Stradbroke Rutile Pty Ltd - Glass Mine, Minjerribah

Transitional Progressive Rehabilitation and Closure Plan (EPML00349813)

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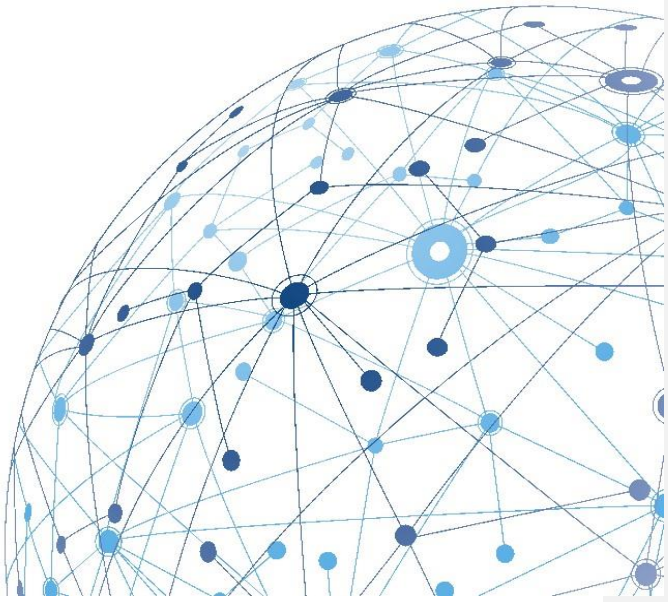

Sibelco Australia Pty Ltd

Transitional Progressive Rehabilitation and Closure Plan

EPML00349813

15 July 2025

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Document History and Status

Revision	Approved By	Date Approved	Revision Type	Issued To	Date Issued
A	K.Jeffrey	27/07/2023	Internal review	Epic Environmental	23/09/24
B	K.Jeffrey	24/10/24	Client review	Sibelco	24/10/24
0	Stephen Kendall	31/10/24	For Submission	DESI	25/10/24
1	Stephen Kendall	15/07/2025	For Submission	DETSI	15/07/2025

GLOSSARY OF TERMS

Term	Meaning
EA	Environmental Authority EPML00349813 issued and effective on 21 December 2018
EMOS	Environmental Management Overview Strategy. A statutory document under the MRA used to manage and regulate environmental impacts associated with mining activities in Queensland prior to the assent of the Environmental Protection and Other Legislation Amendment Bill 2000
EP Act	*Environmental Protection Act 1994*
JSOI	Joint Statement of Intent agreed between Sibelco Australia Pty Ltd, QYAC and the Queensland State government
LOD	Land Outcome Document
LOR	Limit of Reporting
MERFPA	*Mining and Energy Resources (Financial Provisioning) Act 2018*
MRA	*Mineral Resources Act 1989*
MRSP	Minjerribah Rehabilitation and Surrender Plan
NSIPSA	*North Stradbroke Island Protection and Sustainability Act 2011*
PRCP Guideline	Guideline – Progressive rehabilitation and closure plans (PRC Plans). Department of Environment and Science. ESR/2019/4964 Version 3.00, last reviewed 04 April 2023
PRCP	Transitional Progressive Rehabilitation and Closure Plan
QYAC	Quandamooka Yoolooburrabee Aboriginal Corporation RNTBC
RA	Rehabilitation Area consistent with the description provided in the PRCP Guideline
SAPL	Sibelco Australia Pty Ltd
Visy	Visy Glass Operations (Australia) Pty Ltd

1 Rehabilitation Planning Part

1.1 Introduction

Visy Glass Operations (Australia) Pty Ltd is the approval holder for the Glass Sand Mining Project (the Project), located on Mining Lease's (ML) 1124 and 7064 (the site) and authorised under Environmental Authority (EA) EPML00349813.

Sibelco Australia Proprietary Limited (SAPL) are the operator of the Project. Long term management of the Project has occurred under the current SAPL entity, also previously called Unimin Australia Limited (Unimin) until November 2010.

The Project is a silica sand mine, located approximately 4 km north-east of the township of Dunwich located in Minjerribah within the Redland Local Government Area (LGA) (see Figure 1). The Project is part of a wider mining operation which includes the neighbouring SAPL Vance Project on ML 1108. Operations on ML 1108 are covered separately by EA EPML00349713 and are excluded from this Progressive Rehabilitation and Closure Plan (PRCP).

The Project commenced mining operations on ML 1124 in 1973 under previous ownership of ACI operations Pty Ltd and progressed through to ML 7064 in 2001. These operations involved open cut excavation of dune sand from a shallow pit at the rate of up to one million tonnes per annum (Mtpa). Resource extraction ceased on ML 1124 in 2001, and on ML 7064 in 2007, after which the mined areas became available for rehabilitation. The remaining infrastructure on the MLs was utilized by the neighbouring Vance project operations. By 2014, all operations on ML 1124 and ML 7064 had ceased. Currently, there are no ongoing mining operations taking place within the Project tenements.

Rehabilitation has been carried out progressively on the site since 1975. Rehabilitation activities for the Project have been largely completed, with rehabilitated areas currently subject to monitoring and maintenance against the completion criteria established in the Rehabilitation Plan (Appendix B) prepared pursuant to Condition F2-2 of the Project EA.

A transition notice to prepare a PRCP was received on 4 October 2022.

1.2 Regulatory context

This PRCP has been developed as part of the transitional provisions whereby the holder of EA EPML00349813 must submit a proposed PRCP that meets the requirements of Sections 126C and 126D of the *Environmental Protection Act 1994* (EP Act), pursuant to Section 754 of the EP Act. Furthermore, this PRCP has been prepared in accordance with the *Mining and Energy Resources* (Financial Provisioning) *Act 2018* (MERFP Act) and to meet the requirements of the PRC Plan Guideline (ESR/2019/4964) and Schedule 8A of the *Environmental Protection Regulation 2019*.

For existing operations such as the Glass Sand Mining Project, the transitional arrangements mean that existing 'land outcomes' (Post-mine land uses – PMLUs - and associated milestone criteria) secured in a 'land outcome document' (LOD) received by the Department of Environment, Science, Technology and Innovation (DETSI, formerly DES) (and not rejected) before December 2018 can

be carried forward and do not need community consultation or stakeholder agreement. According to Section 750 of the EP Act a 'land outcome document' can be:

a. *an environmental authority for a resource activity on the land;*
b. *a document made under a condition of an environmental authority mentioned in paragraph (a), if—*
    i. *the document relates to the management of a void within the meaning of section 126D on the land, or the rehabilitation of the land; and*
    ii. *the document was received by the administering authority before the assent date; and*
    iii. *the administering authority has not, within 20 business days after the assent date, given notice to the holder of the environmental authority that the document is insufficient in a material particular relevant to a matter mentioned in subparagraph (i); and*
    iv. *before the assent date, the document had not been superseded;*
c. *a document made under a condition of an environmental authority mentioned in paragraph (a), if—*
    i. *the document relates to the management of a void within the meaning of section 126D on the land, or the rehabilitation of the land; and*
    ii. *the environmental authority requires the document to be given to the administering authority on a stated day that is on or after the assent date, or does not state a day when the document must be given; and*
    iii. *the document is received by the administering authority within 3 years after the assent date; and*
    iv. *the administering authority does not, within 20 business days after receiving the document, give the holder of the environmental authority notice that the document is insufficient in a material particular relevant to a matter mentioned in subparagraph (i);*
d. *a report evaluating an EIS under the State Development and Public Works Organisation Act 1971, section 34D;*
e. *an EIS assessment report;*
f. *a written agreement between the holder of an environmental authority mentioned in paragraph (a) and the State that is in force on the assent date.*

The PRCP guideline (DETSI 2023) states that the LOD list is hierarchical and if there are inconsistencies between these documents on either the final outcomes or details of the outcome, then the document appearing first in the above list will prevail to the extent of the inconsistency. For the Project, the primary LOD is the EA (EPML00349813), issued 9 November 2020, which includes specific conditions relating to rehabilitation outcomes (Table 1), including the PMLU. The EA EPML00349813 has been provided in **Appendix A**.

The Rehabilitation Plan for Disturbed Areas (Unimin 2009) (**Appendix BAppendix B**) was developed under condition F2-2 of the EA, and therefore meets the definition of an LOD. This document provides rehabilitation objectives and completion criteria (Table 2).

Table 1 EA EPML00349813 conditions relevant to rehabilitation

<table>
<tr><th>Condition No.</th><th>Condition</th></tr>
<tr><td colspan="2">Rehabilitation Landform Criteria</td></tr>
<tr><td>F1-1</td><td>All areas significantly disturbed by mining activities must be rehabilitated to the final land description as defined in Schedule F – Table 1.
<table>
<tr><th>Disturbance type</th><th>Disturbance Area (ha)</th><th>Pre-mine land description</th><th>Post-mine land description</th><th>Pre-mine land capability classification</th><th>Post-mine land capability classification</th><th>Analogue site identification</th></tr>
<tr><td>Nursery</td><td>0.10</td><td>Native Ecosystem</td><td>Landowner*</td><td>1</td><td>Landowner*</td><td></td></tr>
<tr><td>Maintenance workshop</td><td>0.04</td><td>Native Ecosystem</td><td>Landowner*</td><td>1</td><td>Landowner*</td><td></td></tr>
<tr><td>Administration buildings</td><td>2.76</td><td>Native Ecosystem</td><td>Landowner*</td><td>1</td><td>Landowner*</td><td></td></tr>
<tr><td>Vehicle parking</td><td>0.10</td><td>Native Ecosystem</td><td>Landowner*</td><td>1</td><td>Landowner*</td><td></td></tr>
<tr><td>Processing plant</td><td>5.0</td><td>Native Ecosystem</td><td>Landowner*</td><td>1</td><td>Landowner*</td><td></td></tr>
<tr><td>Stockpile</td><td>10.0</td><td>Native Ecosystem</td><td>Landowner*</td><td>1</td><td>Landowner*</td><td></td></tr>
<tr><td>Mine area</td><td>573.0</td><td>Native Ecosystem</td><td>Landowner*</td><td>1</td><td>Landowner*</td><td>V1, V12 V13 V17 V20</td></tr>
<tr><td>Haul roads</td><td>7.0</td><td>Native Ecosystem</td><td>Landowner*</td><td>1</td><td>Landowner*</td><td></td></tr>
<tr><td>Access roads</td><td>13.0</td><td>Native Ecosystem</td><td>Landowner*</td><td>1</td><td>Landowner*</td><td></td></tr>
<tr><td>Tracks</td><td>17.0</td><td>Native Ecosystem</td><td>Landowner*</td><td>1</td><td>Landowner*</td><td></td></tr>
<tr><td colspan="7">* Post mine classification to be determined by landowner</td></tr>
</table></td></tr>
<tr><td>F1-2</td><td>Progressive rehabilitation must commence when areas become available within the operational land</td></tr>
<tr><td colspan="2">Native Ecosystem Outcome</td></tr>
<tr><td>F2-1</td><td>Areas, which are to be progressively rehabilitated to native ecosystem, must comply with the following outcomes;
a) a self sustaining native ecosystem has been established and species composition and distribution of analogue sites; and
b) all areas disturbed by mining activities must be rehabilitated to the landform design criteria proposed as a result of rehabilitation program undertaken as per condition (F2-2); and</td></tr>
</table>

	c) landforms are stable with erosion comparable to analogue sites; and d) landforms have been reshaped as close as practicable to the aspect orientation appropriate to the climax community.
F2-2	Maintain a rehabilitation program of disturbed areas (including landform design criteria) to meet the outcomes in (F2-1)
Infrastructure	
F3- 1	All infrastructure, constructed by or for the environmental authority holder during the mining activities including water storage structures, must be removed from the site prior to mining lease surrender, except where agreed in writing by the post mining land owner/holder.

Notes:

1) Pursuant to Condition F2-1 and F2-2 the North Stradbroke Island Project Rehabilitation Plan for Disturbed Areas (rehabilitation plan) was developed in 2009 by Unimin Australia Limited (Unimin)
2) Prior to an EA amendment in 2020, Schedule F – Table 1 provided the post-mine land description for the Mine Area was 'Native Ecosystem'

Table 2 Rehabilitation completion criteria (Unimin Australia Limited, 2009)

<table>
<tr><th>Rehabilitation Parameter</th><th>Possible Rehabilitation Objectives</th><th>Possible Indicators</th><th>Nature of Completion Criteria</th></tr>
<tr><td rowspan="4">Landform</td><td rowspan="4">Landform design meets criteria</td><td>Slope direction and aspect</td><td>Disturbed areas to approximate the pre-mining surface landform by comparison with pre-mining contour mapping.</td></tr>
<tr><td>Landform height</td><td>Disturbed areas to have a general reduction in landform height of about 5 to 10 metres (the depth of sand mined) by comparison with pre-mining contour mapping.</td></tr>
<tr><td>Slope angle and length.</td><td>Where lowered (mined) areas meet undisturbed ones, slope and angle meet the specified guidance presented below:
<table>
<tr><th>Slope Grade (%)</th><th>Slope Length (m)</th></tr>
<tr><td>>30</td><td>25</td></tr>
<tr><td>20-30</td><td>30</td></tr>
<tr><td>10-20</td><td>80</td></tr>
<tr><td>5-10</td><td>120</td></tr>
<tr><td><5</td><td>170</td></tr>
</table></td></tr>
<tr><td>Surface Drainage/flow</td><td>Disturbed areas will approximate the pre-mining surface landform by comparison with pre-mining contour mapping</td></tr>
<tr><td rowspan="2">Stability</td><td rowspan="2">Erosion in rehabilitated areas equivalent to non Disturbed reference sites</td><td>Measurement of erosion rates</td><td>Erosion rates are below 10mm/yr.</td></tr>
<tr><td>Measurement of gullies</td><td>No erosion gullies exist that exceed 2m wide x 1m deep.</td></tr>
<tr><td rowspan="2">Sustainable Land Use</td><td rowspan="2">Establish specified self sustaining natural vegetation or habitat</td><td>Species type and diversity</td><td>The index of similarity has increased for 3 consecutive years after the value has reached 50%.</td></tr>
<tr><td>Species percent comparison</td><td>Species comprising more that 15% of the reference areas, the difference in percentage between reference and rehabilitation areas is within ±20%.</td></tr>
</table>

1.3 Purpose of Plan

This PRCP demonstrate SAPL's ongoing commitment to sound environmental practice and responsibility. The PRCP establishes that the Project has an agreed PMLU and describes how rehabilitation of the site has been completed. The PRCP further describes project planning, community consultation, risk assessment, monitoring and maintenance of rehabilitated areas going forwards, and includes a PRCP Schedule (Appendix C).

Since the completion of mining in 2007, the site has remained in a period of closure and rehabilitation. Rehabilitation for all mined areas was completed by 2021.

The main purpose of this PRCP is to provide a framework that allows SAPL to:

- demonstrate how, where and when activities have been carried out on land in a way that has promoted the progressive rehabilitation of the land to a stable condition
- document how SAPL has and will rehabilitate the land to an agreed condition that will facilitate EA surrender

2 Project Planning

This section of the PRCP provides baseline information, site location details, a description of Project operations and information on rehabilitation planning.

2.1 Baseline Information

2.1.1 Site Location

The Glass Sand Mining Project is located within ML 1124 and 7064, which are located approximately 4 km north-east of the township of Dunwich at Minjerribah. ML 1124 has a total area of 81.46 ha and is located wholly within Lot 17 SP296433. ML 7064 has a total area of 45.2 ha and is located on Lot 151 on SP297202. The Glass Sand Mining Project is adjacent to SAPL's Vance project located on ML1108. However, Vance operations are authorised separately under EA EPML00349713 and are not addressed within this PRC Plan.

Minjerribah, also known as North Stradbroke Island, is part of a series of sand islands along the south-east Queensland coastline. Minjerribah is located approximately 40 km east of the Brisbane central business district within the Redland local government area (LGA).

2.1.2 Site Topography

The topography of the site is characterised by undulating landforms, which consist of a series of high dune formations. Elevation at the site ranges from approximately 15 metres Australian Height Datum (mAHD) in the North of ML 1124, to approximately 80 m AHD in the South of ML7064. Slope ranges on Glass are relatively shallow to surrounding natural landforms.

Site topography is shown in Figure 2.

Figure 1 Glass project locality

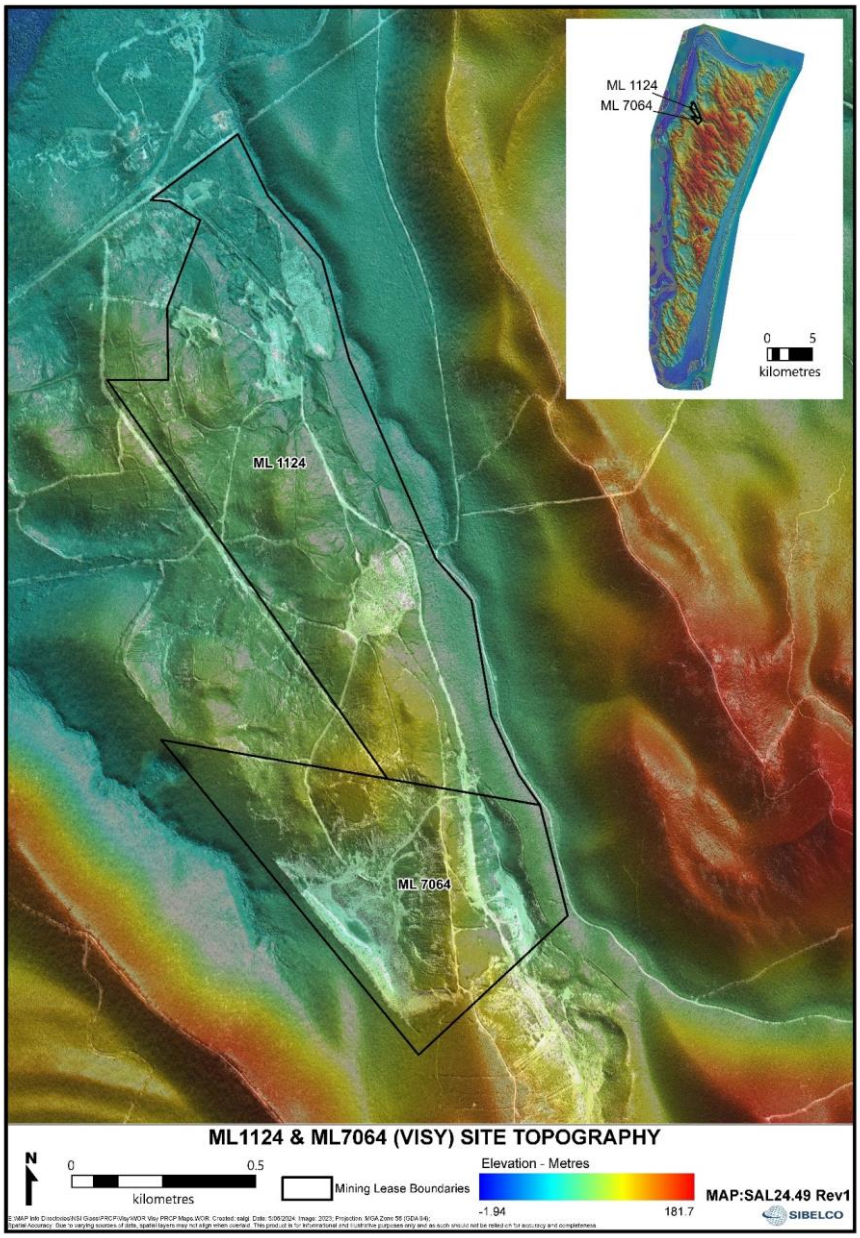

Figure 2 Site topography

2.1.3 Climate

The climate of the region surrounding the Project is classified as sub-tropical typical of south-east Queensland which is largely characterised by warm wet summers and cool dry winters. Rainfall typically occurs throughout the year, but the highest monthly totals occur between December and May ((Australian Bureau of Meteorology (BoM), 2024)).

Bureau of Meteorology (BoM) weather stations located proximate to the site include:

- Point Lookout (Site no. 040209)
  - Distance to site: <10 km northeast
  - Years operational: 1997 – active
- Dunwich Post Office (Site no. 040070)
  - Distance to site: <5 km southwest
  - Years operational: 1913 – 1956

For the purposes of this analysis Point Lookout (Site no. 040209) will be adopted due to the outdated and limited dataset available for the Dunwich location.

Climate data for the region has been captured by the Point Lookout weather station (site no. 040209) since 1997 and remains active ((Australian Bureau of Meteorology (BoM), 2024)). Based on the climate data collected from this weather station, the region experiences an annual mean maximum temperature of 25.5 degrees Celsius (°C), a mean minimum temperature of 18.6 °C and a mean total annual rainfall of 1466.1 millimetres (mm). The long-term mean temperature and rainfall data is provided in Table 3.

Evaporation rates influence soil moisture, rehabilitation success and mine water balance and is therefore relevant in the site's assessment. Mean solar exposure based on climatic data recorded at Point lookout (site no. 040209) located approximately 10 km northeast of the site indicates a seasonal trend with monthly values ranging from 11.1 megajoules per square metre (MJ/m^2) during the winter (June) to 24.2 in spring (November) ((Australian Bureau of Meteorology (BoM), 2024)). Both the Point Lookout and Dunwich weather stations do not record evaporation data. However, the mean daily evaporation was recorded as 5.4 millimetres (mm) at the Brisbane Airport station (site no. 040842) located approximately 30 km northwest of the site ((Australian Bureau of Meteorology (BoM), 2024)).

Table 3 Long-term mean temperature and rainfall since 1997 (BOM weather station 040209, Minjerribah)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min (°C)	22.7	22.6	22.0	19.6	16.9	14.6	13.8	14.3	16.6	18.5	19.9	21.4
Max (°C)	29.5	29.3	28.6	26.4	23.8	21.7	21.1	22.1	24.0	25.2	26.5	28.1
Mean Rainfall (mm)	143.4	153.3	166.1	160.0	145.0	148.8	102.7	55.1	54.4	93.5	115.0	124.5

2.1.3.1 Storms

Although there is no defined season or period when severe weather events are most likely to occur in Queensland, severe storms tend to occur more frequently during summer months (October to April) and periods of heatwave (Queensland Fire and Emergency Services ((Queensland Fire and Emergency Services (QFES), 2017)).

Severe storms can result in damaging or destructive wind gusts, flash flooding and large hailstones (greater than 4 centimetres (cm) in diameter) ((Queensland Fire and Emergency Services (QFES), 2017)).

2.1.3.2 Wind

Winds in south-east Queensland are dominated by the south-east trade winds with occasional westerlies and northerlies in the winter and summer months. The wind rose for Minjerribah is presented in Figure 3.

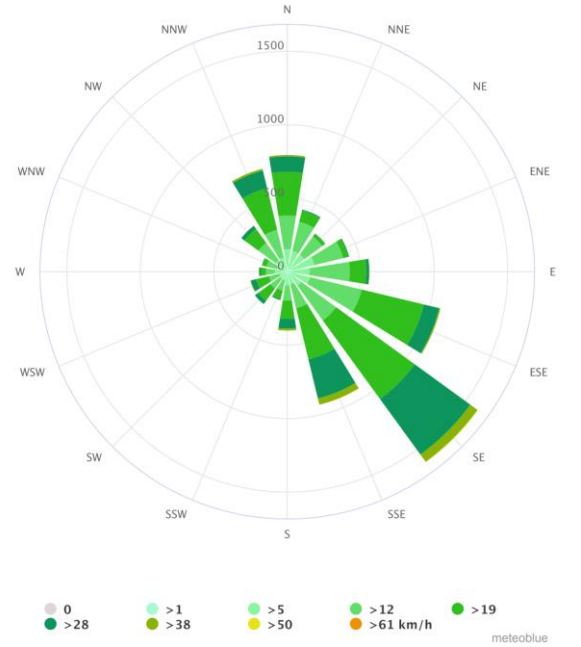

Figure 3 Wind rose for Minjerribah (1985 – 2024) (Meteoblue, 2023)

2.1.3.3 Cyclones

Tropical cyclones are low pressure systems that form over warm tropical waters usually from early November to late April ((Australian Bureau of Meteorology, 2024), (Queensland Fire and Emergency Services (QFES), 2017)). In Queensland, tropical cyclones typically affect the Gulf of Carpentaria, Cape York Peninsula and eastern coastline extending from the north tip of Queensland to central coastal regions.

The number of tropical cyclones making landfall in Australia is influenced by a number of factors, however, tends to be strongly influenced by the El Niño Southern Oscillation (ENSO), with the Queensland coast experiencing three to four times as many cyclones during La Niña years compared to El Niño years ((CSIRO, 2024)). Climate change is also predicted to result in more frequent and intense cyclones impacting the south of Queensland (Redland City Council, 2023). There have been 46 tropical cyclones since

recording began in 1900 that have occurred along the south coast of Queensland. The most recent occurred in February 2023 (tropical cyclone Oma) (Australian Bureau of Meteorology, 2024).

2.1.3.4 Floods

The risk of flooding occurring on Minjerribah is considered to be low due to the high permeability of the sand comprising much of the island and largely occurs as the result of tidal inundation caused by storm tides/ surges. The Redland City Council (RCC) mapping of Flood Hazard Areas indicates that the Project is not located within a flood hazard area or a tidal inundation area (Redland City Council, 2023). A further review of both Queensland Globe (Queensland Government, 2024) and FloodCheck Queensland (Department of Resources (DoR), 2024) indicated that the Project area has not experienced historical flooding and is not likely to experience a one percent Annual Exceedance Probability (AEP) flood event.

2.1.3.5 Bushfires

Most of Minjerribah has been identified as having a high to very high bushfire risk. Due to the high level of bushfire risk on Minjerribah, several government agencies including RCC, QFES, Southeast Queensland Water (SEQW), Quandamooka Yoolooburrabee Aboriginal Corporation (QYAC) and Queensland Parks and Wildlife Service (QPWS) undertake coordinated hazard reduction burns and maintain fire lines to reduce the impacts of unplanned bushfires (Redland City Council, 2024).

Bushfire risk is influenced by a combination of increased temperatures, higher winds, lower rainfall, and woody vegetation. As winters are typically drier, wildfires mostly occur in the spring and early summer. The State-wide mapping of the Bushfire Hazard Area (developed by the Department of State Development and Infrastructure, formerly DSDILGP) indicates that the Project is located partially within Very High and High Bushfire intensity areas with some potential impact buffer ((Commonwealth Scientific and Industrial Research Organisation (CSIRO), 2024)).

2.1.3.6 Earthquakes

Queensland is seismically active with the highest probability of earthquakes occurring along the eastern coast and nearby offshore regions. In the last 100 years (1923-2023) there has been eight earthquakes recorded by the Australian Government's Geosciences monitoring network within a 60 km radius of Minjerribah (Geoscience Australia, 2024). All earthquakes were of a low magnitude with an average reading of 1.6 Richter magnitude (ML) and a range of 0.7 to 2.9 ML. The highest magnitude record of these locations was at Acacia Ridge in 1996. Based on the historical data the potential for significant earthquakes to occur within the Project area is low.

2.1.3.7 Droughts

Drought is defined as an acute water shortage brought about by a serious or severe rainfall deficiency. To classify the severity of a drought, rainfall periods of three months or greater are examined. A drought is classified as serious if rainfall falls above five percent of the recorded rainfall but below ten percent for the period in question, and as severe if rainfall is among the lowest five per cent for the period in question (Australian Bureau of Meteorology (BoM), 2024). Drought frequency, intensity, and

duration can vary markedly, and are influenced by the El Niño-Southern Oscillation (ENSO) cycle. El Niño events are characterised by reduced rainfall, warmer than average temperatures, later monsoon onset, reduced tropical cyclone numbers, and a shift in temperature extremes (Australian Bureau of Meteorology (BoM), 2024).

The most recent drought to occur on Minjerribah occurred between January 2017 and December 2019, with below average rainfall annually and the lowest rainfall on record over the 36 month period. Minjerribah also experienced the millennium drought between 1997 and 2009, with below average rainfall occurring. Cycles of drought are expected to continue into the future across greater Queensland and Australia including the Project area (Australian Bureau of Meteorology (BoM), 2024).

2.1.4 Geological Setting

In a regional context, the geology of Minjerribah is characterised by Quaternary Holocene and Pleistocene sand overlying Triassic and Jurassic bedrock, comprising quartzose sandstone, siltstone, shale conglomerate, coal, basalt and breccia (URS Corporation, 2007).

The entirety of ML7064, and most of ML1124 are older sand dune deposits (Qpd) which predate the Holocene emergence and consist of fine to medium-grained quartz sand with minor peaty layers, ironstone bands, and carbonaceous indurated sand-rock zones. These zones exhibit varying degrees of induration which are expected to have formed in relation to each stage of dune development (URS Corporation, 2007). The eastern side of ML1124 is of recent Pleistocene alluvium (Qpa), which is characterised as stratified alluvial soils with surfaces of sands and loamy sands, and clay subsoils that may contain silt and sand (Wilson & Taylor, 2012). The geology for the ML1124 and ML7064 is presented in Figure 4**.**

The Pleistocene sand dune deposits (Qpd) are the most extensive surface geological unit on Minjerribah. These sands represent the successive overlay of a number of major episodic aeolian events interspaced by periods of stability that have occurred through much of the Quaternary and is continuing today (URS Corporation, 2007). There have been nine sand blowing events with intervening periods of strand plain development, the resulting formation is a transgressive dune field with north-west trending ridge lines (Ward 1977, Ward & Grimes 1987 as cited in (URS Corporation, 2007).

2.1.5 Site Hydrology and Fluvial Networks

2.1.5.1 Waterways and Watercourses

The Project is adjacent to the second order ephemeral Cooroon Cooroonpah Creek and the first order ephemeral Capembah Creek. The Cooroon Cooroonpah Creek drainage line flows in a northerly direction approximately parallel to the eastern boundary of the Project area. Capembah Creek flows roughly parallel to the western boundary of ML 7064 in a northwest direction (Figure 5). Both drainage lines flow toward coastal swamp land.

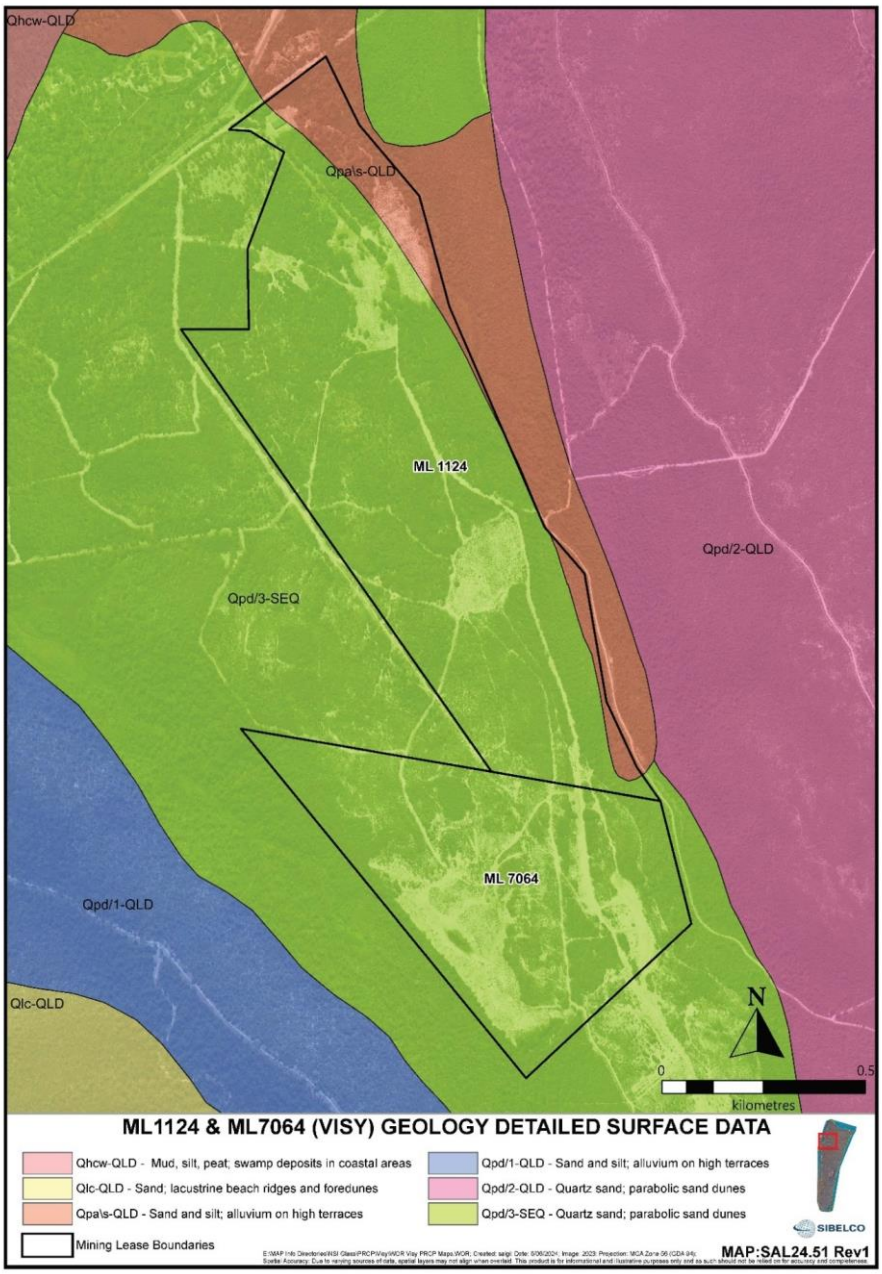

Figure 4 Geological setting of the Project

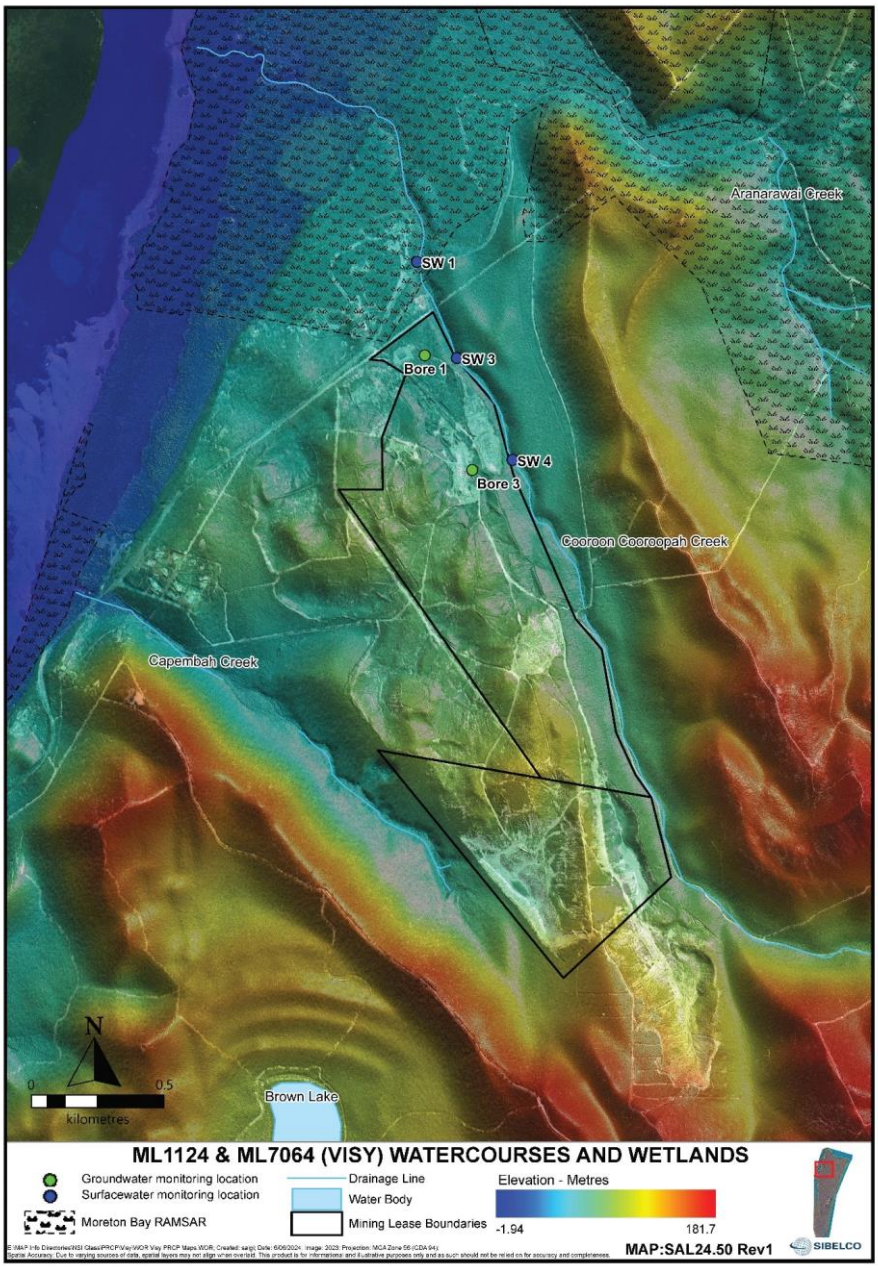

Figure 5 Watercourses and wetlands

The upper reach of Cooroon Cooroonpah Creek is generally dry, and only flows during extended rain periods (Land and Resource Solutions Pty Ltd, 2002). Due to the highly permeable nature of the underlying sands, surface runoff is rarely observed on site even during intense rainfall. Where surface flow does occur, this is mostly confined to Cooroon Cooroonpah Creek; some as a direct result of rainfall runoff and some from seepage of shallow groundwater springs where the water table and surface intersect at a low angle.

A 100 m wide no-mining buffer zone was established on either side of both the Cooroon Cooroonpah and Capembah Creeks. No mining was undertaken in these buffer areas.

2.1.5.2 Catchment Overview (Regional and Local) and Water Quality

The Project area is located in the Stradbroke Islands drainage sub-basin that has a total area of 29,106 ha and lies within the larger Moreton Bay Islands drainage basin.

ML1124 and ML7064 contribute to the surface water flow in two catchments as described in Section 2.1.5.1**.** The main surface catchment, Cooroon Cooroonpah Creek, flows in a north-westerly direction towards swamp land adjacent to the East Coast Road and drains through a section of the Moreton Bay RAMSAR wetlands to marine environments at Rainbow Channel and to the wider Moreton Bay.

Cooroon Cooroonpah Creek is recognised as a Wallum Freshwater Creek. These are generally tannin-stained (tea-coloured), low gradient, small to mid-sized streams, many with sandy substrates and naturally low pH draining through wallum vegetation.

The relevant Environmental Values (EV) and Water Quality Objectives (WQO) under the EPP (Water and Wetland Biodiversity) are outlined in the *Moreton Bay including Stradbroke Islands, Moreton Island and other bay islands Environmental Values and Water Quality Objectives* (Department of Environment and Science, 2022). The applicable EVs for surface (fresh) water found within and surrounding the Project include:

- Aquatic ecosystem
- Aquaculture
- Human consumer
- Primary recreation
- Secondary recreation
- Visual recreation
- Drinking water
- Industrial use
- Cultural and spiritual values

Site-specific contaminant limits are established for the Project, as prescribed under Schedule C - Table 2 of the Project EA. These limits are applicable to releases from the Project into receiving surface waters, being Cooroon Cooroonpah Creek. Receiving water contaminant limits established in the Project EA are consistent with the limits originally provided by the Environmental Management Overview Strategy (EMOS) (Land and Resource Solutions Pty Ltd, 2002). The EMOS states that these limits were established through baseline sampling of Cooroon Cooroonpah Creek prior

to the development of mining in the area, and were developed with reference to the ANZECC guidelines applicable at the time.

2.1.6 Regional Hydrogeology

Rainfall recharge to the permeable sand dunes has created a groundwater mound which peaks near the middle of the island and flows to the island edges. Groundwater elevations on the island roughly mirror the local topography, ranging from 22 mAHD to 34 mAHD (Geo-Eng, 2024) (Figure 6**)**.

Regional groundwater flow is from the central areas of the island towards the coast and towards existing creeks, streams, lakes and swamps within the island. Discharge of groundwater from the regional aquifer occurs by lateral seepage to the ocean, or by flow to surface water. Freshwater lakes are formed where the regional groundwater table intersects the ground surface in areas of low elevation.

The high historical fluctuation in groundwater elevation is attributed to the aquifer being primarily recharged by rainfall infiltration through highly permeable quartz sands. The high infiltration capacity and hydraulic conductivity of the sands allow for rapid infiltration of recharge and flow of groundwater (URS Corporation, 2007).

Localised and sometimes isolated perched aquifers occur where indurated coffee rock is present below the surface. Dry mining was undertaken with no mining occurring below the water table. Therefore, the flow direction of regional groundwater on site would not have been substantially altered as a result of mining.

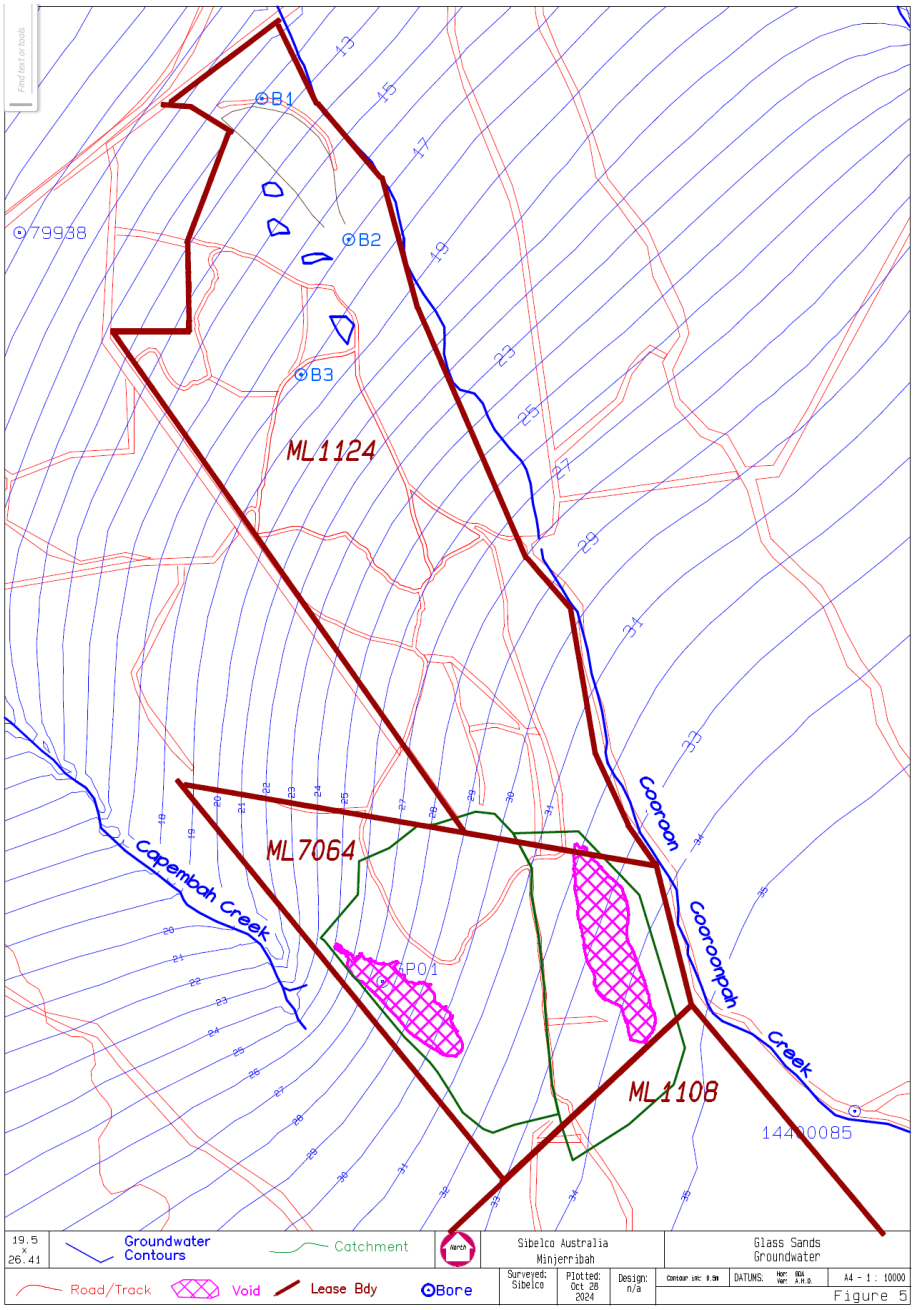

Figure 6 Groundwater contours (Geo-Eng, 2024)

2.1.6.1 *Existing Groundwater Uses*

Background measurements of groundwater quality have informed the Project EA groundwater quality limits (Land and Resource Solutions Pty Ltd, 2002). Groundwater was encountered approximately 10 m below the surface.

Groundwater was extracted from three bores (bores 1, 2 and 3) on ML 1124 (Figure 7) and was used for run of mine (ROM) pumping and processing. Bores 1 and 3 were monitored throughout the mine life for the site-specific contaminant limits established in the EA, and to ensure groundwater drawdown did not exceed two metres per year. Table 18 details groundwater quality monitoring data from bores 1 and 3. Bore 2 is planned to be decommissioned in line with applicable standards. For further information please refer to section 7.1.3.

2.1.6.2 *Springs and Other Groundwater Dependent Ecosystems*

Doody *et al.* (Doody, Hancck, & Pritchard, 2019) defines groundwater dependent ecosystems (GDEs) as natural ecosystems which require access to groundwater on a permanent or intermittent basis to meet all or some of their water requirements so as to maintain their communities of plants and animals, ecological processes and ecosystem services (Richardson, 2011). The broad types of GDEs are (Eamus, Froend, Loomes, Hose, & Murray, 2006):

- Ecosystems dependent on surface expression of groundwater – springs, groundwater fed wetlands or baseflow fed streams or rivers
- Ecosystems dependent on sub-surface expression of groundwater – terrestrial GDEs
- Subterranean ecosystems – stygofauna

A search of potential GDEs on Queensland Globe identified, with moderate confidence, the presence of a surface GDE. This is likely associated with the localised presence of indurated coffee rock layers and perched water tables. The mapping indicated with high confidence that both Cooroon Cooroonpah Creek and Capembah Creek support a terrestrial GDE. The Cooroon Cooroonpah Creek terrestrial GDE Area overlaps the eastern boundary of both ML 1124 and ML 7064, while the Capembah Creek terrestrial GDE area overlaps the western boundary of ML 7064.

Impacts to areas of GDEs, and the natural values that they support, have been minimised through mine planning, including the implementation of creek buffers.

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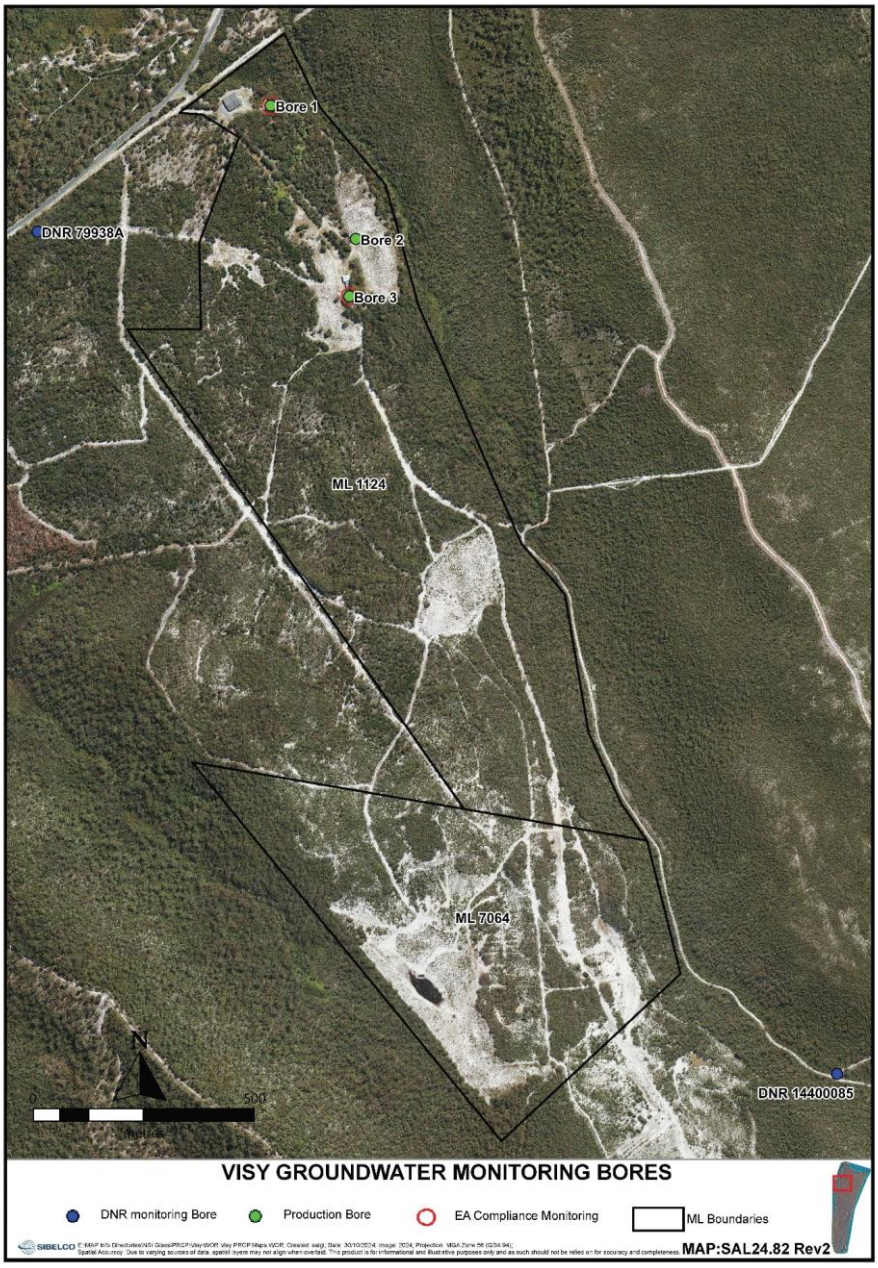

Figure 7 Groundwater monitoring bores

2.1.7 Soil Types, Property and Productivity

The soil types, property and productivity underlying the Project have been determined based on soils mapping undertaken on Minjerribah by Thompson and Ward (Thompson & Ward, 1975) cited by Overton (Overton, 2006).

2.1.7.1 Soil Types and Productivity

Two major soil types were mapped for the Project area (Thompson & Ward, 1975). A general description of the land units identified is given in Table 4**.** The occurrence and distribution of soil types on Minjerribah is shown in Figure 8.

Table 4 Description of soil types

Soil mapping unit	Dominant soil[1]	Description
Arawoolum	Podzol (deep)	Deep soils with acid peaty/organic sand soils with highly organic and humic surficial (A1) soil horizons, locally with white fine sandy (A2) subsoil over organic rich subsoil (B) horizons
Oyerpunya	"Giant" Podzol	Deep soils with thick moderate to highly organic and humic surficial (A1)) soil horizons, over deep white fine sandy (A2) subsoil horizons

The pre-mined soils across many of the operations comprised of Podzols[1] on aeolian silica sand parent materials. Podzols are soils with high porosity and low clay content and high infiltration rate that have been subject to varying degrees of leaching of the sesquioxides from the surface layers depending on slope position. The sesquioxides give fresh dune sand its yellowish colour, but in well-developed Podzols, the bleached A2 horizon (the layer below the topsoil) is white and can stretch for several metres below the soil surface (the so called Giant Podzols that typically occur on crests and slopes of older dunes).

Similar Deep and Giant Podzols have been observed at neighbouring Vance on the same landform (URS Corporation, 2007). The surficial (A1) horizons are generally dark grey or black in colour and contain moderately high amounts of organic matter. At Vance, the organic rich surface A1 horizons (topsoils) are usually between 0.3-0.6 m thick (though they can be up to 1.0 m in places).

With regards to presence of potential acid sulphate soils, it is noted that acid sulphate soils typically occur in areas of elevation below 20 mAHD, particularly in coastal areas. The Acid sulfate soils series mapping on Queensland Globe shows that acid sulphate soils are not mapped in the Project area, and the base of excavations, limited to the high bleached sands of the deep Podosols, is at an elevation above 30 mAHD (Geo-Eng, 2024). The soils are naturally acidic due to their low buffering capacity and leaching effects of naturally occurring organic acids. However, no potentially acid sulphate soil material would have been or will be disturbed by the mining operation.

The nature of the land and soils within the Project area are not well suited to agricultural productivity and the most suitable land use is for the conservation of native vegetation.

[1] This is the Great Soil Group classification (of Stace et al. 1968 and Northcote et. al. 1975). In the Australian Soil Classification (ASC) of Isbell & NCST (2021) which has superseded the Great Soil Groups as the Australian Standard, the soils would likely be classified as Aeric or Semiaquic Podosols.

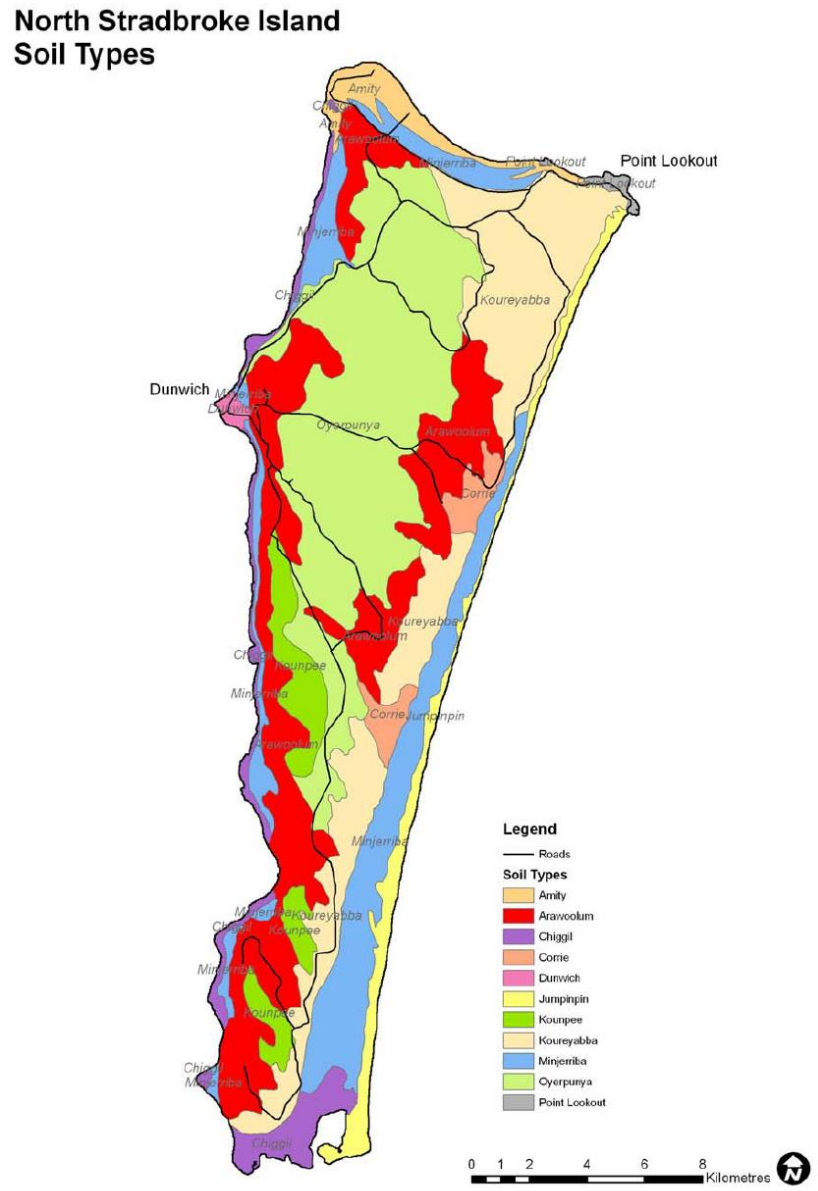

Figure 8 Major soil types mapped on North Stradbroke Island (Thompson & Ward, 1975)

2.1.7.2 Topsoil Resources

Useable topsoil resources are mainly confined to the surficial (A1) horizon materials, which is higher in organic matter, contains seed-stock, micro-organisms and nutrients necessary for plant growth. Soil microbial activity, organic matter content and other parameters affecting soil fertility, tend to decrease with depth.

The depth of useable topsoil resource has not been investigated for the Project area, however, a soils investigation of the neighbouring Vance Project found the median depth of useable topsoil resource to be 0.4-0.5 m, and this is generally the depth available in areas mined to date.

Although the surface soils are strongly acidic and have generally low fertility, they support native vegetation communities adapted to acid low nutrient environments. Most plant nutrients are held in the living vegetation and made available through decomposition of vegetative litter and nutrient cycling. As the mined areas will be returned to native vegetation similar to that which occurred pre-mining, the quality of the soil available is suitable and indeed beneficial for this PMLU. The acid conditions and low nutrient status provide a poor environment for weed establishment.

2.1.8 Land Stability

The terrain within the lease area and throughout much of the central and northern part of North Stradbroke Island consists primarily of north-westerly trending sand ridges and hills with varying crestal elevations which have resulted from the superimposition of different generations of transgressive wind driven dune stacking. These sand hills reach elevations over 200 mAHD in the vicinity of Mount Hardgrave. The upland areas exhibit a strongly undulating to low hilly surface form, with slopes mostly in the range of 10-20% on the upper slope margins. Elsewhere, narrow more sharply rounded dune ridge crests occur which have somewhat steeper marginal slopes (15-30%) increasing to 30-60% on the adjacent steep irregular planar ridge slopes to the narrow but mainly broadly depressional drainage lines (URS Corporation, 2007).

In general, the more elevated upland areas and the more exposed higher parts of some north-east facing dune slopes have been subject to moderately severe surface erosion by wind and the remnant vegetation is sparse to moderately dense. On the more protected south-west facing slopes and elsewhere on the mid to lower dune slopes and in drainageways, the vegetative cover is dense to very dense and the effects of erosion appear significantly lower (URS Corporation, 2007).

An erosion investigation undertaken by URS (URS Corporation, 2007) found that soil erosion within the adjacent Vance Project area largely occurred through surface sheet/wind erosion. This was associated with clearing of vegetation/ ground disturbance for access and mining exploration tracks and the experience that areas of low ground cover are more susceptible to erosion effects.

The results of infiltrometer testing demonstrated the top 500 mm of the soil profile has an average saturated permeability of approximately 23 metres per day (m/d). This rapid percolation of water means that for overland flow to occur, the rainfall intensity must meet or exceed approximately 1000 millimetres per hour (mm/hr). Soil erosivity (K factor in the Revised Universal Soil Loss Equation or RUSLE) is a function of soil particle size, soil organic matter content, infiltration rate and soil structure. It has been

calculated using on existing soils mapping and soil analysis data from SAPL's sand mining operations on Podzols on Minjerribah. With a soil erodibility rating (K value) of 0.0045, soil erosivity is classed as very low according to the ratings of Rosewell and Loch (Rosewel, 1993). This is further discussed in **Section 7.5.**

Although the unsaturated permeability will be lower at the beginning of a storm event when soils are dry, surface water runoff is uncommon and the surface water erosion risk is low. As the nature of the post-mining soil profile (recovered sandy topsoils over residual bleached A2 sands) is expected to have the same properties in the long-term, rehabilitated and vegetated landforms are expected to be stable in the long-term. Nevertheless, during the operation and rehabilitation of the mine, erosion and sediment control measures were implemented to mitigate its effects.

There may also be a period during early rehabilitation prior to ground cover establishment where the presence of the stabilising bituminous emulsion (applied to rehabilitated areas from 2018 to minimise wind erosion) may reduce infiltration and promote surface run off on steeper slopes. This emulsion breaks down within approximately 12 months and rapid infiltration and a negligible surface water erosion risk would be expected beyond this initial establishment phase. Monitoring and routine inspections backed up with trigger values and corrective actions have been used to manage erosion (refer to **Section 10**).

2.1.9 Flora and Vegetation Communities

2.1.9.1 Bioregion

The Project area is located in the South East Queensland (SEQ) bioregion which extends over 6,248,417 ha and is comprised of 14 subregions. The Project area falls within the Sunshine Coast – Gold Coast lowlands sub-bioregion (the sub-bioregion). The sub-bioregion extends over 348,000 ha from Noosa Heads to Tweed Heads. The sub-bioregion is characterised largely by eucalypt forests and low lying woodlands (Queensland Government, 2024).

2.1.10 Vegetation Communities

Historic surveys of vegetation communities and flora have been undertaken on ML 1124 (Wildthing Environmental Consultants, 1996), and ML 7064 (Outline Planning Consultants, 1999).

Vegetation communities predominantly consisted of open forest, banksia wallum, mallee heath and wetland, with banksia wallum being the most abundant in both MLs. Regional ecosystems (REs) associated with these vegetation communities are described in Table 5.

Table 5 Vegetation communities verified within the Project area

RE	Short description[1]	VM Act class	Biodiversity status (EP Act)
12.2.10	*Eucalyptus planchoniana* +/- *Corymbia gummifera*, *E. racemosa* subsp. *racemosa*, *Banksia aemula* low woodland on dunes and sand plains, especially southern sand mass island. Usually deeply leached soils	Of concern	Of concern
12.2.6	*Eucalyptus racemosa* subsp. *racemosa* open forest on dunes and sand plains. Usually deeply leached soils	Least concern	No concern at present

Note: [1]Regional Ecosystem Description Database (REDD) (Queensland Herbarium, 2023)

One threatened flora species, Tiny Wattle (*Acacia baueri* subsp *baueri*), was identified in banksia wallum along the drainage line of Cooroon Cooroonpah Creek on ML 7064 in October 1997 (Wildthing Environmental Consultants, 1996). A small patch of the same species has also been found on the northern end of ML 1124, along East Coast Road.

Plates 1-4 show some example images of the remnant reference sites for both REs.

Plate 1. Reference site V20
Remnant RE 12.2.10 reference site (Ausecology, 2018)

Plate 2. Reference site 60-62
Remnant RE 12.2.10 reference site (Ausecology, 2018)

Plate 3. Reference site V17
Remnant RE 12.2.10 reference site (Ausecology, 2018)

Plate 4. Reference site V12
Remnant RE 12.2.10 reference site (Ausecology, 2018)

State mapped Matters of State Environmental Significance (MSES) are shown in Figure 9.

2.1.10.1 Culturally Significant Flora

The Rehabilitation Plan lists the following flora species identified by the Minjerribah Moorgumpin Elders as being of cultural significance (Unimin Australia Limited, 2009):

- Forest Boronia (*Boronia rosmarinifolia*) which occurs in low open dry heath habitat along the exposed ridge tops and in relatively low abundance in the *Eucalyptus pilularis* open forest

- Safrole Boronia (*Boronia safrolifera*) which occurs in low open dry heath habitat along the exposed ridge tops
- Wallum Boronia (*Boronia falcifolia*) which occurs in closed wet heath

2.1.10.2 Weed Species

Due to the low edaphic nutrient content typical of dune vegetation communities, the risk of weed infestation in rehabilitation areas is considered low. However, the presence of weeds was monitored through inspections of rehabilitated areas. Annual rehabilitation monitoring did not record significant weed numbers within disturbed, rehabilitated, and non-disturbed areas.

To minimise potential movement of weed material onto and within operational areas, specific machinery was designated for use at the site and before any non-designated machinery or vehicles entered the site, measures were taken to ensure they were free of adhering soil and plant material.

An effective weed control program was also implemented on site and included:

- Effective management methods to control spread of declared weed species, in keeping with management practices
- Ongoing monitoring of the project site to identify any new incidence of weed infestation
- Provision of information for project staff on the identification of declared weeds
- Dedicated machinery serviced on site and restricted to onsite use
- Wash down protocols for any non-dedicated machinery or vehicles introduced to the site

Annual rehabilitation monitoring reports up until 2022 indicate that no significant weed numbers were identified within ML1124 and ML7064. This demonstrates the effectiveness of the weed control program employed by SAPL (Unimin Australia Limited, 2009). Recent monitoring reports from 2022 and 2023 (Ausecology) have indicated low (less than 1% foliage projective cover) presence of *Megathyrsus maximus* and *Praxelis clematidea* at monitoring sites, with monitoring of these species continuing across the rehabilitated sites.

Figure 9 Matters of State Environmental Significance

2.1.11 Fauna Presence and Populations

2.1.11.1 Historic Desktop Assessment and Ecological Survey

A historic survey of fauna was undertaken on ML 1124 (Wildthing Environmental Consultants, 1996), and on ML 7064 (Outline Planning Consultants, 1999). This included fauna observation and trapping survey methods.

The wallum tree frog (*Litoria olongburensis*), listed as vulnerable under the NC Act was identified off-lease in a drainage line outside the eastern area of ML 1124.

2.1.11.2 Updated Desktop Assessment and Ecological Survey

An ecological assessment was conducted by BAAM Ecological Consultants (BAAM Ecological Consultants, 2014) to evaluate the habitat values for terrestrial fauna within rehabilitated areas and un-mined remnant reference sites. This survey provided a comprehensive overview of the ecological composition across multiple mining leases on the island, offering a general ecological context for the region.

Several conservation significant species listed under the NC Act and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were observed or indicated across the island, during the survey. Scats of Koala (*Phascolarctos cinereus*) (listed as vulnerable under both the NC Act and the EPBC Act) were collected from various sites across the island, and Koalas were observed nearby the Vance survey sites. The Glossy Black Cockatoo (*Calyptorhynchus lathami*) (Vulnerable under the NC Act) was not observed during the survey. However, some evidence of feeding activity was found within all rehabilitation areas. Other species observed on the island included the Wallum Sedge Frog (*Litoria olongburensis*) (Vulnerable under both the NC Act and the EPBC Act), the Wallum Froglet (*Crinia tinnula*) (Vulnerable under the NC Act), the Grey-headed flying fox (*Pteropus poliocephalus*) (Least Concern under the NC Act, Vulnerable under the EPBC Act), and the Common Death Adder (*Acanthophis antarcticus*)(Near threatened under the NC Act).

A recent desktop ecological assessment identified seven conservation significant fauna species listed under the NC Act and EPBC Act that have historically been recorded within a 1 km buffer of the Project area (source WildNet Wildlife Online database search and the Protected Matters Report (PMR) generated by the Protected Matters Search Tool). This includes the Koala which is listed as Endangered under the NC Act and EPBC Act. Furthermore, a review of the MSES wildlife habitat mapping on Queensland Globe (Queensland Government, 2024) indicates that approximately 20% of the site is mapped as wildlife habitat for endangered or vulnerable fauna species under the NC Act and core Koala habitat.

Pest fauna within the Project and surrounding area identified by terrestrial ecology surveys include (BAAM Ecological Consultants, 2014):

- Dingo/Dog (*Canis familiaris* (dingo)/*Canis familiaris*)
- Fox (*Vulpes vulpes*)
- Feral Cat (*Felis catus*)
- House Mouse (*Mus musculus)*
- Cane Toad (*Bufo marinus*)

2.1.12 Pre-Mining Land Use

Prior to mining commencing on ML1124 and ML7064, the land was described as Native Ecosystem or bushland (Queensland Government, 2024).

A search of available historical aerial imagery on QImagery (Queensland Government, 2024) was conducted. The best available imagery from before mining commenced in 1971 was taken in 1967 and shows the Project area to be heavily vegetated.

The Quandamooka people, as the traditional owners of Minjerribah, have a long history of utilizing the area. In 1999, the Quandamooka Land Council Aboriginal Corporation (QLC) conducted a survey within ML7064, revealing the deep connection of the Aboriginal community of Quandamooka to Minjerribah. Specific areas like Brown Lake and its surroundings were actively utilized by traditional owners for various purposes, reflecting their longstanding presence and cultural significance in the region.

2.1.13 Cultural Heritage

Cultural heritage surveys have been undertaken on both ML 1124 (AGES Australia Pty Ltd, 1997) and ML 7064 (Wildthing Environmental Consultants, 1996). These surveys did not identify any archaeological sites on either ML. However, Cooroon Cooronpah Creek (located off-lease) and Capembah were identified as significant sites.

2.1.14 Identification of Underlying Landholders

The tenure of the two land parcels, Lot 17 on Plan SP296433 and Lot 151 on Plan SP297202, underlying the Project tenements ML1124 and ML7064 respectively is detailed in Table 6.

Non Exclusive Native Title has been granted over the subject land under the Native Title Determination with the Quandamooka Yoolooburrabee Aboriginal Corporation (QYAC) registered native title body corporate (RNTBC).

Table 6 Land Parcels within ML1124 and ML7064

Tenement	Land Parcel	Holder	Tenure	Area (ha)	Current Usage
ML1124	Lot 17/SP296433	State of Queensland	State Land	81.46	Mining, mine ancillary infrastructure, including processing plant, water management infrastructure
ML7064	Lot 151/SP297202	Seqwater	Reserve	45.20	Mining, mine ancillary infrastructure, including slurry and water pipelines, power lines, tracks and roads, water holding dams

2.2 Project Description

Sand mining at Glass ceased in 2007. Current activities focus primarily on rehabilitation monitoring and maintenance. This section provides a detailed description of previous mining activities and historical information.

2.2.1 Mining Tenements

The Project is located within ML1124 and ML7064, making up a total area of 126.66 ha (Table 7). Both mining leases will expire on the 31 October 2025, with no possibility of extension.

A partial surrender was completed for approximately 141 ha of ML1124 on the 09 January 2019. ML1132 was previously authorised under the Project EA and has since been surrendered.

Table 7 Details of mining tenure

Permit	Lease holder as listed	Granted	Expiry	Area (ha)	Permit sub-type
ML1124	Visy Glass Operations (Australia) Pty Ltd	24 April 1975	31 October 2025	81.46	Mineral
ML7064	Visy Glass Operations (Australia) Pty Ltd	31 May 2001	31 October 2025	45.20	Mineral

2.2.2 Completed Mining Activities

During operations, mining activities involved open cut excavation with dry mining methods. The target mineral deposit was accessed by laterally working an active mining face into the side of the dune rather than vertically from the surface. Excavated sand (ore) was transported by conventional heavy mobile equipment and placed in a mobile Dry Mining Slurry Unit (DMSU).

The sand slurry was pumped from the DMSU to the separation plant on ML1124, where the sand was separated using gravity suspension techniques to extract the silica sand from the ore and remove impurities such as heavy minerals, organic matter and fines. The processed silica sand was stockpiled for drainage and then trucked to a marine export facility located at Dunwich, for shipping to the port of Brisbane. Heavy mineral materials were concentrated and stockpiled for sale. Reject materials (fine silica and clay) were pumped away with wash water and settled out in process dams.

Sand slurry (mixture of sand and water) had comparable characterisation to mined silica sand and was therefore suitable for management (and rehabilitation) within the process water dams.

The mine has ceased operation and there are no ongoing mining or processing operations taking place within the Project tenements.

2.2.3 Primary Mine Features

Primary mine features of the Project include the rehabilitated void areas and ancillary mine infrastructure, including a processing plant. The disturbance areas are described in Table 8 and shown in Figure 10.

Progressive rehabilitation of the site has been underway since 1975 on ML 1124, and since 2002 on ML 7064 All mobile plant and temporary infrastructure not necessary for rehabilitation activities have been removed. Partial surrenders have been completed for some of the rehabilitated mine area.

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Table 8 Final land use and rehabilitation approval schedule (generally per EA Schedule F – Table 1)

	Disturbance area (Ha)		Land description		Capability Classification				
Disturbance type	**Permitted**	**Maximum**	**Pre-mine**	**Post-mine**	**Pre-mine land**	**Post-mine land**	**Infrastructure Type (Ha)**	**Status**	**Rehabilitation Area**
Nursery	0.1	0.005	Native ecosystem	Landowner*	1	Landowner*	Nursery 0.005	Removed	RA1 – ER**
Maintenance workshop	0.04	0.040	Native ecosystem	Landowner*	1	Landowner*	Mechanical Workshop – 0.04	On-site	RA2c – OC**
Administration buildings	2.76	0.025	Native ecosystem	Landowner*	1	Landowner*	Weighbridge – 0.006	Removed	RA1 – ER**
							Amenities – 0.001	Removed	RA1 – ER**
							Office – 0.006	Removed	RA2a – UR**
							Lab & Rehab Shed – 0.01	Removed	RA1 – ER**
							Crib Room – 0.002	Removed	RA1 – ER**
Vehicle parking	0.10	0	Native ecosystem	Landowner*	1	Landowner*	N/A		
Processing plant	5	1.156	Native ecosystem	Landowner*	1	Landowner*	Separation Plant – 0.022	Removed	RA1 – ER**
							Fuel Storage – 0.002	Removed	RA2a – UR**
							Concrete Footpaths – 0.012	Removed	RA1 – ER**
							Bore #1	On-site	RA3 –RI**
							Bore #2	On-site	R2b – TR**
							Bore #3	On-site	RA3 – RI**
							Energex Infrastructure – 1.12	On-site	RA3 – RI**
Stockpile	10	0.55	Native ecosystem	Landowner*	1	Landowner*	Dry Stockpile Storage Shed – 0.09	Removed	RA2a – UR**
							Open Stockpiles – 0.46	Removed	RA1 – ER**
Mine area	573	89.2	Native ecosystem	Landowner*	1	Landowner*	Mining Areas – 88.5	Revegetated	RA1 – ER**
							Process Dams – 0.7	Revegetated	RA1 – ER**
Haul roads	7.0	0.12	Native ecosystem	Landowner*	1	Landowner*	Stockpile Haul Road – 0.12	Removed	RA1 – ER**
Access Roads	13.0	0.68	Native ecosystem	Landowner*	1	Landowner*	Bitumen Road – 0.24	On-site	RA3 – RI**
							Gravel Road – 0.44	On-site	RA3 – RI**
Tracks	17	5	Native ecosystem	Landowner*	1	Landowner*	Sand Tracks – 5.0	Revegetated	RA1 – ER**

*Post-mine classification to be determined by landowner

**RA1 – Existing Rehabilitation, RA2a – Under Rehabilitation, RA2b – To be Removed, RA2c – Ongoing Consultation, RA3 – Retained Infrastructure

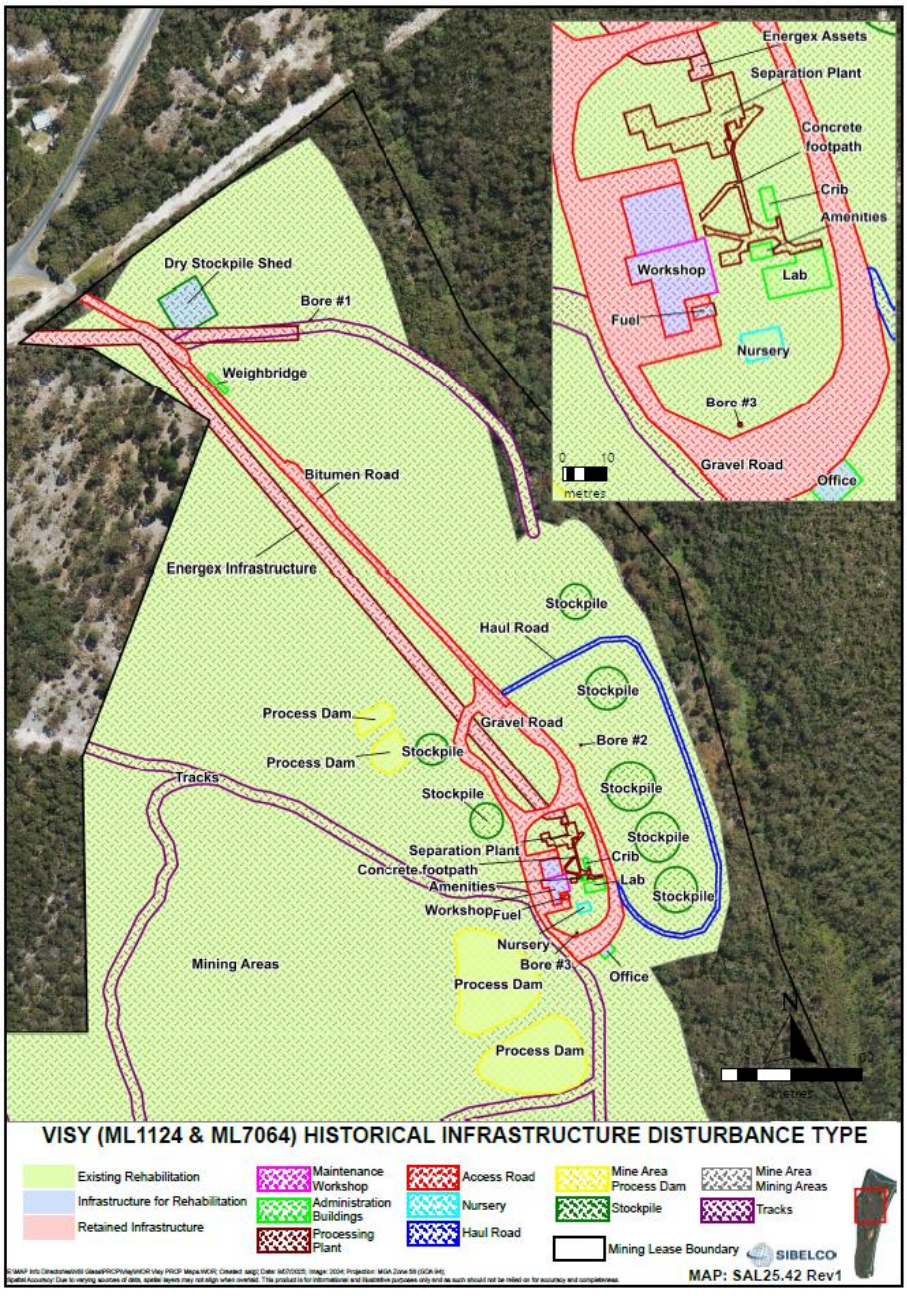

Figure 10 Glass historical infrastructure disturbance type

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2.2.4 Type of Mining Operation

Mining was undertaken by means of contour type strip mining. The target mineral deposit was accessed by laterally working an active mining face into the side of the dune rather than vertically from the surface. The residual void is therefore not internally draining and has been blended into the surrounding dune formations.

Silica sand mining was undertaken on the site from 1973 to 2007, with processing activities continuing until 2014. The mine has ceased operation and there are no ongoing mining operations taking place at the site. Historical mining operations are described in **Section 2.2.2**.

2.2.5 Proposed Duration of Operation

Mining of silica sand was undertaken from 1973 – 2001 on ML 1124, and from 2001 – 2007 on ML 7064. Processing of ore from the neighbouring Vance operations continued on ML 1124 until 2014.

The Project's mining leases are due to expire 31 October 2025. However, no further mining activities will occur on site and have not occurred since operations ceased.

All rehabilitation activities of the mine area were completed by 2021, with monitoring and maintenance of these areas planned to be ongoing until 2038 (Refer to the PRCP Schedule in **Appendix C**). Historically completed rehabilitation is shown in Error! Reference source not found..

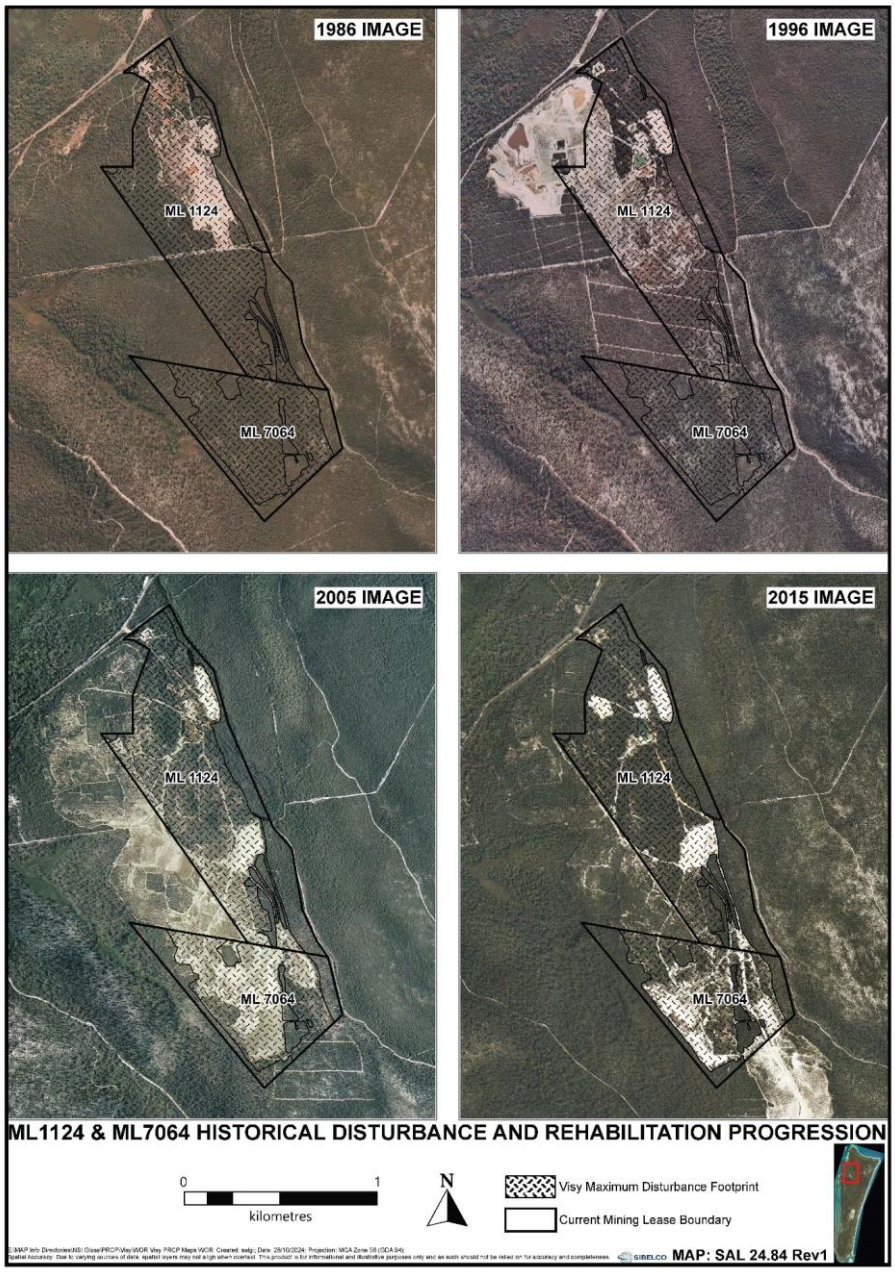

Figure 11 Historical rehabilitation

2.3 Design for Closure

This section of the PRCP is typically used to outline how progressive rehabilitation and closure has been considered in the design and operation of the project site. However, as the Project is non-operational and in the final stages of rehabilitation, future considerations of design for closure are not applicable. The following sub-sections therefore provide an overview of how the completed Project was broadly designed with respect to closure.

It is acknowledged that transitional PRCP are not required to demonstrate how aspects of the mine site have been designed for closure for existing or approved disturbance.

2.3.1 Location of Mine Features/Infrastructure

Locations of completed mined areas are shown in Figure 10**.** Whilst authorised at these locations, it is acknowledged that the Project was designed to minimise impact on the following to the extent possible:

- Protection of the environmental values of the site and receiving environment, including MNES, MSES, and Matters of Local Environmental Significance (MLES)
- Surrounding land uses and proximity to sensitive receptors
- Local and regional topography
- Surface and groundwater features (quality, quantity, seasonal variation)
- Geotechnical conditions (i.e., soil/rock characteristics)
- Competing water and land uses
- Visual impact

2.3.2 Design of Mine Features

As described in **Section 2.2.3**, key mine features include the rehabilitated mined areas and ancillary mine infrastructure.

Mining activities were conducted in a way that enabled progressive rehabilitation activities to proceed behind extraction activities, limiting the area of disturbance at any one time and facilitating effective rehabilitation of mined areas.

The operational void design considered post-mining final landform stability and was intended to seamlessly blend in with the surrounding landform at closure, as guided by the relevant rehabilitation objectives and completion criteria established in the Rehabilitation Plan (Unimin Australia Limited, 2009).

2.3.3 Mining Methods

Mining ceased at the site in 2007. The mining methods used on the site are described in **Section 2.2.2**. No other mining method was feasible.

2.4 Rehabilitation Planning

The areas for rehabilitation planning are located within the bounds of ML 1124 and ML 7064. There are no improvement areas planned.

2.4.1 Objectives

The Project's objectives for rehabilitation have been outlined in LODs made under conditions of the EA (**Section 1.2**). The overarching objectives of mine rehabilitation in relation to the Project are to (Unimin Australia Limited, 2009):

- Create a final landform that meets design criteria
- Establish stable final landforms with comparable erosion rates to reference sites
- Establish landforms that have been reshaped as close as practicable to the aspect orientation appropriate to the climax community
- Establish self-sustaining native vegetation communities

2.4.2 Overview of Rehabilitation Areas

Three Rehabilitation Areas (RAs) and zero Improvement Areas (IAs) have been established for the Project. These areas are outlined in Table 9 and further detailed in the PRCP Schedule.

Table 9 Rehabilitation and improvement areas

Area No.	Area description	Post mining land use	Area (ha)
RA1	Rehabilitated areas	Native ecosystem	94.8
RA2	Infrastructure	Native ecosystem	0.15
RA3	Retained Infrastructure	Retained Infrastructure	1.8
		Total (ha)	**96.7**

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2.4.3 Rehabilitation by Year

As mining has ceased and disturbed areas have been rehabilitated, it is not appropriate to produce year by year rehabilitation mapping. Progressive rehabilitation of mined areas has occurred, and this progression is presented in Figure 11. For future rehabilitation refer to the PRC Plan Schedule (Appendix C) and final site design Figure 12.

2.4.4 Duration of Relevant Activities

Mining activities ceased on ML 1124 and ML 7064 in 2001 and 2007, respectively. Processing activities for the neighbouring Vance mine continued to occur on ML 1124 until 2014, after which all operations on the site had ceased. The site has been undergoing progressive rehabilitation since 1975 (ML 1124) and 2002 (ML 7064).

Progressive rehabilitation was completed as part of the mining cycle, with rehabilitation activities undertaken as areas were mined out. Planning for closure was a key consideration of this process, limiting the Project's disturbance footprint at any one time, and enabling disturbed areas to become available for rehabilitation relatively quickly.

Progressive rehabilitation activities have been completed for all mined areas and they are now in care and maintenance.

2.4.5 Availability for Progressive Rehabilitation

As the planned rehabilitation has been completed and only requires on-going maintenance, there is no need to plan for progressive rehabilitation. Where applicable, remaining rehabilitation activities have been identified and scheduled in the PRCP Schedule.

For the remaining infrastructure areas (RA2), is it anticipated that these areas will become available for rehabilitation by the end of 2025. This timeline will allow for a decision to be reached by the landowner on infrastructure they wish to retain, and the establishment of a landholder agreement as required.

2.4.6 Existing Rehabilitation

Progressive rehabilitation has been completed since 1975 as land became available for rehabilitation. All available disturbed areas, including all mined areas, have now been fully rehabilitated and are subject to ongoing monitoring and maintenance as per the Rehabilitation Plan.

No applications for progressive certification have been submitted for the Project, however partial surrenders have been completed for approximately 141 ha of ML1124. This included successfully rehabilitated mined areas achieving completion criteria.

Rehabilitation to date has focused on establishing vegetation with similarities to the pre-disturbance floristic and structural characteristics of the surrounding vegetation communities. This includes the establishment of species that are both ecologically and culturally significant (refer **Section 2.1.9**). Former drill pads have been passively rehabilitated by means of mulching, rehabilitation and natural recruitment.

Plate 5 through to **Plate 8** show examples of previously disturbed areas that have been rehabilitated (Ausecology, 2018).

Plate 5. Rehabilitated site 'V7' within ML 1124

Image of a rehabilitated disturbed area, analogous to RE 12.2.10

Plate 6. Rehabilitated site 'V6' within ML 7064

Image of a rehabilitated disturbed area, analogous to RE 12.2.6

Plate 7. Rehabilitated site 'A51' within ML 7064

Image of a rehabilitated disturbed area, analogous to RE 12.2.10

Plate 8. Rehabilitated site 'V25' within ML 7064

Image of a rehabilitated disturbed area, analogous to RE 12.2.10

All rehabilitation within the Project's ML has been completed per the methodology described in **Section 7.** Generally, this included the following steps:

1. The open area was contoured to the required shape
2. Local topsoil was spread across the contoured landform to a nominal 200 mm thickness
3. A native seed mix was sown, with stabilising products used more recently (since approximately 2010) to protect the topsoil against wind and rain
4. Native species tubestock was planted into the stabilised area

As noted in **Section 2.2.5** and **Section 2.4.3,** all mine areas within the Project MLs has been rehabilitated. This is shown in Error! Reference source not found..

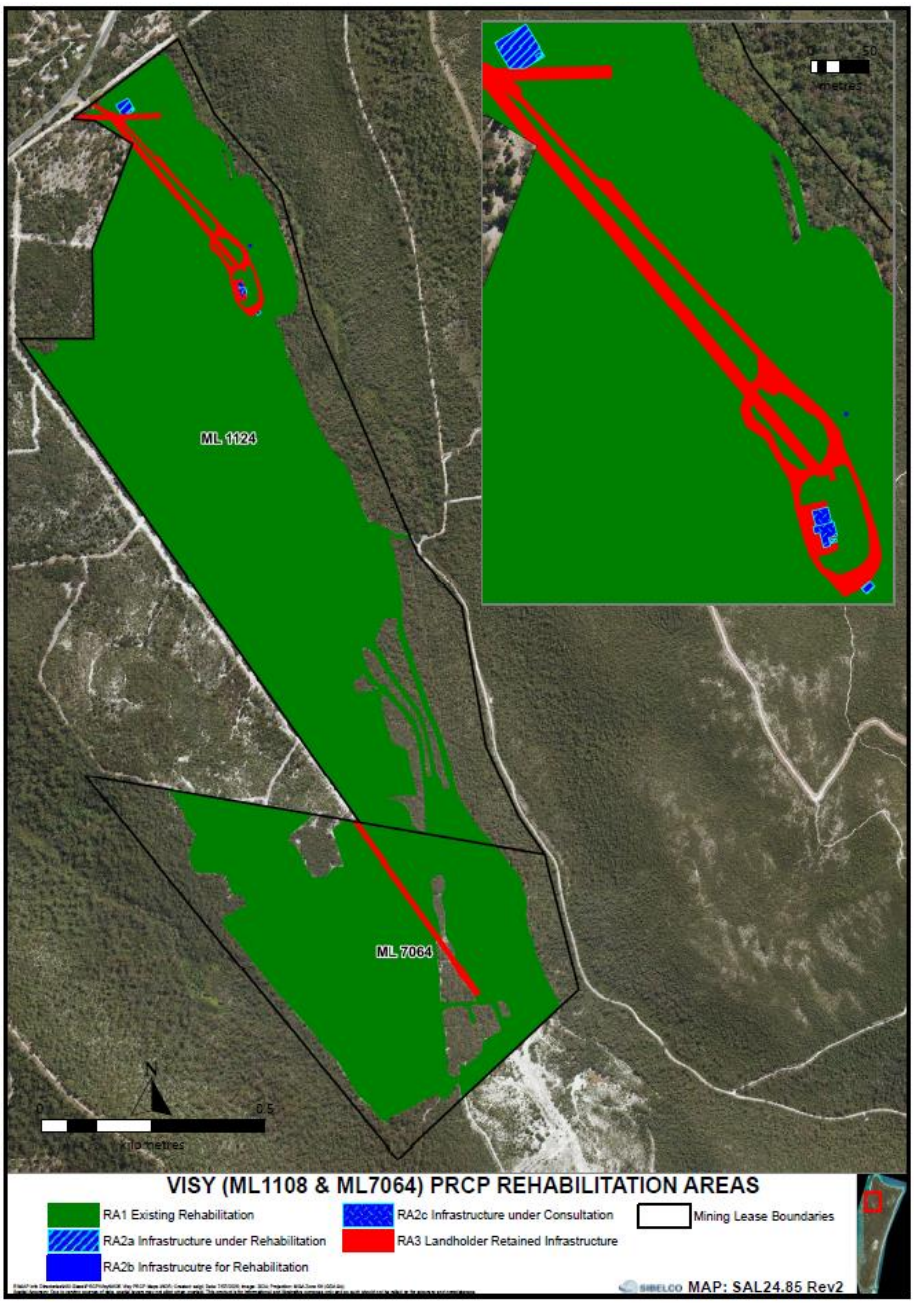

Figure 12 Rehabilitation areas

3 Community Consultation

This section of the PRCP outlines information on stakeholders and community consultation.

3.1 Stakeholder Consultation

SAPL has undertaken engagement with the community throughout the Project. Though detailed consultation records from start of operation to nearing the end of operations within leases ML1124 and ML7064 in the early 2000's are not available.

The following groups/stakeholders have been consulted in relation to the Project:

- Environmental Protection Agency (EPA) (now known as DETSI)
- Friends of Stradbroke Island (FOSI)
- Stradbroke Island Management Organisation (SIMO)
- Quandamooka Yoolooburrabee Aboriginal Corporation (QYAC)
- Redland Shire Council
- Department of Natural Resources Mines and Energy (DNRME, now DRMDW and DoR)

Significant stakeholder consultation was completed in relation to rehabilitation methodologies used on the Glass Project during the approval of the EIS for the neighbouring Vance Project. It was noted that stakeholders initially questioned the success rate of the proposed rehabilitation methodologies. However, Unimin provided evidence of success regarding rehabilitation works involving the Index of Similarities on all rehabilitated areas reaching the set level for two consecutive years on its other leases. Stakeholders reviewed this progress and found the works satisfactory and as a result these rehabilitation practices were continued to be used within the Glass project and were retained for the Vance Project (URS Corporation, 2007).

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3.1.1 Relevant Stakeholders

For the purpose of this PRCP, the community area has been defined as the communities and surrounding areas of the town of Dunwich within the Redland City Council LGA. This area encompasses directly impacted landholders as well as members of the Minjerribah community and various organisations (including government, industry, service providers, adjoining landholders and community groups) who may have an interest in rehabilitation and the post mining land use of the Project site. The relevant stakeholder groups identified by SAPL are presented in Table 10.

Table 10 Categorisation of relevant stakeholders

Category	Relevant stakeholders	Identified groups/individuals relevant to the Project
Federal, State and Local Government Representatives	Government representatives at the Federal, State and Local Government level, including, local representatives and Government agencies responsible for the regulation of the Project.	Federal • Federal Member for Bowman
		State • State Member for Oodgeroo • Department of Environment, Science, Tourism and Innovation

Category	Relevant stakeholders	Identified groups/individuals relevant to the Project
		• Department of Resources
		Local Government • Redland City Council – Mayor and Councillors
Special Interest Groups	Community organisations and groups such as social clubs/associations, schools, childcare facilities, and environmental groups.	• Friends of Stradbroke Island (FOSI) • Stradbroke Island Management Organisation (SIMO) • Dunwich Progress Association •
Indigenous Stakeholders	Traditional owner groups, local land councils, other Indigenous organisations	• Minjerribah Moorgumpin Elders in Council • Quandamooka Yoolooburrabee Aboriginal Corporation (representing the Koenpul, Ngugi and Nunukul peoples)
Local Community	Residents or visitors to Minjerribah who may have an interest in the Project.	• Residents of Minjerribah • Visitors to Minjerribah
Direct Landholders	Property owners within the MLs	• Lot 17 on Plan SP296433 (State Land) • Lot 151 on Plan SP297202 (Reserve Land)
Adjoining Landholders	Residents located adjoining the site which may experience impacts during operation and rehabilitation (visual impact, noise, dust, traffic).	• Landholders within a 5 km radius of the Project boundary

3.1.2 Consultation Tools and Information

A range of consultation tools have been utilised in the past and will continue to be utilised where suitable moving forward. These tools include:

- Direct stakeholder contact, such as telephone calls, emails, and face-to-face meetings and site inspections
- Coordination of a SAPL Community Survey, which was aimed at identifying the community preferences for the Island's future (previous tool)

Future engagement of stakeholders for the Glass project is anticipated to be around the retention of assets and surrender of the associated leases, given that the rehabilitation of the mined area within the Glass project is practically complete at the time of this document. As such future engagement is anticipated to use the methods described in Table 11.

Table 11 Stakeholder and community engagement

Stakeholders	Type of Engagement				
	Passive			Active	
	Newsletter/ community update	Letter	Complaints register	Individual meetings	Phone calls / emails
Federal Member for Bowman					✓
State Member for Oodgeroo	✓				✓
Department of Environment, Science and Innovation		✓		✓	✓
Department of Resources		✓		✓	✓
Redland City Council	✓	✓			✓
Special Interest Groups	✓		✓		
Indigenous Stakeholders	✓	✓	✓	✓	✓
Local Community	✓	✓	✓		
Direct landholders	✓	✓	✓	✓	✓
Adjoining landholders	✓	✓	✓		✓

3.1.3 Consultation Register

Key consultation undertaken since SAPL acquired the site has been detailed in Table 12. This has included consultation with QYAC on site rehabilitation activities and post-mine uses for site infrastructure. Landholder agreements have been established for infrastructure that QYAC wishes to retain, including water bores and access tracks.

Discussions on infrastructure to be retained by QYAC are ongoing at the time of submission, with QYAC indicating interest in retaining further infrastructure. As required, landholder agreements for the retention of site infrastructure will be updated.

Table 12 Consultation register

Timing	Stakeholder(s)	Format	Information Provided/Discussed	Outcomes of engagement and/or actions taken
Community consultation records prior in relation to ML1124 and ML7064 (Glass) not available				
2000	MMEIC & RCC	Site visit	• Inspect rehab on ML1124 and ML7064	Request to support setup of Stradbroke Island flora at community park in Redland shire.
27 September 2005	Queensland Environmental Protection Agency (QLD EPA)	Review of draft ML1108 / Vance ESR	• ESR would be enhanced by outlining the mine path and depth of proposed mining operations • Further information required, including but not limited to results from baseline environmental studies and details of stakeholder consultations	Comments were reviewed and ESR was updated

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Timing	Stakeholder(s)	Format	Information Provided/Discussed	Outcomes of engagement and/or actions taken
			• Establishing the links between environmental values, hazards and identification of risk levels noted in EA conditions	
2007 – 2008	QLD EPA	Review of draft ML1108 / Vance ESR	• Not enough flora rehabilitation reference sites surveyed and concerns over quality of data obtained • Further detail on landform rehabilitation and success criteria required • Potential impacts on threatened species • Bunding of chemical/fuel storage	Instead of re-visiting the issues again in an updated ESR, SAPL and the QLD EPA agreed to address any outstanding concerns within the EMP to be developed as part of the Commonwealth EPBC approval conditions
2008	SIMO	Community review of draft ML1108 / Vance ESR Appendix N	• Request for additional meetings • Location and size of buffers to sensitive areas • Lack of detail for proposed fauna surveys • Final landform design criteria • Amount and detail of proposed revegetation flora/fauna monitoring • Impacts to indurated layers • Rehabilitation performance criteria • Potential impacts to other creeks on the lease and buffers • Mining access to north side of Cooroon Cooroonpah Creek • External facilitation of Community Consultation Committee • Weed/feral animal control • Include additional information (e.g., drainage lines and other features on figures) • Monitoring of Amity Swamp • Hydrological/Hydrogeological regime and potential impacts to creeks and wetlands	• All issues were given full consideration and discussed at length with the regulatory authorities Where agreed appropriate and adding value updates were made to the EMP to incorporate material to address these key stakeholder concerns or interest areas
June 2010	Community	Online information and feedback	• Vision for North Stradbroke Island information • Online request for feedback on vision	Department of Environment and Resource Management distributed information and received feedback regarding the vision for North Stradbroke island
July 2010	Community	Information session	• Vision for Stradbroke Island Information seession	Information session held by Department of Environment and Resource Management held in Cleveland, slideshow included

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Timing	Stakeholder(s)	Format	Information Provided/Discussed	Outcomes of engagement and/or actions taken
				• details of Glass / Vance project. Requesting feedback on Vision for North Stradbroke Island.
April 2013	Community	Letter	• Decision and rationale for ceasing continuous mining at Glass / Vance	• Community were made aware of the changes and the impacts. (Appendix O)
January 2014	DEHP (DETSI)	Letter	• Notification of reduction in activity – NSI Glass / Vance	• For notification only
November 2018	QYAC	Phone calls/emails	• Project infrastructure QYAC seek to retain	• Landholder agreement for retaining fire trails and pipe • Noted and used to confirm the PMLU and Rehabilitation Areas
22 October 2019	QYAC	Meeting	• Project infrastructure QYAC seek to retain	• Landholder agreement for retaining the two bores, all roads (both sealed and unsealed). • Noted and used to confirm the PMLU and Rehabilitation Areas
May 2021	QYAC	Email	• QYAC request for temporary use of Glass front shed for storage of plant and equipment	• Sibelco allowed the temporary storage of plant and equipment
August 2022	QYAC	Email	• QYAC advised SAPL of its intent to utilise and upgrading the rehabilitated sand track network at Glass and Vance operations to meet fire trail prescriptions as part of the implementation of the Minjerribah Township Fire Management Strategy (**Error! Reference source not found.**) (Appendix M)	• Noted
September 2024	QYAC	Phone calls/emails	• Review of existing landholder agreements	• Pending

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3.2 Consultation Plan

Community consultation was previously managed under the Project's EMOS and where applicable through the consultation completed for the neighbouring Vance Project.

As noted in section 3.1.2, rehabilitation is practically complete at the Glass project. Future consultation is anticipated to be focused on the finalisation of rehabilitation, retention of infrastructure and the surrender of the respective leases. The consultation plan has been developed to document engagement with the community and stakeholders required for the PRCP and for future engagement. The consultation plan is presented in Table 13.

Table 13 Community Consultation Plan

Engagement type	Consultation frequency	Information to be included	How will comments / feedback be considered
Community update to share key updates. (Letter / Social Media)	As required	Closure and rehabilitation status updates	Feedback will be requested by email or phone and will be documented in the consultation register. Consideration of all feedback will be undertaken during site management meetings.
Receipt and response to verbal or written Complaint.	When received	Details of complaint and response to complaint matter	Reason for complaint and response provided will be documented in the consultation register. Consideration of the complaint will be undertaken during site management meetings.
Individual Meetings (Incoming Land Holder)	As required	Closure and rehabilitation status / Asset retention	Meeting notes will be documented in the consultation register. Consideration of all matters raised at the meeting will be undertaken during site management meetings.
Individual Meeting (DETSI)	As required	Where an update to the PRCP or Schedule is required	Meeting notes will be documented in the community consultation register. Consideration of advice provided by the Administrating Authority will be considered any update to the PRCP or Schedule.
Surrender application (DETSI / QYAC)	As required	Surrender application including Final rehabilitation reports for assessment	Feedback will be received and actions taken to address.
Annual Environmental Report (DETSI)	Annually	Information relating to compliance with the Glass EA	Feedback will be received and actions taken to address.

QYAC has advised SAPL of its intent to utilise and upgrade the existing but rehabilitated track network at Glass and Vance operations to meet fire trail prescriptions as part of the implementation of the Minjerribah Township Fire Management Strategy (Appendix M) to SAPL dated 09/08/2022). The map of the access tracks to be utilised is shown in Figure 13. QYAC now utilise and maintains the fire trail for this purpose.

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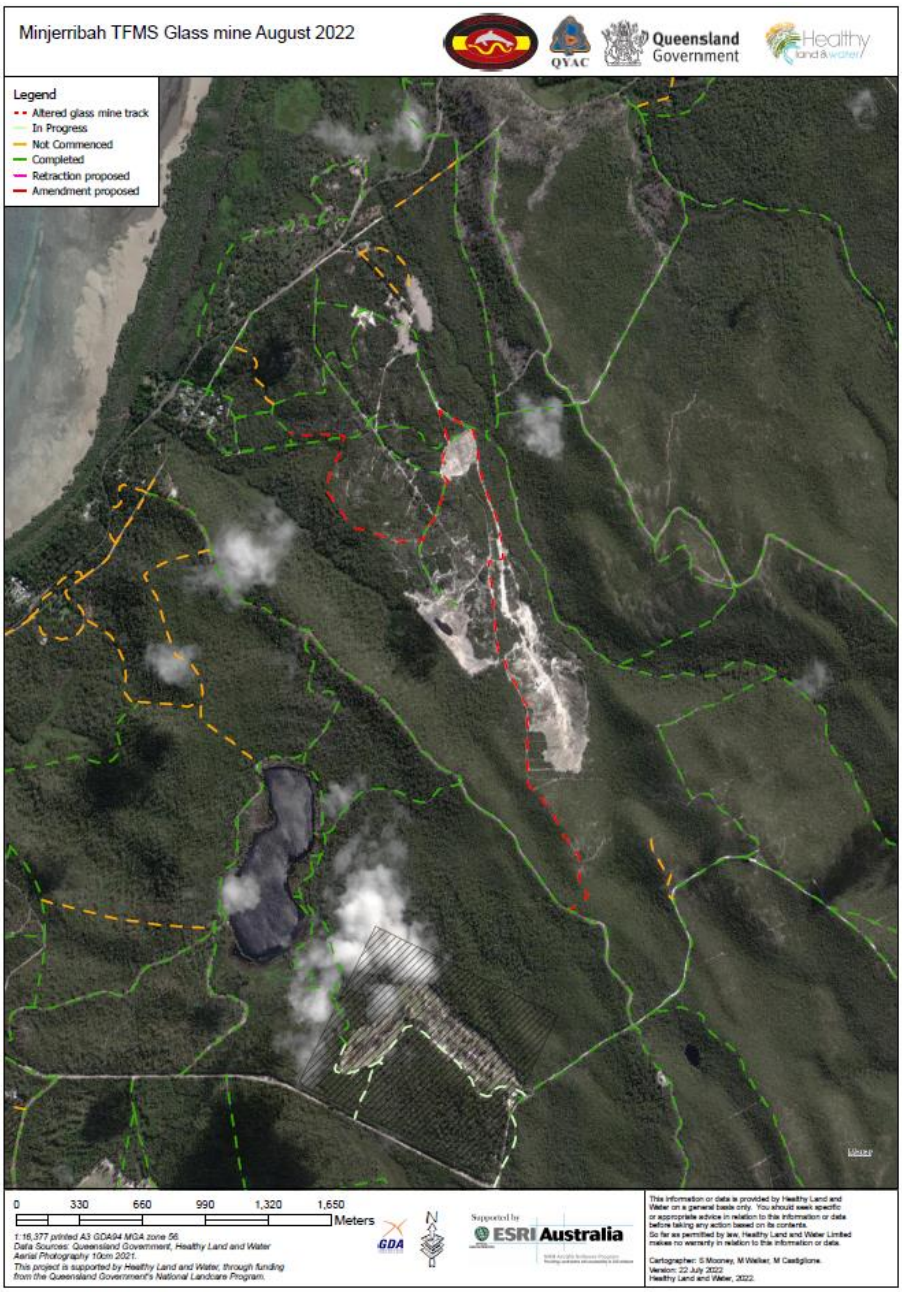

Figure 13 Access tracks to be retained, as provided by HLW on 9 August 2022

3.3 Public Interest Considerations

There are no new NUMAs proposed for the Project. PMLUs are consistent with existing LODs. As such, a public interest evaluation is not required.

4 Post-Mining Land Use

During preparation of this PRCP the Queensland Government's Mined Land Rehabilitation Policy was considered which outlines the importance of identifying suitable post-mining land uses with regard to the surrounding landscape, community views and the objectives of any local and regional planning strategies. Per the Progressive Rehabilitation and Closure Plan Guideline, a PMLU is defined under s112 of the EP Act as the purpose for which the land will be used after all relevant activities for the PRCP carried out on the land have ended. Further, the Guideline provides several examples of potential PMLUs that can be considered (but are not limited to), such as:

- Native ecosystem
- Habitat and ecosystem services
- Agriculture
- Forestry
- Industrial
- Landfill
- Water storage

4.1 PMLU Criteria and Relevant Legislation

In accordance with section 126C(1)(d) of the EP Act, the RPP of the PRCP must state the extent to which each post-mining land use for land identified in the PRCP schedule for the Plan is consistent with:

a. The outcome of consultation with the community in developing the Plan, and
b. Any strategies or plans for the land of a local government, the State or the Commonwealth.

In order for a proposed PMLU to be accepted, the PRCP schedule must demonstrate that the land can be rehabilitated to a stable condition in accordance with the section 111A of the EP Act:

Land is in a stable condition if –

a. The land is safe and structurally stable; and
b. There is no environmental harm being caused by anything on or in the land; and
c. The land can sustain a post-mining land use.

Schedule 8A, Part 3, Table 1 of the EP Reg further states that each PMLU –

a. Is viable, having regard to the use of the land in the surrounding region; and
b. Satisfies at least one of the following –
    i. The use is consistent with how the land was used before a mining activity was carried out on the land
    ii. The use is consistent with a development approval relating to the land

iii. The use is consistent with a use of the land, other than a use that is mining, permitted under a State or Commonwealth Act, including, for example, a planning instrument under the *Planning Act 2016*
iv. The use will deliver, or is aimed at delivering, a beneficial environmental outcome.

4.2 Assessment of PMLU Options

4.2.1 Consideration of PLMU Options

PMLU options have been considered as not being viable in relation to the Project's rural location and proposed activities are summarised below.

4.2.1.1 Agriculture

The Project area is classified as Category D agricultural land, which is non-agricultural land and land not suitable for agricultural uses. The soil types that occur within the Project area are dominated by the occurrence of white silica sands that have been subject to strong weathering/leaching. The terrain within the lease area consists primarily of north-westerly trending sand ridges and hills with varying crestal elevations which have resulted from the superimposition of different generations of transgressive wind driven dune stacking. The nature of the land and soils within the Project area are not well suited to agricultural productivity.

4.2.1.2 Landfill

Mining was undertaken by means of contour type strip mining. The target mineral deposit was accessed by laterally working an active mining face into the side of the dune rather than vertically from the surface. The residual void is therefore not internally draining and has been blended into the surrounding dune formations. The PMLU for a landfill is not viable as there is no 'pit' within the final landform which could be utilised for this PMLU.

4.2.1.3 Industrial

An industrial use will not be viable as there will be limited infrastructure on site and is not a practical PMLU. A proposed industrial use will not be consistent with the zoning of the Redland City Plan 2018 (Redland City COuncil, 2023) which zones the Project area as 'conservation'.

4.2.2 PMLU Option Methodology

The methodology employed for determining PMLU options was undertaken as an evidence-based comparison, and subsequent justification of possible PMLU options. The methodology involved the incorporation of community feedback and consultation (**Section 3**), assessment of potential PMLU options specified in the PRCP Guideline and identification of regulatory constraints (Local, State and Commonwealth). A ranking scale was also developed to enable comparison and decision making on the appropriateness of each potential PMLU against the PRCP Guideline criteria for the Project. The higher the score, the more appropriate/well suited the PMLU is. Refer to Table 14 for an overview of the ranking scale and Table 15 for the options analysis.

Table 14 Ranking scale for option analysis

Description	Score	Definition

Inappropriate / incompatible and/or extremely cost prohibitive	1	• Does not comply with regulatory considerations/constraints (Commonwealth, State and Local) • Not able to appropriately manage physical constraints and chemical characteristics • Cannot meet available rehabilitation methods • Cost prohibitive • Unable to provide potential economic, environmental, and social benefits • Incompatible with surrounding landscape and pre-mined landscape • No optionality for retaining/transitioning infrastructure and/or utilities
Moderately in appropriate/ incompatible and/or moderate cost	2	• Partially complies with regulatory considerations/constraints (Commonwealth, State and Local) • May be able to appropriately manage physical constraints and chemical characteristics • Can partially meet available rehabilitation methods • Moderately high cost • Partially able to provide potential economic, environmental, and social benefits • Partially compatible with surrounding landscape and pre-mined landscape • May have optionality for retaining/transitioning infrastructure and/or utilities
Entirely appropriate / compatible and/ or cost effective	3	• Complies with regulatory considerations/constraints (Commonwealth, State and Local) • Able to appropriately manage physical constraints and chemical characteristics • Meets or exceeds available rehabilitation methods • Cost effective • Able to provide potential economic, environmental, and social benefits • Compatibility with surrounding landscape and pre-mined landscape • Optionality for retaining/transitioning infrastructure and/or utilities

Table 15 Potential PMLUs option analysis

PMLU Options (Per PRCP Guideline)	Assessment of Potential PMLUs					
	Native Ecosystem	**Agriculture**	**Landfill**	**Forestry**	**Industrial**	**Retained Infrastructure**
Any regulatory constraints on, or objects for, the proposed land use (e.g. Indigenous Land Use Agreements, site management plan (contaminated land), local and regional land use plans, endangered species, or registered heritage places)	3 No regulatory constraints or objections to this PMLU	1 Incompatible with *Redland City Plan 2018*	1 Incompatible with *Redland City Plan 2018*	1 Incompatible with *Redland City Plan 2018*	1 Incompatible with *Redland City Plan 2018*	3 Compatible with *Redland City Plan 2018*
Physical constraints (e.g. slopes, voids, geology)	3 No physical constraints for this PMLU	1 Significant physical constraints for this PMLU	1 Significant physical constraints for this PMLU	2 Some physical constraints for this PMLU	2 Some physical constraints for this PMLU	2 Some physical constraints for this PMLU
Chemical characteristics (e.g. residual contamination from tailings or other waste disposal)	3 No concern with regards to chemical characteristics of the site	3 No concern with regards to chemical characteristics of the site	3 No concern with regards to chemical characteristics of the site	3 No concern with regards to chemical characteristics of the site	3 No concern with regards to chemical characteristics of the site	3 No concern with regards to chemical characteristics of the site
Available rehabilitation methods, including best practice (e.g. backfill, profile, capping)	3 Site is able to support available rehabilitation methods	1 Site is not compatible to support best practice rehabilitation methods for this land use	1 Site is not compatible to support best practice rehabilitation methods	2 Site is partially not compatible to support best practice rehabilitation methods	1 Site is not compatible to support best practice rehabilitation methods	3 Site is compatible to support best practice rehabilitation methods
Relative costs of each rehabilitation option	3 Cost effective	1 Cost prohibitive	1 Cost prohibitive	2 Moderately high cost to support this PMLU	2 Moderately high cost to support this PMLU	3 Cost effective
Potential economic benefits of each option (e.g. tourism, public use, grazing)	3 Able to provide economic benefit (potentially eco-tourism)	1 Productivity potential would not allow provisiuon potential economic,	2 Able to provide some economic benefits	3 Able to provide economic benefit	3 Able to provide economic benefit	3 Able to provide economic benefit

PMLU Options (Per PRCP Guideline)	Assessment of Potential PMLUs					
	Native Ecosystem	**Agriculture**	**Landfill**	**Forestry**	**Industrial**	**Retained Infrastructure**
		environmental, and social benefits				
Potential environmental benefits of each option (e.g. create wildlife corridors, revegetation)	3 Able to provide environmental benefit from revegetation, wildlife corridors and creation of native habitat	1 No environmental benefits (risk of land degradation)	1 No environmental benefits	2 Partially able to provide some benefit with moderate revegetation	1 No environmental benefits	2 Partially able to provide some benefit by facilitating access
Potential social benefits of each option (e.g. recreational use, public amenity, employment)	3 Able to provide social benefit through public amenity, recreational use	3 Able to provide social benefit through employment	3 Able to provide social benefit through employment and provision of public facilities	3 Able to provide social benefit through employment	3 Able to provide social benefit through employment	3 Able to provide social benefit through access and public amenity
Compatibility with surrounding land uses (e.g. agriculture, ecosystem)	3 Compatible with surrounding land uses	1 Incompatible with surrounding land uses	1 Incompatible with surrounding land uses	2 Partially compatible with surrounding land use	1 Incompatible with surrounding land uses	3 Compatible with surrounding land uses
The land use before the mining activity commenced	3 Compatible with pre-mined land use	1 Incompatible with pre-mined land use	1 Incompatible with pre-mined land use	1 Incompatible with pre-mined land use	1 Incompatible with pre-mined land use	3 Compatible with pre-mined land use
Options for retaining/transitioning infrastructure and utilities such as road and rail transport accessibility as well as power, communications, and water management systems	1 No optionality for retention of infrastructure (all would need to be removed)	2 May have optionality for retention of infrastructure	2 May have optionality for retention of infrastructure	2 May have optionality for retention of infrastructure	2 May have optionality for retention of infrastructure	3 Optionality for retention of infrastructure
TOTAL SCORE	**31**	**16**	**17**	**23**	**20**	**31**

4.3 Selected PMLUs

The selected PMLUs for the Project are informed by the rehabilitation outcomes defined within existing LODs (refer to **Section 1.2)**, community consultation (**Section 3**) and the potential PMLU's option analysis provided in Table 15.

As the Project is an existing operation, existing 'land outcomes' are nominated in a LOD and are proposed to be transitioned into the PRCP schedule (refer **Section 1.2**). The Rehabilitation Plan (Unimin Australia Limited, 2009) meets the definition of a LOD being prepared under condition F2-2 of the EA (being relevant for rehabilitation management and land outcomes) and received by the administering authority before the assent date of the MERFP Act.

Transitional land outcomes for the Project are nominated under the Rehabilitation Plan and provide that all disturbed areas are to be returned to "native bushland". The Rehabilitation Plan is applicable to all disturbed areas, including mined areas and infrastructure areas. The Rehabilitation Plan identifies the rehabilitation objectives, indicators and completion criteria for achieving native bushland areas.

The land outcome established for disturbed areas under the Rehabilitation Plan is consistent with the intention of the EA, which requires the Rehabilitation Plan to guide progressive rehabilitation to a "native ecosystem" outcome (EA Condition F2-1 and F2-2). This follows and builds on the post-mine land description of "bushland" for mined areas under the Project's Environmental Management Overview Strategy (EMOS) (Land and Resource Solutions Pty Ltd, 2002).

Furthermore, the PMLU of native ecosystem is considered the most appropriate for the Project, being consistent with the surrounding land use and informed by community consultation (**Section 3**).

Consultation with landowners has identified beneficial uses for some site infrastructure, with agreements in place for this infrastructure to be retained. Therefore, an infrastructure PMLU is also proposed.

The selected PMLUs are presented in Table 16 and Figure 14.

Table 16 Selected PMLU and Source

Disturbance type	RA and description	Area (ha)	Pre-mining land use	Relevant source LOD	Rehabilitation objective	PMLU
Mine area including voids, sand tracks and other associated infrastructure areas	RA1 - Rehabilitated areas	94.8	Other minimal use (native vegetation)	Rehabilitation Plan	Re-establish the pre-disturbance floristic and structural characteristics of the disturbed community.	Native Ecosystem
Remaining Infrastructure (Stockpile storage shed, admin buildings mechanical workshop,bore 2 etc)	RA2 - Infrastructure	0.15	Other minimal use (native vegetation)	Rehabilitation Plan	Re-establish the pre-disturbance floristic and structural characteristics of the disturbed community.	Native Ecosystem
Retained infrastructure (access, roads, Bore 1 & 3, Energex owned electrical infrastructure[1])	RA3 - Retained infrastructure	1.8	Other minimal use (native vegetation)	Landholder agreement with QYAC	For retention and economic and social benefit of the landholder	Retained Infrastructure

[1] Energex electrical infrastructure remains property of Energex

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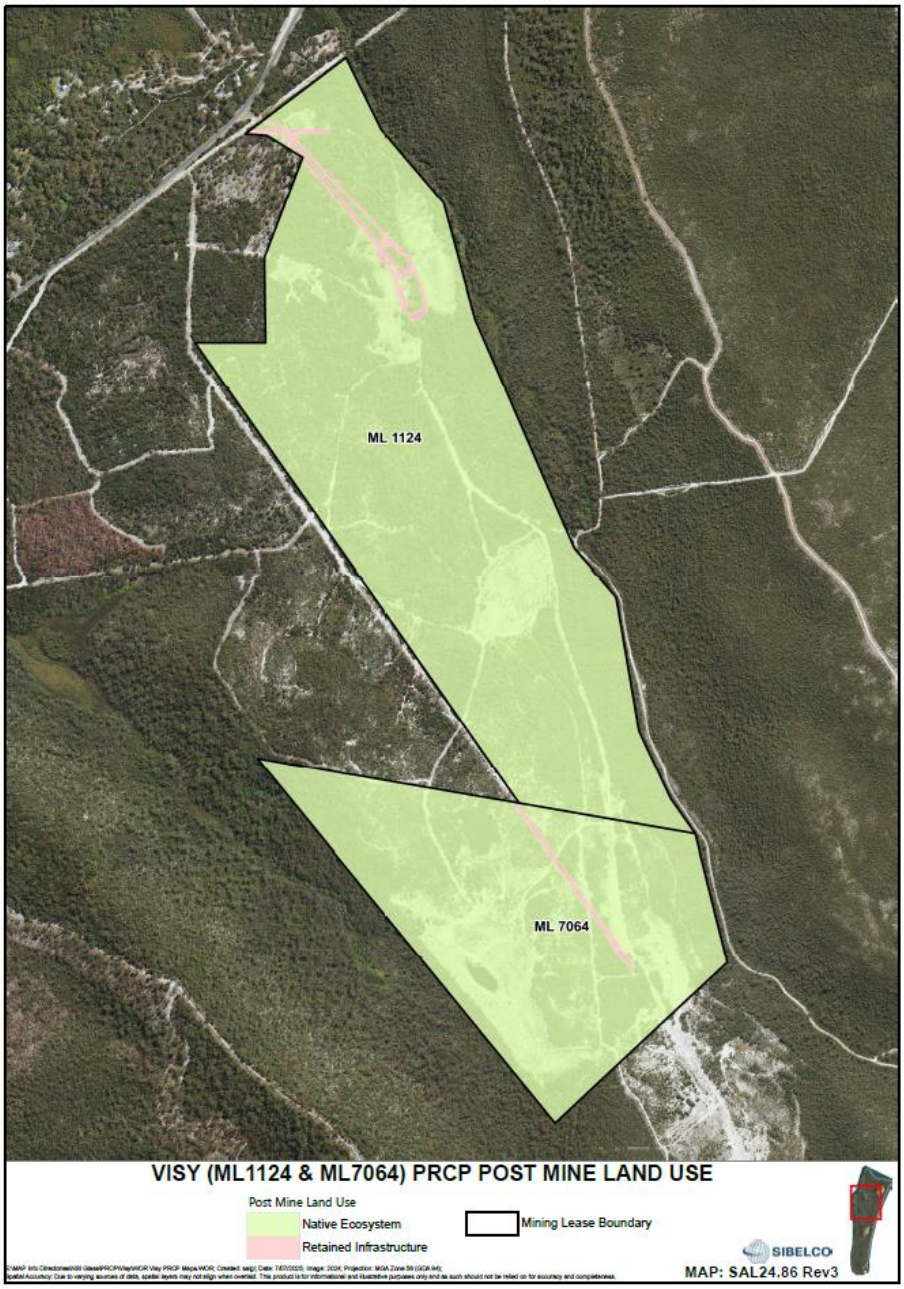

Figure 14 Post Mining Land Uses

4.3.1 Transitional PMLUs are consistent with Community Consultation Outcomes

As discussed in **Section 4.3,** the transitional PMLU of native ecosystem is consistent with the pre-mining land description of the Project disturbance areas and surrounding land uses, and nominated PMLU in LODs. The transitional PMLUs are also consistent with the outcomes of community consultation and is supported by relevant stakeholders (**Section 3**).

During consultation with QYAC, post-mining uses have been identified for some of the Project infrastructure, and is proposed to be retained by these stakeholders under agreement (**Appendix L**).

4.3.2 Transitional PLMUs are consistent with Government Strategies or Plans for the Land

The transitional PMLU of native ecosystem is consistent with relevant strategies and plans for the land at Local Government and State Government levels.

This includes consistency with the *Redland City Plan 2018 (Redland City Council, 2023),* which zones the Project area as 'conservation'.

The transitional PMLU relevant to the retention and repurposing of some infrastructure by QYAC is consistent with QYAC's plans for the land (as a relevant stakeholder and representative body of the Native Title claimants of the area).

The rehabilitation of mined areas and the implementation of PMLUs is also consistent with:

- The vision for Minjerribah more broadly as articulated in the *QYAC Strategic Plan 2022 – 2026* (Quandamooka Yoolooburrabee Aboriginal Corporation, 2022)
- *Shaping SEQ, South East Queensland Regional Plan 2023* (DSDILGP, 2023)

No other plans or strategies (at a State/Commonwealth level) relevant to the PMLUs have been identified.

5 Non-Use Management Areas

There are no Non-Use Management Areas (NUMA) proposed for the Project.

6 Voids in Floodplains

This is a transitional PRCP, and the location and PMLU of the void is specified in LODs. As such, section 126D(3) of the EP Act, which conditions flood plain modelling, does not apply. Although flood plain modelling is not required for this Project, SAPL has rehabilitated the void in a way that minimises environmental harm. The rehabilitated void is consistent with a native ecosystem PMLU.

An assessment of the flooding susceptibility and influence has been undertaken and is presented in **Section 7.2**.

7 Rehabilitation Management Methodology

7.1 Hydrogeology

The groundwater setting and information on groundwater depth and characteristics is provided in **Section 2.1.6**. The following sections provide a hydrological assessment as it relates to the interaction of the site with groundwater resources and how groundwater considerations have been integrated into environmental management and the rehabilitation strategy at Glass.

7.1.1 Groundwater Occurrence

Groundwater occurrence on the Project is documented in the groundwater assessment from the Project's Environmental Impact Statement (EIS) (Gilbert and Sutherland 1999, within (Land and Resource Solutions Pty Ltd, 2002)). This assessment indicated that the groundwater level at the Project is at least 4 m below the bottom of the silica sand resource and therefore well below the base of mining. This was limited by the B Horizon of the soil profile which contains concentrations of clays, iron and alumina which are unsuitable for glass making. As such, mining on the Project did not disturb groundwater.

The Sibelco Groundwater Model (Geo-Eng, 2024) has recently been refined with more accurate topography, especially to reflect the creeks near the Project. Estimated groundwater contours from the model for a near average groundwater table are shown in Figure 15. The model estimates the groundwater table to be within eight meters of the local ground level at the two voids.

Recent groundwater assessments on the neighbouring Vance Project have intersected indurated soil B horizons (known as coffee rock) of varying degrees of induration at depths as shallow as 2.5 m down to depths of 23 m (URS Corporation, 2007). Indurated layers can create discontinuous perched aquifers with the coffee rock acting as a localized aquitard to deep infiltration to the regional ground water below. Multiple layers of coffee rock have been intersected indicating multiple episodes of dune building activity. Regional groundwater depths have been recorded at between 6 m and over 40 m bgl depending on the topography and ground surface elevation.

Dry mining methods were used meaning that the groundwater was not intercepted during mining operations. The mining targeted the white, bleached A2 horizon. As such excavations stopped when yellow sand was encountered providing a 2-3 m buffer above the coffee rock preventing impacts on indurated layers (Land and Resource Solutions Pty Ltd, 2002) and associated perched aquifers and groundwater resources. Hydrogeological assessment has demonstrated that the rehabilitated landform will have minimal impact on the groundwater table (Geo-Eng, 2024), noting that the groundwater will be within 1m and 8m below the lowest points in ML7064..

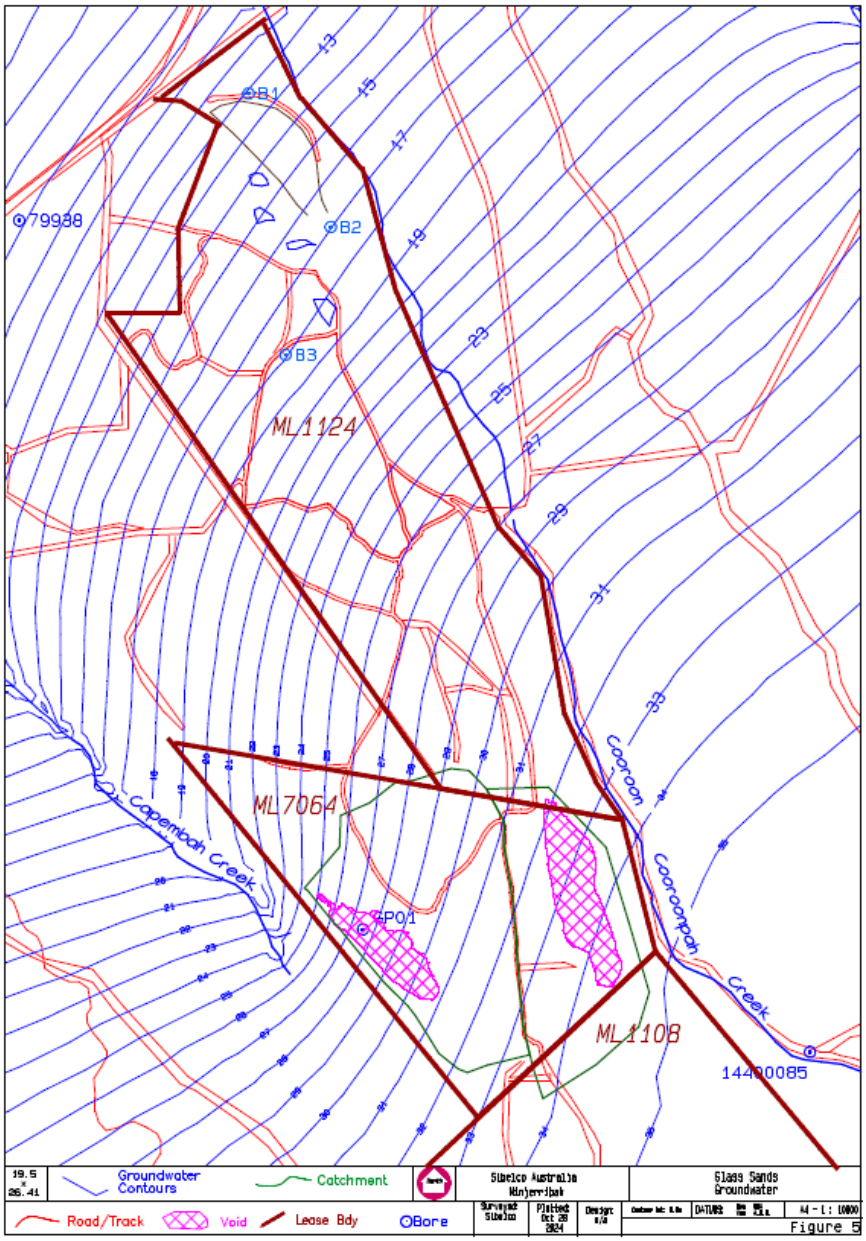

Figure 15 Glass project groundwater model average groundwater level contours (Geo-Eng, 2024)

7.1.2 Groundwater Recharge and Discharge

Groundwater recharge principally occurs from direct rainfall infiltration, due to the highly permeable sandy substrate. Apart from the indurated B-horizon sands, the dune sands are generally permeable and rainfall infiltrates into the ground to the water table (Geo-Eng, 2024).

During the drilling study at Vance, infiltrometer testing holes all exhibited homogeneous sand with very little variation spatially or with depth (URS Corporation, 2007). Results demonstrate that the top 500 mm of the soil profile has an average saturated permeability of approximately 23 m/d. This rapid percolation of water demonstrates that for overland flow to occur, the rainfall intensity must meet or exceed approximately 1000 mm/hr. As such surface water runoff on the lease could only happen in extremely rare circumstances.

The recorded groundwater levels have a high degree of correlation with rainfall and with very little lag time between rainfall, indicating that there is a direct hydraulic connection between Cooroon Cooroonpah Creek and the perched aquifer. As the indurated coffee rock is discontinuous, where it does occur, spillage of the perched water table reports to the deeper regional groundwater. Rainfall recharge studies of the neighbouring Vance Project reported by URS (URS Corporation, 2007), estimated the infiltration rate of between 400 mm/yr and 800 mm/yr (but more likely 600 mm/yr to 800 mm/yr), or 23 to 47% of average rainfall is recharged to the regional aquifer. Higher rates of infiltration are expected during the early stages of rehabilitated vegetation establishment. However, as the taller vegetation becomes established the infiltration will reduce and the evapotranspiration rates will increase to normal levels. The net effect of changes to infiltration to the water table is expected to be small and not significant compared to the measured natural fluctuations in water table levels of about 6 m (Geo-Eng, 2024).

Regional groundwater within areas potentially affected by mining flows to the north and west of the area towards the northwest coast. Groundwater discharge from the site will principally occur into freshwater streams and swamps near the coast and lateral seepage to Moreton Bay.

Small water bodies, both perched and groundwater table window lakes, are found across the island. Perched water bodies (e.g., Swallow Lagoon) are located where there is underlying low-permeability cemented sands (Geo-Eng, 2024). Cooroon Cooroonpah Creek is located to the east of the Project MLs, and Capembah Creek is located to the west. Cooroon Cooroonpah Creek is supported by a perching layer above the prime water table for most of its length, until its northwestern end. Thus, it is usually dry, with flows only occurring after heavy rain. Capembah Creek intersects the groundwater table at about 24mAHD, about 10 m lower than the lowest point in the mining area, 200 m to the east (Geo-Eng, 2024).

The closest water body to the Project is Brown Lake. Brown Lake is a large, perched lake to the Southwest of the Project. Historical studies had found that regional groundwater does not flow into Brown Lake (URS Corporation, 2007). Lake water levels are strongly correlated to seasonal rainfall.

7.1.3 Groundwater Quality and Levels

The EMOS (Land and Resource Solutions Pty Ltd, 2002) identified that the installation of and extraction of groundwater from production bores would lead to temporary lowering of the groundwater level during operations, but that this would have no significant impact on groundwater. It also stated that impacts to groundwater resources would cease upon mine closure with the cessation of pumping from the production bores. Recent hydrogeological assessment supports that the pumping would not have long term impact to the groundwater table (Geo-Eng, 2024).

Groundwater monitoring has been undertaken in the vicinity of the Project since 2008. Average groundwater level results relevant to Glass monitoring bores is provided in Table 17.

Table 17 Groundwater level monitoring for Glass and surrounding operations

Groundwater monitoring bore details			**Groundwater level**		
Bore I.D.	**Monitoring location**	**Purpose**	**Min RL (m)**	**Max RL (m)**	**Average RL (m)**
Bore 1	ML 1124	Regional Groundwater Quality and Level	10.62	12.09	11.46
Bore 3	ML 1124	Regional Groundwater Quality and Level	17.28	20.61	18.60
DNR Bore 14400085	ML 1108 - Cooroon Cooroonpah Creek buffer	Regional Groundwater Level	31.39	37.49	34.36
DNR Bore 79938	Immediately north of ML1124	Regional Groundwater Level	6.66	8.71	7.59

Groundwater monitoring records are available from water supply bores (including EA monitoring points Bore 1 and Bore 3) and two long-term groundwater monitoring bores (DNR Bore 799338 and 14400085) located near the mined area. Recorded groundwater levels are shown in **Figure 16**. This data confirms that bore pumping has not had a significant long-term impact on the groundwater table, as is confirmed by comparing the groundwater monitoring levels before and after 2015 when bore pumping ceased **(Geo-Eng, 2024)**. An evident smoothing of the hydrograph is noted from the end of 2015, when bore pumping ceased.

Analysis of groundwater levels from the regional bores (DNR Bore 799338 and 14400085) and cumulative rainfall totals demonstrates groundwater is highly responsive to rainfall, with levels responding positively to rainfall and declining during drier seasons (**Figure 17** and **Figure 18**).

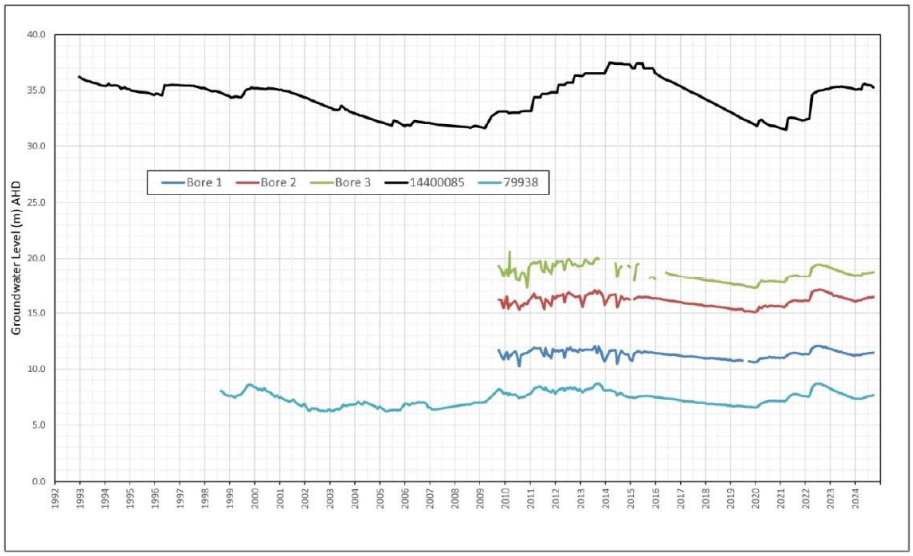

Figure 16 Groundwater Monitoring Levels (Geo-Eng, 2024)

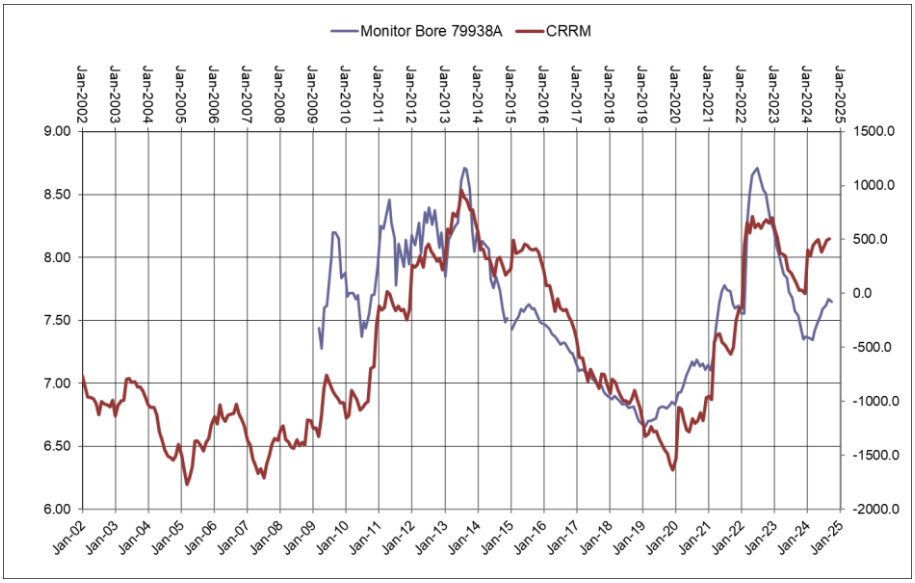

Figure 17 Response of Groundwater Levels to Cumulative Rainfall (DNR bore 79938A)

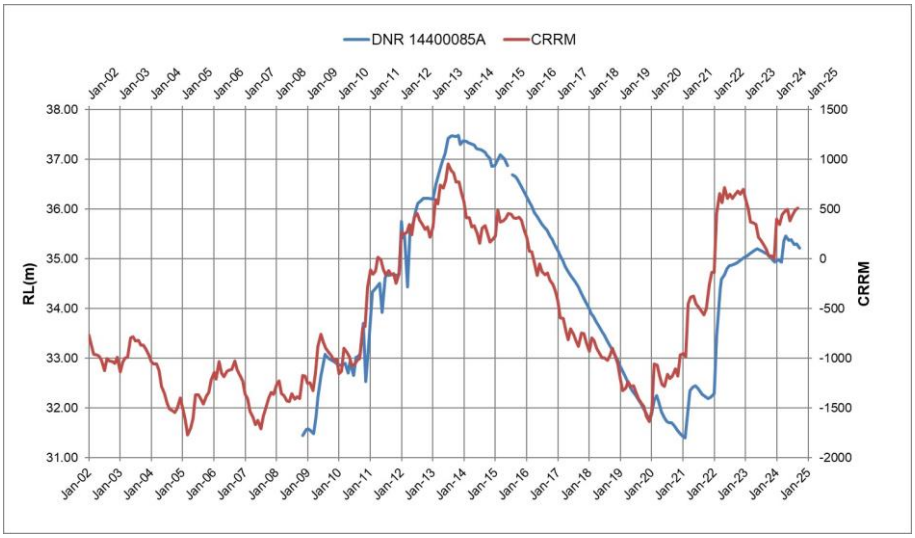

Figure 18 Response of Groundwater Levels to Cumulative Rainfall (DNR bore 14400085A)

Groundwater monitoring of the site has shown that the ground water chemistry is similar to the chemistry of rainfall, being slightly acidic with total dissolved solids less than 100mg/L (Geo-Eng, 2024). Water quality monitoring for the Project has been undertaken since 2008. The 20th and 80th percentiles for the various sites monitored are detailed in Table 18.

The mining and processing methods used on the Project did not include the use of any process chemicals or potential pollutants (Land and Resource Solutions Pty Ltd, 2002). The ore and exposed sand are highly leached and benign and not a source of potential acid or metalliferous mine drainage. As a result, there are no known contaminants of concern that could enter surface waters or ground waters within the mining lease area (Geo-Eng, 2024).

Table 18 Groundwater quality monitoring data from Glass bores (2008 – 2024)

Parameter (unit)	20th	80th
pH (pH Unit)	4.4	5.6
Conductivity (µS/cm)	63	83
Turbidity (NTU)	0.5	6.3
Sulphate	2	2
Chloride	16	20
Sodium	10	12
Calcium	0.9*	0.9*
Nitrate	0.02	0.33
Phosphate	0.009*	0.009*

(In mg/L unless stated otherwise)
*Below the laboratory limit of reporting (LOR)

Figure 19 depicts recorded pH levels for bore 1 & bore 3 from 2008 to 2024. The minimum pH was recorded at 3.9pH units, while the maximum pH was recorded at 6pH units. The average pH for the monitoring time period was 4.8pH units for bore 1 and 5.2pH units for bore 3.

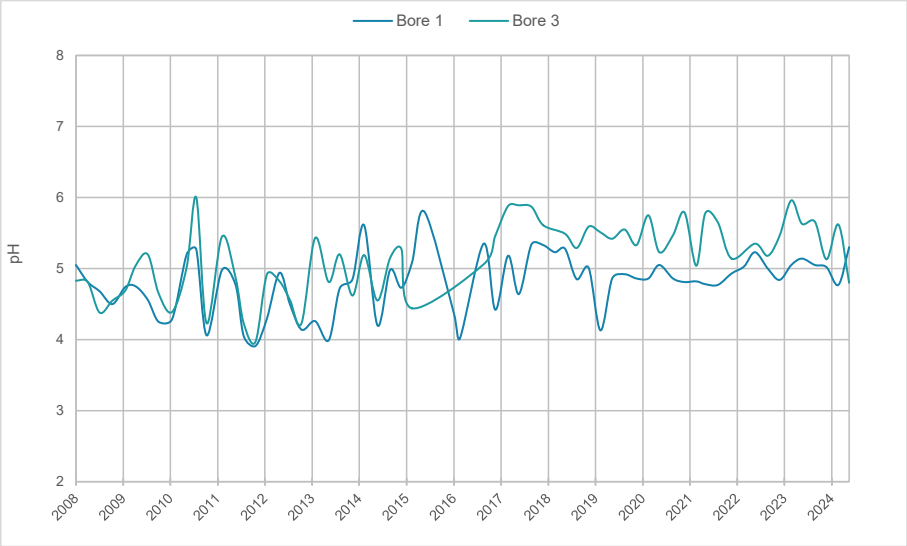

Figure 19 Groundwater quality – pH

Figure 20 depicts recorded conductivity levels for bore 1 & bore 3 from 2008 to 2024. The minimum conductivity was recorded at 37µS/cm, while the maximum conductivity was recorded at 132µS/cm. The average conductivity for the monitoring time period was 71µS/cm for bore 1 and 76µS/cm for bore 3.

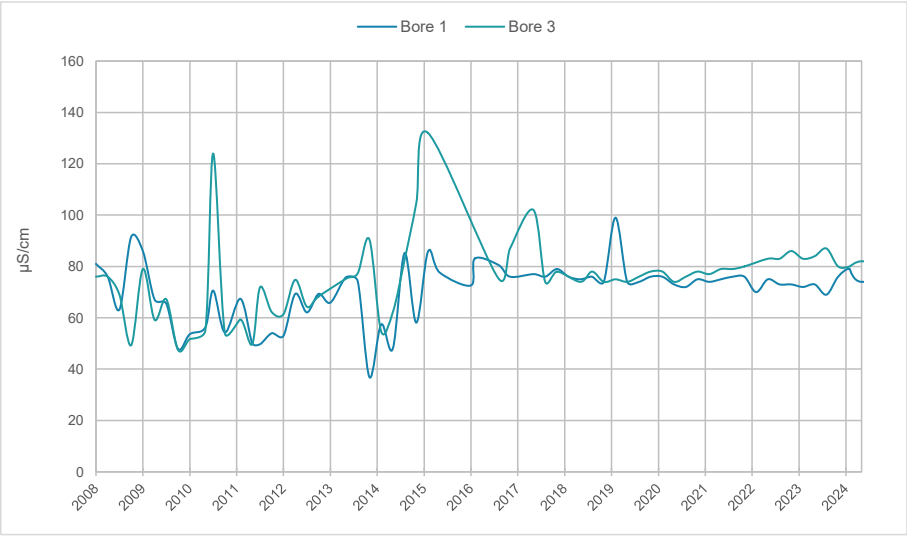

Figure 20 Groundwater quality – Conductivity

Figure 21 depicts recorded turbidity levels for bore 1 & bore 3 from 2008 to 2024. The minimum turbidity was recorded at 0ntu, while the maximum turbidity was recorded in one instance at 124ntu. The average turbidity for the time period was 2.9ntu for bore 1 and 8.1ntu for bore 3. The temporary elevation of turbidity in 2017 was deemed to be in relation to the bore casing causing false elevated readings. Noting that turbidity returned to typically recorded levels as depicted in **Figure 19**.

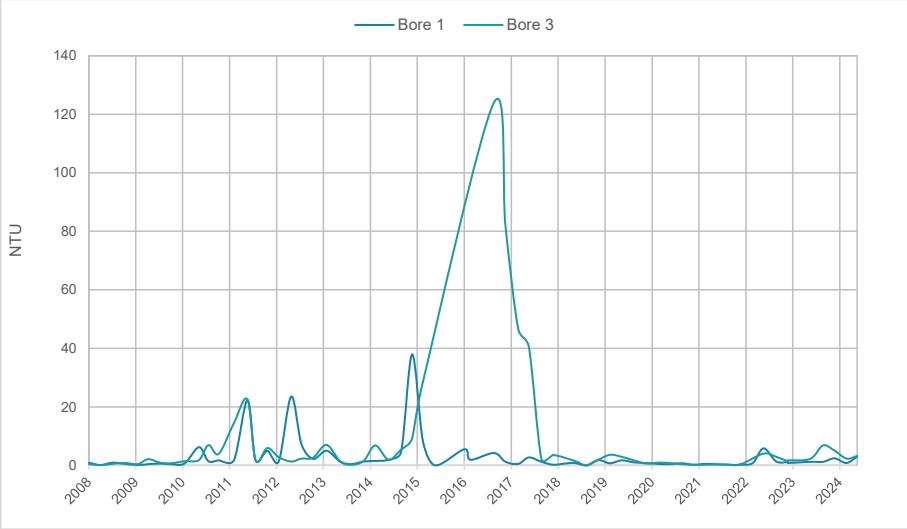

Figure 21 Groundwater quality – Turbidity

Figure 22 depicts recorded sulphate levels for bore 1 & bore 3 from 2008 to 2024. The minimum sulphate was recorded at <1mg/L (1mg/L LOR), while the maximum sulphate was recorded in one instance at 7mg/L. The average sulphate for the time period was 2.1mg/L for bore 1 and 2.2mg/L for bore 3.

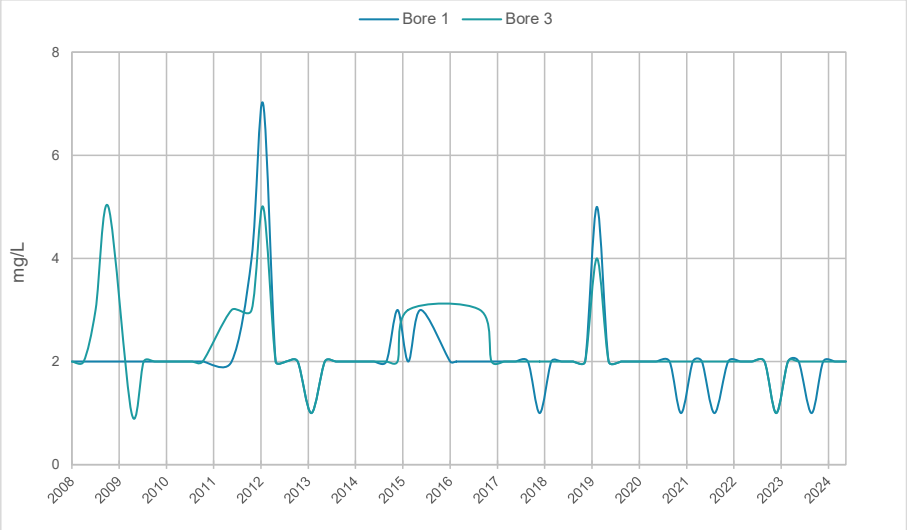

Figure 22 Groundwater quality - Sulphate

Figure 23 depicts recorded chloride levels for bore 1 & bore 3 from 2008 to 2024. The minimum chloride was recorded at 2mg/L, while the maximum chloride was recorded in one instance at 33mg/L. The average chloride for the time period was 17.2mg/L for bore 1 and 18.1mg/L for bore 3.

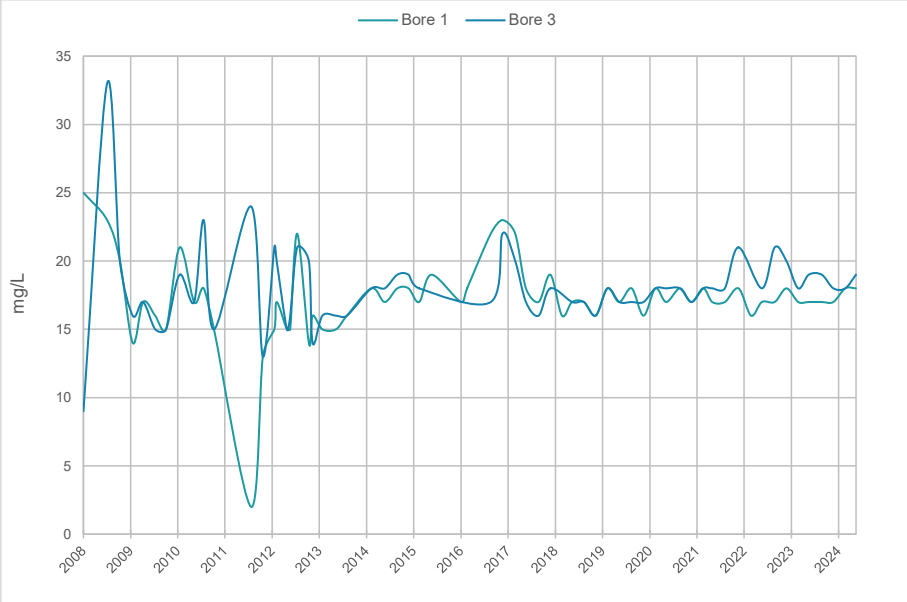

Figure 23 Groundwater quality - Chloride

Figure 24 depicts recorded sodium levels for bore 1 & bore 3 from 2008 to 2024. The minimum sodium was recorded at 9mg/L, while the maximum sodium was recorded at 14mg/L. The average sodium for the time period was 10.7mg/L for bore 1 and 10.8mg/L for bore 3.

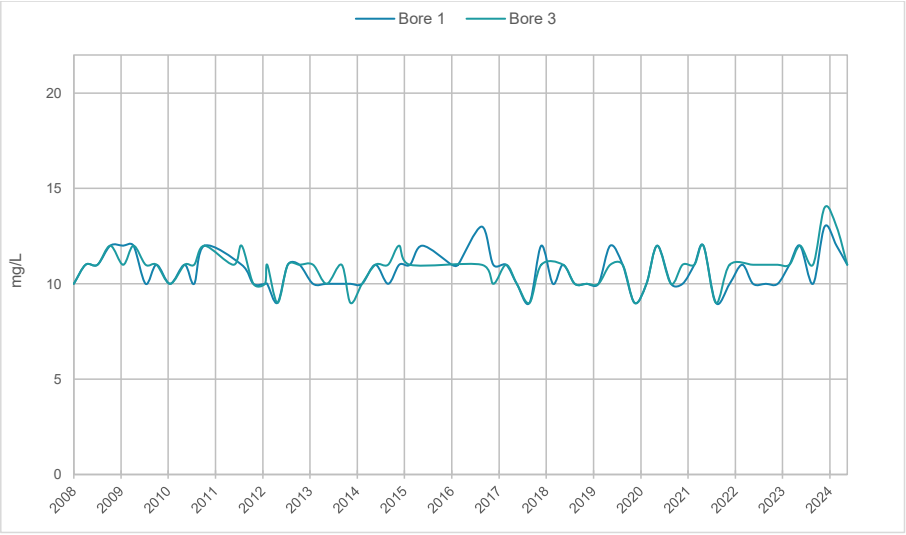

Figure 24 Groundwater quality - Sodium

Figure 25 depicts recorded calcium levels for bore 1 & bore 3 from 2008 to 2024. The minimum calcium was recorded at <1mg/L (1mg/L LOR), while the maximum calcium was recorded at 1mg/L. The average sodium for the time period was 0.9mg/L (<LOR) for both bore 1 and bore 3.

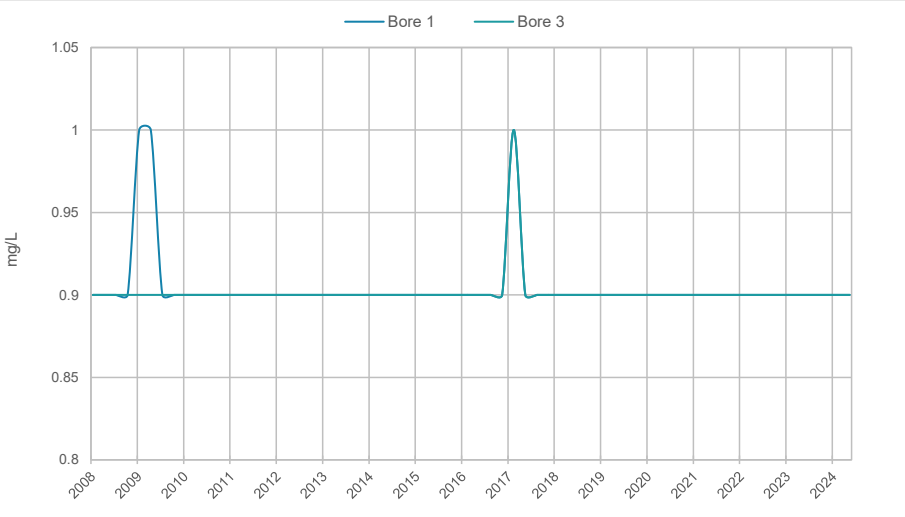

Figure 25 Groundwater quality - Calcium

Figure 26 depicts recorded nitrate levels for bore 1 & bore 3 from 2008 to 2024. The minimum nitrate was recorded at <0.01mg/L (0.01mg/L LOR), while the maximum nitrate was recorded in one instance at 3.8mg/L. This temporary elevation was recorded at typically recorded levels both before and after the temporary elevation in late 2015, as depicted in Figure 26. The average nitrate for the time period was 0.3mg/L for bore 1 and 0.1mg/L for bore 3.

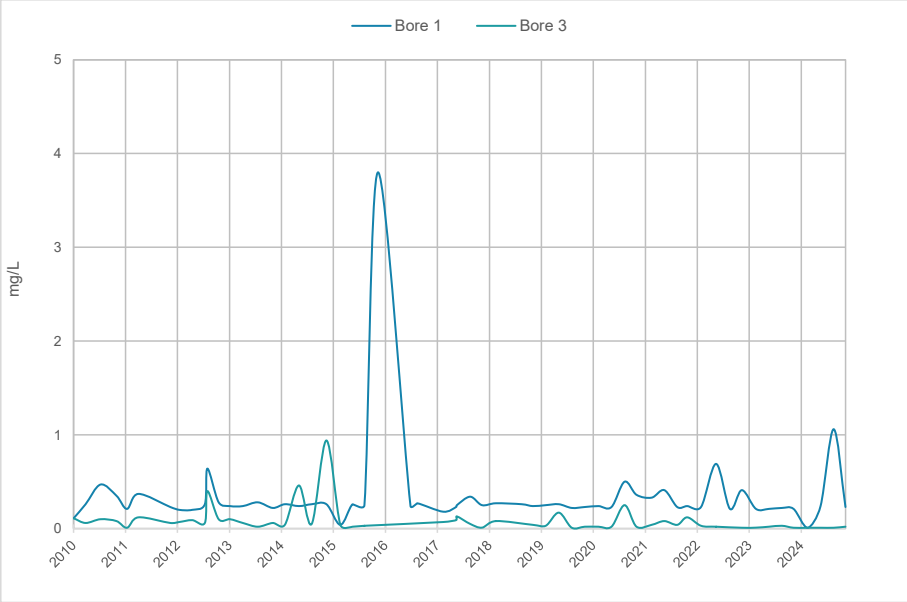

Figure 26 Groundwater quality - Nitrate

Figure 27 depicts recorded phosphate levels for bore 1 & bore 3 from 2008 to 2024. The minimum phosphate was recorded at <0.01mg/L (0.01mg/L LOR), while the maximum phosphate was recorded in one instance at 0.5mg/L. This temporary elevation was recorded at typically recorded levels both before and after the temporary elevation recorded in late 2008, as depicted in Figure 27. The average phosphate for the time period was 0.017mg/L for both bore 1 and bore 3.

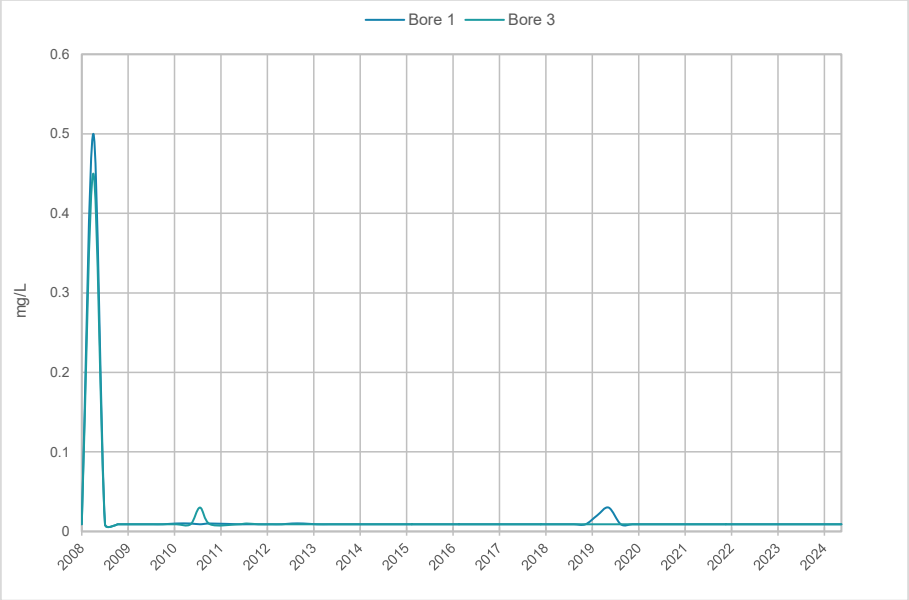

Figure 27 Groundwater quality - Phosphate

7.1.4 Groundwater Flow

Regional groundwater within areas potentially affected by mining flows to the north and west of the area towards the northwest coast. Previous regional studies have estimated groundwater velocities through the sands near the centre of the island to be between 4 and 7 m/day, as typical of fine to medium grained dune sands. Hydraulic slug testing completed for the neighbouring Vance project found similar aquifer hydraulic conductivity of between 2.26 and 6.64 m/d for the perched sand aquifer at Cooroon Cooroonpah Creek (URS Corporation, 2007).

7.1.5 Groundwater Uses

During the mine life, groundwater was extracted from three bores (bores 1, 2 and 3) on ML 1124 (Error! Reference source not found.) and was used as make up water for losses in the processing system. Bores 1 and 3 were monitored throughout the mine life for the site-specific contaminant limits established in the EA, and to ensure groundwater drawdown did not exceed two metres per year. Bore 2 is planned to be decommissioned in line with applicable standards.

7.2 Flooding

As discussed in **Section 2.1.3.4**, the Project is not located within a flood hazard area or a tidal inundation area. The Project area has not undergone historical flooding and is not likely to experience a one percent AEP flood event. This indicates that the potential for a flooding interaction with the void is unlikely and there will be no pit lake to act as a source of contaminants that could be mobilised by flooding.

7.3 Soil Material Assessment

7.3.1 Soil and Capping Material Assessment

As discussed in **Section 2.1.7.2**, although the surface soils are strongly acidic and have generally low fertility, they support native vegetation communities adapted to acid low nutrient environments. As the mined areas will be returned to native vegetation similar to that which occurred pre-mining, the quality of the soils recovered from mined areas is suitable and indeed beneficial for this PMLU. The acid conditions and low nutrient status are beneficial in that they provide a poor environment for weed establishment.

Topsoil sampling has occurred on North Stradbroke Island to analyse topsoil for its ability to ensure sustainable natural ecosystems. The topsoil sample results reported lower pH and nutrient values, which is representative of topsoil throughout North Stradbroke Island. This is consistent to previously utilised topsoil which has been proven as sufficient for its ability to ensure development of a native ecosystem.

Although the topsoil resources are suitable for rehabilitation purposes, the use of a broad-spectrum general 'start-up' fertiliser combined with the use of an initial cover crop and native seed application, was used to promote initial plant establishment in the rehabilitation process. The fertiliser used was a specialist formulation (CB 74203) developed by Incitec Pivot to suit the soils and native vegetation outcomes on Minjerribah with a NPKS composition of 12-5-14-15.

Historic characterisation of Project reject material confirmed that the material was suitable for placement within process dams with rehabilitation of these dams achieved through backfilling, contouring and revegetation (LRS 2000). Rehabilitation of these dams has been completed. As there is no further mine waste or mine waste landforms that require capping, no capping material assessment is required.

7.3.1.1 Topsoil Storage

There was a sufficient quantity of topsoil available within the Project area, which was of suitable quality for achieving the target rehabilitation methodology for a PMLU of Native ecosystem (**Section 2.1.7.2**).

Topsoil was stripped and secured so that the quality of stripped topsoil was not reduced through mixing with underlying sands (Unimin Australia Limited, 2009). The topsoil was stored away from drainage lines and operations, and stockpiled to ensure continued viability of the seed bank and microbial function. The batter was constructed downslope of the proposed operations and protected the 100 m Cooroon Cooroonpah Creek buffer from sediment that may have been generated from cleared operations areas upslope to exclusion area. Brush matting from cleared vegetation was utilised to stabilise topsoil as needed, and an appropriate cover crop was applied to maintain soil stability, soil fauna and microbial activity.

Topsoil was used as soon as was practicable to assist in the revegetation process to ensure the seedbank remained viable. However, if topsoil had to be stored for more than 6-12 months, care was taken to optimise the quality of the material to be respread when it was removed from the stockpiles. To achieve this, the upper and lower sections of the stockpiles were mixed during the recovery process to ensure that seed stock and micro-fauna content was consistent throughout the material being replaced.

Commented [SK16]: @Ben Savins I summarised this from the Min Sands ERC docs - are you comfortable with including this?

Commented [BS17R16]: Could be picked up that the topsoil stockpile samples were in relation to the min sands erc/prcp.

Commented [SK18R16]: That could be ok as the topsoil is at enterprise, and it matches the description in 2007 ESR for Glass

Commented [BS19R16]: Maybe this wording?

Commented [SK20R16]: Like it thanks Ben

Commented [SK21]: Check naming

All the available topsoil was used in the rehabilitation process and all stockpiles have been removed. A minor quantity of topsoil (approx. 196 m^3) may be required for the rehabilitation of building footprints to be rehabilitated. This material will be sourced from SAPL Enterprise mine on Minjerribah.

At the time of this document, there is approx. 25 ha of open area remaining to be covered and approx. 80,600m^3 of available topsoil. At a nominal coverage depth of 0.2m the required volume of topsoil is approximately 50,000m3. Thus there is sufficient topsoil to finalise the remaining rehabilitation at the Enterprise mine as well as complete the topsoiling of the area beneath the workshop (if required).

The haulage distance between the topsoil stockpile at Enterprise and the workshop are at Glass is approx. 17km and is shown in Figure 28.

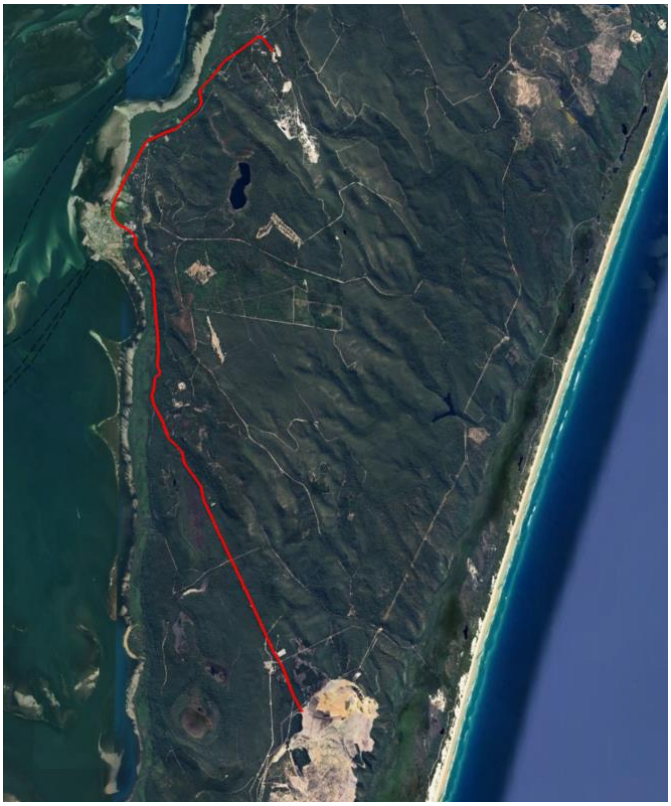

Figure 28 Enterprise to Glass haulage (17 km)Surface Preparation

Pre-mining surveys of each mining block gathered information such as slope, aspect and surface drainage direction. This information was referred to during rehabilitation to ensure these landform characteristics were reflected in the rehabilitated landform (**Section 7.5**). Where possible, landform contouring commenced within three months

of an operational area becoming available and was generally completed within 12 months.

A tracked dozer was used to re-establish slopes (within parameters for stability) throughout the mined area. The final contours and slopes reflect the pre-mining state, but with a reduction in height of approximately 5 to 10 m (the depth of white sand horizon).

Topsoil was recovered from the stockpiles and spread over the surface of the recontoured ground to an average depth of approximately 200 mm (Land and Resource Solutions Pty Ltd, 2002). Brush matting was used as an erosion control. Mulch was used as required, and a bituminous emulsion (Terolas) was used to provide additional initial protection from wind erosion. Regular inspections for erosion were conducted and any areas generally repaired and retreated as soon as possible.

Where available, cleared canopy vegetation and large woody debris were reinstated to provide faunal habitat as part of rehabilitation works.

Revegetation techniques employed included natural regeneration, direct seeding, and/or tube stock planting of native species consistent with the surrounding vegetation. Native seed collected from SAPLs leases and seedlings propagated at SAPLs nursery was used (**Section 7.8**). A specialist fertiliser tablet developed for native plants was added to each planting hole (Florafert SRF 10 g with a NPKS composition of 20-1-10-4.6 with trace elements). The following is the most contemporary species list used for RE 12.2.10 specific tubestock revegetation (with target planting density of 1,650 plants/ha):

- Trees
  - *Banksia aemula* (Wallum Banksia)
  - *Corymbia gummifera (*Red bloodwood)
  - *Eucalyptus planchoniana* (Planchon's Stringybark)
  - *Eucalyptus racemosa* (Scribbly gum)
- Tall shrubs
  - *Acacia suaveolens* (Sweet Scented wattle)
  - *Leptospermum polygalifolium* (Tantoon)
  - *Leptospermum trinervium* (Wooly Tea Tree)
  - *Podocarpus spinulosus (*Dwarf plum pine)
  - *Xanthorrhoea johnsonii* (Forest Grasstree)
- Low shrubs
  - *Austromyrtus dulcis* (Midgen Berry)
  - *Leptospermum semibaccatum* (Wallum Tea Tree)
  - *Petrophile canescens* (Conesticks)
  - *Strangea linearis* (Strangea)
- Grass and Grass-like
  - *Eriachne insularis*
  - *Imperata cylindrica* (Blady grass)
  - *Patersonia sericea var. sericea*

The following is the most contemporary native species list used for direct seeding:

- *Acacia suaveolens*
- *Acacia ulicifolia*
- *Aotus lanigera*
- *Dillwynia retorta*
- *Dodonea triquetra*

- *Hardenbergia violacea*
- *Kennedia rubicunda*
- *Leptospermum polygalifolium*
- *Leptospermum semibaccartum*
- *Leptospermum trinervium*
- *Xanthorrhoea johnsonii*
- *Xanthorrhoea macronema*
- *Eucalyptus pilularis*
- *Eucalyptus planchoniana*
- *Eucalyptus racemosa*
- *Eriachne pallescens*
- *Cymbopogan refractus*

Surface preparation and revegetation works have been largely completed and the replaced topsoil has been shown to have successfully supported the growth of key native plant species, consistent with regenerating target vegetation communities (described in **Section 7.8**. As such, rehabilitation milestones for surface preparation are limited to footprints associated with a few remaining buildings and will involve minor earthworks and reshaping only.

7.4 Waste Characterisation

Historic waste characterisation has been completed on the sand slurry from the process plant (Land and Resource Solutions Pty Ltd, 2002). Results from this assessment found the material to be benign and suitable for management within the site process water dams (Land and Resource Solutions Pty Ltd, 2002). More recent characterisation of the sand slurry has confirmed that the material is comparable to mined silica sand (refer **Appendix D**), supporting that specific rehabilitation or management strategies for the material are not required.

7.5 Landform Design

The final landform development for the Glass project was practically completed prior to this document (except Workshop area). The final landform is approximately 97 Ha located within ML1124 and ML7064, with elevation ranging from 20m AHD to 80m AHD.

The final landform at the Glass project has been constructed by contouring the remaining dunal structure in addition to any placed tails sand. The dunal and tailings sand is considered to be of similar fine grained quartz sand composition, which is chemically inert and permeable.

The final landform has dunal ridges and valley elements similar to surrounding areas. During rainfall events, rainwater permeates the surface to the groundwater. During periods of high rainfall intensity the rainwater can run from the higher terrain to the lower and temporarily pond in low lying areas. Where possible the landform has been designed to limit material movement due to rainwater.

As it is desired for rainwater to permeate into the regional groundwater no lining or seepage control measures were required.

Development of the Project final landform design has been completed in accordance with the landform design specifications in Table 19**,** as established in the Rehabilitation Plan (Unimin Australia Limited, 2009).

Table 19 Landform stability design parameters (as per Table 1. Landform stability design parameters, Rehabilitation Plan for Disturbed Areas 2009).

Slope Grade (%)	Slope Length (m)
>30	25
20-30	30
10-20	80
5-10	120
<5	170

The landform stability design parameters in Table 19 were applied to re-develop a final landform that was recontoured to conform as closely as possible to the pre-mined land surface (at a lowered elevation)(refer to **Section** Error! Reference source not found.)(Figure 29 and Figure 30).

The design for the Project's final constructed landform is to have a maximum slope of 25 degrees to the horizontal (within the range of undisturbed dune sand slopes surrounding the Project that exceed 25 degrees in places). A maximum slope angle of constructed landforms of 25 degrees ensures a minimum factor of safety (FoS) of 1.34 (Geo-Eng, 2024) against slope failure. A target FoS for stable sand slopes is 1.34 is based on well accepted industry standards and site experience. Notably: the sand used in the construction of the Project landform is equivalent to that of the naturally occurring dunal landforms on Minjerribah and there are many undisturbed dune sand slopes surrounding the Project's ML that are steeper than 25 degrees and show no mass stability issues (GEO-ENG 2024).

The general aspect of the pre-mining landform was northerly, and has been retained with the majority of slopes to the western side of the rehabilitated area having a similar north-south slope direction and aspect as observed in the pre-mining landform, as shown for the post-mine aspect of rehabilitated areas (Figure 31). Though sand dunes on Minjerribah as with other similar environments were and continue to be built through the effects of wind and rain. For the development of the final landform at the Glass project the North – South dune direction has helped to protect the early rehabilitation establishment from the predominant South Easterly wind. Additionally, where required wind fences can be utilised to minimise material movement as a result of the wind.

An as built 3D landform plan for the Project is shown in Figure 32.

The rehabilitated mined area covers an area of approximately 89 ha (refer Void Closure Plan in Appendix F).

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Commented [LK23R22]: Yes I would say so, I have no idea where the 32 Ha would have come from

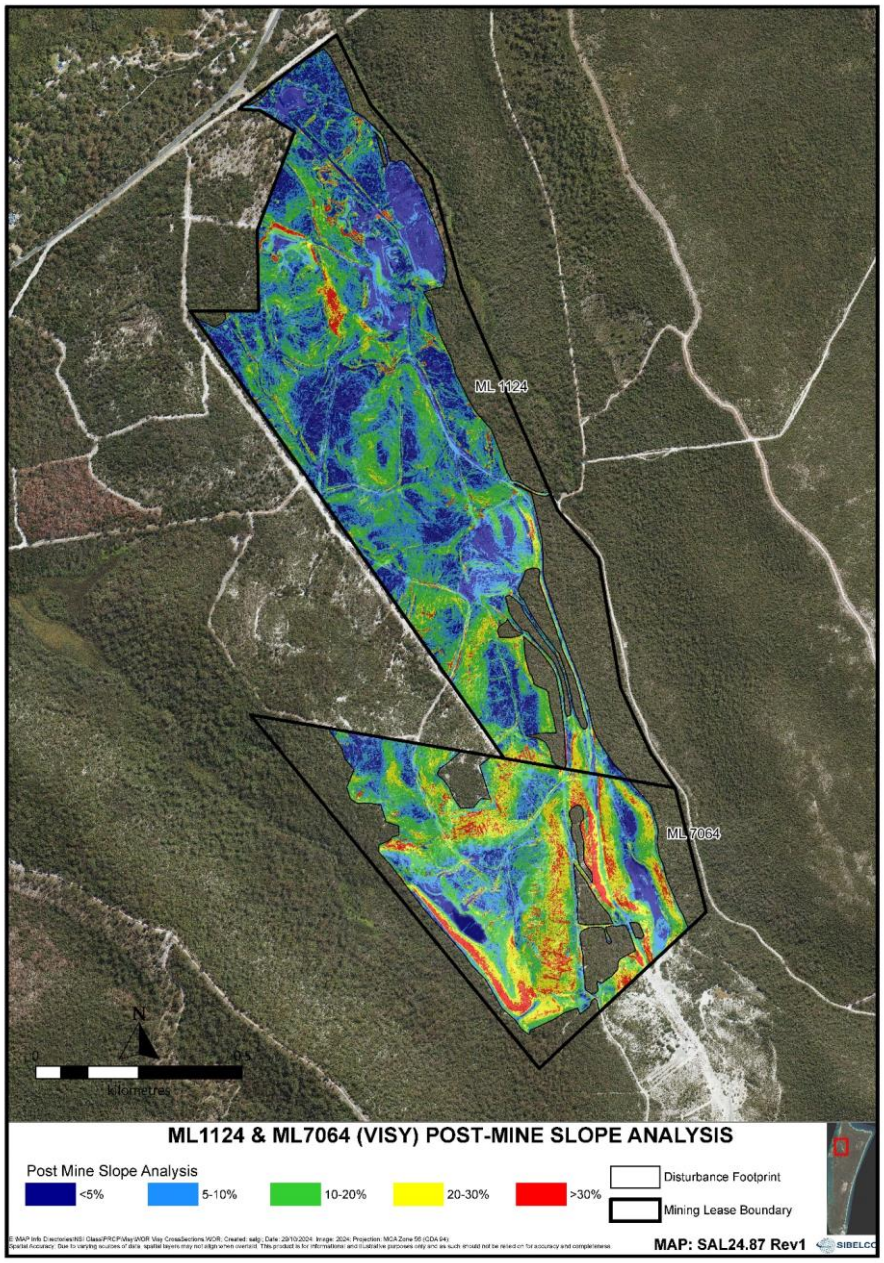

Figure 29 Post mine slope analysis

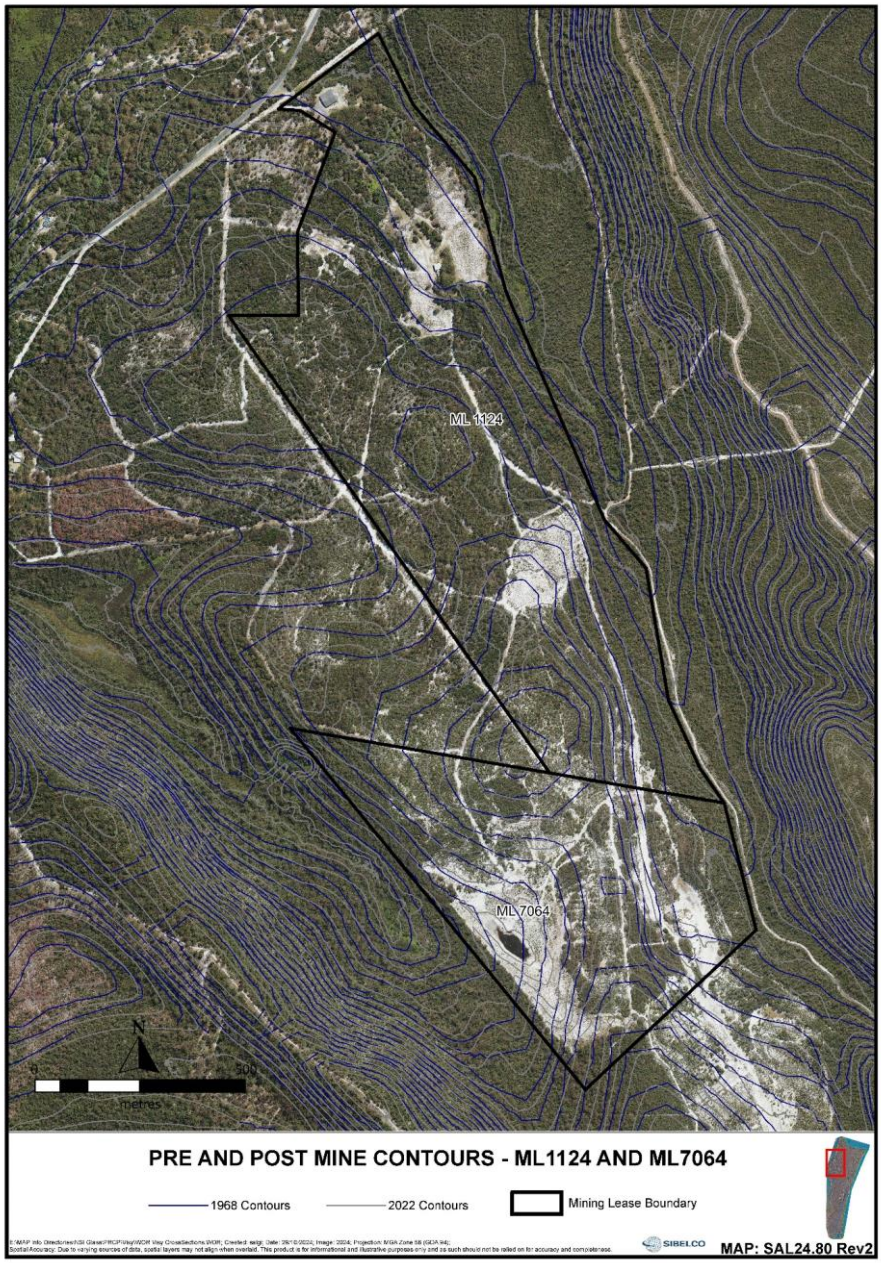

Figure 30 Pre and post mine contours

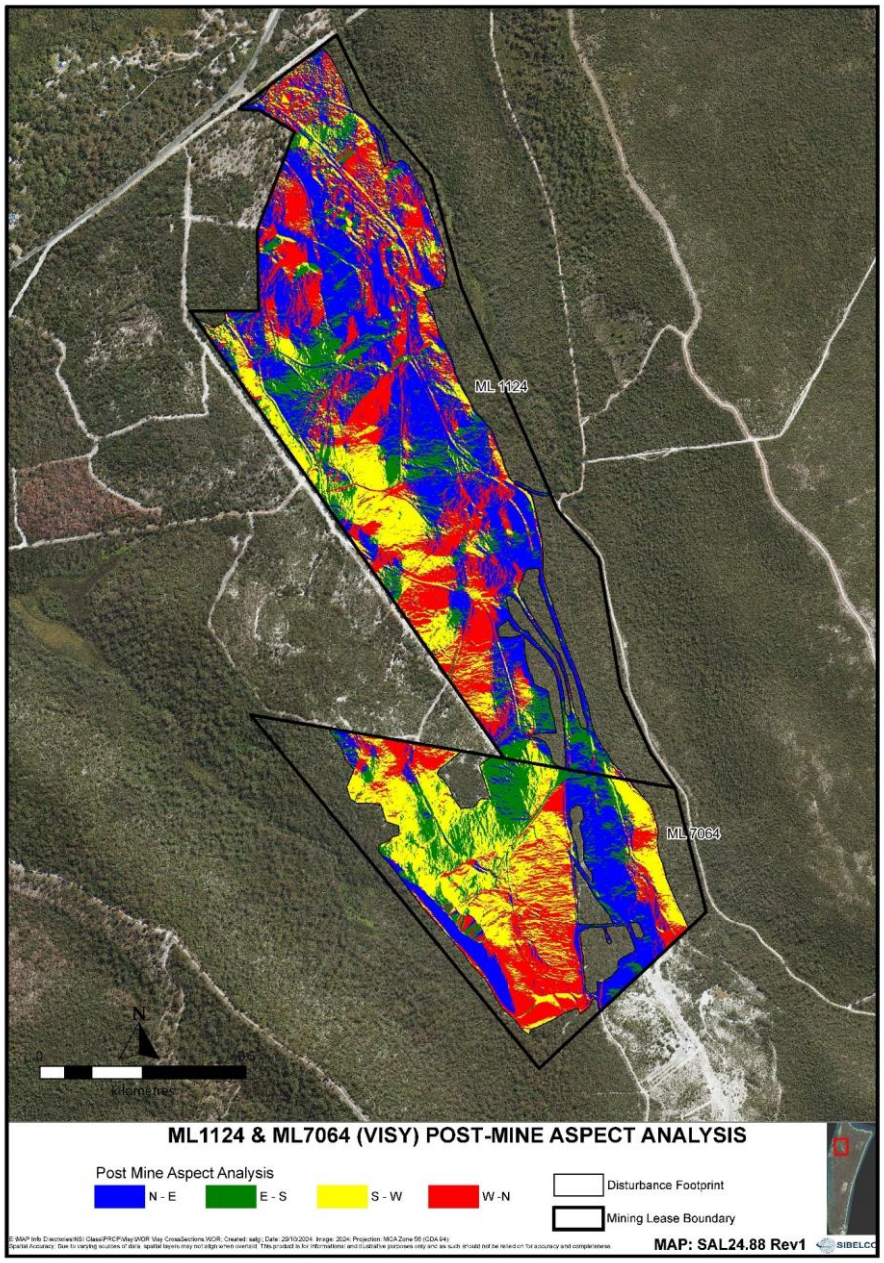

Figure 31 Post-mine aspect of rehabilitated areas

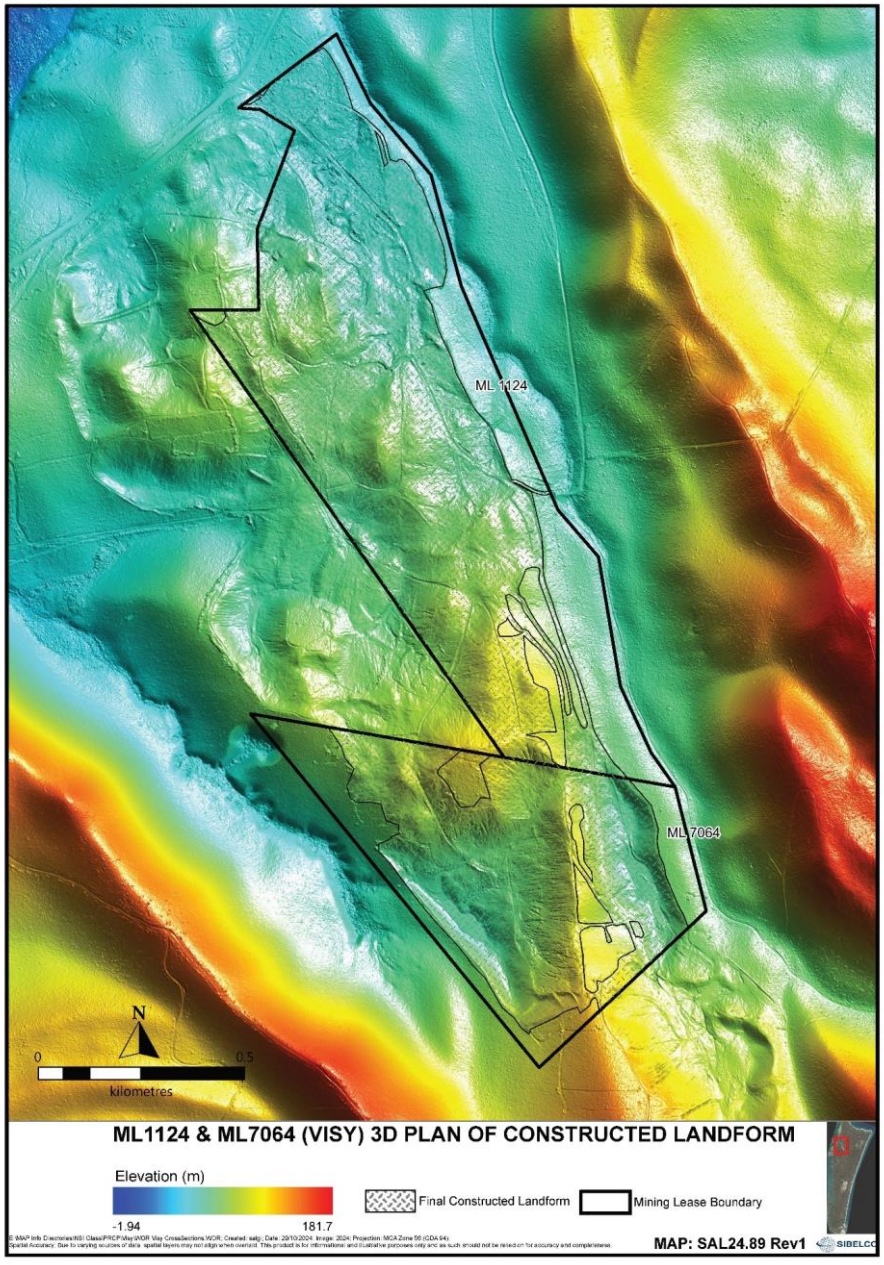

Figure 32 Final landform design

7.5.1.1 *Landform Geotechnical Stability*

The mass geotechnical stability of the final rehabilitated landform (void) has been assessed in the Void Closure Plan in **Appendix D**. As described above a FoS of >1.34 has been achieved and this exceeds some of the natural landforms on Minjerribah. Generally, the side slopes on the steeper western side of the void are approximately 16°, with the steepest zone being about 18° at the southern end of the void. The steepest overall slope of 18°, is calculated to have a FoS of about 2.0. The landform is assessed to be stable and has similar stability to the surrounding natural undisturbed area (Geo-Eng, 2024).

7.5.1.2 *Landform Erosional Stability Modelling*

The scale and complexity of the final post-mine landforms on Minjerribah have been considered when selecting appropriate models for assessing long-term stability. The nature of the final landforms and the possible contributions from both water and wind erosion processes on recently established final landforms on Minjerribah makes landform evolution modelling practically impossible. In the short term, water erosion is likely the most serious risk as it has the potential to remove large volumes of material in discrete events. Wind erosion is likely to be an important process in the very long-term but is unlikely to result in long-term stability issues; rather it will be responsible for on-going natural evolution and recovery of dune processes.

RUSLE is an empirical-based modelling approach that is used to estimate average annual rates of soil loss from landforms. It has been successfully employed by other proponents for assessing post-mine landform stability as part of PRCP preparation (Engeny, 2023). The model is relatively easy to parameterise, allows the handling of large datasets and computation, making it attractive for assessments over large areas. Process-based water erosion models (like Water Erosion Prediction Project or Siberia) need to be calibrated with many inputs and are hard to apply over large areas (Zhang, et al., 2022).

The RUSLE equation is expressed as follows:

$$A = R \times K \times LS \times C \times P$$

Where:

A = estimated average soil loss in tonnes per hectare per year

R = rainfall-runoff erosivity factor

K = soil erodibility factor

LS = slope length and steepness factor

C = cover-management factor

P = support practice factor

The source of data for R, LS, C and P is provided below:

- R Factor was derived from Q Spatial layer of USLE R factor centred on Minjerribah (https://www.data.qld.gov.au/dataset/soils-universal-soil-loss-equation-series/resource/802d9acc-241f-4430-b3ca-15b08b883b0f) = 6106
- LS Factor was calculated based on the equation developed by Moore and Burch (Moore & Burch, Physical basis of the length-slope factor in the Universal Soil Loss Equation, 1986)and Moore and Wilson (Moore & Wilson, Length-slope factors for the Revised Universal Soil Loss Equation: Simplified method of estimation, 1992)slope using

hydrological (upslope catchment as an improvement for a 1 D slope) and slope raster within a GIS application using LiDAR DEM created for the Project
    - LS= ((Flow accumulation × cell size)/22.13)$^{0.5}$ × (sin(slope (degrees) raster × .01745)/0.0896)$^{1.3}$
    - Mean LS for the Project = 2.782[2]
- C factor varied to simulate the effects of different rates of vegetation and ground cover (based on C Factor tables for established woodland/forest cover IECA 2008 and (Kassam, van Velthuizen, Mitchell, Fischer, & Shah, 1992)) and ranged from 1 to 0.001 (see further discussion below)
- P Factor recognised that rehabilitation areas will not be managed and returned to native vegetation. Therefore, a P Factor of 1 was adopted

The formula for calculating the K Factor is that developed for the SOILOSS program (K_SOILOSS) (Rosewel, 1993) as follows:

$$K=((2.77 \times M^{1.14}) \times 10^{-7} \times (12\text{-}OM)) + ((4.28 \times 10^{-3}) \times (SS-2)) + ((3.29 \times 10^{-3}) \times (PP-3))$$

Where:

- M = (silt % + very fine sand %) × (100 – clay %) with silt plus very fine sand including particles between 2 and 100 µm in diameter and clay including particles less than 2 µm in diameter
- OM is organic matter %
- SS is the soil structure class in RUSLE
- PP is the permeability class in RUSLE

The source of data for calculating the K Factor is provided below:

- Based on detailed particle size data of five samples in Esys (ESys Consulting Pty Ltd, 2002), the average clay fraction was 0.5% and the average very fine sand plus silt fraction was 3.6% giving an M value of 357 (due to the high medium to course sand and low fines content))
- OM = 0.84 % based on the lowest recorded OM in rehabilitated areas throughout SAPL's operations on Minjerribah (data in (Lockhart, 2006)). This is conservative as values are generally >1% in topsoils ((ESys Consulting Pty Ltd, 2002), (Lockhart, 2006))
- For SS, as the Minjerribah soils are too sandy to have well developed soil structure and there is no equivalent single grained soil structure class in RUSLE, a soil structure class of 4 (massive) has been assumed (the most conservative value available)
  For PP, the most rapid permeability class (1 equivalent to >600 mm/hr) and been assumed. URS (URS Corporation, 2007) measured infiltration rates of 23 m/day (c >900 mm/hr) at the Project. Similar rapid infiltration rates have also been recorded at other sand dune masses in the region (e.g., Cooloola) (Reeve, Fergus, & Thompson, 1985)

The derived K Factor for Glass is 0.0045 which is rated as 'very low' (the lowest erodibility class rating available) according to Rosewell and Loch (2002). This very low value is due to the very low fines content and very high infiltration rate of these soils and indicates that the sands at the Project are very stable with respect to erosion risk.

As the soils at the Project are stable and have a low K Factor and most landforms have been constructed already (minimising the opportunity to change slope angle and slope length), managing the C Factor becomes one of the most critical elements of ensuring erosionally stable landforms. Therefore, for the purpose of modelling erosional stability, a range of C Factors corresponding to the achievement of 25%

[2] Note this LS value is lower than at many of the other mines on Minjerribah including those that have been fully revegetated and have achieved very low rates of erosion (e.g. Amity, Bayside and Gordon that have soil loss rates of <1 t/ha/yr) and indicates the final landform is expected to be stable on completion of full rehabilitation.

Projected Foliage Cover (PFC) dominated by tree cover and variable litter/ground cover have been used to demonstrate the effect of vegetation/ground cover on rates of erosion.

This is conservative as rehabilitation efforts by SAPL on older areas at Glass as well as other operations on Minjerribah have achieved canopy cover far in excess of 25%. Canopy cover and understory cover can be substantial in some areas of mature rehabilitation which both improve the C Factor. For example, litter cover >90% (equivalent to reference) has been achieved at older rehabilitation areas at Bayside (Lockhart, 2006) and is evident in older areas of rehabilitation at Glass (**Plate 9** and **Plate 10**).

Plate 9 Litter cover at rehabilitation monitoring site 'V5'

Plate 10 Litter cover at rehabilitation monitoring site 'V7'

From this modelling it has also been possible to estimate the minimum vegetation/ground cover coverage required to meet acceptable rate of erosion of 10 t/ha assuming a minimum of 25% pfc. This rate of soil loss has been used in approved PRCP Schedule Milestone Criteria for the Mt Coolon Gold Mine (PRCP schedule: PRCP_EPML00449313_V1) and is below the 12.5 t/ha/yr value suggested Carey & Barry (Carey & Barry, 2004) in The Soil Conservation Measures Design Manual for Queensland.

Figure 33 RUSLE model outputs for 25% PFC and varying amounts of ground cover % shows the effect of ground cover on estimated rates of soil loss. To meet the acceptable rate of soil loss of 10 t/ha, a groundcover equivalent to 17% would be required with a minimum PFC of 25%. The low value is due to the low LS values measured at Glass. This minimum cover should be achievable as PFC and litter cover values far in excess of this have been recorded elsewhere on rehabilitated land on Minjerribah, including the Ibis and Gordon sites.

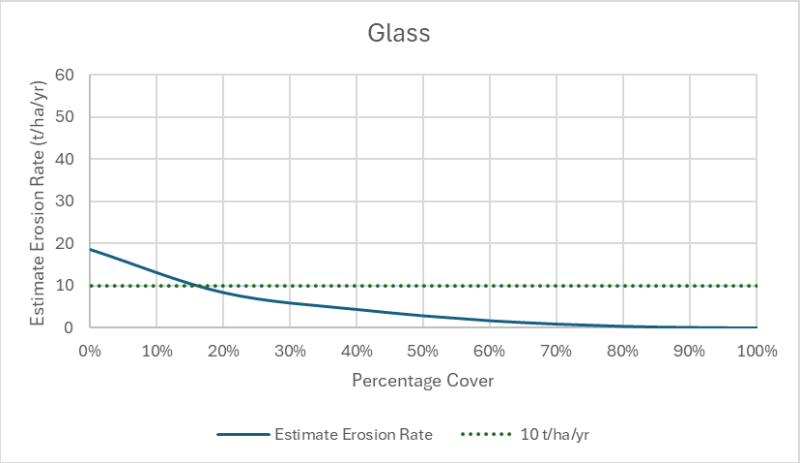

Figure 33 RUSLE model outputs for 25% PFC and varying amounts of ground cover %

Additional assessments have been conducted at Glass that demonstrate stability and low rates of erosion can be achieved as described in the following sections.

7.5.1.3 Direct Measurements of Erosion

Erosion rate monitoring using up to 35 erosion pins inserted into the soil was conducted in areas of different rehabilitation ages between 1997 and 2012. This captures combined wind and water erosion The results are presented in Figure 34.

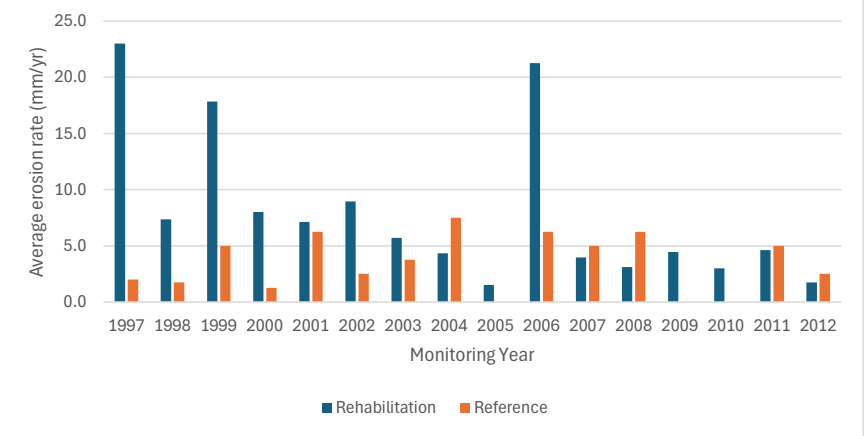

Figure 34 Erosion rates measured in rehabilitated areas at Glass

Apart from a spike in erosion rates in 2006 associated high rainfall and two high values obtained from area of relatively young rehabilitation, rates of erosion were below the Glass criteria of 10 mm/yr from 2000 to 2012. From 2007 to 2012, erosion rates from rehabilitated areas were consistently below those in reference areas Given the low rates of erosion, monitoring ceased after 2012. The vegetation across the rehabilitated

areas has continued to mature and improve since 2012 to establish a self-sustaining native ecosystem (Ausecology, 2018). The improvement in cover associated with this would be expected to further improve stability. Estimates of erosion rates using differences in surface elevation of digital elevation models generated from temporally separated LiDAR captures at some of SAPL's other operations rehabilitated before 2003 have shown consistently low rates of erosion (in the order of < 2 t/ha) which would support this assertion.

7.5.1.4 Identification and Assessment of Gully Erosion

Lidar data analysis has been used to assess the presence of gully erosion features at Glass. This used the method of Qian *et al* (Qian, Shen, Xi, Chen, & Wang, 2018). This identified 17 gully features that were either > 0.5m or >1.0 m deep. This method offers a means of identifying features that may need monitoring or repair. The method has been successfully validated by field inspections. Table 20 shows that the LiDAR analysis was successful in identifying the presence and depth class of erosion features. There were a few false positives identified, but the method provides a conservative assessment approach and has been used to direct erosion feature management.

Table 20 Validation of depth of gully features identified through LiDAR analysis at Glass

Feature ID	Depth class estimated by LiDAR analysis (m)	Field measurement of feature (m)	Comments
A	>1	N/A	This was found to be an old drill pad not a gully
B	>1	1.15	
C	>1	1.11	
D	>1	1.06	
E	>0.5 <1.0	0.73	
F	>0.5 <1.0	0.64	
G	>0.5 <1.0	0.72	
H	>0.5 <1.0	0.83	
I	>1	1.18	
J	>0.5 <1.0	0.52	
K	>0.5 <1.0	N/A	Visual inspection confirmed presence. No measurements taken as close to a larger feature that was measured
L	>0.5 <1.0	0.54	
M	>0.5 <1.0	0.51	
N	>1	NA	Not erosion gully. The elevation change was due to a mound of soil adjacent to a flat area
O	>1	1.06	
P	>0.5 <1.0	NA	Feature misidentified in the field. The elevation change was due to an embankment of soil adjacent to a flat area
Q	>1	1.1	

The gully features identified in the Table 20 have stabilised and are not showing active erosion. They do not appear to convey water any more, have high litter and vegetation

cover and do not warrant management intervention or pose a risk to slope stability at Glass (see **Plate 11**).

Plate 11 Stabilised erosion features D (left and middle) and H (right)

7.5.1.5 Potential for Erosion to Cause Downstream Pollution and Impacts to Water Quality

Due to the sandy nature and low fines (<2% clay) content of the soils at Glass, there is little or no risk of erosion causing offsite impacts to water quality. Therefore, erosion is only a risk to physical stability .

7.6 Cover Design

As discussed in **Section 7.4** and **7.9,** due to the benign nature of the sand slurry the material was suitable for management within the site process water dams, with no specific rehabilitation requirements (i.e. a facility cover design) for the material.

7.7 Water Management

7.7.1 Water Quality Criteria

Site-specific water quality criteria for the Project are prescribed under Schedule C of the Project EA. These criteria were developed from baseline data from Cooroon Cooroonpah Creek collected prior to mining activities commencing.

It is acknowledged that WQOs for the surrounding area are established in *Moreton Bay including Stradbroke Islands, Moreton Island and other bay islands, Environmental Values and Water Quality Objectives – Basin 144 and adjacent basins to 141 to 143, 145 and 146* (DES 2022). Of relevance are the WQOs for the North Stradbroke Island wallum fresh waters, which is applicable for Cooroon Cooroonpah Creek, located to the east of the Project's lease. The Cooroon Cooroonpah Creek is considered a wallum/tannin-strained freshwater environment. However due to the nature of the waters at Glass, it is noted that the WQO for parameters such as pH are not met in natural, unimpacted waters within Cooroon Cooroonpah Creek. Therefore,

site-specific water quality criteria developed from pre-mining baseline data and presented in the EA are more appropriate for protection of the receiving environment and for the development of milestone criteria.

7.7.2 Potential Water Quality Contaminants

Mining of silica sand is a relatively low risk form of mining. Initial processing activities require some physical separation of organic matter using a trommel close to the mine face. However, no chemicals were used in this process. Overflow from the trommel flowed into a sump behind the mine plant, where the water was either recirculated back to the trommel for use or returned to the main process plant on ML1124.

The material from the trommel was transferred as a slurry to the processing plant on ML1124. The slurry run through a series of spirals for gravity separation of fines, silica sand product and heavy minerals. Heavy minerals separated from this process were stockpiled separately for sale. The process water containing the fines was settled and water recycled through the system. Sand slurry had comparable characterisation to mined silica sand and was therefore a benign product from the process (refer to **Section 7.4**).

Fuel for the Project and the adjacent Vance Project was stored within bunded tanks in the main storage shed and workshop area on ML1124. Other general waste with the potential to contain hydrocarbons (waste oil, oily waste and rags, contaminated soil from any spillages and from cleaning out the oil/water separator), was appropriately stored and collected by a licenced contractor.

Sources of potential water quality contaminants and likely contaminants on the Project are outlined in Table 21 below.

Table 21 Potential contaminant sources

Potential contaminant source	Likely contaminants
Processing plant	Heavy minerals (e.g. ilmenite, rutile, zircon)
Maintenance Workshop, Fuel Bunkers, Main Storage Shed	Hydrocarbons
Heavy mineral stockpiles	Heavy minerals (e.g. ilmenite, rutile, zircon)

As described in **Section 2.1.5,** there are no watercourses within the Project area. Due to the highly permeable nature of the underlying sands, surface runoff is rarely observed on site even during intense rainfall. Therefore, the risk of runoff towards Cooroon Cooroonpah Creek during operations and rehabilitation activities is minimal, resulting in a low risk of potential impacts to receiving waters located off-lease to the east of the Project.

7.7.3 Surface Water Diversions

Surface runoff is rarely observed on site even during high and intense rainfall and where surface flows do occur it is generally confined to Cooroon Cooroonpah Creek. As the underlying sands are highly permeable and the general topography of the site is steep, water ponding in depression areas evaporates or infiltrates quickly after rainfall. As such, in general surface water diversions were not required during operations.

A protection buffer was established between the operations and Cooroon Cooroonpah Creek to ensure sediment that may have been generated from cleared operational

areas was not mobilised to receiving waters. Brush matting from cleared vegetation was utilised to stabilise topsoil as needed, and an appropriate cover crop was applied to maintain soil stability, soil fauna and microbial activity (SAPL 2023a).

7.7.4 Ongoing Water Management

All Project operations have ceased, with all infrastructure decommissioned and removed from the Project (with the exception of minor infrastructure under RA3, which are to be retained subject to landholder agreements). There are no permanent water management structures remaining on the Project. All temporary erosion and sediment control devices (used on rehabilitated areas as required) will either be removed during rehabilitation milestone RM6, or a new system using biodegradeable products of wood and jute will be used which will note require further intervention.

7.8 Revegetation

The section summaries the revegetation activities and outlines the activities that will enable establishment of self-sustaining vegetation communities that are appropriate for the PMLU. Revegetation performance criteria used for previous annual monitoring are established in the Rehabilitation Plan (Appendix B**Appendix B**). As discussed in **Section 9**, these criteria have been contemporised to satisfy the requirements under the PRCP framework. Therefore, the following sections describe the revegetation activities undertaken to date, with the proposed monitoring program captured in **Section 10.1.**

7.8.1 Revegetation Program

The Rehabilitation Plan outlines the revegetation objectives, indicators and completion criteria, proposed native species and densities, and locations for revegetation, Specifically, the rehabilitation program proposed steps to achieve a post-mining land use of native ecosystem. Therefore, under the PRCP framework, SAPL's objective is to return the Project area to land that is suitable for the nominated PMLUs (refer to **Section 3.3**), analogous to the surrounding unmined areas. The objectives of rehabilitation and revegetation are described in **Section 2.4.1**).

7.8.1.1 Vegetation Communities and Key Species

Three vegetation communities were identified within the Project area in pre-clearing surveys (Wildthing Environmental Consultants, 1996):

- RE 12.2.6 – *Eucalyptus* spp. woodland on Quaternary dunes and sand dunes
- RE 12.2.9 - *Banksia aemula* low woodland
- RE 12.2.10 – Mallee *Eucalyptus* spp. low woodland on Quaternary dunes and sand plains

Active rehabilitation monitoring is occurring for sites within RE12.2.6 and RE12.2.10 (Ausecology 2023)

As noted in **Section 2.1.9**, key flora species to be included in the revegetation program included:

- *Boronia rosmarinifolia* (Forest Boronia) located in the low open heath habitat along the exposed ridge tops and in relatively low abundance in the *Eucalyptus pilularis* open forest
- *Boronia safrolifera* (Safrole Boronia) located in the low open heath habitat along the exposed ridge tops
- *Boronia falcifolia* (Wallum Boronia) located in the closed wet heath

Ecological surveys identified potential habitat for the state conservation listed species *Acacia baueri* subsp *bauri* (vulnerable under the NC Act) at the northern end of ML 1124, and located a single specimen along the drainage line of Cooroon Cooroonpah Creek on ML 7064 (Wildthing Environmental Consultants, 1996).The wallum tree frog (Litoria olongburensis), listed as vulnerable under the NC Act, was also identified in a drainage line outside the eastern area of ML 1124.

7.8.1.2 Revegetation Program

Revegetation and rehabilitation on site has been completed progressively since 1975 and 2002 on ML1124 and ML7064, respectively. SAPL was committed to progressive rehabilitation on site both during mining and after mining activities ceased, with no more than 39.5 ha of open operational area cleared at any one time (Land and Resource Solutions Pty Ltd, 2002).

Surface preparation has been described in **Section** Error! Reference source not found.. Once site preparation was completed, direct seeding was generally undertaken in the appropriate autumn or spring period each year. Seeds for the direct seeding were collected by SAPL and were of local provenance. Seeds were treated to break dormancy (if required) and sown with a tractor and seeder. Where required, a sterile sorghum was added to the native direct seeding mix, as a cover crop. The sterile cover crop provided protection while the seeds were germinating and becoming established. Species that were not reliably established through direct seeding were propagated in the nursery or translocated from cleared areas. Planting programs generally occurred in autumn or spring for optimum seedling establishment success.

Selected specimens of *Xanthorrhoea johnsonii* species (forest grass trees) and Boronia species were retrieved from the mine path during clearing and transplanted into rehabilitated areas, where possible. The specimens were excavated, retaining as much soil around the roots as possible, and replanted in areas to be rehabilitated. Trees that exhibited signs of stress were directly burnt, to stimulate new growth and flowering.

The SAPL Kounpee nursery has facilitated the site revegetation program since 2012 and continues to support the revegetation of various SAPL sites on Minjerribah. The general workflow of the seed production and propagation process is described in **Plate 12**.

1.Cones and seed pods from banksias, eucalyptus and other species are collected

2.Controlled burning of the pods and cones occurs to trigger seed release. SAPL personnel, sift through the burnt material to isolate

3.Excess seeds are stored in labelled boxes and

4.Seeds are planted for initial establishment in large trays. Seedlings are later transplanted into

5.Tubes are filled with specially formulated seeding mix in preparation for seedlings. Once planted, the individual tubes are

6.Plants are placed outside to harden and are ready to use when needed to stabilise reshaped and

Plate 12. Nursery workflow

Topsoil

Topsoil management is described in **Section 7.3.1.1.**

Organic Screening

Organic material used was screened off at the mine face trommel which contained seeds and nutrients valuable with assisting revegetation and erosion control on the site. The material was retained during mining activities and spread over rehabilitated areas with particular attention to areas with a higher potential for wind erosion. Refer to **Section** Error! Reference source not found. for surface preparation activities.

Direct Seeding

Once the topsoil was respread over the rehabilitation area the site was subject to direct seeding, which was generally undertaken in the appropriate autumn or spring period each year following the completion of landform contouring and topsoil reinstatement.

Seeds used for direct seeding are collected from mature plants located on and around the site. The seeds are then treated (if required) and sown with a tractor and seeder. Where deemed necessary a sterile sorghum was/is used with the direct seeding mix as a cover crop to provide protection while the seeds germinate and become established.

Propagation and Replanting

Where species were/are not becoming established through direct seeding, species will either be propagated or replanted. Seeds are collected from the Island and taken to the onsite nursery for treatment and propagation. Planting programs are generally campaigned in autumn (if required) for optimum seedling establishment success.

Transplanting

Where it was accessible by excavation machinery, all mature *Xanthorrhoea* species were retrieved from the mine path during clearing and transplanted into rehabilitated areas. If the trees exhibited signs of stress, they were directly burnt to stimulate new growth and flowering.

Weed Control

Due to the low edaphic nutrient cycling typical of dune vegetation communities, the risk of weed infestation in rehabilitation areas is considered low.

To ensure that weed species did not or will not propagate on site (including non-local native species), the presence of weeds was monitored through monthly inspections of both rehabilitated and topsoil stockpile areas. If weed species were/are identified, they are controlled by a combination of herbicide spraying (though this will not include broad acre spraying) and physical removal on an as needs basis.

Fire Management

On site access roads, extraction area, and newly contoured rehabilitation areas provide access for bush firefighting and act as fire breaks for remnant vegetation. No control burning other than that associated with *Xanthorrhoea* have been undertaken on site by SAPL.

Ongoing Maintenance

Maintenance of rehabilitated areas will continue to be undertaken in response to annual monitoring to ensure that rehabilitation is successful. Maintenance may include works such as re-seeding or the further planting of tube stock of tree and/or shrub species to meet required

revegetation parameters and erosion protection. In reviewing the revegetation criteria previously used for the Project, the rehabilitation criteria nominated in the LOD documents have been contemporised to meet both the original intent of the source LODs and the requirements of the PRCP guideline for milestone criteria. This is further discussed in **Section 9.**

7.9 Tailings Storage Facility

No tailings storage facility (TSF) was located on the Project.

Sand slurry (mixture of sand and water) was pumped from the process plant to process dams for settlement and managed as part of the water management process during operation of the dams. Subsequently, the material was contoured and rehabilitated. Sand slurry had comparable characterisation to mined silica sand (refer **Appendix D**) and as such specific management (i.e. a TSF) or management strategies were not required.

7.10 Voids

The Glass project does not have a final void as the mining operation continued on into the adjoining Vance project (ML1108). How ever two shallow depressions were formed as a result of mining in ML 7064. The depression on the Eastern side of ML7064 is approx. 440m long and 120m wide. While the depression on the Western side of ML7064 is approximately 350m long by 100m wide. The two low areas are shown in Figure 35.

The size of the two areas of depression are representative of the surrounding unmined area, as such there was negligible scope to minimise the respective sizes of the already constructed landforms.

SAPL has rehabilitated the voids in a way that minimises environmental harm. The voids are geotechnically stable, with no risk to the environment (being located above the water table and underlain by permeable sand) (Geo-Eng, 2024).

A Void Closure Plan is presented in **Appendix F** and the stability of the void landforms has been discussed in **Section 7.5**.

Commented [LK24]: First sentence of this section, we say we don't have a final void, now in this sentence it is referred to as final void

Commented [LK25R24]: @Stephen Kendall

The two shallow depressions have been rehabilitated generally as per Section 7.8, with plant species more suited to low lying areas where rain water can temporarily pond. This could include species such as *Melaleuca quinquenervia* and *Eucalyptus robusta* similar to Regional Ecosystem 12.3.5. This is inline with the Native Ecosystem PMLU of the Glass project and surrounding unmined areas.

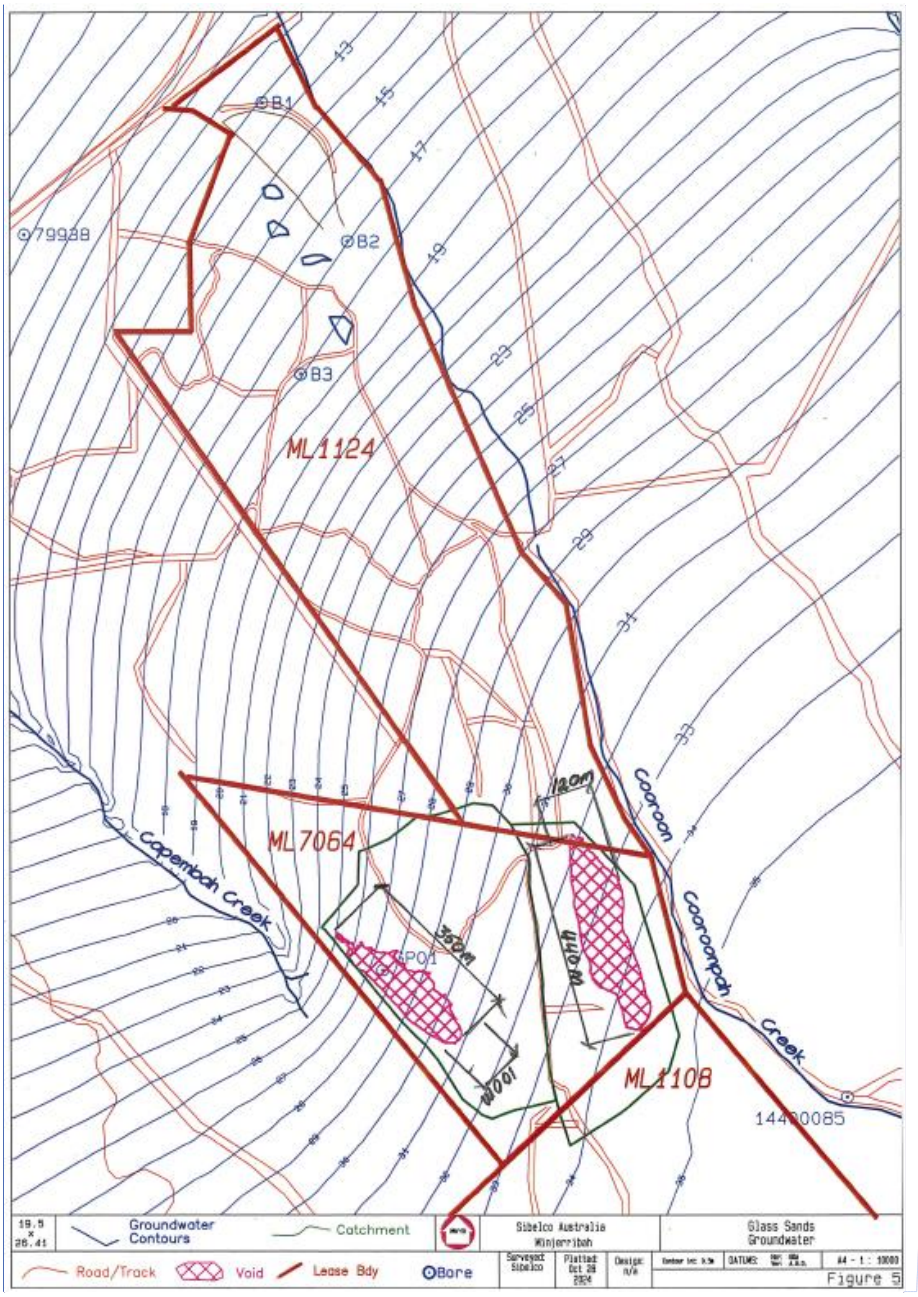

Figure 35 Depression dimensions with ML7064 (Geo-Eng, 2024)

Commented [SK26]: @Ben Savins @Lisa Karklis dodgy? Or showing that we aren't spending a lot of money?

Commented [BS27R26]: Fine by me

Commented [LK28R26]: Fine by me too

7.11 Waste Rock Dumps

No waste rock dumps were or will be located on either ML 1124 or ML 7064.

7.12 Underground Mining

No underground mining has occurred or is planned on either ML1124 or ML7064.

7.13 Built Infrastructure

Built infrastructure comprises all above and below ground infrastructure, including offices, amenities, workshop facilities, fixed and mobile plant. All built infrastructure utilised as part of the Project has been decommissioned, demolished and/or disposed of at an appropriate waste facility, with the exception ofinfrastructure yet to be removed or to be retained under landholder agreement.

7.13.1 Identification of Built Infrastructure

The following built infrastructure has been safely removed from site:

- Mobile plant and equipment
- Administration offices / buildings
- Amenities block
- Crib / break room
- Processing plant, fuel bunkers and main storage shed
- All fuel and water management infrastructure
- Lab and rehab shed
- Weighbridge
- Nursery
- Stockpile areas

The following infrastructure is yet to be removed:

- Maintenance / Mechanical Workshop (*At the time of this document SAPL and QYAC are in discussion regarding the retention of this asset.)*
- Bore 2
- 40mm UPVC piezometer located within ML7064

The following infrastructure is to be retained per the existing landholder agreement (Quandamooka Yoolooburrabee Aboriginal Corporation RNTBC, 2019): Please note that the existing landholder agreement was developed in consultation with QYAC, DoR and Sibelco. It includes assets and infrastructure across two (2) Environmental Authorities on Minjerribah (Mineral Sands and Glass). As such the letter includes infrastructure within the Glass and Mineral Sands projects. A contemporary Landholder agreement solely for the Glass project is not currently available, thus Sibelco asserts that the existing Landholder Agreement is applicable.

- Bore 1 and Bore 3, including associated electrical power and control infrastructure

- All sealed and unsealed roads

The remaining electrical infrastructure for Bore 1 and Bore 3, will remain, including the connection to Energex power supply infrastructure located within ML1124. The Energex power supply infrastructure is not to be considered part of the existing landholder agreement.

7.13.2 Decommissioning of Built Infrastructure

All plant except the infrastructure yet to be removed or to be retained was safely removed by September 2024. The removal process included the sale of saleable assets and the demolition of non-saleable plant and equipment. All demolition material was removed from the site as either recyclable or waste.

Infrastructure demolished onsite was transported to an appropriate waste disposal facility. Demolition was undertaken in a controlled manner with consideration given to the materials from which they were constructed. Where practicable, efforts were made to segregate construction materials with the view of maximising the beneficial reuse or recycling of such material.

As noted in **Section 3.1**, there are ongoing discussions with the landholder regarding the retention of the mechanical workshop. In the event that this infrastructure is not retained by QYAC, it will be decommissioned and the area rehabilitated.

To demolish the mechanical / maintenance workshop, an excavator with a shear will be used to demolish and sort the steel structure and cladding of the workshop and place into bins for cartage. To demolish the concrete pad and footings an excavator with a rock breaker will be used to break the concrete into pieces able to be carted.

Bore 2 will have the pump, hose and all electrical and control equipment safely removed. The bore casing will be cut approximately 1m below ground level. The casing will be back filled with sand and grouted using cement generally as per *Minimum Construction Requirements for Water Bores in Australia. National Uniform Drillers Licensing Committee 2020.* Noting that isolating the ground water is not a key requirement given the high permeability of the existing surrounding material.

The 40mm UPVC piezometer bore located in the western side of ML 7064 will be decommissioned and made safe by pulling directly out of the ground if possible or cutting at least 1m below ground level and back filling the remaining hole.

All materials will be removed from site by a suitably qualified carrier and disposed to appropriately licensed waste facility.

A contaminated land investigation will be completed to determine the requirement for any specific management requirements following the decommissioning and removal of infrastructure.

1.1.1 Maintenance of remaining built infrastructure

The nominal required maintenance for the retained infrastructure is noted in Table 22

Commented [SK29]: @Ben Savins do you think we leave as is for now, rather than introducing the recent PSI?

Commented [BS30R29]: Looking at the PSI we just received it could probably be revised for potential radiological impacts (removed). So probably best to work through the PSI before recognising it in PRCP!?

Commented [SK31R29]: Agreed

Commented [SK32R29]: @Ben Savins am thinking to add sentence into rresponding letter to advise that Sibelco has commenced a PSI but not yet available. Awaiting finlisation of Workshop retention to confirm requirements. What do you think?

Commented [BS33R29]: Agree

.

Table 22 Remaining built infrastructure maintenance requirements

Assett	Potential issue	Maintenance requirements
Fire trails	Track is eroded and impassable	• Regular inspection with actions developed to address any current or impending issues.
	Track is overgrown and impassable	• Regular inspection with actions developed to address any current or impending issues.
All sealed and unsealed roads	Road is eroded and impassable	• Regular inspection of road including verge and drains if applicable, with actions developed to address any current or impending issues.
	Road is overgrown and impassable	• Regular inspection with actions developed to address any current or impending issues.
Bore 1 and 3	Electrical fault	• Regular statutory electrical inspections and testing, with actions raised to address any current or impending issues.
	Mechanical fault	• Regular inspection and running up of the bore to check operation, with actions raised to address any current or impending issues.
	Corrosion or degradation of equipment	• Regular inspection or the bore head with actions raised to address any current or impending issues.
40mm UPVC bore (ML7064)	Nil	

8 Risk Assessment

The overall objective of the rehabilitation and closure risk assessment (the risk assessment) is to identify risks that might prevent the achievement of a stable condition for rehabilitated land and to document how SAPL has or intends to treat or mitigate the risks identified in accordance with Section 126C(1)(f) of the EP Act. As defined in Section 111A of the EP Act, *Land is in a stable condition if —*

a. the land is safe and structurally stable; and
b. there is no environmental harm being caused by anything on or in the land; and
c. the land can sustain a post-mining land use.

A risk assessment was undertaken in accordance with AS/NZS ISO 31000:2018 *Risk Management – guidelines* and *HB203:2006 Environmental risk management principles and processes*. The criteria adopted for assessing risk levels of identified hazards is shown in Table 23. Analysis of the likelihood and consequence was conducted to determine the risk rating given against each hazard (refer Table 24 and Table 25).

The risk assessment matrix in Table 26 provides a summary of the hazard analysis and risk assessment as it relates to the PRCP. The risk assessment also identifies the risk of a stable condition for land not being achieved and includes mitigation measures outlining how this risk will be managed. The identified mitigation measures have been incorporated into the rehabilitation and closure planning outlined in the PRCP.

Table 23 Risk assessment criteria

Likelihood	Consequence				
	Extreme 5	Major 4	Moderate 3	Minor 2	Insignificant 1
Almost Certain 5	Extreme (25)	Extreme (20)	Extreme (15)	High (10)	Moderate (5)

Likely 4	Extreme (20)	Extreme (16)	High (12)	Moderate (8)	Low (4)
Possible 3	Extreme (15)	High (12)	Moderate (9)	Moderate (6)	Low (3)
Unlikely 2	High (10)	Moderate (8)	Moderate (6)	Low (4)	Low (2)
Rare 1	Moderate (5)	Low (4)	Low (3)	Low (2)	Very low (1)

Table 24 Likelihood scale

Level	Descriptor	Definition
1	Rare	Unlikely to occur during a lifetime or very unlikely to occur
2	Unlikely	Could occur about once during a lifetime or more likely not to occur than to occur
3	Possible	Could occur more than once during site lifetime and more likely not to occur than to occur
4	Likely	Will probably occur in most circumstances
5	Almost Certain	Is expected to occur in most circumstances

Table 25 Consequence scale

Level	Descriptor	Definition
1	Insignificant	• Very low environmental and health impacts confined to a small area within the site • Prompt (typically within a shift) clean-up • Negligible loss of human, social, financial, or built capital/wellbeing • Negligible media coverage
2	Minor	• Low environmental and health impacts confined within the site • Short-term (typically within a week) clean-up • Small but noticeable loss of human, social, financial, or built capital/wellbeing, can be easily rehabilitated • Regulation breaches without fine or litigation • Negative local media coverage • Complaint from community
3	Moderate	• Reversible off-site environmental health impacts, requiring short-term clean-up (weeks) • Onsite medium term (months) clean-up • Moderate, noticeable loss of financial or built capital/wellbeing • Regulation breaches resulting in fine or prosecution • Negative media coverage at local/regional level over more than one day
4	Major	• Major, off-site, environmental and health impacts requiring medium-term clean-up (months) • Onsite impact requiring significant clean-up effort (years) • Substantial loss of financial or built capital/wellbeing, will attract public concern • Major litigation at operation level • Negative national media cover age
5	Extreme	• Prolonged or severe, off-site, or regional environmental and health impacts requiring long-term clean-up (years) with irreversible residual damage • Extreme permanent loss of, financial or built capital/ wellbeing, with anticipated major public outrage • Major litigation or prosecution at parent company level • Loss of environmental licence

Table 26 Qualitative risk assessment

Relevant PMLU	Risk Event	Potential impact on achievement of stable conditions (i.e. what is the effect on each of the matters that DESI considered constitute stable from a, b, c above)	Risk Rating (Prior to mitigation)	Proposed mitigation strategy and risk treatment	Performance assessment and reporting	Residual Risk Rating (after mitigation)
Native Vegetation	Pests, disease and/or weeds prevent adequate Vegetation establishment	• Potential to impact the achievement of subsequent rehabilitation milestones • Pests, disease and/or weeds spreading to neighbouring properties • Loss of habitat and feeding areas for vulnerable species • Inappropriate weed management during revegetation may result in weed infestation in rehabilitated areas • Potential to impact the achievement of subsequent rehabilitation milestones • Risk of weeds spreading to neighbouring properties	Moderate	• Vehicle hygiene controls will be implemented to minimise the risk of weeds being transported to the site • Vegetation condition monitoring program developed • Additional site inspections and monitoring will be triggered by serious pest invasions and disease outbreaks • The soils are naturally low in nutrients that favour the native vegetation and reduce the risk of weed establishment • Implementation of weed control and management measures as required	RM6(a)	Low
	Vegetation fails to establish due to inappropriate species mix	• Poor vegetation cover leads to accelerated erosion • Unable to achieve vegetation milestones in the PRCP schedule	Moderate	• The plant species selected are of local provenance and suited to site conditions. • Revegetation strategy considered optimum timing for planning to maximise potential for follow up rains • Vegetation and land condition monitoring program developed • Progressive rehabilitation using endemic species	RM6 (e), RM7 (b)	Low
	Extreme weather events/climate change	• Loss of vegetation and increased erosion • Change in drought patterns, leading to reduced rainfall, which may inhibit plant growth • Unsuccessful planting resulting from strong winds • Increased rainfall and change in rainfall patterns • Increased rainfall event causing the mobilisation of sediment • Delay to achieving criteria due to bushfires and harsher/more extreme weather • Climate change impacts may result in delay to achieving successful rehabilitation outcomes	Moderate	• Native vegetation used for rehabilitation is of local provenance and suited to site conditions. • Monitoring rehabilitation areas on a regular basis will ensure that original objectives set out in the PRCP are achieved. • In the circumstances that rehabilitation activities do not achieve the desired outcomes in the PRCP, procedures will be reviewed and adapted to achieve compliance • Monitor weather forecasts and plan rehabilitation works accordingly	RM6 (a)	Low
	Fire	• Natural fires may result in loss of vegetation • Loss of vegetation cover may result in increased erosion and soil loss • Delay in achieving milestone criteria pertaining to vegetation cover	Moderate	• Minjerribah TFMS • Ongoing implementation of Monitoring and Maintenance Program • Note – natural fires and controlled fires may promote diversity and resilience in revegetated areas	RM6 (a)	Moderate
	Unforeseen conditions affect achievement of stable conditions	• Unable to achieve vegetation milestones	Moderate	• Vegetation monitoring program is implemented • Corrective actions are developed and actioned as needed in response to vegetation monitoring program • Additional site inspections will be triggered by previously unforeseen event	RM6 (a) to (c), RM6 (h)	Low
	Ground compacted by previous land use prevents adequate vegetation establishment or sustained ground cover	• Compaction leads to poor water holding capacity, poor drainage and waterlogging, poor vegetation establishment	Low	• Low risk in sandy soils Monitoring for water ponding is included in the nominated monitoring program • Periodic monitoring of ground conditions and vegetation is undertaken • Where applicable, rip the surface prior to seeding and stabilising	RM6 (c) to (e), (h), and RM7 (a) and (e)	Low
	Stability of landform not being achieved for rehabilitation areas	• The post mining land use for the relevant rehabilitation areas cannot be achieved • Impacts to rehabilitation timing and achievement of rehabilitation milestones	Moderate	• Rehabilitated landform slopes similar to surrounding landforms • Exposed areas to be progressively rehabilitated to achieve a suitable level of ground cover to minimise the potential for scouring • Reusing cleared shrubby vegetation as brush matting for landform stabilisation or maintenance	RM6 (c) to (e), (h) and RM7 (a)	Low
	Topsoils used in rehabilitation is of unsuitable quality	• Importation of weeds or pests • Poor quality topsoil does not provide suitable growing conditions for proposed post mining land use	Moderate	• Topsoil in stockpiles to be used for rehabilitation is taken from mined area on Minjerribah and has been assessed as suitable. • An adequate depth of topsoil is provided in rehabilitation methodology	RM6 (b) to (d)	Low
	Poor rehabilitation leads to delay in development of previously present habitats	• Delay In achieving rehabilitation milestone	High	• Cleared canopy vegetation and large woody debris such as hollow logs and branches will be reinstated as structures for fauna habitat • Rehabilitated ecosystem species selected to suit landform and surrounding ecosystem • Rehabilitation monitoring program • Implementation of actions from rehabilitation monitoring reports.	RM6 (a), (b), (e) and (i), RM7 (a) to (e)	Low

Relevant PMLU	Risk Event	Potential impact on achievement of stable conditions (i.e. what is the effect on each of the matters that DESI considered constitute stable from a, b, c above)	Risk Rating (Prior to mitigation)	Proposed mitigation strategy and risk treatment	Performance assessment and reporting	Residual Risk Rating (after mitigation)
				• Timing of rehabilitation milestones to provide contingency for reaching milestone criteria		
	Poor rehabilitation of mined areas	• Poor diversity of the ecosystem, Delay In achieving rehabilitation milestone	Moderate	• Rehabilitation undertaken with the objective of re-establishing pre disturbance floristic and structural characteristics • Area of disturbance minimised during operation and progressive rehabilitation undertaken • Monitoring and maintenance of rehabilitated areas	RM6 (a) to (h) and RM7 (a) to (h)	Low
	Changes to groundwater recharge characteristics	• Loss of habitat and feeding areas for vulnerable species • Greater erosion risk	Moderate	• Progressive rehabilitation to minimise increased recharge of groundwater • Monitoring of groundwater conditions	RM6 (h) and RM7 (h)	Low
	Adverse groundwater quality identified	• Impacts to downstream and off-site environmental values	Moderate	• Ongoing monitoring of groundwater values	RM6 (h) and RM7 (h)	Low
	Incomplete or inadequate removal of infrastructure	• Infrastructure or hazardous building materials pose a risk to human and fauna safety • Surface or buried debris prevents soil seedbed preparation	Moderate	• All infrastructure not to be retained by the landholder has been removed from the site	RM1 (a) to (d)	Low
Retained Infrastructure	Erosion of the fire trail	• Erosion of retained sand tracks results in inability to access areas	Moderate	• The rehabilitation strategy incorporates ongoing use of a fire trail • Ongoing maintenance of trails will include – regular inspection of track for integrity and potential future issues. Actions arising from the inspection may include track repair or upkeep by hand or through the use of heavy vehicles.	RM8 (a)	Low

8.1 Rehabilitation Trials

The rehabilitation process was based on trial and experience undertaken over the years on other SAPL projects and no specific trials were necessary at the Project. Notwithstanding, SAPL have trialled the use of hydromulch for establishing revegetation and controlled burns for the maintenance of existing revegetated areas on the Project. To date, these trials did not identify any improvements to current practices and no trial methods used have been more widely implemented.

9 Rehabilitation Milestones and Completion Criteria

The PRCP Guideline requires the development of rehabilitation milestones and milestone criteria for all RAs that have a PMLU. No management milestones (as they apply to NUMAs) are required for the Project.

Rehabilitation milestones are a set of sequential steps in the rehabilitation process with specific timeframes that need to be met to demonstrate progressive rehabilitation is occurring and on the expected trajectory. Rehabilitation milestones are legally enforceable commitments once the PRCP schedule is approved. Milestones are future targets and the PRCP Schedule cannot include dates in the past to account for actions that have already been completed or outcomes that have been achieved and documented.

Rehabilitation milestone criteria are rehabilitation requirements (such as an action, standard or value) that must be met to achieve the milestone. It must be possible to quantitatively measure the achievement of the milestones and milestone criteria to demonstrate that land has been rehabilitated to a stable condition (according to the definition in Section 111A of the EP Act).

The PRCP Guideline requires that rehabilitation milestones and milestone criteria meet the SMART (Specific, Measurable, Achievable, Reasonable/Relevant and Time-specific) principles.

9.1 Basis for the Development of Rehabilitation Milestones and Milestone Criteria

Site specific rehabilitation milestones and milestone criteria have been developed for the Project. They have been developed to reflect the current conditions in the EA and LODs prepared and submitted under conditions of the EA for each of the stages of the mining operation. Specific to the Project this includes the Rehabilitation Plan (**Appendix B**) developed in accordance with EA Condition F2-2.

Any existing criteria secured in the EA or associated LOD have been reviewed against the SMART principals and modified as required. However, considering the high level of stakeholder input into the development of the LODs and rehabilitation planning, care has been taken to ensure that milestone criteria retain their original intent and demonstrate the achievement of previously agreed outcomes.

Rehabilitation milestones apply to areas when they become available for rehabilitation. Given that progressive rehabilitation commenced in 1975 and the majority of the rehabilitation is now advanced, not all milestones that would normally apply to a mining operation are required at the Project, and all areas are proposed to commence in the PRCP Schedule at the rehabilitation monitoring and maintenance phase.

9.2 Milestones and Milestone Criteria

Rehabilitation activities have been completed for the majority of the Project site (i.e., RA1) with these areas currently in the rehabilitation monitoring and maintenance phase. The nominated PMLU for rehabilitated areas is Native Ecosystem (Table 16).

The final site design and reference map prepared as part of the PRCP Schedule are presented in Figure 36 and Figure 37**.**

Rehabilitation milestones and milestone criteria appropriate for the Project are nominated in Table 27 .

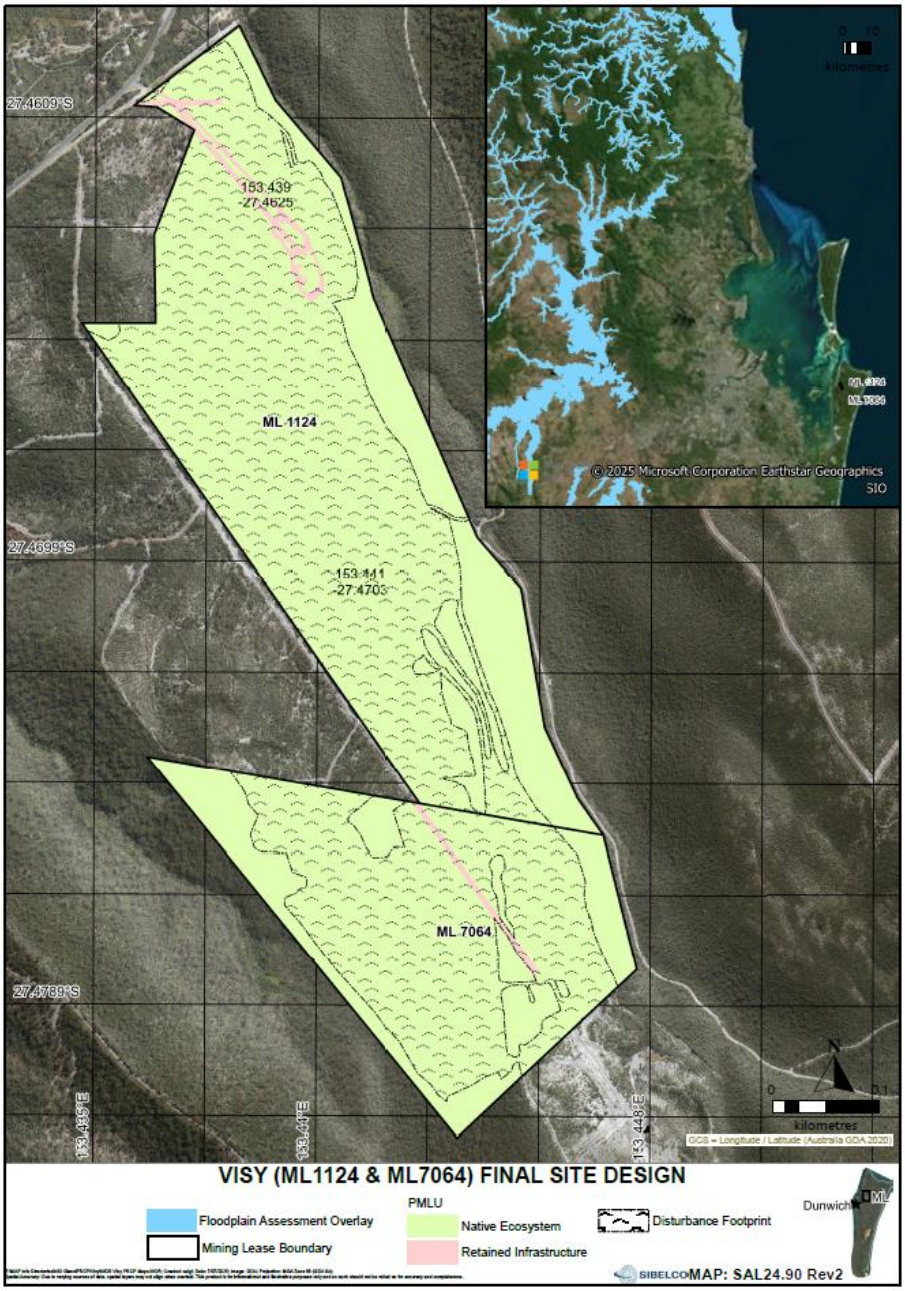

Figure 36 Final site design

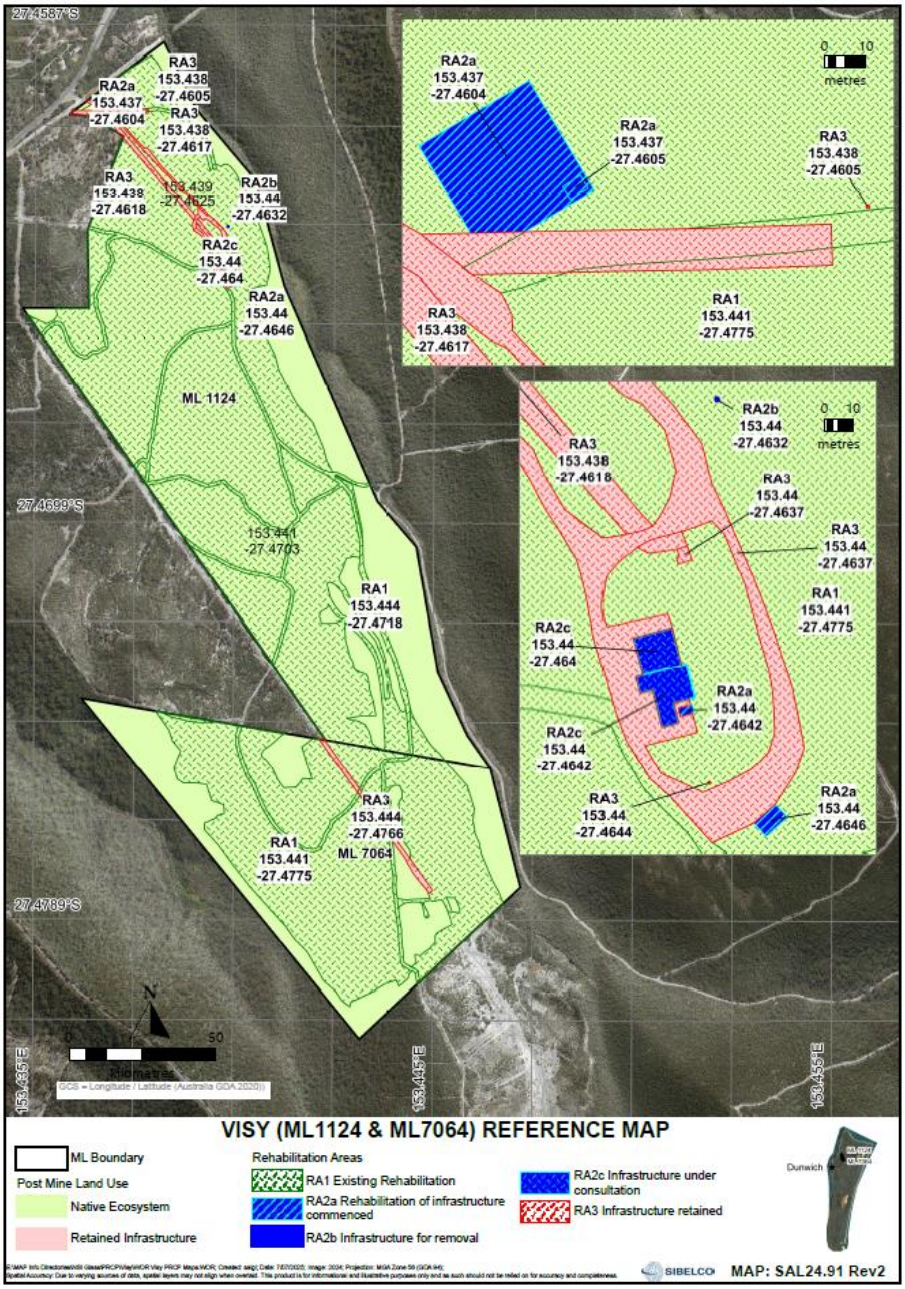

Figure 37 Final site design reference map

Table 27 Rehabilitation criteria and milestones

Milestone ID	Applicable Rehabilitation Area	Milestone criteria			Source and justification
RM1 - Infrastructure decommissioning and removal	RA2	1	a)	All remaining services not required for rehabilitation monitoring and maintenance and not subject to landholder agreements disconnected	Existing landholder agreements provide for the retention of some services
		1	b)	All buildings and associated infrastructure (not subject to landholder agreements) demolished, and removed offsite to an appropriately licensed waste facility	No buildings and associated infrastructure are to remain as part of the PMLU, as per landholder agreements
		1	c)	Hardstands are removed to an appropriately licensed waste facility	No hardstands to remain as part of the PMLU as per landholder agreements
		1	d)	Machinery not required for rehabilitation removed off-site.	Machinery that is not required for rehabilitation and not subject to landholder agreements should be removed from site to an appropriate storage facility to eliminate any potential safety risks
RM2 - Investigation and/or remediation of contaminated land	RA2	2	a)	Contaminated land investigation completed by a suitably qualified person	A contaminated land investigation completed by a suitably qualified person is necessary to ensure that risks to human health and the environment have been appropriately managed. The site investigation / remediation may include (as required): • contaminated land site investigation undertaken in accordance with Schedule B2 (Guideline on Site Characterisation) of the National Environmental Protection (Assessment of Site Contamination) • preparation of a Remediation Action Plan (RAP) • a validation program to confirm suitable remediation actions have been adequately implemented and the site is suitable for the final PMLU"
		2	b)	If required, remediation is carried out including removal, appropriate treatment and / or disposal of contaminated water, soils and materials	As required, it will be necessary to: • either remove or treat onsite contaminated water to ensure appropriate remediation and a safe, non-polluting site • remove and dispose of contaminated materials to ensure a safe and non-polluting site onsite remediation of contaminated soils will be undertaken to ensure a safe and non-polluting site
		2	c)	If required, validation testing conducted to confirm that contaminated soils and/or water have been removed and remediated.	Once any contaminated soils have been removed and/or remediated, it is necessary to undertake validation testing. This can be included as part of the contaminated land investigation if needed and will ensure a safe, non-polluting PMLU
RM3 - Landform development and reshaping	RA2	3	a)	Minor earthworks completed and landform constructed in accordance with final engineering and design plans	Landform development and reshaping / re-profiling involves major earthworks (i.e. removal, adding and/or moving large quantities of soil and/or overburden from one area to another)
		3	b)	Reshaped areas assessed as stable and non-polluting by a suitably qualified person	Assessment must be provided by a suitably qualified engineer that the final landform is stable post reshaping / re-profiling of landform
RM4 - Surface preparation	RA2	4	a)	Topsoil placed to an average depth of 200 mm to reshaped areas	Topsoil placed at an average depth of 200 mm to provide sufficient depth for vegetation growth
		4	b)	Application of fertiliser at a rate of 300kg/ha to topsoiled areas if required	Fertiliser may be required to sustain nutrient levels for plant growth.
RM5 - Revegetation (native ecosystem)	RA2	5	a)	After topsoil application, seeding of target species in accordance with the revegetation plan (Section 7.8.1 of the PRCP RPP)	As per the existing revegetation program implemented for the Project
		5	b)	Planting of target native tubestock in accordance with revegetation plan (Section 7.8.1 of the PRCP RPP), at a rate of 1650 per ha	As per the existing revegetation program implemented for the Project
RM6 - Rehabilitation monitoring and maintenance	RA1 RA2	6.	a)	The rehabilitation monitoring program has been implemented for RA1 and RA2	

Milestone ID	Applicable Rehabilitation Area	Milestone criteria			Source and justification
		6.	b)	Reshaped slopes that connect to mined areas to the natural landform within RA1 will meet the following design parameters to ensure long term stability: • Slopes >30% should not exceed 25 m length • Slopes of 20-30% should not exceed 30 m length • Slopes of 10-20% should not exceed 80 m length • Slopes of 5-10% should not exceed 120 m length • Slopes of <5% should not exceed 170 m length.	From Table 1 of the Rehabilitation Plan with minor wording changes to make it usable as a rehabilitation milestone criterion.
		6.	c)	Annual monitoring shows no active gullies[1] >1.0 m depth	Appendix A of the Rehabilitation Plan has a criteria to stabilise wash out areas >1 m deep. Wording has been revised to include defined terminology that make the criteria measurable, auditable, and benchmarked against approved PRCPs. This is a commonly accepted assessment of erosion status for this milestone (such as Graymont's Murgon Operations (PRCP schedule: PRCP-EPML00352613-V1-1) and Marmor Operations (PRCP schedule: PRCP-EPML00319713-V1-1)).

Milestone ID	Applicable Rehabilitation Area	Milestone criteria			Source and justification
		6.	d)	Temporary erosion and Sediment Control Structures, such as non-biodegradable sediment fencing, removed from RA1	All temporary and non-biodegradable erosion and sediment control structures to be removed from the Project. No previous criteria included in the Rehabilitation Plan.
		6.	e)	Vegetation monitoring determines that at least one of the significant species present in unmined reference sites is present in rehabilitated areas. Significant species that may be present include: • *Boronia rosmarinifolia* (forest boronia) (cultural species) • *Boronia safrolifera* (safrole boronia) (cultural species) • *Boronia falcifolia* (wallum boronia) (cultural species)	Significant species identified in Section 3.3 of the Rehabilitation Plan. Potential habitat for *Acacia baueri subsp bauri* was identified at the north end of ML1124, northwest of East Coast Rd during a survey completed in September 1996. One specimen was observed along the drainage line of Cooroon Cooroonpah Creek on ML 7064 in October 1997. The Minjerribah Moorgumpin Elders have identified three other species that are of cultural significance to the traditional owners of North Stradbroke Island.
		6.	f)	The index of similarity has increased for 3 consecutive years after the value has reached 50%	From Table 1 of the Rehabilitation Plan with minor wording changes to make it usable as a rehabilitation milestone criterion.
		6.	g)	For species comprising more than 15% of the reference areas, the difference in percentage between reference and rehabilitation areas is within ±20%	From Table 1 of the Rehabilitation Plan with minor wording changes to make it usable as a rehabilitation milestone criterion.
		6.	h)	A surface water and groundwater quality monitoring program has been implemented	Surface water and groundwater quality at EA monitoring locations is to be monitored against the site specific water quality criteria developed from pre-mining background monitoring, as specified by EA Schedule C – Table 2 (surface water) and Schedule C – Table 4 (groundwater)
RM7 - Achievement of post-mining land use to stable condition (native ecosystem)	RA1 RA2	7.	a)	Monitoring shows no active gullies >0.3 m are within RA1 and RA2	Erosion gullies must be less than or equal to 0.3 m and are considered stable, showing no active erosion. Replacement of erosion criteria (i.e. <10mm/year) from Appendix A of the Rehabilitation Plan. Monitoring at reference sites has identified elevated erosion rates, i.e. >10 mm/year, indicating this criteria is unsuitable for monitoring the success of rehabilitated sites. The proposed replacement criteria will provide a better indication of erosion risk and stability within rehabilitated landforms, and supports regular site-wide monitoring (through LiDAR) as part of the monitoring program and follow up field validation. It is readily auditable. Criterion benchmarked against approved PRCPs (such as Graymont's Murgon Operations (PRCP schedule: PRCP-EPML00352613-V1-1) and Marmor Operations (PRCP schedule: PRCP-EPML00319713-V1-1)). This is a commonly accepted assessment of erosion status for this milestone.
		7.	b)	Vegetation monitoring shows that all significant species present in unmined reference sites are present in rehabilitated areas. Significant species that may be present include: • *Boronia rosmarinifolia* (forest boronia) (cultural species) • *Boronia safrolifera* (safrole boronia) (cultural species) • Boronia falcifolia (wallum boronia) (cultural species)	Significant species identified in Section 3.3 of the Rehabilitation Plan.
		7.	c)	The index of similarity has increased for 3 consecutive years after the value has reached 50%.	From Table 1 of the Rehabilitation Plan with minor wording changes to make it usable as a rehabilitation milestone criterion.
		7.	d)	For species comprising more than 15% of the reference areas, the difference in percentage between reference and rehabilitation areas is within ±20%	From Table 1 of the Rehabilitation Plan with minor wording changes to make it usable as a rehabilitation milestone criterion.
		7.	e)	Evidence of the return of soil function demonstrated by litter accumulation and incorporation (nutrient cycling) within RA1	Outcomes implemented as result of the soil health and suitability assessment/s competed by a suitably qualified person. Litter accumulation alone may indicate a lack of incorporation and soil humus was already provided though topsoil application (its presence is not an indication of the return of key nutrient cycling processes processes). Monitoring methods to be amended to include aspects of soil surface condition assessment from the landscape function analysis method.
		7.	f)	Surface water quality of the Project's receiving waters (at the locations specified in Schedule C - Table 1 of the EA) meets[2] the site specific water quality criteria detailed in Schedule C - Table 2 of the EA	Surface water and groundwater quality at monitoring locations is to remain within site specific water quality criteria developed from pre-mining background monitoring, as outlined in the conditions of the EA, specifically Schedule C – Table 2 (surface water) and Schedule C – Table 4 (groundwater).
		7.	g)	Groundwater quality of the Project's receiving groundwaters (at the locations specified in Schedule C - Table 3 of the EA) meets[2] the site specific groundwater quality criteria detailed in Schedule C - Table 4 of the EA	
		7.	h)	Groundwater bores decommissioned according to the preferred practices nominated in the 'Minimum Construction Requirements for Water Bores in Australia' (National Uniform Drillers Licensing Committee 2020)	No groundwater bores to remain as part of the PMLU

Milestone ID	Applicable Rehabilitation Area	Milestone criteria			Source and justification
RM8 - Achievement of post-mining land use to stable condition (retained infrastructure)	RA3	8.	a)	The Quandamooka Yoolooburrabee Aboriginal Corporation (QYAC) has assumed responsibility for the maintenance of RA3	No previous criteria

[1.] Active and gullies as defined in the *Australian Soil and Land Survey Field Handbook* (3rd Edition), The National Committee on Soil and Terrain published by CSIRO Publishing 2009.
[2.] Based on test values collected over a 24 month period prior to completion of this milestone.

9.3 Method to Achieve Stable Condition

The prescriptive criteria (requiring the completion of an action) will be captured in the QA/QC procedures outlined in the monitoring program. **Section 10** provides the routine monitoring requirements to determine rehabilitation progress against milestones for the achievement of agreed PMLUs to a stable condition. All monitoring will be undertaken by appropriately qualified professionals (AQPs).

9.4 Adaptive Management

Rehabilitation must be adaptive in order to achieve completion criteria. SAPL will adaptively implement the PRCP to mitigate uncertainty that may arise throughout the process where the plan is not delivering completion criteria.

Adaptively implementing the PRCP is critical to achieving the plan's objectives. Where required, implementation of adaptive management strategies can enhance effectiveness and deliver improvements. To maintain an adaptive approach, SAPL will:

- Effectively schedule monitoring to make informed decisions on risk management and corrective actions (see **Section 10**). The schedule for rehabilitation stages has been provided in Appendix C
- Periodically review risks, including those in response to the changing risk level, new information, changing circumstances or the results from implementing corrective actions
- Review the rehabilitation methods where monitoring indicates persistent rehabilitation failure.

10 Monitoring and Maintenance

Monitoring is conducted by SAPL to assess the success of rehabilitation activities in comparison to the achievement of long term land use objectives and milestone criteria. The monitoring results are also used to identify, through the establishment of trigger levels, where progress is not on track and where adaptive management intervention is required to achieve milestone criteria in the timeframe nominated in the PRCP Schedule.

The monitoring programs required to demonstrate the achievement of rehabilitation milestones and milestone criteria are based on those documented in the Rehabilitation Plan, but have been modified where required to suit the amended criteria documented in **Section 9.**

Only the monitoring required for assessing rehabilitation progress are documented in this plan. The most recent annual rehabilitation monitoring assessment undertaken at the site by Ausecology has been provided in Appendix G**.**

10.1 Monitoring Program

The monitoring program is outlined in Table 28.

Table 28 Monitoring requirements

Rehabilitation aspects	Monitoring type	Methods	Timing	Frequency	Trigger	Action
Landform stability	LiDAR for slope analysis	LiDAR will be used to prepare DEMs and cross sections of the revegetated areas to confirm the areas meet the design criteria nominated in Table 27 (RA1 and RA2 areas).	NA	One-time assessment. Prior to completion of RM6	Built slope angles exceed angles nominated in **section 7.5.**	No action required as landform is constructed and all slope angles within criteria
Erosion rates	LiDAR and ground truthing for erosion feature assessment	Assessment of LiDAR data to identify active (unvegetated) gullies >0.3 m and >1.0 m deep (RA1 and RA2)	NA	Approximately biennially to coincide with milestone completion dates	Milestone completion dates	Assess updated LiDAR and corrective actions as required
Revegetation	Vegetation assessment and presence of significant species	Vegetation species type and diversity, species percent comparison and significant species recorded in reference site transects (50 x 2 m) will be recorded in rehabilitation transect (50 x 2 m) and walk through survey of rehabilitation areas (native ecosystem PMLU areas). Additional flora species present within a 50 m x 10 m plot recorded to contribute to species richness. Quaternary assessments as per Neldner *et al* (2022) at reference and rehabilitation monitoring sites. This will include maintenance of photographic records.	End of the wet season (March to June)	Annually for vegetation	No Significant species noted in rehabilitation quadrats or surveys	Complete relocation or propagation of required Significant species within Rehabilitation Area
					Species composition score (SIS) is less than criteria	Implementation of recommendations from Flora monitoring report
					Species abundance score of dominant species (i.e, those comprising >15% at reference sites)	

Rehabilitation aspects	Monitoring type	Methods	Timing	Frequency	Trigger	Action
					is ± 20% at monitoring sites	
Litter incorporation	Surface condition	Litter depth and degree of incorporation classified as follows (Tongway and Hindley 2005): • Nil decomposition - litter loosely spread on the surface with few signs of decomposition and incorporation. • Slight decomposition - litter is broken down into small fragments and intimately in contact with soil; some fragments may be partially buried. • Moderate decomposition - litter developed distinct layers (different degrees of decomposition) with the layer next to the soil somewhat humified; some darkening of the soil to a depth of less than 10 mm. Soils surface darkening was examined by removing surface litter and then carefully scraping away the surface material with a spade to determine if it was darker than the material beneath. Extensive decomposition - litter has at least three layers or stages in decomposition ranging from fresh material on top to 20 mm or more of comprehensively humified (very dark, with no identifiable fragments) at the soil-litter interface; mineral soil may have significant organic darkening in excess of 10 mm.	May to September	Annually	Litter is absent or no litter incorporation is occurring	Where litter is absent, review vegetation data and determine the need for additional shrub and canopy species density to provide appropriate litter. Where litter is accumulating and not being incorporated, review soil conditions and determine need for amelioration.
Water quality	Groundwater	Groundwater quality monitoring at the locations specified in Schedule C – Table 3 and against the contaminant	January - December	Biannual (ongoing)		

Rehabilitation aspects	Monitoring type	Methods	Timing	Frequency	Trigger	Action
		limits specified in Schedule C – Table 4 of the EA				
	Surface water	Surface water quality monitoring at the locations specified in Schedule C – Table 1 and against the contaminant limits specified in Schedule C – Table 2 of the EA	January - December	Biannual (ongoing)		

10.1.1 Identification of Reference and Monitoring Sites

Groundwater and surface water quality monitoring sites are established in the Project's EA. These sites are identified in Table 29 and Table 30 respectively.

Reference sites and rehabilitation monitoring sites (within RA1) currently used for the Project's vegetation monitoring program are identified in Table 31 below and shown in Figure 38. Monitoring consistent with the methods proposed in this Plan is to continue at these sites.

Table 29 Surface water monitoring locations

Monitoring Point	Easting (GDA94 Zone 56)	Northing (GDA94 Zone 56)	Purpose
1	0543251	6962832	Surface water quality receiving monitoring point
3	0543398	6962472	Surface water quality receiving monitoring point

Table 30 Groundwater monitoring locations

Monitoring Point	Easting (GDA94 Zone 56)	Northing (GDA94 Zone 56)	Purpose
1	0543267	6962484	Groundwater quality receiving monitoring point
3	0543267	6962484	Groundwater quality receiving monitoring point

Table 31 Vegetation monitoring locations

Site ID	Sites type and RA	Pre-Clear Regional Ecosystem	Year established
G1	Rehabilitation RA1	12.2.10	2018
G2	Rehabilitation RA1	12.2.10	2019
G3	Rehabilitation RA1	12.2.6	2020
G4	Rehabilitation RA1	12.2.10	2021
G5	Rehabilitation RA1	12.2.6	2021
G6	Rehabilitation RA1	12.2.10	2021
P7	Reference	12.2.10	2008
Ref1	Reference (on ML1108)	12.2.10	2020
Ref2	Reference	12.2.10	2020

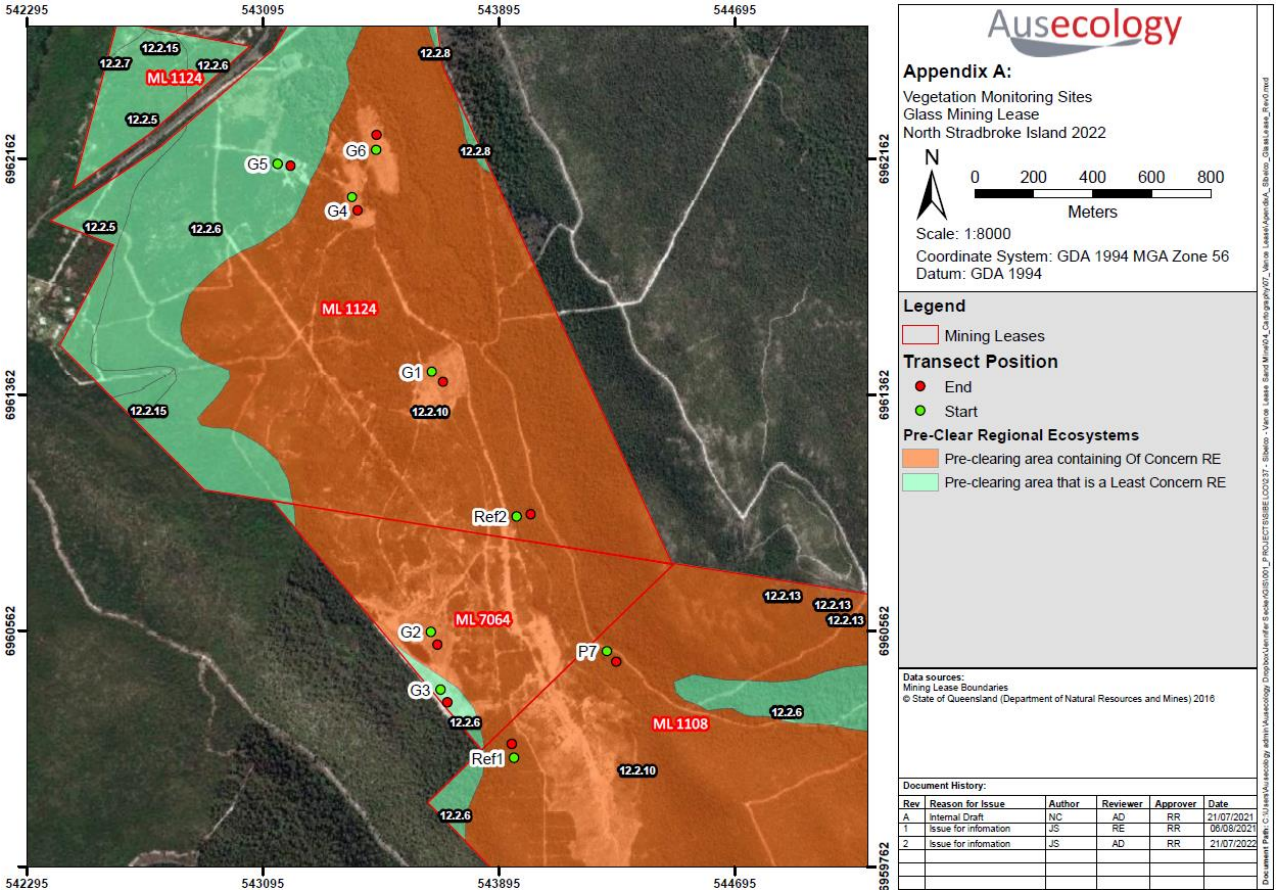

Figure 38 Vegetation monitoring locations (Note use of State mapped REs) (Ausecology, 2023)

10.2 Maintenance Program

Maintenance of rehabilitated areas will be undertaken where necessary and in response to results of the monitoring program to ensure milestone criteria are being met or are projected to meet the schedule. Example maintenance works which may be required include:

- Re-seeding or planting of tube stock of tree/ and or shrub species
- Soil amelioration
- Erosion repair or implementation of erosion protection measures

Corrective actions (contingency measures) for operational and post-rehabilitation have been nominated in the Rehabilitation plan. Only those that apply to the post-rehabilitation and monitoring phase have been adapted for this plan and are included in Table 32.

Table 32 Corrective Actions

Trigger	Corrective action	Responsibility	Timing
On completion of final landform survey, the landform does not align to the milestone criteria	Investigate why the final surface does not align to the milestone criteria	Project Manager Relinquishment Coordinator Rehabilitation Officer	Within 3 months of the results being received
	Undertake assessment of landform to determine appropriate corrective actions that may include recontouring/ shaping (where safe and practicable)	Project Manager	Within 6 months of the investigations results being received
Active erosion features >1.0 m persist between monitoring events	Identify washout area, repair and reseed or replant. Provide additional erosion protection as required.	Project Manager Relinquishment Coordinator Rehabilitation Officer	Within 3 months of monitoring results being made available (subject to favourable weather conditions)
Dieback of rehabilitation	Investigate possible reasons for the dieback (e.g. pest, disease or planting not in appropriate planting season). Implement corrective actions such as spraying or supplementary planting	Project Manager Relinquishment Coordinator	Within 12 months of the results (subject to favourable environmental conditions allowing for corrective actions to be implemented)
Significant species present in reference sites are not present in rehabilitation areas	Undertake corrective actions which may include reseeding or supplementary planting.	Project Manager Relinquishment Coordinator	Within 12 months of the results (subject to favourable planting conditions)
Vegetation in rehabilitation areas failing to meet (or not progressing towards) the criteria in Table 27	Investigate possible reasons for the poor rehabilitation response. This may include collecting soil samples	Project Manager Relinquishment Coordinator Rehabilitation Officer	Within 3 months of the results
	Undertake corrective actions which may include soil treatment, weed/pest spraying, reseeding or supplementary planting.	Project Manager Rehabilitation Officer	Within 12 months of the results of the investigations being received (subject to suitable environmental

Trigger	Corrective action	Responsibility	Timing
			conditions allowing for corrective actions to be implemented)
Surface water quality results do not comply with EA limits	Investigate reasons for variation in water quality parameters (this may include re- sampling if sampling error, laboratory analysis error or extraneous impacts are suspected to have influenced water quality results)	Project Manager Relinquishment Coordinator	Within 1 month of receiving and processing the results
	Implement appropriate management actions, which may include additional monitoring, inspection of conditions in the upstream catchment, a review of the monitoring program.	Project Manager Rehabilitation Officer	Within 1 month of the results of the investigations being determined, where this is found to be relevant to the Project's activities
Groundwater quality results do not comply with EA limits	Investigate reasons for change in water quality parameters (this may include re-sampling)	Project Manager Relinquishment Coordinator	Within 1 month of receiving and processing the results
	Implement appropriate management actions, which may include additional monitoring, inspection of conditions in the upstream catchment, a review of the monitoring program.	Project Manager	Within 1 month of the results of the investigations being determined, where this is found to be relevant to the Project's activities
Delay to achieving milestone criteria due to bushfires and harsher/ more extreme weather.	Periodically monitoring the changes to the climate over the life of the Project and updating rehabilitation strategies based on climate projections from the BOM, CSIRO, and expert advice from suitable qualified persons, as needed.	Project Manager	Within 6 months of delays being identified as a result of extreme weather event.

10.2.1 Fire Management

On site access roads and newly contoured rehabilitation areas provide access tracks for bush firefighting and fire breaks for remnant vegetation.

Control burning on-site has been limited to treatment of *Xanthorrhoea.*

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SIBELCO

Appendix A. ENVIRONMENTAL AUTHORITY (EPML00349813)

Appendix B. Rehabilitation plan for disturbed areas (UNIMIN 2009)

Appendix C. PRCP Schedule

Appendix D. EMOS (LRS 2000)

Appendix E. Silica sand slurry composition

Table 33 Composition of mined silica sand and sand slurry

	Mined sand	**Sand slurry (+75µm)**	**Sand slurry (-75µm)**
% SiO_2 (By Balance)	99.40	98.87	97.13
% Fe_2O_3	0.108	0.184	0.544
% TiO_2	0.241	0.536	1.4
% Al_2O_3	0.057	0.148	0.230
% CaO	<0.01	<0.01	0.03
% MgO	<0.01	0.02	0.05
% Na_2O	<0.01	<0.01	0.03
% K_2O	<0.01	<0.01	0.02
% Cr_2O_3	0.0008	0.0080	0.017
% Loss on Ignition (1000°C)	0.19	0.23	0.55
Dry Screen Analysis - % Retained			
850µm	0.0		
600µm	0.0		
425µm	0.8		
300µm	9.1		
212µm	38.0	6.9	
150µm	45.2	47.6	
106µm	3.8	29.2	
90µm		5.7	
75µm	0.7	6.4	2.4
63µm		3.1	2.2
53 µm		0.4	2.9
Pan	2.4	0.6	92.5
TOTAL	**100.0**	**99.9**	**100.0**

Appendix F. VOID CLOSURE PLAN

Appendix G. 2023 Rehabilitation monitoring report (Ausecology 2023)

Appendix H. 2022 Rehabilitation monitoring report (Ausecology 2022)

Appendix I. 2021 Rehabilitation monitoring report (Ausecology 2021)

Appendix J. 2020 Rehabilitation monitoring report (Ausecology 2020)

Appendix K. 2019 Rehabilitation monitoring report (Ausecology 2019)

Appendix L. Landholder agreement

Appendix M. TFMS Implementation

Appendix N. ML1108 (Vance) Environmental Studies Report 2007

Appendix O. Letter to community - Structure changes