tap water. Method: Equipment will be decontaminated as follows: • Washing thoroughly in a bucket with phosphate free detergent (e.g., Extran/Decon90). • Rinsing thoroughly in a second bucket using potable water; and • Rinsing thoroughly with de-ionised water.
Sampling procedure	Preparations Method • Document weather conditions time of sampling • Locate bores on map. Ensure bore numbers are clearly identified and samples are taken accordingly. • Plan sampling route such that the bores most likely to be contaminated are sampled last. • Decontaminate and rinse all sampling equipment prior to collection of each sample using a 3% solution of phosphate free detergent (Decon 90 or Extran) and distilled water, respectively. • Open well and clear any foreign material as required. • Using an electronic water level meter measure and record the total depth and depth to water. • If the bore is to be sampled by means other than low flow sampling the stagnant water in the well will need to be removed (at least 3 bore volumes) so that water representative of the groundwater can be sampled.

Item	Description

- Calculate the volume of water in the well for purging using the following formula:

Bore Volume = casing volume + filter pack volume

$= \pi h_1 d_2^2/4 + n(\pi h_1 d_1^2/4 - \pi h_2 d_2^2/4)$

Where: $\pi = 3.14$

n = porosity (0.3 for most filter pack material)

h_1 = height of water column

d_1 = diameter of annulus

h_2 = length of filter pack

d_2 = diameter of casing

Sampling using bailers or pump

Equipment

- Stainless steel or disposable bailers or pump.
- Water level meter.
- Water quality meter.
- Filters.
- Sample bottles.
- Bucket.
- Ice and container.
- Twine / cord (venetian blind cord is recommended); and
- Field data forms.

Method

- Document weather conditions time of sampling as well as colour, turbidity and odour of the waters being tested.
- If using a bailer:
  - Attach clean strong string to a bailer which is long enough to submerge the bailer into the water with a sturdy knot so as not to lose bailer down the well.
  - Tie the other end of string to firm object (e.g., monument bore cover).
  - Lower the bailer into the well at least 100mm below the surface of the water to obtain a sample.
- If using a pump:
  - Check equipment is correctly assembled so you don't lose components down bore.
  - Lower submersible pump / hosepipe into bore.
  - Set at the appropriate depth based on well construction and depth to water.
- Purge/remove 3-5 bore volumes to completely refresh the well.
- After each bore volume pour a quantity of water into the bucket.
- Record field parameters (pH, EC, DO, Eh, temperature) on field data forms.
- Empty bucket.
- Dispose of purged water away from immediate work area.
- Monitor the following parameters which may be considered stable when three consecutive readings are within:
  - ± 10% for dissolved oxygen.
  - ± 3% for electrical conductivity.

Item	Description
	- ± 0.05 for pH; and - ± 10mv for redox potential. • When parameters have stabilised collect the sample (the same bailer maybe used). • If the bore bails/pumps dry before 3 bore volumes are removed, then record details on field data form and allow bore to recover before collecting samples. • Sample for metals analysis should be filtered: - Samples for metals require filtering via a 0.45µm filter. - Sampled must be transferred from the decontaminated collection vessel or bailer through the filter and directly into a laboratory supplied nitric acid preserved sample bottle for metals. • Fill sample bottles to the line. • Transfer samples into laboratory-prepared sample bottles/containers. • Label with Date, Location, Sample ID, time, and Sampler name. • New cord is to be used for each bore. • If a stainless-steel bailer was used, it must be decontaminated before moving to another bore. • Remove sampling equipment from the well. • Record post sampling depth to water; and • Replace lid and lock well. Micro purge / Low flow sampling Equipment • Micro Purge Pump - including 12V compressor, controller. • Flow through cell. • Water level meter. • Water quality meter. • Filters. • Sample bottles. • Ice and container; and • Field data forms. Method • Document weather conditions time of sampling as well as colour, turbidity and odour of the waters being tested. • Check equipment is correctly assembled so you don't lose components down bore. • Lower submersible pump slowly into bore to minimise disturbance of the water column. • Set the inlet above the middle of the screened interval at the point where the contaminant concentration is required. Placement to close to the bottom will result in atypical sediment sampling. • Lower water level meter into borehole. • Purge initially at 100mL/min if the specific rate for that bore is not known. • Monitor drawdown and adjust rate to minimise drawdown. • Attach the effluent to the flow through cell and insert water quality meter probes. • Record field parameters (pH, EC, DO, Eh, temperature) on field data forms. • Monitor the following parameters which may be considered stable when three consecutive readings are within: - ± 10% for dissolved oxygen.

Item	Description
	- ± 3% for electrical conductivity. - ± 0.05 for pH; and - ± 10mv for redox potential. • When parameters have stabilised collect the samples into laboratory-prepared sample bottles/containers directly from the sampling tube. • Sample for metals analysis should be filtered. - Samples for metals require filtering via a 0.45µm filter. - Sampled must be transferred from the decontaminated collection vessel through the filter and directly into a laboratory supplied nitric acid preserved sample bottle for metals. • Fill sample bottles to the line. • Label with Date, Location, Sample ID, time, and Sampler name. • New tube is to be used for each bore. • Remove sampling equipment from the well. • Record post sampling depth to water; and • Replace lid and lock well.
QAQC	Rinsate blanks • Rinsate blanks to be collected at the end of each day. • Taken from the final rinse of equipment after decontamination. Blind Duplicates • Taken in immediate succession and subjected to the same filtering, preservation, holding and analysis methods. • Submit to primary laboratory. • Label in a way that does not indicate it is a duplicate.
Sample Handling	• Immediately store samples in an ice cooled, insulated, and sealed container for transport to the laboratory for analysis within the minimum holding times. • Chain of custody procedures will be used to ensure transport to the laboratory is documented. Documentation will include: - The name of the person transferring the samples. - The name of person receiving the samples, e.g., laboratory staff. - The time and date the samples were taken. - The time and date the samples were received; and - The analytes to be determined, including detection limits.

Periodic Monitoring Program: Surface Water

Surface Water Monitoring Procedure

Item	Description
Purpose	This procedure describes the operating principles, installation, operation, and maintenance of the groundwater monitoring devices.
Standards / relevant legislation	EPA Victoria *Sampling and Analysis of Waters, wastewaters, soils, and wastes* IWRG701
Preparations	• Field instruments are to be calibrated prior to travel to site with calibration records kept with field records. • Prepare / review Health and Safety Plan for the task. • Ensure appropriate PPE is worn, use clean nitrile gloves while sampling. • Document weather conditions prior to commencement of monitoring. • On arrival at site hold 'toolbox' meeting and review and sign Health and Safety Plan
Personal Protective Equipment	• Nitrile gloves. • Steel cap footwear. • Long sleeves and trousers. • Safety glasses. • Sun hat and sunscreen. • First aid kit. • Charged mobile phone.
Decontamination	Equipment: • Phosphate free detergent (Decon 90, or equivalent). • De-ionised water. • Tap water. Method: Equipment will be decontaminated as follows: • Washing thoroughly in a bucket with phosphate free detergent (e.g., Extran/Decon90). • Rinsing thoroughly in a second bucket using potable water; and • Rinsing thoroughly with de-ionised water.
Sampling procedure	Equipment: • Telescopic sampler with sample cup or stainless-steel bucket. • Water quality meter. • Ice and container. • Sample bottles containing preservatives. Method: • Identify an appropriate sampling point providing safe access. Document any access issue which may affect ongoing monitoring. • Sampling to be conducted by using either a stainless-steel bucket or collect water directly into laboratory supplied containers, telescopic sampler, or other sampling device. • Submerge the sampling equipment in the surface water being careful not to disturb dam/creek sediment. • Measure and record field parameters including pH, EC, • Collect sample.

Item	Description
	• Sample for metals analysis should not be filtered. • Transfer samples into laboratory-prepared sample bottles/containers; and • Label with Date, Location, Sample ID, time, and Sampler name.
QAQC	Rinsate blanks • Rinsate blanks to be collected at the end of each day. • Taken from the final rinse of equipment after decontamination. Blind Duplicates • Taken in immediate succession and subjected to the same filtering, preservation, holding and analysis methods. • Submit to primary laboratory. • Label in a way that does not indicate it is a duplicate.
Sample Handling	• Immediately store samples in an ice cooled, insulated, and sealed container for transport to the laboratory for analysis within the minimum holding times. • Chain of custody procedures will be used to ensure transport to the laboratory is documented. Documentation will include: - The name of the person transferring the samples. - The name of person receiving the samples, e.g., laboratory staff. - The time and date the samples were taken. - The time and date the samples were received; and - The analytes to be determined, including detection limits.

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Mineral Resources (Sustainable Development) Act 1990

Tenement Number: WA127

Plan Number: PLN-001686

Work Plan Statutorily Endorsed

Signed: _____

Delegate of the Department Head

Date: 01/05/2024

YANNATHAN QUARRY REHABILITATION PLAN

WA127

Client: Hanson Construction Materials

Ricardo ref. 30765 Issue: V6.0 16/12/2023

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Ricardo is certified to ISO9001, ISO14001, ISO27001 and ISO45001.

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Cover page

Project summary	
Project name	Yannathan Quarry Area and Depth Extension
Work Authority holder	Hanson Construction Materials Pty Ltd
Work Authority number	WA127
Company name	Hanson Construction Materials Pty Ltd
Title	Rehabilitation Plan – WA127 Yannathan
ID	31085.01_Yannathan Rehabilitation Plan
Version	V6.0
Date of submission	December 2023
Name	Gunther Benedek
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Checklist

Rehabilitation plan checklist	Section
Does the rehabilitation plan have a **cover page**?	Cover Page
Site information and setting Does the rehabilitation plan include: • Project summary – rehabilitation specific content as well as relevant cross refences to summaries provided in the work plan • Rehabilitation obligations and commitments – a comprehensive list of all rehabilitation related legal obligations, conditions and commitments, and an explanation of how these obligations will be met through the proposed rehabilitation activities • Environmental and social setting – a detailed description of the local and regional environmental setting and inclusion of all environmental data relevant to rehabilitation planning • A description of any sensitive receptors that have the potential to be impacted or affected • A map of your site and the surrounding area (see GeoVic for suitable maps) that includes: the work authority boundaries; neighbouring properties; and labels all key features such as neighbouring land uses, national parks, forests, grazing, rivers and creeks, proposed haul roads, mountains and infrastructure.	Section 1.1.1 Section 0 Section 2.2 Section 2.3 Figure 2-1
Community engagement Does the rehabilitation plan include: • detail of the stakeholder engagement undertaken, and set out how community views (including views of landowners and Traditional Owners on Crown Land) have been considered in the proposed post-quarrying land use(s).	Section 2.5
Proposed post-quarrying land uses and land form Does the rehabilitation plan Include: • proposed post-quarrying land use(s) • a summary of how community's views were considered when determining the proposed land use(s) • post-quarrying land form(s) that will support the proposed land use(s) • key characteristics of the post-quarrying land form(s), having regard to the proposed post-quarrying land use(s) • an outline of the practicality and achievability of the rehabilitated land form, including what resources will be required and their availability • explanation of the activities involved in forming (e.g. blasting, dozing) the land form(s) • demonstration that the land form design considers threatening events such as fire, flood and drought.	Section 3 Section 3.1 Section 4.3 Section 3.2 Section 3.3 Section 3.3 Section 3.4
Rehabilitation domains Does the rehabilitation plan include: • rehabilitation domain(s) that in sum cover the whole site • domains plan (if there is more than one rehabilitation domain)	Section 4.4
Rehabilitation objectives Does the rehabilitation plan include: • a whole of site objective • objectives for each rehabilitation domain that articulate what the post-quarrying land form will be.	Section 5
Rehabilitation criteria	Section 5

Rehabilitation plan checklist	Section
Does the rehabilitation plan include: • 'SMART' closure criteria linked to the site's closure objectives with detailed information on how the criteria were developed and will be measured.	
Schedule for rehabilitation milestones Does the rehabilitation plan include: • progressive and final rehabilitation milestones • a clear statement describing the milestone • an indication of when the milestone will be achieved (this may be measured via triggers or timings. A trigger could be, for example, completion of extraction).	Section 5
Post rehabilitated land risk assessment Does the rehabilitation plan include: • the identification and detail of risks (if any) that the rehabilitated land may pose.	6

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Glossary

Term / Acronym	Explanation
ADWG	Australian Drinking Water Guidelines
AHD	Australian Height Datum
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water
AMRR	Accumulative Monthly Residual Rainfall
AusIMM	Australian Institute of Mining and Metallurgy
BLCAC	Bunurong Land Council Aboriginal Corporation
C&D	Construction and demolition
CaLP	Catchment and Land Protection
CCD	Community contact database
CFA	Country Fire Authority
CHMP	Cultural Heritage Management Plan
CMA	Catchment Management Authority
DEECA	Department of Energy, Environment and Climate Action
DJPR	Department of Jobs Precincts and Regions
DO	Dissolved oxygen
DTP	Department of Transport and Planning
EC	Electrical conductivity
EPA	Environment Protection Authority
ERR	Earth Resources Regulation
ERS	Environment Reference Standard
GED	General Environmental Duty

Term / Acronym	Explanation
GWZ	Green Wedge Zone
MRSDA	Mineral Resources (Sustainable Development) Act
NEPM (ASC)	National Environmental Protection (Assessment of Site Contamination) Measure
NTU	Nephalometric turbidity units
RAP	Registered Aboriginal Party
Rehabilitated landform/profile	Landform/profile at the completion of rehabilitation, also referred to as the final landform/profile
RL	Reduced Level – level relative to 0m AHD
SLO	Significant Landscape Overlay
SW	Surface Water
Terminal landform/profile	Landform/profile at completion of extraction, prior to rehabilitation
UGB	Urban growth boundary
VPA	Victorian Planning Authority
WPV	Work Plan Variation
WSPA	Water Supply Protection Area

1. INTRODUCTION

Ricardo has been engaged by Hanson Construction Materials (Hanson) to prepare Rehabilitation Plan for the Yannathan quarry (the Site). The site is located approximately 6 km east-north-east of the township of Lang Lang, and 80 km south-east of the Melbourne CBD, **Figure 1-1.** This report supports a Work Plan Variation (WPV) to extend the area and depth of extraction.

Figure 1-1 Site Location

1.1 SITE OPERATIONS

1.1.1 Project summary

Table 1-1 Project summary

Item	Description	Work Plan cross reference
Land ownership	Hanson construction Materials Pty Ltd	Part 1, Section 1.3
Area of site	80.16 hectares	Part 1, Section 1.2
Annual tonnage	400,000 tonnes per annum	Part 1, Section 3.1
Depth of pits	RL26 to RL-9	Part 1, Section 2.2
Commodity	Sand/Gravel	Part 1, Section 3.1
Geological substrate	Yallock Formation (sand)	Part 1, Section 2.8
Quarry method	Excavation (dry) and dredging	Part 1, Section 3.5

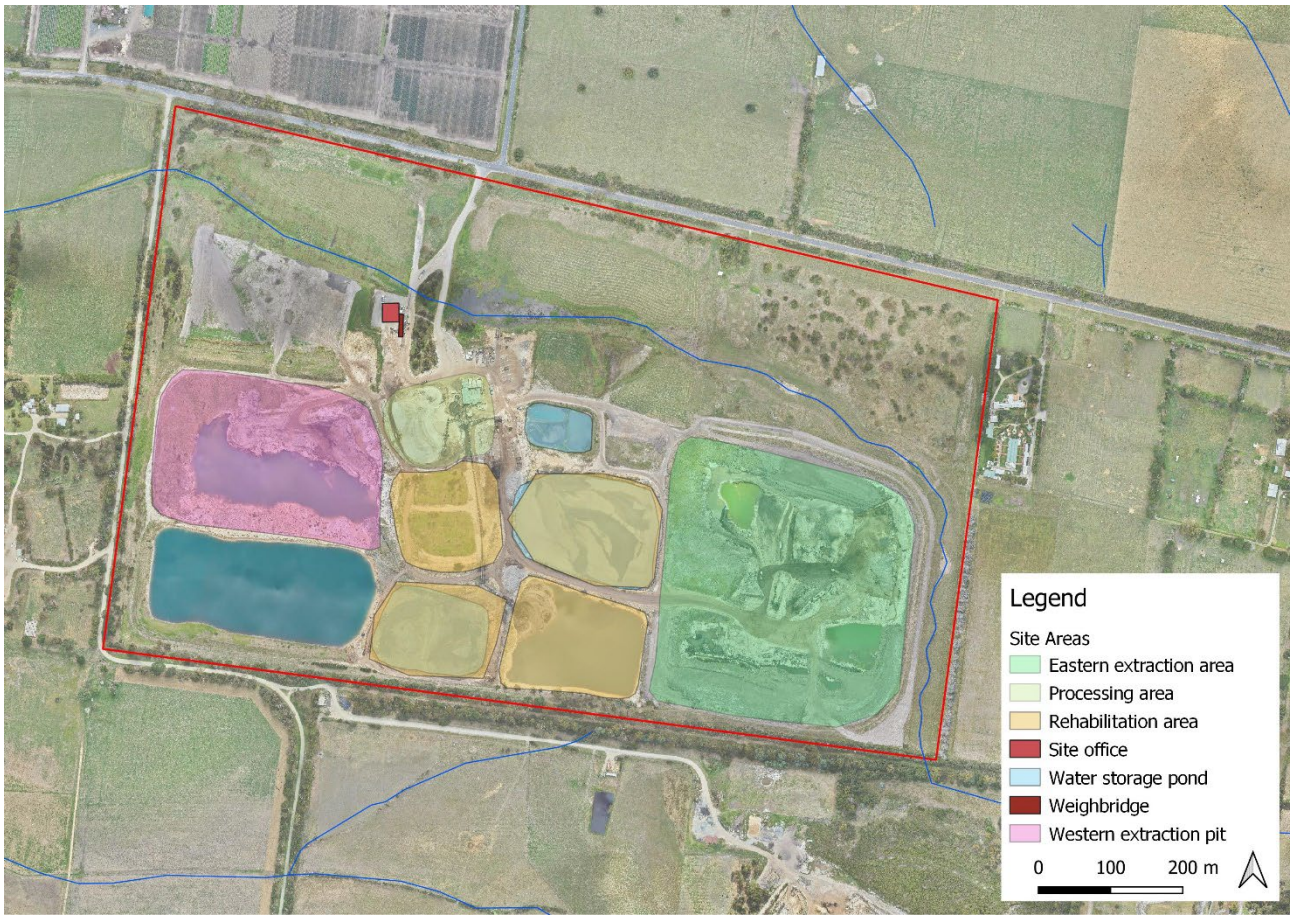
Item	Description	Work Plan cross reference
Terminal batter profile	1V:2.0H (existing terminal batters). 1V:2.5H (dry excavated terminal batters in expansion areas) 1V:2H (dredged batters)	Part 1, Section 3.5.3
Processing	On-Site Screening/washing/belt press slimes management	Part 1, Section 3.9
Other activities	Product Sales	

The Site is located at 870-910 Westernport Road, Yannathan, approximately 6km east-north-east of Lang Lang, opposite the intersection with Heads Road. The Site is on a relatively flat alluvial plain approximately midway between the Lang Lang River to the north and the Little Lang Lang River to the south.

The existing pits, shown in **Figure 1-2**, are operated using dry quarrying means, with the inflowing water draining to the base of the pit. Water is pumped from the base of the pit to onsite storages for use in sand processing or water storage.

Groundwater extracted from the pits is retained on site. The site has a groundwater extraction licence for 19.5 ML to account for groundwater lost with exported wet product. The licence is by annual transfer since the Water Supply Protection Area (WSPA) is fully allocated and no new licences are available.

Figure 1-2 Site layout



1.2 REGULATORY REQUIREMENTS

Quarries are regulated by Earth Resources Regulation (ERR), a branch of the Department of Energy, Environment and Climate Action (DEECA).

1.2.1 Rehabilitation Strategy

The *Regulatory Practice Strategy for the Rehabilitation of Earth Resources Sites* presents ERR's rationale for the rehabilitation of mines, quarries and other earth resources sites. The overarching objectives include:

- Protect people, land, infrastructure and the environment
- Ensure land can be returned to a safe, stable and sustainable landform

Actions include the development of rehabilitation policies and guidelines, in particular relating to rehabilitation bonds and oversight of rehabilitation works.

An Addendum Report was released subsequently identifying new and more specific rehabilitation improvement actions.

1.2.2 Primary Regulation

Quarries are regulated by under the *Mineral Resources (Sustainable Development) Act 1990* (MRSDA) as amended by the *Mineral Resources (Sustainable Development) Amendment Act 2019*. The relevant regulation are the *Mineral Resources (Sustainable Development) (Extractive Industries) Regulations 2019* (MRSDA Regulations).

1.2.2.1 MRSDA Requirements

Responsibility for rehabilitation is defined in Section 8A of the MRSDA to be the holder of an extractive industry work authority. The MRSDA requires that a rehabilitation plan:

- Take into account:
  - Any special characteristics of the land and
  - The surrounding environment
  - The need to stabilise the land
  - The desirability or otherwise of returning agricultural land to a state that is as close as is reasonably possible to its state before the extractive industry work authority was granted
  - Any potential long term degradation of the environment
- Be prepared by the applicant for extractive industry work authority after consultation with the owner of the land, if the land is private land
- A rehabilitation liability assessment is required to be undertaken of the rehabilitation works in accordance with the manner and form determined by the Minister
- The rehabilitation plan may need to be certified by an auditor

The MRSDA specifies that rehabilitation:

- Must, as far as practicable, be complete before the work authority ceases to apply to the land
- If works continue after the work authority has ceased to apply
  - The works must be completed as expeditiously as possible
  - The former work authority holder must continue to engage a manager to control and manage works
- Works may be required to be audited to certify rehabilitation has been completed as required

Rehabilitation must align with the principles of sustainable development as outlined in the MRSDA.

1.2.2.2 MRSDA Regulations requirements

The MRSDA Regulations provides the following definitions.

Table 1-2 Definitions

Word/phrase	Interpretation
Rehabilitation hazard	Any rehabilitation activity and circumstance that may pose a risk to the environment, to any member of the public, or to land, property or infrastructure in the vicinity of the rehabilitation activity
Safe, stable and sustainable	• Is not likely to cause injury or illness; and • Structurally, geotechnically and hydrogeologically sound; and • Non-polluting; and • Aligns with the principles of sustainable development (refer MRSDA)
Relevant risks	Risks that may require monitoring, maintenance, treatment or other ongoing land management activities after rehabilitation is complete

New requirements for quarry rehabilitation came into force on 1st July 2021. Rehabilitation Plans submitted after this date are required to contain:

- Proposed land uses for the affected land after it has been rehabilitated, that considers community views expressed during consultation and
- A land form that will be achieved to complete rehabilitation, which must:
  - Be safe, stable and sustainable and
  - Be capable of supporting the proposed land uses
- Objectives that set out distinct rehabilitation domains that collectively amount to the total land form and
- Criteria for measuring whether the objectives have been met
- Descriptions and schedule for each step
- Identification and assessment of relevant risks that the rehabilitated land may pose to the environment, to any member of the public or to land, property or infrastructure including
  - The type, likelihood and consequence of risks
  - Activities required to manage the risks
  - Projected costs to manage the risks
  - Any other matter relevant to risks arising from rehabilitated land

1.2.3 Earth Resources Regulation guidelines

1.2.3.1 Rehabilitation Guideline

Preparation of Rehabilitation Plans Guideline for Extractive Industry Projects was released in March 2021. A process was identified for the development of Rehabilitation Plans. The following table identifies the sections of this report where each is addressed.

Table 1-3 Rehabilitation plan development

item	Task	Description	Section in this report
1	Rehabilitation Risk Management Plan	Identify and assess rehabilitation risks and prepare risk management plan	**Appendix A** and **Section 6**
2	Develop a knowledge base	Gather information to support the rehabilitation plan	**Section 2**

item	Task	Description	Section in this report
v	Compare current plan against new requirements	Compare current rehabilitation plan to the new framework to identify what needs to change	**Section 0**
3	Propose post-quarrying land use(s)	Identify post-quarrying land use(s) that consider community and landholder views	**Section 3**
4	Identify post-quarrying land form(s)	Identify a landform that is safe, stable and sustainable and supports the post-quarrying land use.	**Section 0**
5	Identify domains	Separate the site into areas with similar rehabilitation requirements. Each domain may have a different post-quarrying land form and use.	**Section 4.4**
6	Develop rehabilitation objectives	Develop a whole of site rehabilitation objective, and specific objectives for each domain.	**Section 5, 5.1.2 etc**
7	Develop rehabilitation criteria	Develop criteria to assess whether the rehabilitation objective(s) for each domain have been met	**Section 5,** Error! Reference source not found. **etc**
8	Identify rehabilitation milestones	Identify milestones that will be achieved in rehabilitating each domain	**Section 5, 5.4.3 etc**
9	Assess post-rehabilitation risks	Complete an assessment of the risks (if any) posed by the rehabilitated landscape after rehabilitation is complete	**Section 6**

1.2.3.2 Work Plan guidelines

Risk planning is undertaken in accordance with *Preparation of Work Plans and Work Plan Variations* (Work Plan Guideline) most recently updated in December 2020. A Risk Management Plan is a component of the Work Plan package, as is the Rehabilitation Plan. Use of the same risk assessment matrix reduces inconsistencies and confusion.

The Risk Assessment Process is presented in Appendix A of the Work Plan Guideline.

1.2.3.3 Geotechnical guideline

Geotech guideline for terminal and rehabilitated slopes is the key reference for geotechnical matters. Most recently published in October 2020 the guideline presents the geotechnical assessment requirements.

Buffers are to be within Work Authority boundary.

A Competent Person must be either a full member or fellow of a recognised professional organisation such as AusIMM or Engineers Australia. The guideline outlines the information required for the Competent Person's Letter and a Geotechnical Assessment.

1.2.3.4 Imported Materials Management guideline

Imported Materials Management Guideline was updated most recently in 2018. The guideline outlines how construction and demolition waste can be used for quarry rehabilitation. The Environment Protection Act 2017 was revised on 1 July 2021. This brings additional permission requirements from EPA for the use of C&D waste for this purpose, specifically the need to become a "lawful place" for waste receival.

If materials are required to be imported to site the requirements outlined in ERR's guidance need to also consider EPA requirements.

1.2.4 Other legislative and regulatory requirements

Table 1-4 Other regulatory requirements

Agency	Legislation	Aspects
WorkSafe	*Occupational Health and Safety Act 2004* *Dangerous Goods Act 1985*	Health safety and welfare of employees and other persons at work
Environment Protection Authority	*Environment Protection Act 2017*	General Environmental Duty (GED) Discharge licences (Development Licence and Operating Licence)
Department of Energy, Environment and Climate Action (DEECA)	*Wildlife Act 1975* *Flora and Fauna Guarantee Act 1988*	Native vegetation management
DEECA – CMA	*Catchment and Land Protection Act 1994* *Water Act 1989*	Works on waterways
DEECA - Rural Water Authority	*Water Act 1989*	Groundwater extraction licensing Works Licences Surface water diversions
Department of Agriculture, Water and the Environment (Commonwealth)	*Environment Protection and Biodiversity Conservation Act 1999*	Management of selected endangered species
Department of Transport and Planning (DTP) - Heritage Victoria	*Heritage Act 2017*	Heritage management of places and objects on the Heritage Register
Traditional Owners (Crown Land)	*Native Title Act 1993 (Commonwealth)* *Traditional Owner Settlement Act 2010*	Consultation requirements
Aboriginal Victoria / RAPs	*Aboriginal Heritage Act 2006*	Cultural Heritage Management Plans
CFA	*Country Fire Authority Act 1958*	Fire management
VPA		Strategic planning
Local Government	*Planning and Environment Act 1987*	Planning permit

2. BACKGROUND INFORMATION

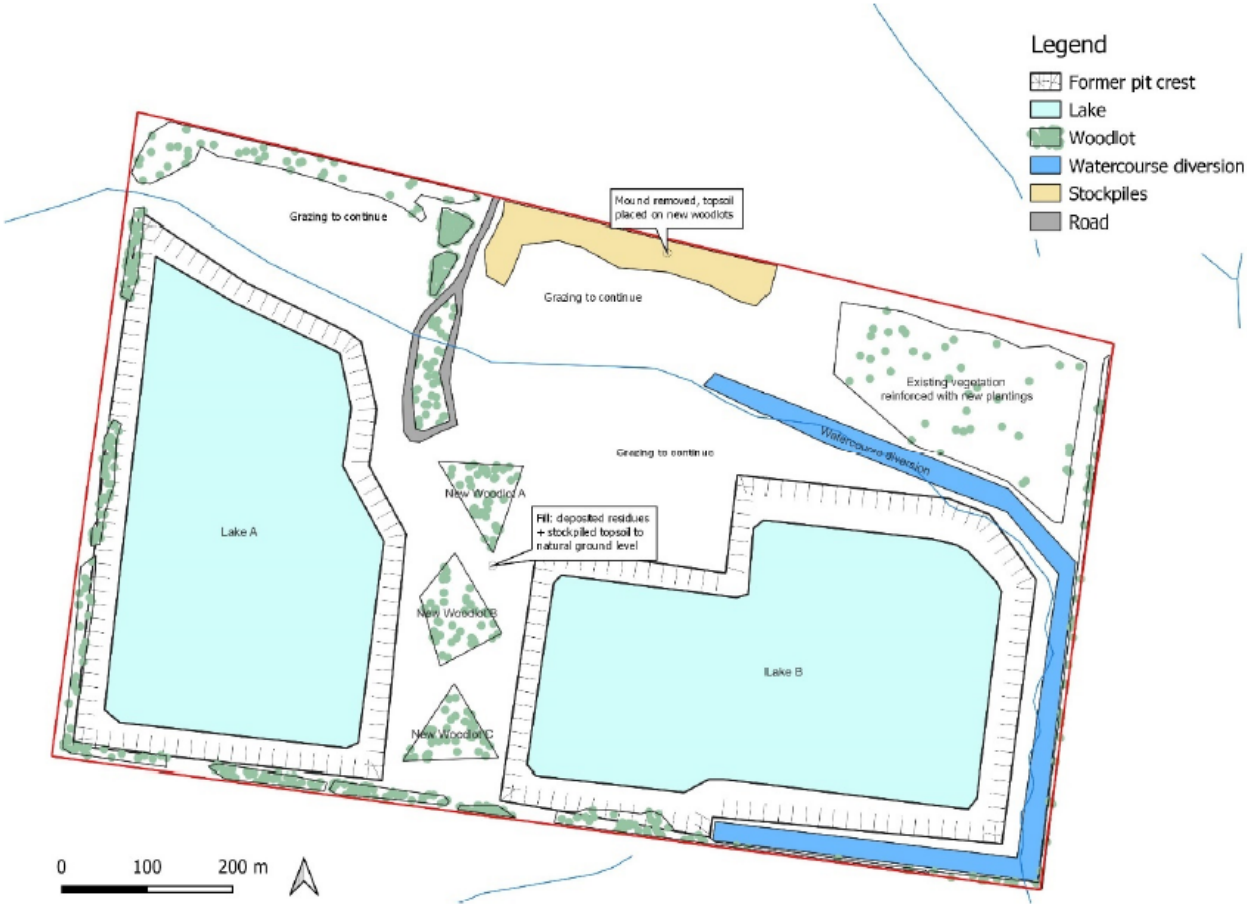
2.1 CURRENT APPROVED REHABILITATION PLAN

The rehabilitation plan provided in the work plan amendment (WA127) dated 10 November 2014 was developed in support of a Work Plan Variation to extend the area of extraction. A further extension of the area of extraction was approved by Admnistrative Update on 28th April 2014.

The approved rehabilitation plan specifies the landscaping, backfilling, and reshaping of the terminal faces where required so that a large portion of the rehabilitated Site will be a landform that is consistent with the surrounding pastoral and agricultural land uses.

The currently approved plan has been updated to reflect an increased area of extraction but remains consistent with the principles of the currently approved plan. The Site will be planted with species native to the area under the guidance of a horticulturalist. The approved rehabilitation plan incorporating the Administrative Update is presented in

Figure 2-1 Approved rehabilitation plan



2.1.1 Landscaping

Landscaping is to be completed in three stages:

- Initial stage involves planting along the perimeter of the Site and buffer zones in the pre-quarrying phase.
- The next landscaping stage is during operation and includes intermittent planting on overburden mounds and topsoil stockpiles.
- The final stage is the vegetation of the rehabilitated site post operations.

2.1.2 Progressive rehabilitation

The Site is to be progressively rehabilitated, with some of the excavated areas to be filled with oversize materials and filter cake from the materials processing plant. Filter cake includes fine (undersize) materials separated from process water. Overburden will be used to refill the northern areas following extraction to allow for relocation of the watercourse and the access road. Surplus overburden will be used on worked out areas of pits and on terminal faces where required to form safe and stable batter walls.

2.1.3 Future use

The future use will be waterbodies and land used for conservation purposes. Formerly agricultural use was proposed.

2.1.4 Conclusions from review of previous Rehabilitation Plan

This Work Plan Variation extends the area of extraction to include the majority of the land that was formerly proposed for agricultural use, the area now remaining is unlikely to be large enough for agriculture to be the primary site use.

2.2 SITE CONTEXT

The township of Yannathan is located within the Shire of Cardinia and has a small population of 272 (2021). Located on the edge of the former Koo Wee Rup Swamp, native vegetation was cleared, and a network of drains was constructed in the 1890's to drain the shallow groundwater. Land use in the Yannathan area has historically been used for farming and agriculture purposes.

2.2.1 Surrounding land use

Surrounding land uses adjacent to the Site are shown in **Figure 2-2** and described in **Table 2-1.**

Figure 2-2 Surrounding land use

Table 2-1 Surrounding land use

Direction	Description
North	Agricultural uses. A residential farmhouse is located approximately 740m from the north-western corner of the site. A former residential building to the north of the site is used as an office for the market garden, not a residence.. However, it is understood that a caretaker stays overnight from time to time.
East	Land immediately east of the site is currently a kennel boarding and cattery facility and a farm with on-site residence. There is also a current work authority (WA511) over the property.
South	Current work authorities (WA1005 and WA1029) exist over the properties immediately south of the Site.
West	An intensive poultry farming facility with on-site residence exists immediately west of the site. There is also a caretaker residence on this property.

2.2.2 Climate

Climate data for the site was accessed on SILO[1], an online climate database. Relevant climate data ranging from 1970-2021 is presented in **Table 2-2.**

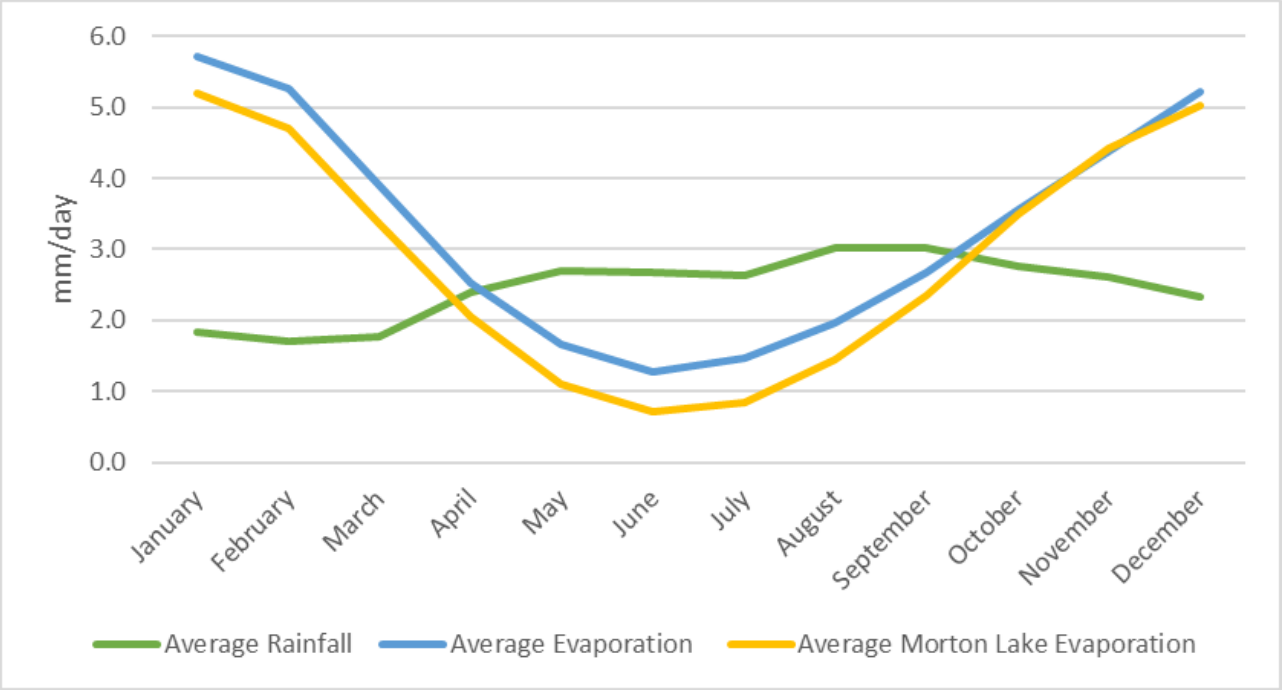
Table 2-2 Climate data - 1970-2021

Month	Average Maximum Temperature (°C)	Average Minimum Temperature (°C)	Average Rainfall (mm/day)	Average Evaporation (mm/day)	Average Morton Lake Evaporation (mm/day)
January	25.4	13.5	1.8	5.7	5.2
February	25.9	13.8	1.7	5.3	4.7
March	23.7	12.5	1.8	3.9	3.4
April	20.1	10.2	2.4	2.5	2.1
May	16.8	8.3	2.7	1.7	1.1
June	14.1	6.3	2.7	1.3	0.7
July	13.5	5.8	2.6	1.5	0.8
August	14.6	6.3	3.0	2.0	1.4
September	16.6	7.5	3.0	2.7	2.4
October	18.9	8.8	2.8	3.5	3.5
November	21.1	10.5	2.6	4.4	4.4
December	23.3	12.0	2.3	5.2	5.0

Average daily rainfall, evaporation and Morton Lake evaporation between 1970 - 2021 are presented in **Figure 2-3** below.

[1] https://www.longpaddock.qld.gov.au/silo/gridded-data/

Figure 2-3 Average daily rainfall, evaporation and Morton Lake evaporation - 1970-2021

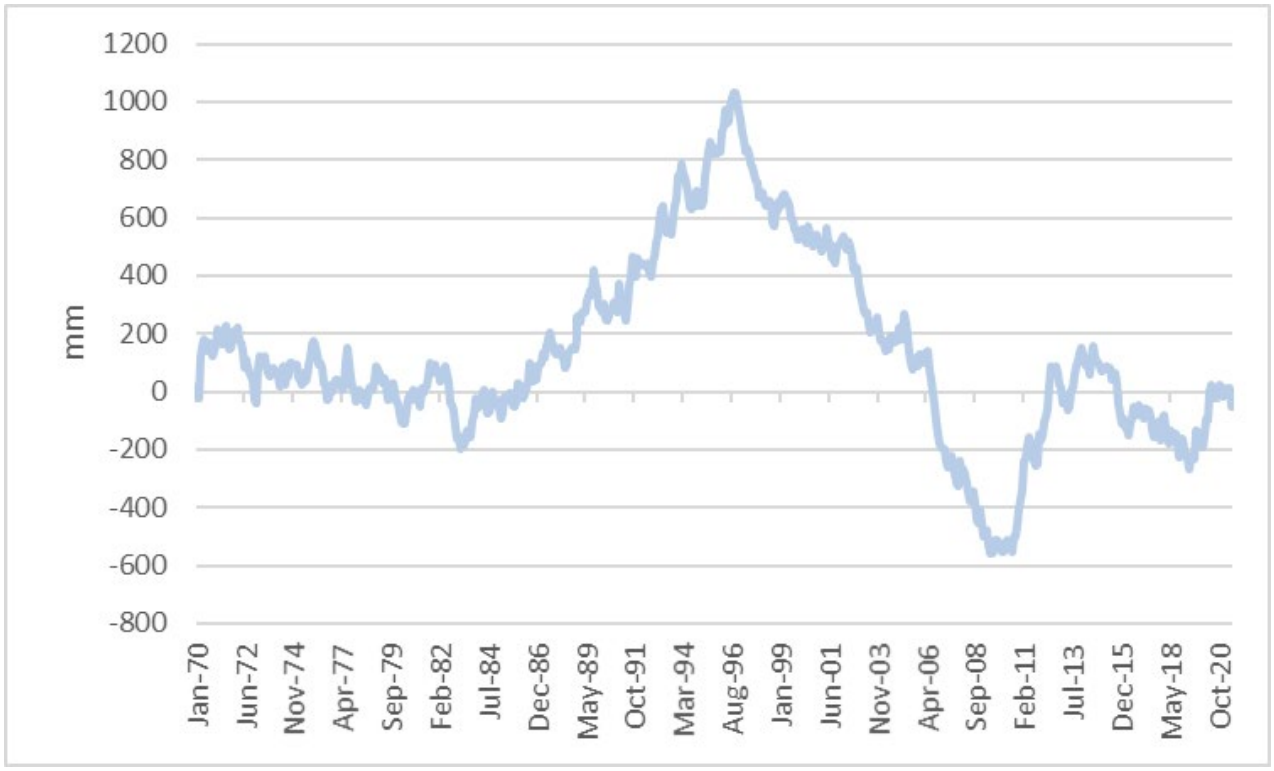


Morton Lake evaporation is a modelled value specifically designed for ponds and waterbodies incorporating subsurface heat storage in the waterbody.

Climatic fluctuations between 1970 – 2021 are presented below in an accumulated monthly residual rainfall (AMRR) plot in **Figure 2-4**. A negative trend in the data indicates below average rainfall, and a positive trend indicates above average rainfall. Groundwater systems generally reflect these water availability trends, assuming there are no external influences.

The plot shows an extended period of above average rainfall between 1984 and 1997. The millennial drought extended from 1997 to 2009. Since 2009 the extremes appear to be returning to a more normal pattern similar to that experienced prior to 1984.

Figure 2-4 AMRR plot

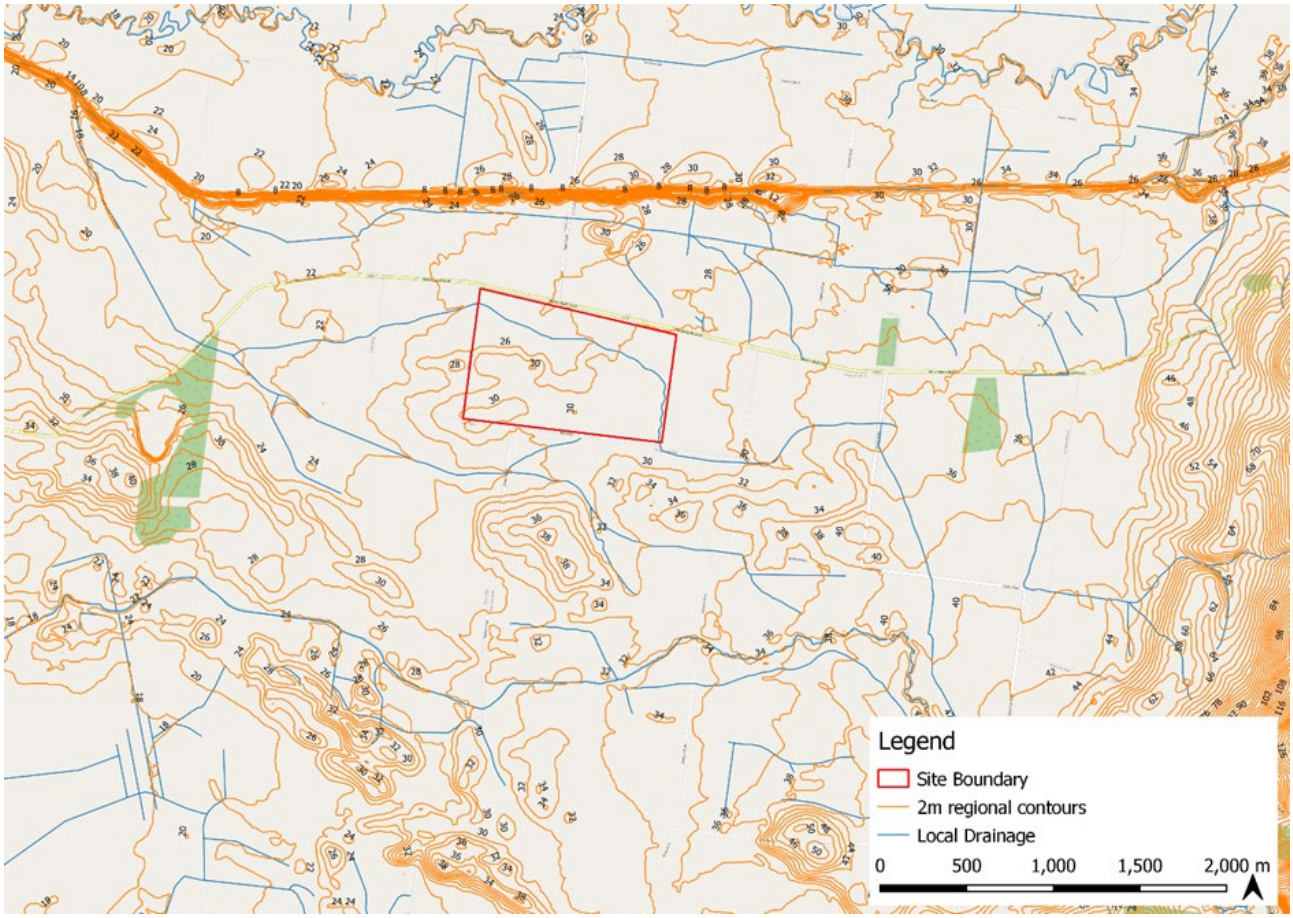


2.2.3 Topography and drainage

The pre-development topography and drainage surrounding the site are shown in **Figure 2-5**.

The site is set in a relatively flat area, grading from the south to northwest from 30 m AHD to 26m AHD onsite. The topography grades to the north to the Lang Lang River. East and southeast of the site the topography is also relatively flat then grades sharply to approximately 70m AHD approximately 3km from the site.

Figure 2-5 Topography and drainage



2.2.4 Ecology and Ecosystems

The quarry manager has reported that when Hanson purchased the site there were no trees on the site, so no remnant native trees were present. All trees currently present onsite have been planted or have naturally seeded since this time.

Fauna and flora at the Site was assessed by Ecology & Heritage Partners in accordance with “Victoria’s Native Vegetation Management: A Framework for Action”. A copy of this report is contained as an appendix to Part 1 Summary Report.

2.2.5 Geotechnical considerations

CMW Geosciences have prepared a geotechnical assessment for the site A copy of this report is contained as an appendix to Part 1 Summary Report.

Terminology:

ERR’s Rehabilitation guideline uses the following terms:

Terminal landform/profile - Landform/profile at completion of extraction, prior to rehabilitation
Final landform/profile - Landform/profile at the completion of rehabilitation,

We note that many operators use the terms interchangeably. To avoid confusion Ricardo adopts the following:

Terminal landform/profile - Landform/profile at completion of extraction, prior to rehabilitation
Rehabilitated landform/profile - Landform/profile at the completion of rehabilitation,

The geotechnical report proposes the following:

Terminal batters:

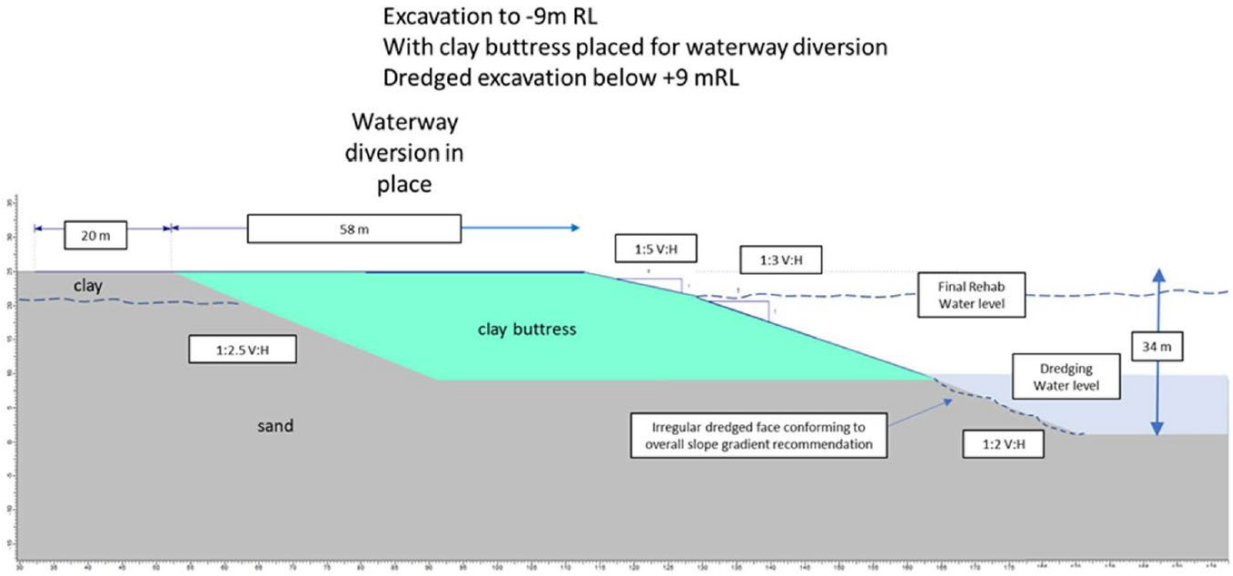
- 1V:2.0H (existing terminal batters).
- 1V:2.5H (dry excavated terminal batters in expansion areas)
- 1V:2H (dredged batters)

Rehabilitated Batters:

- 1V:5H to below final (recovered) water levels
- 1V:3H from below final (recovered) water levels to 9mAHD.
- 1V:2H below 9mAHD (dredged batter)

The terminal and rehabilitated profiles are shown in **Figure 2-6**.

Figure 2-6 Terminal and rehabilitated profiles



Source: CMW 2022

2.2.6 Geology

2.2.6.1 Regional setting

The Site is located on the north eastern edge of the Westernport Basin. The Westernport Basin is described as a 'complexly faulted and eroded basin that is largely underlain by shallow basement covered by a thin veneer of early Lower Cretaceous Strzelecki Group and Tertiary sediments and volcanics" (Carrillo-Rivera 1974). Regional flow lines detailed in the 1:100,000 Westernport hydrogeological map show the regional groundwater flowing to the northwest.

The site is on the downthrown side of a major regional fault. The Heath Hill Fault is a northeast to southwest trending fault approximately 4 km southeast of the site. Bedrock in this area comprises Cretaceous-aged Strzelecki Group at a depth of approximately 150m. The stratigraphic sequence at the site from the top down comprises:

- Quaternary aged quartzose aeolian deposits (discontinuous).
- Oligocene aged Yallock Formation (now classified as Sandringham Formation) – sand, medium to coarse quartzose; gravel, often organic rich; minor lignite; fluvial and paludal deposition.
- Eocene aged Older Volcanics – basalt.
- Early Eocene aged Childers Formation – sand, coarse quartzose; gravel; often organic rich, numerous lignite and hard organic clay beds, fluvial and paludal deposition.

The sand resource in the Yallock (Sandringham Sandstone) Formation extends to a depth of approximately 100m.

2.2.6.2 Local geology

Generally, the geology underlying the site includes a layer of clean sands, underlain by black sands which are further underlain by clean sands. The natural ground surface elevation at the site is between 25 and 34 mAHD. Historically, Hanson extracted the upper level of clean sands to approximately RL: 9 mAHD (top of black sands layer). The black sands layer below contains a high proportion of organic matter, and in some places lignite. Black sands are currently being quarried from the western pit, and recent drilling has shown a significant thickness of clean sand beneath.

2.2.7 Hydrogeology

The black sands act as a confining layer separating waters above and below. This WPV extends the depth of the pits to the lower sands. The impact of this on the groundwater systems was modelled with the results presented in the Hydrogeological Assessment which is an appendix to **Part 1 Summary Report**.

It was determined that even if the pits were quarried dry this would not have an unacceptable impact on the surrounding groundwater users. Hanson has now made the decision to quarry the deeper sands using a dredge which will have the added benefit of reducing the impact on groundwater systems than a dry quarry scenario.

2.2.8 Natural disaster history

No natural disasters have been reported within the vicinity of the Site, however it is deemed to be within a designated bushfire prone area.

A magnitude 5.9 earthquake was detected in the Yarra Ranges north of Rawson in September 2021. The epicentre of the earthquake was approximately 90km from the Site. The nearest fault to the Site is the Heath Hill fault, approximately 2km to the east of the Site. In the last ten years no earthquakes have been recorded in the immediate vicinity of the Site[2].

2.3 SENSITIVE RECEPTORS

2.3.1 Residential

Surrounding properties within 2km are shown in **Figure 2-7.**

[2] Geoscience Australia, 2021

Figure 2-7 Residences within 2km

2.3.2 Surface Water

A drainage channel is present on the site that runs from the eastern property on the southern boundary and exits the Site from the western boundary to the north of the quarry pits. The channel is ephemeral and a tributary to the Lang Lang River to the north of the Site. This will be relocated to the northern site boundary during the operational phase.

Figure 2-8 Current and proposed site drainage

2.3.3 Groundwater

Groundwater is a resource used by others in the community and is therefore also a potential receptor. The review of groundwater data in the Summary Report indicates the groundwater falls into Segment A1 as defined in the ERS. The following potential environmental values are required to be protected:

- Potable mineral water supply.
- Agriculture and irrigation.
- Human consumption of aquatic foods.
- Aquaculture.
- Industrial and commercial use.
- Water-based recreation.
- Traditional Owner cultural values.
- Navigation and shipping.
- Buildings and structures.
- Geothermal properties.

2.4 PLANNING

2.4.1 Strategic Plans

2.4.1.1 Cardinia Western Port Green Wedge Management Plan

A green wedge area refers to non-urban land that surrounds the outward development of Melbourne. The land is separated from urban areas by the urban growth boundary (UGB) which was defined by the Victorian government in 2002. There are 12 green wedges across Melbourne spread between 17 local government

areas. Green wedges accommodate for agricultural and recreational uses, as well as important functions that support metropolitan Melbourne.

The *Cardinia Western Port Green Wedge Management Plan* was adopted in May 2017. The Western Port Green Wedge is one of the 12 green wedges on the fringes of Melbourne and is outside of the UGB. It is shared between the Cardinia Shire Council and the City of Casey. The Site is located within Precinct 1 of the Cardinia Shire Council section of the green wedge.

The *Cardinia Western Port Green Wedge Management Plan* achieves:

- Identifies the values and features of the Cardinia Western Port Green Wedge across a range of thematic areas, including biodiversity, agriculture and horticulture, water, climate change, cultural heritage and more.
- Provides objectives, strategies and actions to protect and improve the quality of these important assets.
- Identifies areas of commonality through the identification of precincts and sets out the preferred future land uses in these areas.
- Acknowledges and responds to the needs and values of the local community.
- Identifies priority actions and further work that is required to successfully manage the Cardinia Western Port Green Wedge into the future.

The key issues identified in the plan include:

- The protection of environmentally significant areas including the northern hills and the Western Port coast.
- The protection and management of biodiversity.
- The protection of the Koo Wee Rup swamp area which contains important groundwater reserves and horticultural soils in the Western Port basin.
- The management of urban growth, including urban pressures on the rural hinterland.
- The protection and sustainable use of agricultural land.

The following themes and objectives are outlined in the management plan and summarised in **Table 2-3**.

Table 2-3 Green Wedge Themes and Objectives

Theme	Objective
Indigenous and post-contact heritage	Identify, protect, celebrate and promote the heritage values, history, Indigenous cultural heritage and post-contact heritage in the Cardinia Western Port Green Wedge and its history.
Landscape	Protect and enhance the unique and attractive landscapes in the Cardinia Western Port Green Wedge.
Environmental significance	Protect and enhance biodiversity and habitats within the Cardinia Western Port Green Wedge, especially for rare or endangered flora and fauna.
Visitation and recreational land uses	Encourage opportunities for recreation and tourism that are linked to local strengths including food, trails and education with minimal impact on the green wedge environment.
Soils and land capability	Recognise the versatility of soils in the Cardinia Western Port Green Wedge and protect and enhance their capability to support productive farming and biodiversity, and ensure that these activities are not detrimental to the environment.
Water	Develop a coordinated approach with agencies to water management that reduces the risks of flooding, erosion and sedimentation and groundwater depletion and improves water quality.

Theme	Objective
Groundwater	Recognise the role groundwater plays in the Cardinia Western Port Green Wedge and protect and enhance its capability to support productive farming.
Agriculture and horticulture	Maintain and develop a thriving agricultural and horticultural industry in the green wedge with a focus on horticulture, agriculture, soil based produce, food security and new and emerging agricultural practices to service the local and export markets.
Climate change	Recognise, understand and prepare for the projected impacts of climate change and rising sea levels on the Cardinia Western Port Green Wedge.
Urban development	Restrict opportunities for development in the green wedge except for those that are required to complement its primary values of agriculture, horticulture, biodiversity, major infrastructure, maintain viable settlements and for tourism-related purposes.
Infrastructure and transport	Support major new infrastructure which provides a net community benefit. Recognise the potential impacts that this infrastructure may have on the green wedge and identify ways in which such impacts can be minimised and mitigated.
Extractive industry	Recognise the importance of extractive industry for both the municipality and metropolitan Melbourne and ensuring that these activities are not detrimental to the environment.

Strategies relating to extractive industry include:

- *Support potential future extractive industry, particularly in the north area of the green wedge.*
- *Protect existing and future extractive industry from residential encroachment by ensuring that buffer areas are enforced and protected.*
- *Protect the sand resources in the Lang Lang area in order to provide for the extraction of these resources and the rehabilitation of sites in a manner that protects the significant environmental, social and economic values of the area.*

The land within Precinct 1 is considered suitable for agriculture, horticulture and soil based food production. The Plan also notes the importance of the extractive industry in the area east of Lang Lang. The future directions/preferred land uses includes:

- *Support potential future extractive industry in the area nominated as an extractive industry interest area within Precinct 1.*

The proposed rehabilitation concept has considered the objectives in **Table 2-3** and is consistent with objectives where relevant.

2.4.2 Council Planning

The Site is located across two addresses, 870 and 910 Westernport Road Yannathan. A planning summary for each address is provided in **Table 2-4**.

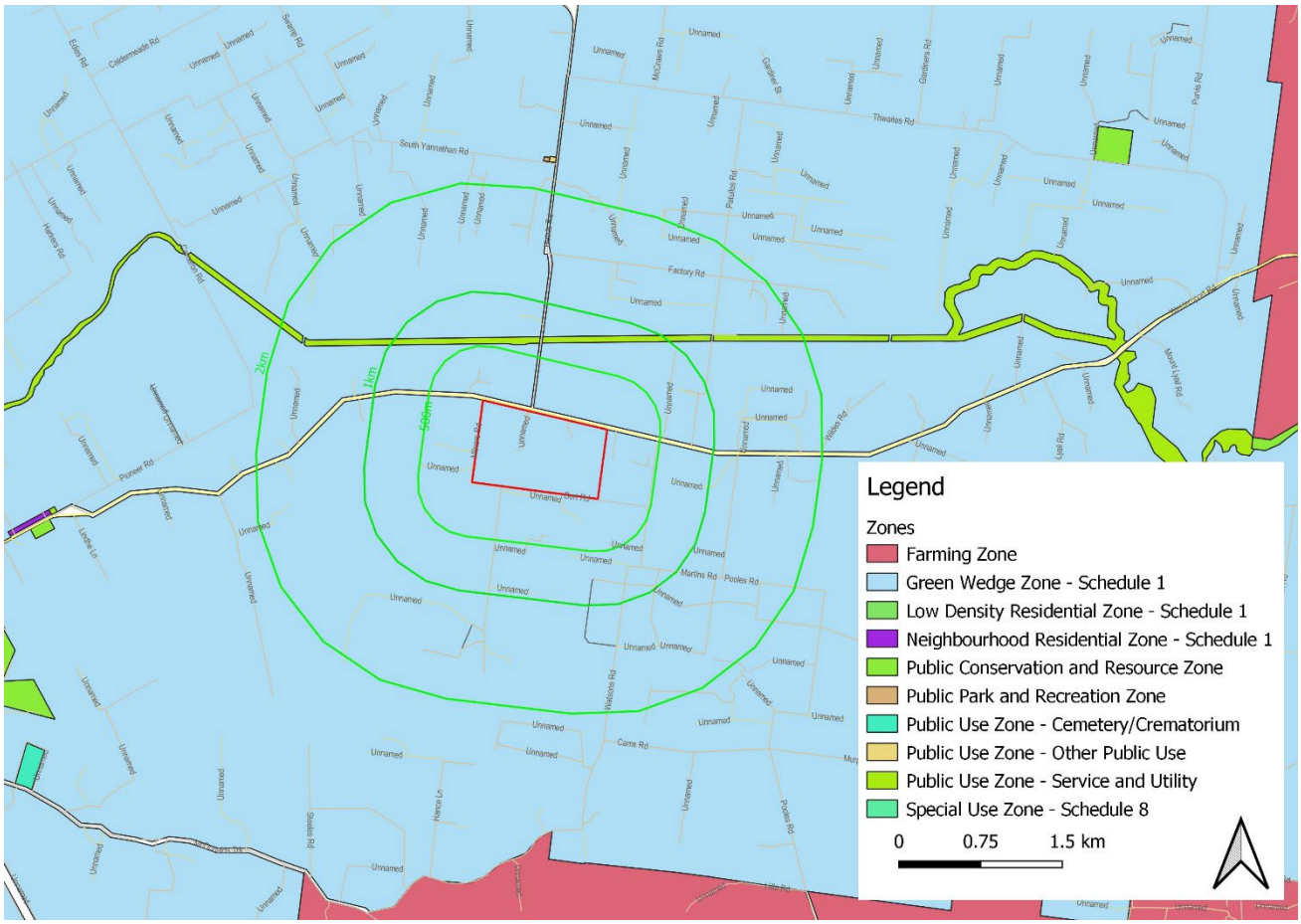
Table 2-4 Planning summary

Name	870 Westernport Road Yannathan	910 Westernport Road Yannathan
Zone	Green Wedge Zone (GWZ)	Green Wedge Zone (GWZ)
Overlay	Significant Landscape Overlay (SLO) Significant Landscape Overlay - Schedule 3 (SLO3)	Significant Landscape Overlay (SLO) Significant Landscape Overlay - Schedule 3 (SLO3)

Name	870 Westernport Road Yannathan	910 Westernport Road Yannathan
Areas of Aboriginal Cultural Heritage Sensitivity	All or part of this property is an 'area of cultural heritage sensitivity'.	All or part of this property is an 'area of cultural heritage sensitivity'.
Designated Bushfire Prone Areas	This property is in a designated bushfire prone area.	This property is in a designated bushfire prone area.

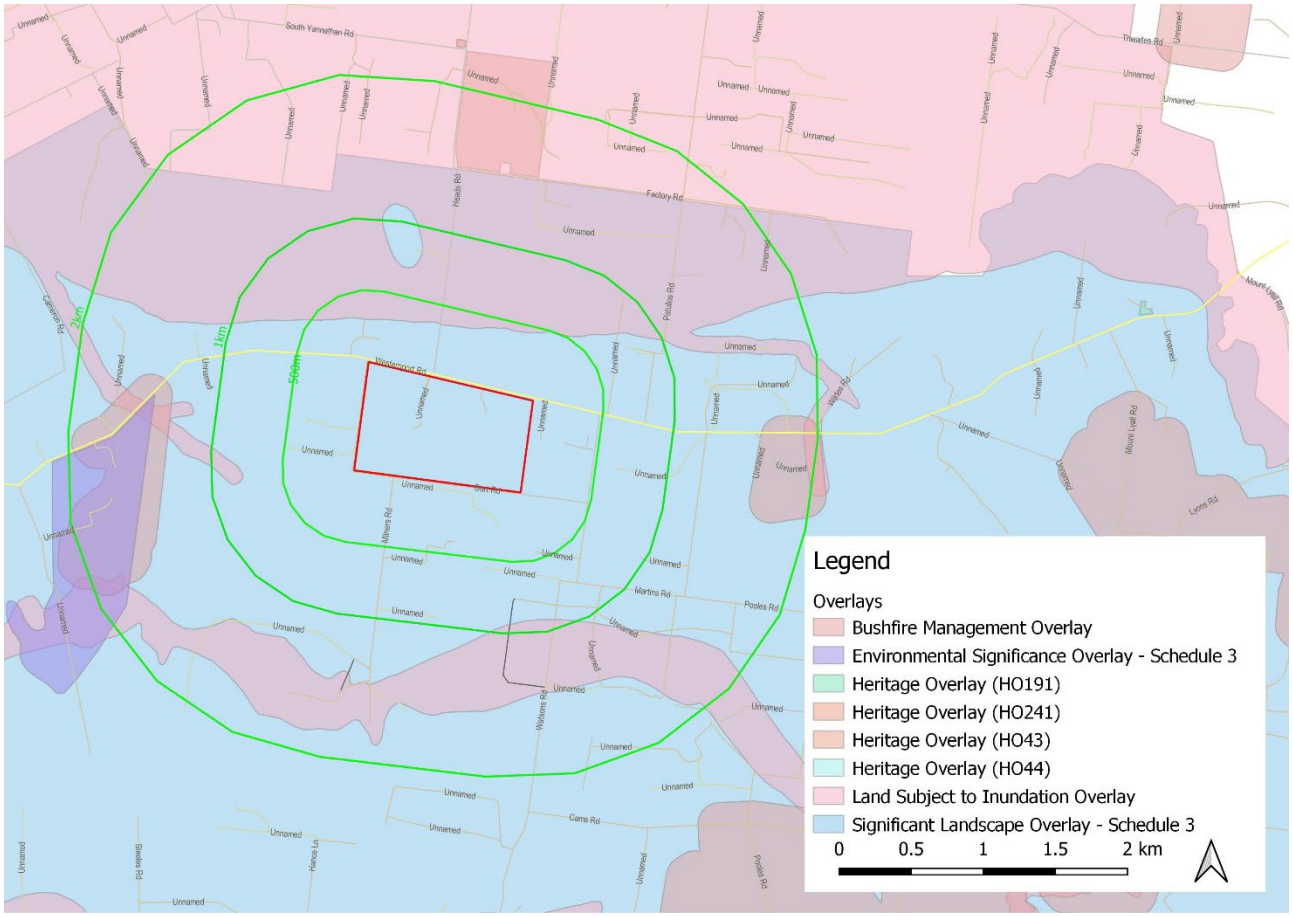
The site is in a Green Wedge Zone as shown in **Figure 2-9.**

Figure 2-9 Planning zones



Planning overlays for the Site and surrounds are provided in **Figure 2-10**.

Figure 2-10 Planning overlays



2.5 CONSULTATION

2.5.1 Site owner

The site is owned by Hanson Construction Materials, who also operates the quarry, consultation with the owner is therefore internal.

2.5.2 Regulatory stakeholders

The existing Site operates as a quarry under WA127 and has been licensed in accordance with regulatory requirements. A summary of this is as follows:

- Cardinia Shire Council – planning permit, green wedge planning, responses to queries from the community.
- Earth Resources Regulation – site operations and approvals, response to issues.
- Southern Rural Water – licensing of groundwater.
- Melbourne Water – design of surface water diversion
- EPA – noise and dust modelling

2.5.3 Community stakeholders

The Quarry Manager maintains regular communication with the site's immediate neighbours to ensure any issues are proactively addressed to minimise adverse impacts to the extent practicable.

The Community Engagement Plan is contained in Part 4 of the application. The following Stakeholder Engagement Plan is extracted from this document (**Table 2-5)**.

Table 2-5 Community engagement

Activity / Tools	Timeframe	Communities	Level of Engagement[3]	Method of Engagement
Community Information Session / Pop Up Display / Site Tour	As required	Community members Earth Resources Regulation Cardinia Shire Council	Inform Consult Involve	Community Contact Database Email Advertising Fact Sheets Pop-up exhibits in community spaces Presentations by Hanson and statutory authority representatives.
Community Contact Database (CCD)	Utilised for real time information distribution and issue / query registration.	Community Community organisations Government Regulatory Authorities Non-Regulatory Authorities Media	Inform Consult	Email Mail CCD registration Dedicated community contact email address Face to face meetings.
Personal meetings	As required	Elected representatives Community organisations Community members	Inform Consult Involve	Face to face meetings Issue investigation Outcome reporting.
Project Updates	As required	Elected representatives Statutory Authorities Community organisations Community members	Inform Consult	Email Mail Personal delivery
Fact Sheets	As required	Elected representatives Statutory Authorities Community organisations Community members	Inform Consult	Email Mail Personal delivery
Value and Effectiveness Surveys	At all community events	Community organisations Community members	Not applicable	Survey forms

A Cultural Heritage Management Plan (CHMP) has been prepared for this application, with meetings with Bunurong Land Council Aboriginal Corporation staff as required by this process at the following project milestones:

- Project initiation

[3] IAP2 Public Participation Spectrum, Community Engagement Guidelines for Mining and Mineral Exploration in Victoria, Step 5, Levels of Engagement

- Completion of Desktop Review
- Completion of the Standard Assessment
- Completion of the Complex Assessment
- Agreement of management conditions

The CHMP has been approved by Bunurong Land Council Aboriginal Corporation (BLCAC). A copy of this is contained as an appendix to **Part 1 Summary Report**.

2.6 REHABILITATION OBLIGATIONS AND COMMITMENTS

The requirements of the Mineral Resources (Sustainable Development) Act 1990 are contained in **Section 1.2**. The requirements of the Mineral Resources (Sustainable Development) (Extractive Industry) Regulations 2019 are contained in **Section 1.2.2.2**. ERR has released a Rehabilitation Guideline and the requirements of this are also presented in **Section 1.2.3.1**.

The current rehabilitation obligations are provided in the 2013 Work Plan. The current approved rehabilitation plan specifies that landscaping, backfilling, and reshaping of the terminal faces where required so that a large portion of the rehabilitated Site will be a landform that is consistent with the surrounding pastoral and agricultural land uses. The remainder of the Site is to be a waterbody within the excavated pit, that will match the surrounding recovered groundwater elevation. The Work plan also outlines landscaping and progressive rehabilitation requirements discussed in **Section 2.1**.

The future use outlined in the current approved Work Plan is for grazing and similar agricultural purposes.

Conditions in the amended planning permit (T140140-1) related to rehabilitation are summarised in **Table 2-6**.

Table 2-6 Planning Permit rehabilitation conditions

Condition Number	Condition
Condition 8	*The operator of the use shall submit to the Responsible Authority every two (2) years or other times agreed to in writing by the Responsible Authority a report prepared by a landscape architect detailing the current rehabilitation situation at that time. The progressive rehabilitation of the site must be undertaken to the satisfaction of the Responsible Authority.*
Condition 49	*The Work Authority holder must revegetate the buffer zones with locally indigenous species and maintain the plantings to ensure their survival.*
Condition 58*	*Any fill material brought onto the premises or used in the rehabilitation of the quarry site must meet the specifications contained in Soil Hazard Categorisation and Management (EPA Publication IWRG621, 2009) or as amended, from time to time.*

**Note: This publication has been superseded by EPA Publication 1828.2*

There are no other rehabilitation commitments to other agencies.

2.6.1 Roles and responsibilities

The roles and responsibilities of the rehabilitation project will be those of the staff that operate existing quarrying operations. The responsibilities are summarised in **Table 2-7**.

Table 2-7 Responsibilities during the rehabilitation phase

Position	Responsibility
Quarry Manager	• Ensure the requirements of the Rehabilitation Plan are fulfilled, including: • Oversight of filling operations. • Review of compliance data.

Position	Responsibility
	• Staff training. • Compliance with operational procedures. • Program initiation and signoff (e.g. weed removal). • Response to Regulatory Stakeholders as required. • Financial responsibility to ensure budgetary resources are available when needed to complete works.
Quarry Supervisor	• Scheduling and managing compliance tasks with staff. • Site inspections and documentation of issues and corrective actions. • Coordination of works. • Procurement of materials/plants as needed. • Fencing of revegetated areas to protect from stock damage. • Compliance reporting.
Technician	• Undertake works as directed by Quarry Manager or Supervisor. • Report areas of degradation if observed.

3. PROPOSED END USE

3.1 END USE OPTIONS

The potential end uses for the Site are evaluated below in **Table 3-1.**

Table 3-1 End use evaluation

Name	Description	Comment
Commercial/ Industrial Use (Employment Use)	Utilisation of the former quarry for industrial/ commercial purposes following completion of quarry activities.	The Site is zoned as green wedge. Commercial/industrial uses would not be suitable and would require a change to the zoning. Additionally, commercial/industrial land use would differ from surrounding land uses.
Agricultural land	Utilisation of the land following completion of quarry activities for agricultural purposes.	Agricultural land uses are permitted under the green wedge zone. Given the proposed rehabilitation layout, grazing would be the most likely use for the Site post rehabilitation. However the area of land available for this use is significantly less than for the previous application, so while this may technically be possible and would also compliment the surrounding land uses, this may be limited under this application.
Residential development	Rural residential farmlets	Residential development of the Site would not be suitable as a large proportion of the Site will be water body. It is also inconsistent with surrounding land uses.
Recreation	Development of ovals and sporting facilities	The Yannathan Recreational Reserve is approximately 2.3km north of the Site. The nearby town of Lang Lang also has sporting facilities and ovals. Given the relatively low population of Yannathan, it is unlikely that additional sporting facilities are needed in the area. Most of the site will be waterbodies so there would be insufficient area for this end use.
Bushland / conservation	Revegetation to create habitat for wildlife	This land use is suitable within the green wedge zone and it is conceivable that redevelopment of a portion of the site as bushland would be appreciated by the local community.
Water supply	Emergency fire fighting water supply	The site would be suitable for this use.
Landfill / waste Management	Return the land to the original landform by infilling with waste	This land use is not suitable for the Site and would contradict the rehabilitation requirements outlined in WA127. Current EPA policy would also preclude development of the site as a landfill, tipping into watertable would not be permitted.

3.2 END USE EVALUATION AND CONCLUSIONS

The best end use for the Site is for conservation with lakes occupying a large portion of the footprint. In addition Melbourne Water requires the waterbodies be fenced, further reducing the area available for agricultural purposes. This is suitable within the green wedge zone and complementary to the surrounding land uses.

The rehabilitated site will contain large waterbodies which can also serve as an emergency water supply for fire fighting when needed.

A rehabilitation concept is provided in **Figure 3-1.** The central, south-eastern and north-eastern area of the Site are to be revegetated. There will also be water bodies across the central and south western sections of the Site, which will be former quarry pits that contain water at the natural groundwater elevation.

Figure 3-1 Rehabilitation concept

3.3 ACHIEVABILITY ASSESSMENT

Progressive rehabilitation works are currently being undertaken on the existing Site as required in the Work Plan. The water bodies are a result of the existing pits from the quarrying process. Batters of the pits will require grading to prevent erosion.

3.3.1 Materials Balance

A material balance was conducted as part of the Slimes Management Plan appended to **Part 1 Summary Report**. Material will be required for:

- Battering of terminal slopes for rehabilitation.
- Construction of two new dam walls in the current East Pit to form an additional cell for filter cake / overize material and an additional water storage dam.
- Capping of cells filled with slimes and filter cake / oversize material.

Material for the above will be obtained from:

- Stripping of overburden material as part of quarry operations.
- Overburden material currently stored in the East Pit.
- Oversize material from primary screens.

A summary of the materials balance estimate is provided in **Table 3-2**. Further details are provided in the Slimes Management Plan appended to **Part 1 Summary Report.**

Table 3-2 Materials Balance Estimate

Material Description	Volume (m^3)	Comments
Material required for Construction:		
Batters and waterway diversion	1,142,080	Allows engineered construction for waterway diversion (60m width) and rehabilitation batters to 1 vertical : 3 horizontal
New dams across East Pit	457,470	Allows 1 additional cell for storage of filter cake / oversize material and 1 additional water storage dam
Capping of slimes / filter cake / oversize material cells	203,325	Allows 1.5m cap as used in previously rehabilitated cells
	1,802,875	**Total construction material required**
Material available:		
Overburden	1,405,331	From stripping to be completed
Stockpiled Overburden	192,000	Currently stockpiled in base of East Pit
Oversize	205,544	Required from production
	1,802,875	**Material to be used in construction**
	492,721	Remaining oversize to be placed in cells with filter cake

Based on the above, there is sufficient material on-site for the proposed rehabilitation work, and no import of additional material will be required. In the unlikely event that additional material is required, the north walls of the two water storage dams will be excavated when the dams are no longer required.

3.4 END USE SUITABILITY

The proposed end use is consistent with Council's vision for this area as well as the existing surrounding land uses. The Site is within the green wedge zone and the proposed end use is suitable under this zoning.

The final landform of the Site, being revegetated with dams, will transform this former quarry area into a valuable asset for the surrounding ecosystem. The end use is also suitable when considering environmental events such as large flood events and bushfire.

3.4.1 Injury and illness

The post-rehabilitation land uses will not have any unacceptable risks that are related to previous quarrying operations.

ERR's rehabilitation guideline outlines potential sources of injury and illness. These are discussed in **Table 3-3.**

Table 3-3 Potential sources of injury or illness

Source of injury/illness	Comment
Falls from uneven ground	Site will be backfilled to a gentle slope so falls from uneven ground will not occur in these areas. The general public will not be able to access the majority of the Site (only the far north western corner where a plaque/ information board is to be

Source of injury/illness	Comment
	established where members of the public can visit to learn about the indigenous history of the area).
Crushing from rock falls	The site is a sand quarry and will be shaped to prevent any erosion or subsidence.
Injury from dangerous infrastructure	New infrastructure is not required post-rehabilitation of the Site. Redundant quarrying equipment will be removed after the operational phase. Rehabilitation is progressive, so only minor works will need to be completed after the operational phase ends.
Injury following unauthorised access to restricted area	The site will be fenced to prevent inadvertent access by the public. The surface of the former quarry land other than waterbodies will be returned to elevations and gradients close to those prior to quarry development. The gradients will be shallow for the filled land so there will be no steep drops which might pose a risk following unauthorised access.
Drowning in unsafe waterways	The water body at the rehabilitated Site will not be accessible to the public and will not be used for recreational activities. Drowning is not considered a risk.
Chemical contamination of surface or ground water	Fuels and chemicals are not anticipated to be used or stored on-Site post rehabilitation. However, in the event that they are stored on-Site, it will be within accordance of regulatory requirements.
Acid generating waste rock and associated drainage	The quarry is sand and the areas is considered to have low potential for acid sulphate soils.
Contaminated food/farming areas	The proposed end use is deemed unlikely to impact adjacent food/farming areas.
Ingestion/inhalation of contaminants in soil, water or air	It is not anticipated there will be a need to import fill material for the proposed site works. It is envisaged that the end use proposed for the existing quarry site will not produce emissions to soil, water or air environment.
Contaminated dust from waste rock, or asbestos in buildings	All existing structures will be removed from Site during rehabilitation. Replaced overburden will be vegetated to minimise dust hazards.

There are therefore no unacceptable risks for the proposed future land use arising from the former use of the Site as a quarry.

3.4.2 Structurally, geotechnically and hydrogeologically sound

The final end use is required to be safe, stable and sustainable.

Structural *– relates to any built structure that is proposed to remain on site after surrender of the work authority. Earth Resources Regulation will have regard to the relevant engineering and construction requirements and standards.*[4]

Following operations, the processing plant, Site office and weighbridge will be removed. No buildings are anticipated to be remaining at the Site post-rehabilitation.

Geotechnical *– the geotechnical characteristics of the site that will influence the stability of the rehabilitated land, including the slope of designed (e.g. waste rock areas, dams and voids) and natural site aspects (e.g. original slope of the land, weathering characteristics and other geological features).*

[4] Guidelines for Open Pit Slope Design, Read & Stacey p.69.

Batters will be rehabilitated and revegetated to stabilise during the rehabilitation process. The Geotechnical Assessment contained in the Summary Report has modelled the operational and rehabilitation landforms and demonstrates their stability.

Hydrogeological *– groundwater pressure aspects of a site and how this interacts with surface water and ground stability. Erosional stability in the long term also need to be assessed and demonstrated, especially for slopes which consists of problematic soils (e.g dispersive, reactive, swelling/shrinking clays).*

A groundwater model was prepared as part of the hydrogeological assessment of the site (refer to the Summary Report). Dry quarrying was modelled as a "worst hydrogeological case" scenario. The modelling confirmed that there would be no unacceptable impacts on neighbouring groundwater users and that groundwater levels would recover quickly at the completion of quarrying. The water in the dams will be hydraulically connected to the surrounding groundwater system, there will be no water level impacts on surrounding groundwater users post-rehabilitation.

Hanson has since elected to operate the deeper stages of the quarry as a wet operation utilising a dredge, which will mean far lesser drawdowns. If the operation would have been safe and stable with greater drawdown then it will also be safe and stable hydrogeologically for the post rehabilitation landform.

It is proposed to divert the existing surface water drainage line to the north so that sand on the current alignment can be extracted. The design has been developed in consultation with Melbourne Water and has considered the geotechnical requirements of the diversion (refer to the Geotechnical and Surface Water reports contained in the Summary Report).

3.4.3 Non-polluting

Potential contaminating activities through the rehabilitation phase will be managed in accordance with the *Environment Protection Act* (2017).

No potentially polluting activities are anticipated to take place at the Site post-rehabilitation.

3.4.4 Principles of sustainable development

Table 3-4 presents an evaluation against the principles of sustainable development set out in the MRSD Act:

Table 3-4 Principles of sustainable development

Principle	Comment
Community wellbeing and welfare should be enhanced by following a path of economic development that safeguards the welfare of future generations	The proposed end use is consistent with surrounding land use. While not contributing directly to economic use of the land, and whilst the community will not be able to access the land, the proposed post-rehabilitation land use will provide an area which preserves biodiversity and conservation which will provide an overall community benefit.
There should be equity with and between generations	The proposed future land use is sustainable and will be suitable for future generations.
Biological diversity should be protected and ecological integrity maintained	The vegetation of rehabilitated areas at the Site will allow for the protection of biological diversity, through the planting of indigenous species.
There should be recognition of the need to develop a strong, growing, diversified and international competitive economy that can enhance the capacity for environment protection	The rehabilitation of the Site to conditions that generally reflect the surrounding area reflects the capacity for environmental protection post-quarrying activities.
Measures to be adopted should be cost effective and flexible, not disproportionate to the issues being addressed, including improved valuation, pricing and incentive mechanisms	The quarrying activities will form the dam proposed in the conceptual rehabilitation plan and will not add additional significant rehabilitation costs. Progressive

Principle	Comment
	rehabilitation decreases the quantum of rehabilitation works required at the completion of quarrying.
Both long and short term economic, environmental, social and equity considerations should be effectively integrated into decision-making	This is a broad principle which ultimately comes down to the decision-maker. Hanson Construction Materials has demonstrated their resolve to include environmental and social equity in the economic process through their commitment to community engagement and a proactive environmental approach.
If there are treats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation and decision-making should be guided by: • A careful evaluation to avoid serious or irreversible damage to the environment wherever practicable; and • An assessment of the risk-weighted consequences of various options	The monitoring program is targeted to identify potential environmental risks and their impacts. This demonstrates Hanson's commitment to identifying and managing potential environmental impacts.
Development should make a positive contribution to regional development and respect the aspirations of the community an of Indigenous peoples	Sand from quarrying operations is used in construction in both urban and rural areas. The Site is within the green wedge zone and the proposed use is suitable within this zoning. Special management controls are required where indigenous artifacts have been identified. A plaque and/or information board are proposed for the north western corner of the site near the intersection of Milners Road and Westernport Road (subject to BLCAC approval).
Decisions and actions should provide for the community involvement in issues that affect them	Hanson maintain a community database where all communications with the community are recorded. Each entry is reviewed and responded to if needed.

4. REHABILITATION PLANNING

4.1 REHABILITATION RISKS

The Rehabilitation Guidelines identify the following common post-rehabilitation risks. The risks related to the proposed rehabilitation landform include the following:

- Soil erosion and sediment loss.
  - Erosion and sediment loss is at greatest risk in the batters. Rehabilitation and stabilisation of the pit batters will require gradually grading to the surrounding surface level. Establishment of vegetation on the batters will increase the stability and reduce the risk of erosion and sediment loss. Once batters are graded and vegetation is established, soil erosion and sediment loss are no longer a risk.
- Weed infestations prevent land use as intended.
  - Vegetation establishment is at greatest risk in compacted areas of the Site, such as the operational plant area. Uptake of revegetation may require minor landscaping in these areas.

The land is owned by Hanson so responsibility to manage these risks will reside with Hanson once the site closes.

4.2 SITE PLANNING

The progressive staging of the rehabilitation enhances the environmental outcomes by minimising the area exposed and ensuring longer vegetation establishment times during the operational stage of the quarry life. Staging also safeguards against the failure of the operator to fulfil their legal obligations. As a result, much of the rehabilitation work is conducted progressively, producing established and mature vegetation prior to the completion of extractive activities at the Site.

This staged approach to rehabilitation has multiple environmental benefits including:

- Minimisation of the unvegetated disturbed area of ground, reducing emissions of nuisance dust and erosion and improving visual amenity.
- Allowing vegetation to become established and reach maturity relatively early in the quarry life cycle.
- Reducing the risk of rehabilitation failure and allowing monitoring and rectification of rehabilitated areas (if necessary).
- Guaranteeing the continuous retraction of the extractive limits over the quarries working life.

At the end of extraction the dominant feature of the Site will be pit lakes that will occupy at least half of the area. There will also be a waterway along the eastern and northern boundaries of the Site. The filtercake storage pits will be in varying stages of rehabilitation. Perimeter vegetation which is already well established will still remain. The conservation area in the northeast will have enhanced vegetation compared to its current state. The perimeter of the pit lake abutting the boundary/drainage line and the north and west sides of the filtercake/slimes storage areas will already have the clay buttress in place.

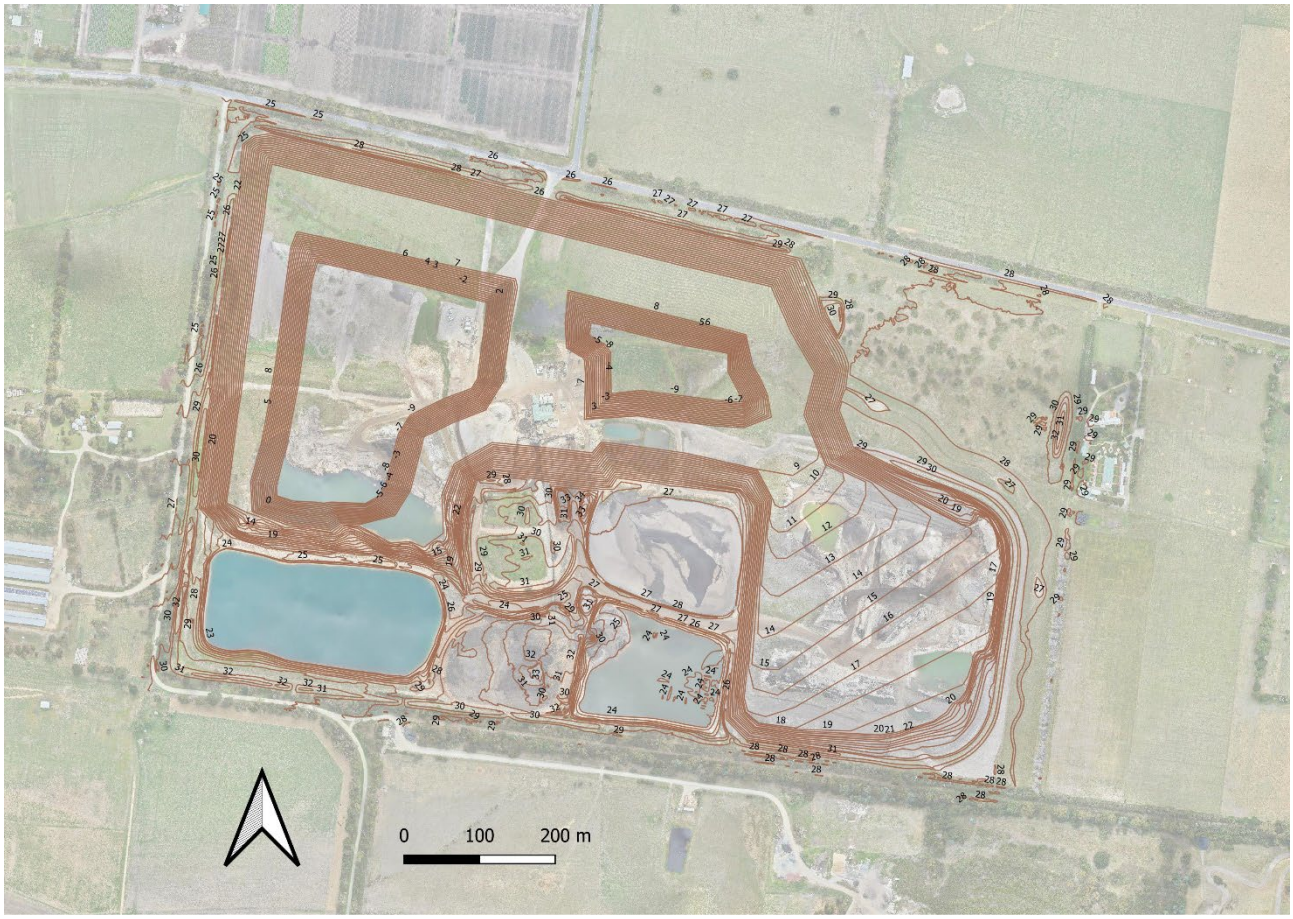
At the commencement of the Rehabilitation Stage overburden clays will have been stored on the filled pits along the southern boundary of the site for construction of the buttress along the northern boundary of the filtercake/slimes storage area, this will be the final area requiring earthworks and will be the only earthworks required to be undertaken during the Rehabilitation stage.

4.3 LANDFORM

The terminal landform is the profile at the completion of the operational stage, the final landform is the rehabilitated landform. Progressive rehabilitation is proposed and is necessary in some parts of the site to facilitate later operational stages. Specifically, the drainage line cannot be relocated until sand from the northernmost areas have been quarried and the northern face rehabilitated so that the new drainage line can be constructed on the filled land.

Figure 4-1 presents the terminal landform. Since rehabilitation works are conducted progressively this does not reflect the landform at any point in time since some parts will have been quarried and rehabilitated, while others are partially extracted, and others again that have not yet been extracted.

Figure 4-1 Terminal landform

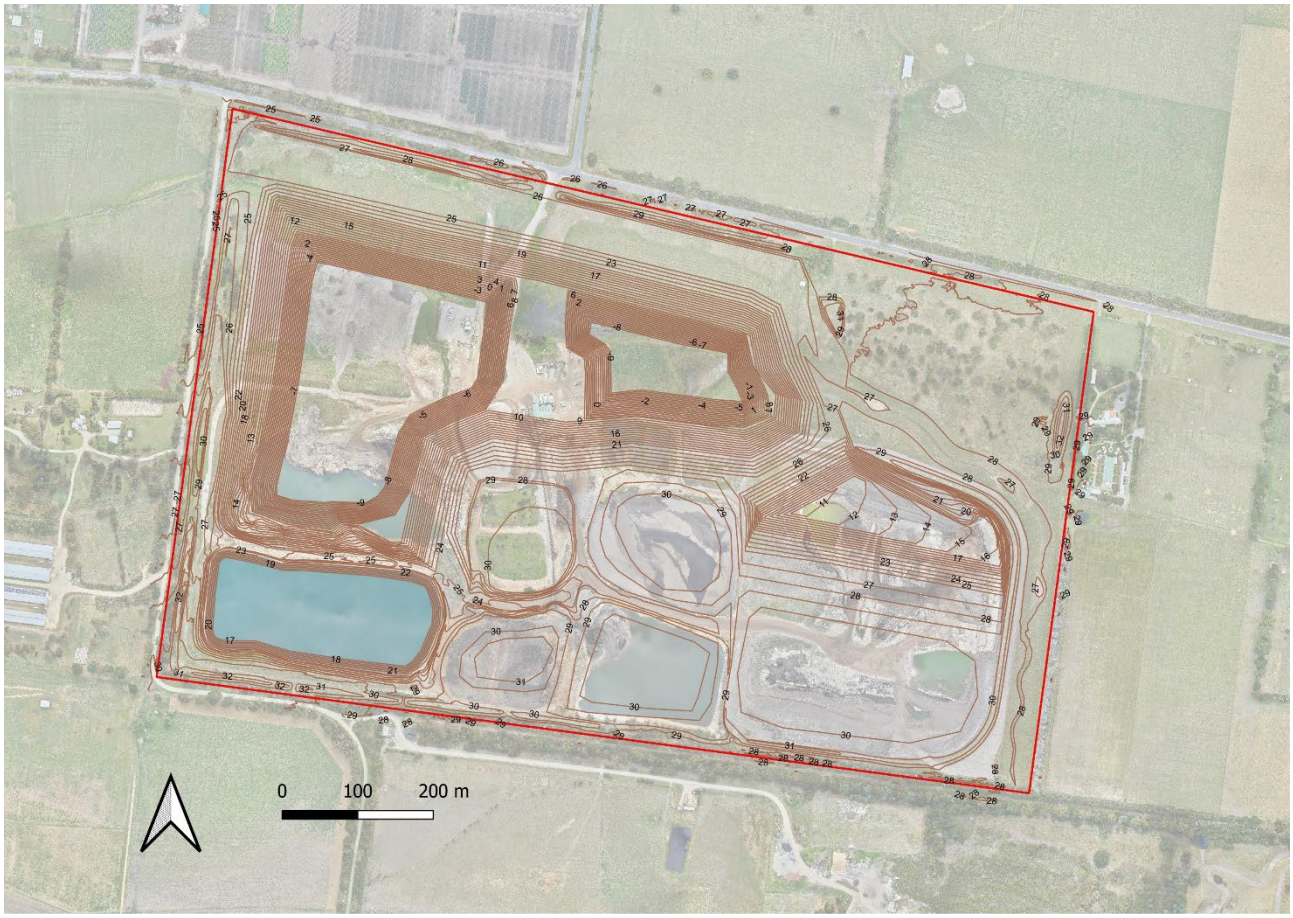


The proposed future site layout is contained in **Figure 3-1**.

The rehabilitated landform is shown in plan view in **Figure 4-2**. A series of cross sections are contained in the Summary Report.

Based on historic water level records and the groundwater model contained in the hydrogeological assessment it is expected that the recovered water level will recover to approximately 24 mAHD.

Figure 4-2 Rehabilitated landform



The following site constraints were considered in the development of a rehabilitation concept:

- Future drainage requirements.
- Final land use (conservation).
- Neighbouring land uses (agriculture).
- Work Authority and extraction boundaries.
- Planning overlays (Significant Landscape Overlay).

4.4 DOMAIN DEFINITION

Through the future operational stage excavation will occur on the east and west sides moving in a generally northerly direction. The sand resource differs in each pit so in order to produce the full range of products it is necessary to be able to blend sands from both pits. During this period the sand will continue to be processed at the existing sand plant.

The final extraction stage will involve removal of processing and administrative infrastructure so that sand extraction can be undertaken in the administration, processing and sales areas. Sand will be extracted then trucked to an offsite facility for processing.

Domain is the term for the grouping of operational features of the site. The following domains are relevant to this site:

- Administration – comprising carpark, offices and weighbridge
- Processing and sales – including the processing plant, sales area, fines management systems and workshop
- Extraction areas
- Storage dams

- Conservation areas (including waterway)
- Cultural heritage area
- Roads

Figure 4-3 Rehabilitation domains

5. TASK IDENTIFICATION

5.1 WHOLE OF SITE REHABILITATION OBJECTIVE

The whole of site objective is to:

> *Rehabilitate the quarry site to meet the future needs of the local community. Specifically this includes creating a conservation area to support environmental, cultural and social community values.*

The Rehabilitation Concept is presented in **Figure 3-1.** The land in the Site will be rehabilitated for conservation to provide habitat for native flora and fauna.

5.2 TIMING

It is proposed to rehabilitate the site progressively, and this has already commenced in the area immediately south of the processing plant. Major landforming activities (such as the placement of clay against pit batters) will be undertaken during the operational stages to manage water inflows to the pit. As such there will only be a small area that will require earthworks at the completion of extraction.

Fill material will be stockpiled on the southernmost filtercake storage dams during the final stage of extraction for future use to construct the final batter on the northern edge of the Storage Dams Domain. This will also have a beneficial effect on the southernmost filtercake storage dams by providing a load that will accelerate the stabilisation so that the areas can be more promptly capped and revegetated.

Rehabilitation has already commenced and will continue through future extraction. The completion of works depends in part on the timing of completion of extraction which is also dependent on external factors such as market demand. It is therefore not possible to provide a strict “closure calendar”.

An approximate timeline is shown below.

Table 5-1 Indicative timeline

Item	Indicative timing
Final landform for northern face of storage area	18 months following cessation of extraction
Establishing vegetation to minimise erosion of waterbody banks	6 months following completion of earthworks
Capping and revegetation of south-eastern pit and slimes dam	3 years following cessation of extraction
Completion cap shaping and revegetation of unvegetated areas	4 years after cessation of extraction
Ripping and revegetation of disused roads	4 years after cessation of extraction
Post rehabilitation monitoring and management	Undertaken throughout operational, rehabilitation and post-closure periods

5.3 DOMAIN A – WATERBODY / PIT LAKE

5.3.1 Description

5.3.1.1 Administration

The administration buildings and infrastructure are located on un-extracted land. The final phase of quarrying involves extracting this sand and transporting it offsite for processing. Hanson have other sites nearby and the administrative functions will be undertaken from one of these sites so that these areas can be extracted.

The administration buildings and associated infrastructure will have been removed before the end of extraction, during the Operational stage. At the end of extraction the areas currently occupied by administration buildings

and infrastructure will be part of the large pit lake. Therefore there are no actions that will be required for this area during the Rehabilitation stage.

5.3.1.2 Processing and sales

Similarly, the stockpiles, processing equipment, fines treatment infrastructure and workshop will all have been removed prior to the final stage of extraction. No rehabilitation actions will be required for this domain either.

5.3.1.3 Extraction Areas

At the completion of quarrying the pit lake will already be formed. The key action associated with the rehabilitation of the pit lake will be to shore up the erosion protection measures around the perimeter of the pit lake and to provide additional plantings for landscaping.

The current location of the above operational activities in relation to the domain extent is shown in **Figure 5-1.**

The landform beneath the waterline is the final landform as shown in **Figure 4-2**.

Figure 5-1 Domain A Waterbody / Pit lake

5.3.2 Hydrogeological and geotechnical stability

At the completion of extraction the water levels in the pit lake will be similar to background groundwater levels. it is expected that the recovered water level will recover to approximately 24 mAHD. This is based on the hydrogeological investigations documented in the Hydrogeological Assessment contained as an appendix to **Part 1 Summary Report**. The Terminal Landform dictates the major features of the rehabilitated landform. The Terminal landform was based on the findings of the Geotechnical assessment also contained as an Appendix to **Part 1 Summary Report**, which in turn was informed by the Hydrogeological Assessment. The terminal and rehabilitated landforms are presented in **Section 4.3**.

Having been extracted the administration and processing and sales areas will be fully submerged and will therefore not pose a hydrogeological or geotechnical risk to the final landform.

While the clay liners for the ponds will provide some retardation the groundwater modelling indicates that water levels will have returned to natural levels within a few years (Groundwater Solutions 2021).

The clay lined batters (constructed during operational stages) provide the necessary protection to the pit walls from wave action on the pit lake. This will be reinforced by vegetating the clay batters to provide additional stability to the clay as well as landscaping benefits.

Once rehabilitated seasonal water level fluctuations in the pit lake will be governed by irrigation extractions on neighbouring properties which will be moderated to a degree by counterbalancing inflows from the Lang Lang River to the north. Historic seasonal variability shows a maximum magnitude of 2m from winter to summer, but is mostly less than 1m. Given the WSPA is fully allocated this is unlike to change significantly.

5.3.3 Domain objectives criteria and monitoring

Table 5-2 Domain A Objectives criteria and monitoring

Area	Objective	Criteria	Monitoring
Vegetation	To provide erosion protection for banks of waterbody	Vegetation established for 90% of the bank area	Refer to Section 6 of **Part 3 Risk Assessment**
Waterbody	To create a waterbody with stable banks	Fewer than 10 areas where erosion of banks is greater than 100mm deep and/or wide	Refer to Section 6 of **Part 3 Risk Assessment**

5.3.4 Tasks, milestones and timing

At the completion of extraction the following rehabilitation tasks will be needed:

Table 5-3 Domain A Tasks, Milestones and Timing

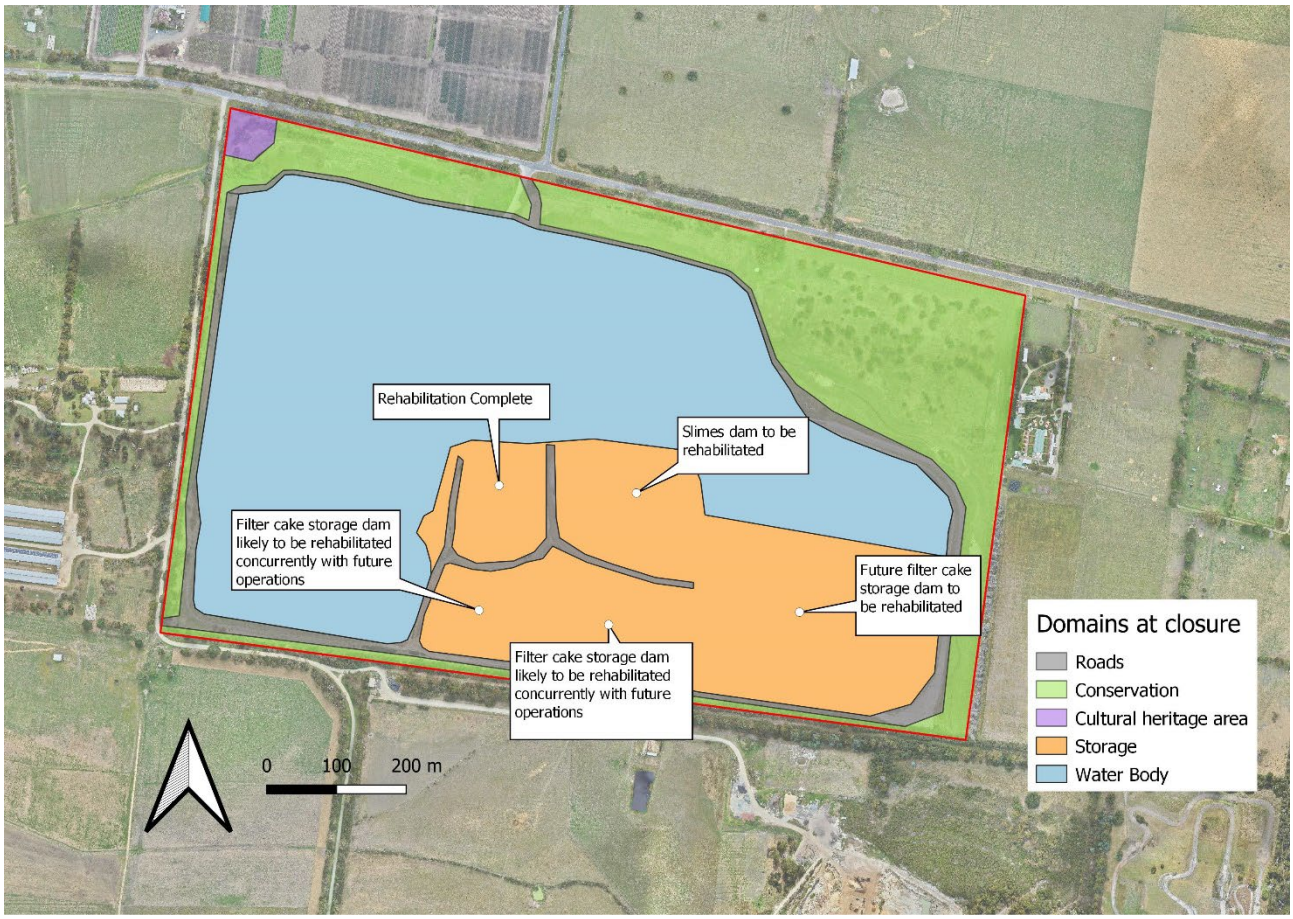
Task	Milestone	Timing
Earthworks - Buttress materials from stockpiles placed on the southern filtercake storage dams to be placed and compacted on the northern face of the storage area domains in the immediate vicinity of the current processing plant (which will have been removed previously)	Completion of this task is defined as the completion of earthworks	To be completed within 18 months following cessation of extraction
Revegetation – establishment of vegetation over banks	Completion of this task is defined as completion of the planting stage in this area.	To be completed within six months of the completion of earthworks
Post rehabilitation monitoring and management	Will continue from the completion of revegetation of this area through the aftercare period. Vegetation: 80% established Erosion: more than 10 erosion channels greater than 100mm deep and/or wide Monitoring requirements are contained in Part 3 Risk Assessment	To be discontinued 10 years post closure

5.4 DOMAIN B - STORAGE DAMS

5.4.1 Description

There are five storage dams adjacent to one another south and southeast of the current processing plant. These are in varying degrees of rehabilitation, it is envisaged that by the time the operational stage concludes that progressive rehabilitation will be complete for at least three of these. Rehabilitation comprises capping and revegetation as has been done on the dam where rehabilitation is already complete.

Figure 5-2 Domain B Storage dams



5.4.2 Domain objectives criteria and monitoring

Table 5-4 Domain B Objectives criteria and monitoring

Area	Objective	Criteria	Monitoring
Storage area surfaces	To create an area of native vegetation that will be a refuge for native wildlife	Area capped and stabilised for light vehicle access. Vegetation established	Refer to Section 6 of **Part 3 Risk Assessment**

5.4.3 Tasks, milestones and timing

At the completion of extraction the following rehabilitation tasks will be needed:

Table 5-5 Domain B Tasks, milestones and timing

Task	Milestone	Timing
Capping and revegetation of south-eastern pit and slimes dam	Completion to be defined as the completion of revegetation in this area	To be completed within three years of the completion of extraction.
Completion cap shaping and revegetation of unvegetated areas	Completion to be defined as the completion of revegetation in this area	To be completed within four years of the completion of extraction.
Post rehabilitation monitoring and management	Will continue from the completion of revegetation of this domain through the aftercare period. Vegetation: 80% established Erosion: more than 10 erosion channels greater than 100mm deep and/or wide Monitoring requirements are contained in Part 3 Risk Assessment	To be discontinued 10 years post closure

5.5 DOMAIN C - CONSERVATION AREAS

5.5.1 Description

The site is fully fenced with a stockproof fence that is consistent with fencing on surrounding properties. Gates are located at the front entrance and in the south west corner of the site which will remain. Perimeter vegetation is already established around the whole site. The new waterway will be constructed concurrently with extraction and will be completed well before the end of the extraction stage.

Figure 5-3 Domain C Conservation areas

5.5.2 Domain objectives criteria and monitoring

Table 5-6 Domain C Objectives criteria and monitoring

Area	Objective	Criteria	Monitoring
Vegetated areas	To provide screening and buffer area for operations and post rehabilitation to minimise visual amenity impacts for the local community To provide visual and auditory screening for neighbours	Vegetation established Bunds constructed and vegetated	Refer to Section 6 of **Part 3 Risk Assessment**
Drainage	Construction of a waterway in accordance with Melbourne Water requirements	Drainage line constructed	Refer to Section 6 of **Part 3 Risk Assessment**

5.5.3 Tasks, milestones and timing

Part of this area has already been rehabilitated. Bunds, fencing and vegetation within this area will remain in their current state. Therefore, the works that are required include the following.

Table 5-7 Domain C Tasks, Milestones and Timing

Task	Milestone	Timing
Replanting of screening vegetation on perimeter	Ongoing as needed	To be discontinued 10 years post closure
Enhancing vegetation plantings in the north east conservation area	Ongoing as needed	To be discontinued 10 years post closure
Post rehabilitation monitoring and management	Will continue from the completion of revegetation of this domain through the aftercare period.. Vegetation: 80% established Erosion: more than 10 erosion channels greater than 100mm deep and/or wide Monitoring requirements are contained in Part 3 Risk Assessment	To be discontinued 10 years post closure

5.6 DOMAIN D CULTURAL HERITAGE AREA

5.6.1 Description

A Cultural Heritage Area is proposed to the north west of the site for reburial of artefacts currently buried to the east of the processing area, and any other artefacts identified in future operations. A CHMP has been agreed with the BLCAC, however at BLCAC's request this provision was excluded, and will be the subject of future discussions. Development of this area is required prior to excavation of the current burial area and will have been completed prior to completion of site operations, including additional plantings will be made to enhance the regenerating vegetation. No rehabilitation actions will be required for this domain.

Figure 5-4 Domain D Cultural Heritage Area

5.6.2 Domain objectives criteria and monitoring

Table 5-8 Domain C Objectives criteria and monitoring

Area	Objective	Criteria	Monitoring
Cultural heritage area	To provide an area for the community to appreciate the indigenous history of the area	Maintain plantings, ensure grass is mowed	Refer to Section 6 of **Part 3 Risk Assessment**

5.7 DOMAIN E ROADS

5.7.1 Description

The roadways required for the post closure period is shown below. Most of the existing roads are within the area which will form the pit lake so no works will be required on these. Some roads serving the final extraction will be located through the former storage areas south of the plant and around the future pit lake.

Figure 5-5 Domain E Roads

5.7.2 Domain objectives criteria and monitoring

Table 5-9 Domain E Objectives criteria and monitoring

Area	Objective	Criteria	Monitoring
Roadways	To provide access for monitoring and management of the site	Access tracks constructed	Refer to Section 6 of **Part 3 Risk Assessment**

5.7.3 Tasks, milestones and timing

At the completion of extraction the following rehabilitation tasks will be needed:

Table 5-10 Domain E Tasks, milestones and timing

Task	Milestone	Timing
Ripping of roadway surface for roads no longer required	Completion of this task is defined as the completion of earthworks	To be completed four years after cessation of extraction
Revegetation	Completion to be defined as the completion of plantings in this domain	To be completed four years after cessation of extraction

Task	Milestone	Timing
Monitoring and maintenance	Will continue from the completion of revegetation of this domain through the aftercare period Vegetation: 80% established Erosion: more than 10 erosion channels greater than 100mm deep and/or wide Monitoring requirements are contained in Part 3 Risk Assessment	To be discontinued 10 years post closure

5.8 AFTERCARE MONITORING

The aftercare period is 10 years. The frequency of monitoring will decrease progressively through this period provided no issue arise that cannot be managed by routine maintenance. Monitoring locations are shown in **Figure 5-6**. Monitoring details are reproduced from Section 6 of **Part 3 Risk Assessment.**

Figure 5-6 Aftercare monitoring locations

5.8.1 Site inspections

The following aspects will be noted during site inspections:

- Geotechnical stability
  - Water level in pit lake
  - Banks of waterbody
    - Erosion
    - Tension cracking at or within a short distance (15m) of the waters edge
  - Drainage line – erosion, subsidence

- Dust
  - areas of poor/no vegetation regrowth
  - responses to complaints and incident reports
- Surface drainage
  - Sediment traps.
  - Areas of erosion (width, depth and location)
  - Water diversion drains.
  - Receiving waterways; and
  - Records of maintenance works.
- Visual impact:
  - Vegetation in perimeter buffer areas;
  - Height of grass in cultural heritage area
- Pests
  - Security of perimeter fencing.
  - Evidence of new burrows;
  - Check site and surrounding properties for weed infestations.
- Vegetation
  - Percentage of area established
  - Areas requiring further plantings

5.8.2 Periodic monitoring

5.8.2.1 Groundwater

LL16 will be destroyed during the final stages of extraction, however the remainder of the monitoring network will continue to be monitored through to the aftercare period.

Water level monitoring will reduce to quarterly for the first five years of the aftercare period and then annually for the remaining five years. Sampling and analysis will be undertaken biennially (every two years). The parameter list remains as for the operational and rehabilitation periods.

5.8.2.2 Surface water

Sampling from the Upstream and Downstream locations will be undertaken biennially (every 2 years) through the aftercare period. The parameter list remains as for the operational and rehabilitation periods.

5.8.2.3 Dust

Real time dust monitoring will be discontinued. Dust deposition monitoring will continue at the dust deposition gauges for the first five years of the aftercare period. Land use change in surrounding areas will be noted.

6. POST REHABILITATION RISK ASSESSMENT

A post rehabilitation risk assessment was completed to evaluate the relevant risks for the Site for the proposed end use.

The risk register is provided in **Appendix A**.

6.1 HAZARD IDENTIFICATION

The potential hazards of the Site operation during the post- rehabilitation phases are summarised in **Table 6-1**.

Table 6-1 Hazard identification

Activity	Hazard	Risk Type	Receptor	Risk Event	Risk Event ID
Site maintenance	Weeds	Chemical usage	Surface water	Chemical usage impacting surface waters during operations post closure phase	G09C
Site maintenance	Weeds	Chemical usage	Land	Chemical usage impacting land during operations during post-closure phase	G10C
Site maintenance	Rabbits and foxes	Burrows	Land	Burrows impacting land from rabbits and foxes during post-closure phase	G05C
Site maintenance	Foxes, cats and dogs	Predation	Native fauna	Predation of native fauna by foxes, cats and dogs during post closure phase	G06C
Site maintenance	Weeds	Weed Infestations	Neighbour's property	Weed infestations impacting neighbour's property during operations during post closure phase	G07C
Site maintenance	Weeds	Weed Infestations	Native flora	Weed infestations impacting native flora during operations during post-closure phase	G08C
Abnormal events	Security breach	Unauthorised access	Public safety	Deep waterbodies posing drowning risk for trespassers during post-closure phase	G43C
Bare areas	Sediment	Sediment	Surface Water	Sediment impacting surface waters from roadways and stockpiles during post-closure phase	S05C
Landform	Erosion	Slope failure of batters	Adjacent property, roads	Tunnel/piping erosion leading to slope and crest collapse degrading the slope condition	S71C

Activity	Hazard	Risk Type	Receptor	Risk Event	Risk Event ID
Landform	Settlement/ subsidence	Geotechnical instability	Adjacent property, roads	Settlement/subsidence due to excessive water table depression after buttress placement	S63C

6.2 RISK ASSESSMENT FRAMEWORK

Risk assessment involves determining the likelihood of a risk occurring and the consequence if the event occurs and is conducted in accordance with ERR's risk assessment framework in the Workplan guidelines (ERR 2020).

Risk is based on an assessment of Likelihood and consequence in accordance with the following risk assessment matrix.

Table 6-2 Risk Assessment Matrix

Almost Certain	Medium	High	Very High	Very High	Very High
Likely	Medium	Medium	High	Very High	Very High
Possible	Low	Medium	Medium	High	Very High
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Medium	Medium	High
	Insignificant	**Minor**	**Moderate**	**Major**	**Critical**

Table 6-3 Risk ranking explanations

Rating	Description
Critical	Hazard has critical impact, in terms of severity and/ or duration. Treatment or remediation effort is required, although some effects may be irreversible. Remediation of environmental contamination would require significant private and public resources. Hazard event would be the subject of widespread community outrage.
Major	Hazard has major impact, in terms of severity, duration and/ or frequency of occurrence. Treatment or remediation effort is required. Some effects may be irreversible. Remediation of environmental contamination would require significant private and public resources. Hazard event would be the subject of widespread community concern.
Moderate	Hazard has moderate, noticeable impact, in terms of severity, duration and/ or frequency of occurrence. Moderate treatment or remediation effort may be required. Hazard event would be the subject of limited community concern.
Minor	Hazard is perceived but has minor and typically temporary effects. Some remediation may be required.
Insignificant	Impacts are barely recognised and/or quickly recovered from. No specific remediation required.

The qualitative measures of likelihood for risk management is provided in **Table 6-4**.

Table 6-4 Qualitative measures of likelihood

Rating	Description	Probability of event occurring
Almost certain	The risk is expected to occur in most circumstances	90-100%
Likely	The risk event will probably occur in most circumstances	79-90%
Possible	The risk event might occur at some time	30-70%
Unlikely	The risk event could occur at some time	5-30%
Rare	Highly unlikely, but the risk event may occur in exceptional circumstances	0-5%

The qualitative measure of consequence for risk management is provided in with ERR's risk assessment framework in the Workplan guidelines (ERR 2020) and is shown below in **Table 6-5.**

Table 6-5 Qualitative measures of consequence

	Consequence	Critical	Major	Moderate	Minor	Insignificant
Consequence for " any member of the public" – public health, safety, amenity, and Aboriginal heritage	**Public health and safety** Fatalities, injuries, or illnesses due to exposure to a hazard.	Fatalities, life-threatening injuries or illnesses or injuries resulting in permanent disablement. Public exposed to a severely debilitating chronic health impact or life-threatening hazard.	Injuries or illness requiring surgery or resulting in long-term disablement. Public exposed to a hazard that results in hospitalisation for treatment from injury or illness.	Injuries or illness requiring treatment by a physician or hospitalisation. Public exposed to a hazard that results in injuries or health effects requiring treatment by a physician.	Injuries or illness requiring first aid treatment. Public exposed to a hazard that could cause injuries or adverse health effects requiring first aid treatment.	Injury or ailment that does not require medical or first aid treatment.
	Public amenity Community or multiple individuals experience loss of amenity from dust, odour, fumes, noise, or other similar hazards.	Continuously experience significant losses of amenity over periods of weeks or longer.	Regularly experience (weekly-monthly basis) significant losses of amenity for multiple days on end.	Regularly experience (weekly-monthly basis) significant loss of amenity.	Infrequently experience (no more than monthly) a small effect on the amenity.	Infrequently experience (no more than monthly) a marginal reduction in the amenity.
	Aboriginal heritage Destruction of places and/or associated cultural values with Aboriginal cultural heritage.	Destruction of place(s) and/or associated cultural values of exceptional value. A place identified by Aboriginal Victoria and/or cultural values identified by Traditional Owners of exceptional value that the destruction would be catastrophic.	Destruction of a rare occurrence place(s) and/or associated cultural values. A place with a large number and diverse range of cultural materials. A place with stratified deposits and/or surface spatial patterning that reflects the way in which the cultural materials were deposited.	Destruction of a common occurrence place(s) and/or associated cultural values. A place with a limited range of cultural heritage materials and a place in fair to good condition with some degree of disturbance evident.	Destruction of a place(s) and/or associated cultural values in a deteriorated condition with a high degree of disturbance evident and some cultural heritage remaining.	No impact on Aboriginal cultural heritage sites.
	Heritage Damage works or disruption to a place, object or historical archaeological site listed on the Commonwealth National Heritage List, Victorian Heritage Register, Victorian Heritage Inventory, or local Heritage Overlay.	Irreversible damage, or destruction.	Damage and removal, or relocation or removal of associated elements.	Works to features that will not alter the cultural heritage significance.	Isolated damage to regionally or locally significant features that is readily rectified.	
Consequences for " land, property and infrastructure " *beyond the boundary of the licence or work authority area*	**Land and land uses** Loss of production from primary production land or loss of annual-seasonal primary production. Environmental damage to National Park, other conservation reserve or other public land.	Permanent loss of production from primary production land >10 ha. Loss of annual-seasonal primary production from >100 ha of land. Irreversible or long-term environmental damage (with rehabilitation taking years or longer) to >1 ha of National Park or other conservation reserve.	Permanent loss of production from primary production land <10 ha. Loss of annual-seasonal primary production from 10-100 ha of land. Irreversible or long-term environmental damage to <1 ha of National Park or other conservation reserve or to ≥10 ha of other public land. Reversible damage to ≥1 ha of National Park or other conservation reserve or to ≥10 ha of other public land.	Loss of annual-seasonal primary production from <10 ha of land. Short-term (days-weeks). Disruption to 10-100 ha of primary production land. Reversible damage to <1 ha of National Park or other conservation reserve or to <10 ha of other public land.	Minor damage to agricultural land or public land not requiring active rehabilitation. Temporary and small-scale disruption to agricultural production (days, 1-10 ha)	Total damage to private or public property or infrastructure <$1k. .
	Public and private property Damage to private or public property or infrastructure or loss of income	Total damage >$10 million. Total loss of value of private property equivalent to >$10 million.	Total damage $1-10 million. Total loss of value of private property equivalent to $1-10 million.	Total damage $50k-$1 million. Total loss of value of private property equivalent to $50k-$1 million.	Total damage $1-50k. Total loss of value of private property equivalent to $1-50k.	Total damage <$1k. Total loss of value of private property equivalent to <$1k.
	Services provided by infrastructure Negative impact to important community services (e.g., transport, energy, health, telecommunications, education, water)	Services suspended or significantly disrupted for extended period (weeks or longer).	Services suspended or significantly disrupted for days or experiencing minor disruptions for long periods (weeks or longer).	Services suspended or significantly disrupted for up to 1 day or experiencing minor disruptions for weeks.	Services suspended or significantly disrupted for short period (hours).	Services maintained but experiencing minor disruptions or delays.
Consequences for " the environment" – air, water, soil, vegetation, flora, and fauna species *other than for planned and approved disturbances*	**Environmental contamination event** Environmental contamination event (of air, soil-land and/or water)	A State-level incident response is required. Incident response, clean-up and rehabilitation expected to run for years and/or cost ≥$10 million.	A regional emergency management incident response required. Clean-up and rehabilitation expected to run for months and/or cost $1-10 million.	Clean-up and rehabilitation expected to run for weeks and cost $10k-$1 million.	Clean-up and rehabilitation may be required but can be completed within days.	Hazard event with minimal environmental impact and no noticeable effect beyond the immediate occurrence or expression of the hazard.
	Native vegetation, flora species or fauna species Environmental contamination event or other form of environmental damage that impacts native vegetation, flora, or fauna species	Damage leading to bioregional, State, or national extinction of listed threatened species of native flora or fauna or vegetation community. Irreversible or long-term (years) damage or environment harm to ≥10 ha of native vegetation (not listed threatened vegetation community) or to ≥1 ha listed threatened native vegetation community.	Damage leading to local extinction of listed threatened species of native flora or fauna or vegetation community. Deaths of up to ~100 listed threatened flora or fauna species or native mammals. Major damage or environment harm to 1-10 ha of native vegetation (not listed threatened vegetation community) or to	Damage leading to deaths of a small number of listed threatened flora or fauna species or native mammals. Reversible damage or environmental harm to <10 ha of non-listed native vegetation community or <1 ha of listed native vegetation community.	Damage to <1 ha of native vegetation (not listed threatened vegetation community) that can be recovered in weeks to months. Damage that affects native fauna populations but does not kill individuals or disrupt breeding or other important ecological processes.	Hazard event with minimal environmental impact and no noticeable effect beyond the immediate occurrence or expression of the hazard.

	Consequence	Critical	Major	Moderate	Minor	Insignificant
		Deaths of hundreds (or more) of listed native flora or fauna species or native mammals. Contamination or other environmental damage leading to deaths of native fauna well beyond (>1 km) the boundaries of the operation.	<1 ha listed threatened native vegetation community that will be irreversible or take years to recover from.			
	Surface water or groundwater Contamination of surface water/groundwater aquifer	Contamination leading to disruption of beneficial uses as defined by SEPP (Waters) for more than a year.	Contamination leading to disruption of beneficial uses as defined by SEPP (Waters) for up to one year.	Localised contamination leading to disruption of beneficial uses as defined by SEPP (Waters) for weeks to months.	Contamination of natural waterway or wetland occurs, but water quality remains within applicable EPA or ANZECC guidelines for existing beneficial uses. Water extraction or diversion reduces surface water flows or groundwater available for environmental uses, but with no detectable effect on dependent species or ecosystems and carried out within terms of water licence.	Hazard event with minimal environmental impact and no noticeable effect beyond the immediate occurrence or expression of the hazard.

Note: SEPP (Waters) has now been superseded by the ERS

6.3 RISK EVALUATION

ERR's risk rating acceptability is provided below in **Table 6-6**.

Table 6-6 Risk rating acceptability

Risk level	Description
Very High	Totally unacceptable level of risk. Control measures must be put in place to reduce the risk to lower levels.
High	Generally unacceptable level of risk. Control measures must be put in place to reduce the risk to lower levels or seek specific guidance from ERR.
Medium	May be acceptable provided the risk has been minimised as far as reasonably practicable.
Low	Acceptable level of risk provided the risk cannot be eliminated.
Eliminated	The risk is eliminated.

The Risk Matrix is provided in **Appendix A** presenting the assessment of risk for the post rehabilitation operations. The Risk Matrix is presented in the format specified by ERR in the 2020 Workplan guideline.

A total of 6 risks were identified and evaluated. Following implementation of controls, all residual risks were found to be Low risk. Summaries from the Risk Matrix are provided in the Risk Treatment Plan in **Section 6.4**.

6.4 RISK TREATMENT PLANS

6.4.1 Risk treatment plan – Fuel, lubricants and hazardous materials

6.4.1.1 Scope

This risk treatment plan is for the control of fuel, lubricants and hazardous materials.

During the post-closure period no chemicals or fuels will be stored onsite.

6.4.1.2 Sensitive receptors

The sensitive receptors associated with this hazard are shown in the table below.

Table 6-7 Receptors - fuel, lubricants and hazardous materials

Receptor	Distance	Direction	Impact	Evidence inherent risk	Comment
Surface water	On-Site	On-Site	Contamination of surface water from fuel chemical spills Excess herbicides washing into creeks and waterbodies Wastewater contaminating surface water from vehicle and machine wash down and maintenance	SW monitoring data Site inspection reports	Nearest waterway
Land	On-Site	On-Site	Excess herbicides contaminating land	Site inspection records	Excess herbicides contaminating land

6.4.1.3 Inherent risk assessment

Assessment of the inherent risk associated with the risks identified for this hazard is shown in the table below.

Table 6-8 Inherent risk - fuel, lubricants and hazardous material

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
G09C	Chemical usage impacting surface waters during operations post closure phase	Post-closure	Rare	Insignificant	Low
G10C	Chemical usage impacting land during operations during post-closure phase	Post-closure	Rare	Insignificant	Low

6.4.1.4 Controls

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 6-9 Control measures - fuel, lubricants and hazardous materials

Control ID	Control Description	Risk Event ID	Performance measure
C08	Inspect and maintain spill control equipment, (e.g. bunds, oil water interceptors, sediment traps, ponds etc) to ensure sufficient capacity is available to contain contaminated run-off.	G09C, G10C	Visual inspection.
C13	Field personnel provided with information and training on spill control measures to prevent the discharge of contaminants from the site.	G09C, G10C	Personnel with relevant training on site or available during operating hours.
C14	Discharge to surface water bodies shall not exceed the trigger values in the ERS for the applicable segment of the environment and its Environmental Values.	G09C	Water discharges to surface water bodies or groundwater satisfy applicable ERS compliance.
C17	Document and report to EPA any spill of hazardous or flammable substances stored or used on site.	G09C, G10C	Record of spill reports maintained.
C18	Select less hazardous substances for use onsite where practicable.	G09C, G10C	
C21	Limit activities involving the handling or generation of hazardous substances to the extent practicable (e.g. vehicle maintenance activities conducted offsite).	G09C, G10C	

6.4.1.5 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 6-10 Residual risk - fuels, lubricants and hazardous materials

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
G09C	Chemical usage impacting surface waters during operations post closure phase	Post-closure	Rare	Insignificant	Low

Risk Event no	Risk description	Stage	Likelihood	Consequence	Residual Risk rating
G10C	Chemical usage impacting land during operations during post-closure phase	Post-closure e	Rare	Insignificant	Low

6.4.1.6 Compliance standards and acceptance criteria

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks. The following compliance requirements are relevant.

Table 6-11 Compliance standards - fuel, lubricants and hazardous materials

Segment	Performance standard	Environmental value	Assessment Criteria	Required studies
Land	Environment Reference Standard	Highly modified ecosystems	Inorganic and organic contaminants in Appendix A of Schedule B2 of the NEPM (ASC) and any other contaminants present at the site as determined by the current use or site history assessed in accordance with the NEPM (ASC)	An Environmental Assessment is required if contamination is suspected
		Human health	Inorganic and organic contaminants in Appendix A of Schedule B2 of the NEPM (ASC) and any other contaminants present at the site as determined by the current use or site history assessed in accordance with the NEPM (ASC)	
		Buildings and structures	pH, sulfate, chloride, redox potential, salinity or any chemical substance or waste that may have a detrimental impact on the structural integrity of buildings or other structures	
Surface Water	Environment Reference Standard	Water dependent ecosystems & species - slightly to moderately modified	ANZG Ecocystem Guidelines (slightly to moderately modified) and additional indicators are specified in Tables 5.8 and 5.9 of the ERS.	If Inherent risk is High or Very High a hydrological study is required
		Agriculture and irrigation (irrigation)	Indicators specified for irrigation and water for general on-farm use in the ANZG	If Inherent risk is High or Very High a hydrological study is required
		Agriculture and irrigation (stock)	Indicators specified for livestock drinking water quality in the ANZG	If Inherent risk is High or Very High a hydrological study is required
		Human consumption of aquatic foods	Indicators specified for metal contaminants, non-metal contaminants, natural toxicants, and mercury in Schedule 19 (Maximum levels of contaminants and natural toxicants) of the Food Standards Code	If Inherent risk is High or Very High a hydrological study is required
		Aquaculture	Faecal (thermotolerant) coliforms (median from 5 samples)	If Inherent risk is High or Very High a hydrological study is required
		Aquaculture	Physical and chemical stressors	If Inherent risk is High or Very High a hydrological study is required
		Aquaculture	Toxicants	If Inherent risk is High or Very High a hydrological study is required
		Aquaculture	Off-favour compounds	If Inherent risk is High or Very High a hydrological study is required
		Aquaculture	Indicators specified for metal contaminants, non-metal contaminants, natural toxicants, and mercury in Schedule 19 (Maximum levels of contaminants and natural toxicants) of the Food Standards Code	If Inherent risk is High or Very High a hydrological study is required
		Industrial and commercial	Indicators specific to the particular industrial or commercial activity and their use of water	If Inherent risk is High or Very High a hydrological study is required
		Water-based recreation (primary contact)	E. coli¸ enterococci	Water quality objectives to be derived from a risk assessment approach following industry best practice and

Segment	Performance standard	Environmental value	Assessment Criteria	Required studies
				guidance published or approved by EPA
		Water-based recreation (primary contact)	Harmful algae, chemical hazards, aesthetic effects	If Inherent risk is High or Very High a hydrological study is required
		Water-based recreation (secondary contact)	E. coli¸ enterococci	Water quality objectives to be derived from a risk assessment approach following industry best practice and guidance published or approved by EPA
		Water-based recreation (secondary contact)	Harmful algae, chemical hazards, aesthetic effects	If Inherent risk is High or Very High a hydrological study is required
		Water-based recreation (aesthetic enjoyment)	Harmful algae, chemical hazards, aesthetic effects	If Inherent risk is High or Very High a hydrological study is required
		Traditional Owners Cultural Values	Objectives must be developed in consultation with Traditional Owners and may be informed by the process identified in the ANZG for determining cultural and spiritual values	If Inherent risk is High or Very High a hydrological study is required
		Cultural & Spiritual Values	No generic investigation levels or thresholds for cultural and spiritual values have been adopted. A qualitative assessment of potential impacts to this environmental value is recommended. Current default based around WDE protection & water-based recreation (	If Inherent risk is High or Very High a hydrological study is required
			Tot P 75th%: <= 55 ug/L; Tot N 75th %: <= 1100 ug/L; DO 25th %: >= 75 %sat; DO max: 130 % sat; Turbidity 75th %: <= 25 NTU; EC 75th%: <= 250 uS/cm; pH 25th%: >= 6.7 pH units; pH 75th%: <= 7.7 pH units; Toxicants: 95% protection;	
		Human consumption after appropriate treatment	Indicators specified in the ADWG	Applicable for water supply in special water supply catchments in Schedule 5 of the Catchment and Land Protection Act 1994 or the Safe Drinking Water Act 2003.If Inherent risk is High or Very High a hydrological study is required.

6.4.1.7 Monitoring and ongoing management

The monitoring and reporting requirements associated with this hazard are shown in the table below.

Table 6-12 Monitoring and reporting requirements - fuel, lubricants and hazardous materials

Monitoring aspect	Reporting details
Maintenance records	Servicing frequency
OHS records	Occurrence
Site Inspection	Occurrence of odour
Surface water	Surface water sampling and analysis
Vegetation health	Site inspection
Visible evidence of spill	Site inspection
Visible impact	Site inspection

6.4.1.8 Relevant industry publications

- AS1940 – Storage and Handling of Flammable and Combustible Liquids
- Mining and quarrying – Guide to preventing harm to people and the environment. (EPA Victoria 2020)
- Liquid Storage and Handling Guidelines. (EPA 2018)
- Environment Protection Regulations (Victorian Government 2021)
- Environment Reference Standard – EPA 2021

6.4.2 Risk treatment plan – pests, weeds and diseases

6.4.2.1 Scope

This risk treatment plan is for the control of pests, weeds and diseases.

6.4.2.2 Sensitive receptors

The sensitive receptors associated with this hazard are shown in the table below.

Table 6-13 Receptors - pests, weeds and diseases

Receptor	Distance	Direction	Impact	Evidence inherent risk	Comment
Land	On-Site	On-Site	Destabilises ground making it susceptible to erosion	Site inspection records	
Native fauna	On-Site	On-Site and immediate surrounds	Predators may extend their range to neighbouring properties and bushland	Site inspection records, complaint register	Nearest bushland
Native flora	On-Site	On-Site	Establishment of weed populations, especially in adjacent bushland	Site inspection reports	Nearest treed area (including buffer)
Neighbour's property	20m 30m 50m 30m	East West North South	Establishment of weed populations	Complaints register	Nearest site boundary (m)

6.4.2.3 Inherent risk assessment

Assessment of the inherent risk associated with the risks identified for this hazard is shown in the table below.

Table 6-14 Inherent risk - pests, weeds and diseases

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
G05C	Burrows impacting land from rabbits and foxes during post-closure phase	Post-closure	Possible	Insignificant	Low
G06C	Predation of native fauna by foxes, cats and dogs during post closure phase	Post-closure	Possible	Insignificant	Low
G07C	Weed infestations impacting neighbour's property during operations during post closure phase	Post-closure	Possible	Minor	Medium
G08C	Weed infestations impacting native flora during operations during post-closure phase	Post-closure	Possible	Minor	Medium

6.4.2.4 Controls

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 6-15 Control measures - pests, weeds and diseases

Control ID	Control Description	Risk Event ID	Performance measure
P02	Identify and map areas within the Work Authority boundary that contain declared noxious weeds (under the CaLP Act) and establish exclusion zones.	G07C, G08C	Areas containing declared weed species are not disturbed by site activities.
P03	Eradicate or control any declared noxious weeds or established pest animals present on the Work Authority area	G07C, G08C	Infestations of declared noxious weeds and established pest animals are controlled.
P04	Identify pest species habitats within the Work Authority boundary (as per the CaLP Act) and remove refuge areas (burrows, hollow logs) where practicable.	G05C, G06C, G07C, G08C	Pest animal habitats are removed / destroyed.
P09	Inspect rehabilitated areas to assess the health of the vegetation and to check for erosion, pest animal browsing damage and weed infestation.	G07C, G08C	Rehabilitation areas are monitored at least seasonally and emerging weed or pest animal populations are controlled.
P10	Pesticides and/or herbicides will only be used to control species and at rates prescribed on the label.	G07C, G08C	No off-label use of pesticides or herbicides.
P11	Maintain a map or other register with locations within Work Authority area with infestations of declared noxious weeds.	G05C, G06C, G07C, G08C	Registers established and maintained.
P13	Protect rehabilitation areas until vegetation is successfully re-established.	G05C	

Control ID	Control Description	Risk Event ID	Performance measure
P14	Identify and apply any local biosecurity protocols applicable to the area.	G07C, G08C	
P15	Consult with DEWLP regarding suitable eradication techniques for onsite feral animals.	G05C, G06C	
P17	Use seeds / seedlings from locally occurring native species for reseeding during site rehabilitation activities.	G07C, G08C	Site rehabilitation undertaken with locally occurring native species.
P21	Provide personnel with information and training on the measures used to prevent the spread of weed and pest species at the site.	G07C, G08C	100% of personnel trained within 1 month of commencing work.

6.4.2.5 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 6-16 Residual risk - pests, weeds and diseases

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
G05C	Burrows impacting land from rabbits and foxes during post-closure phase	Post-closure	Unlikely	Insignificant	Low
G06C	Predation of native fauna by foxes, cats and dogs during post closure phase	Post-closure	Unlikely	Insignificant	Low
G07C	Weed infestations impacting neighbour's property during operations during post closure phase	Post-closure	Unlikely	Minor	Low
G08C	Weed infestations impacting native flora during operations during post-closure phase	Post-closure	Unlikely	Minor	Low

6.4.2.6 Compliance standards and acceptance criteria

The compliance standards are the key best practice standards or guidelines that will be achieved with the control measures in place.

Table 6-17 Compliance standards - pests, weeds and diseases

Performance standard	Environmental value	Assessment Criteria	Required studies
Ecology	Planning and Environment Act (1987). Public Health and Wellbeing Act (2008). Agricultural and Veterinary Chemicals (Control of Use) Act (1992). Agricultural and Veterinary Chemicals (Control of Use) Regulations (2007) Catchment and Land Protection Act (1994)	Environment Protection and Biodiversity Conservation Act lists. Flora and Fauna Guarantee Act lists	If undisturbed land is impacted undertake an Ecological study to identify potential sensitive receptors.

6.4.2.7 Monitoring and ongoing management

The monitoring and reporting requirements associated with this hazard are shown in the table below.

Table 6-18 Monitoring and reporting requirements - pests, weeds and diseases

Monitoring aspect	Reporting details
Complaint register	Frequency and response
Presence of burrows	Site inspection
Site inspections, complaint register	Occurrence
Weed infestations	Site Inspections

6.4.2.8 Relevant industry publications

- *Planning for biodiversity* (DELWP 2017)

6.4.3 Risk treatment plan – site access

6.4.3.1 Scope

This risk treatment plan is for the control of site access.

6.4.3.2 Sensitive receptors

The sensitive receptors associated with this hazard are shown in the table below.

Table 6-19 Receptors – site access

Receptor	Distance	Direction	Impact	Evidence inherent risk	Comment
General Public	On-Site	On-Site	Trespassers drowning	Incident reports	Site dams

6.4.3.3 Inherent risk assessment

Assessment of the inherent risk associated with the risks identified for this hazard is shown in the table below.

Table 6-20 Inherent risk – site access

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
G43C	Deep waterbodies posing drowning risk for trespassers during post-closure phase	Post-closure	Rare	Major	Medium

6.4.3.4 Controls

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 6-21 Control measures – site access

Control ID	Control Description	Risk Event ID	Performance measure
A04	Lock or otherwise control access through gates.	G43C	Site gates locked or otherwise secured.

Control ID	Control Description	Risk Event ID	Performance measure
A08	Install warning signs at strategic locations to identify working areas and potentially hazardous areas.	G43C	Signs installed
A09	Maintain safe access to third party easements (e.g. service / utility corridors) where required.	G43C	

6.4.3.5 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 6-22 Residual risk – site access

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
G43C	Deep waterbodies posing drowning risk for trespassers during post-closure phase	Post-closure	Rare	Major	Medium

6.4.3.6 Compliance standards and acceptance criteria

The compliance standards are the key best practice standards or guidelines that will be achieved with the control measures in place. There are no compliance standards related to site access.

6.4.3.7 Monitoring and ongoing management

The monitoring and reporting requirements associated with this hazard are shown in the table below.

Table 6-23 Monitoring and reporting requirements – site access

Monitoring aspect	Reporting details
Security reports	Occurrence

6.4.4 Risk treatment plan – Stormwater

6.4.4.1 Scope

This risk treatment plan is for the control of stormwater.

6.4.4.2 Sensitive receptors

The sensitive receptors associated with this hazard are shown in the table below.

Table 6-24 Receptors – stormwater

Receptor	Distance	Direction	Impact	Evidence inherent risk	Comment
Surface water	On-Site	On-Site	Clogging / silting up waterways	Site inspection records	

6.4.4.3 Inherent risk assessment

Assessment of the inherent risk associated with the risks identified for this hazard is shown in the table below.

Table 6-25 Inherent risk – stormwater

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S05C	Sediment impacting surface waters from roadways and stockpiles during post-closure phase	Post-closure	Rare	Insignificant	Low

6.4.4.4 Controls

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 6-26 Control measures - stormwater

Control ID	Control Description	Risk Event ID	Performance measure
S02	Install diversion drainage structures up-gradient of working areas to prevent clean surface water from entering the site and becoming contaminated.	S05C	Surface water diversion structures installed and effectively intercepting surface water before it reaches operating areas.
S03	Construct and maintain diversion structures to limit impacts on downstream / offsite surface water flows. (e.g. alteration of drainage pathways, change in flow).	S05C	Downstream environmental flow is maintained.
S04	Design onsite diversion drains to accommodate the surface water flows for a 1 in 10 yr storm event, based on the area of the up-gradient catchment area.	S05C	Diversion drains designed for 1 in 10 yr storm event
S05	Construct and maintain in-ground diversion drains to minimise the flow rate of entrained surface water.	S05C	
S06	Construct and maintain above-ground diversion berms to withstand the calculated surface water volumes and velocity.	S05C	
S09	Design and install onsite water storage / sediment ponds to retain surface water runoff from disturbed areas until the sediment has fallen out of suspension.	S05C	Ponds have capacity to contain rainfall for a 1 in 10 yr storm event.
S10	Obtain ‘Take & Use Licence’ is obtained from the relevant Rural Water Corporation and a “Works on Waterways” permit is obtained from a CMA for activities involving works on waterways.	S05C	Licences and permits for water diversion and works on waterways are obtained as required.
S11	Install diversion drains so that the gradient and orientation restricts fast flowing surface water.	S05C	
S12	Construct diversion drains to follow the natural drainage lines and topography of the site and retain existing vegetated areas.	S05C	

6.4.4.5 *Residual risk assessment*

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 6-27 Residual risk - stormwater

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S05C	Sediment impacting surface waters from roadways and stockpiles during post-closure phase	Post-closure	Rare	Insignificant	Low

6.4.4.6 *Compliance standards and acceptance criteria*

The compliance standards are the key best practice standards or guidelines that will be achieved with the control measures in place.

Table 6-28 Compliance standards - stormwater

Performance standard	Environmental value	Assessment Criteria	Required studies
Environment Reference Standard (Water - surface water)	Water-based recreation (primary contact)	E. coli¸ enterococci	Water quality objectives to be derived from a risk assessment approach following industry best practice and guidance published or approved by EPA
Environment Reference Standard (Water - surface water)	Agriculture and irrigation (irrigation)	Indicators specified for irrigation and water for general on-farm use in the ANZG	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water - surface water)	Agriculture and irrigation (stock)	Indicators specified for livestock drinking water quality in the ANZG	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water - surface water)	Human consumption of aquatic foods	Indicators specified for metal contaminants, non-metal contaminants, natural toxicants, and mercury in Schedule 19 (Maximum levels of contaminants and natural toxicants) of the Food Standards Code	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water - surface water)	Aquaculture	Faecal (thermotolerant) coliforms (median from 5 samples)	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water - surface water)	Aquaculture	Physical and chemical stressors	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water - surface water)	Aquaculture	Toxicants	If Inherent risk is High or Very High a hydrological study is required

Performance standard	Environmental value	Assessment Criteria	Required studies
Environment Reference Standard (Water - surface water)	Aquaculture	Off-favour compounds	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water - surface water)	Water dependent ecosystems & species - slightly to moderately modified	ANZG Ecosystem Guidelines (slightly to moderately modified) and additional indicators are specified in Tables 5.8 and 5.9 of the ERS.	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water - surface water)	Industrial and commercial	Indicators specific to the particular industrial or commercial activity and their use of water	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water - surface water)	Human consumption after appropriate treatment	Indicators specified in the ADWG	Applicable for water supply in special water supply catchments in Schedule 5 of the Catchment and Land Protection Act 1994 or the Safe Drinking Water Act 2003.If Inherent risk is High or Very High a hydrological study is required.
Environment Reference Standard (Water - surface water)	Water-based recreation (primary contact)	Harmful algae, chemical hazards, aesthetic effects	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water - surface water)	Water-based recreation (secondary contact)	E. coli¸ enterococci	Water quality objectives to be derived from a risk assessment approach following industry best practice and guidance published or approved by EPA
Environment Reference Standard (Water - surface water)	Water-based recreation (secondary contact)	Harmful algae, chemical hazards, aesthetic effects	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water - surface water)	Water-based recreation (aesthetic enjoyment)	Harmful algae, chemical hazards, aesthetic effects	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water - surface water)	Traditional Owners Cultural Values	Objectives must be developed in consultation with Traditional Owners and may be informed by the process identified in the ANZG for determining cultural and spiritual values	If Inherent risk is High or Very High a hydrological study is required
Environment Reference Standard (Water - surface water)	Cultural & Spiritual Values	No generic investigation levels or thresholds for cultural and spiritual values have been adopted. A qualitative assessment of potential impacts to this beneficial use is recommended. Current default based around WDE protection & water-based recreation (	If Inherent risk is High or Very High a hydrological study is required

Performance standard	Environmental value	Assessment Criteria	Required studies
Environment Reference Standard (Water - surface water)		Tot P 75th%: <= 55 ug/L; Tot N 75th %: <= 1100 ug/L; DO 25th %: >= 75 %sat; DO max: 130 % sat; Turbidity 75th %: <= 25 NTU; EC 75th%: <= 250 uS/cm; pH 25th%: >= 6.7 pH units; pH 75th%: <= 7.7 pH units; Toxicants: 95% protection;	
Environment Reference Standard (Water - surface water)	Aquaculture	Indicators specified for metal contaminants, non-metal contaminants, natural toxicants, and mercury in Schedule 19 (Maximum levels of contaminants and natural toxicants) of the Food Standards Code	If Inherent risk is High or Very High a hydrological study is required

6.4.4.7 Monitoring and ongoing management

The monitoring and reporting requirements associated with this hazard are shown in the table below.

Table 6-29 Monitoring and reporting requirements - stormwater

Monitoring aspect	Reporting details
Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available

6.4.5 Risk Treatment Plan – Geotechnical

6.4.5.1 Scope

The risk treatment plan addresses potential geotechnical issues.

6.4.5.2 Sensitive Receptors

Table 6-30Receptors - geotechnical

Receptor	Distance	Direction	Impact	Evidence inherent risk	Comment
Adjacent property and roads	Immediately adjacent to site	North and west of site	Subsidence, geotechnical instability	Site inspection reports	

6.4.5.3 Inherent Risk Assessment

Assessment of the inherent risk associated with the risks identified for this hazard is shown in the table below.

Table 6-31 Inherent risk – geotechnical

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S71C	Tunnel/piping erosion leading to slope and crest collapse degrading the slope condition	Post-closure	Unlikely	Moderate	Medium
S63C	Settlement/subsidence due to excessive water table depression after buttress placement	Quarrying/ Post-closure	Unlikely	Moderate	Medium

6.4.5.4 Controls

The control measures are to be designed to eliminate or minimise, as far as reasonably practicable, the identified inherent risks.

Table 6-32 Control measures – geotechnical

Control ID	Control Description	Risk Event ID	Performance measure
G06	Establish vegetation over crest	S71C	>80%of area has established vegetation
G28	Monitor road condition and slope crests and faces	S63C	No evidence of settlement/subsidence
G37	Install clay buttresses to permit early detection of incipient failure by monitoring the occurrence of cracking.	S71C	Clay buttresses are installed

6.4.5.5 Residual risk assessment

Assessment of the residual risk associated with the risks identified for this hazard is shown in the table below.

Table 6-33 Residual risk - geotechnical

Risk Event no	Risk description	Stage	Likelihood	Consequence	Inherent Risk rating
S71C	Tunnel/piping erosion leading to slope and crest collapse degrading the slope condition	Post-closure	Rare	Minor	Low
S63C	Settlement/subsidence due to excessive water table depression after buttress placement	Quarrying/ Post-closure	Rare	Minor	Low

6.4.5.6 Compliance standards and acceptance criteria

The compliance standards are the key best practice standards or guidelines that will be achieved with the control measures in place.

Table 6-34 Monitoring and reporting requirements - geotechnical

Monitoring aspect	Reporting details
Quality control of construction, Signs of erosion	Record evidence that clay batter constructed according to Specifications. Monitor according to GCMP.
Ground surface	Cracking, subsidence

6.4.5.7 Relevant industry publications

- Geotechnical guideline for terminal and rehabilitated slopes (ERR 2020)

6.5 RISK MANAGEMENT COSTS

6.5.1 Cost identification

The following controls have been identified in the risk treatment plans above:

Table 6-35 Post closure management cost identification

Control Description	Implementation assumptions
Inspect and maintain spill control equipment, (e.g. bunds, oil water interceptors, sediment traps, ponds etc) to ensure sufficient capacity is available to contain contaminated run-off.	Site inspection and reporting undertaken monthly
Field personnel provided with information and training on spill control measures to prevent the discharge of contaminants from the site.	One training event (2 hours duration) annually
Discharge to surface water bodies shall not exceed the trigger values in the ERS for the applicable segment of the environment and its Environmental Values.	Sampling and analysis in accordance with monitoring program
Document and report to EPA any spill of hazardous or flammable substances stored or used on site.	Abnormal operations – not costed
Select less hazardous substances for use onsite where practicable.	No cost
Limit activities involving the handling or generation of hazardous substances to the extent practicable (e.g. vehicle maintenance activities conducted offsite).	No cost
Identify and map areas within the Work Authority boundary that contain declared noxious weeds (under the CaLP Act) and establish exclusion zones.	Site inspection and reporting
Eradicate or control any declared noxious weeds or established pest animals present on the Work Authority area	Campaign cost assume $1500 annually
Identify pest species habitats within the Work Authority boundary (as per the CaLP Act) and remove refuge areas (burrows, hollow logs) where practicable.	Site inspection and reporting, 4 hours annually for works
Inspect rehabilitated areas to assess the health of the vegetation and to check for erosion, pest animal browsing damage and weed infestation.	Site inspection and reporting
Pesticides and/or herbicides will only be used to control species and at rates prescribed on the label.	No cost
Maintain a map or other register with locations within Work Authority area with infestations of declared noxious weeds.	Addressed in previous controls
Protect rehabilitation areas until vegetation is successfully re-established.	Addressed in previous controls
Identify and apply any local biosecurity protocols applicable to the area.	Addressed in previous controls
Consult with DEWLP regarding suitable eradication techniques for onsite feral animals.	Addressed in previous controls
Use seeds / seedlings from locally occurring native species for reseeding during site rehabilitation activities.	No cost

Control Description	Implementation assumptions
Provide personnel with information and training on the measures used to prevent the spread of weed and pest species at the site.	Addressed in previous controls

In summary, annual costs (as estimated in 2023 dollar values) are:

- Monthly site inspection and reporting ($600 per month) $7200
- Training of staff (2 staff for 2 hours annually) $800
- Surface water monitoring $4000
- Eradication programs $1500
- Removal of refuge areas $800

The annual cost for post closure management of the site is estimated to be in the vicinity of $14,300.

This assumes no abnormal events occur.

7. CONCLUSIONS

Ricardo has been engaged by Hanson Construction Materials (Hanson) to prepare Rehabilitation Plan for the Yannathan quarry (the Site). A Work Plan Variation (WPV) is required to extend the area and depth of excavation. The Mineral Resources (Sustainable Development) (Extractive Industry) Regulations require submission of a Rehabilitation Plan conforming to the new requirements with any WPV.

The central and north-eastern area of the Site are to be revegetated. There will also be a water body across the Site, which will be a former quarry pit that contains water at the natural groundwater elevation.

The proposed end use is consistent with Council's vision for this area as well as the existing surrounding land uses. The Site is within the green wedge zone and the proposed end use is suitable under this zoning.

The final landform of the Site, being revegetated with a dam, will transform this former quarry area into a valuable asset for the surrounding ecosystem.

Post rehabilitation risks for the proposed end use have been assessed and following implementation of controls all have a low residual risk.

8. REFERENCES

Australian Government. (1993). *Native Title Act 1993 (Commonwealth).* No 110 1993.

Cardinia Shire Council. (2017). *Cardinia Western Port Green Wedge Management Plan.*

Carrillo-Rivera, J. J. (1974). *Hydrogeological Maps of Western Port.* Geol Surv Vic Number 1974/4.

Commonwealth Government. (1999). *Environment Protection and Biodiversity Conservation Act 1999.*

DELWP. (2017). *Planning for biodiversity.*

Earth Resources Regulation. (2020). *Geotechnical guideline for terminal and rehabilitated slopes.* ERR, Department of Jobs, Precincts and Regions.

Earth Resources Regulation. (2020). *Preparation of Work Plans and Work Plan Variations, Guideline for Extractive Industry Projects.* ERR, Department of Jobs, Precincts and Regions.

Earth Resources Regulation. (2020). *Regulatory Practice Strategy for the Rehabilitation of Earth Resources Sites.* Department of Jobs, Precincts and Regions.

Earth Resources Regulation. (2021). *Preparation of Rehabilitation Plans Guideline for Extractive Industry Projects.* Department of Jobs, Precincts and Regions.

EPA Victoria. (2018). *Liquid storage and handling guidelines.* Publication 1698.

EPA Victoria. (2020). *Mining and quarrying - Guide to preventing harm to people and the environment.* EPA Publication 1823.

EPA Victoria. (2021). *Waste disposal categories - characteristics and thresholds.* EPA Publication 1828.2.

EPA Victoria. (n.d.). *Soil Hazard Categorisation and Management.* IWRG621.

Groundwater Solutions. (2021). *Hanson Yannathan Quarry, Numerical Groundwater Modelling Report.*

Standards Australia. (2017). *AS 1940:2017 The Storage and Handling of Flammable and Combustible Liquids.* Standards Australia .

Victorian Government. (1958). *Country Fire Authority Act.*

Victorian Government. (1975). *Wildlife Act.*

Victorian Government. (1987). *Planning and Environment Act.* Victorian Government Gazette No. 45 of 1987.

Victorian Government. (1988). *Flora and Fauna Guarantee Act 1988.* No. 47 of 1988.

Victorian Government. (1989). *Water Act.* Incorporating amendments as at 28 October 2010 .

Victorian Government. (1990). *Mineral Resources (Sustainable Development) Act 1990.* No. 92 of 1990 as amended at 1 July 2021.

Victorian Government. (1994). *Catchment and Land Protection Act.*

Victorian Government. (2004). *Occupational Health and Safety Act 2004.* Act No. 107/2004.

Victorian Government. (2006). *Aboriginal Heritage Act.*

Victorian Government. (2017). *Environment Protection Act.* Victorian Government Gazette.

Victorian Government. (2019). *Mineral Resources (Sustainable Development) (Extractive Industries) Regulations 2019.* S.R. No. 137/2019.

Victorian Government. (2021). *Environment Reference Standard.* Victorian Government Gazette No S 245 26 May 2021 (as amended by Evironment Reference Standard No S158 Tuesday 29 March 2022).

Appendix A Risk Register

Activity	Source	Hazard	Risk Event no	Risk description	Stage	Receptor	Location and proximity	Impact	Evidence inherent risk	Inherent LIkelihood	Inherent Consequence	Inherent Risk	Controls	Performance standards	Residual Likelihood	Residual Consequence	Residual Risk	Monitoring aspect	Monitoring details	Risk Treatment Plan
Site maintenance	Rabbits and foxes	Burrows	G05C	Burrows impacting land from rabbits and foxes during post-closure phase	Post-closure	Land	Onsite	Destabilises ground making it susceptible to erosion	Site inspection records	Possible	Insignificant	Low	Protect rehabilitated areas; Identify pests and remove refuges; Map areas of noxious weeds; Consult regulator about eradication methods;	No active burrows	Unlikely	Insignificant	Low	Presence of burrows	Site inspection	Yes
Site maintenance	Foxes, cats and dogs	Predation	G06C	Predation of native fauna by foxes, cats and dogs during post closure phase	Post-closure	Native fauna	Onsite and neighbouring properties	Predators may extend their range to neighbouring properties and bushland	Site inspection records, complaint register	Possible	Insignificant	Low	Identify pests and remove refuges; Map areas of noxious weeds; Consult regulator about eradication methods;	No predation from introduced pest species	Unlikely	Insignificant	Low	Site inspections, complaint register	Occurrence	Yes
Site maintenance	Weeds	Weed Infestations	G07C	Weed infestations impacting neighbour's property during operations during post closure phase	Post-closure	Neighbour's property	Site surrounds	Establishment of weed populations	Complaints register	Possible	Minor	Medium	Identify pests and remove refuges; Eradicate noxious weeds and pests; Inspect rehabilitated areas; Use prescribed rates of pesticides and herbicides; Map areas of noxious weeds; Implement biosecurity protocols; Use local species for rehabilitation; Staff training at induction (pests and weeds); Identify noxious weeds;	No complaints	Unlikely	Minor	Low	Complaint register	Frequency and response	Yes
Site maintenance	Weeds	Weed Infestations	G08C	Weed infestations impacting native flora during operations during post-closure phase	Post-closure	Native flora	Onsite and neighbouring properties	Establishment of weed populations , especially in adjacent bushland	Site inspection reports	Possible	Minor	Medium	Use prescribed rates of pesticides and herbicides; Identify noxious weeds; Eradicate noxious weeds and pests; Inspect rehabilitated areas; Map areas of noxious weeds; Implement biosecurity protocols; Use local species for rehabilitation; Staff training at induction (pests and weeds); Identify pests and remove refuges;	No established weed infestations	Unlikely	Minor	Low	Weed infestations	Site Inspections	Yes
Site maintenance	Weeds	Chemical usage	G09C	Chemical usage impacting surface waters during operations post closure phase	Post-closure	Surface water	Onsite waterway	Excess herbicides washing into creeks and waterbodies	SW monitoring data	Rare	Insignificant	Low	Minimise handling of HazSub; Select less hazardous products; Record spills; ERS compliance; Staff training at induction (HazSub); Inspect spill control measures;	ERS	Rare	Insignificant	Low	Surface water	Surface water sampling and analysis	Yes
Site maintenance	Weeds	Chemical usage	G10C	Chemical usage impacting land during operations during post-closure phase	Post-closure	Land	Onsite	Excess herbicides contaminating land	Site inspection records	Rare	Insignificant	Low	Select less hazardous products; Inspect spill control measures; Record spills; Minimise handling of HazSub; Staff training at induction (HazSub);	Only weeds impacted, ERS	Rare	Insignificant	Low	Vegetation health	Site inspection	Yes
Abnormal events	Security breach	Unauthorised access	G43C	Deep waterbodies posing drowning risk for trespassers during post-closure phase	Post-closure	General Public	Onsite	Trespassers drowning	Security reports	Rare	Major	Medium	Control site access; Onsite signage; Safe 3rd party access;	No incidents of unauthorised access	Rare	Major	Medium	Security reports	Occurrence	Yes
Construction	Roadways and stockpiles	Sediment	S05C	Sediment impacting surface waters from roadways and stockpiles during post-closure phase	Post-closure	Surface water	Onsite waterway	Clogging / silting up waterways	Site inspection records	Rare	Insignificant	Low	Restrict flow velocity in drains; Maintain diversion structures; Design drains following natural lines; Install diversion drains; Obtain licences and permits for water use; Sediment ponds; Scour protection on dam outlet; Maintain stormwater dams; Design drains to accommodate expected flow; Design drains to minimise flow; Design drains to accommodate 1 in 10 yr event; Manage dam outflows; Washdowns and rumble grids;	ERS	Rare	Insignificant	Low	Stormwater infrastructure	Condition of infrastructure, SW monitoring data if available	Yes
Landform	Groundwater level fluctuation	Geotechnical instability	S63C	Settlement/subsidence due to excessive water table depression after buttress placement	Post-closure	Westernport and Milners Roads, neighbours' properties	Beyond boundaries to N, W and E	Land subsidence/collapse	Site inspection records	Unlikely	Moderate	Medium	Monitor road conditions;	No subsidence observed	Rare	Minor	Low	Ground surface	Cracking, subsidence	Yes
Landform	Geotechnical parameters	lope failure of batters due to erosion	S71C	Tunnel/piping erosion leading to slope and crest collapse degrading the slope condition	Post-closure	Westernport and Milners Roads, neighbours' properties	Beyond boundaries to N, W and E	Geotechnical instability	Site inspection records	Unlikely	Moderate	Medium	Install clay buttress; Vegetate crest;	ERR Geotechnical Guidelines	Rare	Minor	Low	Quality control of construction, Signs of erosion	Record evidence that clay batter constructed according to Specifications. Monitor according to GCMP.	Yes

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Mineral Resources (Sustainable Development) Act 1990

Tenement Number: WA127

Plan Number: PLN-001686

Work Plan Statutorily Endorsed

Signed: _____

Delegate of the Department Head

Date: 01/05/2024

Yannathan Quarry
Part 4: COMMUNITY ENGAGEMENT PLAN

Work Authority No. 127
September 2022

Version Control and Approval

Version No.	Prepared	Reviewed	Approved	Date	Description	Next Revision
0	**Lyndel Hunter** (Strategic Communication Consultant)	**Kathy McInnes** (Environmental Consultant)		August 2022	Draft	
1	**Lyndel Hunter** (Strategic Communication Consultant)	**Dave Adams** (Environmental Consultant)	**Daniel Fyfe** (Hanson Construction Materials)	September 2022	Final	
2	**Lyndel Hunter** (Strategic Communication Consultant)	**Kathy McInnes** (Environmental Consultant)	**Daniel Fyfe** (Hanson Construction Materials)	December 2022	ERR variation	

Table of Contents

1. Company Representative Statement

Strong community stakeholder relationships are integral to Hanson's endeavour to be a responsible corporate citizen and a sustainable business. The value of community engagement is recognised at every level of Hanson and we consider our neighbouring communities and businesses, non-government organisations and all levels of government, to be key stakeholders.

An important aspect of Hanson's business plan is our commitment to seek input from our community stakeholders, ensuring consistent operational and environmental performance improvement.

We want to regularly interact with the community in a consultative forum to provide relevant information regarding the operations of our quarry processing facilities; and seek input on a wide range of operational, environmental and corporate citizenship topics.

This aim is supported by both the Hanson *Stakeholder Engagement Policy* and the *Sustainability Policy*. The *Stakeholder Engagement Policy* ensures that company projects and activities actively demonstrate respect for the people and organisations with which Hanson works, and supports inclusive and sustainable community engagement, while the *Sustainability Policy* ensures Hanson's commitment to supporting the social and economic development of our neighbouring communities and ensuring transparent communication with all our stakeholders.

Both policies can be viewed at http://www.hanson.com.au/About/Who-We-Are/Our-Policies

Daniel Fyfe
Land and Mineral Reserves Manager
Hanson Construction Materials Pty Ltd

2. Introduction

LH Strategic Communication has been commissioned by Hanson Construction Materials Pty Ltd (Hanson) to prepare a Community Engagement Plan (CEP) to accompany the Work Plan Variation documentation being prepared for submission to the Earth Resources Regulation (ERR) branch of the Department of Jobs, Precincts and Regions (DJPR) relevant to the proposed expansion of the area and depth of extraction within the Work Authority 127 of Yannathan Quarry, located at 870 and 910 Westernport Road, Yannathan, Victoria (the site).

The variation to the Work Plan seeks to allow extraction of sand to an additional 18 metre depth to RL -9 mAHD and to extract sand from within the northern area of the site Work Authority WA 127.

The purpose of the CEP is to:

- establish clear lines of communication with the community and other project stakeholders;
- provide easily accessible factual, accurate information;
- identify and understand community values, concerns and interests; and
- ensure that stakeholder feedback is documented and addressed.

The CEP identifies relevant stakeholders, summarises engagement to date, outlines a framework for ongoing community consultation through the life of the quarry, and describes how concerns and issues are managed. CEP activities are pre-emptive to address issues before they arise, responsive to issues as they are identified, and flexible to meet the needs of those whose input is sought.

Whilst the CEP includes a range of tools for effective community consultation, Hanson acknowledges that additional or alternative measures may be required at varying stages of the project.

3. Site description

The Hanson Yannathan Quarry is located at 870 -910 Westernport Road, Yannathan, approximately six (6) km east of the township of Lang Lang, and 80 km southeast of the Melbourne CBD. The area around the site is a relatively flat alluvial plain located between the Lang Lang River to the north and Little Lang Lang River to the south. The area is generally known as the Lang Lang Lowlands.

Figure 1: Site Location

With a total site area of 80.15 hectares, the site is accessed from Westernport Road near the intersection with Heads Road. The office, weighbridge, staff amenities and lunchroom are on the right hand side of the access road approximately, 200 metres from the site entrance. The staff and visitor carpark is located at the rear (western side) of the offices.

The processing plant is centrally located on the site, approximately 300m from the site entrance, and there are two pits currently being extracted, the Eastern Pit and the Western Pit. The quarry will continue to extract from the two pits utilising dry extraction methods, process the sand, and transport the product to existing markets.

Since the introduction of *Victoria's Big Build* program, Hanson has experienced a significant increase in demand for quarry products, placing even greater pressure on the Victorian Government's commitment to the response and recovery from COVID-19.

The land immediately surrounding the site is primarily for agricultural use. A former farmhouse is located approximately 130 metres from the north-west corner of the site with the property which is now used as the office for the market garden. Land immediately east of the site is currently operated as a boarding kennel, cattery and farm, while an intensive poultry farming facility exists immediately west of the site.

Both the kennels and the poultry farm have on-site residences. The nearest residence north of Westernport Road is approximately 730m northwest of the north-western corner of the site.

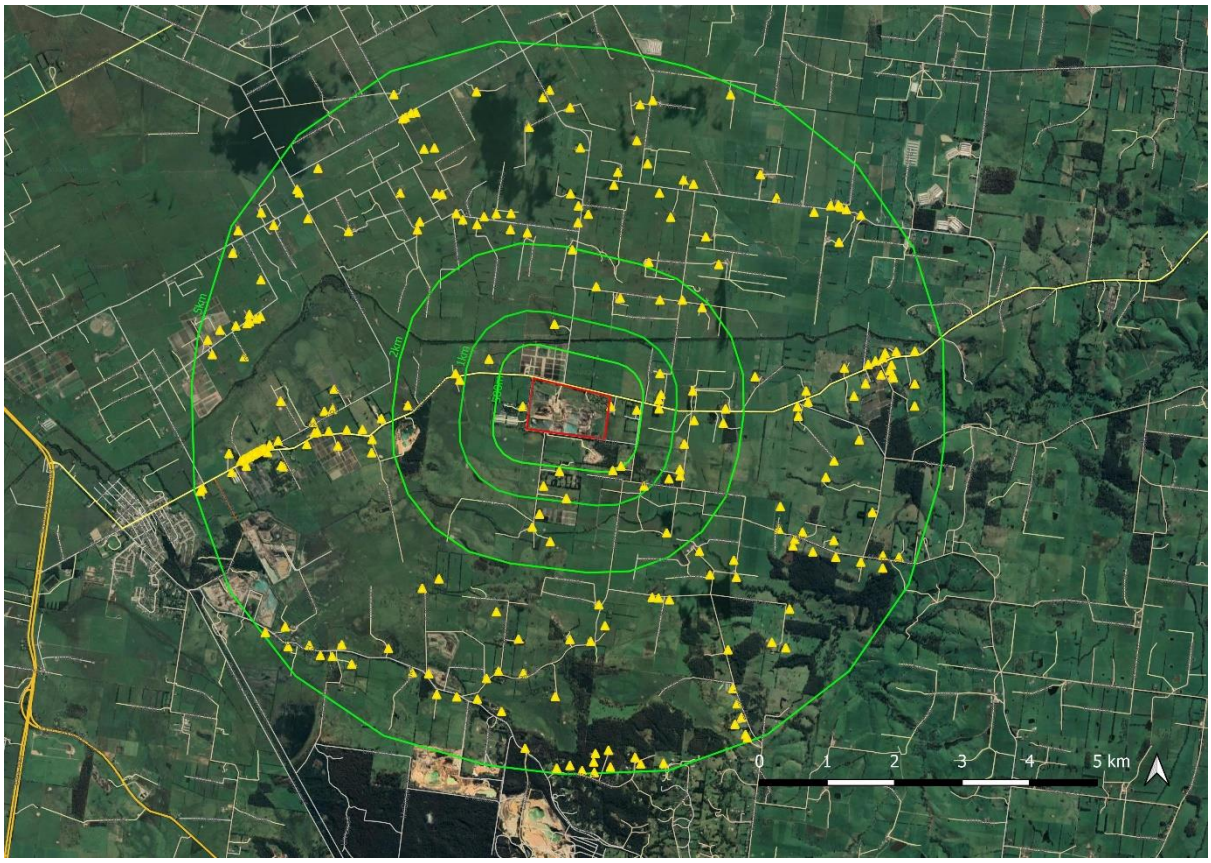


Figure 2: Residential receptors

4. Background

Prior stakeholder engagement

Hanson has placed great importance on addressing community and environmental issues over the operating life of the quarry.

The Yannathan Quarry Manager has regularly met with various local residents and government stakeholders to consult and identify any community and environmental issues associated with the quarry's past development and current operational activities.

During the life of the existing quarry, the Quarry Manager has been proactive in his engagement with the local community by responding immediately to any direct engagement. He has always been available to discuss issues of concern or potential impacts to the local area. Regular engagement is conducted with the market garden farmer to the north-west of the site, the kennels and cattery to the east, and the poultry farmers to the west. All concerns or issues raised during these engagements have been resolved promptly and collaboratively. To date, there have been no documented complaints against the quarry.

5. Legislative framework

This CEP is subject to the legislative requirements set out in the *Minerals Resource (Sustainable Development) Act 1990* and associated regulations, including:

Mineral Resources (Sustainable Development) Act 1990

Section 77G(3)(e) – Community Engagement Plan for a new work plan

Section 77H(2) – Community Engagement Plan for a work plan variation

Section 77K – Extractive industry work authority holder's duty to consult with community.

Mineral Resources (Sustainable Development) (Extractive Industries) Regulations 2019

Part 2, 12 –Information required in work plans—community engagement plan.

For the purposes of regulation 7(e), as part of the community engagement plan included in the work plan under section 77G(3)(e) of the Act, the specified information is information that—

a) identifies the community likely to be affected by the quarry operations; and

b) sets out how the extractive industry authority holder will—

(i) identify community attitudes and expectations; and

(ii) share information with the community; and

(iii) receive feedback from the community; and

(iv) analyse community feedback and consider community concerns or expectations; and

(v) register, document and respond to complaints and other communications from members of the community in relation to the quarry operations.~

Regulation 14(f) – the prescribed information required for a variation of the work plan, is the proposed changes to the information specified in regulation 12, if the variation includes or gives rise to any changes relating to community consultation.

Further, the CEP has been designed to respond to the relevant policies, plans and strategies of the Shire of Cardinia Council and State Government of Victoria, including:

- Shire of Cardinia Council Plan 2021–25 and Community Vision 2040 *Updated 14 April 2020*
- Cardinia Planning Scheme
  Updated by VC223 on 12 August 2022
- Shire of Cardinia Community Engagement Policy V1.2
  Updated 15 February 2021
- Plan Melbourne 2017 – 2050
- Environment Protection Act 2017
- Environment Protection Regulations 2021
- Planning and Environment Act 1987.

6. Goals and objectives

Goals

The goal of this CEP is to effectively engage with the community and stakeholders in an open and transparent manner to ensure their understanding of and contribution to the quarry's processes, progress and outcomes.

This goal is supported by both the Hanson *Stakeholder Engagement Policy* and the *Sustainability Policy*. The *Stakeholder Engagement Policy* ensures that company projects and activities actively demonstrate respect for the people and organisations with which Hanson works, and supports inclusive and sustainable community engagement, while the *Sustainability Policy* ensures Hanson's commitment to supporting the social and economic development of our neighbouring communities and ensuring transparent communication with all our stakeholders.

Strong stakeholder relationships are integral to Hanson's endeavour to be a responsible corporate citizen and a sustainable business. The value of stakeholder engagement is recognised at every level of Hanson and neighbouring communities and businesses, non-government organisations and all levels of government are considered to be key stakeholders.

Hanson's policies can be viewed at http://www.hanson.com.au/About/Who-We-Are/Our-Policies

Objectives

Hanson is committed to responding to and implementing the principles based on best practice as defined by ERR in the *Community Engagement Guidelines for Mining and Mineral Exploration in Victoria*[1], including ensuring:

- **Commitment** is demonstrated when the need to understand, engage and identify the community is undertaken early in the process
- **Integrity** occurs when engagement is conducted in a manner that fosters mutual respect and trust
- **Respect** is created when the rights, cultural beliefs, values and interests of the community within or surrounding the project area are recognised
- **Transparency** is demonstrated when community concerns are responded to in a timely, open and effective manner
- **Inclusiveness** is achieved when a diverse representation of community and broad participation is encouraged and supported by appropriate participation opportunities
- **Trusting relationships** are built through exploring community values and interests and finding common ground
- **Good communication** is achieved when open and meaningful dialogue is carried out and processes established to allow this to occur
- **Trust is built** by establishing processes to record and disseminate information on how community feedback contributed to decision making.

The objectives of the CEP are to:

- Identify stakeholders, including values, concerns, attitudes and expectations

[1] http://earthresources.vic.gov.au/earth-resources-regulation/licensing-and-approvals/minerals/guidelines-and-codes-of-practice/community-engagement-guidelines-for-mining-and-mineral-exploration

- Detail the stakeholder consultation undertaken to date, including engagement goals, timeline, activity, and feedback received
- Develop a framework that seeks and encourages stakeholder input
- Develop a process that actively and effectively responds to stakeholder feedback, including outcome reporting
- Implement an engagement process that is open, honest, inclusive, responsive and accountable
- Ensure that community and stakeholder feedback is addressed and documented
- Identify a strategy to maintain engagement with the community and stakeholders following approval.

The goals and objectives of this community engagement plan can be measured for success as all engagement activity, outgoing and incoming, will be recorded in the Yannathan Quarry Community Contact Database (CCD).

The CCD records the contact details, community identification[2], level of engagement expected, issues and level of risk if not dealt with, of all stakeholders and stakeholder groups. All telephone conversations, one-to-one meetings, emails, letters, community meetings and information dissemination are recorded, allowing activity reports to be generated as and when required.

[2] As described by http://earthresources.vic.gov.au/earth-resources-regulation/licensing-and-approvals/minerals/guidelines-and-codes-of-practice/community-engagement-guidelines-for-mining-and-mineral-exploration

7. Stakeholder and issue identification

Hanson has identified a range of stakeholders that may impact, or be impacted by, the proposed quarry extension. Mitigation measures established by the approved Work Plan will be implemented, managed, monitored and reported as defined by the plan and associated conditions. These measures will be cross-referenced with stakeholders registered on the Yannathan Quarry Community Contact Database (CCD) and relevant advice provided accordingly.

Stakeholder	Community P= Place I= Interest S= Standing	Issues or concerns	Estimated level of impact on the stakeholder 1= High 2= Medium 3= Low	Controls
The Hon Jaala Pulford MLC Minister for Resources	S	Benefit to Victoria Impact on constituency Compliance to all regulation.	2	Ensuring process is conducted to regulation.
Ms Jordan Crugnale Member for Bass	S	Benefit to Electorate Impact on constituency Compliance to all regulation.	2	Ensuring process is conducted to regulation.
Department of Jobs, Precincts and Regions	S	Compliance to Earth Resources Regulation.	3	Ensuring process is conducted to regulation.
Earth Resources Regulation	S	Compliance to regulation, including *Mineral Resources (Sustainable Development) 1990* and *Mineral Resources (Sustainable Development) (Extractive Industries) Regulations 2019.*	3	Ensuring process is conducted to regulation.
Department of Environment, Land, Water and Planning	S	Compliance to regulation, including *Flora and Fauna Guarantee Act 1988*	3	Ensuring process is conducted to regulation.
EPA Victoria	S	Compliance to regulation, including *Environment Protection Act 2017*	3	Ensuring process is conducted to regulation.

Stakeholder	Community P= Place I= Interest S= Standing	Issues or concerns	Estimated level of impact on the stakeholder 1= High 2= Medium 3= Low	Controls
Cardinia Shire Council	S	Impact on community Benefit to community Compliance to regulation, including *Shire of Cardinia Council Plan 2021–25 and Community Vision 2040* *Cardinia Planning Scheme* *Planning and Environment Act 1987.*	2	Ensuring process is conducted to regulation.
Cr Kay Cameron Western Port Ward Cardinia Shire Council	S	Impact on community Benefit to community Compliance to regulation, including *Shire of Cardinia 2019 Council Plan* and *Council Plan Actions 2021-25* *Cardinia Planning Scheme* *Planning and Environment Act 1987.*	2	Ensuring process is conducted to regulation and benefits community.
First Peoples – State Relations	S	Compliance to regulation, including *Aboriginal Heritage Act 2006*	3	Ensuring process is conducted to regulation.
Heritage Victoria	S	Compliance to *Heritage Act 1995.*	3	Ensuring process is conducted to regulation.
Southern Rural Water	S	Compliance in accordance with *Water Act 1989.*	2	Responsible use and management of surface and groundwater.
Melbourne Water	S	Compliance in accordance with *Catchment and Land Protection Act 1994.*	2	Responsible use and management of surface and groundwater.
WorkSafe Victoria	S	Compliance to regulation, including *Occupational Health and Safety Standards Act 2004.*	2	Site is managed in compliance with WorkSafe licence.
Country Fire Authority South East Region District 8	S	Compliance to fire safety regulations	2	Site is managed in compliance with fire safety regulation

Stakeholder	Community P= Place I= Interest S= Standing	Issues or concerns	Estimated level of impact on the stakeholder 1= High 2= Medium 3= Low	Controls
Facility neighbours Including: · Tanderry Farm (poultry farm) · Yannathan Park Boarding Kennels · Lang Lang Holdings · Residents of Milners Road	P	Environment Lifestyle Property Value Business impacts Visual amenity	1	Provide Operational Reports to individual neighbours if required, including environmental and site management
Local community	P	Environment Lifestyle Property Value	2	Provide Operational Reports to individual neighbours if required, including dust, blasting, environmental and site management

8. Communication

The CEP outlined in **9.Stakeholder Engagement Plan** will utilise the relationships established with the facility neighbours during the operation life of the Yannathan Quarry.

A transparent process will be followed to reassure the community that all regulatory requirements will be met and that any concerns are given due consideration. Hanson will accommodate community concerns as far as practicable in its proposed development and ongoing operation of the site.

However, the proposed development of the quarry may require assessments and decisions on a variety of topics relevant to a range of regulatory and non-regulatory authorities. There will be items that are flexible and open for debate and hence negotiable for stakeholder influence. There will also be items that are pre-determined or compulsory and hence are not negotiable. To the extent possible, these items have been and will continue to be, identified and clarified with the stakeholders during the Work Plan variation process.

Key methods and tools for **informing** and **consulting** the community and stakeholders include:

- Email / letter distribution to stakeholders registered on the Yannathan Quarry CCD
- Personalised email / letter in response to specific query or request for information
- Fact Sheets.

Key methods and tools for **involving** and **collaborating** with the community and stakeholders include:

- Personal one-on-one visits
- Open house community information sessions, pop up displays in community hub locations or site tours, if required.

The key method for **analysing** and **considering** community feedback and concerns or expectations Include:

- Yannathan Quarry Community Contact Database *(Refer to* **10. Complaints management process** *and* **11. Evaluation** *below)*
- Value and Effectiveness surveys at community events.

9. Stakeholder engagement plan

Hanson will engage with the community and stakeholders utilising a variety of consultation tools. All communication will be kept clear, concise and culturally appropriate. The proposed schedule of engagement incorporates various methods planned to deliver a range of communication options.

Activity / Tools	Time-frame	Communities	Level of Engagement[3]	Method of Engagement
Community Information Session / Pop Up Display / Site Tour	As required	Community members Earth Resources Regulation Cardinia Shire Council	Inform Consult Involve	Community Contact Database Email Advertising Fact Sheets Pop-up exhibits in community spaces Presentations by Hanson and statutory authority representatives.
Community Contact Database (CCD)	Utilised for real time information distribution and issue / query registration.	Community Community organisations Government Regulatory Authorities Non-Regulatory Authorities Media	Inform Consult	Email Mail CCD registration Dedicated community contact email address Face to face meetings.
Personal meetings	As required	Elected representatives Community organisations Community members	Inform Consult Involve	Face to face meetings Issue investigation Outcome reporting.
Project Updates	As required	Elected representatives Statutory Authorities Community organisations Community members	Inform Consult	Email Mail Personal delivery

[3] IAP2 Public Participation Spectrum, Community Engagement Guidelines for Mining and Mineral Exploration in Victoria, Step 5, Levels of Engagement

Activity / Tools	Time-frame	Communities	Level of Engagement[3]	Method of Engagement
Fact Sheets	As required	Elected representatives Statutory Authorities Community organisations Community members	Inform Consult	Email Mail Personal delivery
Value and Effectiveness Surveys	At all community events	Community organisations Community members	Not applicable	Survey forms

Throughout the process and utilising all activities outlined above, Hanson will ensure all stakeholders are aware of their involvement in the planning process. Clear messaging will appear in all relevant publications, including promotion of Community Contact Database registration details.

> *Example of messaging:*
> Strong community stakeholder relationships are integral to Hanson's endeavour to be a responsible corporate citizen. The value of community engagement is recognised at every level of Hanson and we consider our neighbouring communities and businesses, non-government organisations and all levels of government, to be key partners.
>
> An important aspect of Hanson's business plan is our commitment to seek input from our community, ensuring consistent performance improvement.
>
> Hanson will always investigate issues raised by our community and, where possible, find solutions that balance community and customer expectations with business needs and regulatory requirements.

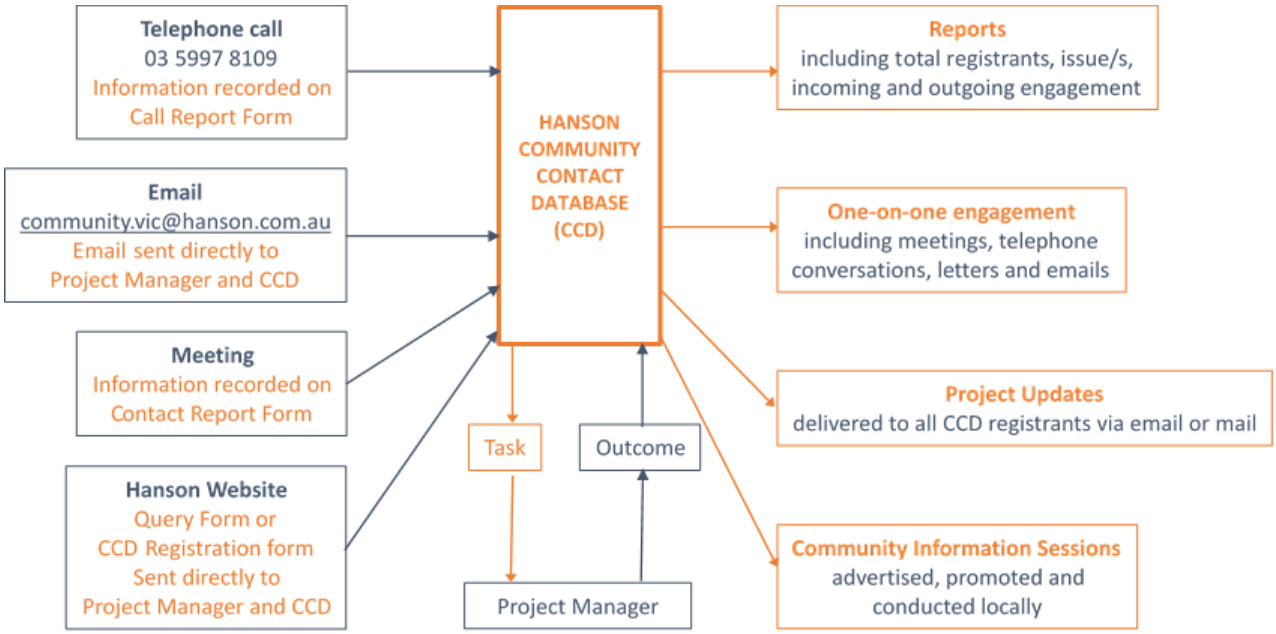
The CEP is not a fixed document. It will be consistently reviewed to reflect any change in circumstances.

Formally, the role and progress of the CEP will be reviewed regularly by Hanson executive and operational management and at times when significant aspects of the project arise. However, any changes proposed or undertaken during the development phase, will not alter the approach to community consultation. As per current practice, Hanson will continue to be in regular contact with neighbours regarding site operation. The ongoing CEP will be reviewed at yearly intervals during the operating life of the site.

10. Complaints management process

Community members are offered the opportunity to contact Hanson directly via a range of options to report any issues or to seek information. These options include:

- dedicated office hours telephone **03 5997 8109**
- dedicated email address **community.vic@hanson.com.au**.



All issues or queries registered via these formats will be entered into the CCD and managed according to the process outlined below.

- Each person registering an issue via telephone, email or website will receive a reply from a Hanson representative on the next working day.
- The Hanson representative will undertake, or request, an investigation into the issue or query registered.
- Once the report is received, the Hanson representative will provide feedback on the outcome of investigation to the issue or query registrant.
- All contact and support information will be recorded in the CCD, including date and time of contact, contact details, description of issues and outcome report.
- A report detailing issues and queries registered and outcomes will be prepared monthly and made available to Hanson executive and operational management, and a summary made available to agencies.

11. Evaluation

Evaluation is not a stand-alone process that completes the implementation of the CEP. Rather, evaluation is an integral and on-going component of every activity, vital to forward planning and providing a strategic basis for decisions about issues.

All information provided by the community, community groups and stakeholders will be recorded in the CCD, which includes contact details, community identification, concerns, expectations, influence (legitimacy, interests and power), issues, level of potential impact and the applicable classification according to the IAP2 Public Participation Spectrum.

The CCD offers a transparent reporting process, recording issues raised or comments received, feedback provided, and generates a 'real time' issues monitoring and outcomes report at each meeting or between meetings as required. Further, incoming and outgoing engagement is reported to Hanson management on a monthly basis and is available for regulatory authority review at any time.

The effectiveness of the CCP in achieving the objectives outlined in this document will be determined through a number of measures including analysis of CCD, numbers participating in consultation activities, use of feedback forms and responses to website and email or mail updates.

All attendees of events conducted to provide information and invite public comment will be encouraged to complete a Value and Effectiveness Survey, providing a measured evaluation of the activity.

Example of Value and Effectiveness Survey

HANSON YANNATHAN QUARRY
(EVENT NAME, VENUE, DATE, TIME)

To help us assess the value and effectiveness of the (EVENT NAME) and to ensure Hanson is meeting the expectations of all stakeholders, we ask you to take a few minutes to complete this questionnaire.

Please consider the categories below and circle the boxed letters that best represent your views.

P = Poor F = Fair A = Average G = Good E = Excellent

Quality of information provided	P	F	A	G	E
Opportunity to discuss issues / concerns	P	F	A	G	E
Consideration given to your issues / concerns	P	F	A	G	E
Hanson's responsiveness to questions / issues raised	P	F	A	G	E
(Referral agency's / specialist consultant's) responsiveness to questions / issues raised	P	F	A	G	E
Extent to which the purpose of your attendance has been fulfilled	P	F	A	G	E
Promotion / notification of the event	P	F	A	G	E
Management of the event	P	F	A	G	E

Open Questions
What have been the highlights or most positive aspects of the [EVENT NAME] from your (and the interests you represented) point of view?

What issues do you believe Hanson has not considered or addressed?

What do you think Hanson has learned from you that they probably wouldn't have learned otherwise?

What could Hanson do to improve the future effectiveness of [EVENT TYPE, eg Community Information Sessions]?

Feel free to explain any of your responses on the first page of this form, or to add any other concerns, issues or comments……

THANK YOU FOR YOUR FEEDBACK!

12. Contact us

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