

Part 1

Ebenezer Project

Progressive Rehabilitation Closure Plan

Environmental Authority EPML00594013

Mining Lease 4712

Version 1-Revision a

16 December 2025

EA Holder: Zedemar Holdings Pty Ltd

Document ID: PRCPlp1

Date of Submission: 16 December 2025

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Document Control

Document Name	Ebenezer Project Progressive Rehabilitation Closure Plan Environmental Authority EPML00594013 Mining Lease 4712
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Revision History

Version#	Document ID	Issue Date (dd/mm/yy)	Details	Authorised By
1.0	PRCPlp1	18/05/23	Final	Luke Zambelli
1.0 Rev a	PRCPlp1	16/12/25	Final	Luke Zambelli

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Limitations

This PCRP was prepared for Zedemar Holdings Pty Ltd, the holder of Environmental Authority (EA) EPML00594013, to achieve compliance with conditions in the EA.

This PCRP has been prepared in good faith in accordance with Zambelli Environmental's understanding of the client's brief at the time it was prepared. The opinions, recommendations and conclusions set out therein are made in accordance with current legislation, relevant guidelines, third party information referenced in this PRC PLAN and generally accepted principles and practices of the environmental consulting profession.

This PCRP remains the intellectual property of The LZ Environmental Company Pty Limited and must only be used for the purpose it was intended and for the administering authority of the *Environmental Protection Act 1994*. No parts of this document are allowed to be copied or altered and reproduced in any other documents without appropriately identifying The LZ Environmental Company Pty Limited as the intellectual owner.

Glossary of Acronyms

BPEM	Best Practice Environmental Management
CCP	Community Consultation Plan
C&D	Construction and Demolition
CMG	Cartledge Mining and Geotechnics P/L
DES	Department of Environment and Science
EA	Environmental Authority
EMOS	Environmental Management Overview Strategy
EP Act	<i>Environmental Protection Act 1994</i>
EPP Air	<i>Environmental Protection (Air) Policy 2008</i>
EPP Noise	<i>Environmental Protection (Noise) Policy 2008</i>
EPP Water	<i>Environmental Protection (Water and Wetlands) Policy 2019</i>
EP Reg	<i>Environmental Protection Regulation 2019</i>
ERA	Environmentally Relevant Activity
ERC	Estimated Rehabilitation Cost
EV	Environmental Value
EVNT	Endangered, Vulnerable or Near Threatened
FOS	Factor of Safety
GDE	Groundwater Dependent Ecosystem
ICC	Ipswich City Council
IBSD	Ironbark South Dump
JCB	John C Beaumont Earthmoving
LGA	Local Government Area
BGL	below ground level
mAHD	metres Australian Height Datum
ML	Mining Lease
MSES	Matters of State Environmental Significance
NC Act	<i>Nature Conservation Act 1992</i>
OPD	Out of Pit Dump
PoOP	Plan of Operations
PM₁₀	Particulate matter with an equivalent aerodynamic diameter of not more than 10 microns (µm).
PM_{2.5}	Particulate matter with an equivalent aerodynamic diameter of not more than 2.5 microns (µm).
PRC PLAN	Progressive Rehabilitation and Closure Plan
RE	Regional Ecosystem

RL	Reduced Level
ROM	Run-of-Mine
RPEQ	Registered Professional Engineer of Queensland
RRA	Resource Recovery Area
SQP	Suitably Qualified Person
SPONCOM	Spontaneous Combustion
TBA	To Be Announced
TD1	Tailings Dam 1
TD2	Tailings Dam 2
TMS	Taylor Mining Services Pty Ltd
VMA	<i>Vegetation Management Act 1999</i>
WRR Act	<i>Waste Reduction and Recycling Act 2011</i>
WRP	Wanless Recycling Park Pty Ltd

1 Introduction

The Ebenezer Project is a former coal-mining operation in southeast Queensland that is currently being rehabilitated and is under care and maintenance.

Progressive rehabilitation and closure plan (PRC Plan) requirements for resource activities came into effect from 1 November 2019 to implement key elements of the Mined Land Rehabilitation Policy issued by the Queensland Government.

The Department of Environment and Science (DES) issued a Transition Notice for a PRC Plan to Zedemar Holdings Pty Ltd (Zedemar) on 31 May 2022 requiring Zedemar to submit a proposed PRC plan to the administering authority, by 30 May 2023.

This PRC PLAN has been prepared by The LZ Environmental Company Pty Limited (Zambelli Environmental) on behalf of Zedemar Holdings Pty Ltd to meet the requirements in sections 126C and 126D of the *Environmental Protection Act 1994* (EP Act) pursuant to section 754 of the EP Act.

Pursuant to the transitional provisions in section 754(3) of the EP Act, Zedemar is not required to comply with the requirements under section 126C(1)(g) or (h), or 126D(2) or (3) of the EP Act as a land outcome for the site has been identified under a land outcome document as defined within section 750 of the EP Act.

For the purpose of the PRC plan, the environmental authority (EA) is considered to be the land outcome document in accordance with section 750 of the EP Act. The post mining land uses for the areas described within Table F1 of the EA include light grazing, fauna habitat and water storage.

This PRC plan consists of two parts:

- Part 1 (this document) details the rehabilitation planning aspects of the PRC plan.
- Part 2 contains the PRC plan schedule for which approval is sought, subject to conditions that may be imposed by the administering authority.

Information contained within Guideline – Progressive rehabilitation and closure plans (PRC PLAN plans), Version 3.0, dated 4 April 2023, prepared by the DES has been considered in preparing this PRC plan.

Part 1 provides background information and strategies to achieve the stated rehabilitation objectives of disturbed land, namely, that the land is:

- stable;
- safe to animals and humans;
- non-polluting; and
- which can support a sustainable land use, post mining, in order to finalise the rehabilitation of ML4712 (the ML) for the Ebenezer Project.

Part 1 of the PRC plan includes information regarding the planned rehabilitation and improvements which are to occur. Part 1 also provides details on how Zedemar will consult with the community and relevant stakeholders as and when required. This includes how Zedemar handles complaints.

Part 1 indicates the post-mining land use for the disturbed areas within ML4712 and describes the rehabilitation management methodology that have been adopted.

A risk assessment has been performed for the identified risks that could impact on achieving the stated rehabilitation objectives above and control measures have been described that will reduce the initial risk ratings.

Monitoring and maintenance detail is provided for various aspects to ensure that rehabilitation is successful.

Various appendices are included within this PRC PLAN as part of the information submitted to DES for consideration.

Rehabilitation planning has considered the geotechnical stability of the high-wall and low-wall of the two existing mining voids known as Lanes Void and Ironbark North Void. The geotechnical stability assessment prepared by Cartledge Mining and Geotechnics (CMG) provides detailed information indicating that both the high-wall and low-wall of the existing voids could remain in their current form. For this to occur it will be necessary to amend Table F1- Final land use and rehabilitation schedule and Table F2 – Residual void design contained within the existing EA. Primarily, the amendment would involve replacing slope defined as a slope percentage to that of slope degrees. CMG's report is provided as supporting information.

However, whilst keeping the above in mind, the expiry date of the ML is 31 October 2023 and Zedemar has submitted an ML renewal application to effect rehabilitation and to commence mining along the high-wall of Lanes Void. Mining would be for the purpose to achieve the current slope requirement of the high-wall.

For the purpose of the PRC plan, Zedemar is proposing that an amendment to Table 1 and Table 2 of the EA occur such that the high-wall slope requirement accord with CMG's determination. However, should approval to mine occur, then this may have implications for the transitional provisions detailed within the EP Act being followed and a PRC plan would need to be amended or re-submitted with new time frames to include the new mine plan.

Zedemar is committed to rehabilitating land that has been disturbed by mining so that the ML can eventually surrendered.

Part 2 of the PRC plan (attached separately) provides a schedule of progressive rehabilitation activities for the Ebenezer Project. The schedule contains rehabilitation milestones and criteria to successfully achieve the milestones.

The success of rehabilitation will be determined by achieving the stated goals and performance indicators (i.e. rehabilitation milestone criteria) which will include direct measurement and observation as detailed within this document and associated PRC PLAN Schedule, presented in Part 2 of the PRC plan.

It is to be noted that Wanless Waste Group has lodged a development application with Ipswich City Council (ICC) for a waste and resource recovery facility. This application has been subject of a detailed assessment including State Government assessment (for which the State Government issued approvals) and Federal Government assessment of rare and threatened species (for which requirements were satisfied). The application was then part refused in 2019 by ICC.

The Minister for Planning then called in the development application for determination. However, three objectors have now brought an administrative law challenge to the Minister's power to call in the application.

The QLD Supreme Court handed down a decision on 5 May 2023 dismissing the challenge against the Minister's decision to call in the application. The Minister has advised that he intends to determine

the application as soon as possible by granting consent subject to the draft conditions provided. The objectors filed an appeal and made an application to stay the Minister's decision pending the determination of the appeal. This application was opposed by Wanless Waste Group and the appeal failed. An application to the Court to vacate the stay was successful, allowing the Minister to decide on the application by 24 May 2023.

Wanless Waste Group remains hopeful that the application will be approved allowing for the transition to the planned future use. This objective is consistent with the initial Environmental Impact Study (EIA) for the project and all subsequent reports. This would provide even greater security for DES that the site would be fully remediated, as it would commence the process of repurposing and redeveloping the ML for commercial value activities.

If the development application is approved, then an amendment to Table 1 and Table 2 of the EA would be required, identifying an industrial use as the final land use for the two existing voids. It is anticipated that this would result in a subsequent amendment to this PRC plan.

2 Part 1 - Rehabilitation Planning

2.1 Project Planning

It is to be noted that the planning for the final rehabilitation of ML4712 commenced when it was realised that mining was not to continue. A Plan of Operations (PoOP) was prepared for a five-year, covering the period between January 2017 to January 2022 which detailed how ML4712 was to be rehabilitated.

Rehabilitation planning has included a review of the PoOP and relevant information has been included within this document such as the rehabilitation objectives and outcomes contained within the PoOP.

Further information provided within Part 1 seeks to satisfy the current legislative requirements so that the associated PRC PLAN schedule contained in Part 2 of the PRC plan is approved by the administering authority.

2.1.1 Background

The EA EPML00594013 is held by Zedemar and allows for Environmentally Relevant Activity (ERA) 20: Clay pit mining, dimension stone mining or mining gemstones (including the material from which gemstones are extracted, (c) more than 100,000 t in a year. The effective date of the EA is 28 April 2020.

The ML was previously mined for coal which commenced in 1986 and was successfully operated by the Ebenezer Mining Company Pty Ltd (EMC) until the cessation of coal production in January 2003. The Ebenezer Mine was an open cut operation, mining a shallow, multi thin seamed, flat lying coal resource. The mined coal produced either an export or domestic quality high volatile steaming coal product. Spoil and reject coal material was generally disposed of within the worked-out open cut areas (Ison Environmental Planners, 2017). **Images 1-5 in Appendix 2 Images** show the backfilling of mine spoil .

ML4712 was acquired by Zedemar in August 2003. An Environmental Management Overview Strategy (EMOS) was submitted January 2004 and an EA was issued by the administering authority on 2 June 2004.

Zedemar proposed to recommence coal mining but instead the decision was made in 2015 to surrender ML4712. Surrender of the western and northern sections of ML4712 was completed in 2016 (Ison Environmental Planners, 2017). The EA was subsequently reissued on 1 November 2016, which included corrections of clerical errors. The associated decision notice advised of the change from ERA 20 Clay pit monitoring to ERA 21 – (formerly Mining – ML other – 21, Site Specific) a mining activity that is an ineligible ERA.

Figure 1 below shows the area that was proposed to be surrendered and the proposed area of ML4712 to be retained. There was a slight change to the proposed areas, primarily around the western and northern edge of Lanes Void, ultimately resulting in 357.8ha being retained.

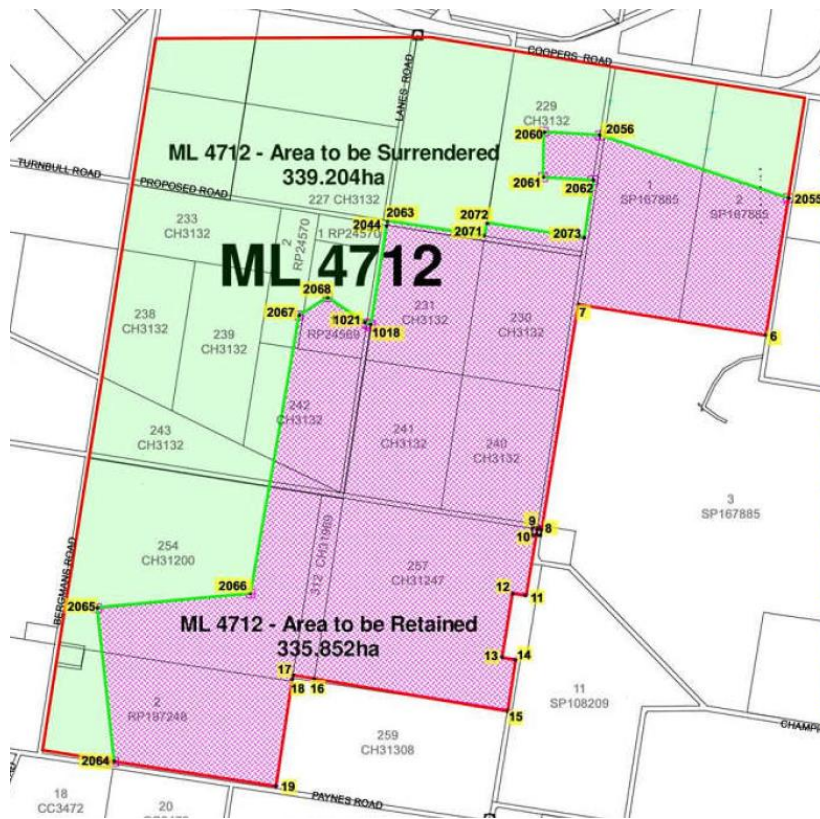


FIGURE 1: AREA SURRENDERED (SHADED GREEN) AND AREA OF ML4712 RETAINED (SHADED PINK)

The administering authority issued the notice – Correction of a clerical or formal error in an environmental authority advising that ERA 8 – Chemical storage 1 and ERA 60 – Waste disposal 2 was incorrectly added to the EA due to default settings within the Connect Platform. The effect date was 28 June 2018. The reissued EA also reflected ERA 20 – clay pit mining.

The administering authority issued the notice – decision on minor amendment application surrounding water monitoring release limit values on 2 August 2019. The effect date was 2 August 2019.

The administering authority issued the notice – Amendment of an environmental authority by written agreement on 29 April 2020, surrounding updates to Table C1 Surface water monitoring locations GPS coordinates and inserting a corresponding updated Figure 1 Surface water monitoring locations. The effect date was 28 April 2020.

Whilst the current EA allows for clay pit mining, no active clay mining is occurring. Stockpiles of previously mined clay were processed on site by Bentonite Resources Pty Ltd at the location shown as

Domain 8 in **Figure 2**. Stockpiled material has been exhausted and no further processing occurs by Bentonite Resources Pty Ltd. At the time of preparing this PRC plan, the processing facility is now occupied by Terrequip Miles Pty Ltd and bentonite sourced off-site is processed.

The ML is currently under care and maintenance and progressing with rehabilitation of disturbed areas identified. The previous Plan of Operation (PoOP) identified portions of the ML that are disturbed and which require rehabilitation. These areas were grouped into individual domains as shown in the following figure:

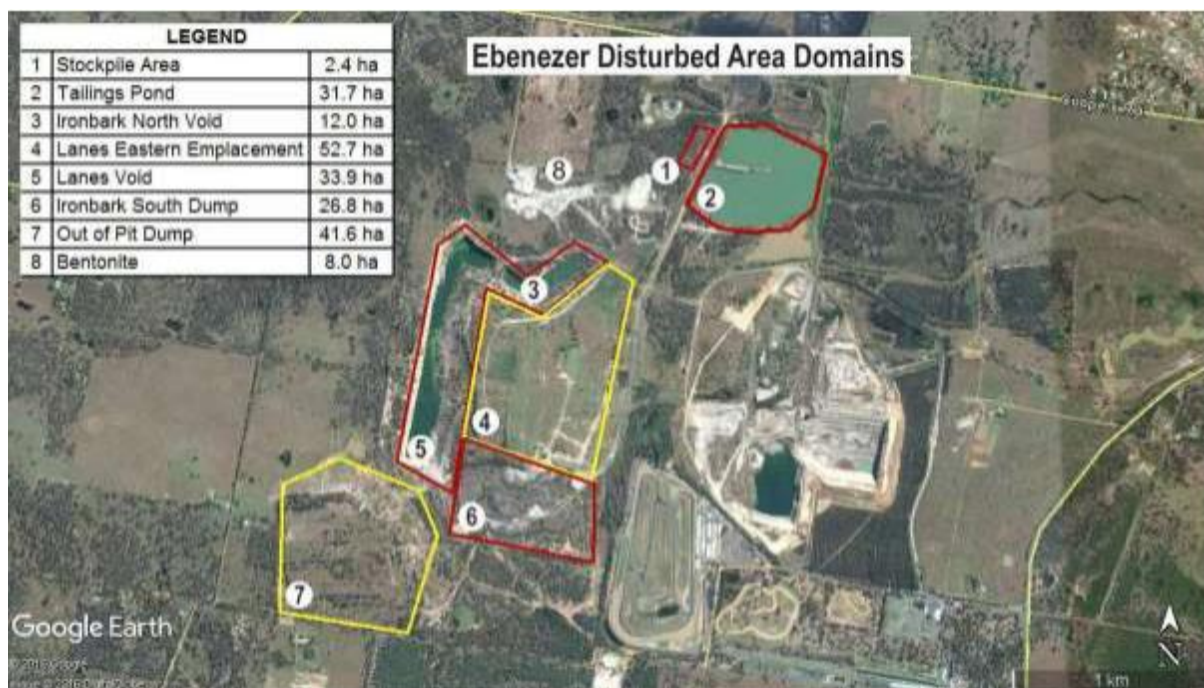


FIGURE 2: DOMAINS IDENTIFIED IN THE PREVIOUS POOP THAT ARE DISTURBED AND REQUIRE REHABILITATION

2.1.2 Historical Areas

Historically the mine site was sectioned into domains, essentially key areas associated with the mine site. For context, a brief description of the specific domain areas is provided below:

- **(Stockpile Area) – This area was used as a secondary Run-of-Mine (ROM) coal stockpile area**

The stockpile area was used as a secondary ROM area. The hardstand was deep ripped, and topsoil and compost spread over the area. The area has been seeded and good growth is present. This area was completed in 2017. The landowner would like to retain this area for use as storage. Proposed works are described in **section 2.4**.

- **(Tailings Pond) – This was a previously mined pit which was subsequently used for tailings deposition until mining ceased in 2003**

The Tailings Pond consisted of two previous mining areas that were specifically mined to provide for tailings disposal. The first void was completed in time for the start-up of the Coal Wash plant in late 1990. The second void was mined later to allow for future disposal. At a later stage the decision was made to breach the dividing wall to allow tailings to flow into the second void to improve the quality of the return water utilised for coal washing.

Mining in Ebenezer ceased in 2002. The last coal was washed in February 2003. Tailings ceased to be deposited into the pond from that time. Based on measurement recently performed in August 2020, the level of tailings is approximately 4 to 13.5 m at the deepest point below the natural topography and thus there is no constructed “tailings dam wall” that could fail.

Proposed works are described in **section 2.4**.

- **(Ironbark North Void) – Mining void where mining ceased in 1996**

Given the location of the final void, the opportunity to use the void as water storage/management structure is a goal and has been investigated during the mining operation. With the potential use of the site for industrial uses, identified by the Queensland State Government and ICC, water storage for industrial uses is also possible. As indicated in **section 1**, the Ironbark North Void has been included within a development application with ICC for a waste and resource recovery facility, which was partly refused by ICC and subsequently called in by the Minister for Planning for determination.

If the development application is approved, then an amendment to Table 1 and Table 2 of the EA would be required, identifying an industrial use as the final land use for the Ironbark North Void. It is anticipated that this would result in a subsequent amendment to this PRC plan.

However, for the purpose PRC plan, the void is to remain for water storage and as fauna habitat. Proposed works are described in **section 2.4**.

- **(Lanes Eastern Emplacement) – Overburden emplacement from mining of the Lanes and Ironbark North Voids as mining progressed to the west**

This area was created during the initial mining phase of the operation. The standard Ebenezer mining practice was that overburden dumps were built using overburden from the open cut placed into previous mining voids in emplacement using five metre lifts up to the penultimate lift to design the final landform. The final lift to final landform height utilised selected tertiary clays as a basis for the placement of topsoil before revegetation. Topsoil of the Lanes Eastern Emplacement is a combination of original topsoil and paunch compost. The toe of the emplacement runs north-south adjacent to the eastern boundary of the ML. The area has been grazed since completion and the grass coverage in this area meets the acceptance criteria. During November 2022, extra stormwater drainage channels were constructed to convey water from the haulage road that leads up to the compost area as erosion was created during the previous large rainfall events which occurred during 2022, including the flood event that occurred in February 2022. The extra channels were constructed to redirect water from the haulage road, where it was converted from a concentrated flow to that of a dispersed flow. No further work is planned except for what is described in **section 2.4** regarding the compost area and two minor erosion areas.

- **(Lanes Void) – Mining Void where mining ceased in 1996**

Mining ceased in the Lanes Void in 1996. Similar to the Ironbark North Void, the opportunity to use the void as water storage/management structure is a goal and has been investigated during the mining operation. With the potential use for industrial uses, water storage for industrial uses is also possible. As indicated in **section 1**, Lanes Void has been included within a development application with ICC for a waste and resource recovery facility, which was partly refused by ICC and subsequently called in by the Minister for Planning for determination.

If the development application is approved, then an amendment to Table 1 and Table 2 of the EA would be required, identifying an industrial use as the final land use for Lanes Void. It is anticipated that this would result in a subsequent amendment to this PRC plan.

Similarly, if the recent ML renewal is granted, it is also anticipated that this would result in a subsequent amendment to this PRC plan.

For the purpose of this PRC plan, Lanes Pit Void is to be retained for water storage and fauna habitat. Shape files prepared for this area by TMS indicate that 33.9 ha will be retained. Proposed works are described in **section 2.42.4.1.5**.

- **(Ironbark South Dump) – a previously mined pit which was being backfilled as part of the Lanes mining operation until mining ceased**

This area is a backfilled mining pit (refer to **Appendix 2 - Image 4** showing mining pit). Waste from the Lanes Void mining development was placed into the void. It was also used for depositing coarse reject from the coal washing plant. The surface of the Ironbark South Dump (IBSD) area follows a sharp profile down from the southern end of the Lanes Eastern Emplacement on the western side of the dump. At the bottom the surface is undulating land, and the dump elevation is currently around 30 m below the top of the Lanes Eastern Emplacement. Moving eastwards, the topography of the IBSD becomes terraced as a result of the way spoil was dumped (refer to **Appendix 5 - Plan 26**). The IBSD was retained for future spoil emplacement when the originally proposed mining was to recommence in the Lanes Void and move westwards.

The recent ML renewal includes utilising the IBSD as a resource stockpile storage area. If the renewal is granted, it is also anticipated that this would result in a subsequent amendment to this PRC plan.

Proposed works are described in **section 2.4**.

- **(Out of Pit Dump) – The original dump for the original box cut when operations commenced in 1986**

The Out of Pit Dump was created from the first overburden from the initial pit on ML4712. Overburden was placed to tie in with an original ridge line on the southern boundary of the ML. The dump was progressively shaped and covered with a selected subsoil layer and topsoil. Dams were created on top of the area to provide water for stock and wildlife. The final surface was revegetated

with pasture species and a range of endemic tree species planted. The area has been grazed since completion. There has been some failure with the rehabilitation in some areas. Proposed works are described in **section 2.4**.

- **(Bentonite Work Area) – bentonite stockpile and processing area**

Buildings and ancillary services will be retained by the landowner for future use. As mentioned previously, at the time of preparing this PRC plan, the processing facility is now occupied by Terrequip Miles Pty Ltd, and bentonite sourced off-site is processed. Similarly, the bentonite stockpile hardstand pads will also be retained by the landowner for future storage. Proposed works are described in **section 2.4**.

In addition to the above original specific domain areas, a further eight unique areas have been included within this PRC PLAN. They are listed as follows:

- **(Maxam Area) – Explosive storage**

Within the ML an explosives storage facility operated by Maxam Australia Pty Ltd (Maxam) exists. Review of development approval 7458/2010 issued by ICC indicates, storage is strictly limited to:

- Ammonium nitrate – Max 100 tonnes;
- Explosives – Max 5 tonnes;
- Detonators – Max 0.3 tonnes;
- Ammonium nitrate suspension Max 100 tonnes.

The landowner wishes to retain the building infrastructure associated with this area. Maxam (current tenant) will remove explosives, detonators, ammonium nitrate and ammonium nitrate solution, plant and equipment, portable infrastructure, including demountable buildings, and items associated with the storage of explosives. Proposed works are described in **section 2.4**.

- **(Haulage Roads) – Provide access throughout site**

The landowner wishes to retain the existing haulage roads for future access. This area has not been previously identified and has been added. Proposed works are described in **section 2.4**.

- **(Wet Weather Storage Area)**

This area was utilised for storage of paunch and abattoir pond sludge during wet weather as access was limited to the compost pad. Proposed works are described in **section 2.4**.

- **Bentonite Storage Area**

Stormwater from the bentonite storage area is diverted into an adjacent vegetated area immediately to the south. Proposed works are described in **section 2.4**.

- **Topsoil Stockpile**

This area has been utilised for the storage of stripped topsoil. The topsoil will be used for the rehabilitation of disturbed areas. Proposed works are described in **section 2.4**.

- **Undisturbed Remaining Area**

This area makes up the balance of land not disturbed within ML4712. Proposed works are described in **section 2.4**.

2.1.3 Post-Mining Landform

The post-mining landform designed for the ML seeks to allow for:

- cattle grazing of introduced and native pastures in selected areas;
- the use of the rehabilitated area by local fauna; and
- for the development of water management structures for grazing and fauna.

2.2 Objective of the PCR

This PCR intends to provide sufficient information to satisfy the current legislative requirements so that the associated PRC PLAN schedule contained in Part 2 of the PRC plan is approved by the administering authority.

The following documents published by the DES were considered in preparing this PRC PLAN:

- the Guideline – *Progressive Rehabilitation and Closure Plans (PCR plans)*, ESR/2019/4964, Version 3.00, Last reviewed: 4 April 2023; and
- Application form, Environmental Protection Act 1994, *Submission of a progressive rehabilitation and closure plan*, ESR/2019/4957, Version 4.00, Last reviewed 29 March 2023; and
- Formatting/structural requirements as determined in Appendix 1 – PRC plan structure, Application form, Environmental Protection Act 1994, *Submission of a progressive rehabilitation and closure plan*, ESR/2019/4957, Version 4.00, Last reviewed 29 March 2023; and
- Definitions and terms used in Application form, Environmental Protection Act 1994, *Submission of a progressive rehabilitation and closure plan*, ESR/2019/4957, Version 4.00, Last reviewed 29 March 2023; and

2.3 Project Description

2.3.1 Site Location

ML4712 is located in the local government area (LGA) of the City of Ipswich in the suburb of Ebenezer, Queensland, 4340 and is described as:

ML4712 contains (either wholly or partially) the following land parcels:

- Lot 18, 225, 227, 229-231, 238-243 on CH3132
- Lot 254 on CH31200
- Lot 257 on CH31247
- Lot 312 on CH31969
- Lot 1 & 2 on SP167885
- Lot 1 & 2 on RP24570
- Lot 1 on RP24569
- Lot 2 on RP197248
- Lot 10 on SP307771
- Lot 1 on RL8701- Temporary Closed Road.

Its eastern portions actually extend into the neighbouring suburb of Willowbank. The City of Ipswich is an LGA southwest of the Brisbane metropolitan area, approximately 40 km southwest of the state capital, Brisbane (Wikipedia, 2022). Refer to **Image 1: Project Location** (Queensland Government, 2021a), **Image 2: Suburb of Ebenezer** (Google, 2022) and **Image 3: Lot and Plan Details and ML 4712 Boundary** (Queensland Government, 2021b).

South of Ebenezer is the suburb of Mount Forbes with a relatively small rural population. West of Ebenezer is the suburb of Lower Mount Walker, also with a relatively small rural population. To the north of Ebenezer is the sparsely populated suburb of Jeebropilly and the suburb of Rosewood, which includes the small town of Rosewood. To the east is the suburb of Willowbank which encompasses a small cluster of medium density residential housing north of Coopers Road.

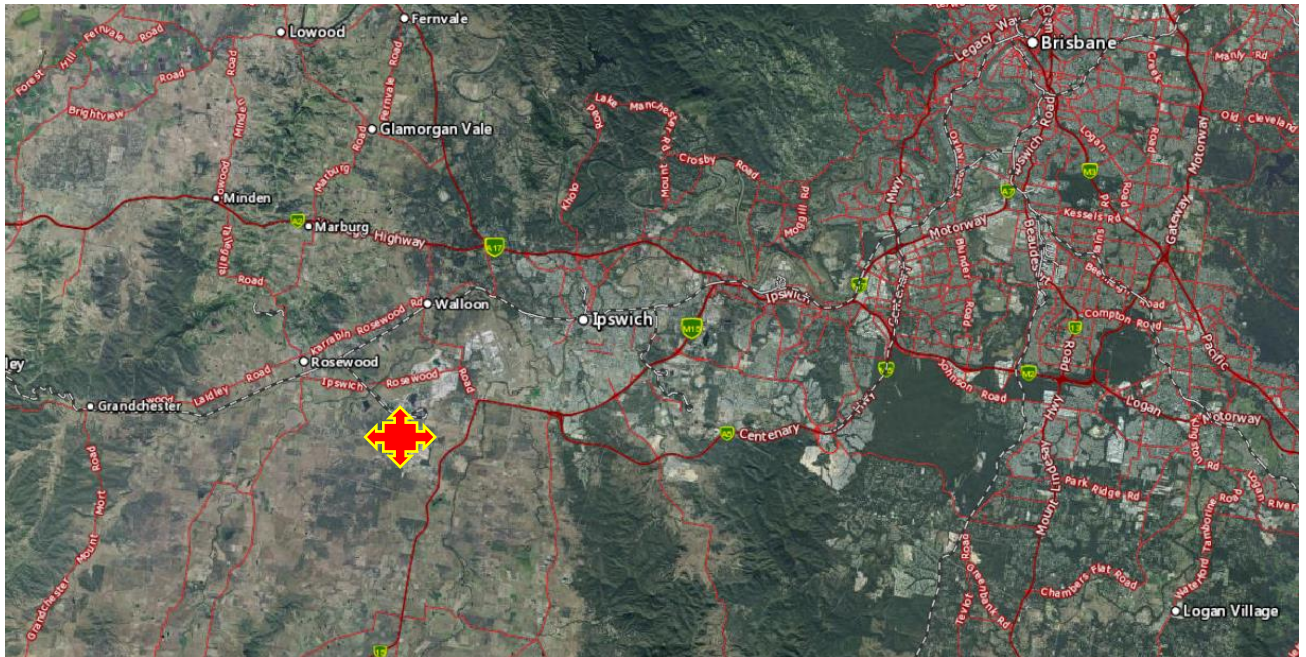


IMAGE 1: PROJECT LOCATION

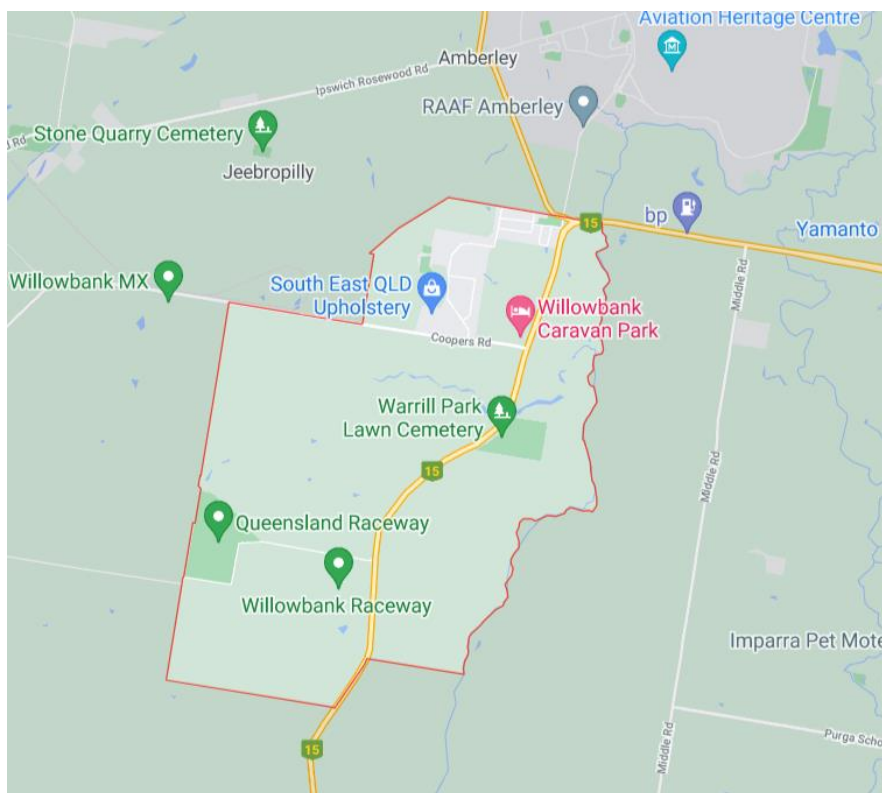


IMAGE 2: SUBURB OF EBENEZER



Final V1.0

2.3.2 Tenure Details

The following tenure detail are provided (Queensland Government, 2021c): Also refer to **Image 4**. WRP owns the freehold land including the area of ML 4712. The current landowner has agreed to take over any infrastructure or areas of disturbance on the ML. The tenure extinguishes Native Title under the *Native Title Act 1993*.

Permit name	Permit number	Permit type	Permit status	Permit sub-status	Lodge date	Grant date	Expiry date	Authorised holder name	Native Title Category	Mineral	Area (ha)
Ebenezer	ML 4712	Mining Lease	Granted	Renewal Lodged	2-Feb-87	29-Oct-87	31-Oct-23	ZEDEMAR HOLDINGS PTY. LTD.	Granted before January 1994 1	BEN, SH	357.8

TABLE 1: TENURE DETAILS



IMAGE 4: CURRENT ML4712 BOUNDARY

2.3.3 Transportation

The ML can be accessed at 266 – 304 and 350 Coopers Road, Ebenezer, Queensland, 4340. Refer to **Image 3**: Lot and Plan Details and ML 4712 Boundary. The entrance to the ML is situated on Lot 1 SP167885 and can be accessed from Coopers Road.

Paynes Road in the south directly abuts the southern ML boundary. Bergmans Road runs parallel to the western ML boundary at an approximate distance of 660 m. An unnamed road runs parallel to the eastern ML boundary at an approx. distance of 840 m but directly abuts the northern part of the eastern boundary. Coopers Road connects to the Cunningham Highway approx. 2.7 km east of the eastern ML boundary. The ML can be traversed in a vehicle via several unsealed tracks, best visible in **Image 3**. The ML contains several road parcels (Queensland Government, 2021d).

The Main Line, a railway line commencing at Roma Street station in Brisbane and terminating in Toowoomba, also runs through the Ipswich CBD. The Ebenezer rail loop, which is part of the Main Line, is situated on the northern side of Coopers Road and connects to the Main Line some 5km north-west of the ML (Wikipedia, 2021). It services the New Hope Jeebropilly Mine. Refer to **Image 4**.

2.3.4 Past Land Use

Condition F1 of the EA references Table F1 which describes the pre-mine land description as light grazing – grazing. **Image 5** shows that the approximate site of the ML consisted of extensive grazing in 1982 (Queensland Government, 1982) before mining commenced.



IMAGE 5: PRE-MINING LAND AERIAL PHOTOGRAPH: 1 MAY 1982

2.3.5 Present Land Use

EA – EPML00594013 authorises Schedule 3 20: Clay pit mining, dimension stone mining or mining gemstones (including the material from which gemstones are extracted, (c) more than 100,000t in a year *Environmental Protection Regulation 2019*. The effect date of the EA is 28 April 2020.

Whilst the current EA allows for clay pit mining, no active clay mining is occurring albeit that a mining renewal has been submitted on 28 April 2023 seeking a 10 year period.

Previously mined bentonite was processed by Bentonite Resources Pty Ltd located at 82 Lanes Road, Ebenezer. At the time of preparing this PRC plan Bentonite Resources has finished processing bentonite mined on site and the processing facility is now occupied by Terrequip Miles Pty Ltd and bentonite sourced off-site is processed at the facility.

Apart from the area occupied by Maxam Pty Ltd for the storage of explosives, the remaining ML is currently under care and maintenance and progressing with rehabilitation of disturbed areas. It is to be noted that some areas that have previously been rehabilitated require rectification works to stabilise the land, primarily within the OPD.

The ML is also used for cattle grazing. A water reserve is located on the eastern boundary of IBSD area and is a designated surface water monitoring point (Queensland Government, 2021e). Refer to **Image 6**.



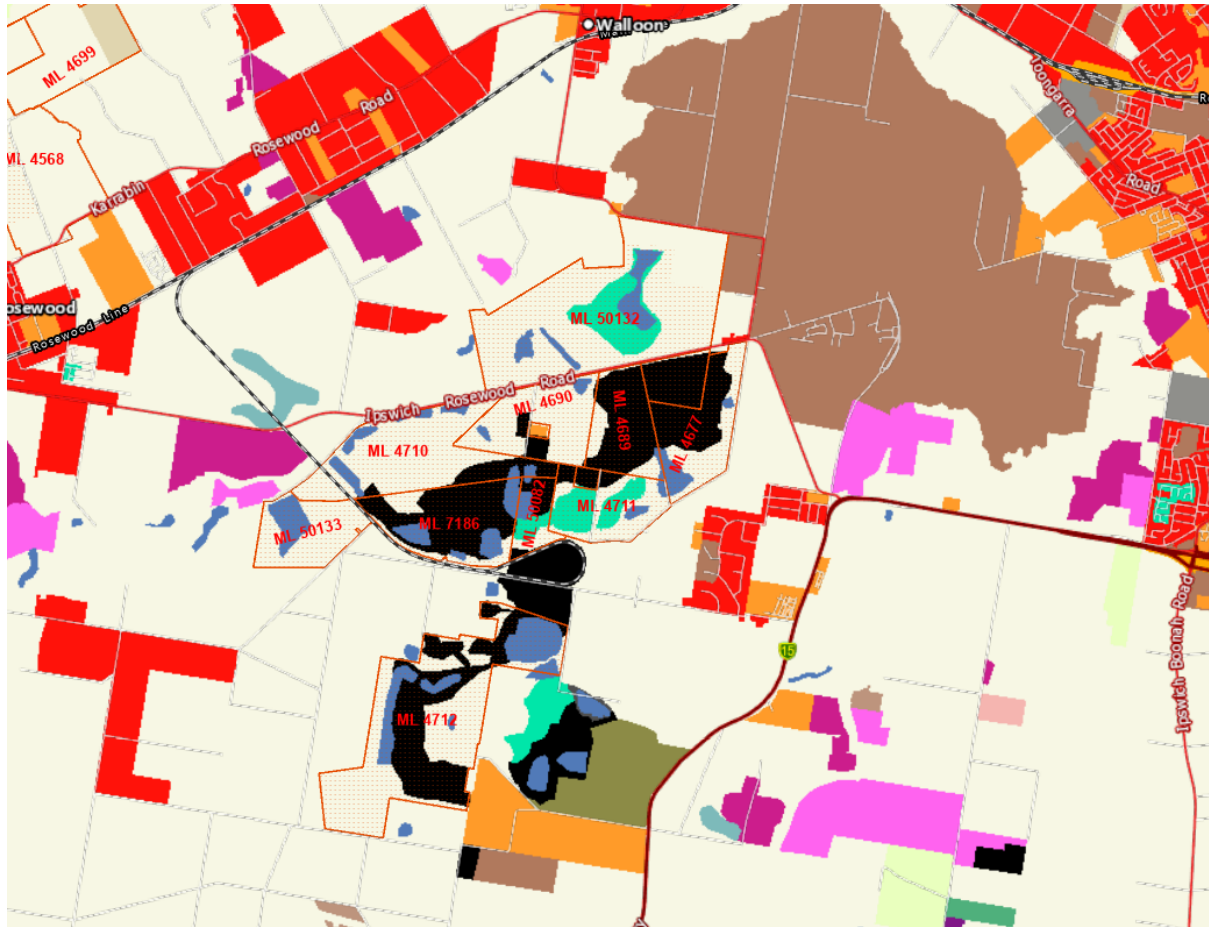
IMAGE 6: LAND USE 1

2.3.6 Surrounding Land Use

The ML is located in a semi-rural area, dominated by grazing, historical mining activities and to a small extent cropping. Some land is extensively covered with native vegetation. The ML is surrounded by scattered rural residences and it is considered that the immediate population density within 500 m from the ML boundary in any direction is low. The closest residences are located on Bergmans Road in close proximity to the western ML boundary and along Paynes Road, directly opposite the southern ML boundary. Refer to **section 2.3.7** for details.

To the north of the ML in the suburbs of Amberley and Jeebropilly lies the former open-cut Jeebropilly Mine owned by the New Hope Group. It produced thermal coal and ceased operations in 2019. The mine is currently undergoing rehabilitation (New Hope Group, 2022).

A motorcycle motocross track, Willowbank MX, is situated on Coopers Road north of the ML, which bounds the ML on two contiguous sides (refer to **Image 6**). To the south are several recreational motorsport facilities that can be accessed via Champions Way off the Cunningham Highway and another commercial bentonite/stock feed processing site. To the east lies the Veolia Ti-Tree Bioenergy Waste Disposal Facility located over the previous O'Connor mining void. The township of Willowbank, the nearest commercial and residential centre, is approx. 2.5 km north-east of the ML. The Amberly Airforce Base is located approximately 5 km to the north-east of the ML (Queensland Government, 2021e). Refer to **Image 6** and **Image 7**.



Notes: - green (Land in Transition), Blue (Reservoir/Dam), sky blue (Marsh/Wetland), black (Mining) and white (Grazing native vegetation), yellow (Utilities), orange (Services), red (Residential), pink (Irrigated modified pastures), magenta (Irrigated cropping), (brown (Other minimal use)

IMAGE 7: LAND USE 2

2.3.7 Buffer Distances

Buffer distances of relevant surrounding land uses have been tabulated below:

Land Use	Buffer Distance, Direction and Location
Rural residential	195 Coopers Road, Willowbank, approx. 550m north-east of the ML.
Rural residential	283 Bergmans Road, Ebenezer, approx. 200m west of the ML
Rural residential	290 Bergmans Road, Ebenezer, approx. 80m west of the ML
Rural residential	179 Paynes Road, Ebenezer, approx. 900m west of the ML
Rural residential	3RP892957, Paynes Road, Ebenezer, approx. 700m from the western ML boundary
Rural residential	231-235 Paynes Road, Ebenezer, approx. 450m west of the ML
Rural residential	18/CC3472, Paynes Road, Ebenezer, approx. 180m south of the ML
Rural residential	20CC3472, Paynes Road, Ebenezer, approx. 100m south of the ML
Residential area	approx. 1.2 km south of the ML from eastern boundary, Willowbank
Surface Water	Ebenezer Creek immediately east of the ML.
Wetlands	Refer to section 2.3.14.
Vegetation, Biodiversity and Conservation	Refer to section 2.3.15.
Agriculture	Grazing native vegetation surrounding the ML nearly entirely.
Mining	New Hope Jeebropilly Mine (undergoing rehabilitation), across Coopers Road, approx. 450m north of the ML.
Commercial/Industrial	Bentonite Resources Pty Ltd, 82 Lanes Road, Ebenezer, within ML
	Maxam Pty Ltd, within ML
	Veolia Ti-Tree Bioenergy Waste Disposal Facility, Champions Way, Willowbank, immediately east of the ML.
	JNJ Resources, 210 Champions Way, Willowbank, approx. 350m south of the ML.
Transportation	Champions Way approx. 600m east of the ML
	Cunningham Highway approx. 2.7km east of the ML
	Coopers Road approx. 300m north of the ML
	Lanes Road approx. 600m west of the ML
	Bergmans Road approx. 150m – 600m west of the ML
	Paynes Road directly abutting parts of the southern ML boundary
Recreation	Willowbank MX, Corner of Coopers Road and Lanes Road, Ebenezer, partially abutting the western ML boundary Willowbank MX
Willowbank Motorsport Precinct	
	Raemus Park, Champions Way, Willowbank, approx. 330m south of the ML

	Queensland Raceway, 133 Champions Way Willowbank, directly abutting the eastern ML boundary
	Ipswich West Moreton Auto Club, Lot 102, Champions Way, Willowbank, approx. 800m east of the ML
	Ipswich Kart Club, 56 Champions Way, Willowbank, approx. 1.3km east of the ML

TABLE 2: BUFFER DISTANCES

2.3.8 Meteorological Data

The Australian Government, Bureau of Meteorology (2023) lists the Amberley AMO weather station, reference number 40004, as the nearest operational weather station, situated approximately 10 km north-west of the ML in the Ipswich suburb of Amberley on the RAAF base. Weather statistics shown below are based on data collected between 1941 and 2023:

- Mean maximum temperature: 31.2°C (January)
- Mean minimum temperature: 5.4°C (July)
- Mean annual rainfall: 867.7mm
- Annual average pan evaporation: 1400 - 1600mm.

The predominant wind directions for each month are shown in **Table 3: Predominant Wind Directions** below based on observations from 1952 to 2022.

	Predominant Wind Direction 9am	Predominant Wind Direction 3pm
Spring		
September	North-West, West, South	North-East, East, West
October	North-West, East, South	North-East, East
November	East, North-West	North-East, East
Summer		
December	East, North-West	North-East, East
January	East, South-East	East, North-East
February	South-East, South	East, North-East
Autumn		
March	South, South-East	East, North-East
April	South	East, North-East, South-East
May	South, North-West	East, West, South-East
Winter		
June	North-West, South, West	West, South, South-East, East
July	North-West, West, South	West, North-West
August	North-West, West, South	West, North-West, East, North-East

TABLE 3: PREDOMINANT WIND DIRECTIONS

2.3.9 Elevation

Excluding the two voids and the Tailings Pond, the lowest point within ML4712 is monitoring point EW07 along Ebenezer Creek (approximately 30m Australian Height Datum (AHD)). For comparison, the elevation of the Tailings Pond spillway, slightly upstream of EW07, is 33.15m AHD. The highest area within the ML is located within the composting area of the Lanes Eastern Emplacement at 90m AHD. The toe of the Lanes Eastern Emplacement is 40m AHD. From here, the land falls towards Ebenezer Creek. The second predominant landform within the south-west corner of the ML is the Out of Pit Dump (OPD) within the OPD at 70m AHD.

The surface elevation increases slightly from Lanes Void at 45-50m AHD to 70m AHD in the west and rises from 55mAHD to 90mAHD in the north-west, ultimately to a ridgeline that is on a south-west to north-east alignment.

Due east of the ML, the land slopes towards Warrill Creek. Contours provided by TMS indicate that Warrill Creek has an elevation of 25m AHD (refer to **Appendix 5 - Plan 10**). To the north of the ML the elevation is 40m AHD.

Further detail regarding the depth of the Tailings Pond, Lanes Void and Ironbark North Void is provided in **section 2.8.7** and **section 2.8.8**.

Refer to **Image 8** (Queensland Government, 2021f) and **Image 9** (Queensland Government, 2021g).



IMAGE 8: ELEVATION CONTOURS



IMAGE 9: ELEVATION, HILLSHADE MULTIDIRECTIONAL

2.3.10 Waters and Drainage

According to the (Queensland Government, 2021h) the ML is situated in:

- the Northeast Coast Drainage Division
- Drainage basin 143 Brisbane
- Drainage basin sub-area 1431 Bremer River
- Sub-catchment Lower Warrill Creek (SEQ Catchments and Natural Heritage Trust, 2006). Refer to **Appendix 5 - Plan 27**.

Site drainage has been described in **section 2.8.6**.

Ebenezer Creek runs mostly parallel to the eastern ML boundary from the south into a north east direction. It traverses the ML across a small area in its south east corner. It receives surface water drainage from an unnamed drainage line originating on the ML. Refer to **Image 10**. Ebenezer Creek is a tributary of Warrill Creek, which merges with Purga Creek downstream. Warrill Creek drains into the Bremer River, which is a tributary of the Brisbane River. The Brisbane River eventually drains into Moreton Bay (Queensland Government, 2021i).

The original alignment of Ebenezer Creek has been significantly disturbed by open cut mining. **Appendix 2 - Image 2** shows the extent of mining in 1992 within ML4712. The original alignment of Ebenezer Creek meandering through undisturbed vegetated area is clearly visible. Ebenezer Creek was relocated over backfilled open cut voids (refer to **Appendix 2 - Image 3**) as mining progressed on land within ML4712 and into the historical ML500100 referred to as the O'Connor's Pit east of ML4712. **Appendix 2 - Image 5** shows the extent of mining in 1995 and extensive surface disturbance, including vegetation clearing, around Ebenezer Creek. Ebenezer Creek is ephemeral and during extended periods of dry weather is a series of disconnected ponds unless authorised releases occur from the neighbouring waste facility. In dry years, most ponds are dry. Only the water reserve and mining structures retain water in all years.

Appendix 5 - Plan 28 shows the Ebenezer Creek catchment and subcatchments. The Ebenezer catchment commences south of Griffiths Road, Mount Forbes QLD, 4340 at an elevation of 100mAHD. A number of unnamed drainage lines flow into Ebenezer Creek.

The Ebenezer Creek catchment equals 3,125.04 ha at the surface water monitoring location EW7, located on Ebenezer Creek at the eastern boundary of ML4712 (refer to **Appendix 5 - Plan 15**). The

total catchment of Ebenezer Creek equals 4,377 ha where it drains into Warrill Creek. The Ebenezer Creek catchment components can be summarised as follows:

Catchment Components	Area (ha)	Percentage (%)
Upstream of ML 4712	2,767	63%
Within ML 4712	358	8%
Downstream of ML 4712	1,252	29%
Total	4,377	

TABLE 4: AREAS OF EBENEZER CATCHMENT

The ML catchment component represents 8% of the Ebenezer catchment and runoff within ML 4712 is principally from areas not disturbed by mining or runoff from rehabilitated areas classified as “not mine affected water”.

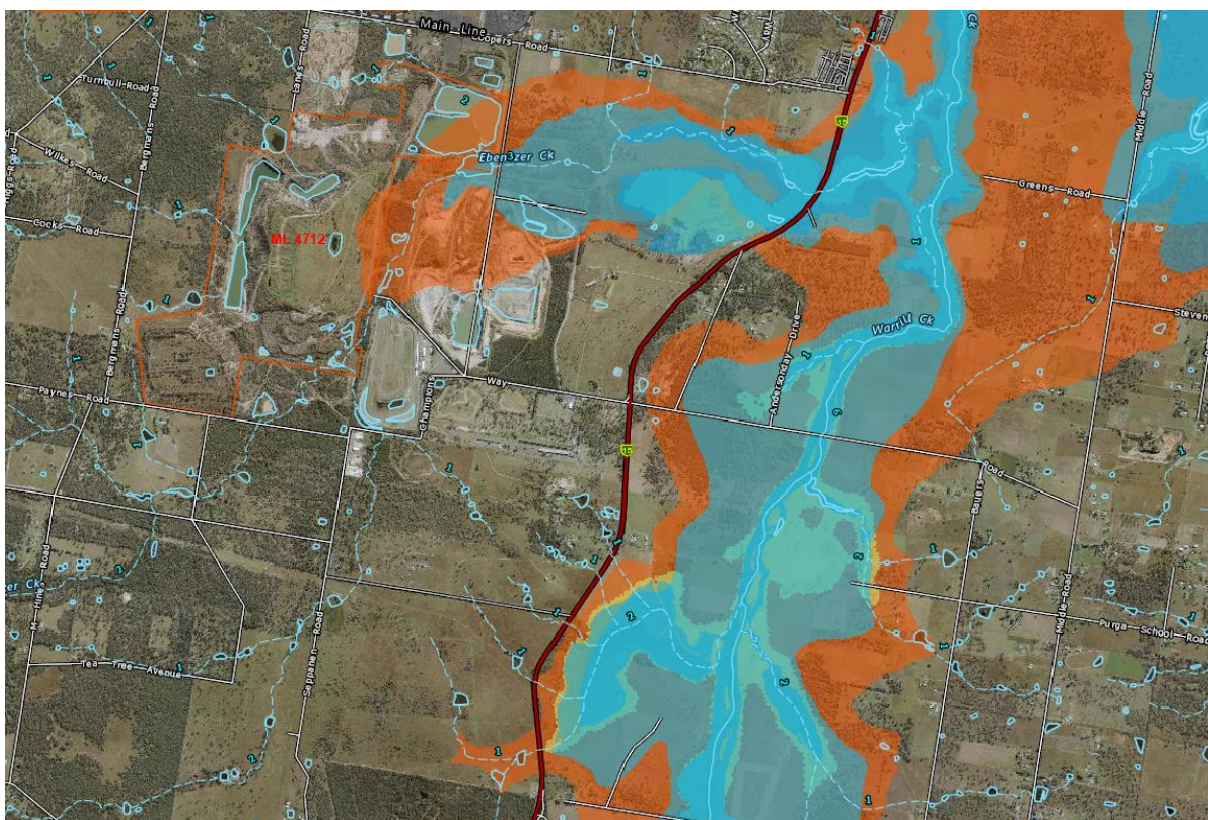


IMAGE 10: WATERCOURSES

2.3.11 Flooding

The ML was not affected by the 1974 flood or the 2010/2011 floods (Ipswich City Council, 2015). Due to the significant amount of rainfall experienced during the February 2022 flood event, some erosion did occur along drainage channels which was repaired during November 2022.

Image 11 shows the extent of flooding that would occur from a referable dam failure, Moogerah Dam, which would marginally extend across the north east ML boundary and cover parts along the eastern boundary for a probable maximum flood with a dam failure (Queensland Government, 2021j).



Notes: blue: Sunny day failure; brown: probable max flood with a dam failure

IMAGE 11: REFERABLE DAM INUNDATION

A report titled Flood and Stormwater Management Plan – Wanless Recycling Park (reference: 19-0162FSMP01-V5), dated 23 April 2020, was prepared by PEAKURBAN Pty Ltd for the development application submitted by Wanless Recycling Park Pty Ltd and which at the time of preparing this PRC plan is subject to an administrative law challenge, brought about by three objectors, challenging the Planning Minister’s power to call in the application to decide the application, after ICC had refused part of the application.

The report includes a hydrologic model of the catchment contributing to Ebenezer Creek to the Cunningham Highway, approximately 2.7 km downstream of the site. The hydrologic model was used to estimate catchment flows for the existing site conditions using the ARR1987 methodology developed by ICC as part of the Ebenezer Creek Flood Model. The output of the hydrologic model was then used to develop a hydraulic (flood) model for the site which includes ML4712 and sufficiently upstream and downstream to assess potential impacts of the development (PEAKURBAN, 2020).

The 2 dimensional (2D) hydraulic model was developed in TUFLOW and was constructed utilising available LIDAR and survey information with hydraulic structures (culverts and bridges) identified through Council held GIS and site validation. The site roughness was delineated using aerial photography and site validation.

The model generated flood extent maps for the existing topography for 39%, 10%, 5%, 2% and 1% AEP events. The five flood extent maps are provided in **Appendix 4 Flood Maps**. The maps indicate minimal impact to the ML under the various AEP events modelled.

2.3.12 Geology and Soils

ML4712 is situated in the north east portion of the Clarence-Morton Basin. ML4712 is situated on the Middle Jurassic Walloon Coal Measures consisting of Arenite-Mudrock (shale, coal seams, siltstone and sandstone). The Walloon Coal Measures are overlain by Tertiary Arenite-Mudrock (claystone, siltstone, sandstone) in the northern portion of ML4712 and by Quaternary Alluvium in its north-eastern and eastern portions. The majority of ML4712 is overlain by Late Tertiary – Quaternary Alluvium (pediment slope wash, clay, scree, soil) in its central part. The eastern and south-eastern portions of ML4712 are overlain by Quaternary Alluvium (clay, silt, sand and gravel; flood plain alluvium). Refer to **Image 12. Appendix 5 - Plan 30** shows small, local faults near the Lanes Void and the Ironbark North Void (Queensland Government, 2021k). Refer to **Image 12**.

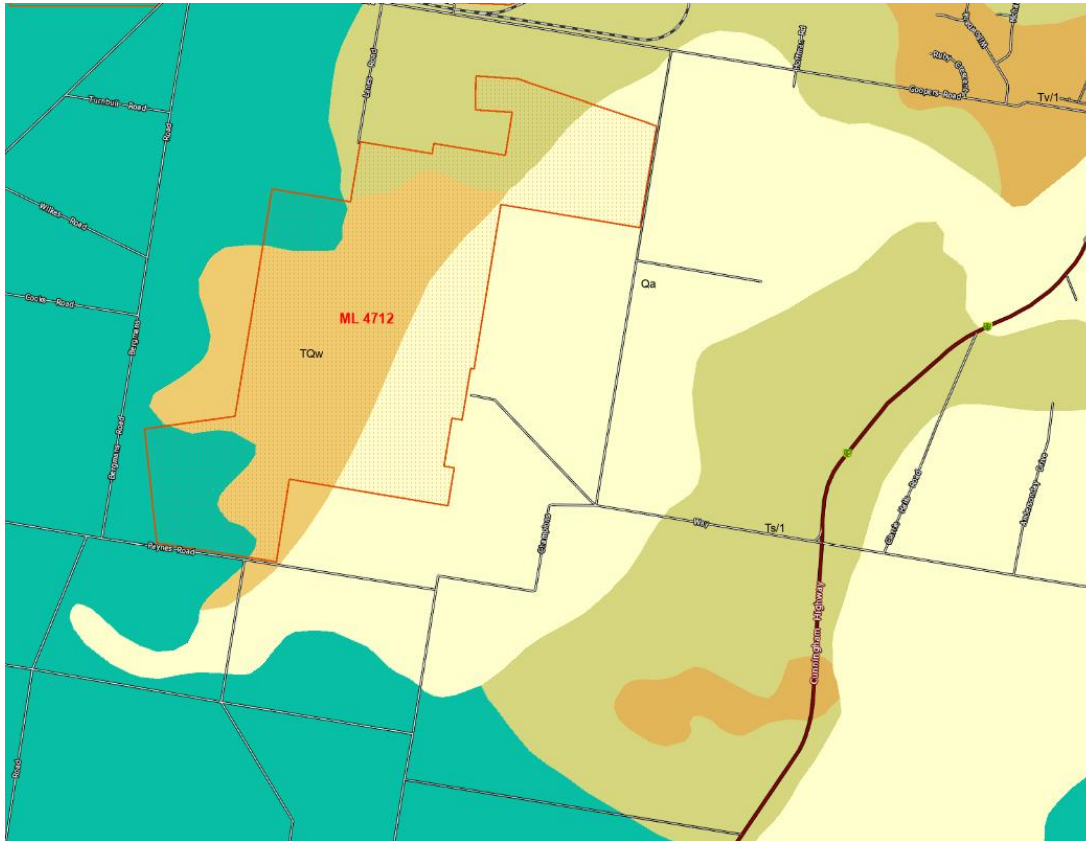
Site specific information on soils and geology is available from drilling activities of ten new groundwater monitoring wells between 27 November and 14 December 2018 (Taft Engineering, 2019).

The bore log data indicate that all new wells are situated within the Walloon Coal Measures and range from total well depths between 54 to 108m. Spoil was predominantly encountered in the north-eastern portion of the ML, ranging from 0 to 5.5 m Below Ground Level (BGL) in GW1, GW2, GW3 and GW4. Spoil was also encountered in GW9 located in the eastern portion of the ML (0-2mBGL) and in GW7 and GW8, located towards the southern site boundary (0-3mBGL). In wells GW5, GW6, and GW10, the top layers consist of natural clayey soil to a maximum depth of 1mBGL. The underlying weathered zones range from 13mBGL to 21mBGL. The geology predominantly consists of layers of clay, siltstone and sandstone, with thin layers of coal found in every borehole at various depths. Individual boreholes show thin bands of tuff and mudstone at depth, and the occasional bentonite and ironstone band closer to the surface. GW2 and GW3 are the only boreholes that have a thin layer of estuarine mud at 2 to 3mBGL and 5.5 to 7.5mBGL, respectively.

Taft Engineering (2019) did not identify any ASS or potential acid sulfate soils (PASS/ASS). On site water monitoring for over 36 years has never identified acid runoff. The ML should not be impacted by PASS/ASS due to its elevation (above 5 m AHD), inland location and underlying geology.

The central and eastern part of the ML consists of brown and red self-mulching cracking clays and hard pedal mottled-yellow duplex soils (Queensland Government, 2021l). A detailed soil investigation was conducted by Douglas Partners (2020), which has been referenced in more detail in **section 2.8.2**

because it provides context for the rehabilitation management methodology as it relates to the final landform design.



Notes: Walloon Coal Measures Jw (green-blue), Late Tertiary – Quaternary Alluvium TQw (orange), Tertiary Arenite-Mudrock Ts/1 (khaki green), Quaternary Alluvium Qa (cream)

IMAGE 12: GEOLOGY

2.3.13 Groundwater and Hydrology

A review of historical bore data published by the Queensland Government for registered water bores within a 3km radius of the on-site voids (Ison, 2018) shows that the regional groundwater is brackish to salty. In particular, bore report for REG NUMBER 173080 indicates an electrical conductivity of 12,000 $\mu\text{S}/\text{cm}$. The bore report for REG NUMBER 145907 indicates a total dissolved solids concentration of 5,090-9,000 ppm. **Appendix 5 - Plan 29** shows the location of the registered water bores listed in the table below:

RN	Date Drilled	Formation	Status	Flow	Salinity
173080	5/4/2016	Walloon Coal	Abandoned & Destroyed		12,000 $\mu\text{S}/\text{cm}$
154910	23/9/2015	Walloon Coal	Existing	No	
22039	30/1/1949	Walloon Coal	Existing	Water @ 66m	Salty
22040	31/1/1952	Walloon Coal	Existing		
145907	14/5/2007	Walloon Coal	Abandoned & Destroyed		9,000 ppm TDS
138180	15/10/2007	Walloon Coal	Existing	No	
133916	20/4/2006	Walloon Coal	Existing	0.45 L/s	Potable
133917	24/4/2006		Abandoned & Destroyed		
124425	9/3/2005		Abandoned & Destroyed		
124424	7/3/2005		Abandoned & Destroyed	0.05 L/s	Brackish 227 $\mu\text{S}/\text{cm}$
73808			Existing		6,500 $\mu\text{S}/\text{cm}$
154444	19/8/2004	Walloon Coal	Existing	1 L/s	Brackish

TABLE 5: REGISTERED WATER BORE INFORMATION

Ten groundwater monitoring wells were installed inside and outside the ML in 2018 by Taft Engineering. The locations of these wells are shown in **Appendix 5 - Plan 5**.

Taft Engineering (2019) states that all wells are screened in the Walloon Coal Measure. Significant groundwater flows were encountered while drilling through fresh coal seams between 30 and 50mBGL. Groundwater was not encountered in bore GW5 and bore GW6 located on the western ML boundary, a potential sign that the surrounding geological units adjacent to the old open cut void may be dewatered. Bore logs also show that groundwater encountered in all other wells ranged from 6 m BGL (GW2) to 23 m BGL (GW10) during drilling.

Groundwater was mostly moderately saline. Groundwater pH ranged from 7.7 to 8.5; EC ranged from 6,750 to 14,600 $\mu\text{S}/\text{cm}$. The measured groundwater flow rate shows that yields ranged from <0.01 to 1.8 L/s.

The former open cut coal mining activities are likely to have had an impact on local groundwater dynamics because they required the dewatering of the coal seams. This could have changed the pressure in surrounding aquifers, and groundwater would have been drawn to the voids created by mining, causing drawdown of the water table in nearby areas (Taft Engineering, 2019). Refer to **Image 13** which shows indicative groundwater flow.

Taft Engineering (2021) provided data for the September 2021 monitoring round for monitoring wells GW1, GW3, GW6, GW7, GW9 and GW10, Lanes Void, Ironbark North Void and the Tailings Pond, which provided the basis for ionic composition analysis by Zambelli Environmental. Data analysis indicates that:

- GW1, GW3, GW7 and GW9 are sodium-chloride dominant
- GW6 and GW10 are sodium-bicarbonate dominant
- GW3 has higher sulfate, magnesium and calcium concentrations than the remaining wells
- the Tailings Pond and the Lanes Void are sodium-chloride dominant
- the Ironbark North Void is sodium-bicarbonate dominant
- the void water contains visibly lower anions and cations than groundwater because the voids/pond are influenced by surface water runoff more than groundwater
- pH in groundwater ranged from 7 to 8.5
- EC in groundwater ranged from 4,500 mS/cm to 14,000 $\mu\text{S}/\text{cm}$.
- Adjacent mining voids have different water quality parameters and are not strongly hydrologically connected.

Refer to **Figure 3** which shows Stiff diagrams for the individual monitoring wells, clearly illustrating the cation/anion concentrations in each well. Refer to **Figure 4** which shows Stiff diagrams for the three voids. **Figure 5** and **Figure 6** illustrate Schoeller diagrams that provide a comparison between groundwater and void waters, respectively. The diagrams clearly show the difference between groundwater and void water, i.e. groundwater has a higher ionic concentration than the void water, because the voids are influenced by surface runoff rather than groundwater.

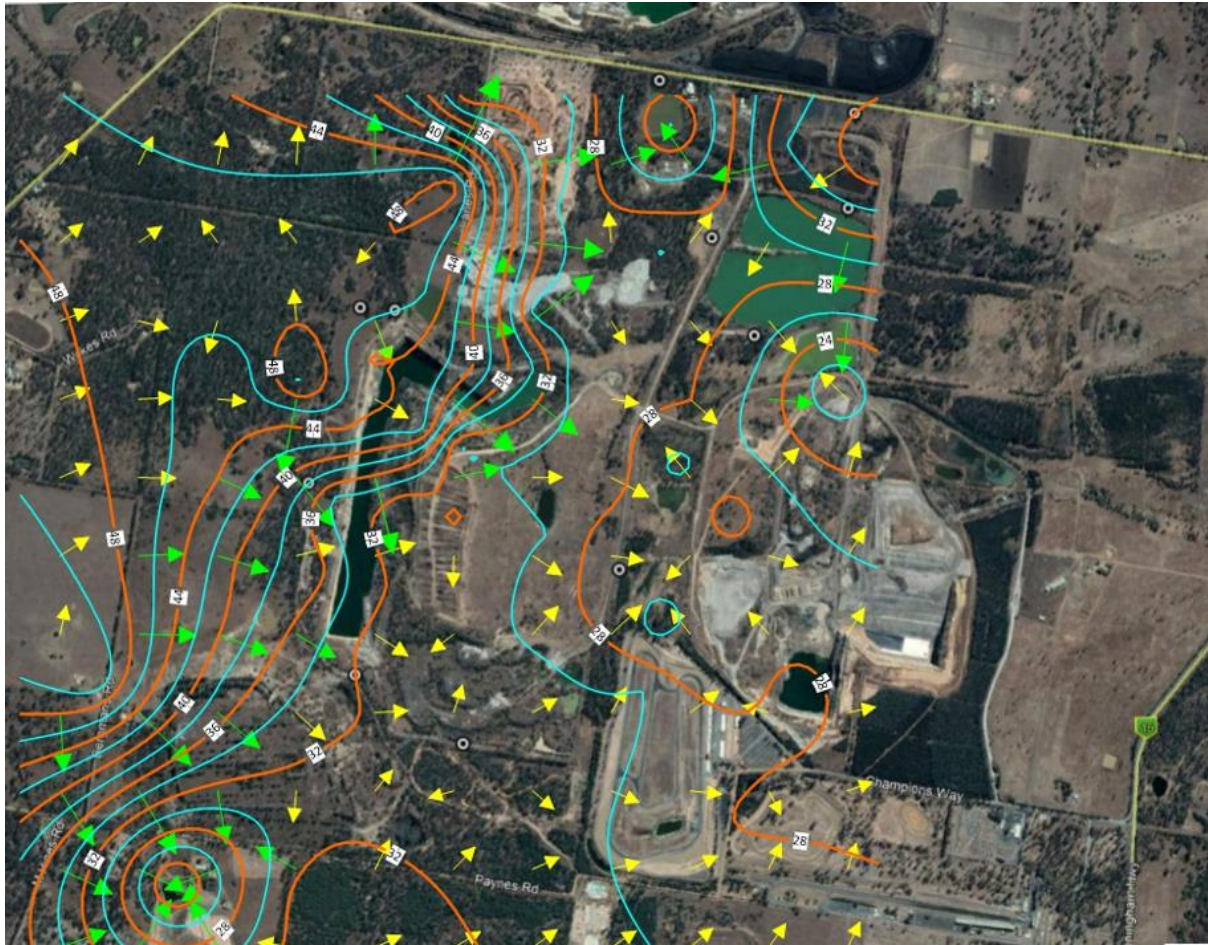
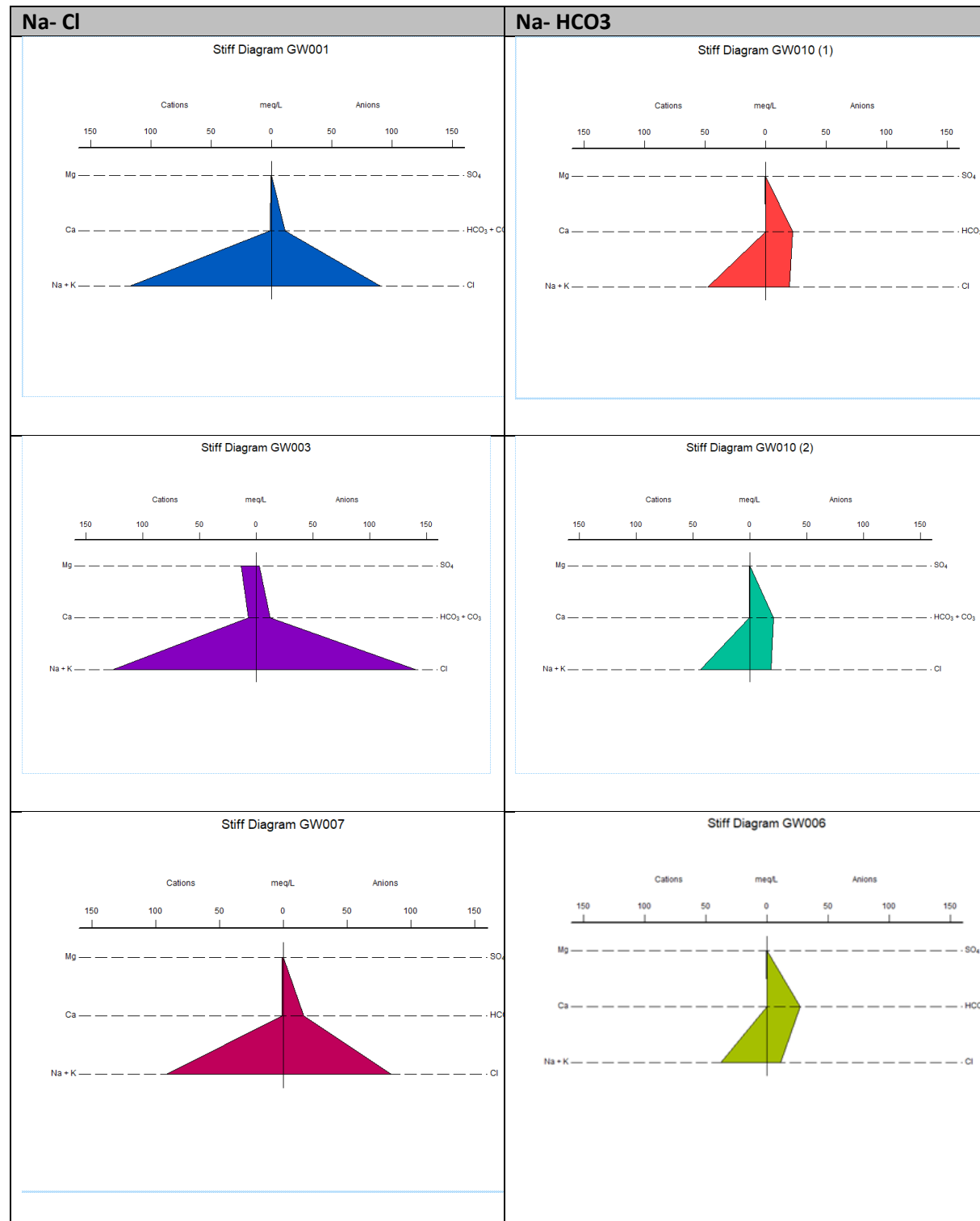


IMAGE 13: INDICATIVE GROUNDWATER FLOW – POST MINING GROUNDWATER CONTOURS (SOURCE: TAFT ENGINEERING, 2021)



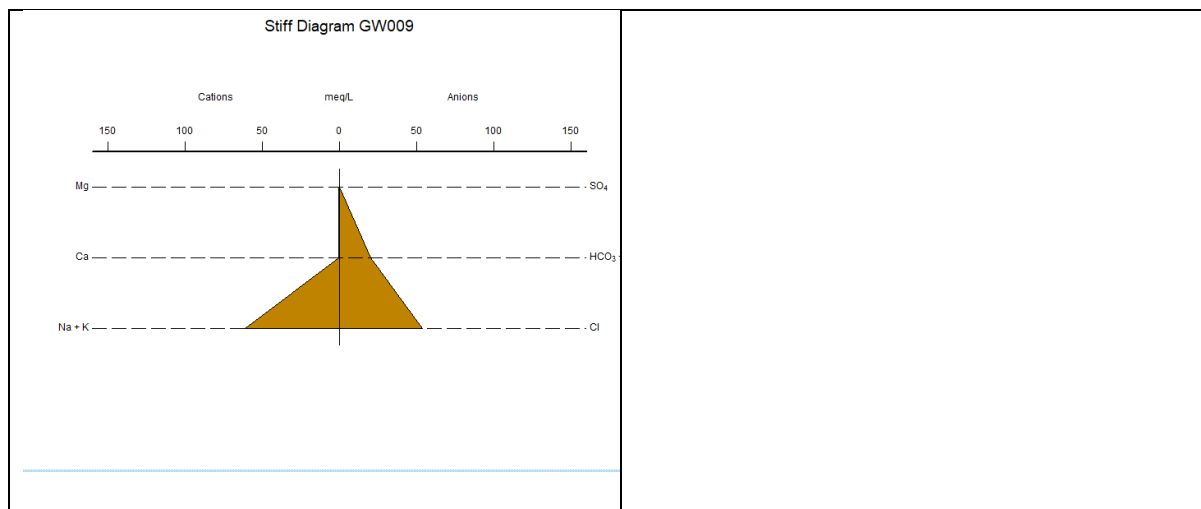


FIGURE 3: STIFF DIAGRAMS – GROUNDWATER

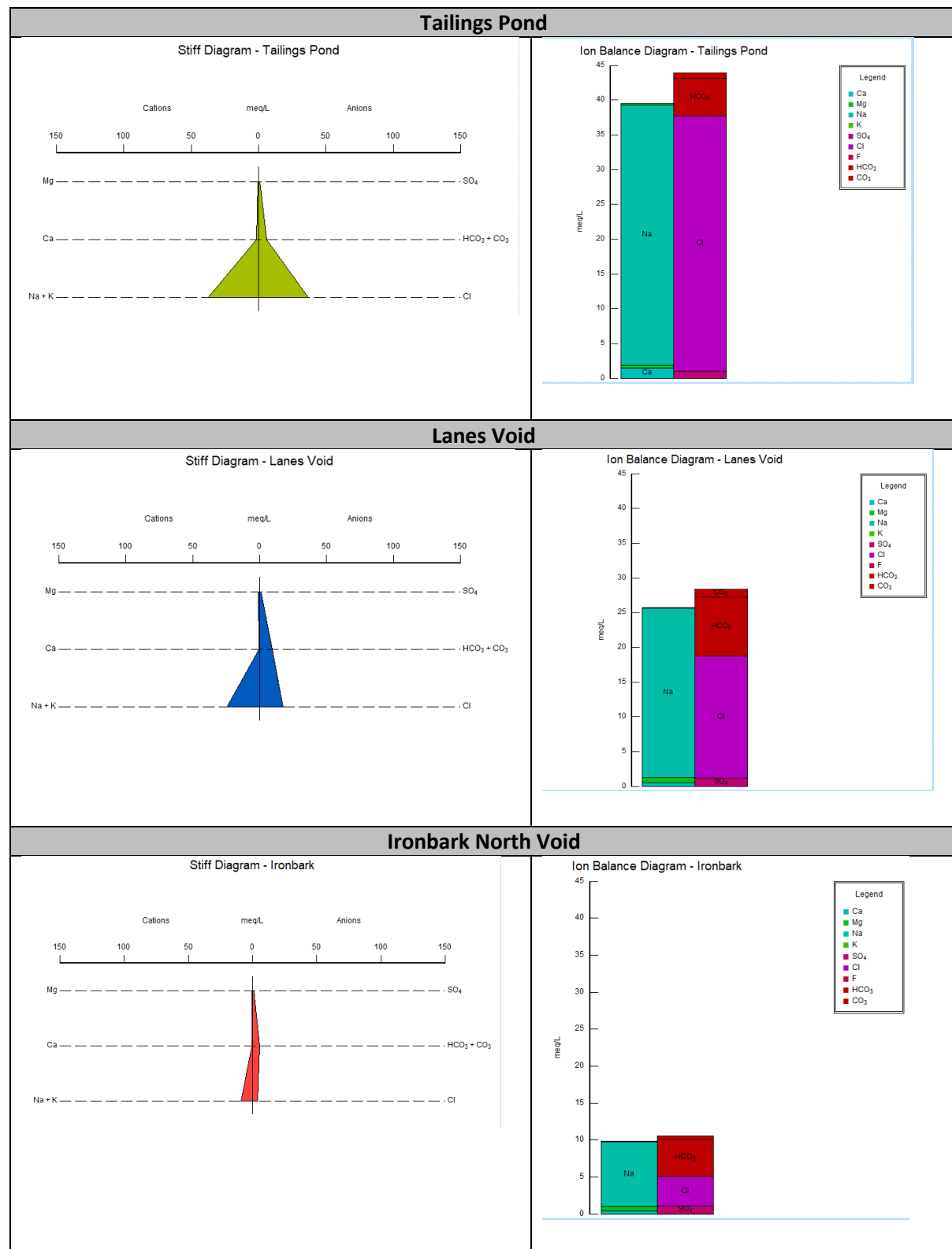


FIGURE 4: STIFF DIAGRAMS AND IONIC BALANCE DIAGRAMS – VOIDS

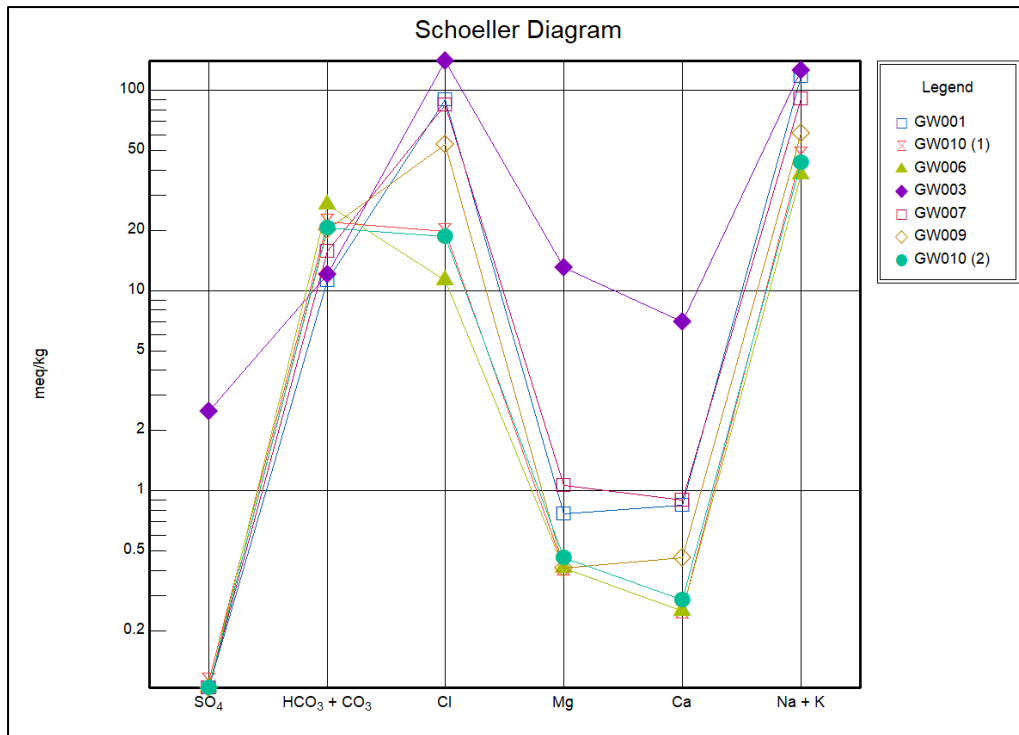


FIGURE 5: GROUNDWATER SCHOELLER DIAGRAM COMPARING GROUNDWATER BORES

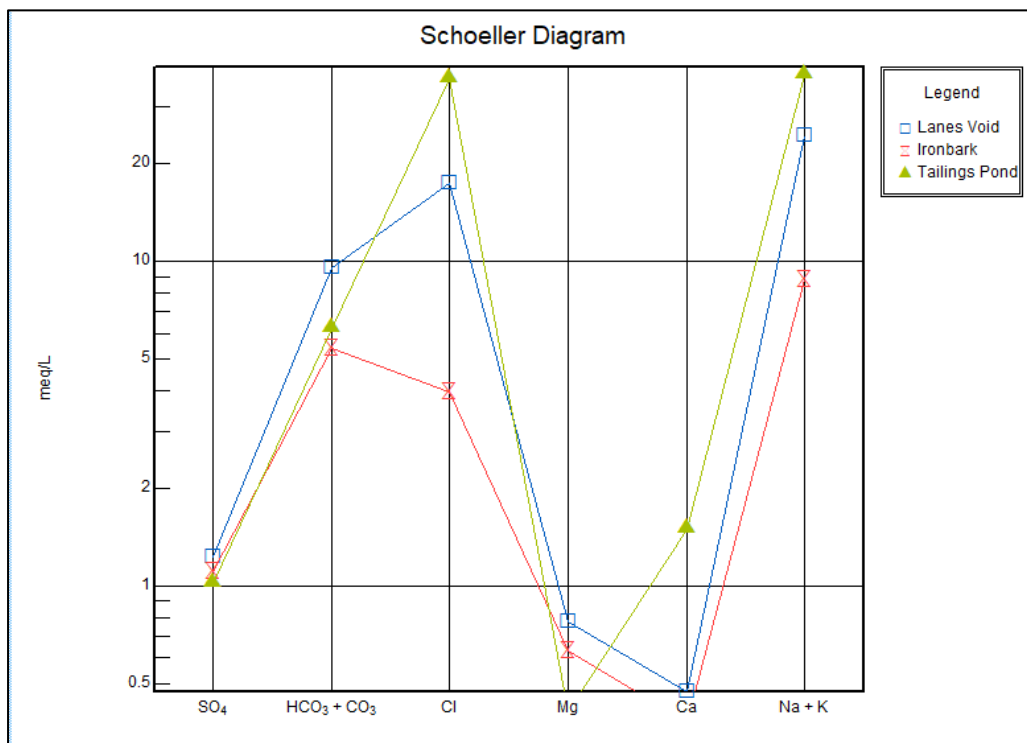


FIGURE 6: SCHOELLER DIAGRAMS FOR THE TAILINGS POND, LANES VOID AND THE IRONBARK NORTH VOID

2.3.14 Wetlands

A number of lacustrine wetland areas have been identified within ML4712 in accordance with (Queensland Government, 2021m), which are the Lanes Void, Ironbark North Void, the Tailings Pond, a small section of Ebenezer Creek and the unnamed dam located within the Lanes Eastern Emplacement. There is also an area directly adjacent to the western edge of the compost pad marked as a lacustrine, but on ground observation shows that no water pools or ponds at this location. Similarly, the IBSD area shows the presence of lacustrine wetlands. **Image 14** shows that the area shaded yellow does not include the existing ponds located within the IBSD area. The said area and ponds are contained within the green rectangle marked. The same image also identifies the presence of palustrine wetlands (red hatching).

(Queensland Government, 2021m) identifies the Tailings Pond, the Ironbark North Void, the dam located within the Lanes Eastern Emplacement and also a small section of Ebenezer, in proximity to sampling location EW07, as of medium conservation significance. The area directly adjacent to the western edge of the composting pad marked as medium conservation significance does not pond or pool water. The area marked as medium conservation significance within the IBSD area does not encompass all ponds that exist and includes some areas that do not pond or pool water. Refer to **Image 15**.



Notes: Lacustrine Wetland Area (yellow), Palustrine Wetland Area (red hatching)

IMAGE 14: LACUSTRINE AND PALUSTRINE WETLANDS



Notes: Non-riverine wetlands – medium conservation significance (green), very low conservation significance (orange)

IMAGE 15: NON-RIVERINE WETLANDS – CONSERVATION SIGNIFICANCE

2.3.15 Vegetation, Biodiversity and Conservation

This section describes vegetation, biodiversity and conservation in accordance with state legislation, i.e. the

- *Vegetation Management Act 1999* (VMA) and the
- *Nature Conservation Act 1992* (NC Act).

The VMA regulates the clearing of vegetation and aims to:

- conserve remnant vegetation
- ensure clearing does not cause land degradation
- prevent loss of biodiversity
- maintain ecological processes
- reduce greenhouse gas emissions
- allow for sustainable land use.

The NC Act and subordinate regulations aim to conserve nature while allowing for the involvement of indigenous people in the management of protected areas in which they have an interest under Aboriginal tradition or Island custom. This includes the:

- protection of wildlife and its habitat
- management of protected areas
- protection of native wildlife and its habitat
- recognition of interest of Aborigines and Torres Strait Islanders in nature and their cooperative involvement in its conservation.

2.3.15.1 Remnant Vegetation

Small areas of remnant vegetation, classed as endangered – dominant under the VMA are present on the eastern ML boundary (Queensland Government, 2021p). Refer to **Image 16**.

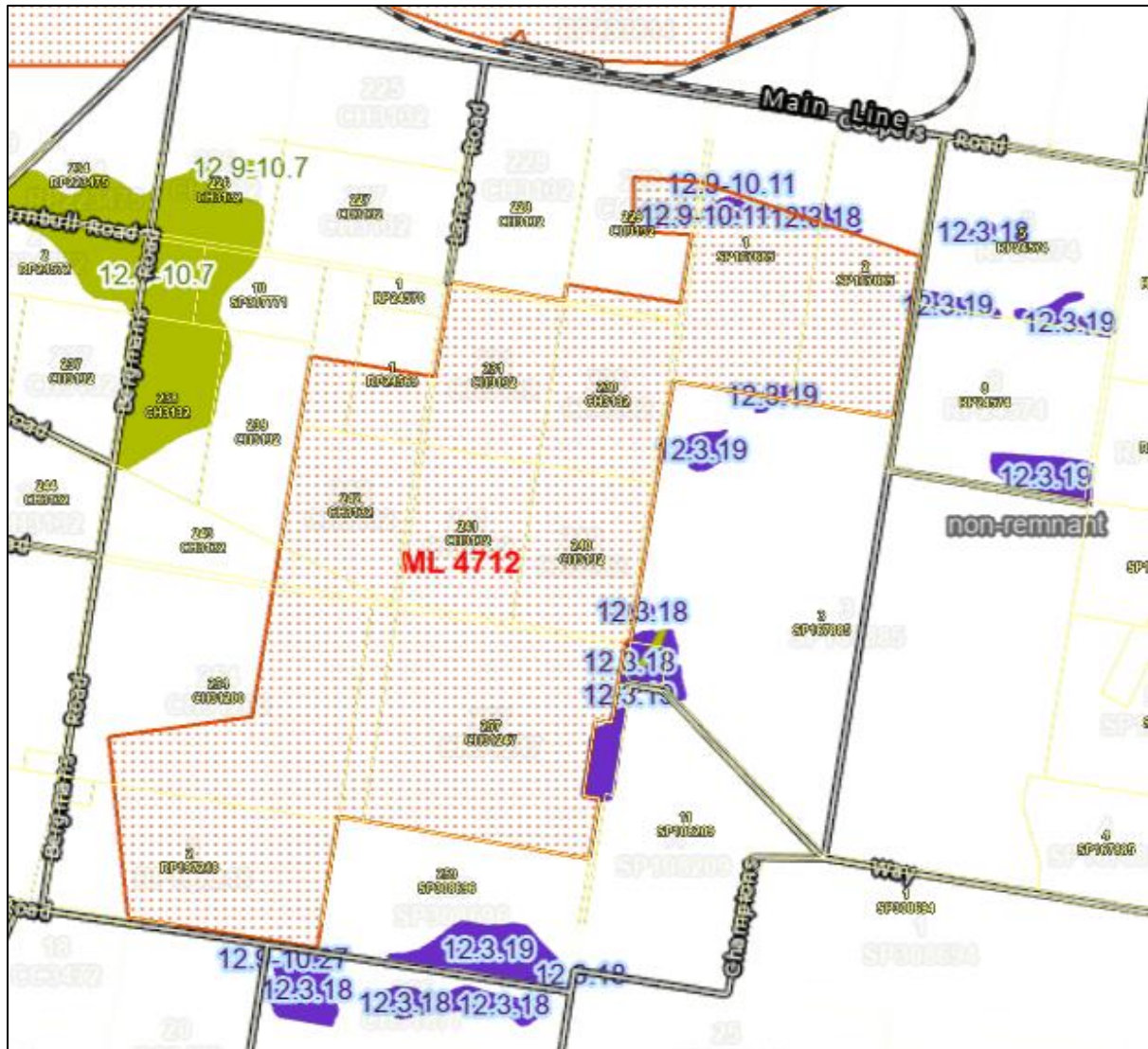
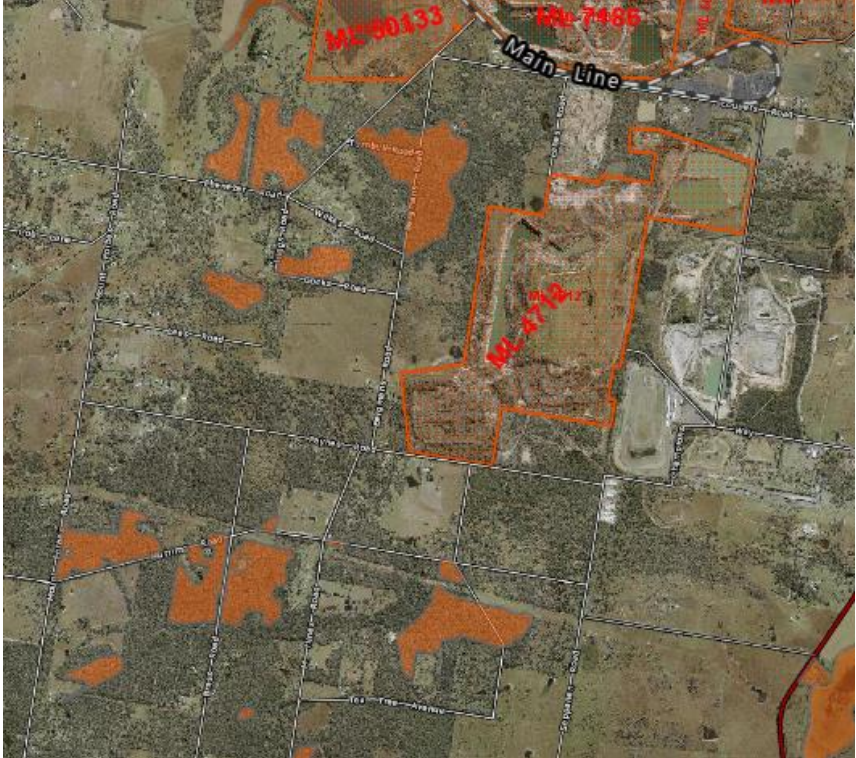


IMAGE 16: REMNANT VEGETATION (VMA)

2.3.15.2 Regional Ecosystems

The ML is located in the Southeastern Queensland bioregion and in the Moreton Basin sub-bioregion. It contains regional ecosystems (RE), which are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil, as defined under the VMA (Queensland Government, 2021o).

RE	Map and Comments
Category A or B area containing endangered regional ecosystems	They are mostly located south of the ML and some are bordering on or marginally overlapping the ML's eastern and northern boundary. 
Category A or B area containing of concern regional ecosystems	None located on the ML. The nearest area is approx. 300m west of the ML.

	
Category A or B; least concern	None located on the ML or in close proximity. 
Category C or R area containing	Several fragmented, small areas surround the ML, and slightly protrude into the ML at the northern, western and southern boundary.

endangered regional ecosystems	
Category C or R area containing of concern regional ecosystems	A small section is located at the western boundary of the ML. 
Category C or R area that is of least concern	Three small areas present on the southern, western and northern ML boundary.

regional ecosystems		
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TABLE 6: REGIONAL ECOSYSTEMS

2.3.15.3 Protected Areas

Protected areas under the NC Act are neither present within ML nor off site in close proximity to the ML.

2.3.15.4 Essential Habitat

Under the VMA, essential habitat for protected wildlife is native wildlife prescribed under the *Nature Conservation Act 1992* (NC Act) as critically endangered, endangered, vulnerable, or near-threatened wildlife. Essential habitat is protected under the VMA and is present as small, isolated areas situated on the ML boundary or slightly protruding into the ML area (Queensland Government, 2021p). Refer to **Image 17**.

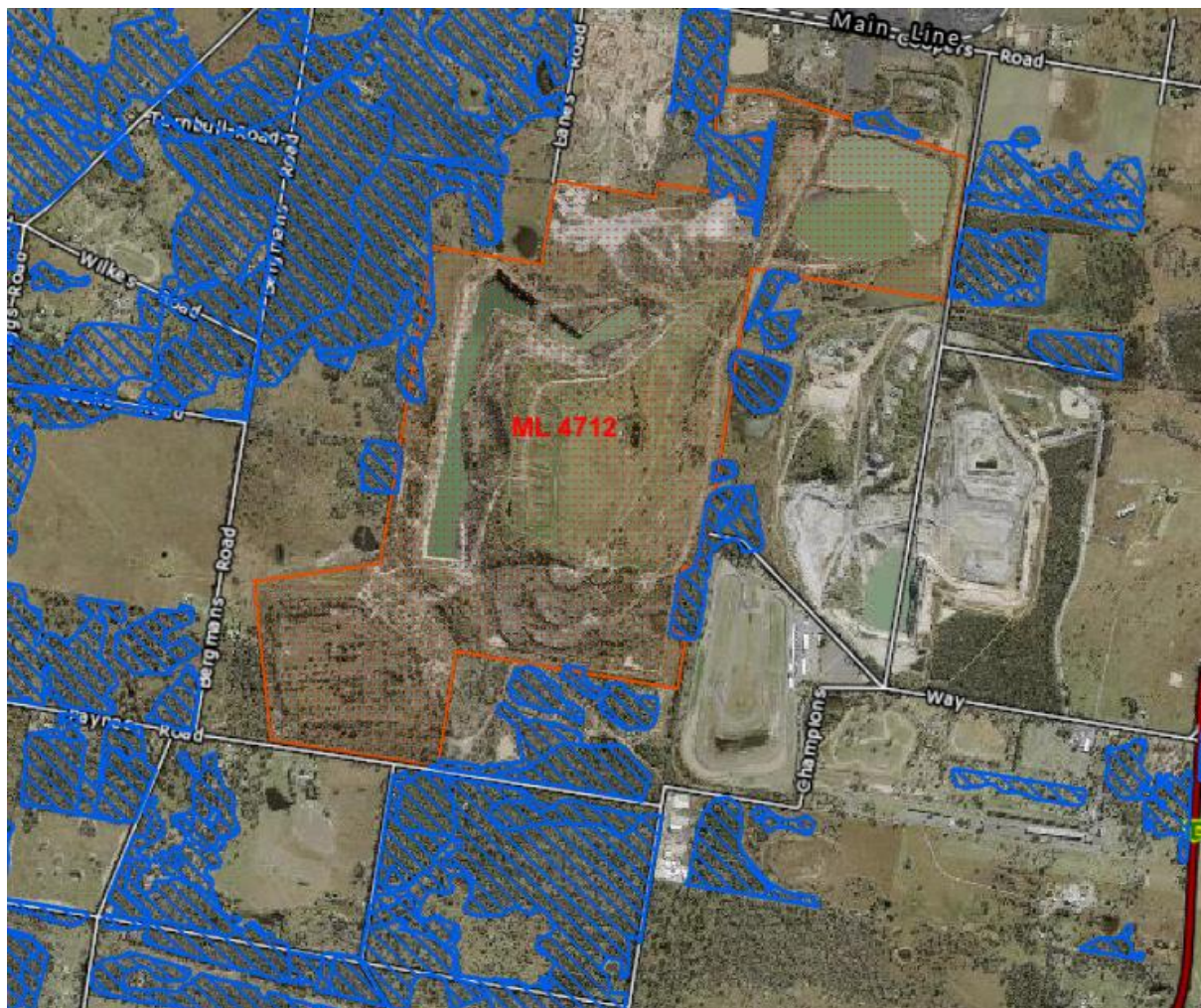


IMAGE 17: ESSENTIAL HABITAT

2.3.15.5 Protected Plants

Image 18 shows high-risk areas where endangered, vulnerable or near threatened (EVNT) plants are present or are likely to be present as defined under the NC Act (Queensland Government, 2021q).

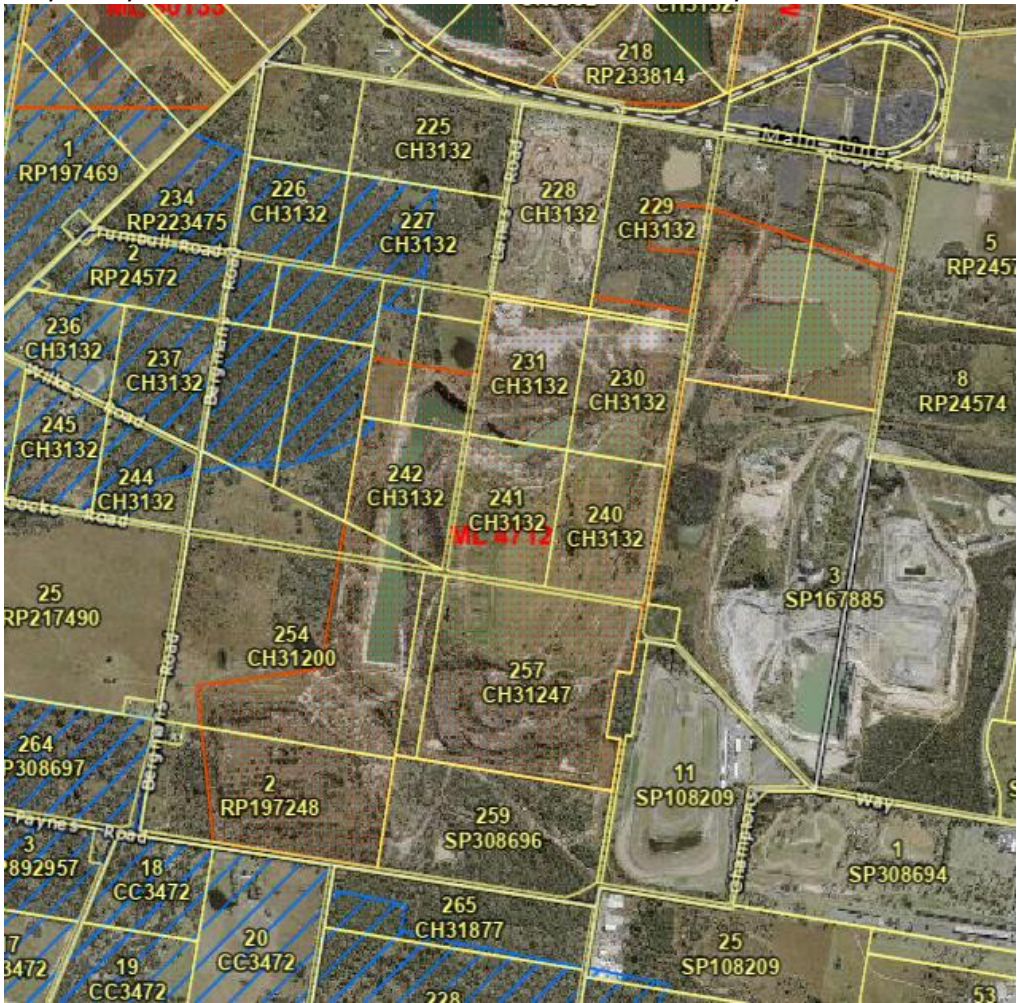


IMAGE 18: PROTECTED PLANTS

2.3.15.6 Koala Habitat

The koala (*Phascolarctos cinereus*) is listed in Queensland as vulnerable by the Queensland Government under the NC Act and endangered by the Australian Government under the *Environment Protection and Biodiversity Conservation Act 1999*.

On 7 February 2020, the Queensland Government introduced new planning controls to the *Planning Regulation 2017* to strengthen the protection of koala habitat in Southeast Queensland (i.e. koala district A). The ML is situated in Koala District A as defined under the *Nature Conservation (Koala) Conservation Plan 2017*. The main purpose is to promote the continued existence of viable koala populations in the wild and to prevent the decline of koala habitat. Refer to **Table 7: Koala Habitat** below (Queensland Government, 2021r).

Koala Plan	Map and Comments
Koala Priority Area	Only a very small area is located on the western site boundary of the ML. 

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Locally Refined Koala Habitat	None present within the ML. Small areas are located south and south-west in close proximity to the ML. 
Koala Habitat Restoration Area	An area is present in the north east portion of the ML towards the Tailings Pond. A very small area appears to be running parallel to the eastern ML boundary.

	
Identified Koala Broad-hectare Area	None present within the ML or in close proximity.



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2.3.15.7 Western ML Boundary – Lanes Void

For the purposes of this report, a more detailed assessment is included for Lanes Void, located adjacent to the western ML boundary. In accordance with EA conditions, Lanes Void, described as Lanes Pit in the EA, requires a specified void design including prescribed competent and incompetent rock slope percentages, which would impact on vegetated areas, including an area identified as an endangered regional ecosystem and area identified as a regional ecosystem of concern (refer to Section 2.3.15) along the western ML boundary and beyond. **Image 19** shows areas west of Lanes Void that would have to be partially cleared if the highwall was to be constructed in accordance with EA requirements. **Table 8** shows photos taken of Lanes Void and vegetated areas west of the void.

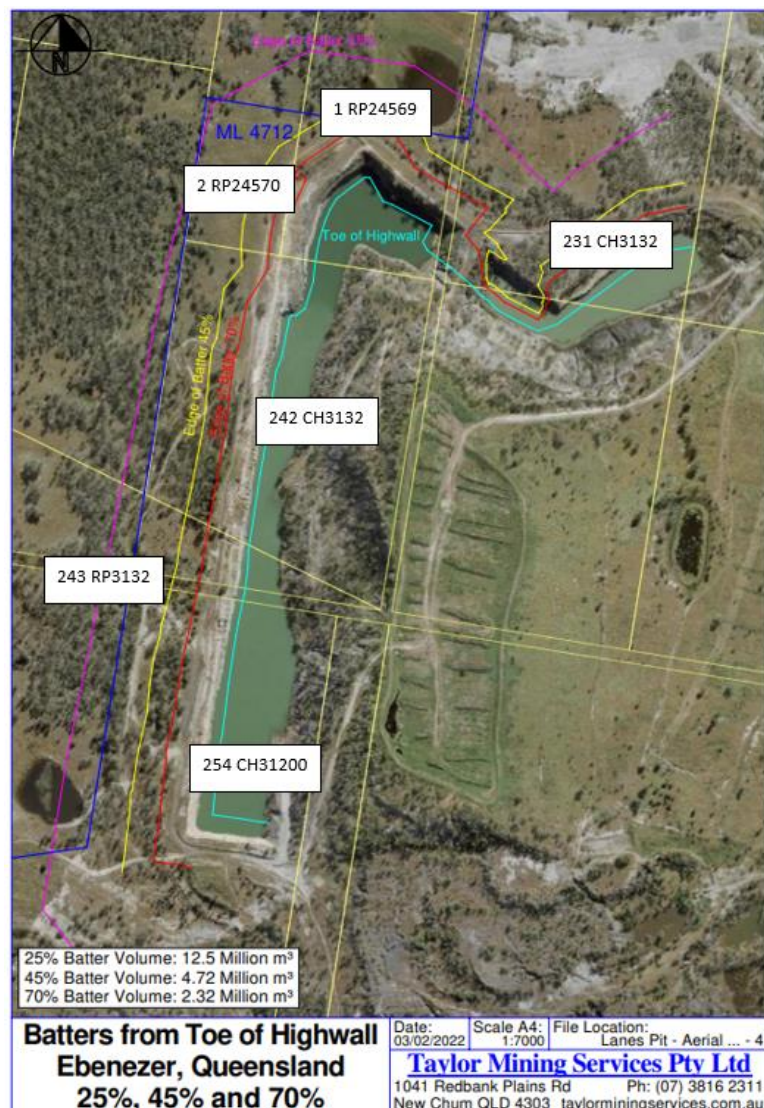


IMAGE 19: PROPOSED HIGHWALL, LANES VOID



TABLE 8: VEGETATION WEST OF LANES VOID

Vegetation management reports have been obtained from the Queensland Government, Department of Environment and Science (2022a). They include information on vegetation categories, regional ecosystems (RE), watercourses, wetlands and essential habitat.

2.3.15.7.1 VEGETATION CATEGORIES

The proposed highwall as required by the EA for Lanes Void would cover all of the land parcels identified in **Table 9: Vegetation Categories** and impact on Category C areas, i.e., high value regrowth areas, as indicated.

Lot/Plan	Cat A	Cat B	Cat C	Cat R	Impact through batter
231CH31332	-	-	-	-	N/A
1RP24569	-	-	yes	-	yes
2RP24570	-	-	yes	-	yes
242CH3132	-	-	yes	-	yes
243CH3132	-	yes	yes	-	no
254CH31200	-	-	yes	-	yes

TABLE 9: VEGETATION CATEGORIES

2.3.15.7.2 REGIONAL ECOSYSTEMS AND ESSENTIAL HABITAT

RE present include *Corymbia citriodora* subsp. *variegata* and/or *E. moluccana*, *E. tereticornis*, *E. crebra* open forest with *Melaleuca irbyana* understorey on sedimentary rocks and *Eucalyptus crebra* +/- *E. tereticornis*, *Corymbia tessellaris*, *Angophora* spp. and *E. melanophloia* woodland on sedimentary rocks. They are classed as 'Endangered' and 'Of concern' under the VMA, respectively, and are also identified as essential habitat for the koala and *Melaleuca irbyana*. Refer to **Table 10**. The table also identifies where the proposed highwall would impact on essential habitat or where it may be possible.

Lot/Plan	RE	Cat	VMA Status	Short Descriptions	Essential Habitat	Common Name	NCA Status	Impact through Highwall
1RP24569	12.9-10.27	C	Endangered	Corymbia citriodora subsp. variegata and/or E. moluccana, E. tereticornis, E. crebra open forest with Melaleuca irbyana understorey on sedimentary rocks	yes	Koala	Vulnerable	yes
						Melaleuca irbyana	Endangered	
	12.9-10.7	C	Of concern	Eucalyptus crebra +/- E. tereticornis, Corymbia tessellaris, Angophora spp. and E. melanophloia woodland on sedimentary rocks	yes	Koala	Vulnerable	yes
2RP24570	12.9-10.27	C	Endangered	Corymbia citriodora subsp. variegata and/or E. moluccana, E. tereticornis, E. crebra open forest with Melaleuca irbyana understorey on sedimentary rocks	yes	Koala	Vulnerable	no
						Melaleuca irbyana	Endangered	
	12.9-10.7	C	Of concern	Eucalyptus crebra +/- E. tereticornis, Corymbia tessellaris, Angophora spp. and E. melanophloia woodland on sedimentary rocks	yes	Koala	Vulnerable	yes
242CH3132	12.9-10.27	C	Endangered	Corymbia citriodora subsp. variegata and/or E. moluccana, E. tereticornis, E. crebra open forest with Melaleuca irbyana	yes	Koala	Vulnerable	yes
						Melaleuca irbyana	Endangered	

				understorey on sedimentary rocks				
	12.9-10.7	C	Of concern	Eucalyptus crebra +/- E. tereticornis, Corymbia tessellaris, Angophora spp. and E. melanophloia woodland on sedimentary rocks	yes	Koala	Vulnerable	yes
254CH31200	12.9-10.11	C	Endangered	Melaleuca irbyana low open forest on sedimentary rocks	yes	Koala	Vulnerable	yes
						Melaleuca irbyana	Endangered	
	12.9-10.27	C	Endangered	Corymbia citriodora subsp. variegata and/or E. moluccana, E. tereticornis, E. crebra open forest with Melaleuca irbyana understorey on sedimentary rocks	yes	Koala	Vulnerable	potentially

TABLE 10: RE, VMA STATUS AND ESSENTIAL HABITAT

2.3.15.7.3 WATERCOURSES AND WETLANDS

Whilst it is shown that three first-order streams (Queensland Government, 2021s) would be impacted on the parcels tabled below and shown in **Image 20**, it is to be noted these streams have been diverted via constructed bunding and do not enter the respective voids (refer to **Appendix 5 - Plan 12**).

231 CH3132
1 RP24569
242 CH3132
243 CH3132
254 CH31200

TABLE 11: FIRST-ORDER STREAMS

The only wetland (hatched green) present is on Lot 254 RPCH31200 and would be impacted. Refer to **Image 20** below.



IMAGE 20: STREAMS AND WETLANDS

2.3.15.7.4 PROTECTED PLANTS

In Queensland, all plants that are native to Australia are protected plants under the NC Act. The NC Act regulates the clearing of protected plants 'in the wild' that are listed as critically endangered, endangered, vulnerable or near threatened under the NC Act.

High risk areas are present on:

231 CH3132
1 RP24569
2 RP 24570
242 CH3132
243 CH3132
254 CH31200

TABLE 12: LAND PARCELS CONTAINING HIGH RISK VEGETATION

2.3.15.7.5 KOALA HABITAT

Koalas are listed as vulnerable under the NC Act and endangered under the EPBC Act. Koala habitat areas are areas of vegetation that have been determined to contain koala habitat that is essential for the conservation of a viable koala population in the wild based on the combination of habitat suitability and biophysical variables with known relationships to koala habitat (e.g. landcover, soil, terrain, climate and ground water).

Only a very small area classed as Koala priority area on 242 CH3132 would be impacted. Koala core habitat that would be impacted is present on the following land descriptions tabled:

1 RP24569
2 RP24570
242 CH3132
254 CH31200

TABLE 13: LAND PARCELS CONTAINING CORE KOALA HABITAT

The nearest locally refined Koala Habitat is present off site only, but in close proximity to the southern corner of the ML and in an area immediately west of the ML.

Koalas have been sighted at the southern end of the outer pit spoil dump on 2 RP 197248 in 2020 (Zambelli, 2022) which forms part of the ML. The koala sighting occurred in an area not designated as core koala habitat/locally refined koala habitat, but close to it. Lot 2 RP 197248 is located south of 254 CH3132.



Refer to **Section 2.3.15.6** for further information and **Table 7** for images.

Biodiversity and conservation values have been assessed in accordance with Biodiversity Planning Assessments (BPA) and Aquatic Conservation Assessments (ACA) published by the Queensland Government, Department of Environment and Science (2022b). They comprise threatened species, BPA priority species and ACA priority species (riverine and non-riverine).

State Habitat for EVNT taxa (Endangered, Vulnerable, Near Threatened) under the NC Act and for 'Endangered' or 'Vulnerable' species under the *EPBC Act* has been identified on all parcels of land that would be affected by the batter slope reshaping. Threatened flora and fauna species have been recorded on or within 4 km of specified parcels of land tabled in and are summarised in **Table 15: Threatened Species**.

231 CH3132
1 RP24569
2 RP 24570
242 CH3132
243 CH3132
254 CH31200

TABLE 14: LAND PARCELS CONTAINING ENDANGERED OR VULNERABLE SPECIES

Scientific name	Common name	NC Act	EPBC Act
Fauna			
<i>Adelotus brevis</i>	tusked frog	V	-
<i>Phascolarctos cinereus</i>	koala	V	V
<i>Rostratula australis</i>	Australian painted snipe	E	E
Flora			
<i>Marsdenia coronata</i>	slender milkvine	V	-
<i>Melaleuca irbyana</i>		E	-

TABLE 15: THREATENED SPECIES

2.3.15.7.8 BPA PRIORITY SPECIES

A summary of BPA priority species that have been recorded on, or within approximately 4km of the specified parcels of land are listed below:

Scientific name	Common name	Back on Track rank
Fauna		
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	L
<i>Litoria dentata</i>	Bleating Treefrog	L
<i>Mugil cephalus</i>	Sea Mullet	L
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	None
<i>Trachystoma petardi</i>	Pinkeye Mullet	L

TABLE 16: PBA PRIORITY SPECIES

2.3.15.7.9 ACA PRIORITY SPECIES - RIVERINE

Scientific name	Common name	Back on Track rank
Fauna		
<i>Anguilla reinhardtii</i>	Longfin Eel	low
<i>Ardea alba modesta</i>	Eastern Great Egret	low
<i>Bubulcus ibis</i>	Cattle Egret	low
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	low
<i>Mugil cephalus</i>	Sea Mullet	low
<i>Rostratula australis</i>	Australian Painted Snipe	medium
<i>Trachystoma petardi</i>	Pinkeye Mullet	low
Flora		
<i>Eucalyptus tereticornis</i>	-	none
<i>Melaleuca viminalis</i>	-	low

TABLE 17: ACA PRIORITY SPECIES - RIVERINE

2.3.15.7.10 ACA PRIORITY SPECIES – NON -RIVERINE

Scientific name	Common name	Back on Track rank
Fauna		
<i>Anguilla reinhardtii</i>	Longfin Eel	low
<i>Ardea alba modesta</i>	Eastern Great Egret	low
<i>Bubulcus ibis</i>	Cattle Egret	low
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	low
<i>Rostratula australis</i>	Australian Painted Snipe	medium
Flora		
<i>Eucalyptus tereticornis</i>	-	none

TABLE 18: ACA PRIORITY SPECIES - NON – RIVERINE

2.3.15.7.11 CORRIDORS

The entire Lanes Void is situated in a terrestrial regional corridor buffer (Queensland Government, 2021t).

2.3.16 MSES

A search of Matters of State Environmental Significance (MSES) results in the following MSES that are either on the ML or in close proximity to the ML:

- Protected area (nature refuges): Gum Tips Nature Refuge, a palustrine wetland approximately 800 m south of the southern ML boundary.
- Regulated vegetation (defined water courses: Present on the ML and off site. Refer to section **2.3.15.7.3 Watercourses and Wetlands**.
- Wildlife habitat (endangered or vulnerable). Present on the ML and off site. Refer to section **2.3.15.7.7 Threatened Species**.
- Wildlife Habitat (SEQ koala habitat – core). Present on the ML and off site. Refer to section **2.3.15.7.5 Koala Habitat**.
- Regulated Vegetation (**Category B – endangered or of concern**). Minor presence on the northern and eastern ML boundary and off site.



IMAGE 22: MSES - REGULATED VEGETATION (CAT B - ENDANGERED OR OF CONCERN)

-

- Regulated Vegetation (**Essential Habitat**). Minor, localised presence on the ML boundary, including the western ML boundary and off site.

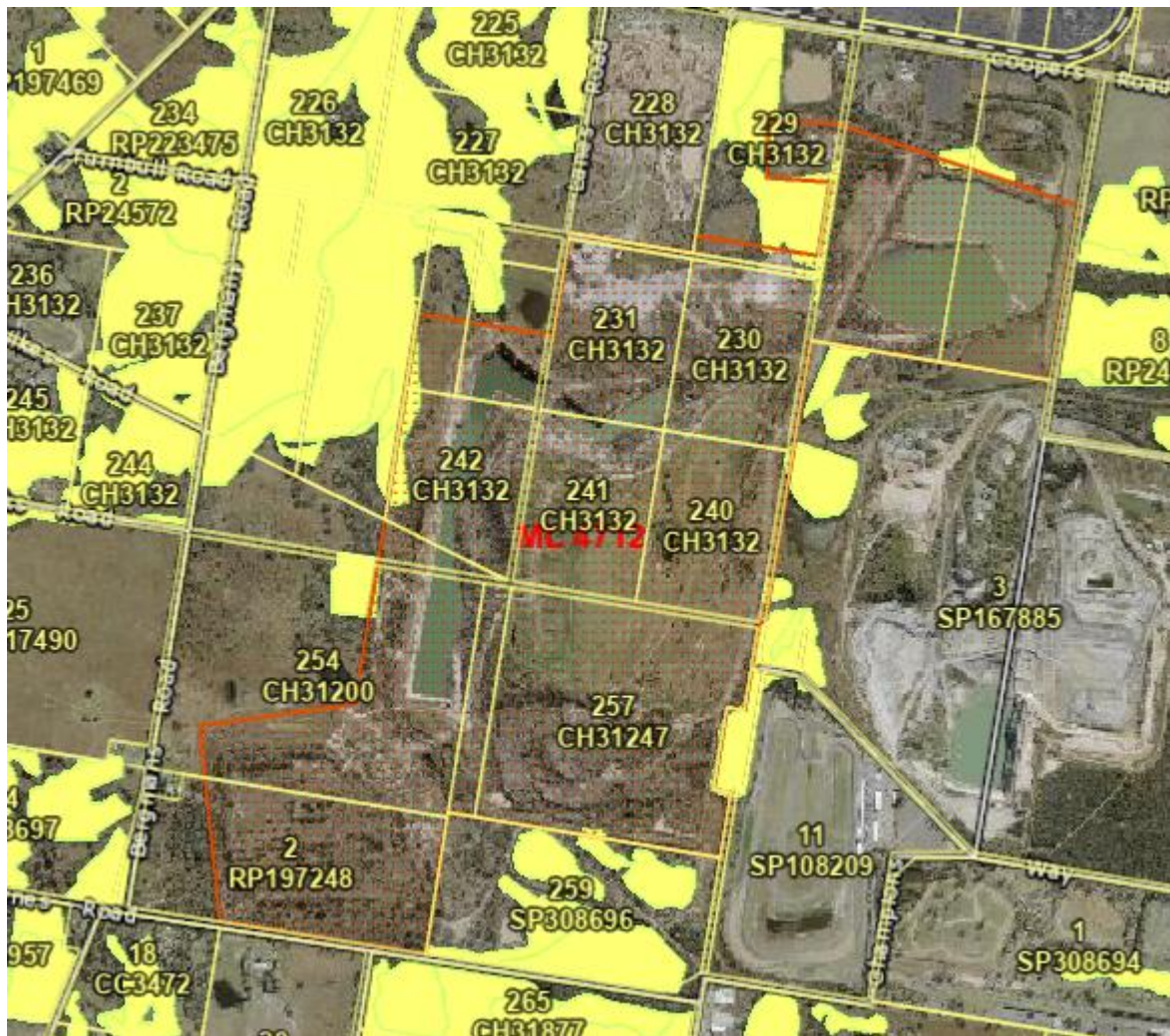


IMAGE 24: MSES - REGULATED VEGETATION (ESSENTIAL HABITAT)

- Regulated Vegetation (**100 m from Wetland**). Minor, localised presence on the ML boundary, including the western ML boundary and off site.



IMAGE 25: MSES - REGULATED VEGETATION (100 M FROM WETLAND)

2.3.17 Bushfires

Image 26 shows that large parts within the ML are not mapped as bushfire prone. It contains areas mapped as medium potential bushfire intensity and bushfire impact buffer. The largest area with medium potential bushfire intensity is in the northern portion of the ML, and a smaller area identified within the IBSD. The ML is surrounded by large areas mapped as medium potential bushfire intensity and bushfire impact buffer situated south, west and north of the ML, extending into western and southern parts of the ML. There are two small areas mapped as having a high potential bushfire intensity on the eastern boundary of the ML. The eastern haulage path located in proximity to the eastern ML boundary traverses through a potential impact buffer in effect acting like a fire break. (Queensland Government, Department of State Development, Manufacturing, Infrastructure and Planning, 2015). Note that site entrance is outside bushfire prone areas.

Potential impact buffers are areas in a bushfire prone area that are at significant risk of bushfire attack from embers, flames or radiant heat. The areas mapped either very high, high or medium potential bushfire intensity include potentially hazardous vegetation that could support a significant bushfire. This vegetation is classified and mapped as having a vegetation hazard class (Queensland Government, Department of State Development, Manufacturing, Infrastructure and Planning, 2019). Vegetation hazard classes have been developed based on estimated fuel loads in tonnes per hectare associated with certain types of vegetation. Significant disturbances that result in permanent or semi-permanent land use change events, such as land clearing for development, are captured in updates of Vegetation Hazard Class (VHC) mapping performed by the Queensland Fire and Emergency Services. (Glen Newnham, Kimberley Opie, Justin Leonard , 2017). Refer to **Image 26**.

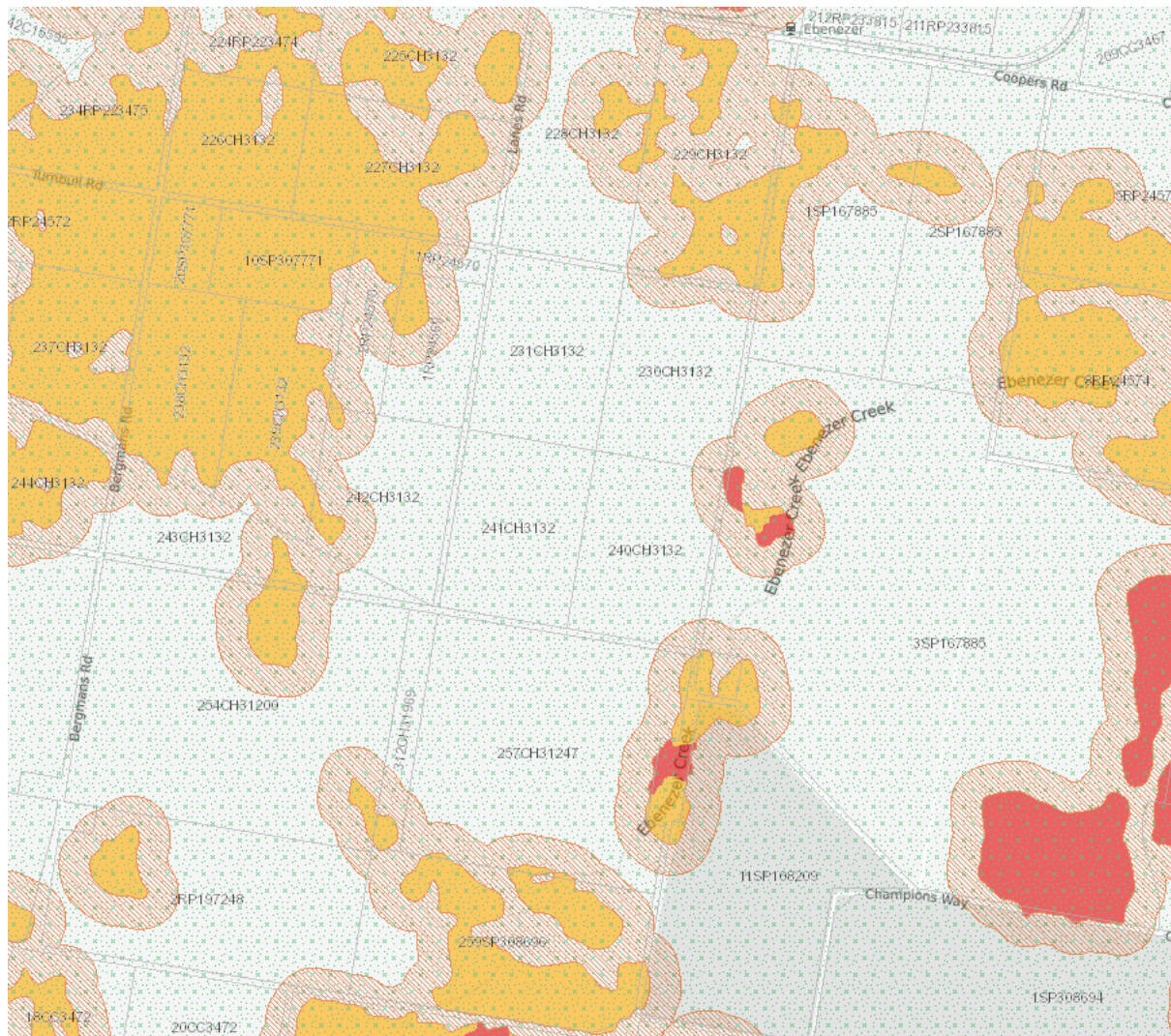
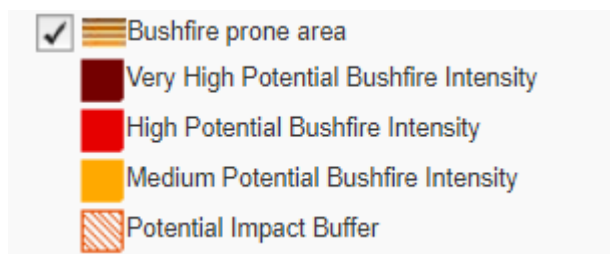


IMAGE 26: BUSHFIRE PRONE AREAS



2.3.18 Notifiable Activities

A search of the Environmental Management Register/Contaminated Land Register on 1 February 2022 identified that Lot 229 on Plan CH3132 is listed for explosives production or storage (EMR Site id: 31883). Note that Maxam is to organise the delisting from the EMR, which includes making good on any contaminated land identified.

2.3.19 Rehabilitation Performed

Significant repair works have occurred to correct failures with previous rehabilitation. In particular:

- A new access ramp was constructed to shorten the haulage distance between the compost pad and the Out of Pit Dump (OPD)
- 6 ha of land located at the OPD were repaired whereby by compost and topsoil were spread across the surface and the contour drain reinstated. Vegetation cover has been achieved (refer to **Appendix 2 - Image 9**).
- The southern drain located within the IBSD area was significantly eroded (refer to **Appendix 2 - Image 25**). It has been repaired via reshaping, installing a number of rock check dams, placing topsoil and spreading grass seed (refer to **Appendix 2 - Image 26**).
- Two rock check dams, one with bidim included as a filter have been constructed at the southeast corner of the IBSD area.
- A new culvert has been installed along the main haulage road. The previous culvert was considered to be unsafe as some areas were starting to collapse.
- Compost was applied to bare surface areas adjacent to the haulage road located north of Lanes Void and Ironbark North Void.
- Regular spraying of weeds occurs.
- Currently, rehabilitation is occurring along the stormwater drainage path at monitoring point EW35. Rock check dams have been installed, with topsoil/compost being applied to bare areas. Grass seed has been spread and grass growth has established in areas that were once bare (refer to **Appendix 2 - Image 27**).

The locations of the above bulleted items are shown in **Appendix 5 - Plan 31**.

2.4 Rehabilitation & Improvement Areas

Rehabilitation areas including post mining land use classifications are listed in the following table.

Rehabilitation Area	Relevant Activities	Area (ha)	PMLU
RA1	Lanes Pit Void and Ironbark Pit Void	15.3	Water storage (Grazing)
RA2	Ti Tree West Pit (Tailings Pond) and Willow Pit Void	23.5	Water storage (Grazing)
RA3	Ironbark South Dump	18.7	Light grazing
RA4	Out of Pit Dump	13.9	Light grazing
RA5	Ti Tree West Pit (Fringing area surrounding Tailings Pond) and Other Areas	142.7	Light grazing
RA6	Storage and Office areas, Roads, Safety Bunds and Bentonite Processing Area and Bentonite Storage Area	32.4	Light grazing
RA7	Office Dam, Ponds, Sediment Basins, Surge Basin	4.0	Water storage (Grazing)

TABLE 19: REHABILITATION AREAS & POST MINING LAND USES

There is one improvement area, Improvement Area 1 (IA1), which has been identified as a Non-use management area (NUMA). It includes the Ironbark Pit slope and Lanes Pit slope. The total size is 50 ha.

2.4.1 Planned Rehabilitation

The planned rehabilitation for the rehabilitation areas listed in **Table 19** above is detailed in the following sections:

2.4.1.1 Rehabilitation Area 1

This area includes water contained within the Lanes Pit Void and the Ironbark Pit Void which will be used as water for cattle grazing. Rehabilitation includes ensuring that safe access for native animals and stock exists and where possible vegetation is established on the low wall. Water quality will be sampled to determine its suitability for use as stock water.

A safety bund restricting access to high-wall and low-wall of the voids will be constructed. A stock fence (total length including is 2.51km) to restrict access to the voids will be constructed. Signs will be fastened on stock fencing advising 'danger do not enter'. Four gates will be installed to access Ironbark Pit Void ramp and haulage road within stock fenced area. An access road outside the stock fence and safety bund will be created.

2.4.1.2 Rehabilitation Area 2

This area includes water contained within the Ti Tree West Pit (Tailings Pond) and Willow Pit Void which will be used as water for cattle grazing. The Tailings Pond will be fenced to restrict cattle access. Water quality will be sampled to determine its suitability for use as stock water. The Tailings Pond is designed to release. Water quality sampling occurs at the time of release to determine impact (if any) to Ebenezer Creek. It is proposed to:

- Construct an earthen bund along the northern edge of the Tailings Pond.
- Construct two earthen bunds along the southern edge of the Tailings Pond.
- Construct a 5-strand wire fence. The top strand is plain wire and the bottom four strands barbed wire.
- Erect signs on stock fence advising 'danger do not enter'.
- Four gates will be installed.

2.4.1.3 Rehabilitation Area 3

The Out of Pit Dump area was constructed with overburden at the commencement of mining. The area was rehabilitated albeit there is an area that requires repair. It is proposed to:

- Carry out bulk earthworks to rectify drainage paths and erosion. This includes the deep ripping of the existing ground surface.
- Spread gypsum over ripped surfaces.
- Spread topsoil over ripped bare ground surfaces to establish vegetation.
- Construction of two rock/geofabric lined down chutes to convey stormwater from the top surface of the out of pit dump.
- Repair contour drains.

2.4.1.4 Rehabilitation Area 4

The Ironbark South Dump area is a previously mined pit which was being backfilled as part of the Lanes mining operation until mining ceased.

- Bulk earthworks to rectify drainage paths and erosion.
- Spread gypsum over ripped surface.
- Spread topsoil over bare ground surfaces to establish vegetation.
- Construction of surge basins to slow the velocity of stormwater runoff.
- Installation of rock check dams within drainage flow paths to slow the velocity of stormwater runoff.
- Construction of haulage road ramp linking RA3 to RA5.

2.4.1.5 Rehabilitation Area 5

This area includes land associated with the Out of Pit Dump, the topsoil stockpile area the existing composting area, the Eastern Emplacement, the wet weather storage pad, land to the north of the Ironbark Pit Void and land surrounding the Tailings Pond. It is proposed to:

- Realign perimeter bund of compost pad above recent low-wall failure (total length 270m, 5m bottom width, 1m top width and 2.5m high), place topsoil of 0.2m thickness and apply grass seed.
- Extend safety bund 100 m down slope at the southern end of Lanes Eastern Emplacement restricting access to RA4.
- Construct bench to stabilise crest (total length 235m).
- Construct stock fence (total length 1.6km).
- Install 3 gates to access Lanes Pit Void Southern Ramp (Improvement Area 1) and RA4.

- Erect signs on stock fence advising 'danger do not enter'.
- Create openings in perimeter bund on the eastern side of composting pad to allow the release of stormwater generated on the compost pad once compost has been removed and therefore eliminating ponding at the crest of batter slopes.
- Deep rip a total of 0.453ha of disturbed area to prepare for spreading of gypsum, topsoil and grass seed.
- Construction of stock fence (total length including Ironbark Pit Void is 2.51km).
- Erect signs on stock fence advising 'danger do not enter'.
- Install 5 gates to access Lanes Void and haulage road within stock fenced area.
- Construct safety bund set back from crest of high-wall and low-wall.
- Install access road outside stock fence and safety bund.
- The perimeter bunds constructed to contain stormwater within the wet weather storage pad area will be spread across the ripped hardstand area (0.759ha). 1,518m³ of topsoil and compost will be spread over the reshaped surface, followed by grass seed to establish vegetation.
- Topsoil and compost will be spread followed by grass seed to establish vegetation within the topsoil stockpile area (0.87ha).

2.4.1.6 Rehabilitation Area 6

This area includes storage and office areas, roads, safety bunds, the former ROM pad, hardstand areas used for the storage of bentonite, the existing bentonite processing facility operated by Terrequip Miles Pty Ltd and the explosive storage facility operated by Maxam. It is proposed to:

- Remove plant and equipment and portable infrastructure that is owned by Terrequip. Remaining infrastructure such as silos, conveyors, and items associated with the processing of bentonite may be repurposed for another use or sold. Buildings and hardstand areas will remain at the request of the landowner.
- Maxam (current tenant) will remove plant and equipment, portable infrastructure such as demountable buildings, and items associated with the storage of explosives. Any contaminated land will be remediated.
- Areas not retaining infrastructure will be deep ripped, with gypsum being applied over the ripped surface before topsoil is placed over ripped bare ground surfaces to establish vegetation.

- The ROM pad and a small area of the former bentonite storage hardstand area will remain for use as on farm storage areas.
- No rehabilitation is proposed for the former ROM pad. The area is currently used by the landowner for the storage of plant and equipment. Slashing of grass will occur when required.
- Further to the connection of the haulage road from RA4 to RA5, a new haulage road (approximately 1.03km) will be constructed outside the stock fence surrounding Improvement Area 1 (IA1) which will link up with existing haulage roads located west of the voids.

2.4.1.7 Rehabilitation Area 7

This area includes the office dam, ponds, sediment basins and surge basin which will be used as water for cattle grazing and native animals. Rehabilitation includes ensuring that safe access for native animals and stock exists and where possible vegetation is established on the banks of ponds. Water quality will be sampled to determine its suitability for use as stock water.

2.4.2 Planned Improvement Area

The planned improvement for IA1 includes:

- Constructing a safety bund 40 m from the Lanes Pit and Ironbark Pit void high-walls. The safety bunds will be constructed in accordance with engineering requirements including:
 - constructed from non-weathered, non-dispersive dumped rockfill;
 - a minimum 2m in height;
 - a minimum of 4 m base width; and
 - 1 in 3 batters.
- Constructing a 5 strand stock fence, to restrict access to the slopes of the Lanes Pit and Ironbark Pit slopes. The top wire will be high-tensile wire and not barbed wire to minimise potential injury to native wildlife such as kangaroos.
- Ensuring existing drainage and diversion bunding is integral to prevent and limit the ingress of overland stormwater flow into the voids.
- Where possible, applying compost and topsoil to establish vegetation on bare ground surfaces of the low-wall.

Geotechnical assessment will occur in order to make improvements to void slopes, consistent with accepted engineering standards and methodologies that are appropriate to the reasonably foreseeable consequences of instability. If instability is unavoidable, recommended measures will

demonstrate that instability is unlikely to negatively impact on the stability of any adjacent or downstream undisturbed areas or rehabilitated areas.

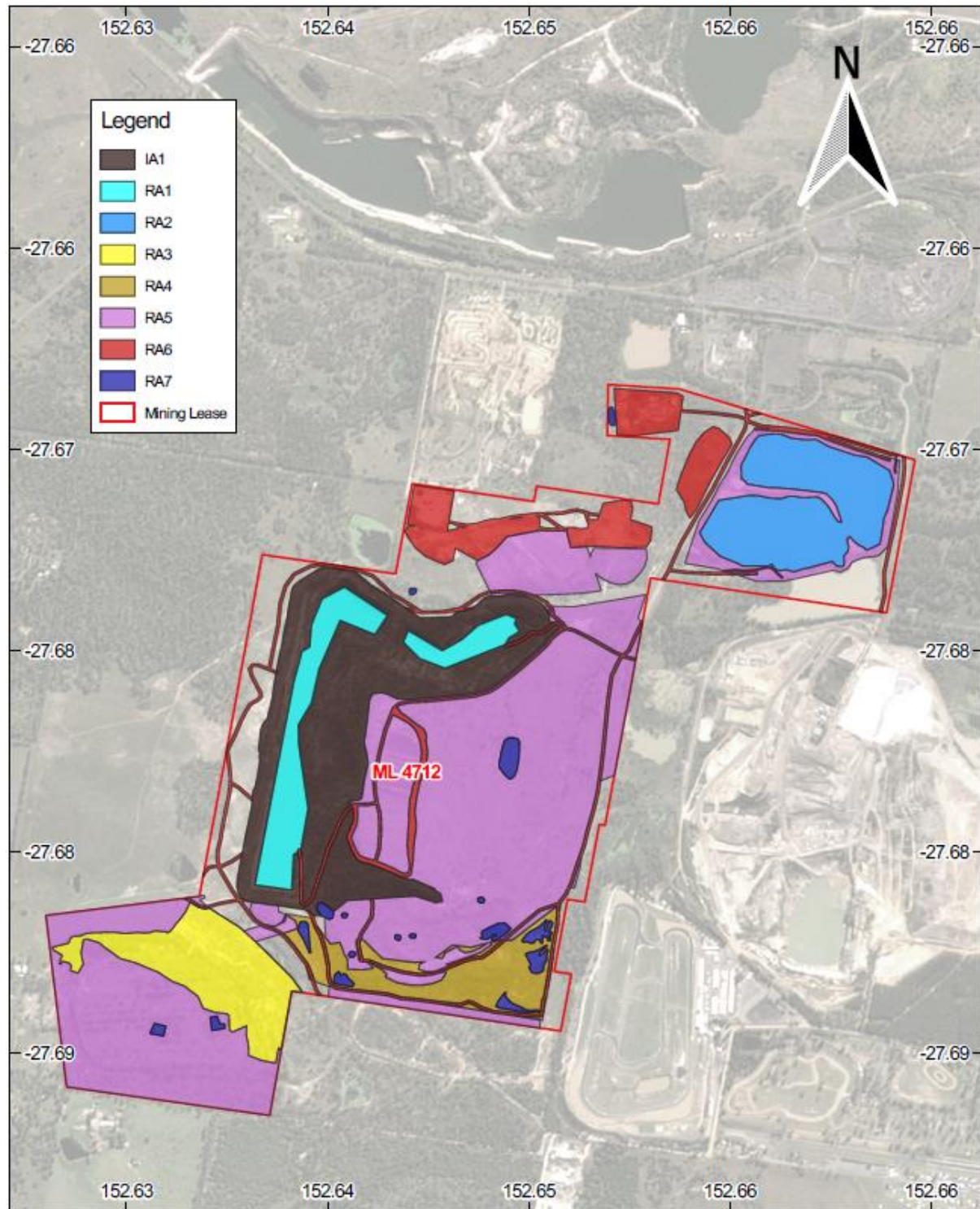


FIGURE 7: PROPOSED REHABILITATION AREAS AND IMPROVEMENTS

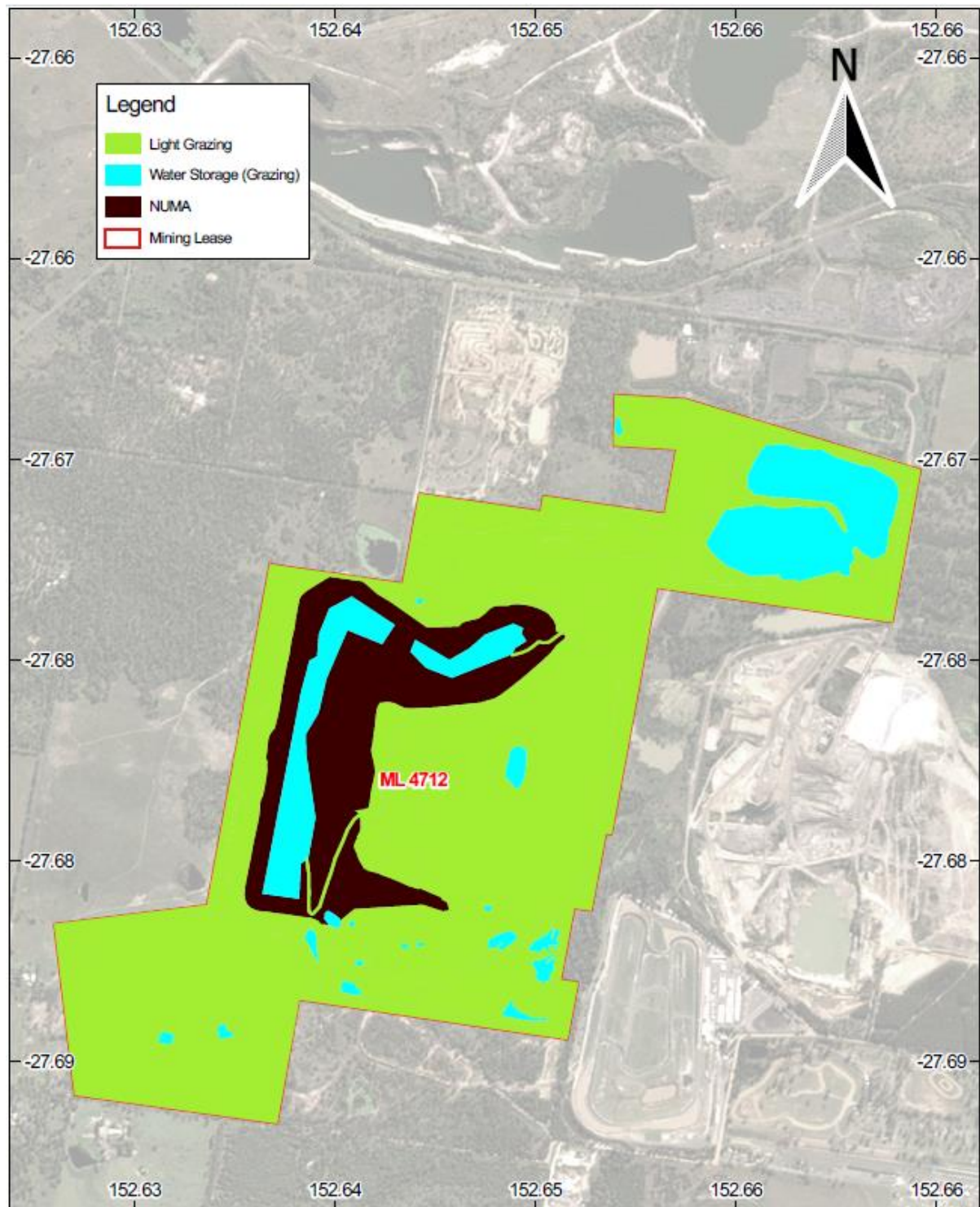


FIGURE 8: FINAL SITE DESIGN

2.5 Community Consultation

Zedemar is committed to consult with the community and other relevant stakeholders regarding rehabilitation and closure activities. Refer to **Appendix 9 Community Consultation Plan** for further information.

2.6 Post-Mining Land Use

Section 2.3.2 contains tenure information sourced from Qld Globe that indicates that the area of ML4712 is 357.8 ha. Cattle grazing occurs upon freehold land once associated with portions of the ML and which have been surrendered and also within areas of the ML that have been rehabilitated such as the area known as the Lanes Eastern Emplacement. Cattle also graze along the internal haulage roads where rehabilitation has occurred. There is also a large population of kangaroos that graze throughout the ML and a resident trip of goats are often sited traversing the high-wall.

Condition F1 of the EA identifies Table 1 – Final land use and rehabilitation schedule (reproduced below). For the purpose of the PRC plan, the EA is considered to be the land outcome document in accordance with section 750 of the EP Act. The post mining land uses for the areas described within Table F1 include light grazing, fauna habitat and water storage.

Table F1 Final land use and rehabilitation schedule

Disturbance type	Disturbance area (ha)	Pre-mine land description	Post-mine land description	Pre-mine land capability ¹	Post-mine land capability ¹	Cover (%)	Slope Range (%)
Infrastructure	12.2	Light Grazing	Light Grazing	3, 4, 5	4, 5	50	<10
Haul roads	15.0	Light Grazing	Light Grazing	4	4	50	<10
Topsoil stripped ahead of mining	11.6	Grazing	Light Grazing	3, 4	4	50	<10
Tailings ponds	31.7	Light Grazing	Fauna habitat	4, 5	5	N/A	<10
Active Pit (final void)	45.9	Grazing	Water Storage Fauna Habitat	3, 4, 5	5	N/A	Competent rock <70 Incompetent material <45
Dams and ponds	8.4	Grazing	Water Storage Fauna Habitat	3, 4, 5	5	N/A	<10
Spoil area	42.0	Grazing	Light Grazing	3, 4	4, 5	30	<18

1. land capability is defined in the Queensland Department of Mines and Energy Technical Guidelines for Environmental Management of Exploration and Mining in Queensland, 1995.

TABLE 20: TABLE F1 – FINAL LAND USE AND REHABILITATION SCHEDULE (SOURCE: EA)

Some of the domains prescribed in the previous PoOP (reproduced as **Figure 2**) do not correlate with some of the disturbance types listed within Table F1 and a complete reconciliation of areas between the previous PoOP and the EA cannot be achieved.

Comparison between the respective domains shown in **Figure 2** and Table F1 of the EA indicates a discrepancy with the EA nominated infrastructure, topsoil stripped ahead of mining, dams and pond area values. The domains and their respective areas shown within Table F1 were based on anticipated future mining in ML4712 and were determined on the maximum area of disturbance anticipated during mining.

It is to be noted that Table F1 of the EA was in place when the EA was issued in 2004 in anticipation of the recommencement of mining, which predates the PoOP. **Figure 1** shows the extent of ML4712 prior to the partial surrender that was sanctioned in 2016. It is understood that prior to the partial surrender application, it was the intention to continue mining towards the western section of ML4712.

Mining ceased to the west within ML4712, and mining commenced within the adjoining ML50100. Once mining was completed within ML50100, the mining of coal did not recommence within ML4712. It is understood that Table F1 was never amended at the time of the surrender described in **Section 2.1.1**. When ML4712 was sold to Zedemar, Ebenezer Mining Company Pty Ltd retained the EA and surrendered ML50100 in approximately 2006. Zedemar had to apply for a new EA for ML4712. **Appendix 5 - Plan 16** is provided to indicate the original boundaries of ML4712 and ML50100.

The total area listed within **Figure 2** equates to 209.1 ha, whilst the total area listed within Table F1 of the EA as requiring rehabilitation equates to 166.8 ha. An attempt to reconcile various areas is provided within the following paragraphs. In some instances no rational conclusion can be made of the difference. It is for this reason that a review of disturbed areas occurred resulting in the current shape files prepared by TMS for this PRC plan and where appropriate, the contemporary area has been provided to clarify

The 12.2 ha indicated as infrastructure under disturbance type within Table F1 of the EA cannot be reconciled. It is to be noted that the landowner wishes to retain the infrastructure associated with Bentonite processing (i.e., all buildings, and the hardstand areas). The previous PoOP indicated the Bentonite Processing Area encompassed a net disturbed area of 8ha shown in **Figure 2**.

Note that the landowner wishes to retain the complete circuit of haulage roads, listed as 15ha in Table F1 of the EA. Shape files prepared by TMS for this PRC plan has determined 15.2 ha as the actual area. This includes new haulage roads to be constructed outside the proposed stock fence around the Lanes Void and Ironbark North Void.

Further to the above, it is to be noted that the proposed area of disturbance of 11.6 ha, identified in Table F1 of the EA for topsoil stripped ahead of mining was never actualised. It is understood that it was a value that was required to indicate the future area where mining would progress into. So there is no actual area that can be correlated with the domains shown in **Figure 2**. Therefore, the 11.6ha of land listed in Table F1 of the EA to be rehabilitated to a post mining land use (PMLU) of light grazing cannot be shown.

When considering the complete circuit of the haulage road and the topsoil stripped ahead of mining, 26.6ha is to be removed from the total disturbance area listed within Table F1 of the EA for light grazing.

The Tailings Pond area of 31.7 ha listed within Table F1 of the EA correlates with – Tailings Pond as shown within **Figure 2** and Error! Reference source not found..

When considering the area of 45.9ha for the active pit (final void) listed within Table F1 of the EA, the Ironbark North Void and Lanes Void equates to a slightly greater area of 46.1ha.

No correlation can be made between the previous PoOP and Table F1 of the EA where 8.4 ha is to be allocated to dams and ponds for water storage and fauna habitat. The small water storage ponds that are to remain for water storage and fauna habitat shown as light blue polygons within **Appendix 5 - Plan 39**, prepared by TMS equates to a combined total area of 3.7 ha.

The spoil area of 42 ha listed within Table F1 does not correlate with the Out of Pit Dump area shown to be 41.6 ha in **Figure 2**. However, the area defined by TMS for the spatial files to accompany this PRC plan equates to 56.5 ha.

It is also to be noted that an explosives storage facility operated by Maxam Australia Pty Ltd. The landowner wishes to retain the building infrastructure associated with this area. Shape files prepared

for this area by TMS indicates 3.7 ha to be retained. The following image indicates the location of the Maxam facility, circled in yellow.



IMAGE 27: LOCATION OF THE MAXAM FACILITY

The majority of the difference of 42.3 ha between the total area associated with **Figure 2** and Table F1 of the EA could be related to the Lanes Eastern Emplacement (52.7 ha, **Figure 2**; now determined to be 76.6 ha **Figure 3**) and the Out of Pit Dump area, now determined to be 56.5 ha. The combined increase in area for the respective areas is 38.4 ha, leaving a remaining difference of 3.9 ha. However considering that IPBSD has increased from the area of 26.8 ha as shown in **Figure 2**, compared to the recent determination made by TMS, equating to 35.9 ha, no reason can be provided for the discrepancy. However, these differences are inconsequential when considering the new areas identified by TMS for this PRC plan.

Lanes Eastern Emplacement is considered to be rehabilitated except for some minor reshaping and topsoiling required in three areas totalling (approximately 1.19 ha) due to minor amounts of scouring.

After review, the disturbance areas shown in the above table do not reflect actual disturbance on the ground as determined during the preparation of the shape files by TMS for this PRC plan.

Nevertheless, PMLU classification for respective rehabilitation areas is provided within **Table 19: Rehabilitation Areas & Post Mining Land Uses**.

2.7 Non-Use Management Areas

Improvement Area 1 (IA1) is proposed as a non-use management area (NUMA). In particular, the area includes the slopes of the Lanes Pit and Ironbark Pit Voids.

2.8 Rehabilitation Management Methodology

This section will include information describing how the proposed rehabilitation and management methodology have been developed and will be implemented.

2.8.1 Landform Design

It is to be noted that the final landform will essentially remain as proposed within the former PoOP.

2.8.2 Overview

Appendix 5 - Plan 10 indicates current surface contours. Further contour plans contained within **Appendix 5** are related to specific areas that are mentioned in the following sections.

The surface area of ML 4712 comprises predominantly infertile saline solodic soils. The mine spoil contains dispersive saline sodic material, which has made successful rehabilitation difficult in some areas. The mine spoil exhibits dispersion, sink holes, channel erosion and piping. Successful rehabilitation has been achieved where mine spoil has been effectively covered with topsoil/compost, facilitating good vegetation cover and where stormwater runoff concentration and velocity has been controlled.

As part of the recent DA application, Douglas Partners (2020) performed soil sampling at 21 locations within the ML (refer to **Appendix 5 - Plan 34**) to determine the dispersiveness of the soil. Eight samples were submitted to ALS for laboratory testing of exchangeable cations in alkaline soil and exchangeable cations. Sample depth ranged between 0.2 - 0.5 m. The following table is reproduced from Douglas Partners (2020, p.7).

Bore	Depth (m)	Material	Emerson Class No.	pH	EC (µS/cm)	CEC (meq/100)	ESP (%)	Ca:Mg Ratio
2	0.5	Sandy Clay	1	8.8	449	12.7	20.6	1.0
4	0.5	Fill Sandy Silt	2	6.9	806	28.8	8.3	2.1
5	0.5	Fill Silty Clay	2	9.0	643	11.8	46.2	0.4
10	0.5	Fill Sandy Gravelly Clay	2	9.3	892	7.9	41.2	0.2
11	0.5	Topsoil Sandy Silt	2	8.6	1430	13.8	14.6	0.3
14	0.2	Fill Silty Sand	2	9.0	551	9.4	39.5	0.8
15	0.5	Clayey Sand	3	7.8	32	3.4	<0.2	0.6
19	0.5	Sandy Clay	1	6.9	539	20.0	13.5	0.5
Note:		Non-sodic and/or low potential for erosion	Marginally sodic to sodic and/or medium potential for erosion and dispersion		Strongly sodic and/or high potential for erosion and dispersion		Very high potential for erosion and dispersion	

TABLE 21: SUMMARY OF SODIC SOIL LABORATORY TEST RESULTS (DOUGLAS PARTNERS, 2020)

As can be seen, the ESP % indicates that soils are strongly sodic at shallow depths and the Emerson class value indicates a very high potential for erosion. Douglas Partners (2020) stated that low calcium to magnesium ratios are often associated with highly dispersive soils, although it was stated that a review of Best Practice Erosion and Sediment Control by International Erosion Control Association (IECA 2008) found that soils with an electrical conductivity (EC) greater than 0.5 mS/cm (500 µS/cm) are considered saline and may have a reduced risk of dispersion.

Areas within the IBSD area and Out of Pit Dump area contain overburden with the above characteristics. Compost blended with topsoil will be utilised to cover such material. A calcium source such as gypsum or calcium silicate will be blended with the compost to assist in increasing calcium to exchangeable magnesium ratios within on-site soil utilised in rehabilitation.

The following section provides details for each specific historical areas with regard to landform design.

No further rehabilitation is proposed for the ROM pad. The landowner is currently utilising this area for the storage of plant and equipment.

The Tailings Pond initially consisted of two mined voids separated by the original ground surface that still exists principally today. At some stage during the 1990s the voids became hydraulically connected when the earthen wall was lowered in the south east section. This was done to optimise the quality of the water being returned to the wash plant. Originally, mined coal was transported to Swanbank, a suburb of Ipswich, for washing, before the wash plant was installed. Fine tailings comprised of coal stone and clay were pumped into the two voids from the wash plant and the coarse reject was emplaced in the Ironbark South Dump Area.

The Tailings Pond has been developed as a water storage and fauna habitat in compliance with the EA. Surface water is directed via the environment dam or directly into the Tailings Pond. As previously noted, the tailings are stored below the natural ground level so there is no “dam wall” that can fail. Water is discharged from the Tailings Pond via an engineered spillway designed for a 1 % AEP. A description of the water quality of the Tailings Pond, sampled at the surface and at depth is provided within **Appendix 7 Void Water Quality**.

Sonar scan images were produced by Hydrobiology Pty Ltd in July 2020 which shows the depth of sediment/tailings within the Tailings Pond (refer to **Appendix 5 - Plan 13**). The data was also utilised to predict the volume of water contained with the Tailings Pond at the time (refer to **Appendix 5 - Plan 14**). No change to the current landform is proposed other than, the construction of safety bunds (refer to **Figure 7**).

No change to the current landform Ironbark Pit Void is proposed. Whilst bunding exists restricting vehicle access to the high wall, along the existing haulage road, further controls are detailed in **Section** Error! Reference source not found..

When considering condition F4 (Residual void outcome) of the EA, the condition requires that residual voids must not cause any serious environmental harm to land, surface waters or any recognised groundwater aquifer other than environmental harm caused by the existence of the residual void per se, and subject to any other condition of this authority.

No environmental harm is being caused to land or receiving surface waters outside the voids. The water contained in the voids is different to the groundwater present within the groundwater network monitored by Taft Engineering (refer to **section 2.3.13**). The groundwater contains more dissolved

salts than the water contained within the voids. Based on the above, it is considered that the voids do not require modification.

However, condition F4 of the EA also refers to Table F9 (residual void design) whereby dependent upon whether rock is competent or not, the rock slope percentage is required to achieve 70% or 45% respectively.

It is to be noted that Cartledge Mining and Geotechnics Pty Ltd was engaged to assess the stability of the high-wall of Lanes Void. As the depth of the Ironbark North Void high-wall is comparable to the area within the Lanes Void assessed (critical cross section 1 within the CMG report), it is considered that the assessment undertaken for Lanes Void can be applied to the Ironbark Pit Void. For further information regarding the CMG report, readers are directed to **Section** Error! Reference source not found..

During a site compliance inspection, officers of the Administering Authority were concerned about the erosion that is occurring and stated the low-wall would need to be stabilised. Within the notice – Information request for an application for an ERC decision 16 November 2021 issued by the DES, it was requested that's costs for assessment or rehabilitation of the low-wall to make it safe and to ensure stability be included within the ERC.

Whilst it is apparent that the low-wall is eroding and images obtained from Qld Globe provide a before and after view of a failure in the low-wall that occurred sometime before 6 July 2007 (refer to **Appendix 2 - Image 24** with **Appendix 2 - Image 22** and **Appendix 2 - Image 23** showing the state of the low -wall prior to the failure in 2007) (QLD Government, 2022a). There is no intention to stabilise the batter slope by reducing the angle of repose.

Zedemar engaged TMS to prepare a cut and fill plan to create a landform that would be considered stable, which would include creating a slope of 1: 4 (V:H) (refer to **Appendix 5 - Plan 32** and **Appendix 5 - Plan 33**). The cost to reduce the low-wall's angle of repose so that it is stable is prohibitive. The cost to remove 5 million m³ of emplaced overburden at approximately \$2.80 / m³, is in excess of \$10,000,000.00 and exceeds the value of the freehold land in entirety. Secondly, there would not be enough topsoil available to stabilise the remaining large, sloped surface.

It is considered that the low-wall can remain in its current state because by doing so, it would not affect the ability of both the Lanes Void and Ironbark North Void to contain water in accordance with the post mining land use description within Table 1 of the EA (refer to **Table 20**).

The risk assessment contained within **Appendix 10** identifies that there is a possibility that the low-wall will fail again until the slope establishes an appropriate angle of repose. Even if failures that are comparable to the 2007 event occur, no environmental harm is envisaged because of the amount of earthen material required to completely fill the voids so that no water ponds according to estimations prepared by TMS is in the order of 12 million m³ (refer to **Appendix 5 - Plan 32: Cut and Fill Plan for Low-Wall**).

It is to be noted that the majority of erosion to the low-wall occurred prior to the compost pad perimeter bund being constructed (refer to **Figure 7**). Further, the perimeter bund wall was not in place in 2007 when the failure occurred. Best practice would dictate that a diversion bund would be constructed to divert water away from the crest of the low-wall to minimise the volume of water flowing down the slope.

Recent rainfall contributed to the failure at the crest of low-wall in December 2021. It is possible that ponded water behind the bund wall was also a contributing factor and thus increasing the hydrostatic pressure. Ensuring that no water ponds or pools in front of the bund wall is essential to minimise seepage and thus increasing the weight of emplaced soil that is displaying a steep angle of repose at the upper level of the low-wall. However, it remains a possibility that failure will occur until an appropriate angle of repose is established.

It is to be noted that Cartledge Mining and Geotechnics Pty Ltd was engaged to assess the stability of the low-wall of Lanes Void. As the height of the Ironbark North Void low-wall reduces as it progresses north, it is considered that the assessment undertaken for Lanes Void low-wall can be applied to the Ironbark North Void. For further information regarding the CMG report, readers are directed to **Section** Error! Reference source not found..

A description of the Ironbark North Void's water quality, sampled at the surface and at depth is provided within **Appendix 7 Void Water Quality**

The area known as Lanes Eastern Emplacement has been grazed since completion. The grass coverage on this area meets the acceptance criteria (refer to **Appendix 2 - Image 28** showing grass cover on top

of compost pad surface on 06.02.2022). No further work is planned expect for at three locations where some channel and sheet erosion has occurred (refer to **Appendix 2 - Image 10**). There has also been natural regrowth of native trees since completion of the rehabilitation.

The area on top of the emplacement is being utilised for the composting of greenwaste blended with paunch, manure and digested abattoir pond sludge . Compost will be utilised in other areas of the site for rehabilitation.

The bund wall located on the western side of the compost will be offset further from the crest of the low-wall due to slippage that occurred early in December 2021. The length of the realignment proposed is 270 m. The location is shown below. **Appendix 2 - Image 12** shows the approximate realignment of the western bund. A 235 m bench will be constructed to stabilise the recent failure. **Appendix 2 - Image 13** shows the slip from the top section of the low-wall batter.



IMAGE 28: LOCATION OF SLIPPAGE ON WESTERN EDGE OF COMPOST PAD

Once composting has ceased, a drain is proposed to be created to convey accumulated surface water from the south west corner of the compost pad to the eastern side. The purpose is to minimise the ponding of water for the long-term.



IMAGE 29: PROPOSED DRAIN ON COMPOSTING PAD

Once composting has ceased, remaining compost will be spread across any remaining bare surfaces of the compost pad. The eastern compost bund wall around the area will be opened at two locations to allow stormwater to drain. Stormwater will be directed towards the Lanes Eastern Emplacement from the western side and as such, the drain will remain. The western and southern bund walls will remain to prevent stormwater movement down respective batter slopes leading down to the two voids and the IBSD area.

No change to the current landform is proposed for Lanes Pit Void. It is to be noted that CMG was engaged to assess the stability of the high-wall of Lanes Void. Slope stability analyses were undertaken on five cross sections of the high-wall, using Slide 2 v9.016 for the existing geometry.

CMG reported that the high-wall of Lanes Void does achieve the required factor of safety (FOS) of 1.5 for the majority of the high-wall (Cartledge Mining and Geotechnics, 2022). CMG advised that the cuckoo search and the block search methods were used, with sliding along the weak bentonitic clays determined as the critical failure mechanism. The Sarma Non-Vertical Slices method was used to calculate the FOS.

Out of five critical cross sections of the high-wall assessed, Table 4 (reproduced below) of the CMG report indicates that the southern end-wall of the Lanes Void does not achieve a FOS of 1.5 and the lowest value determined was 1.179. To put the returned value into context, CMG indicated that an

FOS of 1.1 is approximately equivalent to a 30 % likelihood of slope failure and that a FOS value of ≥ 1.5 is approximately equivalent to a <5% likelihood of failure. However, CMG stated that whilst the southern end-wall did not achieve the recommended minimum FOS of 1.5, as it is an end-wall, it is restrained by the three-dimensional (3D) confinement of the high-wall and the low-wall.

Table 4: Critical Cross-Section Summary of Calculated FOS

Cross-Section	Search Method	Recommended Minimum (FOS) ⁽¹⁾	Existing Surface (FOS)					
			Drained			Undrained		
			$\phi'=8^\circ$	$\phi'=12^\circ$	$\phi'=20^\circ$	50 kPa	100 kPa	400 kPa
1	Cuckoo	1.5	1.630	1.691	1.789	1.524	1.736	2.166
	Block	1.5	1.767	1.816	1.923	1.764	1.892	2.439
2	Cuckoo	1.5	2.183	2.376	2.748	2.405	2.968	5.807
	Block	1.5	2.303	2.450	2.834	2.505	3.089	5.995
3	Cuckoo	1.5	1.613	1.754	1.992	1.582	1.787	2.466
	Block	1.5	1.752	1.881	2.109	1.676	1.899	2.600
4	Cuckoo	1.5	1.629	1.762	2.003	1.615	1.924	2.623
	Block	1.5	1.677	1.803	2.049	1.701	1.962	2.931
5	Cuckoo	1.5	1.216	1.322	1.322	1.179	1.305	1.322
	Block	1.5	1.313	1.384	1.481	1.329	1.301	1.550

Note:

- 1 Minimum FOS of 1.5 is generally accepted as appropriate for long-term stability for non-active production areas within Queensland's open-cut coal mines.

TABLE 22: CRITICAL CROSS-SECTION SUMMARY OF CALCULATED FOS-LANES VOID (SOURCE CMG 2022)

The geological model was initially based on the original void floor level of the Lanes void provided by topographical data, supplied by TMS. Subsequently, TMS prepared a combined topographical and sonar scan plan which indicates the ground surface contours above and below water within Ironbark North Void and Lanes Void (refer to **Appendix 5 - Plan 35**).

CMG reconfigured the geological model to reflect current conditions. It is to be noted that Lanes Void does not contain as much water due to the amount of sediment that has entered the void.

Further to the above, TMS prepared a plan showing the location of the crest of a 45% slope and a 70% slope would be located. Considering, the likely erosion that will occur at such slope percentages, TMS also indicated where a 1:4 (V:H) would be located (refer to **Appendix 5 - Plan 37**). There are some aspects that need to be considered that suggests that no net benefit will occur from the reshaping of the high-wall. They are:

- Existing vegetation including trees will be removed in achieving either of the percentage slopes mentioned above. There will be impact to *Melaleuca Irbyana* which is classified as endangered is located to the west of the Lanes Void high-wall and will need to be removed.
- Coal will be removed in all instances of reshaping. Coal is not authorised to be removed. Only bentonite and shale are approved for mining (refer to **Section 2.3.2**).
- The removal of material, at either one of the slopes mentioned above will not result in the voids being completely backfilled. **Appendix 5 - Plan 37** indicates that 4.72 million m³ would be removed to achieve a slope of 45% and 2.32 million m³ would be removed to create a batter slope of 70%. Even with the reshaping of the low-wall, there still would be approximately 12.5 million m³ of air space remaining when the high-wall is reshaped to a slope of 25%.
- The cost to reshape the high-wall would be significant. Due to the voids containing significant volumes of sediment, reshaping the high-walls from the toe of the existing batter would be a time-consuming process if it could be achieved at all. Firstly, the voids would require dewatering under a discharge management plan. Secondly, sediment that has deposited into the void since the completion of mining would need to be removed to access the toe of the high-wall for reshaping to occur at the nominated angle of repose. The cost would be significant and there is a risk that removing sediment could result in the failure of the low-wall. The time to achieve the above would over-run the expiry date for ML4712.
- There is not enough topsoil available to completely cover the increased area of exposed slopes.
- Different layers of the lithology will erode at different rates when the surface area is increased to weathering.

As mentioned earlier, a slope stability assessment of the low-wall was undertaken by Cartledge Mining and Geotechnics Pty Ltd (CMG) which is attached with this response. The critical cross sections of the low-wall were assessed using two-dimensional (2D) limit equilibrium software to determine whether the slopes achieve a recommended FOS of 1.5, considered appropriate for the long-term. CMG indicated that the slope has a FOS of between ~1.6 and ~2.1. CMG indicated that a global failure within Lane's Pit low-wall is unlikely and that smaller scale, surficial sloughing failures could occur following extreme wet weather. CMG indicated that the set-back distance of the safety bund and stock fence from the crest of the low-wall was appropriate to lessen the likelihood of impact to animal or human (Cartledge Mining and Geotechnics Pty Ltd, 2022).

A description of the Lanes Void's water quality, sampled at the surface and at depth is provided within **Appendix 7 Void Water Quality**.

A combination of coarse reject coal stone generated at the wash plant and overburden was emplaced in the former Ironbark South Dump Area. The strategy was for the co-disposal of the reject material and overburden. However, observation shows that some areas within the IBSD area is primarily comprised of coal stone when mining commenced in the eastern side of ML50100.

Similarly, erosion is present within the IBSD area, however in part it was caused because mining did not recommence and as such, the final landform for the IBSD area was not completed because there was no more overburden available to complete the anticipated landform. That is currently still the case.

Since the cessation of mining , vegetation has re-established. **Images 12 -16** contained within **Appendix 2 Images** demonstrate the extent to which vegetation has re-established. The images also show erosion in various areas throughout the IBSD area, primarily associated with stormwater flow.

The southern batter slope of the compost pad, leading down into the IBSD (refer to **Appendix 2 - Image 14**) had experienced significant erosion due to uncontrolled stormwater flows in the past. This was abated when the perimeter bund wall was constructed around the compost pad. Vegetation has established between the bund and the crest of the southern batter.

Significant erosion has occurred along drainage paths. In some drainage pathways, cracks in the emplaced overburden are creeping up-slope. The stabilisation of drainage paths will result in less sediment transport, (particularly fine colloidal clay particles).

The majority of batter slopes in the IBSD are comprised of coal stone/gravelly material, and some deep erosion channels have been created. By redirecting stormwater flow away from existing batter slopes in conjunction with creating drainage paths that slow the velocity of water, erosion can be controlled. Runoff from the IBSD is either collected in sediment basins and by the Southern Drain which reports to sediment basins before water releases through a rock check dam containing geofabric.

The strategy for the rehabilitation of the IBSD area is to work with the existing landform as presented in **Appendix 5 - Plan 26** whilst attending to:

- reshaping areas to direct stormwater flow to designated drainage paths;

- grading surfaces to reduce the velocity of stormwater flow such that minimal sediment is transported to the designated drainage channels, including fine colloidal clay particles;
- reshaping designated drainage channels to convey stormwater;
- spreading topsoil, fertiliser and grass seed in drainage channels to establish grass to reduce scouring;
- spreading topsoil, fertiliser and grass seed over certain areas where grass has not established adequately to minimise colloidal clay re-entrainment;
- the installation of surge basins and rock check dams along flow paths to slow the velocity of water and thus reduce the potential for scouring and channel erosion development.

Appendix 5 - Plan 26 provides LiDAR contours obtained in 2014 of the IBSD area. This plan is still considered contemporary by TMS.

Appendix 2 - Image 19 shows areas where deep ripping of the existing surface is to occur before topsoil is placed to provide a growing medium for grass to establish. Grass seed will be spread with fertiliser over prepared topsoil. From current observations of vegetation growth within areas of the IBSD, seeding from established grass and trees will likely provide further natural seed for germination once appropriate topsoil is applied to ripped bare surfaces.

Appendix 2 - Image 20 shows the areas where drainage paths require rehabilitation. Deep erosion channels will be reshaped and stabilised. Topsoil will be placed over reshaped areas and fertiliser and grass seed will be spread. **Image 20** also shows where surge basins and check dams will be placed along flow paths to slow the velocity of stormwater.

Appendix 2 - Image 21 shows where existing sedimentation basins are located within the IBSD area which are to remain as water storage and fauna habitat.

Overburden from the original boxcut was transported to the OPD. Spoil from subsequent mining was used to backfill the boxcut. No coal stone was emplaced within the OPD because coal was originally transported for washing to the Box Flat wash plant located in Swanbank, a suburb in Ipswich. Historical rehabilitation of the OPD has failed in some areas with areas of significant erosion occurring on the batter slope and on the top surface. The original approved design of the OPD was to retain water on top of the OPD to aid rehabilitation and build dams to contain water for stock and wildlife. In some areas sink holes have developed on the OPD top surface and pipe erosion has subsequently

developed in some areas. Significant earthworks are required in these areas, including the cut of ~ 30,250 m³ and fill of ~ 29,190 m³. The affected 11.4 ha area requires deep ripping and regrading which represents 20 % of OPD. Some established trees will need to be removed due to their location. The objective of the earthworks is to convey surface water generated during rainfall events from the OPD top surface down to the natural contours that exist below the toe of the OPD batter slope.

Similar to the above, significant erosion (i.e. channelling, piping and sheet erosion) has occurred in previously rehabilitated areas on the OPD batter slope. It is to be noted that approximately 6 ha of the batter slope has been re-contoured and deep ripped. Erosion to contour drains were repaired, with compost manufactured onsite being spread over the surface of the 6-ha area. The area is currently under care and maintenance, which includes regular slashing and application of herbicide to control weeds.

Appendix 2 - Image 6 shows the extent of sheet and channel erosion on the OPD north east batter slope. The image also shows the difference in vegetation cover existing within the recently repaired 6 ha area of the OPD northern batter slope compared to the area requiring repair. A further image (refer to **Appendix 2 - Image 7**) is provided showing a different perspective of the transition between the repaired 6 ha area and the area of the OPD batter slope requiring repair. **Appendix 2 - Image 7** provides an image of the repaired 6 ha area. **Appendix 2 - Image 9** is a set of four images obtained on 21.12.21 showing the rehabilitated OPD northern batter slope. The fourth image is of cattle that are grazing within the area and thus achieving the final land use outcome.

The following plans prepared by TMS are provided in **Appendix 5** that show the proposed works required to rectify the failed rehabilitation:

- **Appendix 5 - Plan 17: The OPD** - Shows the OPD within the ML boundary.
- **Appendix 5 - Plan 18: Proposed Earthworks Location at OPD Top Surface**- Shows the proposed earthworks. Eleven (11) areas have been identified and which equate to 11.4 ha.
- **Appendix 5 - Plan 19: Proposed Drainage Channel and Drop Structure Channels at OPD Top Surface**- Shows the proposed drainage channel and drop structure channels to convey stormwater from the top surface to drainage channels.
- **Appendix 5 - Plan 20: Proposed Cut and Fill at OPD Top Surface**- Shows the proposed cut and fill in area 1 and proposed excavation of proposed drop structures.

- **Appendix 5 - Plan 21: Sink Hole Location at OPD Top Surface-** Shows surveyed sink holes that require backfilling. Backfilled holes will be topsoiled, with fertiliser and grass seed being spread.
- **Appendix 5 - Plan 22: Proposed Drainage Design Plan at OPD Top Surface-** Shows the overall drainage design to convey stormwater from the OPD top surface and the OPD batter slope.
- **Appendix 5 - Plan 23: Erosion Remediation Plan at OPD Top Surface-** Shows drainage erosion and sheet erosion areas requiring repair.
- **Appendix 5 - Plan 24: Stormwater Catchment Plan at OPD Top Surface-** Shows the four catchment areas on the OPD top surface.

Detail regarding the proposed rehabilitation plans have been prepared by TMS and are provided in **Appendix 6**.

When considering the 8.16 ha of the OPD north east batter slope (refer to **Appendix 5 - Plan 25**) that requires repair, it is proposed that contour drains will be repaired, and two drop structures as shown in **Appendix 5 - Plan 22** will be constructed. Areas where sheet erosion has occurred will be deep ripped and topsoil blended with compost will be spread. Fertiliser and grass seed will be spread. The area requiring topsoil and compost to be spread is approximately 4 ha.

Appropriate topsoil cover with the establishment of vegetation is the key for protection of the emplaced mine spoil.

The landowner has expressed that some areas of the hardstand pads, sheds and buildings are to remain.

The landowner has expressed that land, sheds and buildings related to the Maxam activity are to remain.

The landowner has expressed that all haulage roads are to remain. An extra haulage path will be constructed outside the stock fence that will allow access around the Ironbark Pit Void and Lanes Pit Void to the western areas of the site. The current haulage path located within RA4 will connect to RA6 through the proposed earthworks for RA4.

The bunding surrounding the wet weather storage area will be spread across the hardstand area once it has been ripped. Topsoil will be spread across the surface and grass seed will be spread. Fertiliser will be used if necessary.

Stormwater generated on the bentonite storage pads has deposited bentonite clay on the ground surface in and amongst the trees surrounding the area. There are no proposed changes to the landform other than the spreading of compost and topsoil to facilitate the spread of existing grass. Grass seed would be spread also as required.

The overburden spoil heap is relatively small. The majority of the area is vegetated. There are no proposed changes to the landform other than the spreading of compost and topsoil to facilitate the spreading of existing grass. Seed rain from surrounding trees are also likely to strike in topsoil that is spread.

The topsoil stockpiled in this area will be removed and used in rehabilitation in other areas. 200 mm of topsoil will remain. Fertiliser and grass seed will be spread to establish grass.

The balance of the land within ML4712 that has not been disturbed by mining will continue to be allocated for cattle grazing.

2.8.3 Cover Design

In all instances where topsoil is applied, the depth of coverage will be 200 mm thick.

2.8.4 Material Availability

There is approximately 11,000 m³ of composted paunch and approximately 24,000 m³ of stockpiled topsoil available. It is estimated that the amount of topsoil required for the repair of the OPD top surface, the OPD batter slope and the bare surface areas of the IBSD equates to approximately 40,200 m³. It is the intention to blend the compost and existing topsoil to add organic material and available nutrients to the stockpiled topsoil. This will result in approximately 35,000 m³ of topsoil. As part of the earthworks within the OPD, any existing topsoil will be stripped back and stockpiled for reuse. Observation indicates that minimal topsoil is likely to be recovered.

It is estimated that 754 m³ of topsoil will be required to cover the safety bunds surrounding the Tailings Pond and at a thickness of 0.2 m. The length of the safety bund is 754 m with a base width of 5 m, a top width of 1 m and a height of 2.5 m.

It is estimated that 3,530 m³ of topsoil will be required to cover the safety bunds surrounding the respective voids and at a thickness of 0.2 m. The length of the safety bund is 3,530 m with a base width of 5 m, a top width of 1 m and a height of 2.5 m.

To make up the shortfall of topsoil (of ~11,000 m³), Zedemar is recommencing onsite composting of abattoir pond sludge, manure and paunch. These feedstocks will be blended with greenwaste prior to being placed onto the composting pad located within the Lanes Eastern Emplacement.

Approximately 3,500 m³ of compost will be blended with onsite overburden, coal stone and mudstone to create a conditioned topsoil. Gypsum or calcium silicate will be utilised to correct calcium imbalances due to the dominance of sodium. Alternatively clean site soil may be received. Reuse of water treatment residuals under end of waste code (ENEW07503318) may also be a suitable base to create a medium to high organic soil by blending with onsite compost.

Any excess compost created will be spread over areas under maintenance.

2.8.5 Revegetation

Topsoiled areas will be seeded with a mixture of pasture grass types such as Gatton panic (*Megathyrsus maximus*), creeping bluegrass (*Bothriochloa insculpta*), Rhodes grass (*Chloris gayana*), legumes such as butterfly pea (*Clitoria ternatea*) and Siratro (*Macroptilium atropurpureum*). Application rates for fertiliser and grass seed will be 50 kg/ha and 2-3 kg / ha respectively.

2.8.6 Drainage and Surface Water Management

Water Management occurs in accordance with the information provided within the Water Management Plan for Mining Lease ML4712, Version 1.0, 25 November 2022, prepared for Zedemar Holdings Pty Ltd by Zambelli Environmental.

There is no proposed modification to drainage paths or surface water management other than that which has been described to occur within particular areas. Diversion drains and bunds were constructed prior to the recent purchase of Zedemar and are still in place.

Since the recent purchase of the site, the southern drain located within the IBSD has been reshaped, topsoiled, grass has established, and the drainage path is considered stable.

Topsoil has been spread across bare ground surface areas within the drainage path leading to surface water sampling location EW35 (refer to **Appendix 5 - Plan 15** for location). Rock check dams have also

been placed across the drainage path to slow the velocity of water. The aim is to slow and disperse water to aid infiltration and minimise sediment movement. Actions have been effective as reflected in water sampling results.

In late 2022 extra drainage channels were installed to minimise erosion via dissipating the velocity and volume of stormwater flowing down the haulage road leading to and from the compost area (refer to **Appendix 2 - Image 29**). The extra drainage channels direct stormwater into the north-eastern area of the Lanes Eastern Emplacement. Actions have been effective.

2.8.6.1 Impacts on Downstream Water Quality

The rehabilitation as proposed will ensure that the water quality of Ebenezer Creek is unlikely be affected. It is to be noted that coal was mined within the original alignment of Ebenezer Creek within ML4712 and ML50100. The original alignment was never fully re-established, and the former O'Connor mine void was transformed into the Ti Tree waste disposal facility. To observe the above disturbance **Appendix 2 - Image 1**, **Appendix 2 - Image 3** and **Appendix 2 - Image 4** are provided.

2.8.6.2 Receiving Environment Monitoring Program (REMP)

A receiving environment monitoring program has been in place since 1986. Since 2006 water monitoring includes performing quarterly routine monitoring. Routine sampling is currently conducted at 6 sites if water is present: EW01, EW31, EW07. EW3 representing Ebenezer Creek, EW25 Environmental dam and EW33 Spillway Tailings storage (refer to **Appendix 5 - Plan 15**). In accordance with condition C2, surface water monitoring also occurs when runoff events occur.

Appendix 3 - Table 1 contains historical data for routine and runoff monitoring. Descriptive statistics are also provided.

It is to be noted that since 2010, the electrical conductivity at monitoring location EW07 along Ebenezer Creek has often been quite high. There has been an obvious upward trend in measured values since that time. During most seasons, Ebenezer Creek becomes a disconnected set of ponds and some of the high values obtained from EW7 can be explained via this. However, it is to be noted that the neighbouring waste disposal facility has a release limit of 6,000 uS/cm. Their discharge location is upstream of monitoring location EW07.

The release limits for Ebenezer were amended in 2019, whereby the electrical conductivity release limit from the Tailings Dam (monitoring location EW 33) was set at 2,350 uS/cm. Historical data shows

that when there is a release from the Tailings Dam, electrical conductivity values are less than the prescribed limit (refer to **Appendix 3 - Table 2**). Similarly, as the electrical conductivity reduces as the Tailings Pond receives stormwater runoff inflows, pH falls below the release limit of 9 pH units and suspended solids is less than the limit of 50 mg/l. This is understandable as the Tailings Dam provides a long settling path from entry to release.

2.8.6.3 Contaminant Sources, Pathways and Receptors

Former open cut coal mining activities are potentially a source of groundwater contamination, especially if they are associated with acid mine drainage which mobilises heavy metals. However, as the water on ML4712 contained within the voids, groundwater encountered at this site and surface water is in the alkaline range, acid mine drainage or heavy metal contamination is of limited concern as often their toxicity is associated with their association with an acid or a hydrogen ion donor. Water contained on site does not portray high alkalinity however. **Appendix 7** contains water quality analysis of the Tailings Pond, Lanes Void and Ironbark North Void which includes analysis results for various heavy metals. Heavy metal concentrations are quite low.

Another potential source of surface and groundwater contamination could be the location where explosives are stored. Analytical results related to groundwater, or the water contained within the Tailings Pond do not indicate that the storage of explosives by Maxam is a source of contamination. As part of Maxam vacating the site an assessment for the contamination of land will be required to remove the site from the EMR.

As disturbed areas are rehabilitated, re-entrainment of soil during stormwater flow will be reduced. Similarly, stabilisation of drainage paths will also limit the movement of sediment to receiving waters.

Whilst considered a potential contaminant source, as stated previously water released from the Tailings Pond achieves release limits.

As demonstrated previously, Ebenezer Creek is considered a significantly modified system. The alignment was formed over soils which are sodic and saline. So through its realignment, Ebenezer Creek could be also considered as a source of contaminants, particularly when comparing historical pre-mine water quality.

As previously identified, the neighbouring waste disposal facility would be considered a potential contaminant source when considering the approved release limit contained within the EA for electrical conductivity of 6,000 $\mu\text{S}/\text{cm}$.

2.8.6.4 Release Contaminant Trigger Investigation Levels

Condition C2 of the EA requires:

C2	Release to waters Surface waters must monitored at the locations and frequency specified in Table C1 Surface water monitoring locations and depicted in Figure 1 Surface Water Monitoring Locations, for each quality characteristic stated in Table C2 Contaminant trigger levels.
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Table C1 Surface water monitoring locations

Monitoring point	Monitoring point location description	Latitude (decimal degree, GDA94)	Longitude (decimal degree, GDA94)	Monitoring frequency
EW1	Ebenezer Creek upstream site	-27.69449922138	152.64209822303	Once daily for 3 days then weekly during periods of flow
EW7	Ebenezer Creek downstream of ML4712	-27.67661942771	152.66139622144	
EW33	Tailings dam overflow	-27.67539600710	152.65754814620	Once daily during discharge for 3 days then once weekly during discharge
EW34	Culvert from spoil dump to Ebenezer Creek	-27.67889236819	152.65216537993	
EW35	Discharge from adjacent to out of pit dump	-27.68993812929	152.64132471882	

Table C2 Contaminant trigger levels

Quality characteristic	Units	Trigger level
pH	pH units	6.0 – 9.0
Electrical conductivity	$\mu\text{S}/\text{cm}$	2,350
Total suspended solids	mg/L	50

2.8.7 Tailings Pond

The Tailings Pond is located at the northern end of the ML and is comprised of two sections, known as Tailings Dam 1 (TD1) and Tailings Dam 2 (TD2), two previous mining voids.

The tailings from the previous mining and processing operations have been disposed into the Tailings Pond. The level of the tailings is below natural ground and thus there is no constructed “tailings dam wall” that could fail.

The tailings dam was originally designed as a no discharge structure. A diversion bank to stop uncontrolled water ingress had been constructed as part of the original design of the tailing's disposal void. Drainage channels did not discharge over the walls.

The risk was identified by the former DEHP that the water quality in the Tailings Pond would deteriorate and in the event of an eventual overtopping of the Tailings Pond, extremely saline water would be discharged.

As requested by the former DEHP to allow eventual relinquishment, the water management system developed for Ebenezer was amended to direct as much surface flow to the environmental dam and then to discharge this water to the northeast corner of the Tailings Pond. The aim was to maintain a water cover over the tailings and progressively discharge excess water from the Tailings Pond during major rainfall events via a constructed spillway on the southern side of the Tailings Pond to Ebenezer Creek during flow events (PoOP; 2016).

As part of the works a spillway for the Tailings Pond was designed and constructed to withstand the peak flow from a critical design storm as prescribed in Schedule C - Table C5 of the EA (PoOP; 2016).

The Tailings Pond has been developed as a fauna habitat in compliance with the EA.

The two dams are separated by natural ground at a height of RL 30m, approximately 3.3. m below the spillway. TD1 is 10 m deeper than TD2, which is at RL-10m. **Appendix 5 - Plan 1** shows the topography of the two tailings dams.

After depth measurements were obtained at four locations in 2019, TMS estimated that the approximate depth of water above emplaced coal fines to the spillway level (RL 33.3m) was approximately 9.15 m. At the deepest points within the two tailings dams, it was estimated that approximately 42.4 m of fines was located within TD1 and approximately 35.9 m was in TD2 (Taylor; 23/01/2019). The total volume of water above the fines was estimated to be 2.02 GL, leaving approximately 5.03 million cubic metres of coal fines in total.

The above total volume differs to that which is has been provided within prior ROWIT survey submissions. Data previously provided within the ROWIT survey is based upon the Ebenezer Mining Voids – Storage Volumes to Natural Surface Spreadsheet, prepared in 2014. The spreadsheet was used to estimate water volume by interpolating between measured water heights and corresponding

volumes. **Appendix 11** contains a screen shot of the abovementioned spread sheet. The spreadsheet indicates that the Tailings Pond has a total storage volume of 1.062 GL between RL 27.7m and RL 33m. Refer to **Appendix 11 Ebenezer Mining Voids – Storage Volumes to Natural Surface - Spreadsheet**. It is not understood why the spreadsheet associated with the Tailings Pond commences at RL 27.2m.

In July 2020, Hydrobiology Pty Ltd was engaged to perform a sonar sidescan survey of the walls and base of the Tailings Pond (refer to **Appendix 5 - Plan 13**), which resulted in depth contour plots being created (refer to **Appendix 5 - Plan 14**). From these depth plots, TMS estimated the volume contained within the Tailings Pond was 1.102 GL (refer to **Appendix 5 - Plan 11**). It is to be noted that the water height within the Tailings Pond at the time of the sonar scan was approximately 2 m below the spillway.

TMS was asked to review the plan prepared in 2019 and, the above-mentioned spreadsheet in light of the Hydrobiology depth plots. TMS confirmed that the bathymetric survey performed by Hydrobiology provides the best information and that to the spillway level, the volume of water contained above the fines is 1.645 GL. At this time, it was decided that future ROWIT surveys will include data based on the new known floor level of the Tailings Pond (refer to **Appendix 5 - Plan 38**).

The latest ROWIT survey submission contained the following as of 30 June 2022.

Storage Name	Dam Design Capacity (ML)	Remaining Freeboard Volume (ML)	Mine Affected Water (ML)
Tailings Pond	1645.00	28.00	1617 ML

TABLE 23: MINE AFFECTED WATER – TAILINGS POND AND INVENTORY AS OF 30 JUNE 2021

Southeast QLD experienced significant rainfall during the first half of year 2022. The following graph is reproduced comparing data recorded at the Amberley AMO (station 040004) to mean average rainfall determined between 1991 – 2020).

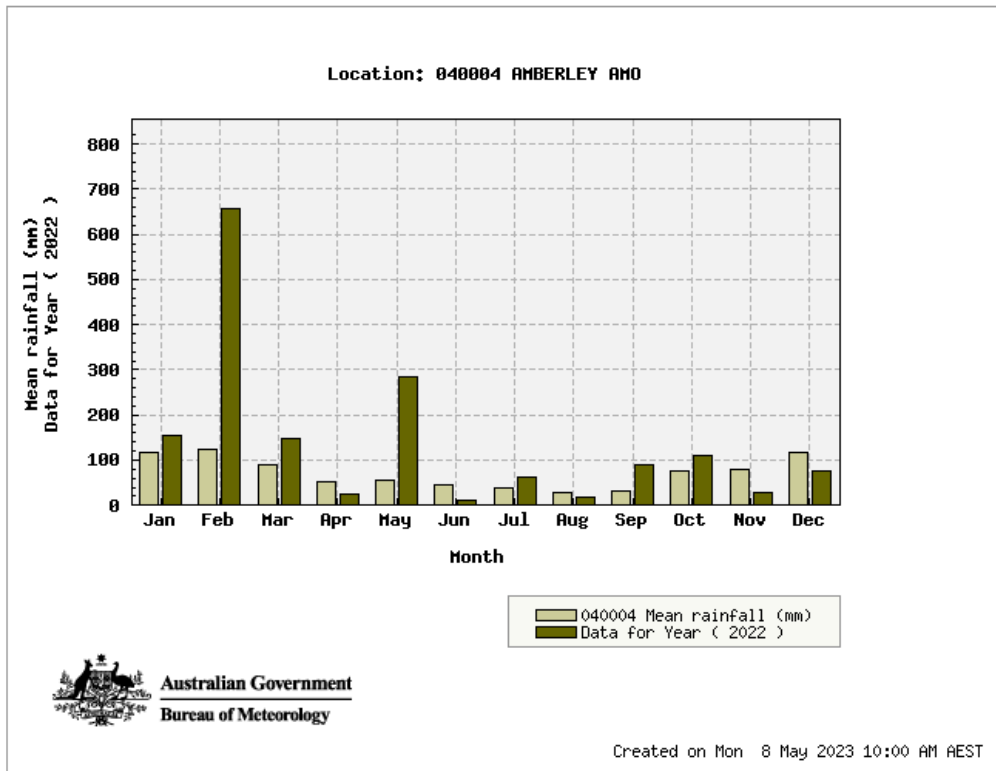


FIGURE 9: RAINFALL DURING 2022 COMPARED TO MEAN RAINFALL (1991-2020)

It is to be noted that between 19 February 2022 and 26 February 2022 the Amberley AMO (station 040004) recorded 315.4 mm of rainfall. The Tailings Pond started to release on 25 February 2022. The pH was recorded at 8.59 pH units. Electrical conductivity was measured at 1,220 $\mu\text{S}/\text{cm}$ and suspended solids was recorded at 9 mg/l. By 7 March 2022, the Tailings Pond was releasing water displaying a pH of 8.10 pH units, an electrical conductivity of 864 $\mu\text{S}/\text{cm}$ and a suspended solids value of 58 mg/l. Significant rainfall occurred between 27 February 2022 and 7 March 2022 with Amberley AMO (station 040004) recording 372.0 mm.

On 14 March 2022, the suspended solids value had decreased to 39 mg/l in compliance with release limits.

The Tailings Pond has been designed to act as the main environmental water storage facility on the lease and at the same time provide a source of water for reuse on site. Excess run off from upslope areas is diverted to the Tailings Pond. Readers are directed to **Appendix 5 - Plan 2: Catchment Flow Paths**, which indicates that there are two catchment areas within the Ebenezer Creek Catchment

which drain into the Tailings Pond, which when combined equate to a total of 249.31 ha. This area extends outside the boundary of ML4712 and also into other freehold property.

The last official survey of the water level was performed on 15 July 2022 where the water level of the Tailings Pond was at RL 33.19 m (refer to **Appendix 5 - Plan 4**).

Results of runoff water monitoring performed is contained in **Appendix 3**. Results show that the release from the Tailings Pond was compliant with release limits with the exception of suspended solids as mentioned above on 7 March 2022.

The Tailings Pond has been designed as a fauna habitat and will be retained for future land use.

The rehabilitation activity for the Tailings Pond includes the construction of a 5-strand fence with the top wire being plain and the remaining four being barbed wire. The length of the fence is 2.15 km.

2.8.8 Voids

Both the Lanes Void and Ironbark North Void are located within the western section of ML4712. It has always been proposed that final voids will be left as part of the final landform. The EMOS for the Ebenezer Mine, January 2004 states:

“Backfilling of final voids with rehandled overburden is uneconomic, would destroy previously stabilised landforms and, if required, will make the project non-viable. The mine planning schedule has attempted to ensure spoil from future operations is progressively placed in an adjacent void and unused ramps (if present). It is intended to leave final voids as part of the final landform.” (PoOP; 2016).

Given the location of the final voids, the opportunity to use the voids as water storage/management structures is a goal and has been investigated during the mining operation. With the potential use of the site for industrial uses, water storage for industrial uses is still possible.

The EA at Schedule F Table 1 - Final land use and rehabilitation approval schedule, requires the Active Pit (final void) to be used as a Water Storage / Fauna Habitat.

TMS provided **Appendix 5 - Plan 10** which provides mine levels of Lanes Void. At its deepest point, Lanes Void is approximately 55 m deep at the southern end whereby the floor of the void is RL-10 m. At its shallowest, the floor is at RL 10 m for a total depth of 45m from the crest of the highwall. On 1

July 2006 the water level within Lanes Void was at RL 12.21m and by 3 August 2020 the water level was at RL 21.43m. As of 3 August 2020, there was approximately 33.57 m of remaining height before Lanes Void would release. As of 15 July 2022, the water level in Lanes Void was 24.25 m, an increase of 2.82 m when compared to the level recorded on 3 August 2020.

Hydrobiology Pty Ltd performed a sonar sidescan of the Lanes Void (refer to **Appendix 5 - Plan 6**) and Ironbark North Void (refer to **Appendix 5 - Plan 8**) on 30 and 31 July 2020. Depth contours of Lanes Void (refer to **Appendix 5 - Plan 7**) and Ironbark North Void (refer to **Appendix 5 - Plan 9**) were also created which resulted in TMS estimating volumes within both voids (refer to **Appendix 5 - Plan 11**). The depth contours indicated that a significant amount of emplaced overburden had filled Lanes Void as a result of the historical western low-wall batter slope slippage and backfilling. When compared to the Ebenezer Mining Voids – Storage Volumes to Natural Surface Spreadsheet (refer to **Appendix 11**), it is estimate that in the order of 700,000 m³ of overburden entered the Lanes Void water body.

The depth contours provided by Hydrobiology for Ironbark North Void indicates that the floor of the void ranges between 4 – 9 m from the surface of the water. When referring to the above-mentioned spreadsheet, the floor of Ironbark North Void is approximately 4 m higher than the floor of Lanes Void at the shallowest point mentioned above. According to the storage volumes spreadsheet, at RL 23.3 m, the volume stored within Ironbark North Void should be approximately 304 ML with a depth of water of approximately 15 m. However, based on the contour depths generated July 2020, the estimated volume provided by TMS was 170 ML, indicating that approximately 130,000 m³ of overburden has entered the Ironbark North Void water body.

The above differs to what is reported to the yearly ROWIT survey, with the survey indicating more water is contained in the Lanes Void and the Ironbark North Void than what there actually is for a defined surface water RL. The ROWIT survey data is based on the original floor RL contours of the voids. The above-mentioned spreadsheet was used to estimate water volume by interpolating between measured water heights and corresponding volumes. **Appendix 11** contains a screen shot of the abovementioned spread sheet. Refer to **Appendix 11 Ebenezer Mining Voids – Storage Volumes to Natural Surface - Spreadsheet**. The latest ROWIT survey submission contained the following as of 30 June 2022.

Storage Name	Dam Design Capacity (ML)	Storage Remaining Freeboard Volume (ML)	Mine Affected Water
Tailings Pond	1645.0	28.0	1617.0
Lanes Void	5839.01	3683.20	2,155.81
Ironbark North Void	1214.11	776.20	437.91
Total	8698.12	4487.40	4210.72

TABLE 24: MINE AFFECTED WATER AND INVENTORY AS OF 30 JUNE 2021

The commitments in the approved EMOS indicated that high-walls will either be bunded or appropriately fenced to restrict vehicular and stock access (PoOP; 2016).

A diversion bund to stop uncontrolled water ingress has been constructed on the western, northern and southern sides of Lanes Void and the northern end of the Ironbark North Void. Vehicular and stock access is restricted by the bunds. Drainage channels do not discharge over the walls. **Appendix 5 - Plan 12** shows where small scale water flow paths and bunding is in place to prevent egress of stormwater into the voids.

The report prepared by CMG indicates that with the exception of the southern end-wall, the high-wall achieves a FOS of 1.5. The highwalls have remained stable since mining ceased in 1994.

The site has always had cattle grazing on site as well as various wildlife including Kangaroos and Koalas. No adverse risk to cattle or wildlife have been identified. A trip of goats is often seen scaling the high wall.

It is proposed to construct a safety bund and 5-strand stock fence, set back from the crest of the high-wall by 40 m to restrict animal and human access. This set back distance is based on the high-wall assessment performed by CMG and the extent of the failure plane predicted through the assessment. The length of the stock fence restricting access to the voids is 4.11 km. The following figure was prepared by TMS showing the location of the fence line.



FIGURE 10: LOCATION OF STOCK FENCE AROUND VOIDS

The fence will have signs attached advising – Danger Deep Excavation every 250 m along the fence as shown below.



FIGURE 11:EXAMPLE OF DEEP EXCAVATION SIGN

2.8.9 Underground Mining

Underground mining has not occurred within the ML. No further information will be provided.

2.8.10 Built Infrastructure

At the request of the landowner, all other built infrastructure is to remain including culverts in place where the haulage road crosses drainage paths, existing stock fences, any built infrastructure located which is to remain for use as storage areas.

Existing ponds located within the mine site are to remain for water storage for grazing cattle.

2.8.11 Plant and Equipment

All plant and equipment utilised in the processing of bentonite will be removed unless it can be repurposed. All plant and equipment utilised for the storage of explosives will be removed.

2.9 Risk Assessment

A risk assessment is provided within **Appendix 10** that identifies various risks and includes a risk treatment plan outlining how the applicant will manage or minimise the risk.

2.10 Rehabilitation Milestones

This section provides rehabilitation milestones for rehabilitation areas within ML4712.

Ten rehabilitation milestones are described within the PRC Plan Schedule (refer to **Part 2 – PRC PLAN Schedule**).

Milestone Reference	Rehabilitation Milestone
RM1	Infrastructure decommissioning and removal
RM2	Identification, remediation and removal of contaminated land
RM3	Landform development (reshaping/reprofiling)
RM4	Surface preparation (topdressing, contour ripping, soil amelioration)
RM5	Revegetation – PMLU Light Grazing
RM6	Achievement of surface requirements – PMLU Light Grazing
RM7	Achievement of postmining land use to a stable condition – PMLU Light Grazing
RM8	Achievement of postmining land use to a stable condition – PMLU Water Storage (Grazing)
RM9	Achievement of postmining land use water quality
RM10	Retained Infrastructure

TABLE 25: REHABILITATION MILESTONES

2.11 Milestone Criteria

The milestone criteria for respective applicable rehabilitation areas are contained in the following table.

Milestone Reference	Milestone Criteria	Applicable Rehabilitation Area
RM1	1.1 With the exception of any infrastructure to remain as part of the post-mining land use (PMLU) or where infrastructure is agreed to be retained by the landholder as evidenced by a signed landholder agreement, the following are complete: (a) All services disconnected and removed; (b) All buildings and associated infrastructure dismantled and removed offsite. (c) All hardstand, concrete areas, and roads (bitumen, blue metal, aggregate etc.) removed. (d) All fencing and associated foundations removed. (e) All pipelines drained and removed. (f) All waste not authorised to be disposed of on-site under Environmental Authority EPML00594013 removed. (g) All surface water drainage infrastructure that does have an associated watercourse or riparian ecosystem PMLU or forms part of a non-use management area (NUMA) is removed.	RA3, RA4, RA5, RA6, RA7

	(h) All drillholes, bores, sediment ponds and sumps decommissioned. (i) All machinery and equipment, not required for rehabilitation works removed from site. (j) All dams dewatered and desilted. (k) Watercourse crossings and culverts removed.	
RM2	2.1 Contaminated land investigations (investigation, remediation and validation) completed by an SQP in accordance with appropriate guidance, including but not limited to the National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM) and National Remediation Framework (NRF). 2.2 Contaminated water and sediment removed from dams, where required to achieve RM2.4. 2.3 Contaminated and hazardous material either remediated in-situ or removed/transported to facility lawfully able to accept the material. 2.4 Contaminated Land Auditor certifies that that no contamination unsuitable for the PMLU remains or is occurring.	RA2, RA 3, RA4, RA5, RA6, RA7
RM3	3.1 All earthworks are completed in accordance with the detailed landform design plan required by PRCP15. 3.2 Erosion and sediment control systems installed post closure are in accordance with the design specification from an AQP.	RA3, RA4, RA5, RA6, RA7

	3.3 Constructed landform achieves geotechnical stability with a Factor of Safety (FOS) ≥ 1.5, which includes consideration of flood stress. 3.4 All landforms are shaped to be water shedding. RA5 and RA6 only 3.5 Disturbed slopes not steeper than $\leq 10\%$ RA3 and RA4 only 3.6 Disturbed slopes not steeper than $< 18\%$	
RM4	4.1 Assessment of growth media characteristics and the development of an amelioration and physical treatment plan is completed by an AQP. 4.2 Ameliorant and physical treatments such as fertiliser, lime, gypsum and/or organic matter are applied as identified in criteria 4.1 4.3 Topsoil/growth media placement of a minimum 0.2 m in areas where topsoil has previously been removed. 4.4 Deep ripping of compacted surfaces, at least 300 mm into soil/subsoil profile along contour of slopes. 4.5 Following amelioration as per criteria 4.1 and 4.2, representative soil testing of growth media confirms:	RA3, RA4, RA5, RA6, RA7

	(a) pH in the range of 6 – 8.5; (b) Electrical Conductivity (saturated extract) <3,500µS/cm; (c) Carbon:Nitrogen ratio 9:1 to 13:1; (d) Total Organic Carbon %: >1; (e) Exchangeable sodium percentage (ESP) (%) for depths to 10cm: (i) For RA3, RA4 and RA5 <6; (ii) For RA5, provided soil stability is certified by an independent AQP, <14, otherwise <6; and (f) Emerson aggregate class (AS1289.3.8.1): ≥4. 4.6 Growth media health and suitability is assessed and documented by an AQP as suitable for the PMLU and target vegetation establishment. 4.7 The surface and groundwater monitoring are underway (at least one year of sampling undertaken). 4.8 Areas of erosion classified as ‘moderate’ or ‘severe’, as defined by Attachment 2 – Erosion classification framework, are repaired.	
RM5	5.1 Completed seeding with a selection of species and seeding rates listed in Attachment 1 – Species list and	RA3, RA6

	seeding rates for grazing PMLU. 5.2 At least four species of 3P native pasture species, two native legumes and two native shade tree species established, from Attachment 1 – Species list and seeding rates for grazing PMLU are applied per application area. 5.3 Non-native seed must not be used for the revegetation (except when sterile cover crops are used). 5.4 Stock exclusion fencing has been established to prevent stock from grazing newly seeded areas.	
RM6	6.1 Species used in revegetation remain present and show evidence of natural recruitment. Evidence of flora recruitment from rehabilitation monitoring data. 6.2 Weed presence is a less than 5% of total vegetative cover. 6.3 Total groundcover (combination of vegetative cover, other organic material (i.e. sticks, leaf litter) and inorganic material (i.e. rocks)) $\geq$ 70%. 6.4 With respect to erosion: (a) No evidence of erosion classified as ‘moderate’ or ‘severe’ as defined by Attachment 2 – Erosion classification framework; (b) Any erosion present will not compromise the achievement of a PMLU to a stable condition; and	RA5

	(c) Erosion requiring intervention has been remediated and does not impact achieving the PMLU. 6.5 Corrective action arising from the routine inspections program have been undertaken. 6.6 Surface water runoff has been collected across representative areas of rehabilitation when surface flows occur and it is safe to do so. 6.7 Surface water runoff complies with Attachment 4 – Surface water quality limits. 6.8 The growth media (topsoil and subsoil) physical, chemical and biological properties does not limit vegetation cover performance or restrict the potential effective depth of rooting. RA3 and RA4 only 6.9 >50% established and self-sustaining vegetative groundcover of species listed in Appendix 1 – Species list and seeding rates for grazing PMLU.	
RM7	7.1 Final landform survey confirms no infrastructure, including any matters listed in RM1, remains with the exception of any infrastructure agreed to remain with written agreement from the landholder 7.2 Safety hazards in the rehabilitation area are not significantly different to surrounding unmined landscapes subject to the same land use. 7.3 The land is structurally and erosionally stable.	RA5

	7.4 Minimum vegetation composition (per hectare (averaged)) of: (a) four species of 3P native pasture species; (b) two native legumes; and (c) two native shade tree species, present. 7.5 Land Suitability class is ≤ 3 7.6 Independent AQP certifies achievement of RM 1.1- 7.5, as applicable.	
RM8	8.1 Retained dams are safe for native animals and stock access and have vegetated banks. 8.2 All retained water storages are safe and stable. RA1 and RA7 only 8.3 Water storages monitored quarterly, water must be of a suitable quality for native wildlife and/or livestock ingestion and must not exceed the stock water guidelines (ANZECC 2000), for a minimum of 5 consecutive years. RA2 only 8.4 Water storages monitored quarterly must not exceed the limits in Attachment 4 - Surface water quality limits, for a minimum of 5 consecutive years.	RA1, RA2

	8.5 Independent AQP certifies achievement of RM 1.1 – 8.4 , as applicable.	
RM9	9.1 Surface water quality results monitored monthly during flow at, but not limited to, downstream locations specified in Attachment 3 – Surface water monitoring locations, must not exceed the limits in Attachment 4 – Surface water quality limits, for a minimum of 5 consecutive years. 9.2 If the surface water quality exceeds criteria 9.1, the applicable upstream/reference site must be compared to the downstream site result; and quality result measured at a downstream site must be equal to or less than the quality result measured at the applicable upstream/reference site¹. 9.3 For a minimum of five consecutive years groundwater quality must be monitored quarterly at, <i>but not limited to</i>, compliance bores/locations specified in Attachment 5, Figure 4 – Groundwater monitoring locations, for all quality characteristics listed in Attachment 6 – Groundwater quality limits. 9.4 Groundwater quality results must not exceed the limits in Attachment 6 – Groundwater quality limits, for 3 consecutive results. 9.5 Groundwater level is monitored twice per year and for a minimum of 5 consecutive years. 9.6 Groundwater level is monitored quarterly, and all results must not exceed the Level Thresholds outlined in Attachment 7 – Groundwater Level monitoring locations and thresholds, for a minimum of 5 consecutive years. 9.7 Independent AQP certifies achievement of RM9.1 – RM9.6.	RA1, RA2

RM10	10.1 Infrastructure to be transitioned to a future landholder is deemed fit for purpose (verified by an AQP) and accepted, by signed agreement, with the future landholder. 10.2 An AQP certifies that all infrastructure to be retained onsite is safe, stable and will not cause environmental harm.	
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Appendix 1 Terms and Definitions

From: Application form, Environmental Protection Act 1994, *Submission of a progressive rehabilitation and closure plan*, ESR/2019/4957, Version 1.00, Effective: 1 November 2019

(Where there is inconsistency between the definition of terms used here and the terms used in the EP Act, the terms in the EP Act apply)

Available for improvement	In relation to land in an improvement area for a non-use management area, means land in the improvement area that is not being mined, other than land to which any of the following applies— a) the land is being used for operating infrastructure or machinery for mining, including, for example, a dam or water storage facility; b) the land is identified in the PRC PLAN schedule or the application for an environmental authority relating to the schedule as containing a probable or proved ore reserve that is to be mined within 10 years after the land would otherwise have become available for improvement; c) the land is required for the mining of a probable or proved reserve mentioned in paragraph (b).
Available for rehabilitation	For a rehabilitation area, means land in the area is not being mined, unless— a) the land is being used for operating infrastructure or machinery for mining,

	including, for example, a dam or water storage facility; or b) the land is identified in the PRC PLAN schedule or the application for an environmental authority relating to the schedule as containing a probable or proved ore reserve, under section 126D(6) of the EP Act, that is to be mined within 10 years after the land would otherwise have become available for rehabilitation; or ba) the land is required for the mining of a probable or proved reserve mentioned in paragraph (b); or c) the land contains permanent infrastructure identified in the proposed PRC PLAN schedule as remaining on the land for a post-mining land use.
Land outcome document	For land, means the following documents relating to the land– 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 of the EP Act 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 environmental authority holder 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 has 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 of the EP Act 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 three years after the assent date; and iv. the administering authority does not, within 20 business days after receiving the document,
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	give the environmental authority holder a notice that the document is insufficient in a material particular relevant to a matter 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.
Improvement area	For a non-use management area, means an area of land in the non-use management area to which a management milestone relates.
Management milestone	For a non-use management area, means each significant event or step necessary to– a) achieve best practice management of the area; and b) minimise risks to the environment.
Non-use management area	Means an area of land the subject of a PRC plan that cannot be rehabilitated to a stable condition after all relevant activities for the PRC plan carried out on the land have ended.
Post-mining land use	For land the subject of a PRC plan, means the purpose for which the land will be used after all

	relevant activities for the PRC plan carried out on the land have ended.
PRC plan	For land the subject of a mining lease, means a progressive rehabilitation and closure plan for the land that consists of – a) the rehabilitation planning part of the PRC plan; and b) the PRC PLAN schedule for the PRC plan, including any conditions imposed on the schedule.
Rehabilitation area	For land the subject of a post-mining land use, means an area of the land to which a rehabilitation milestone for the post-mining land use relates.
Rehabilitation milestone	For the rehabilitation of land, means each significant event or step necessary to rehabilitate the land to a stable condition.

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APPENDIX 2 - IMAGE 1: EBENEZER MINE, LOOKING SOUTH, 1991 (SOURCE: QIMAGERY)

Note exploration tracks in bushland within Ebenezer Creek Flood Plain



APPENDIX 2 - IMAGE 2: MINING DISTURBANCE CA. 1992



APPENDIX 2 - IMAGE 3: EBENEZER MINE, 1994 (SOURCE: QIMAGERY)

Note image shows open cut voids located in the original alignment of Ebenezer Creek and also where the current alignment of Ebenezer Creek is situated.



APPENDIX 2 - IMAGE 4: EBENEZER MINE IN THE FOREGROUND, LOOKING EAST (SOURCE: QIMAGERY)

Note that the O'Connor's Pit Coal Mine located in the original alignment of Ebenezer Creek, which is now the Ti Tree waste disposal facility. The image shows the rehabilitated section of the current Ebenezer Creek alignment located between the Tailings Dam O'Connor's Pit.



APPENDIX 2 - IMAGE 5: MINING DISTURBANCE, JUNE 1998



APPENDIX 2 - IMAGE 6: SHEET AND CHANNEL EROSION ON OPD NORTH-EASTERN BATTER SLOPE



APPENDIX 2 - IMAGE 7: TRANSITION BETWEEN 6 HA AREA OF REPAIRED BATTER SLOPE AND AREA REQUIRING REPAIR



APPENDIX 2 - IMAGE 8: RECENTLY REPAIRED OPD NORTHERN BATTER SLOPE



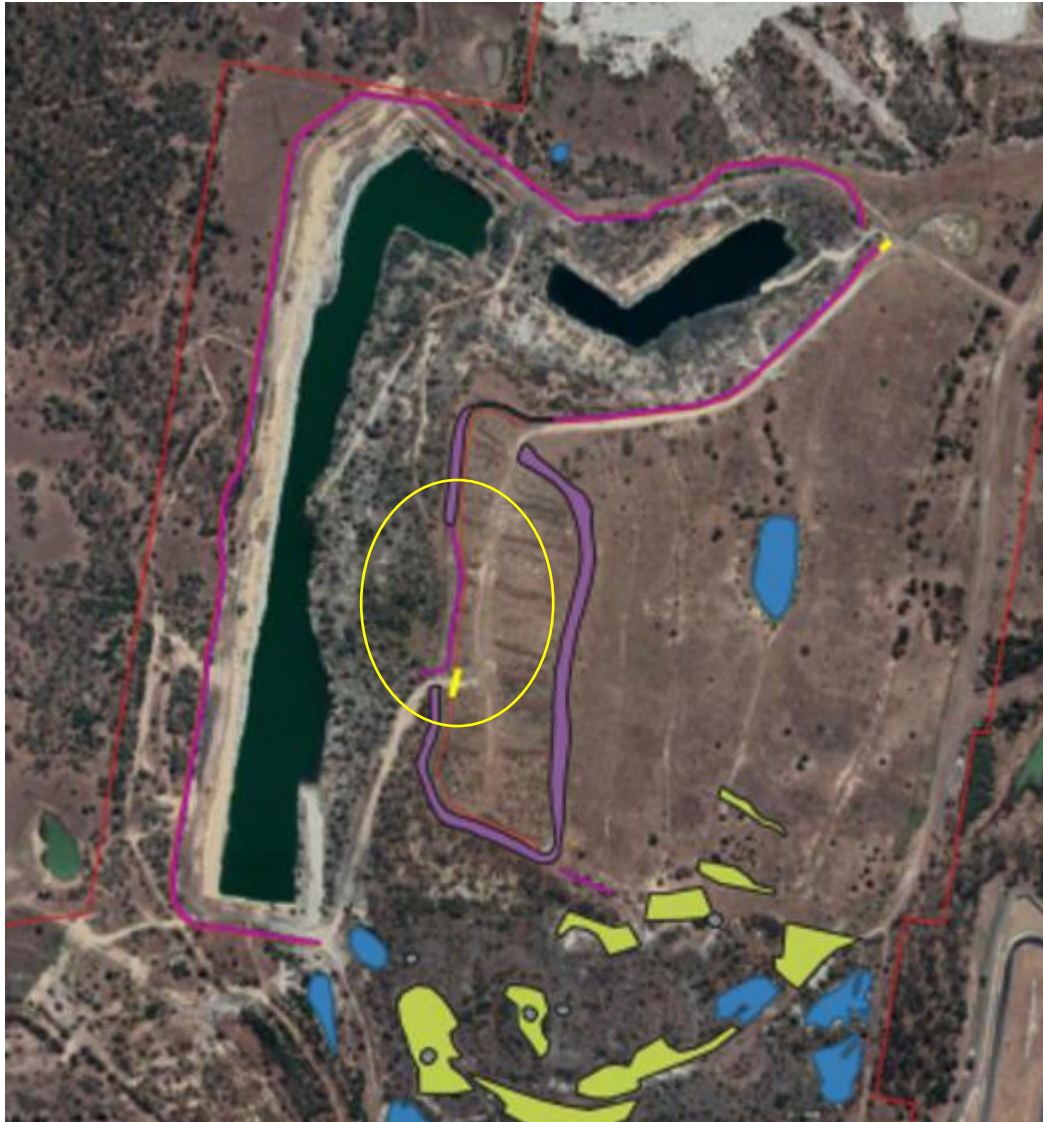
APPENDIX 2 - IMAGE 9: REHABILITATED 6 HA OPD NORTHERN BATTER SLOPE (21/12/2021)



APPENDIX 2 - IMAGE 10: AREAS WITHIN LANES EASTERN EMPLACEMENT REQUIRING REHABILITATION



APPENDIX 2 - IMAGE 11: DRONE IMAGE SHOWING AREAS WITHIN THE LANES EASTERN EMPLACEMENT REQUIRING REHABILITATION



APPENDIX 2 - IMAGE 12: REALIGNMENT OF THE WESTERN BUND WALL



APPENDIX 2 - IMAGE 13: LAND SLIP ON LOW-WALL (15/12/2021)



APPENDIX 2 - IMAGE 14: WESTERN SECTION OF IBSD

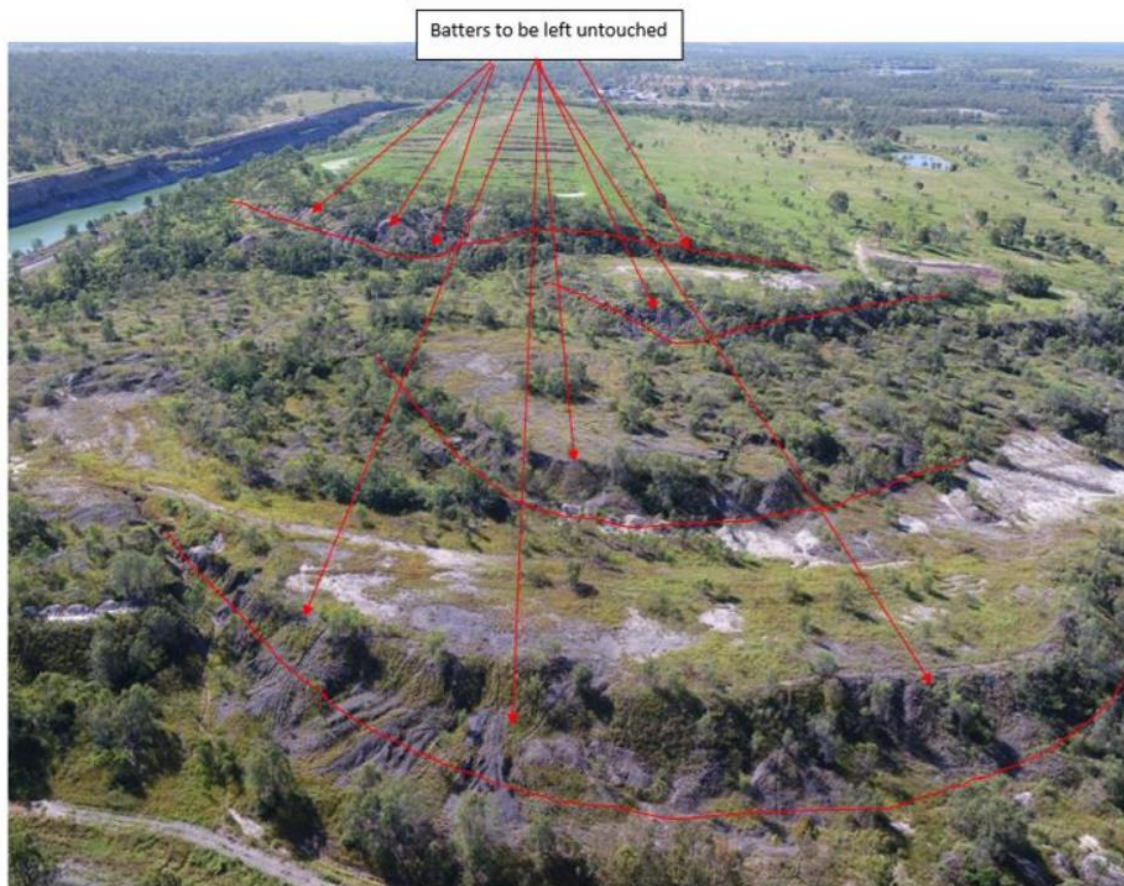


APPENDIX 2 - IMAGE 15: WESTERN SECTION OF IRONBARK SOUTH BATTER SLOPE



Deep Erosion Requiring Backfilling

APPENDIX 2 - IMAGE 16: DEEP EROSION REQUIRING BACKFILLING AT IRONBARK SOUTH



APPENDIX 2 - IMAGE 17: BATTER SLOPES OF IRONBARK SOUTH



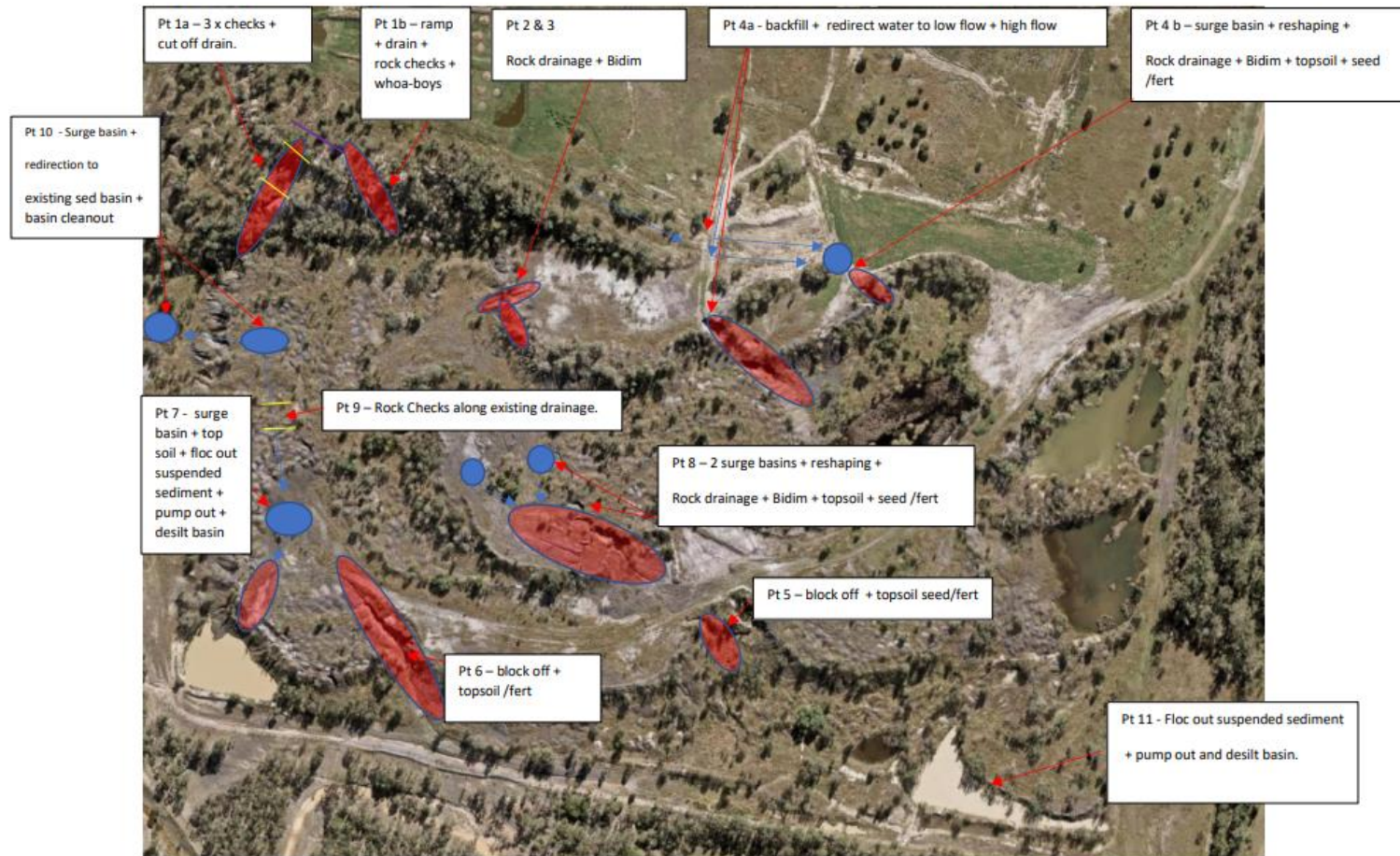
Drain to be stabilised

APPENDIX 2 - IMAGE 18: DRAIN REQUIRING STABILISATION IN THE SOUTH-WEST CORNER OF IRONBARK SOUTH



Area	Ha
1	0.85
2	0.51
3	0.44
4	0.47
5	0.29
6	0.49
7	0.11
8	0.1
9	0.63
10	0.80
Total	4.69

APPENDIX 2 - IMAGE 19: AREAS WHERE DEEP RIPPING AND TOPSOIL PLACEMENT IS REQUIRED OF IRONBARK SOUTH



APPENDIX 2 - IMAGE 20: ERODED DRAINAGE CHANNELS WITHIN THE IRONBARK SOUTH AREA AND REQUIREMENTS TO STABILISE



APPENDIX 2 - IMAGE 21: EXISTING SEDIMENT DAMS TO REMAIN AS WATER STORAGE FAUNA HABITAT



APPENDIX 2 - IMAGE 22: LOW-WALL (27/10/1997)



APPENDIX 2 - IMAGE 23: LOW-WALL (01/11/2004)



APPENDIX 2 - IMAGE 24: LOW-WALL FAILURE (06/07/2007)



APPENDIX 2 - IMAGE 25: SOUTHERN DRAIN IN IBSD AREA BEFORE REHABILITATION, NOVEMBER 2018



APPENDIX 2 - IMAGE 26: SOUTHERN DRAIN IN IBSD AREA AFTER REHABILITATION (12/01/2022)



**APPENDIX 2 - IMAGE 27: REHABILITATED DRAINAGE CHANNEL AT WATER MONITORING LOCATION EW35
(12/01/2022)**



APPENDIX 2 - IMAGE 28: GRASS COVER OVER COMPOST AREA WITHIN THE LANES EASTERN EMPLACEMENT (06/02/2022)



APPENDIX 2 - IMAGE 29: LOCATIONS OF RECENT DRAINAGE WOKS

Appendix 3 REMP Monitoring Data

Date	Rainfall since last sample	EW1: Upstream pH Cond TSS	EW3: Highway pH Cond TSS	EW7: Downstream pH Cond TSS	EW25: Enviro Dam pH Cond TSS	EW33: Tailings Storage pH Cond TSS	EW 31: Water Reserve pH Cond TSS
03-May-05			Dry	NS	8.1 418 50 NR	9.3 2590 15 NR	9.2 8370 15 NR 9.2 465 91 NR
03-Jun-05			Dry	NS	8.3 464 23 NR	9.1 2140 105 NR	9.2 8510 18 NR 9.2 508 47 NR
04-Jul-05		7.0 153 100 NR		NS	8.3 442 30 NR	8.8 2700 40 NR	9.1 8750 20 NR 9.1 291 42 NR
03-Aug-05			Dry	NS	8.1 541 74 NR	8.3 3650 27 NR	8.9 9590 32 NR 8.9 328 36 NR
05-Sep-05			Dry	NS	7.9 728 121 NR	8.1 4100 54 NR	8.8 9290 34 NR 8.8 672 104 NR
03-Oct-05			Dry	NS	8.3 653 148 NR	9.1 5280 70 NR	9.0 9680 18 NR 9.0 428 121 NR
02-Nov-05		6.7 514 352 NR		NS	7.1 569 106 NR	8.2 2120 27 NR	9.1 8230 25 NR 9.1 633 244 NR
04-Dec-05		7.4 175 770 NR		NS	8.2 337 15 NR	9.2 3220 12 NR	9.3 8680 12 NR 9.3 225 135 NR
04-Jan-06		7.6 296 452 NR		NS	7.0 428 56 NR	9.9 4130 22 NR	9.1 9950 18 NR 9.1 236 54 NR
27-Jan-06		6.7 351 90 NR		NS	7.0 432 26 NR	8.9 3330 4 NR	9.1 10200 4 NR 9.1 256 18 NR
04-Mar-06		6.3 213 224 NR		NS	7.2 370 49 NR	8.9 2720 33 NR	9.0 10100 14 NR 9.0 237 24 NR
25-May-06		7.6 872 30 NR		NS	8.2 492 84 NR	9.6 3190 14 NR	9.1 11000 12 NR 7.7 330 79 NR
02-Aug-06		6.5 162 212 NR		NS	8.1 525 44 NR	8.5 3070 42 NR	8.8 10900 12 NR 7.1 347 39 NR
31-Oct-06		7.7 737 16 NR		NS	8.0 344 54 NR	9.4 2840 24 NR	9.0 11200 17 NR 7.7 371 17 NR
07-Feb-07		7.4 947 47 NR		NS	7.7 512 41 NR	8.5 2960 16 NR	9.1 10800 11 NR 8.7 351 208 NR
04-May-07		7.6 362 128 NR		NS	8.4 752 111 NR	9.2 4260 42 NR	8.9 12300 82 NR 7.8 297 176 NR
07-Aug-07		8.3 756 66 NR		NS	8.6 952 52 NR	9.2 3140 37 NR	9.1 13000 20 NR 7.6 289 38 NR
20-Nov-07		7.2 206 282 NR		NS	8.2 686 97 NR	9.1 1750 40 NR	9.0 9360 10 NR 7.5 276 28 NR
11-Feb-08		6.9 126 39 NR		NS	7.3 154 104 NR	7.8 787 36 NR	9.2 6440 26 NR 7.4 169 24 NR
03-May-08		7.8 298 27 NR		NS	7.9 324 129 NR	8.3 1640 398 NR	8.8 9120 18 NR 8.9 294 54 NR
02-Aug-08	245.0	7.2 224 122 NR		NS	8.0 314 150 NR	8.7 1680 35 NR	9.0 8410 34 NR 7.7 218 49 NR
08-Nov-08	199.0	7.4 182 100 NR		NS	8.0 366 94 NR	8.8 999 54 NR	9.3 8960 30 NR 7.2 341 18 NR
03-Feb-09	472.0	7.8 986 77 NR		NS	7.9 254 117 NR	8.1 1020 54 NR	9.2 4060 18 NR 8.6 2050 34 NR
05-May-09	240.0	6.9 142 36 NR		NS	7.7 292 107 NR	8.2 1290 85 NR	9.2 4370 12 NR 7.8 280 23 NR
03-Aug-09	299.0	7.2 262 44 NR		NS	8.0 2350 88 NR	8.3 1850 57 NR	9.0 4110 24 NR 7.5 595 89 NR
02-Nov-09	76.8		Dry	NS	9.2 3830 44 NR	9.0 4900 55 NR	8.9 4530 31 NR 7.4 701 59 NR
15-Feb-10	231.0	8.1 563 58 NF		NS	7.2 170 128 NF	8.7 2490 22 NR	9.3 4290 6 NF 6.7 241 113 NF
10-May-10	245.6	6.7 173 64 NF		NS	8.8 2450 46 NF	9.7 1770 29 NF	8.9 3080 58 NF 7.2 212 8 NF
20-Jul-10	53.4		Dry	NS	8.6 2760 16 NF	9.6 2060 44 NF	8.7 3830 11 NF 7.5 261 15 NF
22-Nov-10	348.5	7.6 157 40 NF		NS	8.1 1740 123 NF	8.2 743 147 NF	8.5 3010 224 NF 7.7 278 37 NF
03-Feb-11	697.0	7.9 690 84 NF		NS	7.2 76 27 NF	8.0 661 93 NF	8.3 1390 30 NF 7.5 185 21 NF
03-May-11	297.0	7.5 148 87 F		NS	8.4 2500 37 F	8.5 953 21 NF	8.5 1370 12 NF 7.8 500 14 F
01-Aug-11	95.2	7.5 271 80 NF		NS	7.1 264 24 NF	8.6 4160 17 NF	9.8 1190 18 NF 8.9 1750 30 NF
03-Nov-11	205.0	6.8 164 56 F		NS	7.8 832 18 F	8.7 1270 24 NF	9.0 1730 10 NF 7.3 345 37 F
15-Feb-12	374.0	7.0 129 27 F		NS	7.7 567 30 F	9.1 1880 55 NF	9.0 1450 22 NF 7.3 202 21 F
03-May-12	204.0	7.2 167 288 NF		NS	7.9 625 36 NF	8.3 1280 39 NF	8.5 1530 10 NF 7.3 419 142 NF
07-Aug-12	117.0	6.9 192 41 NF		NS	8.2 1680 43 NF	8.3 2210 89 NF	8.4 1610 10 NF 7.2 281 28 NF
17-Nov-12	65.4	7.2 384 104 NF		NS	8.6 3760 45 NF	8.7 3710 46 NF	8.8 1740 69 NF 7.6 505 88 NF
07-Feb-13	360.0	7.2 253 126 F		NS	8.0 1390 16 F	8.8 5530 15 NF	8.7 1580 51 NF 7.6 182 21 F
02-May-13	349.0	7.2 191 98 NF		NS	8.6 2410 44 NF	8.7 2400 14 NF	8.5 1380 11 NF 8.0 1020 47 NF
08-Aug-13	126.0	7.6 274 58 NF		NS	8.8 4200 22 NF	8.6 3160 24 NF	8.4 1460 9 NF 8.1 698 <5 NF
01-Nov-13	46.0	7.7 402 59 NF		NS	9.2 5980 94 NF	8.9 6480 80 NF	8.8 1580 29 NF 8.4 835 39 NF
03-Feb-14	276.8	7.1 198 163 NF		NS	8.0 1480 311 F	8.3 2040 50 NF	8.8 1630 16 NF 7.3 296 18 NF
01-May-14	216.2	7.4 134 57 NF		NS	8.7 4800 9 NF	8.5 2530 10 NF	8.7 1630 <5 NF 7.7 262 16 NF
04-Aug-14	68.8	8.0 190 149 NF		NS	8.9 5700 14 NF	8.6 2730 10 NF	8.7 1620 16 NF 7.9 317 14 NF
04-Nov-14	69.8		Dry	NS	9.4 9060 34 NF	9.9 4690 33 NF	9.1 1790 12 NF 7.8 455 20 NF
26-Jan-15	269.2	7.0 123 24 F		NS	7.3 126 31 F	8.2 688 52 F	9.1 1740 6 NF 7.1 148 21 F
06-May-15	457.2	6.9 69 32 F		NS-NF	7.6 300 19 F	7.7 425 57 NF	8.5 1630 8 NF 7.2 98 19 F
08-Aug-15	38.8	7.0 90 25 NF		NS	8.4 1320 64 NF	8.8 1680 58 NF	8.5 1680 13 NF 7.5 170 11 NF
03-Nov-15	131.0	7.0 167 132 NF		NS	8.9 1660 23 NF	8.1 1590 269 NF	8.9 1730 10 NF 7.5 201 6 NF
03-Feb-16	323.8	7.4 198 61 NF		NS	8.5 831 88 NF	8.6 1500 22 NF	8.9 1690 10 NF 7.9 277 14 NF
03-May-16	140.6	7.3 181 19 NF		NS	8.3 1290 <5 NF	8.4 1330 28 NF	8.9 1760 10 NF 7.4 318 6 NF
03-Aug-16	223.0	7.0 119 12 NF		NS	8.4 1760 21 NF	8.2 975 33 NF	8.7 1740 11 NF 7.3 163 14 NF
03-Nov-16	163.0	7.3 256 29 NF		NS	10.0 4220 11 NF	9.4 2030 59 NF	9.0 1810 14 NF 7.5 344 100 NF
2-Feb-17	299.0	7.1 175 174 NF		NS	8.9 4610 20 NF	8.4 1780 44 NF	9.0 1860 9 NF 7.0 207 15 NF
4-May-17	326.6	7.7 97 21 NF		NS	8.3 1300 14 NF	8.7 3820 26 NF	8.6 1720 17 NF 8.2 170 16 NF
7-Aug-17	115.2	7.4 128 40 NF		NS	8.6 2490 14 NF	9.2 3220 135 NF	8.6 1710 17 NF 7.7 163 6 NF
02-Nov-17	147.6	6.9 176 70 NF	8.6 3870 <5 NF	9.6 3100 <5 NF	8.6 2230 10 NF	8.8 1720 14 NF	7.0 211 14 NF
01-Feb-18	246.2	7.4 134 26 NF		Dry	8.1 1500 26 NF	8.3 1140 50 NF	8.9 1750 <5 NF 7.7 196 6 NF
03-May-18	342.4	7.0 142 120 NF	8.2 2280 15 NF	8.4 2460 35 NF	8.5 1220 27 NF	8.6 1710 20 NF	7.3 162 22 NF
03-Aug-18	41.0	7.1 180 27 NF	7.9 2770 5 NF	8.8 3180 17 NF	8.4 1540 34 NF	8.6 1780 <5 NF	7.3 191 <5 NF
04-Nov-18	104.0	7.2 248 18 NF		NF	9.5 9400 86 NF	8.7 2060 40 NF	9.1 1790 7 NF 7.5 232 5 NF
02-Feb-19	151.8	7.5 213 24 NF	7.9 914 42 NF	8.5 2700 49 NF	8.8 2940 222 NF	9.0 1860 24 NF	8.0 278 124 NF
11-May-19	162.8	7.3 248 12 NF	7.9 4270 9 NF	8.7 4000 13 NF	8.6 2050 16 NF	8.7 1920 11 NF	7.6 264 37 NF
01-Aug-19	48.0	7.4 285 177 NF	7.9 4680 36 NF	8.9 5280 8 NF	8.5 2860 27 NF	8.6 2010 6 NF	7.5 293 63 NF
05-Nov-19	58.2		Dry	8.8 7360 70 NF	9.2 7930 145 NF		9.0 2100 18 NF 7.4 453 32 NF
03-Feb-20	163.2	7.2 277 48 NF		Dry	9.3 7960 166 NF	7.7 5490 34 NF	9.1 2310 7 NF 8.8 1340 1210 NF
01-May-20	276.2	7.6 267 35 NF	8.2 2050 17 NF	8.6 2530 88 NF	8.7 1900 8 NF	8.8 2460 25 NF	7.8 305 <5 NF
03-Aug-20	61.4	7.9 275 45 NF	8.6 2170 16 NF	9.0 2930 35 NF	8.6 2380 8 NF	8.9 2360 9 NF	7.6 310 9 NF
03-Nov-20	71.8	7.0 142 234 NF	9.8 3980 28 NF	9.8 4780 193 NF	9.7 3690 24 NF	9.1 2430 24 NF	8.8 429 35 NF
11-Feb-21	329.4	7.2 125 143 NF	8.0 587 16 NF	9.3 7440 165 NF	8.3 1090 11 NF	9.1 2610 <5 NF	7.6 238 7 NF
03-May-21	305.4	7.2 121 14 NF	8.0 751 <5 NF	8.1 1480 <5 NF	9.3 588 <5 NF	9.0 2320 12 NF	8 209 <5 NF
02-Aug-21	111.4	7.3 128 86 NF	8.6 4020 15 NF	8.6 4000 16 F	9.4 730 6 NF	9.0 2490 35 NF	8 247 6 NF
03-Nov-21	194.8	7.4 95 30 NF	8.3 1210 <5 NF	8.1 1140 33 F	8.2 385 20 NF	9.1 2150 12 NF	8 178 12 NF
4-Feb-22	402.6	7.22 91 69 NF	8.08 1370 28 NF	8.21 1740 63 F	8.09 451 90 NF	8.67 1560 12 NF	7.52 248 109 NF
03-May-22	782.6	7.60 185 19 NF	8.24 717 17 NF	8.12 709 67 NF	8.31 607 10 NF	7.95 481 7 NF	8.31 1000 9 NF
03-Aug-22	357.2	6.87 128 20 NF	7.97 835 16 NF	8.33 864 30 NF	8.59 790 11 NF	8.57 978 20 NF	7.83 350 33 NF
03-Nov-22	229.8	6.67 109 26 NF	7.70 509 8 NF	7.52 469 33 NF	8.93 529 10 F	8.61 835 20 F	7.48 319 19 NF
03-Feb-23		7.39 118 145 F	8.01 533 22 F	7.90 425 30 F	7.95 309 48 F	8.61 871 15 F	7.49 157 29 F
04-May-23		7.04 171 612 NF	7.56 2380 <5 NF	8.50 2570 38 NF	7.86 351 8 NF	7.61 258 19 NF	8.39 923 6 NF
Median	210.6	7.2 182 59	8.0 2110 17	8.3 1310 44	8.6 2050 34	8.9 1965 16	7.6 290 28
Mean (average)	226.3	7.3 255 105	8.2 2366 23	8.3 2029 62	8.7 2259 48	8.9 4100 21	7.9 390 60
Minimum	38.8	6.3 69 12	7.6 509 5	7.0 76 8	7.7 309 4	7.6 258 4	6.7 98 5
90 percentile	364.2	7.7 514 224	8.6 4311 39	9.2 4782 128	9.4 4136 89	9.2 9965 33	9.0 698 117
95 percentile	475.1	7.9 747 320	8.8 4814 49	9.4 6053 153	9.6 4938 137	9.2 10810 53	9.1 1001 151
99 percentile	733.8	8.2 959 659	9.6 6851 66	9.8 8191 221	9.9 5739 299	9.4 12447 118	9.2 1813 486
Maximum	782.6	8.3 986 770	9.8 7360 70	10.0 9060 311	9.9 6480 398	9.8 13000 224	9.3 2050 1210

Ebenezer ML 4712 Routine Water Monitoring Results May 2005 to May 2020

NF Not Flowing F Flowing NR Not Recorded NS Not Sampled

APPENDIX 3 - TABLE 1: QUARTERLY SURFACE WATER MONITORING DATA (2005-2023)

Date	Rainfall (mm) @ 9 am #			EW1 UPSTREAM		EW7 DOWNSTREAM		EW33: Tailings Dam spill		EW34: Culvert ex Spoil		EW35: OOPS discharge		EWSD: Southern Drain	
	24 hour	5 day	10 day	pH	Cond TSS	pH	Cond TSS	pH	Cond TSS	pH	Cond TSS	pH	Cond TSS	pH	Cond TSS
28-Mar-14	113.2	151.2	153.2			6.9	110 238	8.8	1550 29 NF	7.2	514 434 F-RSS				
26-Jan-15	0.2	123.8	124.8	7.0	123 24 F	7.3	126 31 F			7.0	130 1930 F-RSS	8.1	682 2440 F-RSS		
25-Feb-15	2.2	94.8	136.4							7.3	582 1290 F-RSS	7.9	583 628 F-RSS		
2-May-15	108.6	133.4	133.4	6.9	69 32 F	7.6	300 19 F	8.5	1630 8 F-B	7.3	848 9780 F-RSS	8.2	1680 4190 F-RSS		
2-May-15												7.7	268 503 F-RSS2		
8-Jun-16	0.0	131.0	131.4							7.0	499 4720 F-RSS	8.1	10500 6850 F-RSS		
14-Nov-16	0.2	31.0	50.8							6.9	174 698 F-RSS				
5-Dec-16	0.0	1.4	8.2							7.1	97 430 F-RSS	7.6	1960 2980 F-RSS		
3-Jan-17	65.2	65.2	71.0							7.2	86 1590 F-RSS	7.8	1830 432 F-B		
18-Jan-17	NR	69.6	70.6							6.9	174 281 F-RSS	8.3	5300 13000 F		
14-Feb-17	21.4	21.4	22.4							6.9	119 3530 F	8.1	6690 402 F		
21-Mar-17	30.2	43.2	49.2	6.7	158 736					7.1	128 652 F	7.8	2410 255 F		
				6.7	150 236										
30-Mar-17	78.0	78.0	120.0					7.2	187 1120 F-RSS	6.9	451 531 F-RSS	7.2	71 1110 F-RSS		
30-Mar-17										7.1	445 451 F-RSS				
31-Mar-17	143.6	221.6	233.4	6.7	56 139 F	7.5	342 138 F	8.5	1700 48 F			7.4	111 149 F		
1-Apr-17	0.0	221.6	227.2	7.4	66 61 F	7.9	436 76 F	8.6	1570 46 F			7.8	250 106 F		
3-Apr-17	0.0	221.6	221.6	6.9	76 30	7.7	755 39	8.6	1650 38 F						
4-Apr-17	0.0	143.6	221.6	6.7	81 36	7.7	760 24	8.5	1640 36 F						
6-Apr-17	3.2	3.2	224.8	6.7	75 35	7.7	772 19	8.5	1630 40 F						
18-Oct-17	3.0	57.6	63.8												
21-Oct-17	6.2	12.0	65.4	7.2	120 133					7.4	384 1130 F	8.0	1660 1460 F		
3-Jan-18	37.6	77.8	112.2	6.9	88 111	7.6	758 81					7.9	333 475 F		
4-Jan-18	11.0	88.8	123.2	6.9	83 59	7.3	410 110					7.8	200 73 F		
1-Feb-18	6.4	10.8	10.8	7.4	134 26 NF	8.1	1500 26 NF								
23-Feb-18	42.8	47.4	97.8	7.8	76 102	8.0	1260 38					8.3	1170 87 F		
24-Feb-18	89.0	136.4	184.8	7.3	65 52	7.4	699 102			7.7	238 40 F	7.5	116 62 F		
28-Feb-18	0.2	123.2	170.6	7.5	70 46	7.5	271 62	8.6	1640 12 F			8.1	196 44 F		
6-Mar-18	25.2	31.6	65.8	6.9	52 92	7.1	177 174	8.8	1580 12 F			7.8	158 54 F		
7-Mar-18	9.6	41.2	74.8	7.1	74 44	7.3	144 58	8.7	1610 8 F			7.6	137 71 F		
22-Mar-18	1.0	1.6	3.0	7.1	98 7	7.6	752 15	8.7	1660 8 F						
23-Mar-18	3.6	5.2	6.6	7.2	101 8	7.6	768 10	8.7	1660 8 F						
24-Mar-18	NR	5.2	5.2	7.7	99 23	7.7	787 16	8.7	1590 8 F						
10-Oct-18	1.2	24.6	25.6	6.8	131 639 NF	9.5	3730 54 NF		NF	7.5	207 1280 F	8.4	2290 106 F		
13-Oct-18	16.2	28.2	44.6	7.0	184 72 NF	9.2	3400 56 NF		NF	8.0	380 1380 F			NF	
14-Oct-18	8.6	29.6	53.2	7.3	218 108 NF	9.4	3560 41 NF		NF	8.1	339 385 F			NF	
15-Dec-18	19.0	19.4	20.2	6.8	135 42 NF	9.0	2520 77 NF		NF	7.8	244 4570 F	7.9	1470 262 F		
16-Dec-18	40.8	60.2	60.2	6.9	94 159 F	7.9	1170 90 F		NF	7.5	304 382 F	8.7	426 3730 F		
17-Dec-18	45.4	105.6	105.6	7.1	109 24 F	7.1	417 131 F		NF	7.0	324 912 F	7.5	183 81 F		
16-Mar-19	21.0	24.8	28.0	6.9	185 287 F	8.6	4800 24 F		NF	7.7	578 2170 F	7.6	1340 542 F		
17-Mar-19	0.8	25.4	28.8	7.0	193 128 F	8.4	3730 15 F		NF	7.6	537 1270 F	7.6	1530 93 F		
18-Mar-19	11.2	36.6	36.8	7.3	195 95 F	8.4	3760 19 F		NF	7.6	540 950 F	7.6	1550 142 F		
9-Feb-20	76.2	142.2	148.4	6.7	168 75 NF	9.0	3760 102 NF		NF	7.4	518 4280 F	8.1	863 2700 F		
10-Feb-20	2.4	143.0	150.8	7.0	174 35 F	9.1	3480 42 NF		NF	7.3	1610 23 NF	7.8	413 80 NF		
11-Feb-20	9.4	126.4	160.0	6.6	99 147 F	9.3	3180 45 NF		NF	7.4	976 945 F	7.9	1350 5660 F		
15-Dec-20	16.8	83.6	91.0	7.2	111 283 NF	9.2	5660 168 NF		NF	7.8	254 1600 F	7.6	1300 2370 F		
16-Dec-20	1.0	84.2	92.0	7.3	116 188 NF	9.3	5440 130 NF		NF	7.8	272 414 NF	8.0	3240 60 NF		
17-Dec-20	1.0	70.4	93.0	7.3	126 169 NF	9.4	5540 81 NF		NF	7.8	296 261 NF			NF	
7-Jan-21	112.2	113.4	127.2	6.6	125 172 F	9.1	4530 775 NF		NF	7.7	197 1700 F	7.6	1030 4650 F	8.34	1660 74 F
8-Jan-21	0.0	113.4	127.2	6.8	124 162 NF	9.4	4300 118 NF		NF	7.7	259 190 NF	7.8	1240 85 NF	8.3	1470 85 F
9-Jan-21	4.0	117.4	127.0	6.9	126 162 NF	9.7	4290 160 NF		NF	7.6	249 218 NF	8.7	2220 98 NF	8.39	1440 82 NF
22-Mar-21	35.40	54.20	92.80	7.0	82 239 NF	8.1	1450 1000 NF		NF	7.7	159 975 F	8.0	560 1850 F	8.38	1720 39 F
23-Mar-21	52.00	96.80	144.80	6.7	75 583 F	7.6	473 431 F		NF			7.6	466 382 F		NA
24-Mar-21	24.80	121.60	169.60	6.8	82 96 F	6.9	89 50 F		NF	7.3	318 872 F	7.4	175 52 F	8.14	851 290 F

7-Apr-21	14.00	44.4	44.8	7.0 98 26 F	7.5 253 <5 F	NF	7.6 575 120 F	7.8 394 219 F	8.2 925 130 F
8-Apr-21	0.00	44.4	44.8	7.3 102 21 F	7.6 247 8 F	NF	7.8 685 47 NF	8.2 418 31 F	8.14 937 132 F
9-Apr-21	0.00	42.4	44.8	7.3 104 11 F	7.7 242 14 F	NF	NF	8.5 1060 38 F	8.41 936 155 F
5-May-21	3.20	9.2	10.8	7.1 60 125 F	8.1 1550 <5 F	NF	7.6 227 2050 F	8.0 1310 1780 F	7.97 563 138 F
6-May-21	9.40	18.0	20.2	7.3 108 40 F	8.2 1620 <5 F	NF	7.6 314 513 NF	8.3 2930 745 F	8.18 904 246 F
7-May-21	0.00	14.2	20.2	7.4 108 43 F	8.2 1700 17 F	NF	NF	8.5 3290 859 F	8.02 905 131 F
9-Jul-21	9.00	9.0	22.8	7.1 106 99 F	8.2 3320 7 F	NF	7.7 347 244 F	8.1 2140 125 F	7.93 694 91 F
10-Jul-21	1.60	10.6	24.4	7.0 106 133 NF	8.3 3340 9 F	NF	7.8 384 133 NF	8.3 3670 37 F	8.07 751 89 F
11-Jul-21	0.00	10.6	24.0	7.1 107 116 NF	8.3 3330 6 F	NF	NF	8.4 5170 16 F	7.95 770 116 NF
14-Oct-21	33.80	72.8	78.2	7.4 132 234 NF	9.3 3690 40 F	NF	7.4 120 701 F	7.9 2020 396 F	8.01 769 179 F
15-Oct-21	4.20	77.0	82.4	7.5 147 160 NF	9.2 3890 106 F	NF	7.6 259 302 F	8.0 1330 646 F	8.22 713 140 F
16-Oct-21	0.00	77.0	82.4	7.3 106 44 F	9.2 4100 24 F	NF	7.8 485 101 NF	8.0 1340 164 F	8 715 245 F
22-Oct-21	14.60	37.2	75.4	6.9 67 105 F	8.0 1320 39 F	NF	7.4 344 180 F	7.8 817 512 F	8.06 651 104 F
9-Nov-21	8.00	29.8	39.2	7.3 101 24 F	8.0 1240 93 F	NF	7.6 187 412 F	8.5 2360 58 F	8.3 495 16 NF
10-Nov-21	0.20	30.0	30.0	7.5 96 25 NF	8.0 1240 52 F	NF	7.6 213 137 NF	8.4 3620 53 F	8.28 532 51 NF
11-Nov-21	3.40	33.2	33.4	7.4 95 40 NF	8.1 1240 118 F	NF	7.5 220 124 F	8.4 2000 78 F	8.4 494 41 NF
23-Nov-21	10.20	23.2	23.2	7.3 82 23 F	8.0 831 38 F	NF	7.6 546 386 F	7.9 248 41 F	8.26 571 123 F
24-Nov-21	20.00	43.2	43.2	7.4 85 14 F	8.1 816 18 F	NF	7.6 523 1170 F	8.0 370 50 F	8.43 559 55 F
25-Nov-21	0.80	44.0	44.0	7.4 87 26 F	8.2 889 26 F	NF	7.9 735 41 F	7.9 211 26 F	8.28 554 60 F
30-Nov-21	6.8	42.6	86.6	7.0 59 324 F	7.2 116 591 F	NF	7.6 522 262 F	7.3 126 43 F	7.45 210 186 F
10-Dec-21	25.6	29.4	110.2	7.24 102 14 F	7.47 195 8 F	8.8 1560 10 F	7.78 572 177 F	8.21 1210 130 F	8.29 842 42 F
11-Dec-21	0.0	29.4	43.4	7.22 118 86 F	7.41 253 9 F	8.64 1590 7 F	NF	8.49 1410 35 F	8.12 796 36 F
12-Dec-21	0.0	29.4	41.8	7.36 115 24 F	7.6 319 6 F	8.48 1590 <5 F	NF	8.7 2040 28 F	8.15 777 36 F
02-Feb-22	2.6	4.0	36.0	7.08 150 191 NF	8.27 1780 22 F	NF	7.64 299 431 NF	8.22 2200 176 F	8.29 576 13 F
03-Feb-22	26.4	29.0	62.4	7.08 92 70 F	8.14 1730 83 F	NF	7.33 159 304 F	7.53 793 801 F	7.76 477 98 F
04-Feb-22	19.6	48.6	82.0	7.22 91 69 F	8.21 1740 63 F	NF	7.77 407 178 F	7.96 1270 212 F	7.92 481 151 F
24-Feb-22	2.2	30.6	35.0	7.18 60 316 NF	8.11 1320 87 F	8.52 1060 14 NF	7.23 282 2530 F	7.4 125 293 F	7.61 387 227 NF
25-Feb-22	67.4	84.4	98.6	6.92 60 299 F	8.09 1330 72 F	8.59 1220 9 F	7.45 277 769 F	7.45 125 173 F	7.63 382 255 F
26-Feb-22	216.8	301.2	315.4	NF	8.2 921 314 F	NF	NF	NF	NF
07-Mar-22	23.4	82.2	588.8	6.6 71 55 F	6.92 204 78 F	8.1 864 58 F	NF	7.79 585 19 F	7.8 918 52 F
14-Mar-22	0.0	6.8	35.2	6.89 89 17 F	7.41 321 18 F	8.23 922 39 F	NF	NF	NF
28-Mar-22	18.8	18.8	18.8	7.36 120 47 F	7.95 466 36 F	8.29 927 30 F	7.90 454 319 F	8.60 3260 84 F	8.54 1950 40 F
29-Mar-22	32.6	51.4	51.4	7.17 112 26 F	7.95 467 22 F	8.30 930 17 F	7.95 445 210 F	8.63 3270 63 F	8.43 1620 26 F
30-Mar-22	6.2	57.6	57.6	7.58 93 35 F	8.02 466 38 F	8.34 930 31 F	NF	8.72 3630 40 F	8.60 2200 34 F
06-May-22	26.0	27.6	34.0	6.92 90 126 F	7.89 656 90 F	NF	7.30 393 570 NF	8.13 1990 144 F	8.28 1210 18 F
07-May-22	0.0	26.0	34.0	6.97 83 65 F	7.60 575 84 F	NF	NF	8.63 2720 72 F	8.18 1200 58 F
08-May-22	16.6	42.6	50.0	6.90 80 507 F	7.53 494 58 F	8.29 943 20 F	7.67 517 208 F	8.54 1340 92 F	8.20 1120 23 F
16-May-22	2.6	181.4	221.4	6.76 90 2040 F	7.27 215 46 F	8.09 721 40 F	NF	NF	NF
23-May-22	2.0	25.6	69.2	7.48 92 442 F	7.76 242 52 F	8.30 837 28 F	NF	NF	NF
03-Jul-22	1.8	35.8	35.8	7.55 117 34 F	8.24 774 44 F	8.37 988 11 F	7.94 697 117 F	8.70 2620 40 F	8.30 1420 44 F
04-Jul-22	0.0	35.8	35.8	7.58 117 34 F	8.24 770 46 F	8.39 990 16 F	NF	8.72 2620 44 F	8.29 1420 50 F
05-Jul-22		35.6	35.8	7.68 144 58 F	8.14 773 43 F	8.32 983 9 F	7.88 570 610 F	8.69 1550 90 F	8.38 1360 42 F
21-Sep-22	0.0	0.2	7.6	6.96 64 204 F	7.80 831 196 F	NF	NF	7.95 238 2120 F	NF
22-Sep-22	14.4	14.4	22.0	6.93 64 224 F	8.03 759 338 F	NF	7.35 153 396 F	8.40 844 508 F	8.49 1370 48 F
23-Sep-22	37.2	51.6	59.2	6.99 67 2090 F	8.04 754 328 F	8.46 942 22 F	7.41 155 444 F	7.77 189 172 F	8.48 1460 76 F
23-Oct-22	27.4	69.2	70.8	5.24 104 1860 F	7.51 242 89 F	8.26 845 26 F	7.79 240 132 F	7.91 391 117 F	8.25 1170 97 F
24-Oct-22	8.0	77.2	78.8	6.67 87 132 F	7.13 232 94 F	8.22 840 18 F	7.41 241 117 F	7.69 268 77 F	8.16 1180 96 F
25-Oct-22	3.0	57.0	81.8	6.93 135 112 F	7.33 283 50 F	8.34 864 24 F	7.71 359 1180 F	8.25 1230 284 F	8.47 1480 39 F
03-Nov-22	0.0	12.6	15.8	6.67 109 26 NF	7.52 469 33 NF	8.61 835 20 F	NF	NF	NF
10-Nov-22	0.0	0.0	12.6			8.51 902 10 F	NF	NF	NF
25-Jan-23	26.0	31.00	47.40	7.33 101 54 F	8.08 965 109 F	8.45 854 22 F	NF	8.33 2890 332 F	8.27 827 52 F
26-Jan-23	0.6	26.60	48.00	7.47 101 570 F	7.68 793 88 F	8.52 807 22 F	NF	8.52 4260 99 F	8.09 816 20 F
27-Jan-23	0.2	26.80	46.00	7.24 103 227 F	7.92 778 46 F	8.54 819 24 F	NF	8.57 4120 46 F	8.10 820 22 F
03-Feb-23	0.0	32.20	59.00	7.39 118 145 F	7.90 425 30 F	8.61 871 15 F	NF	8.63 902 64 F	
15-Feb-23	9.6	9.6	9.6	7.39 138 368 F	8.09 558 132 F	8.40 861 27 F	NF	8.55 3130 224 F	8.34 737 27 F
16-Feb-23	0.2	9.8	9.8	7.34 143 394 F	8.09 548 100 F	8.38 863 25 F	NF	8.69 5570 152 F	8.33 707 28 F
17-Feb-23	0.0	9.8	9.8	7.42 152 260 F	8.09 552 91 F	8.39 870 28 F	NF	8.74 5720 27 F	8.26 751 117 F
Median	6.4	41.8	58.3	7.1 101 95	8.0 774 52	8.5 943 22	7.6 324 434	8.0 1320 136	8.3 824 67
Mean (average)	19.6	59.0	80.2	7.1 106 193	8.0 1454 98	8.4 1152 49	7.5 382 984	8.1 1725 789	8.2 949 90
Minimum	0.0	0.0	3.0	5.2 52 7	6.9 89 6	7.2 187 7	6.9 86 23	7.2 71 16	7.5 210 13
90 percentile	49.4	131.7	162.9	7.5 150 378	9.2 3760 173	8.7 1640 40	7.8 579 2074	8.6 3634 2377	8.4 1477 184
95 percentile	86.8	148.5	221.6	7.6 176 594	9.3 4358 332	8.8 1659 48	7.9 720 3980	8.7 5242 3983	8.5 1681 245
99 percentile	142.4	221.6	309.7	7.7 196 2042	9.5 5546 793	8.8 1683 685	8.0 1179 6339	8.7 7109 7527	8.6 2068 271
Maximum	216.8	301.2	588.8	7.8 218 2090	9.7 5660 1000	8.8 1700 1120	8.1 1610 9780	8.7 10500 13000	8.6 2200 290
# Amberley AMO (station 040004) F Flowing NF No Flow NR Not Recorded NS Not Sampled NA Not Accessible									

APPENDIX 3 - TABLE 2: HISTORICAL SURFACE WATER RUNOFF DATA (2014-2023)

Ref: 3206Jan



6 February 2023

Manager
Zedemar Holdings Pty Ltd

Dear Sir,

EBENEZER COAL MINE (ML 4712) RUNOFF WATER MONITORING: 25-27 JANUARY 2023

This report summarises the environmental monitoring of water runoff conducted on the Ebenezer site covering ML 4712. RSS (Rising Stage Samplers) have been installed at all sites but sampling is also undertaken of any runoff below the sampler inlet.

Additional samples are now collected from flows in the Southern Drain which reports to a dam at the eastern end of the site.

Rainfall is based on the official records from the Bureau of Meteorology recorded at Amberley AMO (station 040004).

Continuing discharge from EW33 Spillway, triggered additional sampling on 10 November 2022 (2Y22Nov2~November 10~Runoff Water Monitoring~Ebenezer.pdf).

Despite it being the “wet season”, no significant rain causing flows occurred in November (29.2 mm) or December (76.2 mm). Significant rain fell 5-6 January (72.0 mm) but no flows were recorded.

Rainfall commencing 20 January 2023 finally triggered the requirement for monitoring on 25 to 27 January 2023 at 3 sites: EW33 Spillway - Tailings storage; EW35 Out of Pit Spoil and EWSD the Southern Drain as well as at EW1 Upstream Ebenezer Creek and EW7 Downstream Ebenezer Creek. EW34 at the culvert below the eastern rehabilitation did not discharge.

Amberley AMO recorded 45.8 mm while the rain gauge on site recorded 46.0 mm over the same period (Table 1).

Table 1. Rainfall regime and sampling status on ML 4712. Samples are in bold.

Date	Day	Amberley	ML 4712	EW1	EW7	EW33	EW35	EWSD
20-Jan-23	Fri	14.0	8.0			NF-NS	NF-NS	NF-NS
21-Jan-23	Sat	5.0				NF-NS	NF-NS	NF-NS
22-Jan-23	Sun					NF-NS	NF-NS	NF-NS
23-Jan-23	Mon		8.0			NF-NS	NF-NS	NF-NS
24-Jan-23	Tue					NF-NS	NF-NS	NF-NS
25-Jan-23	Wed	26.0	20.0	F	F	F	F	F
26-Jan-23	Thu	0.6	10.0	F	F	F	F	F
27-Jan-23	Fri	0.2		F	F	F	F	F

* **F** Flowing **NF** Not Flowing **NS** Not Sampled **NA** Not Accessible

Sampling was conducted for 3 days once a runoff event was triggered at any of the nominated monitoring points where runoff was occurring or had occurred. Samples were collected from the RSS at EW1 and EW7 on 26 January 2023. All other samples were manually collected at all sites where water was present (Table 1).



EBENEZER COAL MINE (ML 4712)
RUNOFF WATER MONITORING: 25-27 JANUARY 2023

Page 2

A graphical presentation of the results is attached.

Current results are presented in Table 2.

Table 2. Summary of results of water monitoring on ML 4712.

Site	Sample date	Flow *	pH	Electrical Conductivity	Suspended Solids
EW1	25-Jan-23	F	7.33	101	54
EW1	26-Jan-23	F	7.47	101	570
EW1	27-Jan-23	F	7.24	103	227
EW7	25-Jan-23	F	8.08	965	109
EW7	26-Jan-23	F	7.68	793	88
EW7	27-Jan-23	F	7.92	778	46
EW33	25-Jan-23	F	8.45	854	22
EW33	26-Jan-23	F	8.52	807	22
EW33	27-Jan-23	F	8.54	819	24
EW35	25-Jan-23	F	8.33	2890	332
EW35	26-Jan-23	F	8.52	4260	99
EW35	27-Jan-23	F	8.57	4120	46
EWSD	25-Jan-23	F	8.27	827	52
EWSD	26-Jan-23	F	8.09	816	20
EWSD	27-Jan-23	F	8.10	820	22

* F Flowing NF Not Flowing NS Not Sampled NA Not Accessible

Conductivity of samples at 4 of the 5 sampling sites were low to moderate, at 101 to 965 $\mu\text{S}/\text{cm}$; below the trigger limit of 2,350 $\mu\text{S}/\text{cm}$ in Table C2 of the EA. Conductivity at EW35 was 2,890 to 4,260 $\mu\text{S}/\text{cm}$. The extended dry period without flows had concentrated salinity that was flushed out by the runoff event. Flow rates were very low and no sample was captured by the rising stage sampler. The higher salinity was not reflected downstream at EW7 (778 to 965 $\mu\text{S}/\text{cm}$). All results were consistent with previous runoff results.

The pH was neutral to alkaline (7.24 to 8.57), consistent with previous results. All results were below the trigger limit of 9.0 in Table C2 of the EA. There was no evidence of acid generation on site. The 7.24 pH result was at EW1 upstream Ebenezer Creek.

Suspended solids results were low, 20 to 570 mg/L, with the highest results on 26 January from the RSS sample at EW1 upstream Ebenezer Creek (570 mg/L). On site sediment controls appear to be working. Results for the discharge at EW33 were 22 to 24 mg/L, below the 50 mg/L trigger limit in Table C2 of the EA.

As discussed above there were discharges at 3 sites but there was no risk of environmental harm due to runoff from the ML 4712 site.

Yours faithfully,
ISON ENVIRONMENTAL

Ray Ison

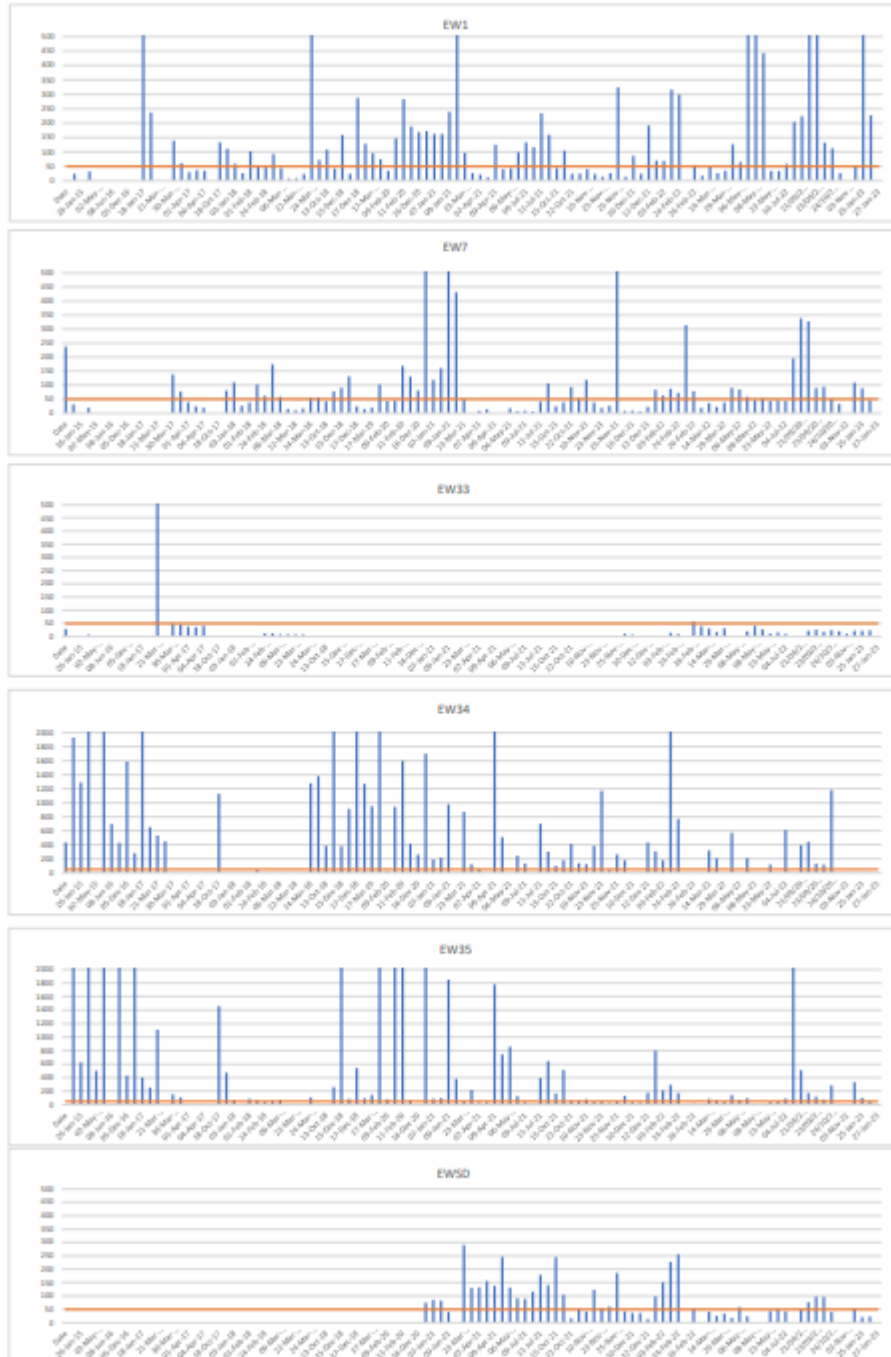
EC Runoff Monitoring Results - Ebenezer ML4712



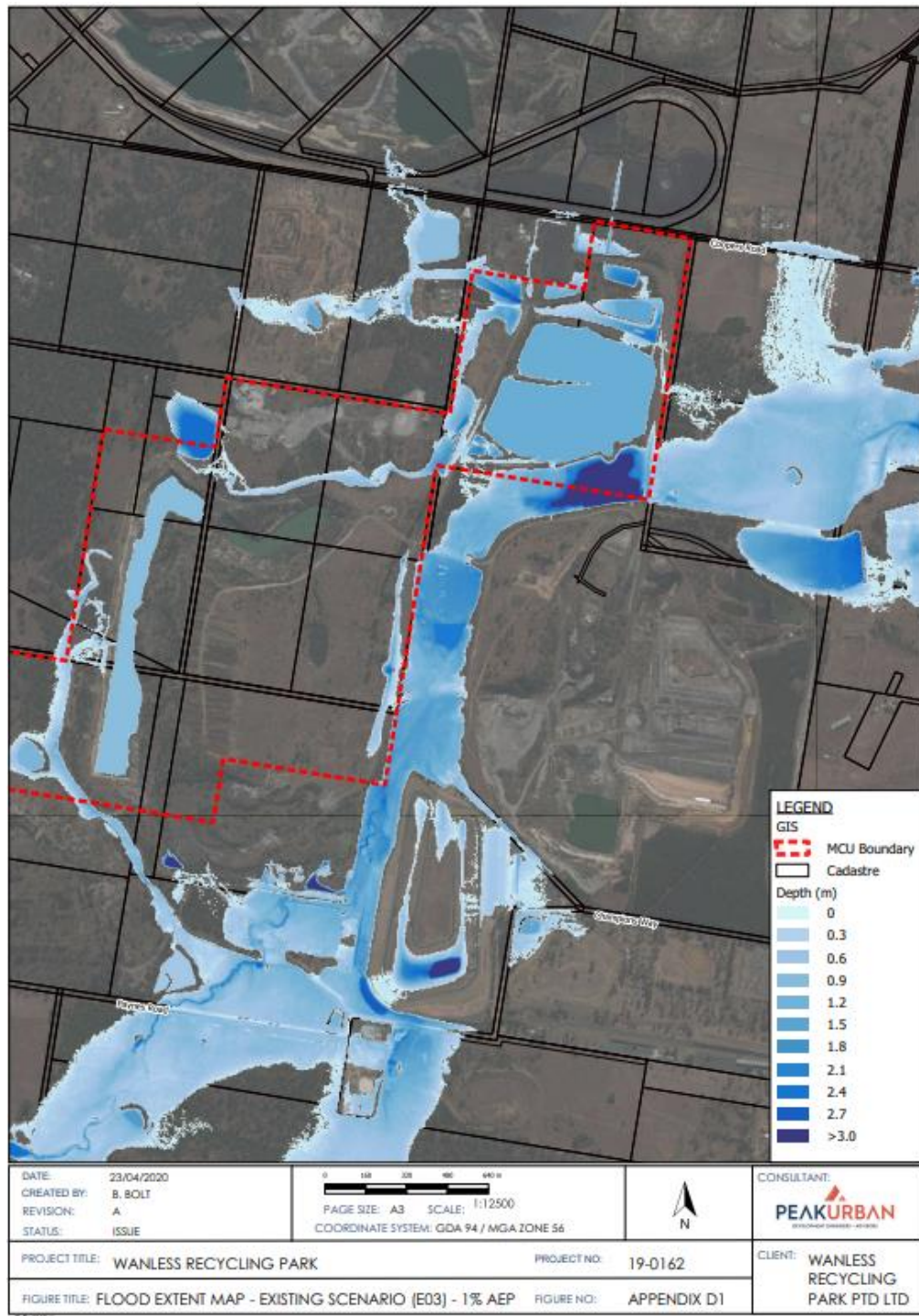
pH Runoff Monitoring Results - Ebenezer ML4712



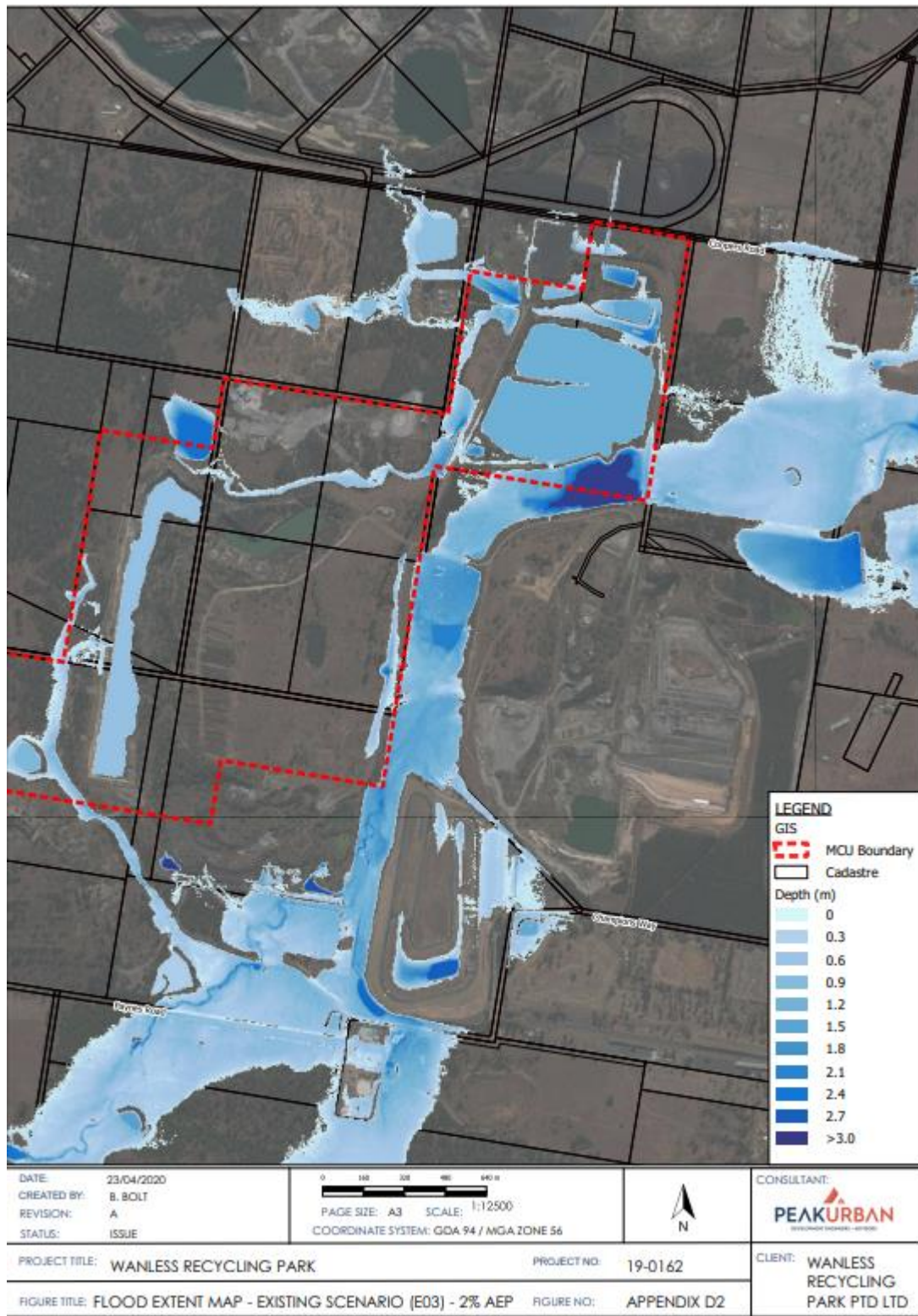
TSS Runoff Monitoring Results - Ebenezer ML4712



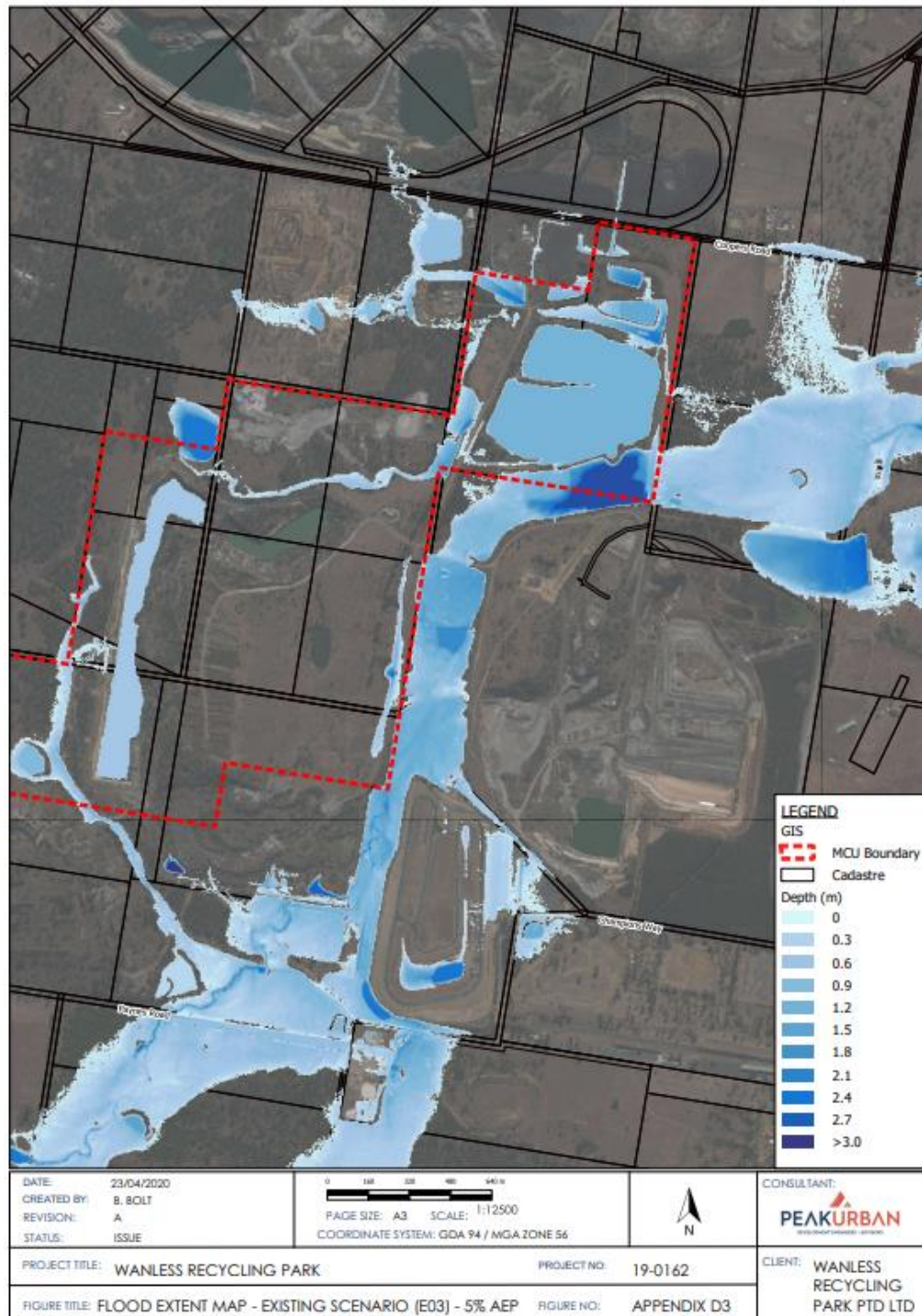
Appendix 4 Flood Maps



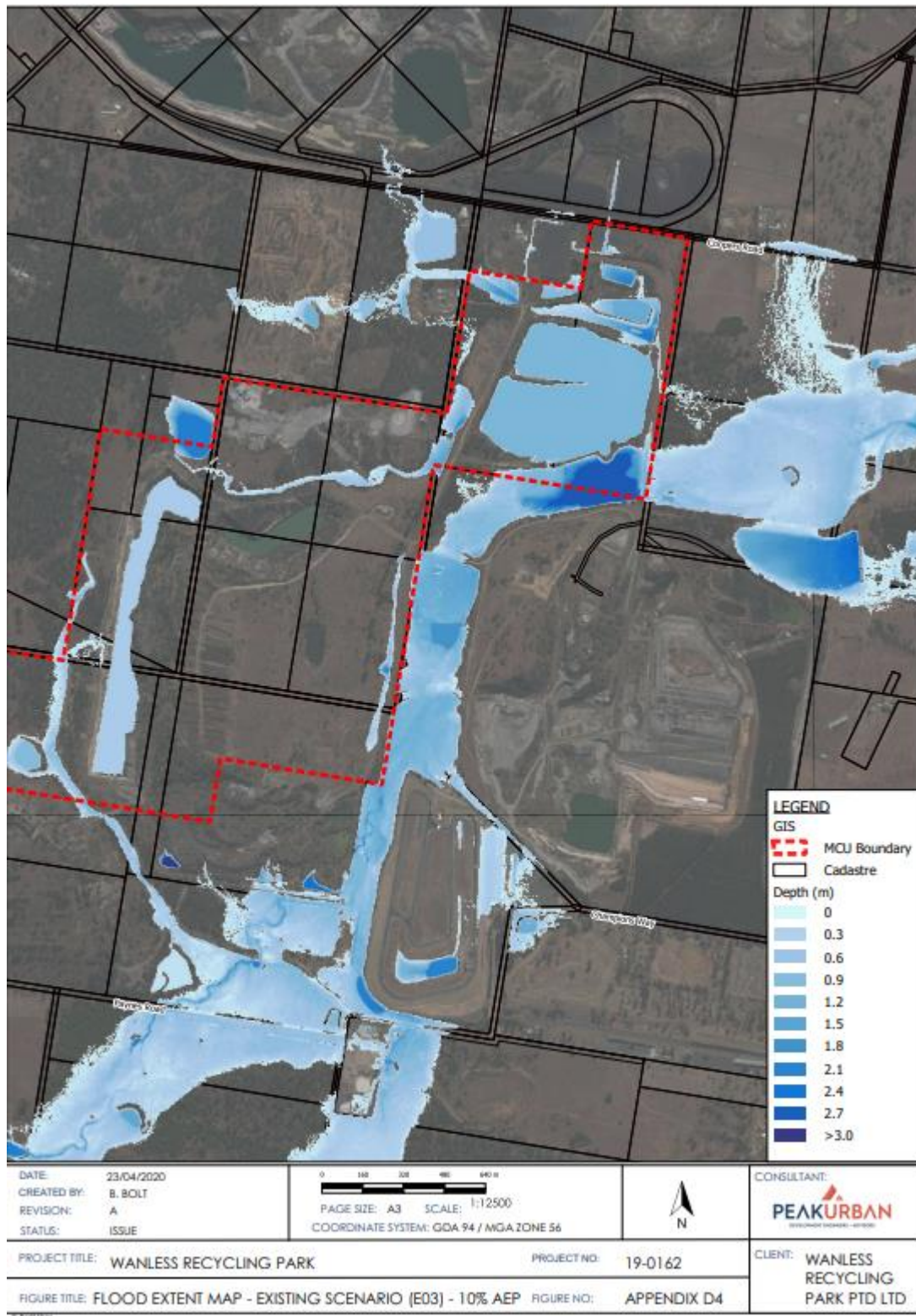
APPENDIX 4 - FLOOD MAP 1: 1% AEP EVENT



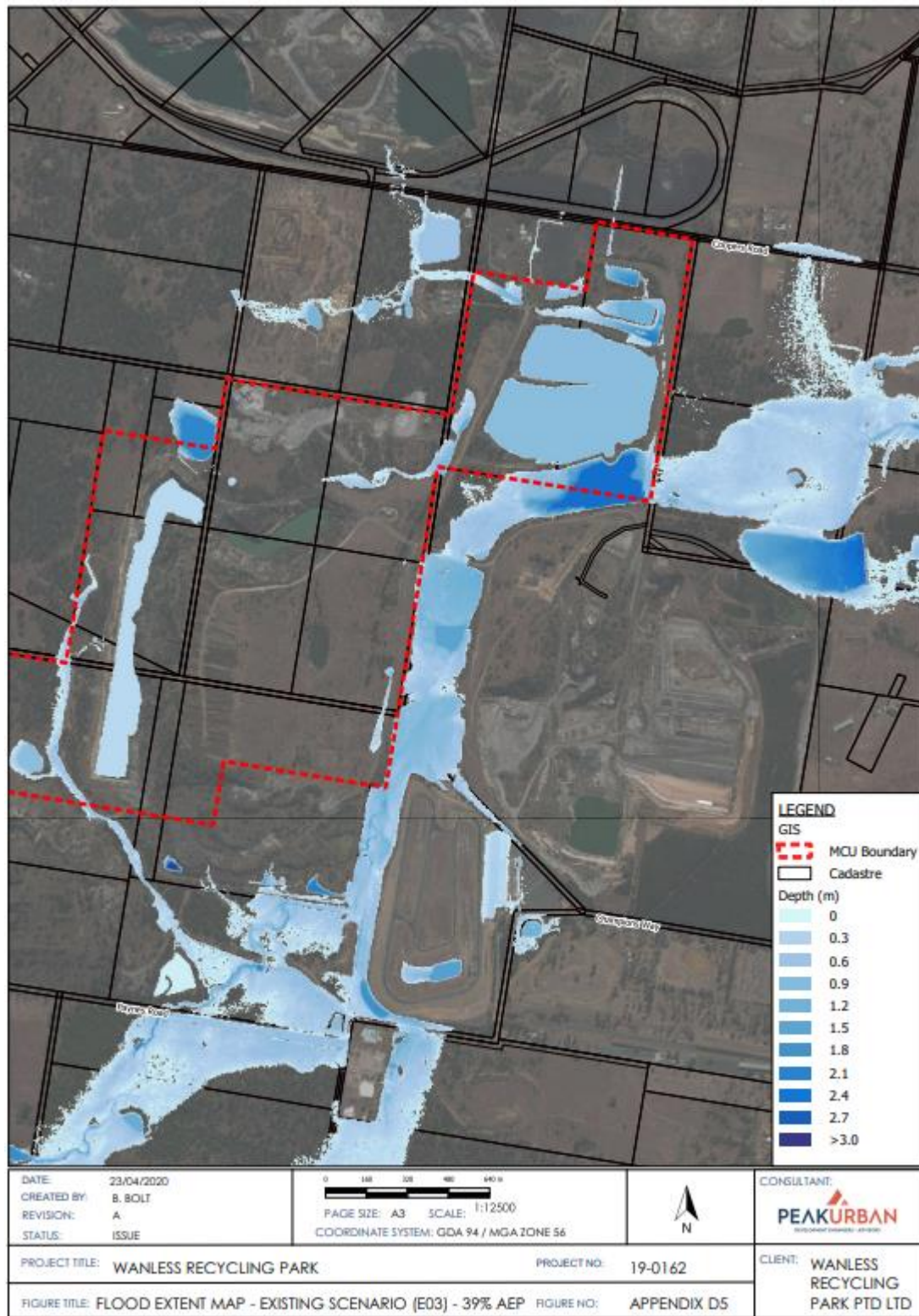
APPENDIX 4 - FLOOD MAP 2: 2 % AEP EVENT



APPENDIX 4 - FLOOD MAP 3: 5% AEP EVENT



APPENDIX 4 - FLOOD MAP 4: 10% AEP EVENT

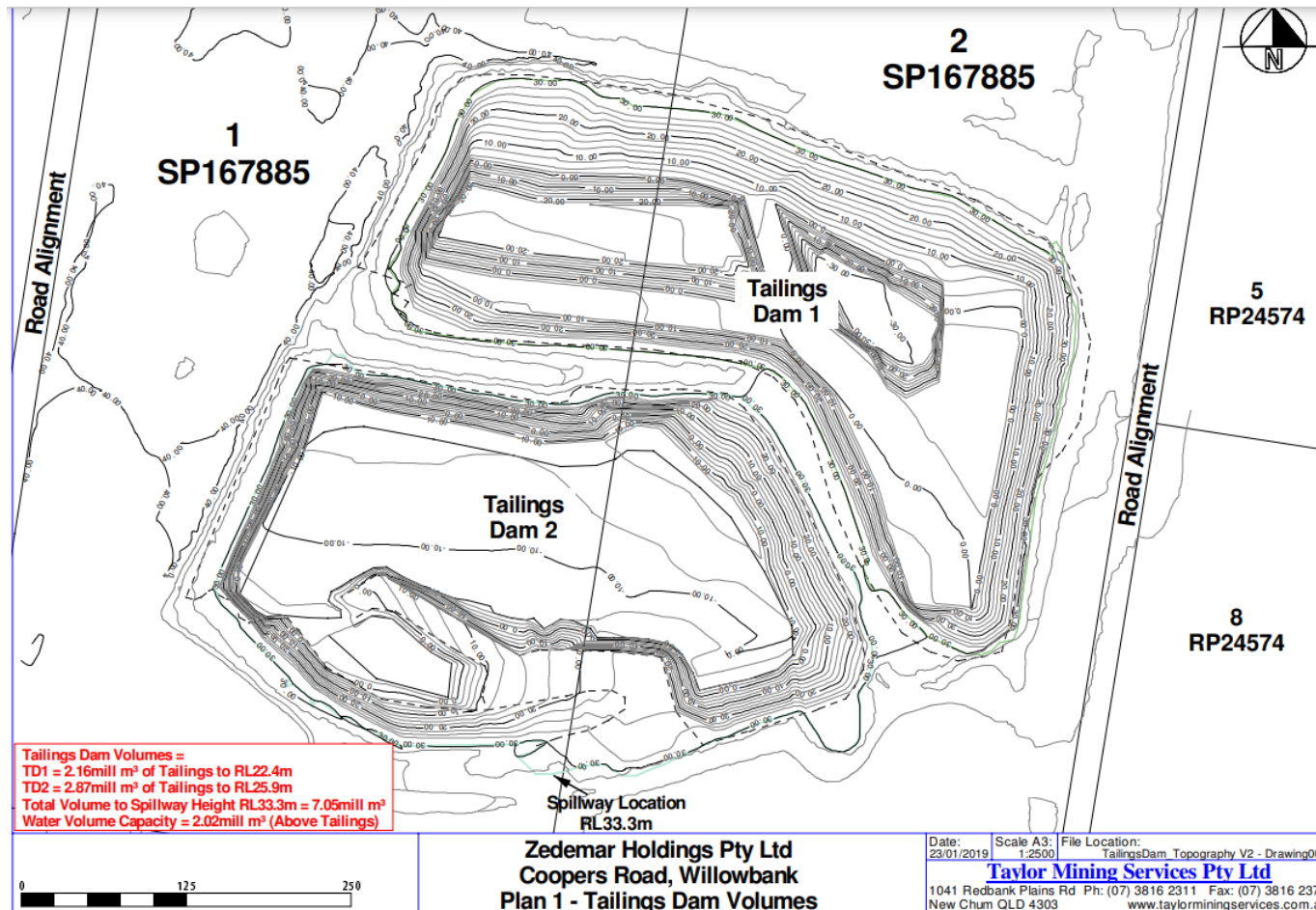


APPENDIX 4 - FLOOD MAP 5: 39% AEP EVENT

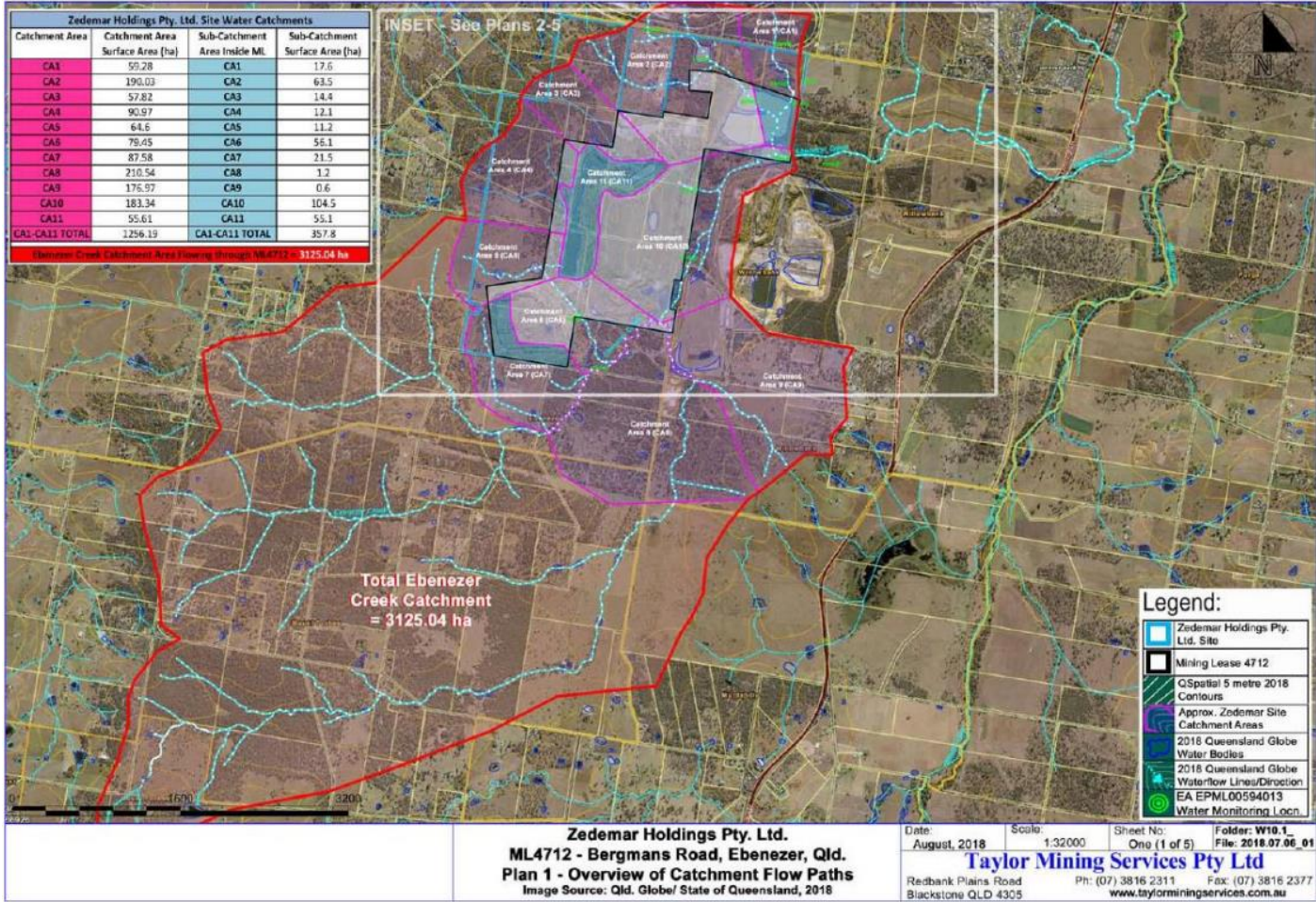
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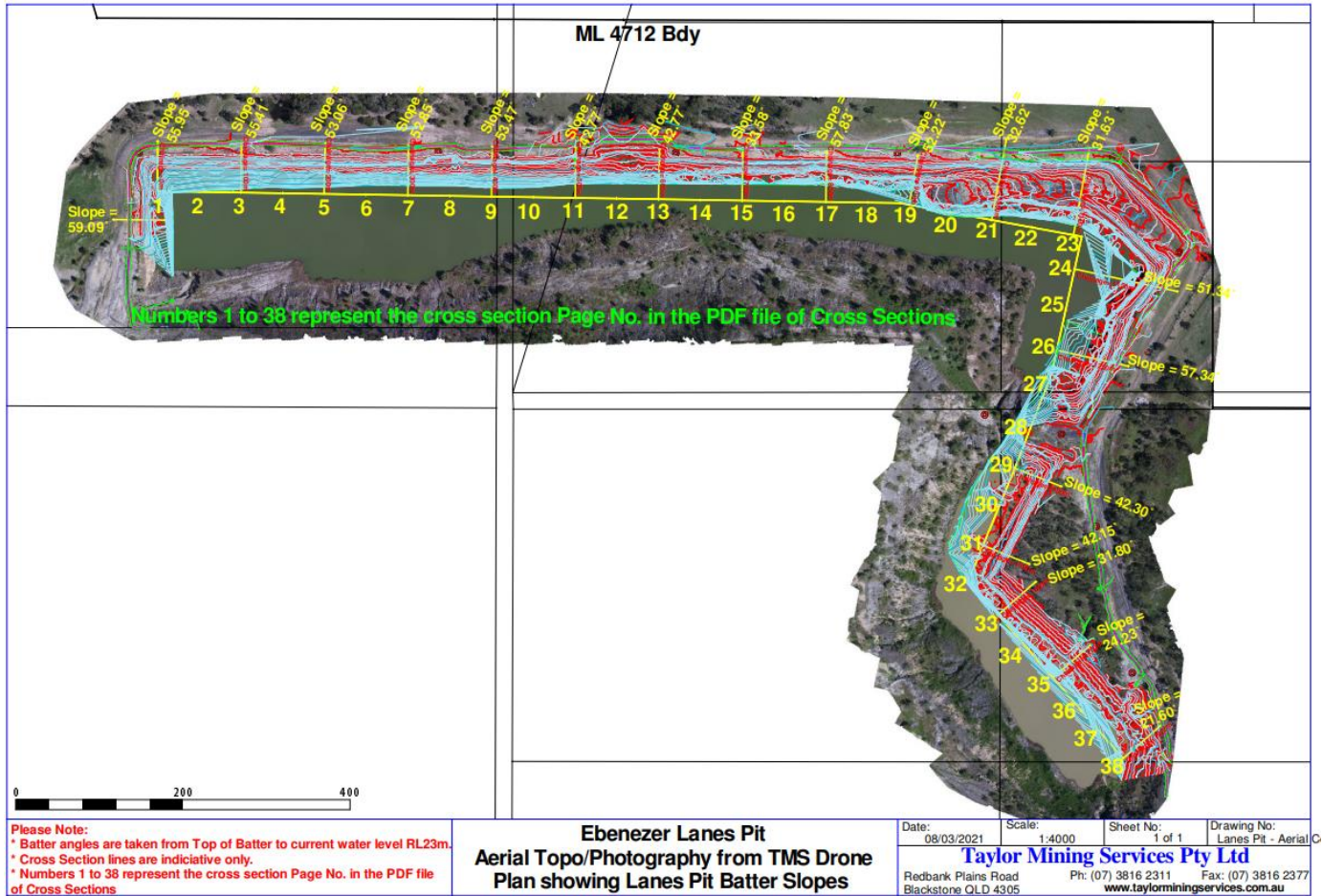
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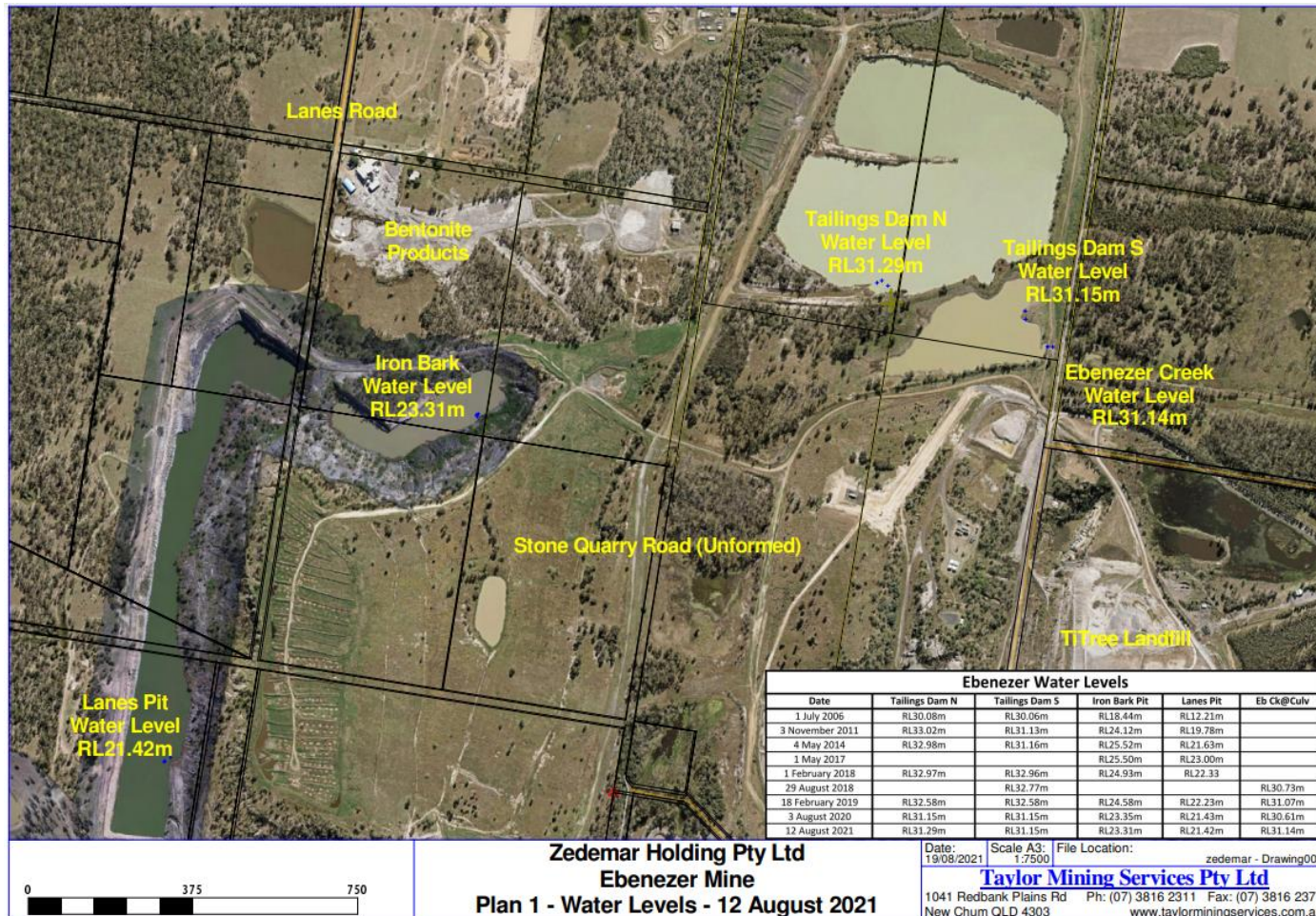
APPENDIX 5 - PLAN 1: TAILINGS DAM VOLUMES & CONTOURS



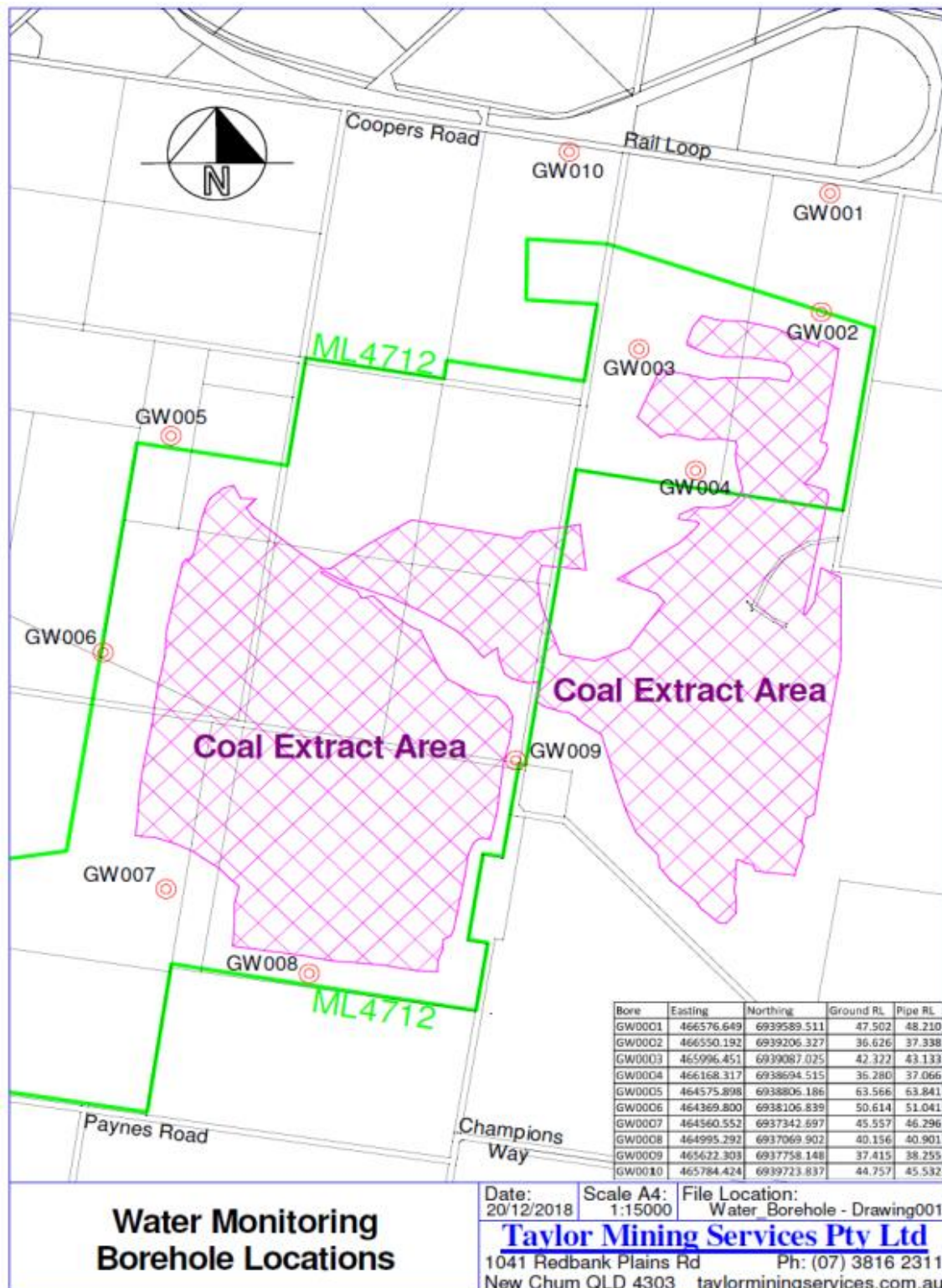
APPENDIX 5 - PLAN 2: CATCHMENT FLOW PATHS



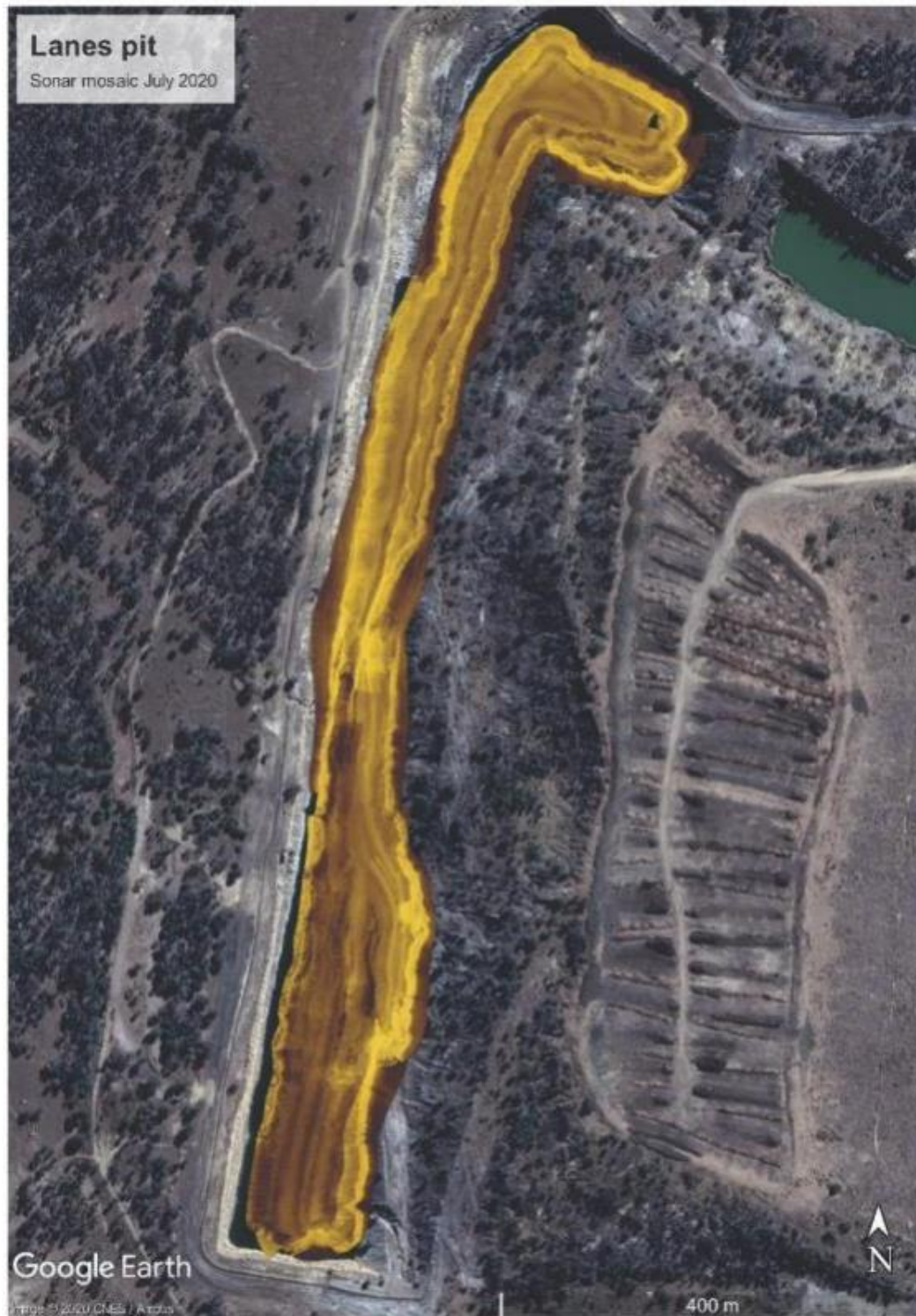
APPENDIX 5 - PLAN 3: DRONE IMAGE SHOWING HIGHWALL BATTER SLOPES



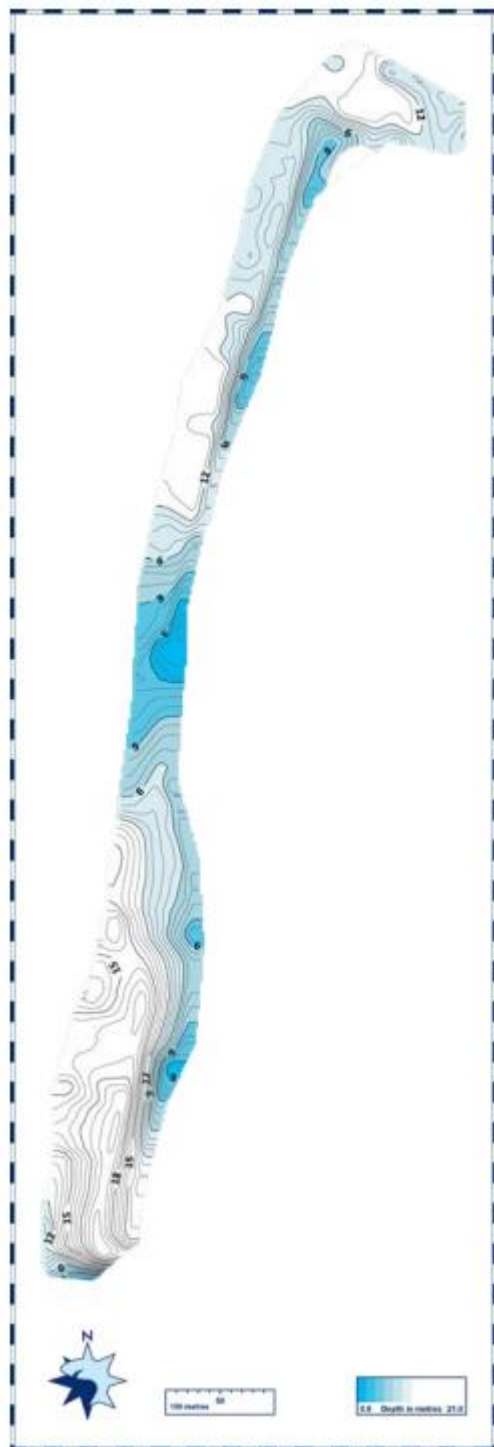
APPENDIX 5 - PLAN 4: VOID WATER LEVELS (12/08/2021)



APPENDIX 5 - PLAN 5: GROUNDWATER MONITORING WELL LOCATIONS



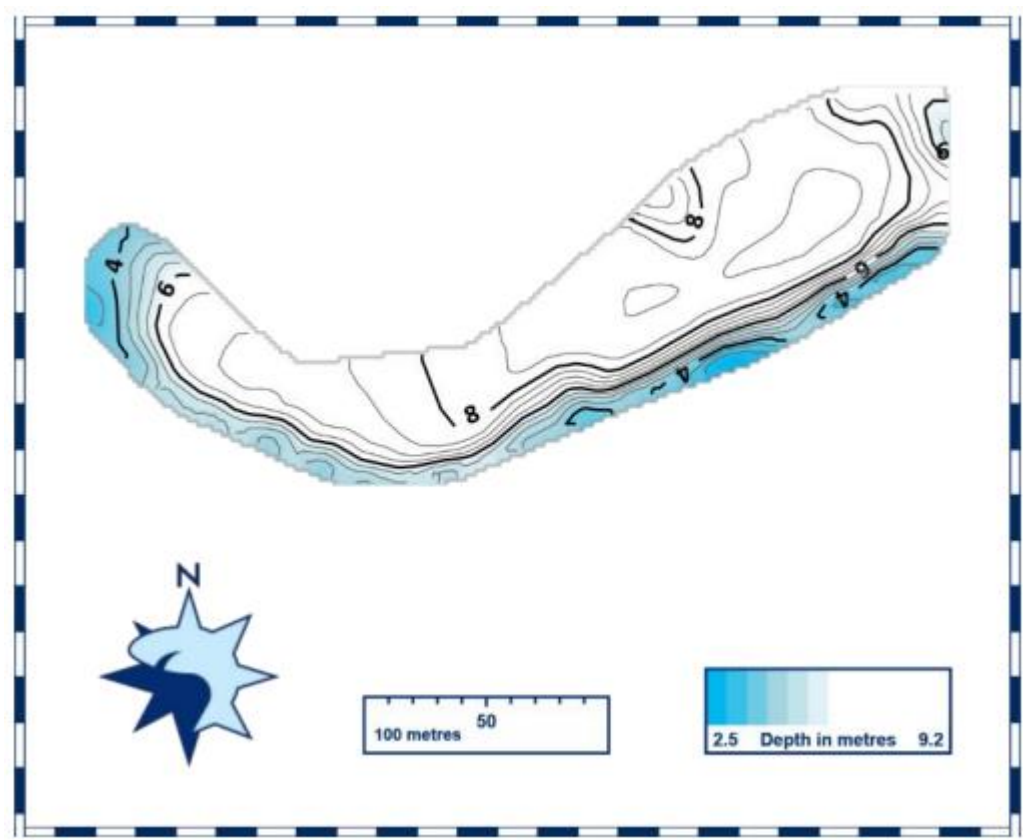
APPENDIX 5 - PLAN 6: SIDESCAN MOSAIC OF LANES VOID (30/07/2020)



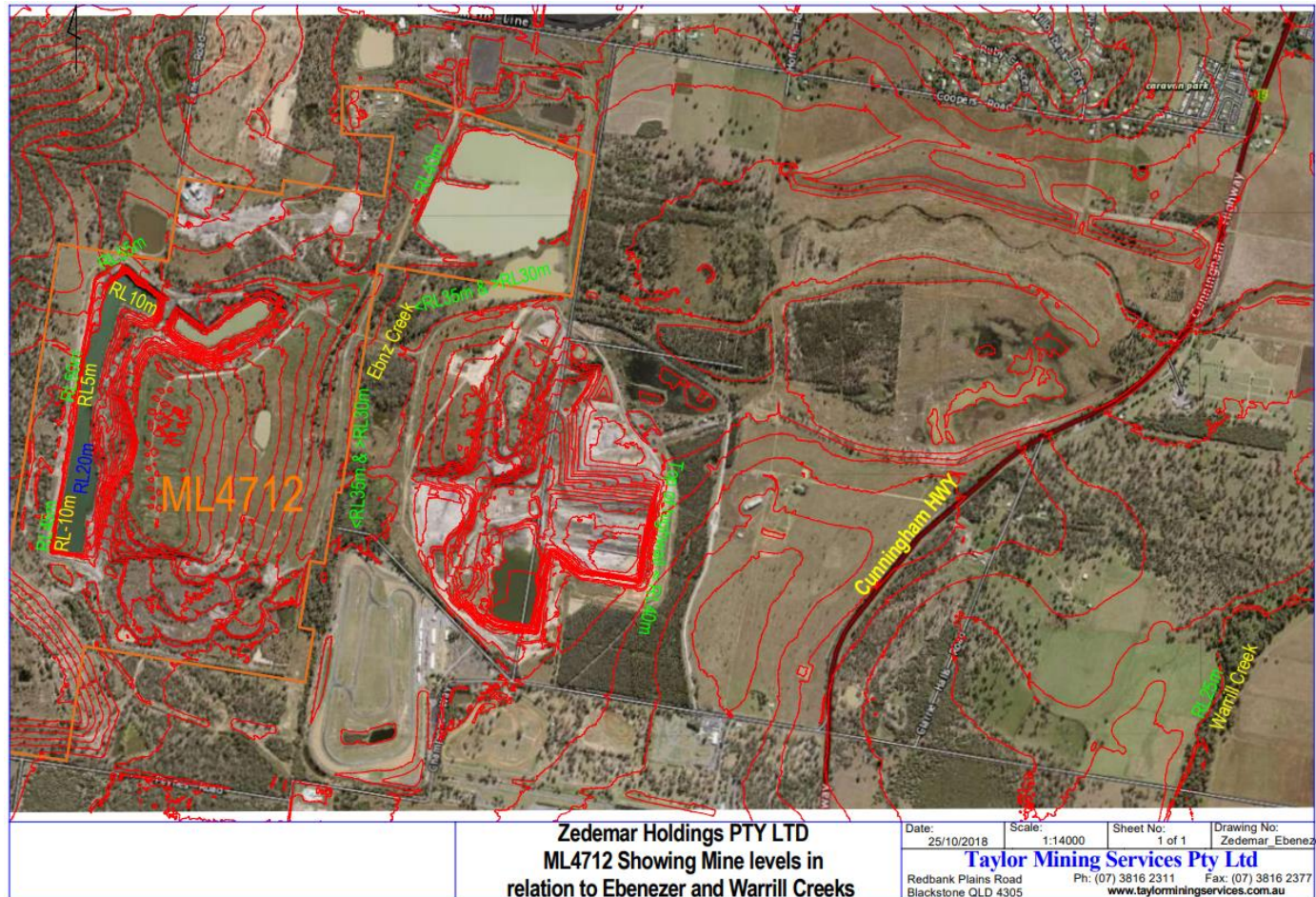
APPENDIX 5 - PLAN 7: DEPTH CONTOURS OF LANES VOID



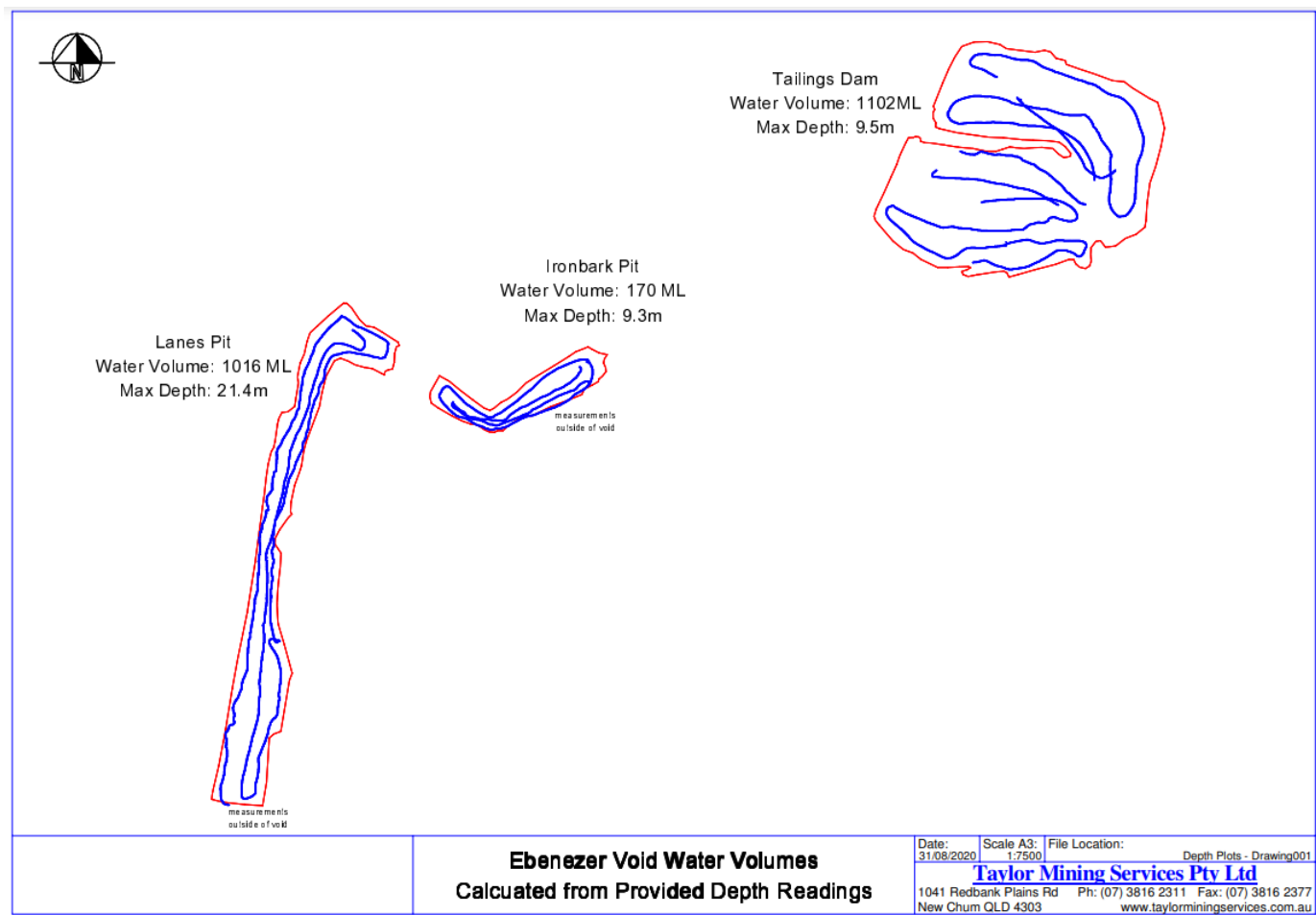
APPENDIX 5 - PLAN 8: SIDESCAN MOSAIC OF IRONBARK NORTH VOID (31/07/2020)



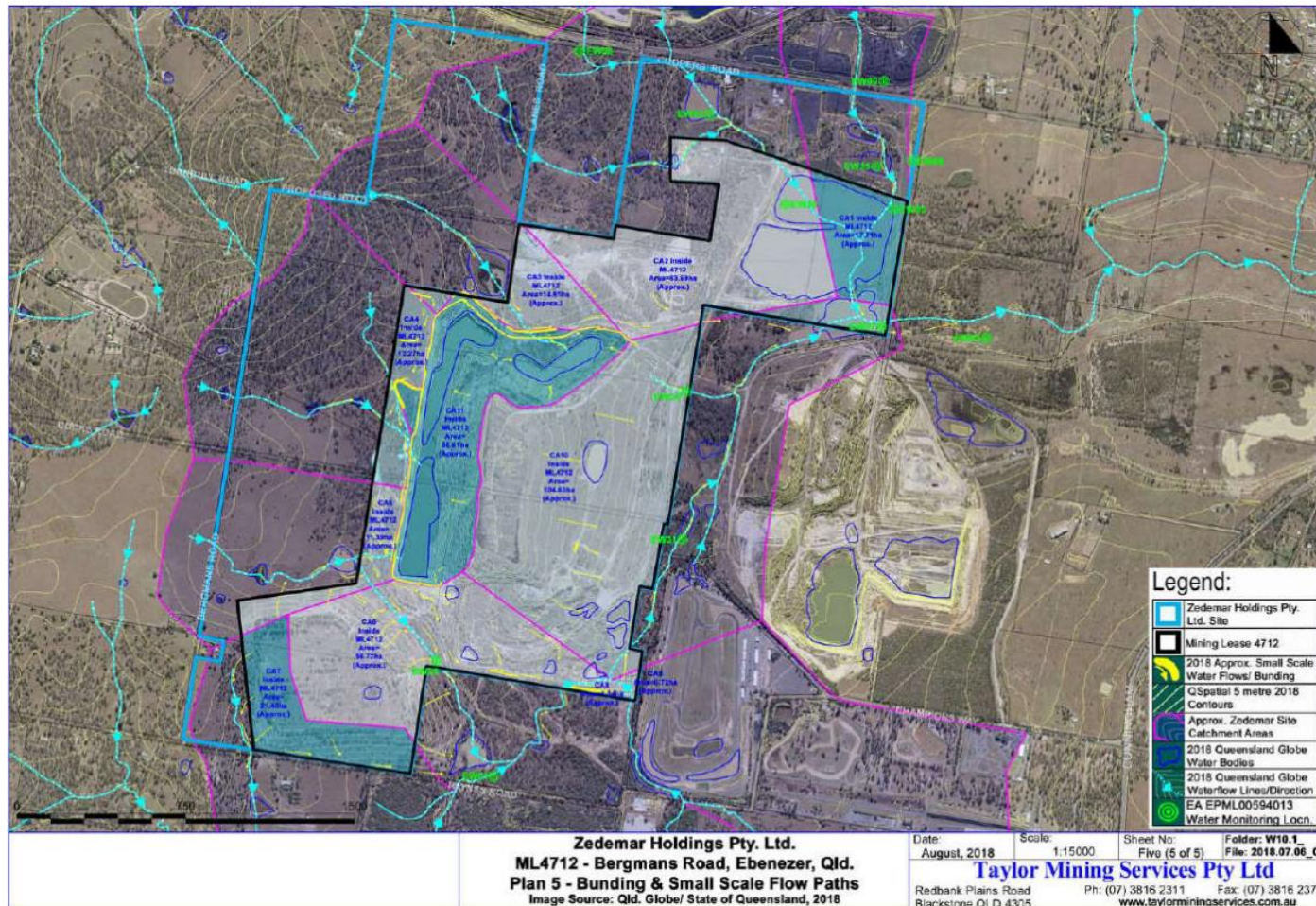
APPENDIX 5 - PLAN 9: DEPTH CONTOURS OF IRONBARK NORTH VOID (31/07/2020)



APPENDIX 5 - PLAN 10: MINE LEVELS IN RELATION TO EBENEZER AND WARRILL CREEK



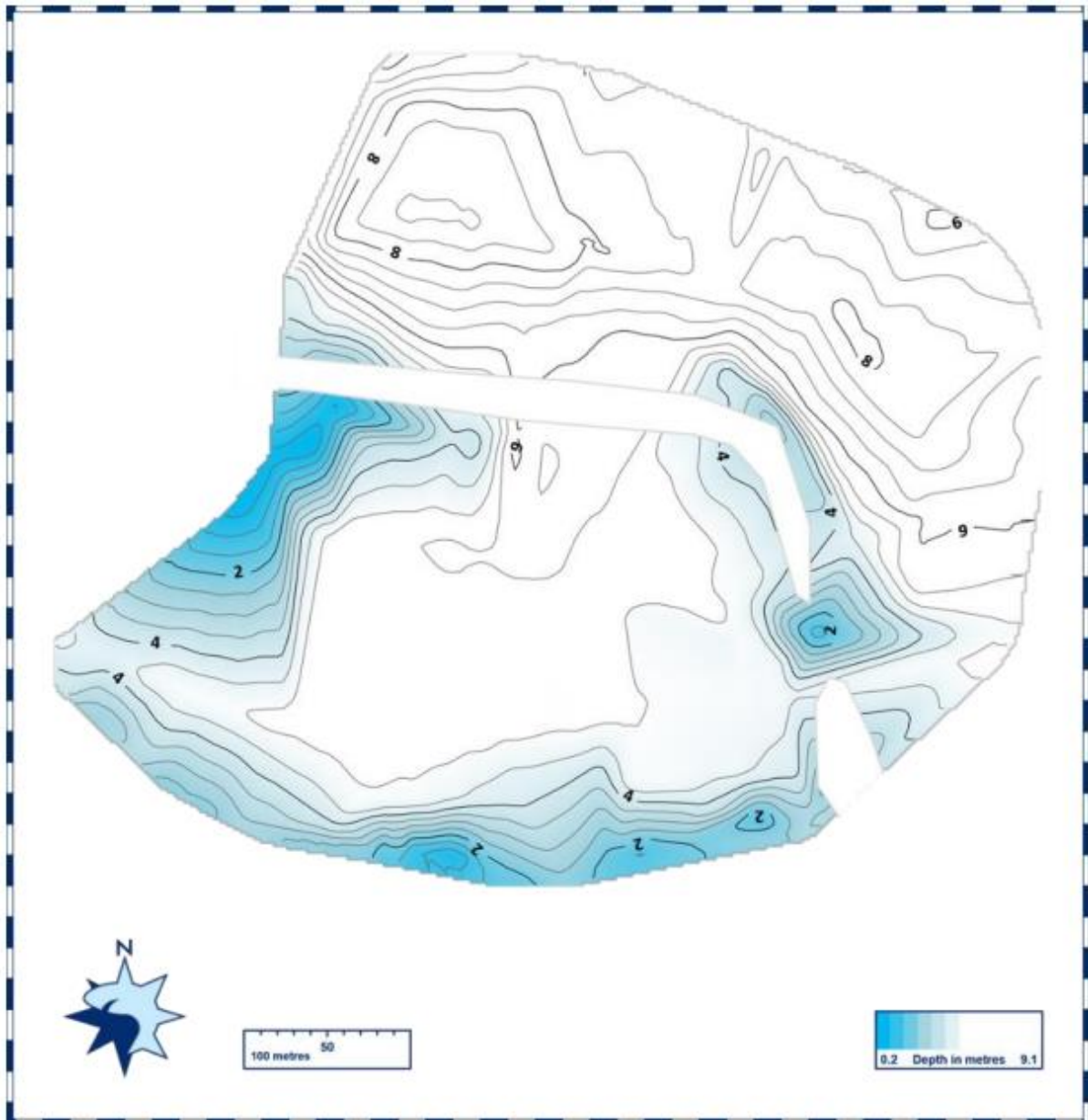
APPENDIX 5 - PLAN 11: VOID WATER VOLUMES, AUGUST 2020



APPENDIX 5 - PLAN 12: SMALL SCALE WATER FLOWS/BUNDING, 2018



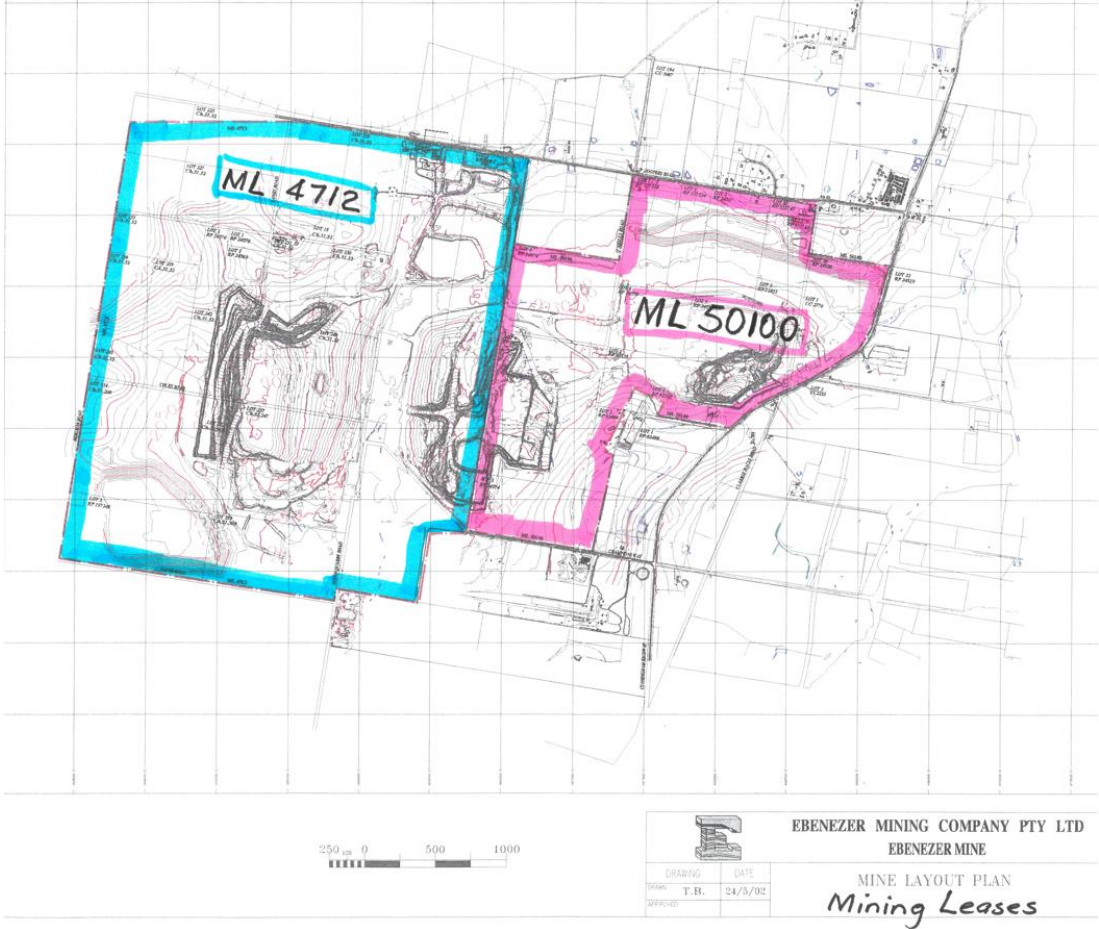
APPENDIX 5 - PLAN 13: SIDESCAN MOSAIC OF THE TAILINGS POND (23/07/2020)



APPENDIX 5 - PLAN 14: DEPTH CONTOURS OF THE TAILINGS POND (23/07/2020)



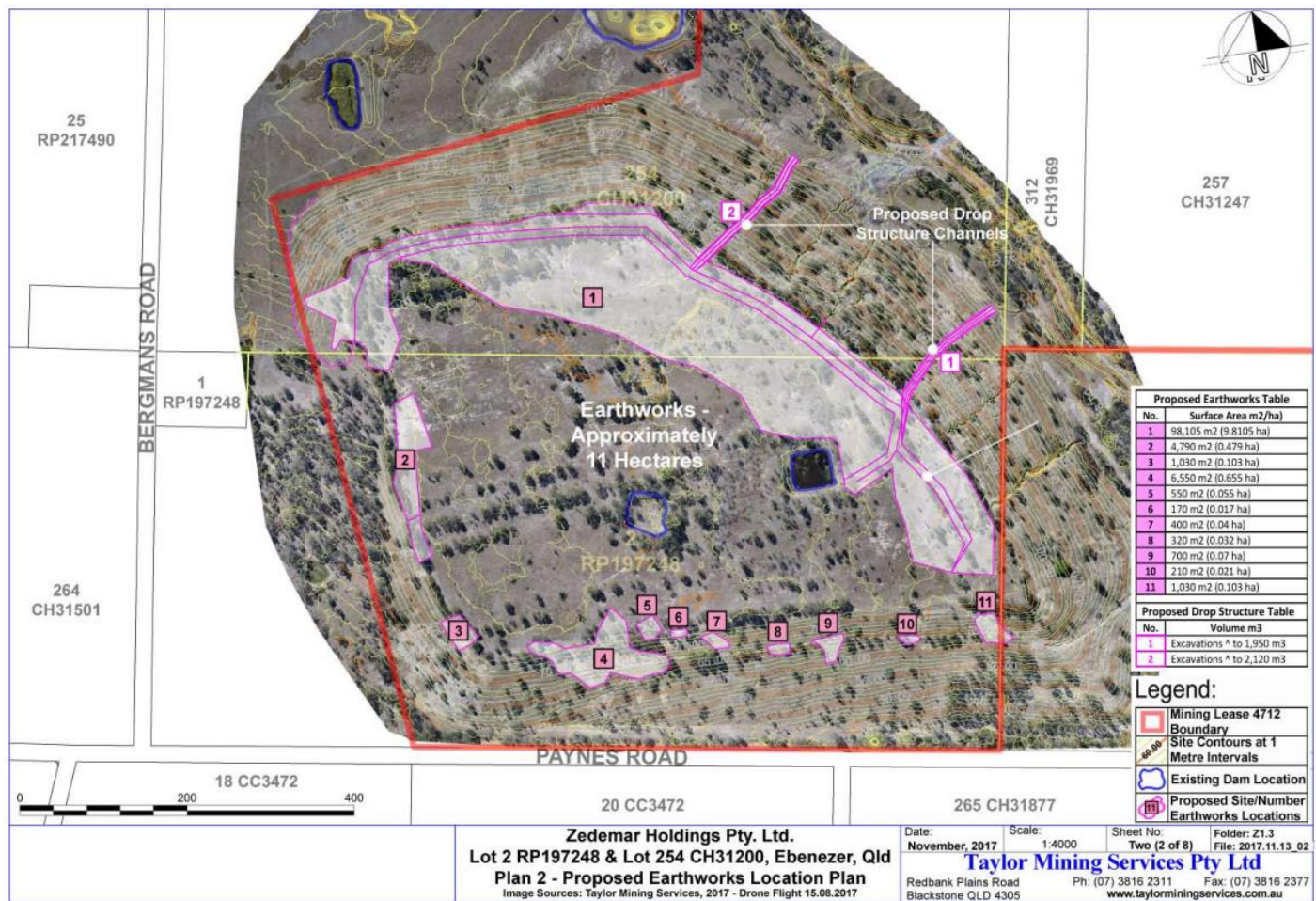
APPENDIX 5 - PLAN 15: SURFACE WATER MONITORING LOCATIONS



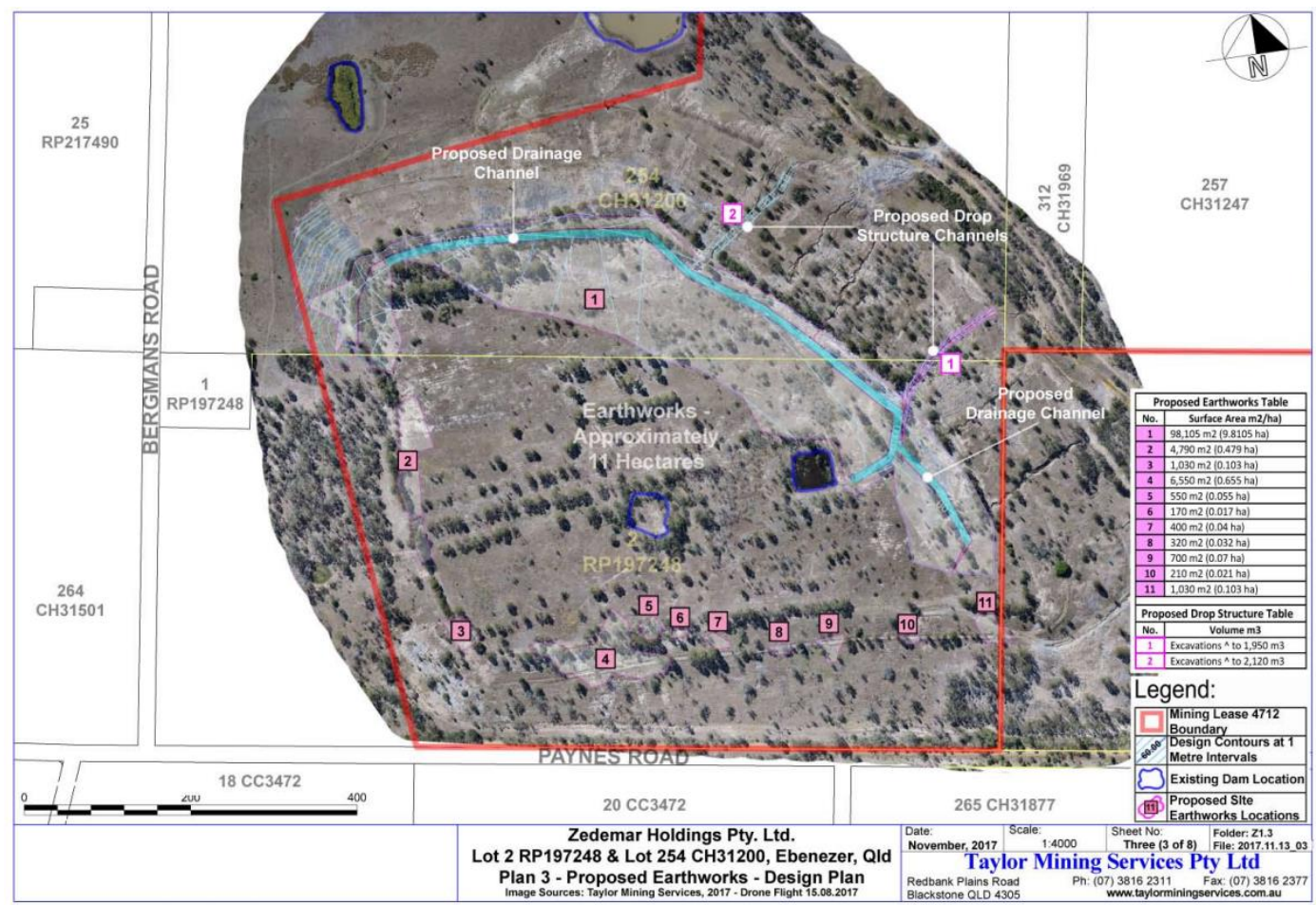
APPENDIX 5 - PLAN 16: ORIGINAL ML4712 AND ML50100 BOUNDARIES (SOURCE: TMS 20/12/2021)



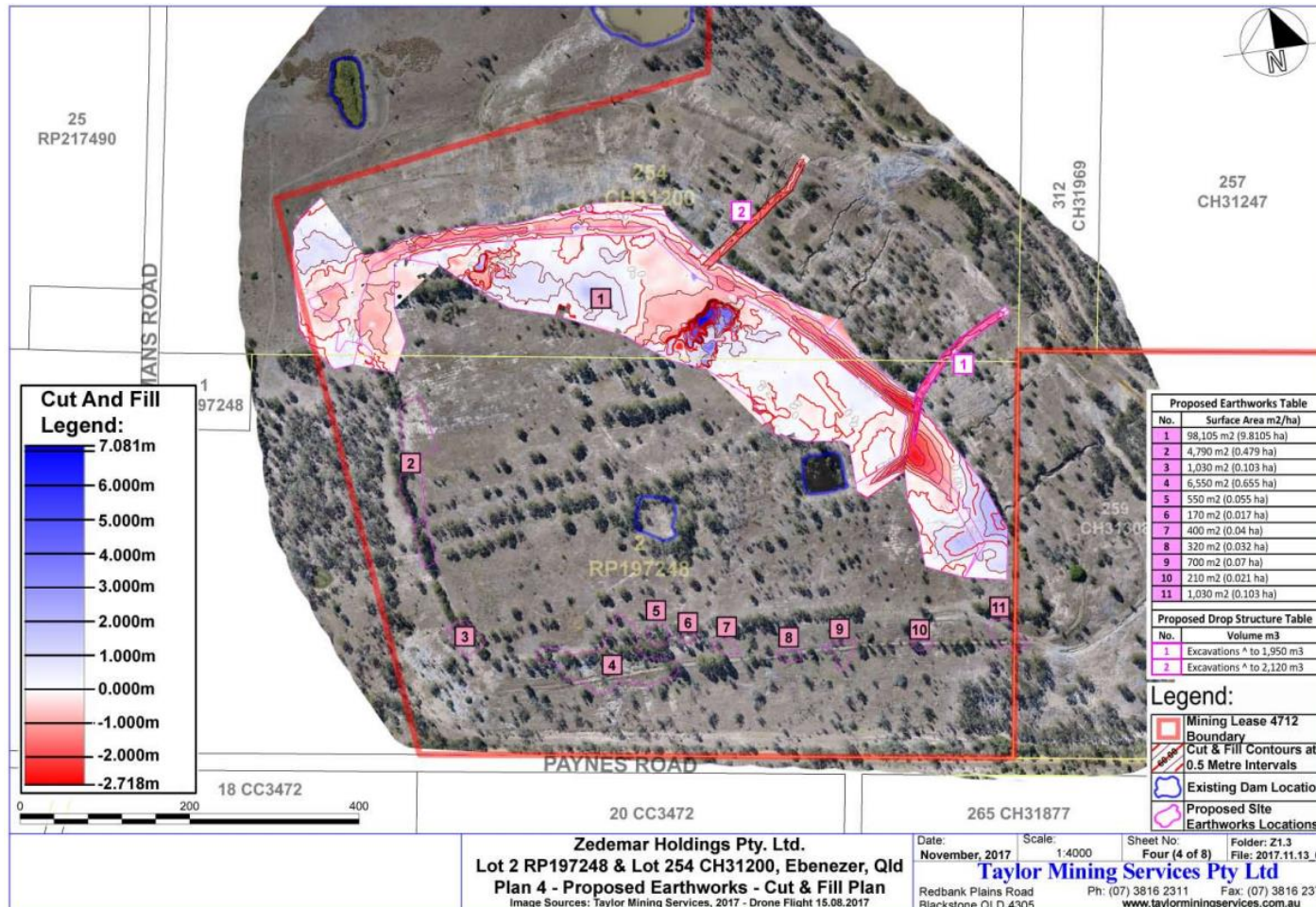
APPENDIX 5 - PLAN 17: THE OPD AREA



APPENDIX 5 - PLAN 18: PROPOSED EARTHWORKS LOCATION AT OPD TOP SURFACE



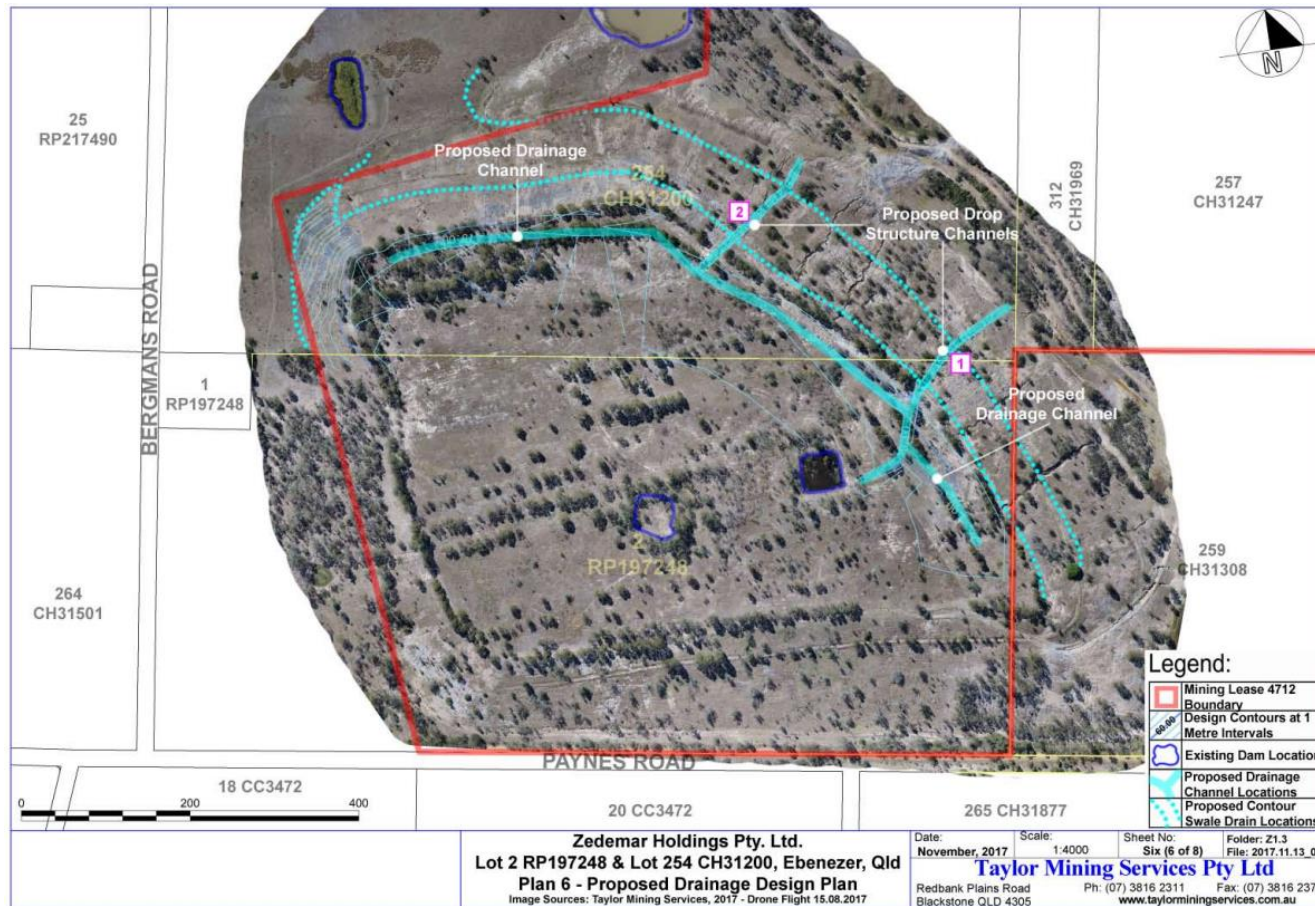
APPENDIX 5 - PLAN 19: PROPOSED DRAINAGE CHANNEL AND DROP STRUCTURE CHANNELS AT OPD TOP SURFACE



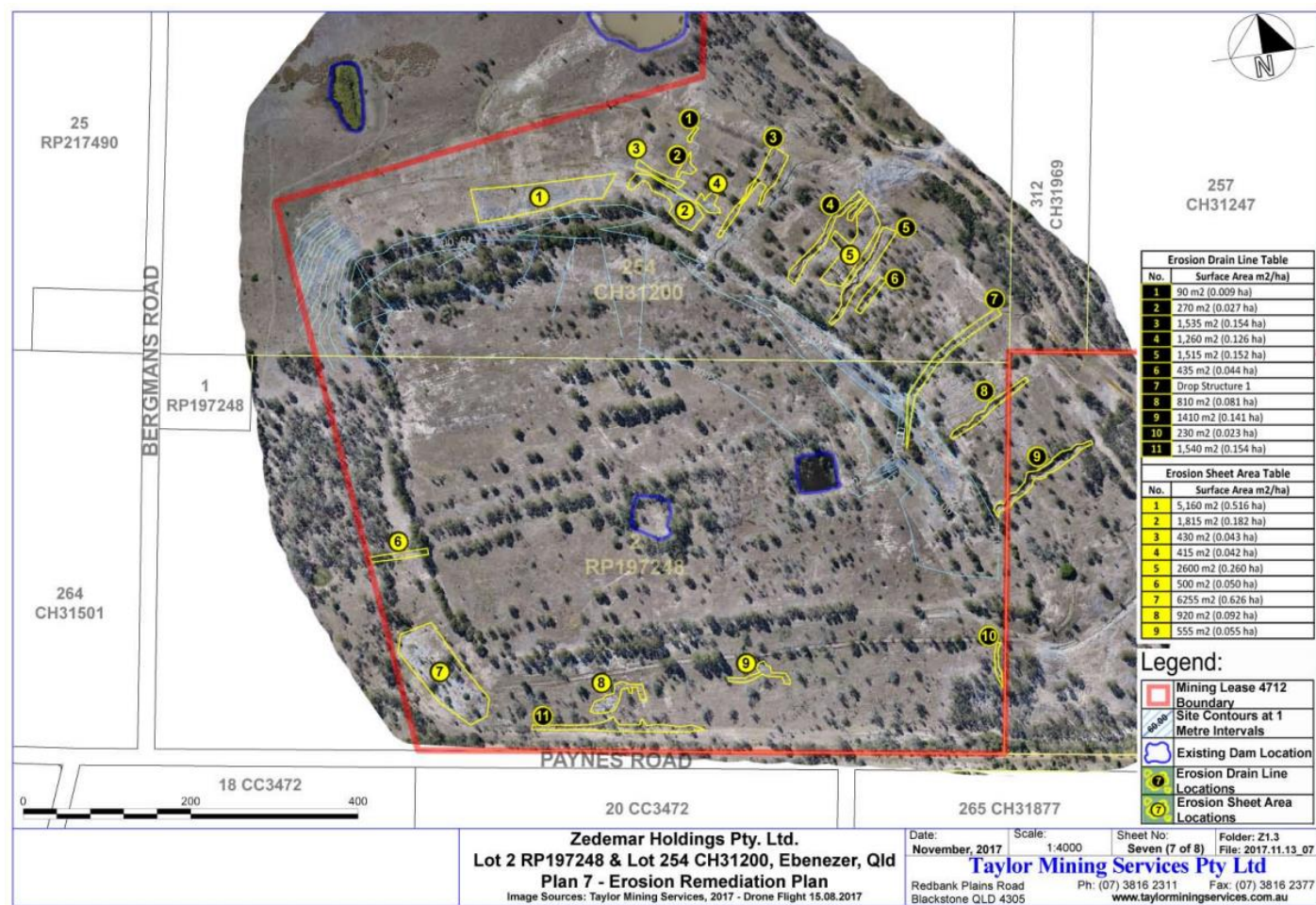
APPENDIX 5 - PLAN 20: PROPOSED CUT AND FILL AT OPD TOP SURFACE



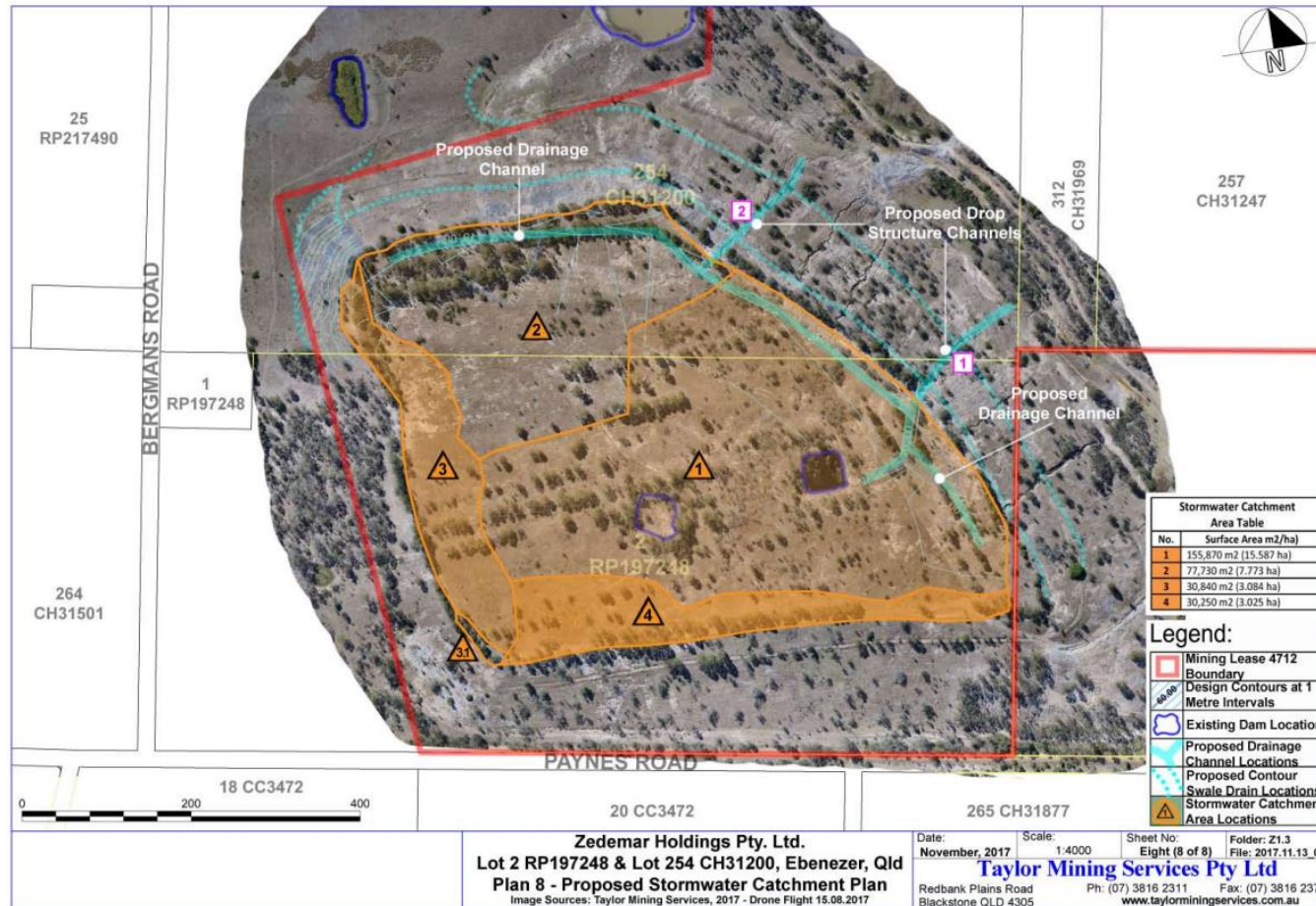
APPENDIX 5 - PLAN 21: SINK HOLE LOCATION AT OPD TOP SURFACE



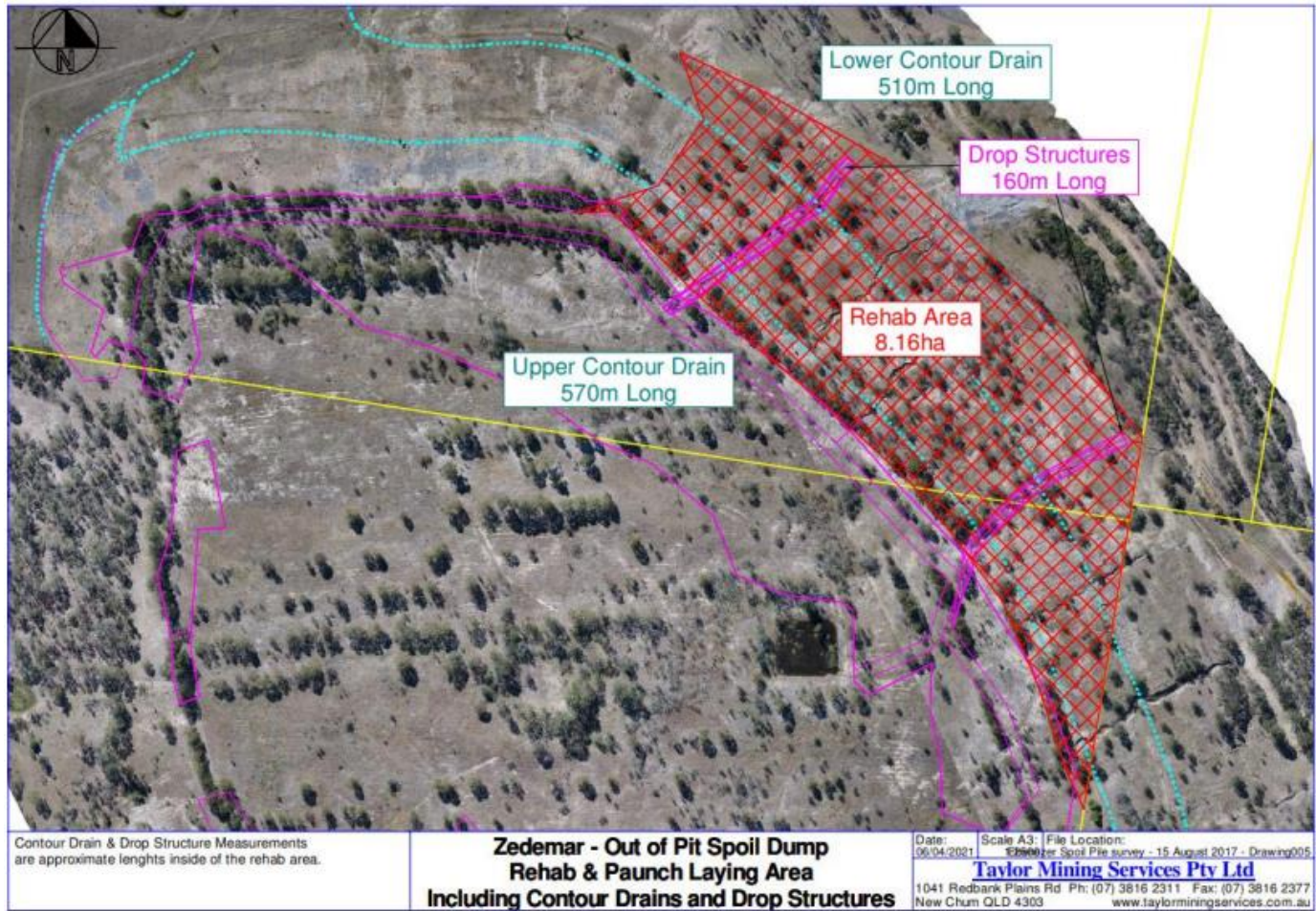
APPENDIX 5 - PLAN 22: PROPOSED DRAINAGE DESIGN PLAN AT OPD TOP SURFACE



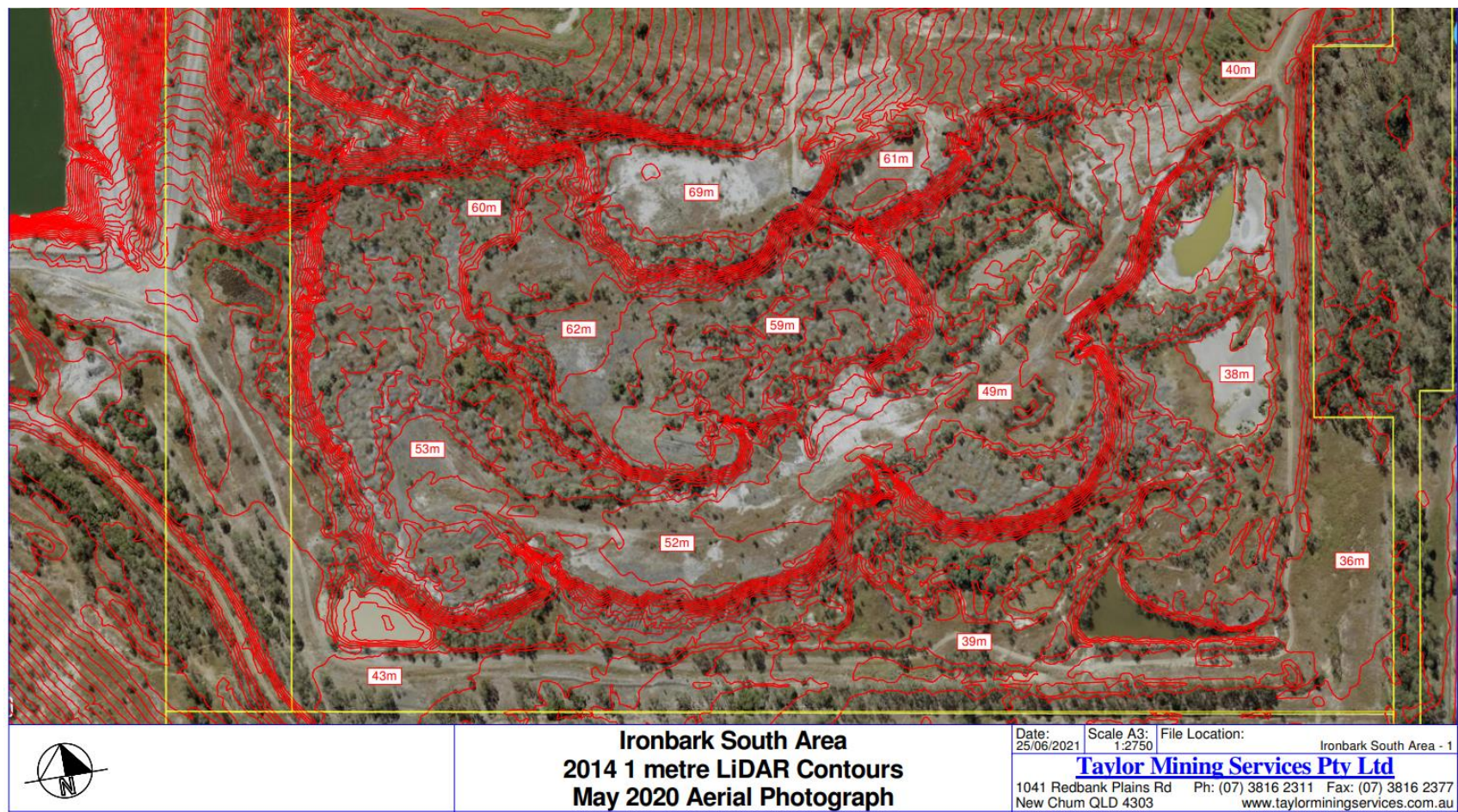
APPENDIX 5 - PLAN 23: EROSION REMEDIATION PLAN AT OPD TOP SURFACE



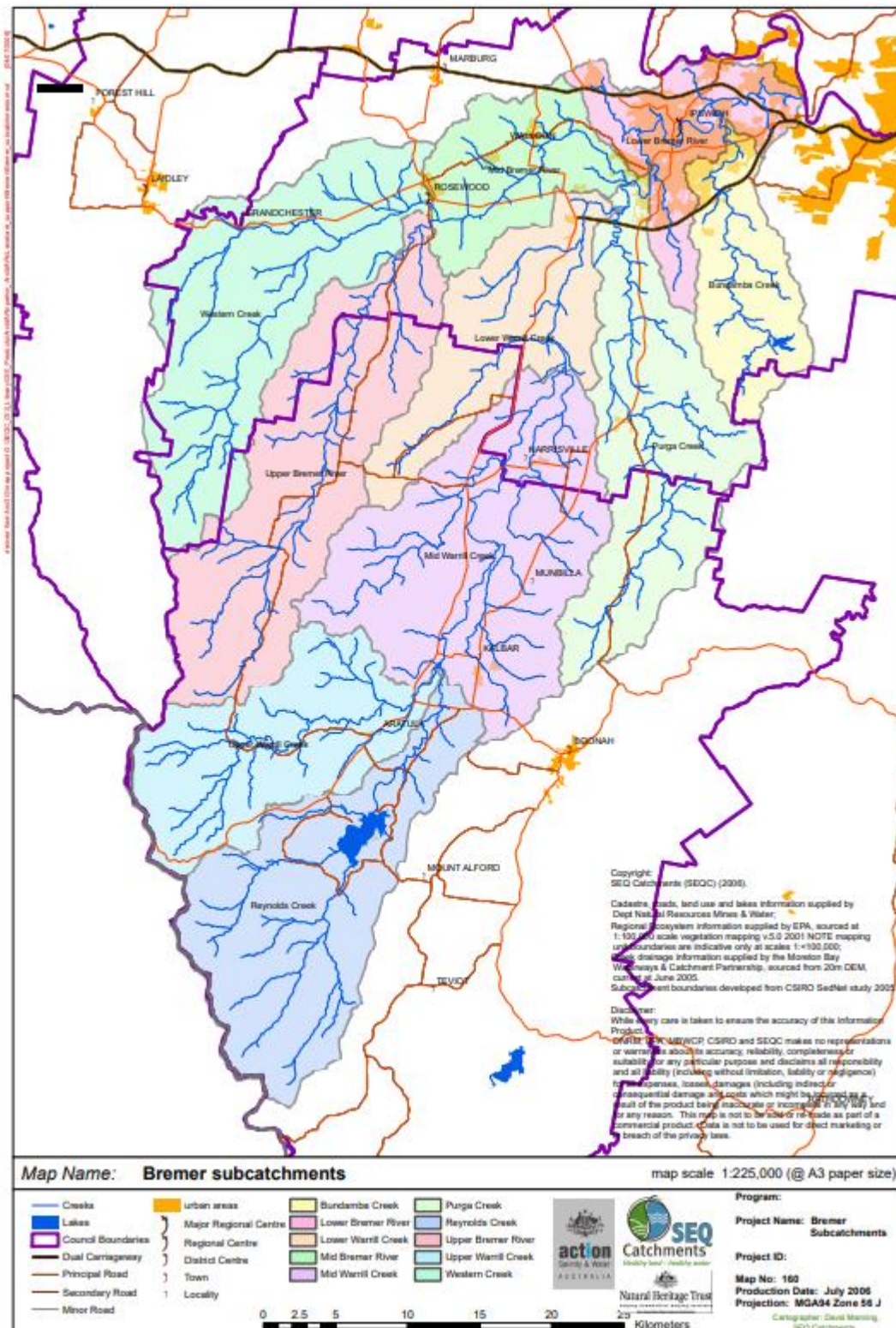
APPENDIX 5 - PLAN 24: STORMWATER CATCHMENT PLAN AT OPD TOP SURFACE



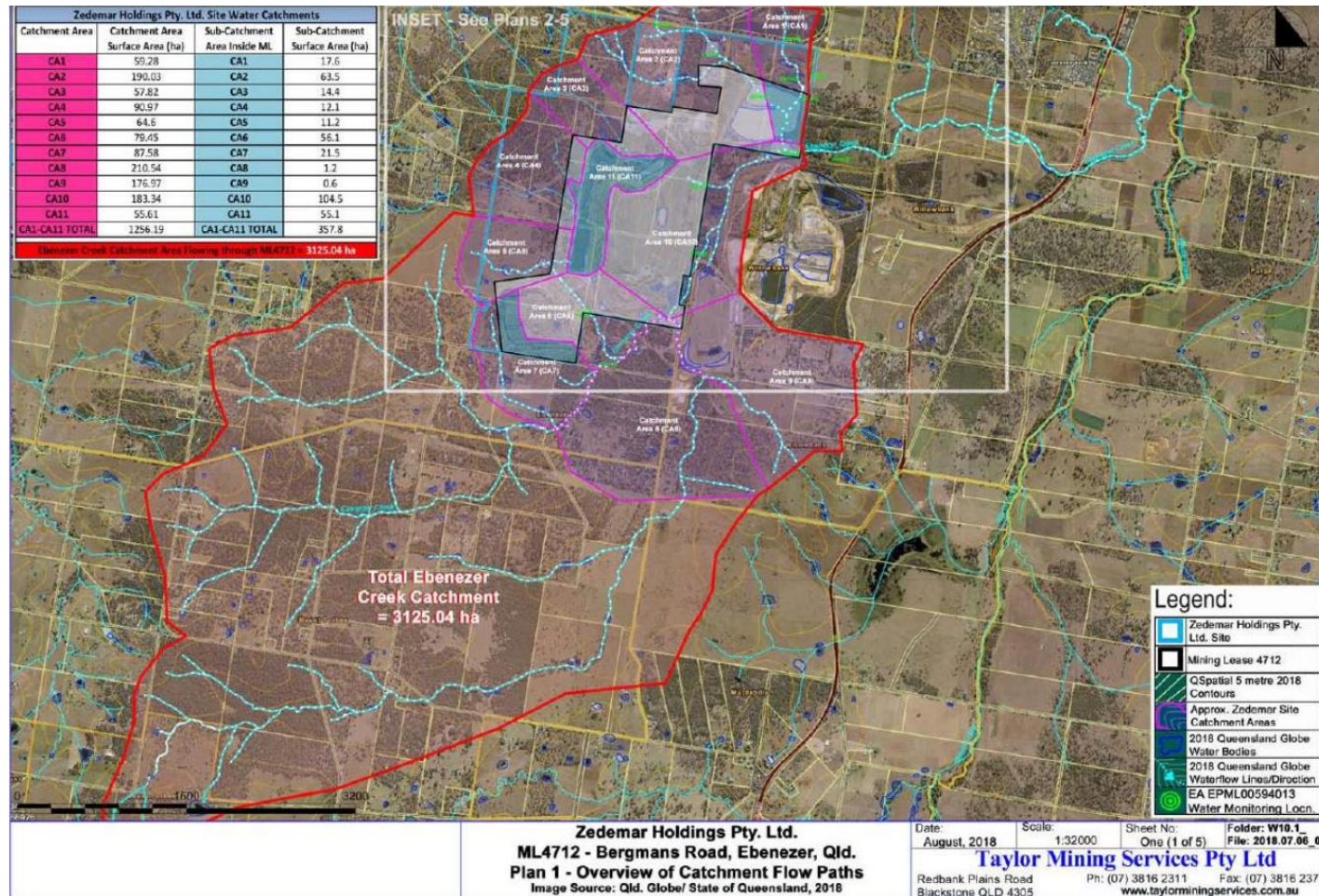
APPENDIX 5 - PLAN 25: 8.16HA AREA ON OPD NORTH-EASTERN BATTER SLOPE REQUIRING REPAIR



APPENDIX 5 - PLAN 26: 2014 LIDAR CONTOURS, MAY 2020



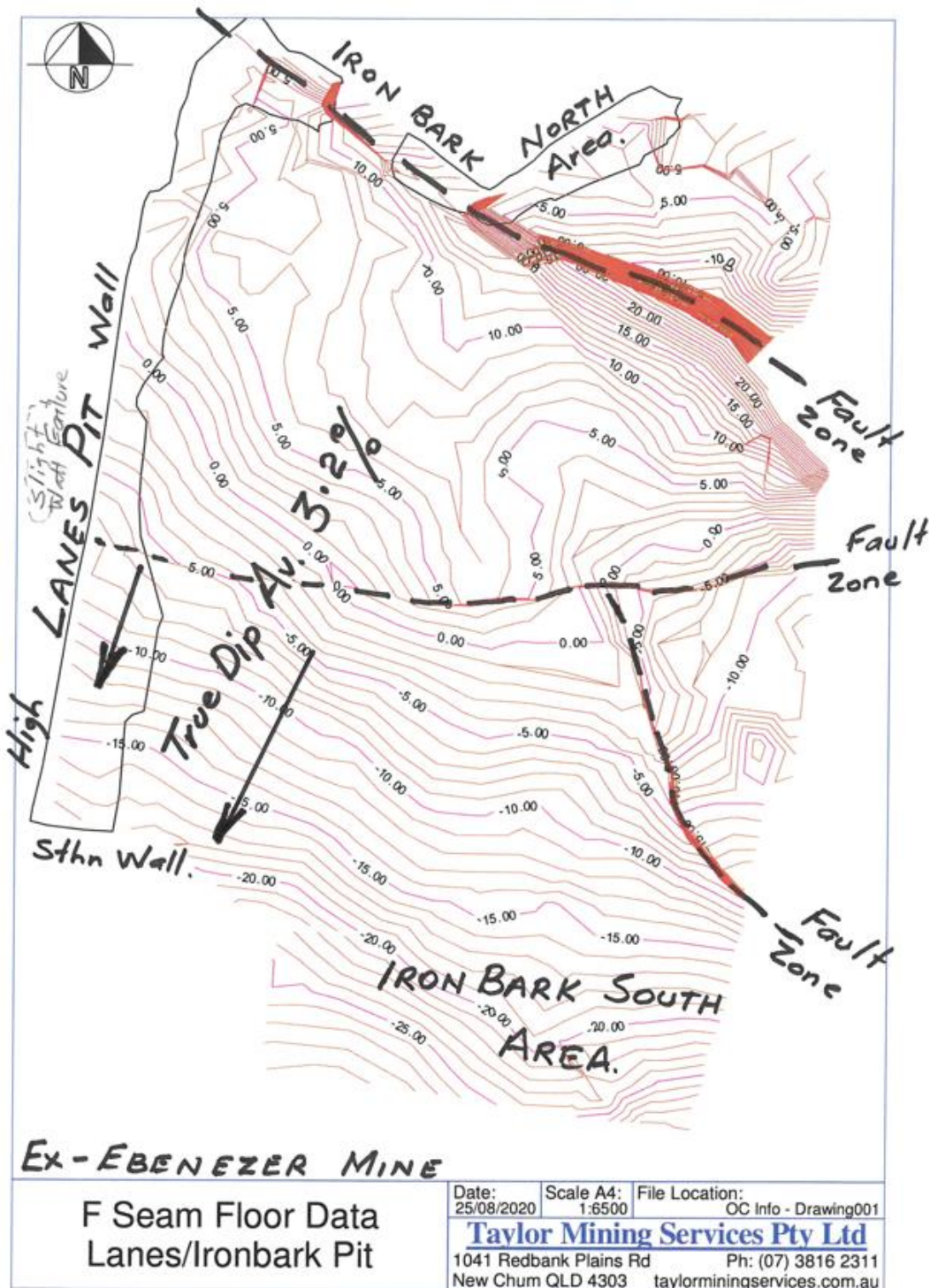
APPENDIX 5 - PLAN 27: BREMER SUBCATCHMENTS



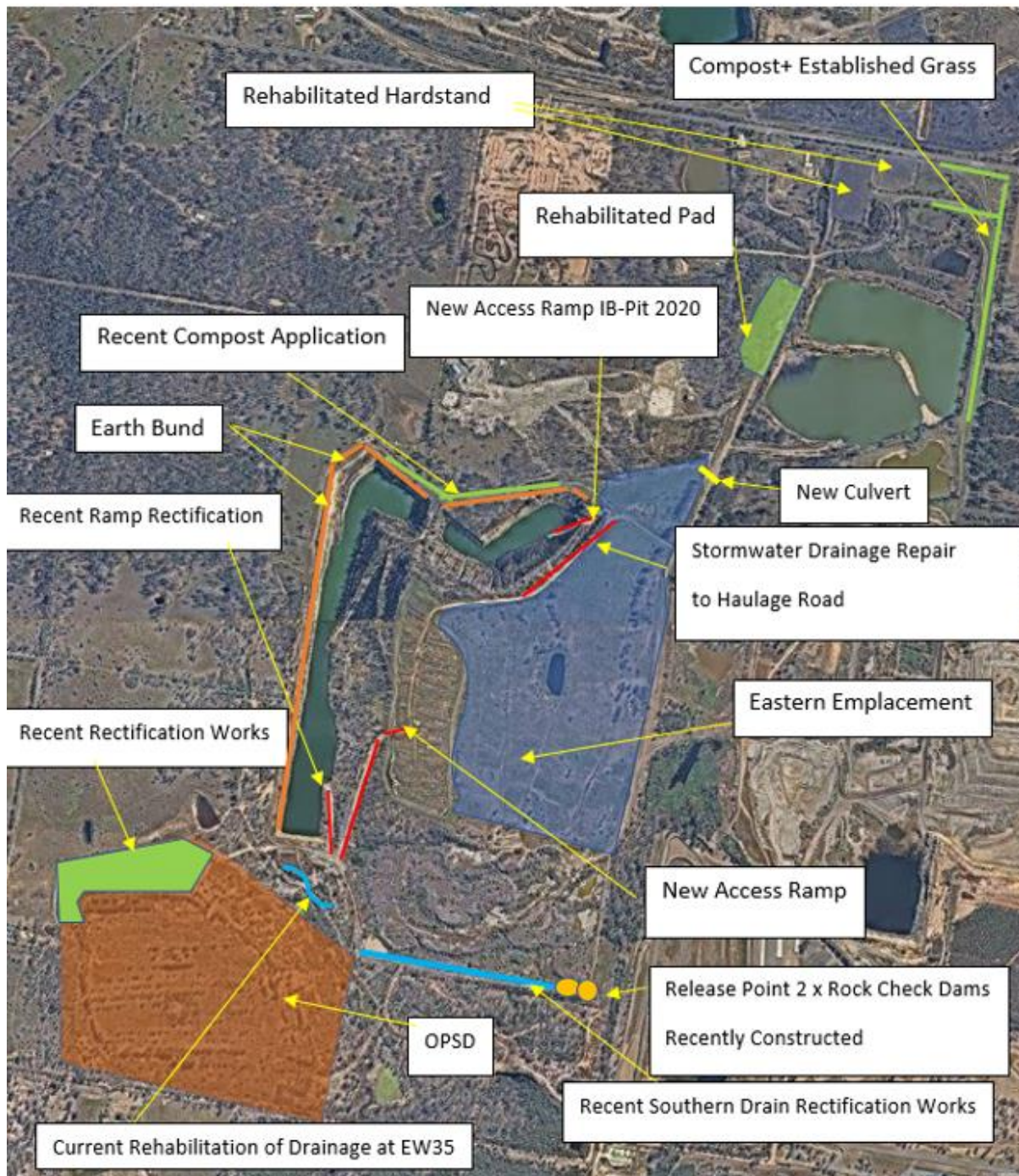
APPENDIX 5 - PLAN 28: CATCHMENT AND SUBCATCHMENTS OF EBENEZER CREEK



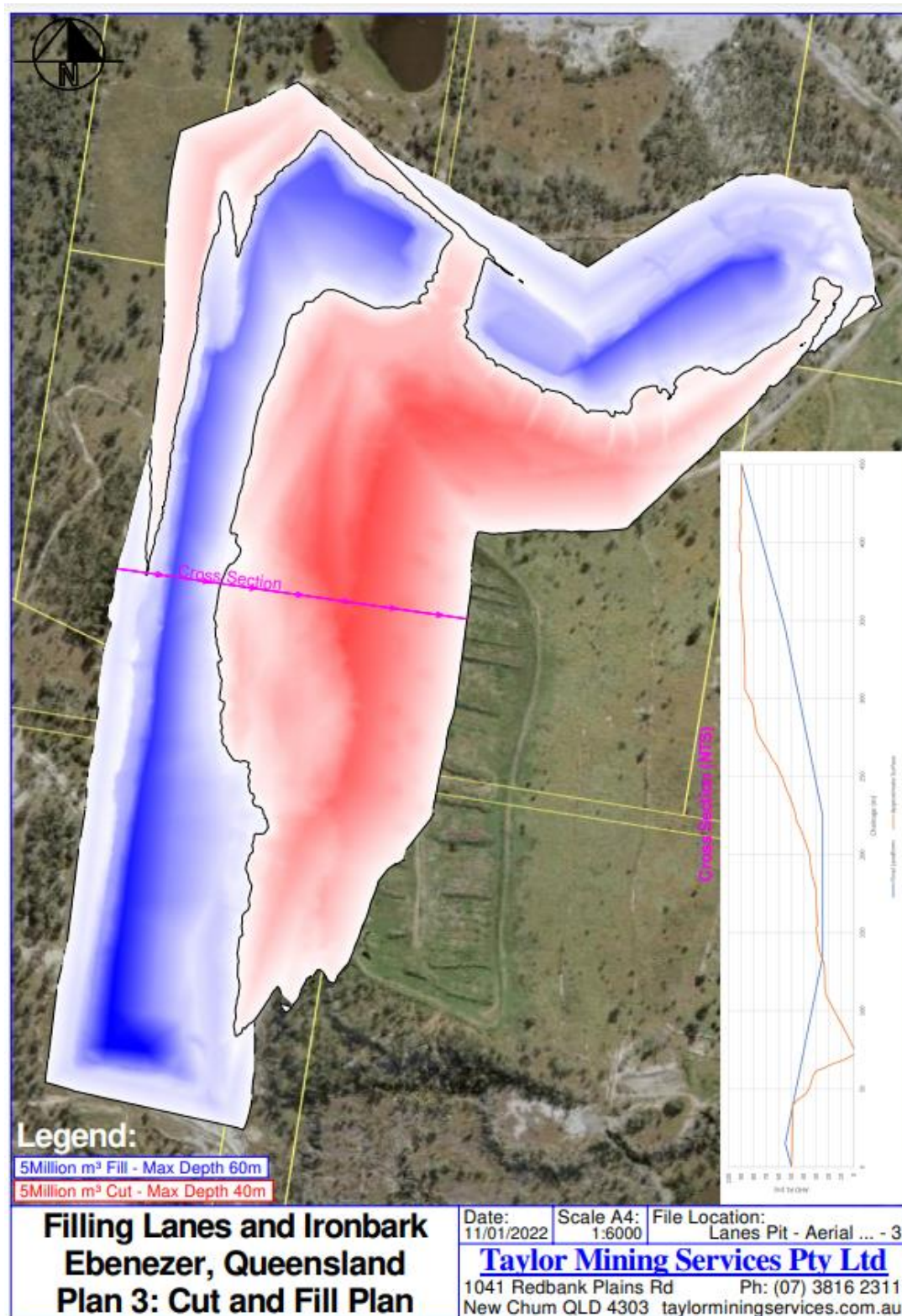
APPENDIX 5 - PLAN 29: REGISTERED WATER BORES



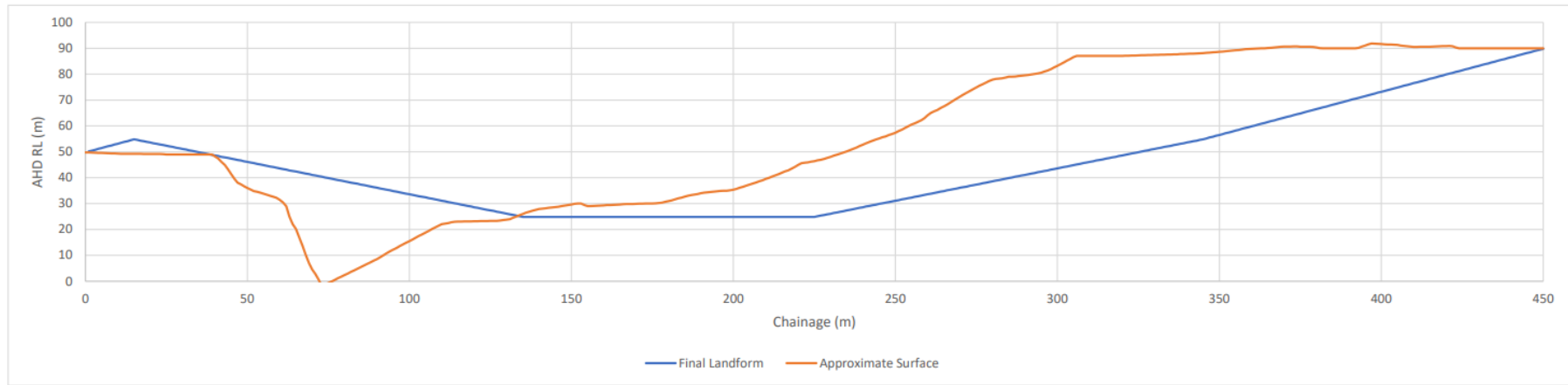
APPENDIX 5 - PLAN 30: F SEAM FLOOR DATA FOR LANES VOID AND IRONBARK NORTH VOID



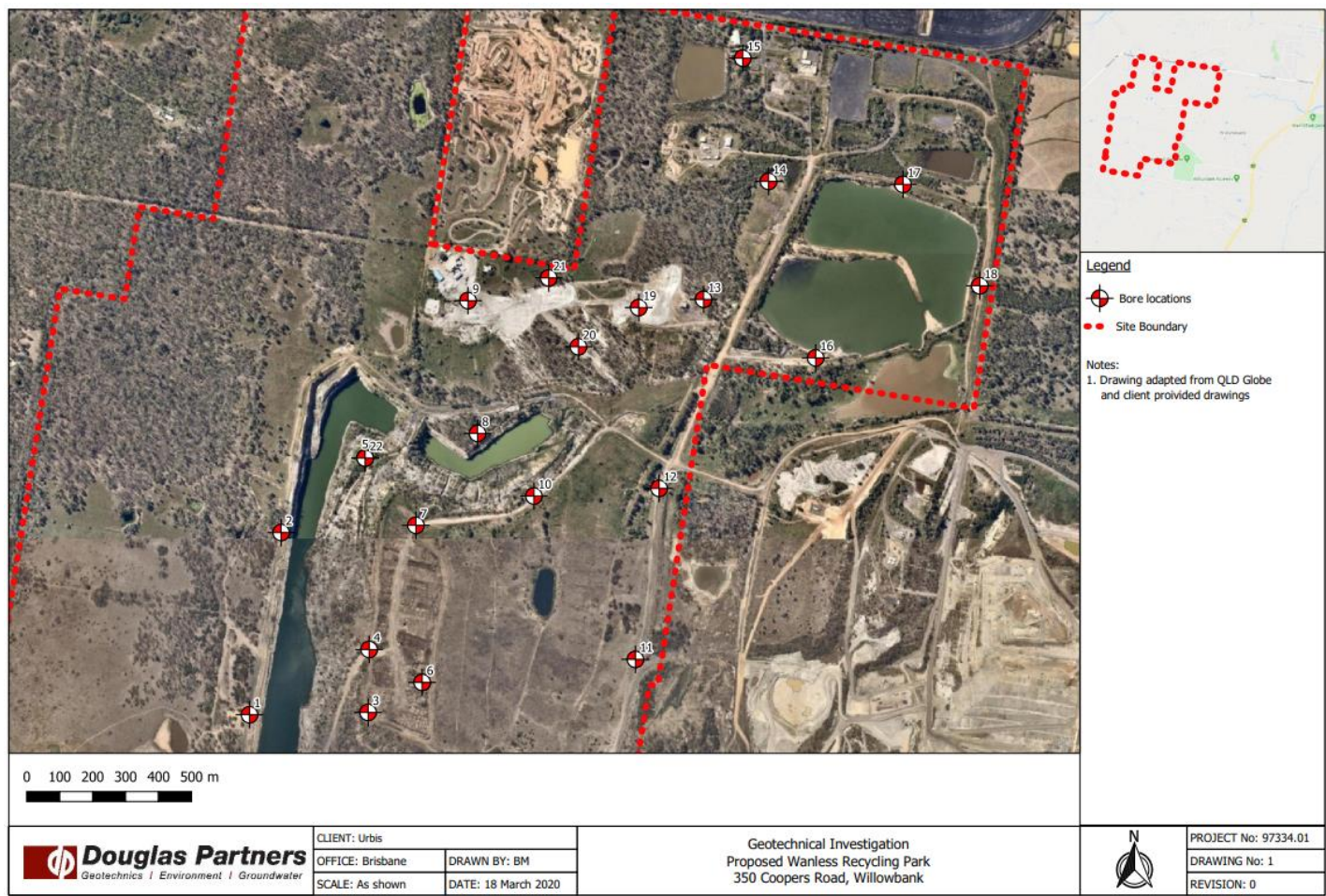
APPENDIX 5 - PLAN 31: REHABILITATION AREAS AND ACTIVITIES SINCE 2018



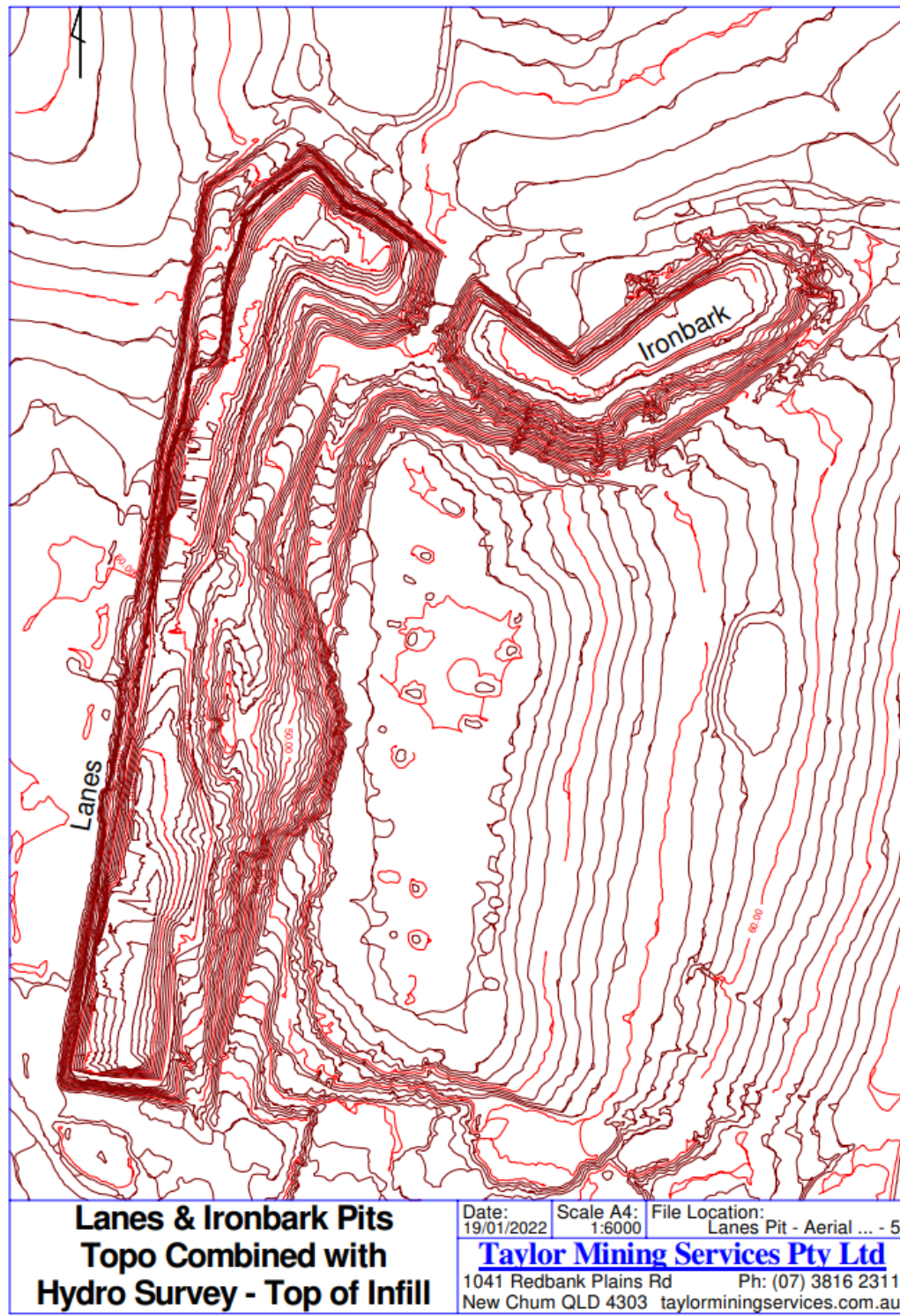
APPENDIX 5 - PLAN 32: CUT AND FILL PLAN FOR LOW-WALL



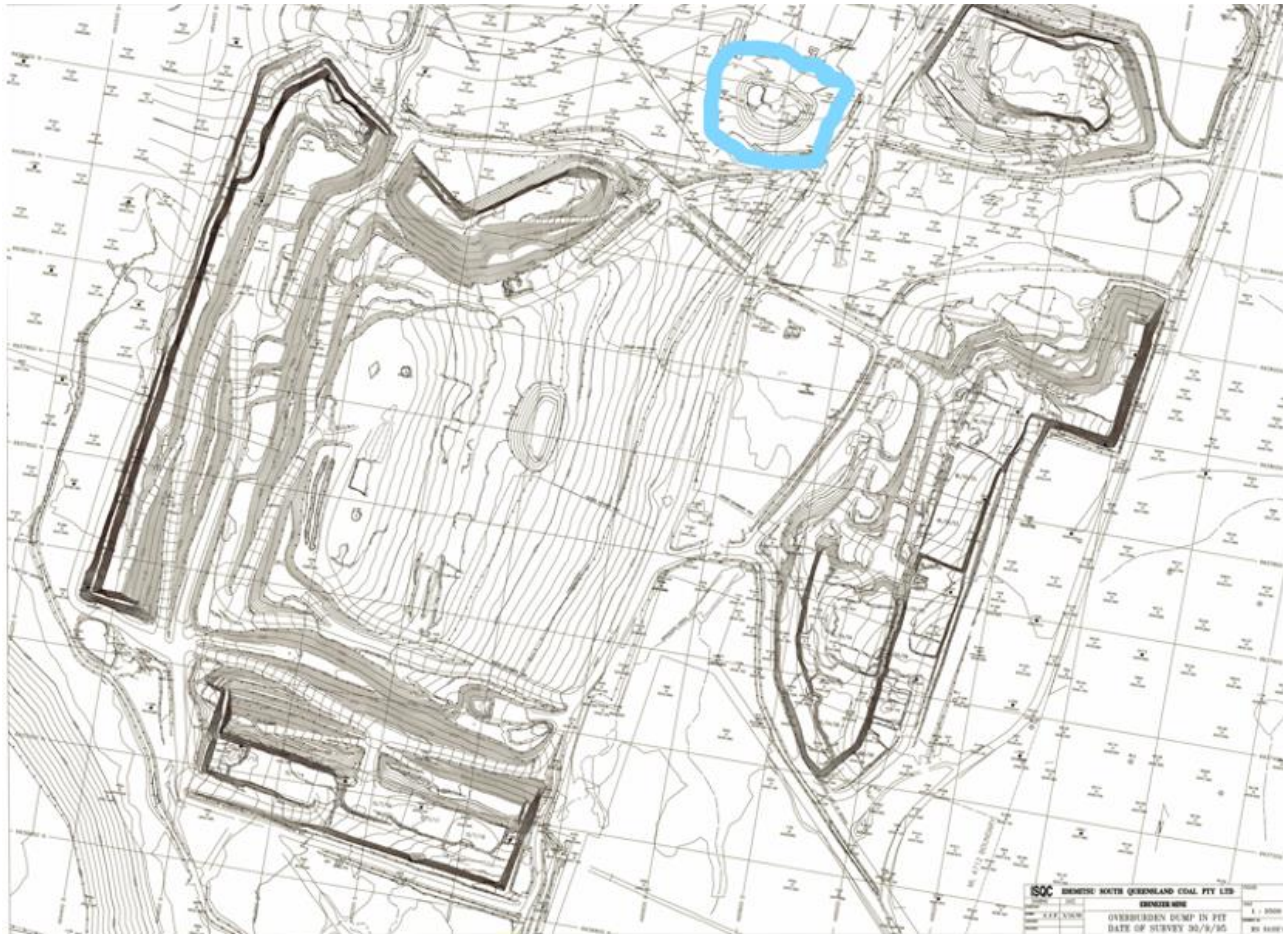
APPENDIX 5 - PLAN 33: CROSS SECTION OF EXISTING LOW-WALL AND CONSIDERED CUT AND FILL PROFILE



APPENDIX 5 - PLAN 34: SOIL SAMPLING LOCATIONS, 2020



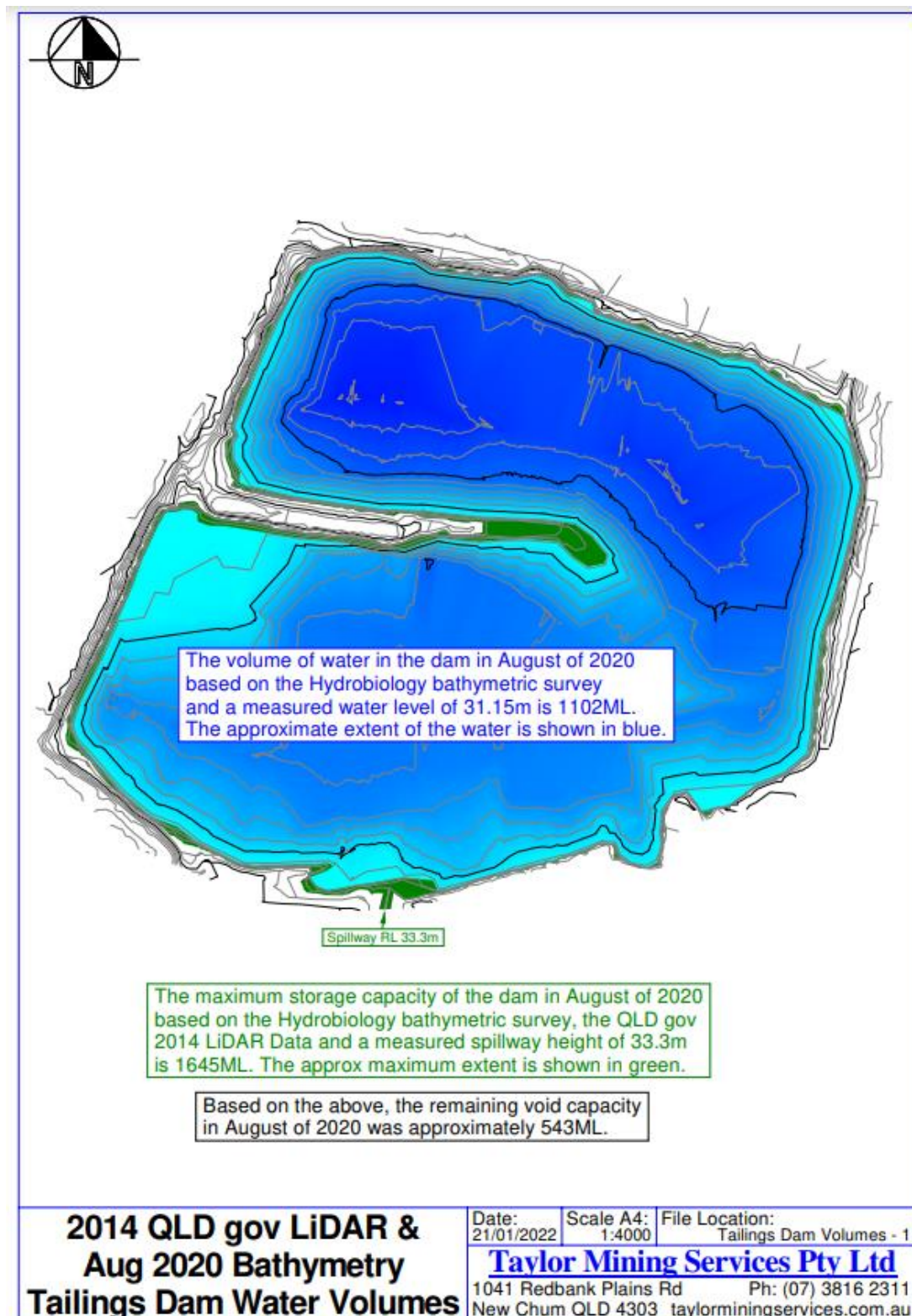
APPENDIX 5 - PLAN 35: COMBINED TOPOGRAPHICAL AND SONAR SCAN FOR LANES VOID AND IRONBARK NORTH VOID



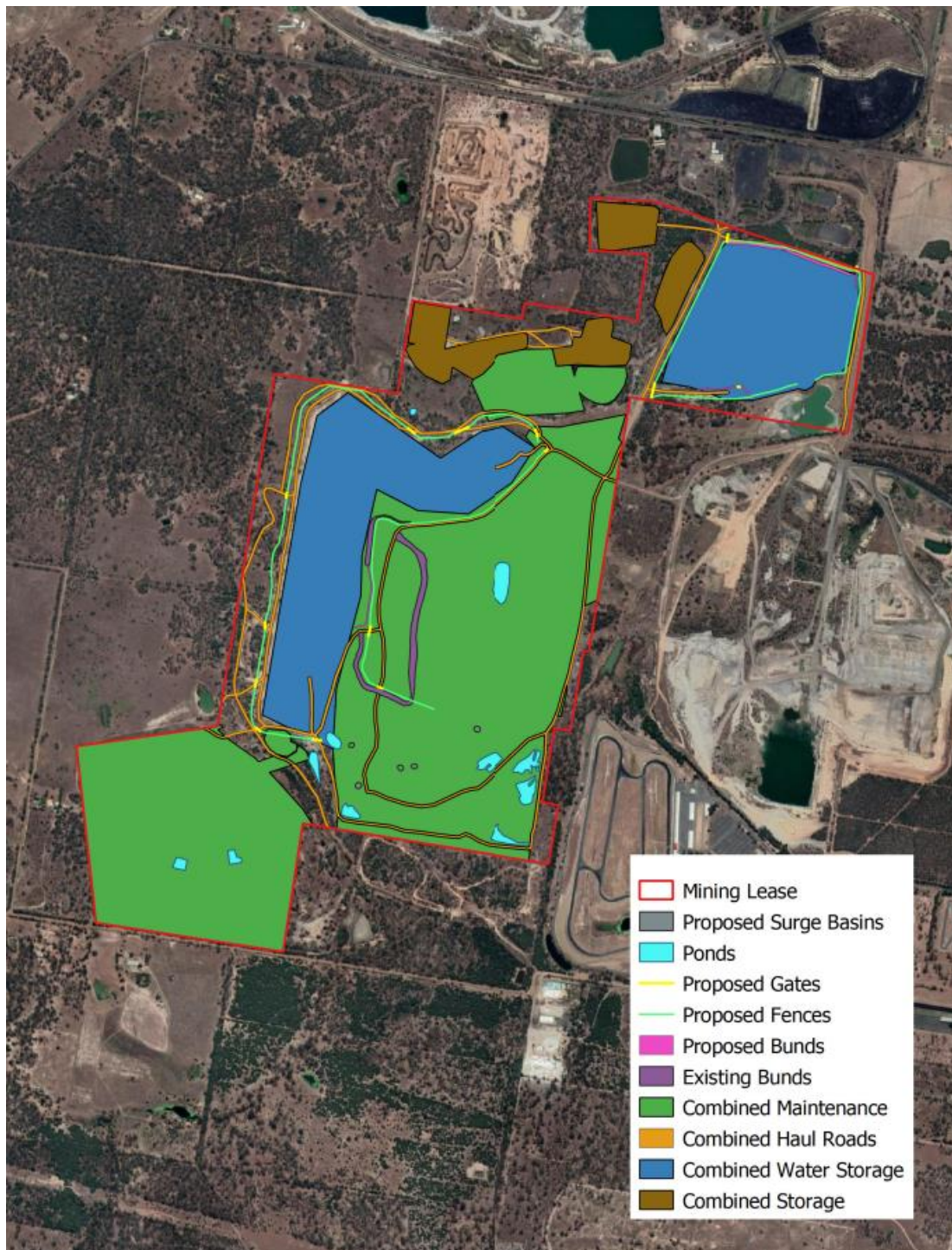
APPENDIX 5 - PLAN 36: LOCATION OF OVERBURDEN MOUND



APPENDIX 5 - PLAN 37: HIGH-WALL CREST AT 25%, 45% AND 70% SLOPE



APPENDIX 5 - PLAN 38: 2014 LIDAR AND AUGUST 2020 BATHYMETRY TAILINGS DAM WATER VOLUMES



APPENDIX 5 - PLAN 39: FINAL REHABILITATED AREAS

Appendix 6 OPD Remediation Detail

TAYLOR MINING SERVICES PTY LTD

ABN: 55 242 784 379

1041 Redbank Plains Road
New Chum Qld 4303

PO Box 4065
RACEVIEW Q4305

Phone: (07) 3816 2311
FAX: (07) 3816 2377
Mobile: 0418 741 915
Email: hugh-taylor@bigpond.com

27 November 2017

Zedemar Pty Ltd
C/- Mr Trevor Smith
Coopers Road
Ebenezer QLD 430

Attention: - Mr Trevor Smith
CC: - Mr John Beaumont

Re:- Remediation of “Out of Pit Spoil Pile” – Southern end ML 4712

Attached please find our Proposed revised rehabilitation works program for the Out of Pit Spoil Pile at the southern end of the Lanes Pit area.

We have reduced the number of Drop Structures to 2 and provided the surface catchment areas for the topography of the spoil pile that will report to the drop structures.

Our previous plan concentrated on the northern face of the Spoil Pile. However, there is a significant amount of work also required on the southern side.
We have not proposed or designed any Drop Structures for the southern area as yet as perhaps a reworking of the surface contour drains may suffice.

The other areas we have included and shown are the drain line and sheet erosion areas. These areas need to be rehabilitated in conjunction with the currently proposed works.

The text set out below shows the areas and potential earthworks volumes required as part of this Program.

Catchment Areas:-

Catchment Area 1: - 155,870 m2 (15.587 ha)

Catchment Area 1 reports to the 2 existing dams (1 Dry and the other holding water) and then to Drop Structure 1 on the eastern face of the Spoil Pile

Catchment Area 2:- 77,730 m2 (7.773 ha)

Catchment Area 2 reports to Drop Structure 2 on the Northern Face of the Spoil Pile

Catchment Area 3: - 30,840 m2 (3.084 ha)

Catchment Area 4: - 30,250 m2 (3.025 ha)

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Proposed Earthworks Areas: -

Deep Rip and Regrading:

We have identified 11 areas to be ripped and regraded: - Total 113,860 m² (11.386 ha) approx.

Proposed Earthworks Area 1: - 98,105 m² (9.8105 ha)

Earthworks required: Cut: 30,250 m³ Fill: 29,190 m³ Net: 1,060 m³

Prop Earthworks Area 1 covers a large area along the top of the northern part of the Spoil Pile where a large proportion of sinkhole and piping or chimneying activity has occurred. This area requires deep ripping and regrading in most but not all parts of the area. This will include some tree stripping in parts.

Part of the proposed earthworks are to create a 1% falling swale drain back some 10m from the outer top edge of the Spoil Pile.

The Swale Drain will run from a crest at the NW end or corner of the Spoil Pile to the East and South East with a drop off point at Drop Structure 2 and continue as overflow on to Drop Structure 1.

The spillway from the Exist Dam 2 will also report to Drop Structure 1.

Bunding and filling is required at the SE end of the swale drain so that water will flow down Drop Structure 1 and not use the deep previous erosion channel (Erosion Channel ??) into the neighbouring Council Property.

Swale Drain lining and rock weirs etc???

Drop Structure 1, Included in the Earthworks Required volume above, requires excavations of up to 1,950 m³.

The structure is approx. 185m in length and 10m wide. Therefore, the geofab area will need to be in the order of 2,000 m² and with rock lining up to 500 thick will require up to 1,000 m³ of rock.

Drop Structure 2, Included in the Earthworks Required volume above, requires excavations of up to 2,120 m³.

The structure is approx. 170m in length and 10m wide. Therefore, the geofab area will need to be in the order of 1,900 m² and with rock lining up to 500 thick will require up to 950 m³ of rock.

Proposed Earthworks Area 2: - 4,790 m² (0.479 ha)

Proposed Earthworks area 2 requires deep ripping and regrading. No earthworks volumes have been prepared for these works as they will have to be assessed at the time of ripping and reshaping the surface. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended.

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Proposed Earthworks Area 3: - 1,030 m² (0.103 ha)

Proposed Earthworks area 3 requires deep ripping and regrading. No earthworks volumes have been prepared for these works as they will have to be assessed at the time of ripping and reshaping the surface. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended.

Proposed Earthworks Area 4: - 6,550 m² (0.655 ha)

Proposed Earthworks area 4 requires deep ripping and regrading. No earthworks volumes have been prepared for these works as they will have to be assessed at the time of ripping and reshaping the surface. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended.

Proposed Earthworks Area 5: - 550 m² (0.055 ha)

Proposed Earthworks area 5 requires deep ripping and regrading. No earthworks volumes have been prepared for these works as they will have to be assessed at the time of ripping and reshaping the surface. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended.

Proposed Earthworks Area 6: - 170 m² (0.017 ha)

Proposed Earthworks area 6 requires deep ripping and regrading. No earthworks volumes have been prepared for these works as they will have to be assessed at the time of ripping and reshaping the surface. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended.

Proposed Earthworks Area 7: - 400 m² (0.04 ha)

Proposed Earthworks area 7 requires deep ripping and regrading. No earthworks volumes have been prepared for these works as they will have to be assessed at the time of ripping and reshaping the surface. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended.

Proposed Earthworks Area 8: - 320 m² (0.032 ha)

Proposed Earthworks area 8 requires deep ripping and regrading. No earthworks volumes have been prepared for these works as they will have to be assessed at the time of ripping and reshaping the surface. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended.

Proposed Earthworks Area 9: - 700 m² (0.07 ha)

Proposed Earthworks area 9 requires deep ripping and regrading. No earthworks volumes have been prepared for these works as they will have to be assessed at the time of ripping and reshaping the surface. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended.

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Proposed Earthworks Area 10: - 210 m2 (0.021 ha)

Proposed Earthworks area 10 requires deep ripping and regrading. No earthworks volumes have been prepared for these works as they will have to be assessed at the time of ripping and reshaping the surface. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended.

Proposed Earthworks Area 11: - 1,030 m2 (0.103 ha)

Proposed Earthworks area 11 requires deep ripping and regrading. No earthworks volumes have been prepared for these works as they will have to be assessed at the time of ripping and reshaping the surface. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended.

Erosion/ Drain Lines Remediation: -

We have identified 11 erosion / drain lines down the batter slope that require remediation. These 11 areas may not be conclusive, and others may be deemed necessary for remediation works during the remediation process. Total Area approx. 9,095 m2 (0.9095 ha)

Erosion Drain Line 1: - 90 m2 (0.009 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended.

Erosion Drain Line 2: - 270 m2 (0.027 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Erosion Drain Line 3: - 1,535 m2 (0.154 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Erosion Drain Line 4: - 1,260 m2 (0.126 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

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Erosion Drain Line 5: - 1,515 m2 (0.152 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Erosion Drain Line 6: - 435 m2 (0.044 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Erosion Drain Line 7: - "Drop Structure 2"

Erosion Drain Line 8: - 810 m2 (0.081 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Erosion Drain Line 9: - 1410 m2 (0.141 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Erosion Drain Line 10: - 230 m2 (0.023 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Erosion Drain Line 11: - 1,540 m2 (0.154 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Erosion (Sheet) Areas Remediation: -

We have identified 9 erosion sheet areas that require remediation. These 9 areas may not be conclusive and other areas may be deemed necessary for remediation works during the remediation process. Total Area approx. 18,650 m2 (1.865 ha)

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Erosion Sheet Area 1: - 5,160 m² (0.516 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Erosion Sheet Area 2: - 1,815 m² (0.182 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Erosion Sheet Area 3: - 430 m² (0.043 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Erosion Sheet Area 4: - 415 m² (0.042 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Erosion Sheet Area 5: - 2600 m² (0.260 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Erosion Sheet Area 6: - 500 m² (0.050 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Erosion Sheet Area 7: - 6255 m² (0.626 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Erosion Sheet Area 8: - 920 m² (0.092 ha)

No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

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Erosion Sheet Area 9: - 555 m2 (0.055 ha)

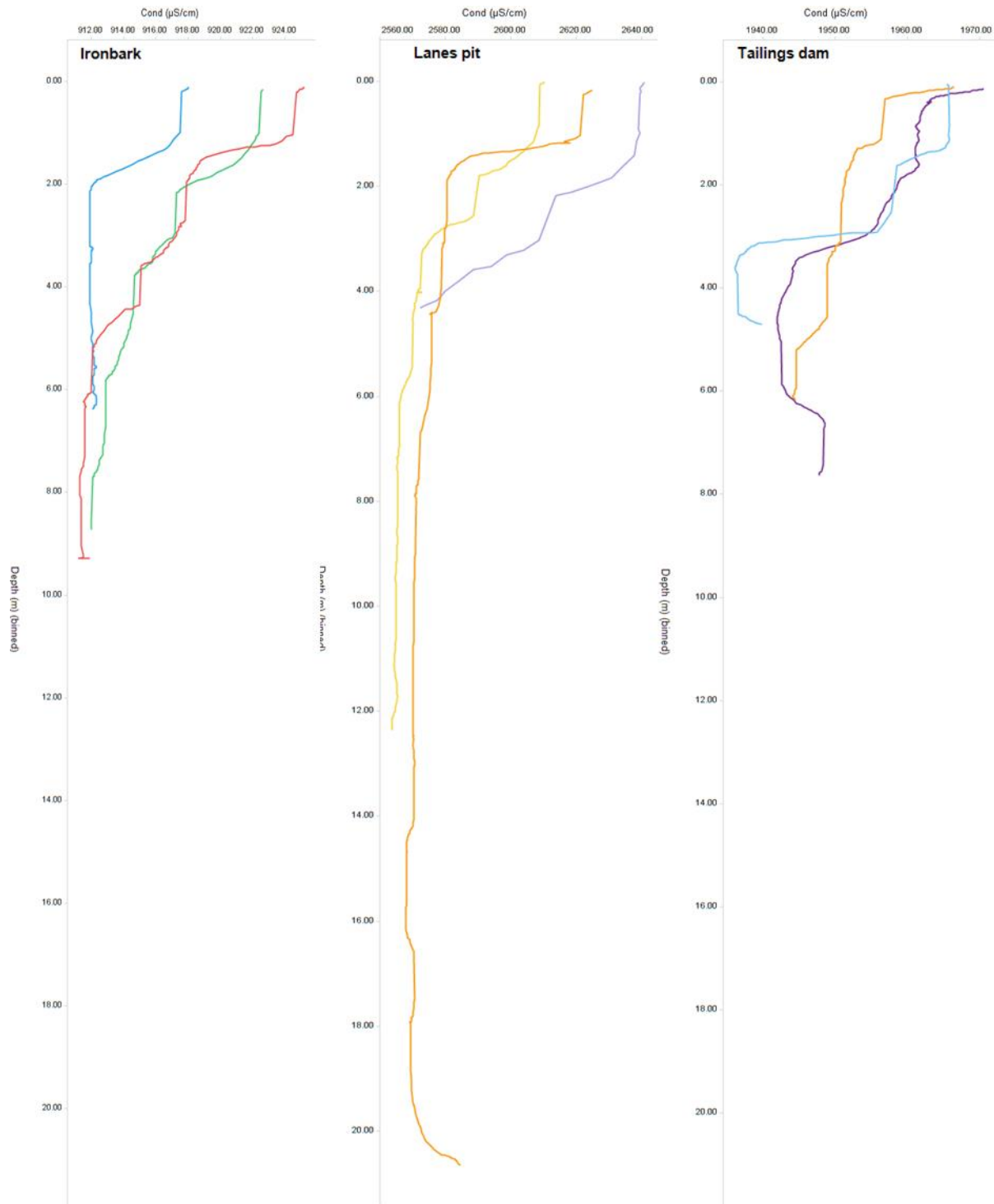
No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Regards,

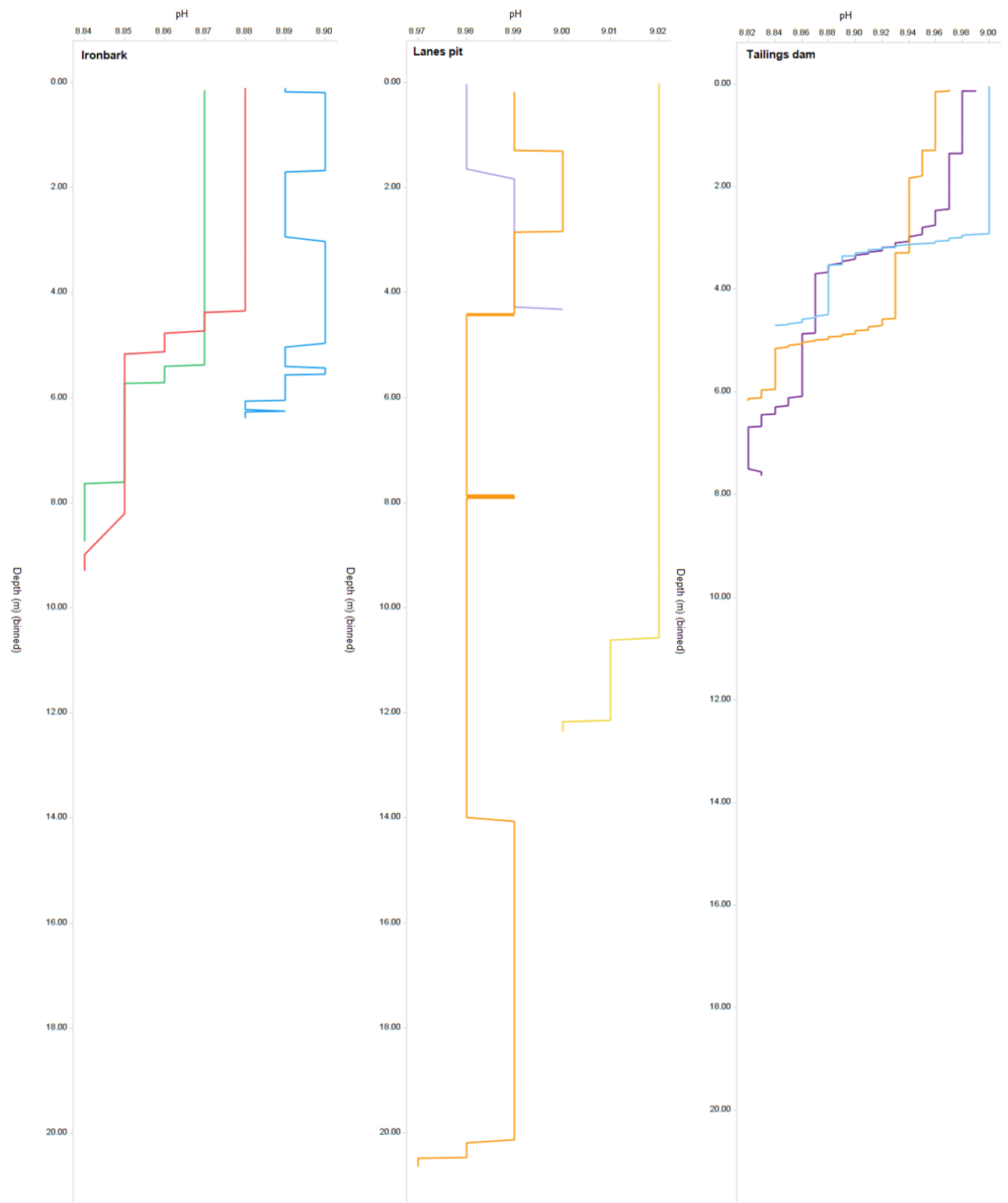
Hugh Taylor,
Site Senior Executive (SSE Coal, Notice Holder)
Registered Surveyor, Mining UC, UM & OC
TAYLOR MINING SERVICES Pty Ltd
ABN 55 242 784 379
PO Box 4065
Raceview QLD 430
PH: (07) 3816 2311
Fax: (07) 3816 2377
Mob: 0418 741 915
Website: www.taylorminingservices.com.au
E-Mail: hugh-taylor@bigpond.com

Appendix 7 Void Water Quality

Note: the following depth plots are provided for Tailings Pond, Lanes Void and Ironbark North Void for electrical conductivity, pH and suspended solids.



APPENDIX 7 - FIGURE 1: EC DEPTH PLOTS FOR TAILINGS POND, LANES VOID AND IRONBARK NORTH VOID



APPENDIX 7 - FIGURE 2: pH DEPTH PLOTS FOR TAILINGS POND, LANES VOID AND IRONBARK NORTH VOID

Note:

The following lab reports have been reproduced from the Hydrobiology P/L report titled

T1 = Tailings Pond sample location 1, T2 = Tailings Pond sample location 2, T3 = Tailings Pond sample location 3.

L1 = Lanes Void sample location 1, L2 = Lanes Void sample location 2, L3 = Lanes Void sample location 3,

I1 = Ironbark North Void sample location 1, I2 = Ironbark North Void sample location 2, I3 = Ironbark North Void sample location 3

QA/QC results can be obtained upon request.

Survey location	Sample name sent to laboratory		Date collected	Latitude (WGS84)	Longitude (WGS84)
	Surface	Depth			
T1	T1S	T1B (T1B DUP = duplicate)	23/07/2020	-27.6712561	152.6577695
T2	T2S	T2B	23/07/2020	-27.673152	152.660647
T3	T3S	T3B	23/07/2020	-27.673882	152.657363
L1	LW1	LW4	30/07/2020	-27.6764433	152.6424393
L2	LW2	LW5	30/07/2020	-27.681049	152.6407472
L3	LW3 (LW7 = duplicate)	LW6	30/07/2020	-27.6855416	152.6400928
I1	IW4	IW1	31/07/2020	-27.678091	152.645327
I2	IW2	IW5	31/07/2020	-27.678106	152.646494
I3	IW3	IW6	31/07/2020	-27.677255	152.647961

APPENDIX 7 - TABLE 1: VOID WATER SAMPLE LOCATIONS



Environment Testing

Certificate of Analysis

Hydrobiology QLD Pty Ltd
Unit 27/43 Lang Parade
Auchenflower
QLD 4066



NATA Accredited
Accreditation Number 1261
Site Number 20794
Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or
measurements included in this document are traceable
to Australian national standards.

Attention: Marie Bigot

Report 734100-W-V5
Project name
Project ID B20038
Received Date Jul 24, 2020

Client Sample ID			T1S	T1B	T2S	T2B
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			B20-JI43092	B20-JI43093	B20-JI43094	B20-JI43095
Date Sampled			Jul 23, 2020	Jul 23, 2020	Jul 23, 2020	Jul 23, 2020
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	< 0.01	0.16	< 0.01	< 0.01
Chloride	1	mg/L	500	500	500	500
Conductivity (at 25°C)	10	uS/cm	2290	2270	2250	2240
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Nitrate (as N)	0.02	mg/L	0.02	0.04	0.03	0.02
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Phosphate total (as P)	0.01	mg/L	0.02	0.02	0.02	0.03
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Sulphate (as SO ₄)	5	mg/L	51	51	51	52
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	1200	1100	1100	1100
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.4	< 1	0.2	0.5
Total Nitrogen (as N)*	0.2	mg/L	0.4	< 1	0.2	0.5
Total Organic Carbon	5	mg/L	22	23	28	19
Total Suspended Solids Dried at 103–105°C	1	mg/L	10	9.9	9.0	9.2
Hardness mg equivalent CaCO ₃ /L	5	mg/L	89	91	110	110
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	410	390	420	390
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	48	31	41	54
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO ₃)	20	mg/L	460	420	460	450
Alkali Metals						
Calcium	0.5	mg/L	11	12	16	16
Magnesium	0.5	mg/L	15	15	18	18
Potassium	0.5	mg/L	5.9	5.6	5.8	5.5
Sodium	0.5	mg/L	470	470	470	470
Heavy Metals						
Aluminium	0.05	mg/L	0.20	0.29	0.22	0.21
Antimony	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Arsenic	0.001	mg/L	0.003	0.003	0.003	0.003
Barium	0.02	mg/L	0.32	0.32	0.32	0.32
Beryllium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bismuth	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Boron	0.05	mg/L	0.19	0.21	0.22	0.23
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

First Reported: Aug 04, 2020
Date Reported: Aug 31, 2020

Eurofins Environment Testing 1/21 Smallwood Place, Muramba, QLD, Australia, 4172
ABN : 50 005 085 521 Telephone: +61 7 3902 4600

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Report Number: 734100-W-V5



Environment Testing

Client Sample ID			T1S	T1B	T2S	T2B
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			B20-JI43092	B20-JI43093	B20-JI43094	B20-JI43095
Date Sampled			Jul 23, 2020	Jul 23, 2020	Jul 23, 2020	Jul 23, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Cobalt	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Iron	0.05	mg/L	0.20	0.30	0.21	0.21
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Manganese	0.005	mg/L	0.009	0.015	0.010	0.010
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Molybdenum	0.005	mg/L	0.007	0.007	0.007	0.007
Nickel	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Selenium	0.001	mg/L	< 0.001	0.001	< 0.001	< 0.001
Silver	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Thallium	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Tin	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Titanium	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Uranium	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Vanadium	0.005	mg/L	0.008	0.009	0.009	0.009
Zinc	0.005	mg/L	< 0.005	0.006	< 0.005	< 0.005
Extended Metals Suite						
Calcium	0.5	mg/L	11	12	16	16
Magnesium	0.5	mg/L	15	15	18	18
Phosphorus	0.5	mg/L	< 10	< 10	< 10	< 10
Potassium	0.5	mg/L	5.9	5.8	5.8	5.5
Silicon	0.5	mg/L	8.6	9.7	8.6	8.9
Sodium	0.5	mg/L	470	470	470	470
Sulphur	0.5	mg/L	16	18	15	18

Client Sample ID			T3S	T3B	T1B DUP	TS
Sample Matrix			Water	Water	Water	Trip Spike (liquid)
Eurofins Sample No.			B20-JI43096	B20-JI43097	B20-JI43099	B20-JI43191
Date Sampled			Jul 23, 2020	Jul 23, 2020	Jul 23, 2020	Jul 23, 2020
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	< 0.01	< 0.01	0.16	-
Chloride	1	mg/L	640	650	500	-
Conductivity (at 25°C)	10	uS/cm	2290	2290	2270	-
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	< 0.05	-
Nitrate (as N)	0.02	mg/L	< 0.02	< 0.02	0.04	-
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	-
Phosphate total (as P)	0.01	mg/L	0.03	0.03	0.02	-
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	< 0.01	< 0.01	-
Sulphate (as SO4)	5	mg/L	59	59	53	-
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	1200	1200	1100	-
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.5	0.5	< 1	-
Total Nitrogen (as N)*	0.2	mg/L	0.5	0.5	< 1	-
Total Organic Carbon	5	mg/L	23	19	23	-
Total Suspended Solids Dried at 103–105°C	1	mg/L	13	15	9.9	-
Hardness mg equivalent CaCO3/L	5	mg/L	110	89	120	-
Naphthalene	1	%	-	-	-	130



Client Sample ID			T3S	T3B	T1B DUP	TS
Sample Matrix			Water	Water	Water	Trip Spike (liquid)
Eurofins Sample No.			B20-JI43096	B20-JI43097	B20-JI43099	B20-JI43191
Date Sampled			Jul 23, 2020	Jul 23, 2020	Jul 23, 2020	Jul 23, 2020
Test/Reference	LOR	Unit				
TRH C8-C10	1	%	-	-	-	71
TRH C8-C9	1	%	-	-	-	72
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	400	380	390	-
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	56	54	31	-
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	-
Total Alkalinity (as CaCO ₃)	20	mg/L	460	440	420	-
Alkali Metals						
Calcium	0.5	mg/L	16	11	16	-
Magnesium	0.5	mg/L	18	15	18	-
Potassium	0.5	mg/L	5.9	5.3	5.5	-
Sodium	0.5	mg/L	470	470	480	-
Heavy Metals						
Aluminium	0.05	mg/L	0.22	0.29	0.29	-
Antimony	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Arsenic	0.001	mg/L	0.003	0.003	0.003	-
Barium	0.02	mg/L	0.32	0.32	0.32	-
Beryllium	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Bismuth	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Boron	0.05	mg/L	0.23	0.24	0.24	-
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Chromium	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Cobalt	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Copper	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Iron	0.05	mg/L	0.19	0.26	0.30	-
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Manganese	0.005	mg/L	0.008	0.011	0.015	-
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	-
Molybdenum	0.005	mg/L	0.007	0.007	0.007	-
Nickel	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Selenium	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Silver	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Thallium	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Tin	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Titanium	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Uranium	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Vanadium	0.005	mg/L	0.009	0.009	0.009	-
Zinc	0.005	mg/L	0.018	0.006	0.006	-
Extended Metals Suite						
Calcium	0.5	mg/L	16	11	16	-
Magnesium	0.5	mg/L	18	15	18	-
Phosphorus	0.5	mg/L	< 10	< 10	< 10	-
Potassium	0.5	mg/L	5.9	5.3	5.5	-
Silicon	0.5	mg/L	8.7	9.7	9.9	-
Sodium	0.5	mg/L	470	470	480	-
Sulphur	0.5	mg/L	18	16	18	-



Client Sample ID			T3S	T3B	T1B DUP	TS
Sample Matrix			Water	Water	Water	Trip Spike (liquid)
Eurofins Sample No.			B20-JI43096	B20-JI43097	B20-JI43099	B20-JI43191
Date Sampled			Jul 23, 2020	Jul 23, 2020	Jul 23, 2020	Jul 23, 2020
Test/Reference	LOR	Unit				
BTEX						
Benzene	1	%	-	-	-	99
Ethylbenzene	1	%	-	-	-	110
m&p-Xylenes	1	%	-	-	-	110
o-Xylene	1	%	-	-	-	110
Toluene	1	%	-	-	-	100
Xylenes - Total	1	%	-	-	-	110
4-Bromofluorobenzene (surr.)	1	%	-	-	-	108



Environment Testing

Certificate of Analysis

Hydrobiology QLD Pty Ltd
Unit 27/43 Lang Parade
Auchenflower
QLD 4066



NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or
measurements included in this document are traceable
to Australian/national standards.

Attention: Marie Bigot

Report 735591-W-V3
Project name
Project ID B20038
Received Date Aug 03, 2020

Client Sample ID			LW1 Water	LW2 Water	LW3 Water	LW4 Water
Sample Matrix			B20-Au01458	B20-Au01459	B20-Au01460	B20-Au01461
Eurofins Sample No.			Jul 30, 2020	Jul 30, 2020	Jul 30, 2020	Jul 30, 2020
Date Sampled						
Test/Reference	LOR	Unit				
TRH - 2013 NEPM Fractions (after silica gel clean-up)						
TRH >C10-C16 (after silica gel clean-up)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34 (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40 (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH - 1999 NEPM Fractions (after silica gel clean-up)						
TRH C10-C36 (Total) (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C14 (after silica gel clean-up)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28 (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36 (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Ammonia (as N)	0.01	mg/L	0.12	0.13	0.17	0.10
Chloride	1	mg/L	600	620	610	600
Conductivity (at 25°C)	10	uS/cm	2900	2850	2950	2400
Nitrate & Nitrite (as N)	0.05	mg/L	0.05	0.05	0.09	0.05
Nitrate (as N)	0.02	mg/L	0.03	0.04	0.07	0.04
Nitrite (as N)	0.02	mg/L	0.02	< 0.02	< 0.02	< 0.02
Phosphate total (as P)	0.01	mg/L	0.01	< 0.01	< 0.01	< 0.01
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Sulphate (as SO ₄)	5	mg/L	49	48	50	52
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	1700	1800	1500	1700
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.6	1.0	0.5	0.7
Total Nitrogen (as N)*	0.2	mg/L	0.65	1.05	0.59	0.75
Total Organic Carbon	5	mg/L	29	42	25	29
Total Suspended Solids Dried at 103–105°C	1	mg/L	11	5.6	6.2	8.6
Hardness mg equivalent CaCO ₃ /L	5	mg/L	94	61	84	82
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	620	640	650	710
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	81	85	85	100
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO ₃)	20	mg/L	710	720	730	820
Alkali Metals						
Calcium	0.5	mg/L	14	7.9	12	12
Magnesium	0.5	mg/L	15	10.0	13	13
Potassium	0.5	mg/L	5.7	5.8	5.5	5.5
Sodium	0.5	mg/L	720	710	740	680



Client Sample ID			LW1	LW2	LW3	LW4
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			B20-Au01458	B20-Au01459	B20-Au01460	B20-Au01461
Date Sampled			Jul 30, 2020	Jul 30, 2020	Jul 30, 2020	Jul 30, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	0.05	mg/L	< 0.05	< 0.05	< 0.05	0.05
Antimony	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Arsenic	0.001	mg/L	0.006	0.006	0.006	0.006
Barium	0.02	mg/L	0.12	0.12	0.12	0.12
Beryllium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bismuth	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Boron	0.05	mg/L	< 0.5	< 0.5	< 0.5	< 0.5
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper	0.001	mg/L	0.001	0.001	< 0.001	0.002
Iron	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Manganese	0.005	mg/L	0.009	0.011	0.012	0.010
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Molybdenum	0.005	mg/L	0.006	0.005	0.006	0.006
Nickel	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Selenium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Silver	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Thallium	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Tin	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Titanium	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Uranium	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Vanadium	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Zinc	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Extended Metals Suite						
Calcium	0.5	mg/L	14	7.9	12	12
Magnesium	0.5	mg/L	15	10.0	13	13
Phosphorus	0.5	mg/L	< 10	< 10	< 10	< 10
Potassium	0.5	mg/L	5.7	5.8	5.5	5.5
Silicon	0.5	mg/L	< 5	< 5	< 5	< 5
Sodium	0.5	mg/L	720	710	740	680
Sulphur	0.5	mg/L	18	18	19	17

Client Sample ID			LW5	LW6	LW7	TRIP BLANK
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			B20-Au01462	B20-Au01463	B20-Au01464	B20-Au01465
Date Sampled			Jul 30, 2020	Jul 30, 2020	Jul 30, 2020	Jul 30, 2020
Test/Reference	LOR	Unit				
TRH - 2013 NEPM Fractions (after silica gel clean-up)						
TRH >C10-C16 (after silica gel clean-up)	0.05	mg/L	< 0.05	< 0.05	< 0.05	-
TRH >C16-C34 (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1	-
TRH >C34-C40 (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1	-
TRH - 1999 NEPM Fractions (after silica gel clean-up)						
TRH C10-C36 (Total) (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1	-
TRH C10-C14 (after silica gel clean-up)	0.05	mg/L	< 0.05	< 0.05	< 0.05	-
TRH C15-C28 (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1	-
TRH C29-C36 (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1	-



Environment Testing

Client Sample ID			LW5 Water	LW6 Water	LW7 Water	TRIP BLANK Water
Sample Matrix			B20-Au01462	B20-Au01463	B20-Au01464	B20-Au01465
Eurofins Sample No.						
Date Sampled			Jul 30, 2020	Jul 30, 2020	Jul 30, 2020	Jul 30, 2020
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.14	0.18	0.14	-
Chloride	1	mg/L	600	610	600	-
Conductivity (at 25°C)	10	uS/cm	2800	2900	2400	-
Nitrate & Nitrite (as N)	0.05	mg/L	0.08	0.05	< 0.05	-
Nitrate (as N)	0.02	mg/L	0.05	0.04	0.03	-
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	-
Phosphate total (as P)	0.01	mg/L	< 0.01	0.01	0.01	-
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	< 0.01	< 0.01	-
Sulphate (as SO ₄)	5	mg/L	49	50	50	-
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	1700	1800	1700	-
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.6	0.8	0.6	-
Total Nitrogen (as N)*	0.2	mg/L	0.68	0.85	0.6	-
Total Organic Carbon	5	mg/L	32	29	43	-
Total Suspended Solids Dried at 103–105°C	1	mg/L	10	6.4	6.4	-
Hardness mg equivalent CaCO ₃ /L	5	mg/L	81	63	65	-
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	600	630	520	-
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	91	82	82	-
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20	-
Total Alkalinity (as CaCO ₃)	20	mg/L	690	710	600	-
Alkali Metals						
Calcium	0.5	mg/L	11	8.0	8.5	-
Magnesium	0.5	mg/L	13	10	11	-
Potassium	0.5	mg/L	5.6	5.4	5.2	-
Sodium	0.5	mg/L	740	690	690	-
Heavy Metals						
Aluminium	0.05	mg/L	< 0.05	< 0.05	< 0.05	-
Antimony	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Arsenic	0.001	mg/L	0.006	0.006	0.007	-
Barium	0.02	mg/L	0.13	0.12	0.13	-
Beryllium	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Bismuth	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Boron	0.05	mg/L	< 0.5	< 0.5	< 0.5	-
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	-
Chromium	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Cobalt	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Copper	0.001	mg/L	0.001	0.001	0.004	-
Iron	0.05	mg/L	< 0.05	< 0.05	< 0.05	-
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Manganese	0.005	mg/L	0.012	0.013	0.014	-
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	-
Molybdenum	0.005	mg/L	0.006	0.005	0.006	-
Nickel	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Selenium	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Silver	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Thallium	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Tin	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Titanium	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Uranium	0.005	mg/L	< 0.005	< 0.005	< 0.005	-



Environment Testing

Client Sample ID			LW5 Water	LW6 Water	LW7 Water	TRIP BLANK Water
Sample Matrix			B20-Au01462	B20-Au01463	B20-Au01464	B20-Au01465
Eurofins Sample No.						
Date Sampled			Jul 30, 2020	Jul 30, 2020	Jul 30, 2020	Jul 30, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Vanadium	0.005	mg/L	< 0.005	< 0.005	< 0.005	-
Zinc	0.005	mg/L	0.006	< 0.005	0.012	-
Extended Metals Suite						
Calcium	0.5	mg/L	11	8.0	8.5	-
Magnesium	0.5	mg/L	13	10	11	-
Phosphorus	0.5	mg/L	< 10	< 10	< 10	-
Potassium	0.5	mg/L	5.6	5.4	5.2	-
Silicon	0.5	mg/L	< 5	< 5	< 5	-
Sodium	0.5	mg/L	740	690	690	-
Sulphur	0.5	mg/L	19	18	17	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{NO2}	0.01	mg/L	-	-	-	< 0.01
TRH C6-C10	0.02	mg/L	-	-	-	< 0.02
TRH C6-C10 less BTEX (F1) ^{NO4}	0.02	mg/L	-	-	-	< 0.02
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	-	-	-	< 0.02
BTEX						
Benzene	0.001	mg/L	-	-	-	< 0.001
Toluene	0.001	mg/L	-	-	-	< 0.001
Ethylbenzene	0.001	mg/L	-	-	-	< 0.001
m&p-Xylenes	0.002	mg/L	-	-	-	< 0.002
o-Xylene	0.001	mg/L	-	-	-	< 0.001
Xylenes - Total*	0.003	mg/L	-	-	-	< 0.003
4-Bromofluorobenzene (surr.)	1	%	-	-	-	114

Client Sample ID			TRIP SPIKE Water	IW1 Water	IW2 Water	IW3 Water
Sample Matrix			B20-Au01466	B20-Au01472	B20-Au01473	B20-Au01474
Eurofins Sample No.						
Date Sampled			Jul 30, 2020	Jul 31, 2020	Jul 31, 2020	Jul 31, 2020
Test/Reference	LOR	Unit				
TRH - 2013 NEPM Fractions (after silica gel clean-up)						
TRH >C10-C16 (after silica gel clean-up)	0.05	mg/L	-	< 0.05	< 0.05	< 0.05
TRH >C16-C34 (after silica gel clean-up)	0.1	mg/L	-	< 0.1	< 0.1	< 0.1
TRH >C34-C40 (after silica gel clean-up)	0.1	mg/L	-	< 0.1	< 0.1	< 0.1
TRH - 1999 NEPM Fractions (after silica gel clean-up)						
TRH C10-C36 (Total) (after silica gel clean-up)	0.1	mg/L	-	< 0.1	< 0.1	< 0.1
TRH C10-C14 (after silica gel clean-up)	0.05	mg/L	-	< 0.05	< 0.05	< 0.05
TRH C15-C28 (after silica gel clean-up)	0.1	mg/L	-	< 0.1	< 0.1	< 0.1
TRH C29-C36 (after silica gel clean-up)	0.1	mg/L	-	< 0.1	< 0.1	< 0.1
Ammonia (as N)						
Ammonia (as N)	0.01	mg/L	-	< 0.01	< 0.01	< 0.01
Chloride	1	mg/L	-	140	130	140
Conductivity (at 25°C)	10	uS/cm	-	1000	1000	1000
Nitrate & Nitrite (as N)	0.05	mg/L	-	< 0.05	< 0.05	< 0.05
Nitrate (as N)	0.02	mg/L	-	< 0.02	< 0.02	< 0.02
Nitrite (as N)	0.02	mg/L	-	< 0.02	< 0.02	< 0.02
Phosphate total (as P)	0.01	mg/L	-	< 0.01	< 0.01	< 0.01



Environment Testing

Client Sample ID			TRIP SPIKE	IW1	IW2	IW3
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			B20-Au01466	B20-Au01472	B20-Au01473	B20-Au01474
Date Sampled			Jul 30, 2020	Jul 31, 2020	Jul 31, 2020	Jul 31, 2020
Test/Reference	LOR	Unit				
Phosphorus reactive (as P)	0.01	mg/L	-	< 0.01	< 0.01	< 0.01
Sulphate (as SO ₄)	5	mg/L	-	44	44	45
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	-	650	570	640
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	-	0.3	0.3	0.4
Total Nitrogen (as N)*	0.2	mg/L	-	0.3	0.3	0.4
Total Organic Carbon	5	mg/L	-	35	26	25
Total Suspended Solids Dried at 103–105°C	1	mg/L	-	4.8	6.8	6.0
Hardness mg equivalent CaCO ₃ /L	5	mg/L	-	64	68	71
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	-	370	350	340
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	-	34	30	49
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	-	< 20	< 20	< 20
Total Alkalinity (as CaCO ₃)	20	mg/L	-	400	380	390
Alkali Metals						
Calcium	0.5	mg/L	-	11	11	12
Magnesium	0.5	mg/L	-	9.1	9.7	10
Potassium	0.5	mg/L	-	2.5	2.6	2.7
Sodium	0.5	mg/L	-	200	210	220
Heavy Metals						
Aluminium	0.05	mg/L	-	< 0.05	< 0.05	< 0.05
Antimony	0.005	mg/L	-	< 0.005	< 0.005	< 0.005
Arsenic	0.001	mg/L	-	0.002	0.002	0.002
Barium	0.02	mg/L	-	0.09	0.09	0.09
Beryllium	0.001	mg/L	-	< 0.001	< 0.001	< 0.001
Bismuth	0.005	mg/L	-	< 0.005	< 0.005	< 0.005
Boron	0.05	mg/L	-	< 0.5	< 0.5	< 0.5
Cadmium	0.0002	mg/L	-	< 0.0002	< 0.0002	< 0.0002
Chromium	0.001	mg/L	-	< 0.001	< 0.001	< 0.001
Cobalt	0.001	mg/L	-	< 0.001	< 0.001	< 0.001
Copper	0.001	mg/L	-	0.001	0.001	0.001
Iron	0.05	mg/L	-	< 0.05	< 0.05	< 0.05
Lead	0.001	mg/L	-	< 0.001	< 0.001	< 0.001
Manganese	0.005	mg/L	-	< 0.005	< 0.005	< 0.005
Mercury	0.0001	mg/L	-	< 0.0001	< 0.0001	< 0.0001
Molybdenum	0.005	mg/L	-	< 0.005	< 0.005	< 0.005
Nickel	0.001	mg/L	-	< 0.001	< 0.001	< 0.001
Selenium	0.001	mg/L	-	< 0.001	< 0.001	< 0.001
Silver	0.005	mg/L	-	< 0.005	< 0.005	< 0.005
Thallium	0.005	mg/L	-	< 0.005	< 0.005	< 0.005
Tin	0.005	mg/L	-	< 0.005	< 0.005	< 0.005
Titanium	0.005	mg/L	-	< 0.005	< 0.005	< 0.005
Uranium	0.005	mg/L	-	< 0.005	< 0.005	< 0.005
Vanadium	0.005	mg/L	-	< 0.005	< 0.005	< 0.005
Zinc	0.005	mg/L	-	< 0.005	< 0.005	< 0.005
Extended Metals Suite						
Calcium	0.5	mg/L	-	11	11	12
Magnesium	0.5	mg/L	-	9.1	9.7	10
Phosphorus	0.5	mg/L	-	< 1	< 1	< 1
Potassium	0.5	mg/L	-	2.5	2.6	2.7



Client Sample ID			TRIP SPIKE	IW1	IW2	IW3
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			B20-Au01466	B20-Au01472	B20-Au01473	B20-Au01474
Date Sampled			Jul 30, 2020	Jul 31, 2020	Jul 31, 2020	Jul 31, 2020
Test/Reference	LOR	Unit				
Extended Metals Suite						
Silicon	0.5	mg/L	-	1.7	1.6	1.7
Sodium	0.5	mg/L	-	200	210	220
Sulphur	0.5	mg/L	-	16	15	16
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{NO2}	0.01	mg/L	110	-	-	-
TRH C6-C10	0.02	mg/L	71	-	-	-
TRH C6-C10 less BTEX (F1) ^{NO4}	0.02	mg/L	-	-	-	-
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	72	-	-	-
BTEX						
Benzene	0.001	mg/L	99	-	-	-
Toluene	0.001	mg/L	120	-	-	-
Ethylbenzene	0.001	mg/L	93	-	-	-
m&p-Xylenes	0.002	mg/L	100	-	-	-
o-Xylene	0.001	mg/L	110	-	-	-
Xylenes - Total*	0.003	mg/L	110	-	-	-
4-Bromofluorobenzene (surr.)	1	%	109	-	-	-

Client Sample ID			IW4	IW5	IW6
Sample Matrix			Water	Water	Water
Eurofins Sample No.			B20-Au01475	B20-Au01476	B20-Au01477
Date Sampled			Jul 31, 2020	Jul 31, 2020	Jul 31, 2020
Test/Reference	LOR	Unit			
TRH - 2013 NEPM Fractions (after silica gel clean-up)					
TRH >C10-C16 (after silica gel clean-up)	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH >C16-C34 (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH >C34-C40 (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH - 1999 NEPM Fractions (after silica gel clean-up)					
TRH C10-C36 (Total) (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C10-C14 (after silica gel clean-up)	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH C15-C28 (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C29-C36 (after silica gel clean-up)	0.1	mg/L	< 0.1	< 0.1	< 0.1
Ammonia (as N)					
Ammonia (as N)	0.01	mg/L	< 0.01	0.01	0.04
Chloride					
Chloride	1	mg/L	130	140	140
Conductivity (at 25°C)					
Conductivity (at 25°C)	10	uS/cm	990	1000	1000
Nitrate & Nitrite (as N)					
Nitrate (as N)	0.05	mg/L	< 0.05	< 0.05	< 0.05
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02
Nitrite (as N)					
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02
Phosphate total (as P)					
Phosphate total (as P)	0.01	mg/L	< 0.01	< 0.01	< 0.01
Phosphorus reactive (as P)					
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	< 0.01	< 0.01
Sulphate (as SO4)					
Sulphate (as SO4)	5	mg/L	44	44	45
Total Dissolved Solids Dried at 180°C ± 2°C					
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	580	590	570
Total Kjeldahl Nitrogen (as N)					
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.4	0.3	0.4
Total Nitrogen (as N)*					
Total Nitrogen (as N)*	0.2	mg/L	0.4	0.3	0.4
Total Organic Carbon					
Total Organic Carbon	5	mg/L	24	21	12
Total Suspended Solids Dried at 103–105°C					
Total Suspended Solids Dried at 103–105°C	1	mg/L	6.8	8.6	6.0
Hardness mg equivalent CaCO3/L					
Hardness mg equivalent CaCO3/L	5	mg/L	71	71	71



Environment Testing

Client Sample ID			IW4 Water	IW5 Water	IW6 Water
Sample Matrix			B20-Au01475	B20-Au01476	B20-Au01477
Eurofins Sample No.			Jul 31, 2020	Jul 31, 2020	Jul 31, 2020
Date Sampled					
Test/Reference	LOR	Unit			
Alkalinity (speciated)					
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	320	340	360
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	34	25	28
Hydroxide Alkalinity (as CaCO ₃)	20	mg/L	< 20	< 20	< 20
Total Alkalinity (as CaCO ₃)	20	mg/L	350	370	390
Alkali Metals					
Calcium	0.5	mg/L	12	12	12
Magnesium	0.5	mg/L	10	10	10
Potassium	0.5	mg/L	2.8	2.7	2.8
Sodium	0.5	mg/L	220	220	220
Heavy Metals					
Aluminium	0.05	mg/L	< 0.05	0.08	0.05
Antimony	0.005	mg/L	< 0.005	< 0.005	< 0.005
Arsenic	0.001	mg/L	0.002	0.002	0.002
Barium	0.02	mg/L	0.09	0.09	0.09
Beryllium	0.001	mg/L	< 0.001	< 0.001	< 0.001
Bismuth	0.005	mg/L	< 0.005	< 0.005	< 0.005
Boron	0.05	mg/L	< 0.5	< 0.5	< 0.5
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002
Chromium	0.001	mg/L	< 0.001	< 0.001	< 0.001
Cobalt	0.001	mg/L	< 0.001	< 0.001	< 0.001
Copper	0.001	mg/L	0.001	< 0.001	< 0.001
Iron	0.05	mg/L	< 0.05	0.05	0.05
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001
Manganese	0.005	mg/L	< 0.005	< 0.005	0.006
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001
Molybdenum	0.005	mg/L	< 0.005	< 0.005	< 0.005
Nickel	0.001	mg/L	< 0.001	< 0.001	< 0.001
Selenium	0.001	mg/L	< 0.001	< 0.001	< 0.001
Silver	0.005	mg/L	< 0.005	< 0.005	< 0.005
Thallium	0.005	mg/L	< 0.005	< 0.005	< 0.005
Tin	0.005	mg/L	< 0.005	< 0.005	< 0.005
Titanium	0.005	mg/L	< 0.005	< 0.005	< 0.005
Uranium	0.005	mg/L	< 0.005	< 0.005	< 0.005
Vanadium	0.005	mg/L	< 0.005	< 0.005	< 0.005
Zinc	0.005	mg/L	< 0.005	< 0.005	< 0.005
Extended Metals Suite					
Calcium	0.5	mg/L	12	12	12
Magnesium	0.5	mg/L	10	10	10
Phosphorus	0.5	mg/L	< 1	< 1	< 1
Potassium	0.5	mg/L	2.8	2.7	2.8
Silicon	0.5	mg/L	1.6	1.7	1.7
Sodium	0.5	mg/L	220	220	220
Sulphur	0.5	mg/L	16	16	16

Appendix 8 Groundwater Quality

Appendix 9 Community Consultation Plan

1 Introduction

This Community Consultation Plan (CCP) is part of Zedemar's commitment to deliver community consultation regarding the rehabilitation of ML4712. The ML is due to expire on 31 October 2023.

The post mining land use proposed by Zedemar seeks to re-establish:

- the pre-mining land use of light cattle grazing of introduced and native pastures in selected areas
- the use of the rehabilitated area by local fauna
- development of water management structures to aid grazing and fauna.

2 Objectives for Community Consultation

In accordance with the 2004 Environmental Management Overview Strategy (EMOS) Zedemar will ensure that no impact occurs.

The following objectives are listed:

- Zedemar will manage rehabilitation operations at ML4712 to minimise negative impacts on nearby residents, commercial activities, infrastructure or the receiving environment.
- Zedemar will provide enough notice to potentially affected neighbours prior to rehabilitation works commencing.
- Zedemar will promptly respond to any complaints received.

3 Stakeholders

There are a number of residences, commercial/industrial and recreational/motorsport activities surrounding the ML. Impacts to the immediate surrounding land use would be minimal during rehabilitation. Being on private land, the rehabilitation project area is not available for public use and will not place any undue demand on local facilities. There are no impacts envisaged for the broader community whilst performing rehabilitation. The rehabilitation works would mostly not be visible from nearby residences. There are several residential premises on Bergmans Road and Paynes Road

in close proximity to the OPD, dust and noise may only impact two residences on Bergmans Road when rectification works occur.

Other stakeholders include state and local government, owners of infrastructure including roads, communication, and electricity.

4 Community Engagement

Given the small scale and short duration of the rehabilitation project, it is not considered necessary to hold public meetings to discuss the methods of rehabilitation already established within the previous PoOP. However, it is acknowledged that an industry group, institution, or member of the community may contact Zedemar from time to time. Zedemar will always engage with them in a professional manner.

Four weeks prior to rehabilitation works commencing, a letter will be sent to surrounding residences and businesses advising of rectification works and that it is possible that air and noise impacts may occur. Because the rehabilitation will occur in stages, several letters may be sent. Realistically, noise and dust impacts may only impact the two residences on Bergmans Road when conducting works in the OPD area, given their close proximity. All other residences and surrounding activities are unlikely to be impacted.

5 Processing of Feedback/Comments Received

Zedemar will promptly review correspondence and assess information received in a timely manner. Responses will be provided within timeframes that are considered reasonable and/or in accordance with any applicable statutory timeframes.

6 Information to be Released

Senior management will be familiar with all information released to the community and relevant stakeholders. All information released will be factual and will be prepared by the most relevant person within Zedemar, a person approved to speak on behalf of the company, or a suitably qualified person when considering the need to respond with specialist reports.

7 Community Consultation Register

A community consultation register will be retained. Refer to **Appendix 9 - Table 2: Community Consultation Register**.

8 Complaints and Enquiries

When a complaint is received, Zedemar will record all complaints received in accordance with condition G1 of EPML00594013.

Permit

Environmental authority EPML00594013

Agency interest: Social	
Condition number	Condition
G1	Complaint response All complaints received must be recorded including details of the complainant, reasons for the complaint, investigations undertaken, conclusions formed and actions taken. This information must be made available for inspection by the administering authority upon request.

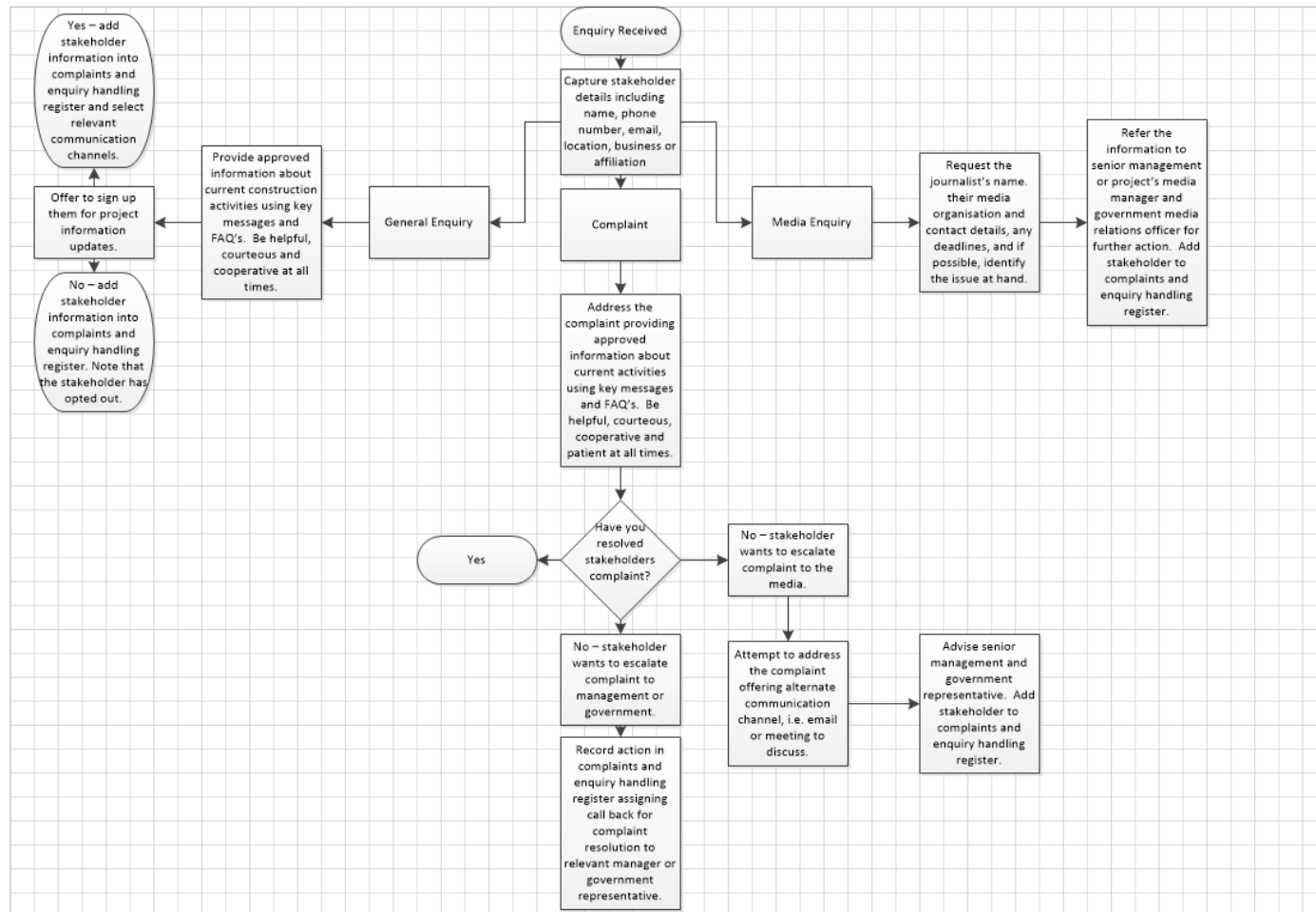
Zedemar has an existing complaint procedure whereby all complaints received are recorded and investigated. Complaints, general and media enquiries shall be handled in a consultative way and promptly dealt with. All complaints received will be responded to within 1 week using Zedemar's complaints handling procedure with the intention of resolving legitimate concerns as quickly as possible.

A flow chart is provided in **Appendix 9 - Figure 1** showing the process for handling complaints, general and media enquiries.

In the instance of a complaint, the procedure includes contacting the complaining party as soon as possible and implementing action to quickly resolve any problems. Where feasible, the person making the complaint is to be advised within 24 hours of the status of the investigation and the likely timeframe for its resolution. The person making the complaint shall be advised at the completion of the investigation (or at reasonable interim times) of the outcome of the complaint and the remedial actions taken.

A complaints and enquiry handling register record has been established to log the details of a complaint or enquiry, any necessary action taken in response and any procedural changes implemented to prevent recurrence. The results of such investigation and actions taken are recorded and the initiator of the complaint or enquiry advised (refer to **Appendix 9 - Table 1**). Records kept are as follows:

- time, date and nature of complaint, general or media enquiry
- type of communication (telephone, letter, email, personal etc.)
- name, contact address, email address and contact telephone number of complainant (note: if the complainant does not wish to be identified then “not identified” is to be recorded)
- name, contact address, media organisation, email address and contact telephone number of stakeholder making enquiry
- response and investigation undertaken as a result of the complaint
- name of person responsible for investigating complaint
- action taken as a result of the complaint investigation
- name of person responsible for providing response to media or general enquiry
- signature of responsible person.



APPENDIX 9 - FIGURE 1: FLOW CHART SHOWING PROCEDURE FOR STAKEHOLDER COMPLAINTS, GENERAL AND MEDIA ENQUIRIES

The complaints and enquiry handling register records the following:

Time, date, and nature of complaint	
Type of communication (telephone, letter, personal etc.)	
Is the communication a general enquiry, complaint or media enquiry (specify).	
Complaint:	
Name, contact address, email address and contact telephone number of complainant (note: if the complainant does not wish to be identified then “not identified” is to be recorded).	
Response and investigation undertaken as a result of the complaint, or response provided to general or media enquiry.	
Name of person responsible for investigating complaint.	
Action taken as a result of the complaint investigation.	
Signature of responsible person and position.	
General Enquiry:	
Name, contact address, email address and contact telephone number of stakeholder.	
Response as a result of general enquiry.	

Name of responsible person providing response to general enquiry.	
Does the stakeholder wish to receive further information updates?	
Signature of responsible person and position.	
Media Enquiry:	
Name, media organisation, contact address, email address and contact telephone number of organisation.	
Name of responsible person providing response to media enquiry.	
Signature of responsible person and position.	

APPENDIX 9 - TABLE 1: COMPLAINTS AND ENQUIRIES REGISTER

Consultation Date.	
Name of person in attendance.	
Name of person communicated to.	
Consultation type (workshop, meeting, letter, email).	
Describe information provided.	
Describe issue raised and discussed.	
Describe how considerations have been considered.	
Provide detail of decision/outcomes of engagement.	
Detail commitments made by Zedemar.	

APPENDIX 9 - TABLE 2: COMMUNITY CONSULTATION REGISTER

Appendix 10 Risk Assessment

Glossary & Acronyms

BPEM	Best Practice Environmental Management
DES	Department of Environment and Science
EA	Environmental Authority
ERA	Environmentally Relevant Activity
ERC	Estimated Rehabilitation Calculation
Environmental nuisance	Unreasonable interference or likely interference with an environmental value caused by— • aerosols, fumes, light, noise, odour, particles or smoke; or • an unhealthy offensive or unsightly condition because of contamination; or • another way prescribed by regulation.
Environmental value	An environmental value is— • a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety; or • another quality of the environment identified and declared to be an environmental value under an environmental protection policy or regulation.
EP Act	<i>Environmental Protection Act 1994</i>
RMP	Risk Management Plan

1 Introduction

It is widely recognised that environmental risk management is essential to the successful operation of an activity that has the potential to impact on the receiving environment. In part, it can assist with good corporate governance of activities if all levels of management and employees adopt the principles that underpin risk management.

It is also widely accepted that for risk management to be successful for a particular activity, it must be grounded in a framework that is structured, informative and which provides for systematic review.

It is recognised that to achieve successful outcomes (i.e. achievement of objectives) with regards to risk management, the risk management framework must incorporate a plan that specifies the approach, the management components, and resources to be applied to the management of risk.

Organisations that have successfully implemented environmental risk management techniques to their businesses have realised that the risk management framework must allow for:

- the identification of risks
- the identified risks to be analysed and evaluated so that the likelihood of occurrence and severity of the consequence is clearly understood
- the provision of management measures that effectively treat the identified risks so that they are minimised to a tolerable level or eliminated completely
- the re-evaluation and assessment of management techniques and control measures to determine success of treatment or if in fact new measures are to be adopted
- adequate communication to be performed between all levels of management and relevant stakeholders.

These same organisations realise that to have an effective risk management plan in place, is to demonstrate strong environmental performance when achieving environmental standards and practices and complying with environmental approvals and governing laws.

This risk management plan (RMP) has been prepared by the LZ Environmental Company Pty Ltd (Zambelli Environmental) for Zedemar Holdings Pty Ltd as part of the PRC PLAN and surrounds the rehabilitation to be performed at the Ebenezer Mine Site (ML4712). This RMP includes a risk assessment of identified risks, their likely consequence and frequency of occurrence that may impact

on achieving the rehabilitation goals of creating a safe, stable, and non-polluting landform that can support a post mining land use.

1.1 Purpose

This document is to be considered as the Risk Management Plan (RMP) for Zedemar’s rehabilitation activities within the Ebenezer mine site (ML4712). The primary purpose of this RMP is to identify and evaluate the environmental risks associated with various aspects of rehabilitation of areas identified within the PRC PLAN and for the establishment of risk management measures that will effectively minimise or eliminate the identified risks.

The framework that underpins this RMP is also provided within this document so that it is clear how Zedemar will manage the identified environmental risks associated with the rehabilitation of the mine site.

This RMP will establish the environmental objectives or standards to be achieved when managing identified risk items. Risks have been primarily determined on actual practices or actions that are occurring currently but also encompass considerations for future scenarios (i.e. extraordinary factors) that could result in an undesirable event occurring. In any event the potential for causing environmental harm will be considered.

Risk management measures will also be provided within this RMP that will assist Zedemar manage the identified risks in a systematic way so that risks are minimised or eliminated. A component of the system will be for the inclusion of regular monitoring which confirms the success of the measures implemented to manage the risk.

It is to be noted that this RMP will be the document that Zedemar will refer to when considering the environmental risks at Ebenezer as they currently are and as they present themselves into the future. Should the risk rating level of any identified item change or should there in fact be new risks identified in the future, then this document will be updated to reflect such changes or inclusions. If a certain identified risk is eliminated, then this document should be amended to reflect such elimination so that the actual risk profile of the rehabilitation can be conveyed to relevant stakeholders as and when required. This will assist with continual improvement of the risks identified within this RMP.

1.2 Risk Management Framework (ISO 31000:2.3)

The risk management framework for the Ebenezer rehabilitation has been established with guidance from the AS/NZS ISO31000:2009 Risk Management – Principles and guidelines, Standards Australia. Terms and definitions utilised within the ISO31000 standard will be emulated throughout this document.

Zedemar understands that the risk management framework incorporates robust policy direction, clearly defined objectives, and a commitment to ensuring risk is managed effectively.

Zedemar recognises that the risk management framework incorporates components that provide the foundations and organisational arrangement for designing, implementing, monitoring, reviewing and continually improving risk management (i.e. co-ordinated activities to direct and control Zedemar's risk) at the Ebenezer site.

In so far as the organisational arrangement that will in effect implement risk management measures, information in Section 6 is provided. The following sections however are provided so as to detail the relevant foundational components considered with regards to policy, objectives and commitment to manage risk at the Ebenezer site.

1.2.1 Risk Management Policy (ISO 31000: 2.4)

It is the intention of Zedemar to demonstrate the highest standard of environmental management when performing rehabilitation activities that have the potential to cause environmental harm to the receiving environment.

As part of its environmental policy, Zedemar requires a proactive approach to environmental management where environmental risks can be anticipated with control measures being implemented, rather than the consequences of risks being reacted to (i.e. where measures are taken to mitigate worsening conditions or to prevent ongoing harm).

1.2.2 Objectives

The primary rehabilitation objective for Zedemar at the Ebenezer site is to effectively rehabilitate disturbed areas so that identified risks are eliminated prior to the submission of a final rehabilitation report that supports an environmental authority surrender application.

The second objective is to ensure that the RMP is continually updated to reflect the current actual risk profile of the various risk items identified to be associated with the rehabilitation of the Ebenezer site.

1.2.3 Commitment to Manage Risk

Zedemar is committed to ensuring that all levels of management adopt this RMP and perform all tasks required by this RMP.

1.2.4 Risk Management Plan (ISO 31000: 2.6)

Zedemar recognises that risk management incorporates systematic planning to ensure that attainment of the above-mentioned objectives is successful.

The approach taken within this document was to identify which aspects of the rehabilitation activities presented themselves as risks to the receiving environment whereby systematic planning for their minimisation or elimination could occur.

1.3 Risk Management Process (ISO 31000: 2.8)

Zedemar recognises that the risk management process must be systematic with regards to the application of management policies and the implementation of various procedures created to manage risk. Zedemar acknowledges that to achieve this, establishing the context is essential so that assessment of the risk can be performed accurately whereby effective risk treatment methods can be established.

It is further understood that to have a successful risk management outcome, monitoring and review of the abovementioned components needs to be incorporated into the process. Zedemar recognises that risk management measures must be communicable between all personnel so that they are implemented effectively.

Communication of success or failure at minimising risks must be an integral part of the risk management process to ensure that all personnel and stakeholders are aware of the current status of the risk profile for Zedemar. Communication and consultation should be embedded within the process between all stakeholders so that no confusion occurs.

This document establishes the context (both internal and external) within Section 3 so as to assist in the achievement of the defined objectives. The risk assessment method adopted within this document is described in the following section.

1.3.1 Risk Assessment (ISO 31000: 2.14)

Zedemar recognises that risk assessment incorporates identification of the risk (ISO 31000; 2.15), risk analysis (ISO 31000; 2.21) and risk evaluation (ISO 31000; 2.24). Section 4 of this document contains the risk assessment which identifies risks, inclusive of sources and events that could result in undesirable consequences occurring.

Most importantly, Section 4 also incorporates risk criteria that assists with the analysis and evaluation of risk so as to ensure that the risk management measures to be implemented are effective at either minimising or eliminating the risk entirely.

2 Principles for Effective Risk Management (ISO 31000: 3.0)

Zedemar recognises that for effective risk management adherence to the following principles must occur. The following principles are obtained from the ISO31000 standard with brief detail being provided on how Zedemar will comply with them.

a) Risk management creates and protects value

Zedemar recognises that risk management contributes to the demonstrated achievement of objectives and assists with the improvement of performance in relation to environmental protection. Zedemar has set objectives within this document that will assist in achieving environmental protection. All employees will ensure objectives are achieved.

b) Risk management is an integral part of all organisational processes

Zedemar recognises that risk management is an integral part of all organisational processes. Zedemar will implement all recommended risk management measures detailed within this document.

c) Risk management is part of decision making

Zedemar will ensure that reference is made to all risk management measures identified within this document when making decisions regarding aspects of the activity so that eventually a final rehabilitation report can be submitted as part of a surrender application.

d) Risk management explicitly addresses uncertainty

In preparing this document, uncertainty has been assessed within the likelihood of occurrence. It is recognised by Zedemar that external factors such as climate may change the way risk management measures are implemented. Zedemar will continually review risk management measures detailed within this document so that it can be demonstrated that measures are contemporary.

e) Risk management is systematic, structure and timely

Zedemar recognises that risk management must be systematic, timely and structured so that it can be demonstrated without delay, that risk management measures are being consistently implemented, are comparable with any results obtained and above all considered as being reliable. Zedemar will ensure that the RMP is continually updated as and when required.

f) Risk management is based on the best available information

Zedemar recognises that risk management relies on having the best available information at the time of assessing the risk. Zedemar will continually re-evaluate identified risks and associated consequences as risk management measures are implemented. Zedemar will ensure that any limitations in data or associated information surrounding identified risks are evaluated via performing gap analysis' whereby any deficiencies will be corrected.

g) Risk management is tailored

Zedemar is confident that this document is aligned with the organisation's external and internal context and adequately defines the risks. Zedemar believes that this document is presented in a format that allows decisions to be made when considering the rehabilitation of the Ebenezer site and the subsequent submission of a final rehabilitation report to accompany a surrender application.

h) Risk management takes human and cultural factors into account

Zedemar understands that risk management recognises the capabilities, perceptions and intentions of external and internal people that can facilitate, or hinder achievement of the objectives set out

within this document. Zedemar will ensure that all persons involved with the implementation of risk management measures are capable persons to achieve the stated objectives.

i) **Risk management is transparent and inclusive**

Zedemar will ensure that the risk management measures remain contemporary. Zedemar will engage relevant stakeholders as and when required so that all views are considered when re-evaluating risk, or establishing new risk criteria.

j) **Risk management is dynamic, iterative, and responsive to change**

Zedemar will ensure that risk management will respond to change whether it be from an internal or external source.

k) **Risk management facilitates continual improvement of the organisation**

Zedemar will ensure that wherever possible continual improvement of the organisation's environmental performance will occur.

3 Establishment of Context (ISO 31000: 5.3)

Zedemar recognises the importance of establishing both the external and internal contexts when considering the risk management process that is to be adopted at the Ebenezer site. The following sections are provided which consider both the external and internal environments.

3.1 Establishing External Context

Zedemar acknowledges the concerns the administering authority has expressed regarding certain aspects of areas requiring rehabilitation. This risk assessment has been prepared as part of the response to the request for further information to assess an application for an ERC decision issued by the Department of Environment and Science (DES). The DES has requested that a revised estimated rehabilitation cost (ERC) be established. The certain aspects of the ERC have been underpinned by the risk assessment findings.

Since the Ebenezer site has to be rehabilitated before surrender of the EA can occur, quantification of the of the risk will be utilised to establish a revised ERC which is to be in place until all rehabilitation has been completed and the EA surrendered.

A key driver for the above is the protection of the receiving environment, namely soil and water environments.

3.2 Establishing Internal Context

The organisational structure of Zedemar is such that this RMP can be implemented effectively. The policies and objectives stated previously are aligned with the strategy that is to address the identified risks. Zedemar believes all management personnel and employees engaged in implementing this RMP have the capability to do so.

The expiry date for the mining lease ML4712 is 31 October 2023 and accordingly rehabilitation is to be completed with an application for the surrender of the EA being submitted.

The treatment measures provided within this RMP to eliminate and in some instances, manage the identified risks are appropriate for the long term.

Zedemar believes that it does have an appropriate culture in place to achieve the objectives of this plan.

3.3 Defining Risk Criteria (ISO 31000: 5.3.5)

In order to establish the significance of the risk, defined risk criteria must be established. Zedemar understands that the following factors should be considered:

- The nature and types of causes and consequences that can occur and how they will be measured;
- How likelihood will be defined;
- The time frames of the likelihood and/or consequence(s);
- How the level of risk is to be determined;
- The views of the stakeholders;
- The level at which risk becomes acceptable and tolerable; and
- Whether combinations of multiple risk should be considered and, if so, how and which combinations should be considered.

The following sections expand on the above factors, and it is the belief of Zedemar that they align with the organisation's values, objectives and resources.

3.4 Nature and Types of Causes and Consequences

In order to establish the nature and types of causes and consequences of impacts, the following factors have been considered in preparing this RMP.

- The topography of the surrounding land surface and its ability to accentuate the consequence;
- The climatic conditions that could in turn facilitate the consequence becoming pronounced;
- The location and number of items or materials that could cause harm if released to the receiving environment under certain conditions;
- The ability for responses to occur when required;
- The significantly modified receiving environment that exists and the impact that could be caused; and
- The influence that the surrounding land may have on contaminant levels observed should there in fact be a release to the receiving environment.

3.4.1 Risk Identification

The following tables provides the risk profile of the rehabilitation at the Ebenezer Site.

Identified Risk Item	Description of Risk
Tailings Pond – Erosion which causes environmental harm or failure to meet post mining land use.	• Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Tailings Pond resulting in releases to the receiving water environment.
Tailings Pond – Instability which causes environmental harm or failure to meet post mining land use.	• Instability that results in the failure of Tailings Pond wall resulting in a significant mass of earthen material entering Tailings Pond resulting in releases to the receiving water environment.
Tailings Pond – Animal and Human Access	• Access by animals or humans resulting in injury or death.
Tailings Pond –Vehicle Access	• Access by vehicles resulting in injury or death.

Ironbark North Void Low-wall - Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Ironbark North Void resulting in releases to the receiving water environment.
Ironbark North Void Low-wall - Instability which causes environmental harm or failure to meet post mining land use.	Instability that results in the failure of the low-wall resulting in a significant mass of earthen material entering Ironbark North Void resulting in releases to the receiving water environment.
Ironbark North Void Low-wall -- Animal and Human Access	Access by animals or humans resulting in injury or death.
Ironbark North Void Low-wall-- Vehicle Access	Access by vehicles resulting in injury or death.
Ironbark North Void Low-wall - Unsuccessful vegetation cover which causes environmental harm or failure to meet post mining land use.	Successful coverage of bare surfaces with vegetation does not occur which results in sediment deposition into Ironbark North Void resulting in releases to the receiving water environment.
Ironbark North Void High-wall - Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Ironbark North Void resulting in releases to the receiving water environment.
Ironbark North Void High-wall - Instability which causes environmental harm or failure to meet post mining land use.	Instability that results in the failure of the high-wall resulting in a significant mass of earthen material entering Ironbark North Void resulting in releases to the receiving water environment.
Ironbark North Void High-wall -- Animal and Human Access	Access by animals or humans resulting in injury or death.
Ironbark North Void High-wall - Vehicle Access	Access by vehicles resulting in injury or death.

Lanes Void Low-wall- Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Lanes Void resulting in releases to the receiving water environment.
Lanes Void Low-wall- Instability which causes environmental harm or failure to meet post mining land use.	Instability that results in the failure of the low-wall resulting in a significant mass of earthen material entering Lanes Void resulting in releases to the receiving water environment.
Lanes Void Low-wall- Animal and Human Access	Access by animals or humans resulting in injury or death.
Lanes Void Low-wall- Vehicle Access	Access by vehicles resulting in injury or death.
Lanes Void Low-wall- Unsuccessful vegetation cover which causes environmental harm or failure to meet post mining land use.	Successful coverage of bare surfaces with vegetation does not occur which results in sediment deposition into Lanes Void resulting in releases to the receiving water environment.
Lanes Void High-wall - Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Lanes Void resulting in releases to the receiving water environment.
Lanes Void High-wall - Instability which causes environmental harm or failure to meet post mining land use.	Instability that results in the failure of the high-wall resulting in a significant mass of earthen material entering Lanes Void resulting in releases to the receiving water environment.
Lanes Void High-wall- Animal and Human Access	Access by animals or humans resulting in injury or death.
Lanes Void High-wall - Vehicle Access	Access by vehicles resulting in injury or death.

Ironbark South Dump Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment release to the receiving water environment.
Ironbark South Dump - Instability which causes environmental harm or failure to meet post mining land use.	Instability that results in the failure of the batter slope resulting in a significant mass of earthen material entering IBSD area resulting in releases to the receiving water environment.
Ironbark South Dump -Vehicle Access	Access by vehicles resulting in injury or death.
Ironbark South Dump – Animal and Human Access	Access by animals or humans resulting in injury or death.
Ironbark South Dump– Unsuccessful Vegetation Cover which causes environmental harm or failure to meet post mining land use.	Successful coverage of bare surfaces with vegetation does not occur which results in sediment deposition into sediment ponds resulting in releases to the receiving water environment.
Lanes Eastern Emplacement – Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment release to the receiving environment.
Lanes Eastern Emplacement – Instability which causes environmental harm or failure to meet post mining land use.	Compost pad stormwater runoff pools/ponds within drain on western side resulting in low-wall failure at crest of western batter.
Lanes Eastern Emplacement – Unsuccessful Vegetation Cover which causes environmental harm or failure to meet post mining land use.	Successful coverage of bare surfaces with vegetation does not occur which results in sediment deposition into sediment ponds resulting in releases to the receiving water environment.

Out of Pit Dump –Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment release to the receiving environment.
Out of Pit Dump – Waterlogging resulting in erosion which causes environmental harm or failure to meet post mining land use.	Waterlogged sodic soil results in tunnel and pipe erosion which causes sediment release to the receiving water environment.
Out of Pit Dump – Unsuccessful Vegetation Cover which causes environmental harm or failure to meet post mining land use.	Successful coverage of bare surfaces with vegetation does not occur which results in sediment releases to the receiving water environment.

APPENDIX 10 - TABLE 1: RISK IDENTIFICATION TABLE

The table above does not include certain areas due to reasons provided below:

- Stockpile Area:** The landowner has requested that the area is retained for use as a storage area. No risk to the receiving land or water environments exists.
- Bentonite Area:** The landowner has requested that the infrastructure and hardstand areas are retained for use as storage areas. No risk to the receiving land or water environments exists.
- Maxam Area:** The landowner has requested that the infrastructure and hardstand areas are retained for use as storage areas. No risk to the receiving land or water environments exists.
- Haulage Roads:** The landowner has requested that the internal haulage roads be retained for site access. No risk to the receiving land or water environments exists.
- Wet weather storage area:** Area is too small to cause environmental harm.
- Bentonite Storage area :** No environmental harm is being caused, minor topsoiling and grass seeding is required.
- Overburden Mound :** Small areas requiring topsoil and grass seed. No potential for environmental exists.
- Topsoil stockpile area:** Small area and no potential for harm.
- Balance of mining lease:** No potential for environmental harm

3.4.2 Measurement of Consequence

The following table is provided to define the consequence and its measurability (i.e. severity level). The table provides descriptions of consequence pertaining to categories of the natural environment, community relations and cultural heritage, legal implications and associated damages, loss and likely business interruptions. Zedemar believes the stated categories adequately align with Zedemar values.

Consequence?	Natural Environment	Community Relations & Cultural Heritage	Legal	Damage/Loss/business Interruption	Severity Level
Catastrophic	Significant and irreversible impact on threatened species, habitat(s) or ecosystem(s)	Irreparable damage to sites of high cultural significance	Major prosecutions and fines resulting in incarcerations for senior executives	Significant Financial Loss. >\$10 million	6
Critical	Very serious long term environmental impairment of eco-system function.	Very serious widespread social impact. Irreparable damage to valued cultural items	Significant prosecutions and fines. Very serious litigation, including class actions	Major \$1M - \$10M	5
High	Serious medium term environmental effects	Ongoing serious social issues. Significant but repairable damages to structures/items of cultural significance.	Major breach of regulation. Major litigation	High \$100,000 - \$1M	4
Moderate	Moderate short-term effects but not effecting overall ecosystem function.	Ongoing social issues. Minor permanent damage to items of cultural significance.	Moderate legal issues, non-compliances, and breaches of regulation	Moderate financial Loss <\$100,000.	3
Minor	Minor effects on biological or physical environment.	Minor medium term social impacts	Minor legal issues, non-compliances, and breaches of regulation.	Low Financial Loss <\$10,000.	2
Negligible	Limited damage to minimal areas of low significance	Low level repairable damage to commonplace structures	Low level legal issues	Min Financial Loss <\$1000.	1

APPENDIX 10 - TABLE 2: CONSEQUENCE RATING

3.4.3 Definition of Likelihood

The following table is provided to define the likelihood.

Likelihood	Description	Frequency	Rating
Certain	Common occurrence	On all occasions, at least daily	6 – Certain
Very Likely	Expected to occur in most circumstances	Once per week	5 – Very Likely
Likely	Probably will occur or has happened in the past	Once per month	4 – Likely
Unlikely	Occurs infrequently	Less than to once per year	3 – Unlikely
Possible	Could happen at some time	Less than to once per 10 years	2 – Possible
Almost Impossible	Not likely to occur	Less than to 1 per 100 years	1 - Almost Impossible

APPENDIX 10 - TABLE 3: LIKELIHOOD, FREQUENCY AND RATING

3.4.4 Risk Level Determination

The following risk matrix is provided to demonstrate how the risk level is determined.

Likelihood	Consequence					
	Negligible	Minor	Moderate	High	Critical	Catastrophic
6 – Certain	6	12	18	24	30	36
5 – Very Likely	5	10	15	20	25	30
4 – Likely	4	8	12	16	20	24
3 – Unlikely	3	6	9	12	15	18
2 – Possible	2	4	6	8	10	12
1 - Almost Impossible	1	2	3	4	5	6

APPENDIX 10 - TABLE 4: RISK LEVEL DETERMINATION

Risk level is defined as:

- Risk Level Rating 25-36 = Extreme risk
- Risk Level Rating 18-24 = Very high risk
- Risk Level Rating 12-16 = High risk
- Risk Level Rating 4-10 = Moderate risk
- Risk Level Rating 1-3 = Low risk.

3.4.5 Risk Acceptability or Tolerance

Risk will be considered acceptable after measures are implemented that results in a risk level rating of Low risk.

3.4.6 Stakeholder Views

Zedemar acknowledges that the DES requires that any identified risk that has the potential to cause environmental harm must be minimised or eliminated.

Complete elimination or management of identified risks will not occur until rehabilitation has been complete and approval to surrender the EA occurs.

The risk assessment provides detail regarding the current risk with no controls in place and similarly, provides detail of the risk associated with areas that have been rehabilitated with controls being in place.

3.4.7 Combination of Multiple Risks

The Zedemar recognises that there is a potential for a combination of the identified risks occurring at once. This would be in extreme weather events such as heavy rainfall, extended dry periods and drought.

4 Risk Assessment

This section provides the risk assessment for the Ebenezer site rehabilitation and identifies various aspects of the rehabilitation that present environmental risks to Zedemar. **Table 5** below represents the current risk profile for Zedemar. Analysis of the likelihood and the consequence of non-desirable events occurring has led to the evaluation of treatment options to minimise or eliminate the risk in **section 5** of this risk assessment.

#	Identified Risk Item	Description of Risk	Likelihood	Consequence	Risk Level	Rating
1	Tailings Pond – Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Tailings Pond resulting in releases to the receiving water environment.	1	2	2	
2	Tailings Pond – Instability which causes environmental harm or failure to meet post mining land use.	Instability that results in the failure of Tailings Pond wall resulting in a significant mass of earthen material entering Tailings Pond resulting in releases to the receiving water environment.	1	2	2	
3	Tailings Pond — Animal and Human Access	Access by animals or humans resulting in injury or death.	3	6	18	
4	Tailings Pond — Vehicle Access	Access by vehicles resulting in injury or death.	1	6	6	
5	Ironbark North Void Low-wall — Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Ironbark North Void resulting in releases to the receiving water environment.	1	1	1	
6	Ironbark North Void Low-wall — Instability which causes environmental harm or failure to meet post mining land use.	Instability that results in the failure of the low-wall resulting in a significant mass of earthen material entering Ironbark North Void resulting in releases to the receiving water environment.	1	1	1	
7	Ironbark North Void Low-wall — Animal and Human Access	Access by animals or humans resulting in injury or death.	3	6	18	

8	Ironbark North Void Low-wall - Vehicle Access	Access by vehicles resulting in injury or death.	2	6	12
9	Ironbark North Void Low-wall - Unsuccessful vegetation cover which causes environmental harm or failure to meet post mining land use.	Successful coverage of bare surfaces with vegetation does not occur which results in sediment deposition into Ironbark North Void resulting in releases to the receiving water environment.	1	1	1
10	Ironbark North Void High-wall Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Ironbark North Void resulting in releases to the receiving water environment.	1	1	1
11	Ironbark North Void High-wall — Instability which causes environmental harm or failure to meet post mining land use.	Instability that results in the failure of the high-wall resulting in a significant mass of earthen material entering Ironbark North Void resulting in releases to the receiving water environment.	1	1	1
12	Ironbark North Void High-wall — Animal and Human Access	Access by animals or humans resulting in injury or death.	3	6	18
13	Ironbark North Void High-wall — Vehicle Access	Access by vehicles resulting in injury or death.	2	6	12
14	Lanes Void Low-wall- Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Lanes Void resulting in releases to the receiving water environment.	1	1	1

15	Lanes Void Low-wall- Instability which causes environmental harm or failure to meet post mining land use.	Instability that results in the failure of the low-wall resulting in a significant mass of earthen material entering Lanes Void resulting in releases to the receiving water environment.	1	1	1
16	Lanes Void Low-wall— Animal and Human Access	Access by animals or humans resulting in injury or death.	3	6	18
17	Lanes Void Low-wall— Vehicle Access	Access by vehicles resulting in injury or death.	2	6	12
18	Lanes Void Low-wall- – Unsuccessful vegetation cover which causes environmental harm or failure to meet post mining land use.	Successful coverage of bare surfaces with vegetation does not occur which results in sediment deposition into Lanes Void resulting in releases to the receiving water environment.	1	1	1
19	Lanes Void High-wall— Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Lanes Void resulting in releases to the receiving water environment.	1	1	1
20	Lanes Void High-wall - - Instability which causes environmental harm or failure to meet post mining land use.	Instability that results in the failure of the high-wall resulting in a significant mass of earthen material entering Lanes Void resulting in releases to the receiving water environment.	1	1	1
21	Lanes Void High-wall — Animal and Human Access	Access by animals or humans resulting in injury or death.	3	6	18
22	Lanes Void High-wall— Vehicle Access	Access by vehicles resulting in injury or death.	2	6	12

23	Ironbark South Dump — Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment release to the receiving water environment.	5	3	15
24	Ironbark South Dump - - Instability which causes environmental harm or failure to meet post mining land use.	Instability that results in the failure of the batter slope resulting in a significant mass of earthen material entering IBSD area resulting in releases to the receiving water environment.	2	3	6
25	Ironbark South Dump — Vehicle Access	Access by vehicles resulting in injury or death.	2	6	12
26	Ironbark South Dump — Animal and Human Access	Access by animals or humans resulting in injury or death.	2	6	12
27	Ironbark South Dump — Unsuccessful Vegetation Cover which causes environmental harm or failure to meet post mining land use.	Successful coverage of bare surfaces with vegetation does not occur which results in sediment deposition into sediment ponds resulting in releases to the receiving water environment.	2	3	6
28	Lanes Eastern Emplacement — Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment release to the receiving environment.	1	1	1
29	Lanes Eastern Emplacement — Instability which causes environmental harm or failure to meet post mining land use.	Compost pad stormwater runoff pools/ponds within drain on western side resulting in low-wall failure at crest of western batter.	1	1	1

30	Lanes Eastern Emplacement — Unsuccessful Vegetation Cover which causes environmental harm or failure to meet post mining land use.	Successful coverage of bare surfaces with vegetation does not occur which results in sediment releases to the receiving water environment.	1	3	3
31	Out of Pit Dump – Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment release to the receiving environment.	6	3	18
32	Out of Pit Dump Waterlogging resulting in erosion which causes environmental harm or failure to meet post mining land use.	Waterlogged sodic soil results in tunnel and pipe erosion which causes sediment release to the receiving water environment.	6	3	18
33	Out of Pit Dump – Unsuccessful Vegetation Cover which causes environmental harm or failure to meet post mining land use.	Successful coverage of bare surfaces with vegetation does not occur which results in sediment releases to the receiving water environment.	6	3	18

APPENDIX 10 - TABLE 5: INITIAL RISK ANALYSIS AND EVALUATION

4.1 Justification of Selection of Initial Likelihood and Consequence

When considering the justification for the initial likelihood and consequences selected, the following table is provided.

#	Identified Risk Item	Description of Risk	Reason
1	Tailings Pond – Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Tailings Pond resulting in releases to the receiving water environment.	- No significant erosion channels exist within ML that results in releases of sediment laden water into the Tailings Pond. - Enough distance is provided within water column for suspended solids to settle before water releases from spillway. - Environmental harm is unlikely to be caused based on a historical average suspended solids concentration of 22 mg/l and a 90th percentile of 34 mg/l. - No affect on post mining land use.
2	Tailings Pond – Instability which causes environmental harm or	Instability that results in the failure of Tailings Pond wall resulting in a significant mass of earthen material entering Tailings Pond resulting in releases to the receiving water environment.	- Tailings Pond is not an above ground structure. - Volume of water contained when full is ~ 1.6 GL.

	failure to meet post mining land use.		• Tailings Pond provides adequate depth for settling of suspended solids. • Enough distance is provided within water column for suspended solids to settle before water releases from spillway.
3	Tailings Pond – Animal and Human Access	Access by animals or humans resulting in injury or death.	• 4 strand barbed wire fence with a top plain wire not constructed. • Warnings signs not in place.
4	Tailings Pond – Vehicle Access	Access by vehicles resulting in injury or death.	• Small area requires safety bunding to be constructed. • Low volume of traffic on site.
5	Ironbark North Void Low-wall - Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Ironbark North Void resulting in releases to the receiving water environment.	• Whilst it is certain that existing erosion channels will become larger in the future, Lanes Void and Ironbark North Void provide adequate storage for deposited sediment without causing environmental harm.

			Deposited sediment will not affect post mining land use as significant volume, including air space above water surface is available.
6	Ironbark North Void Low-wall - Instability which causes environmental harm or failure to meet post mining land use.	Instability that results in the failure of the low-wall resulting in a significant mass of earthen material entering Ironbark North Void resulting in releases to the receiving water environment.	- Whilst there is a possibility that the low-wall could be subject to a failure, the Ironbark North Void would contain the earthen material. - The low-wall reduces in height as it progresses in a north-easterly alignment, resulting in the potential for less material to enter the void. - Significant air space above the water exists to contain sediment.
7	Ironbark North Void Low-wall — Animal and Human Access	Access by animals or humans resulting in injury or death.	4 strand barbed wire fence with a top plain wire not constructed. - Warnings signs not in place.
8	Ironbark North Void Low-wall - Vehicle Access	Access by vehicles resulting in injury or death.	- Stock fence to be installed to restrict access. - Low volume of traffic on site.

9	Ironbark North Void Low-wall - Unsuccessful vegetation cover which causes environmental harm or failure to meet post mining land use.	Successful coverage of bare surfaces with vegetation does not occur which results in sediment deposition into Ironbark North Void resulting in releases to the receiving water environment.	• Whilst it is acknowledged that vegetation coverage is sparse to non-existent, the result is increased sediment being released to the void. • No impact on the receiving environment is occurring. • No effect on post mining land use.
10	Ironbark North Void High-wall - Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Ironbark North Void resulting in releases to the receiving water environment.	• Whilst a safety bund exists, in certain locations it requires further material to be added to achieve required dimensions. Further bunding, set back from the crest of the high-wall is to be constructed. • Existing bunding diverts stormwater away from the void. • No impact on the receiving environment is occurring. • No effect on post mining land use.

11	Ironbark North Void High-wall - Instability which causes environmental harm or failure to meet post mining land use.	Instability that results in the failure of the high-wall resulting in a significant mass of earthen material entering Ironbark North Void resulting in releases to the receiving water environment.	Whilst there is a possibility that the high-wall could be subject to a failure, the Ironbark North Void would contain the earthen material.
12	Ironbark North Void High-wall - Animal and Human Access	Access by animals or humans resulting in injury or death.	- Stock fence not constructed. - Warnings signs not in place. - Diversion bund does exist.
13	Ironbark North Void High-wall - Vehicle Access	Access by vehicles resulting in injury or death.	Whilst a safety bund exists, a stock fence and another safety bund, set back from the crest of the high-wall is to be constructed.
14	Lanes Void Low-wall- Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Lanes Void resulting in releases to the receiving water environment.	- Existing bunding diverts stormwater away from the void. - Further bunding, set back from the crest of the high-wall is to be constructed where recent failure occurred. - No impact on the receiving environment is occurring.

			No effect on post mining land use.
15	Lanes Void Low-wall- Instability which causes environmental harm or failure to meet post mining land use.	Instability that results in the failure of the low-wall resulting in a significant mass of earthen material entering Lanes Void resulting in releases to the receiving water environment.	- Whilst there is a possibility that the low-wall could be subject to a failure, the Lanes Void would contain the earthen material. - Significant air space above the water exists to contain sediment. - No impact on the receiving environment is occurring. - No effect on post mining land use.
16	Lanes Void Low-wall Animal and Human Access	Access by animals or humans resulting in injury or death.	- Stock fence not constructed. - Warnings signs not in place.
17	Lanes Void Low-wall- Vehicle Access	Access by vehicles resulting in injury or death.	- Whilst bunding is in place, the recent low-wall failure requires the bunding to be set back further from the crest of the low wall. - Stock fence not constructed. - Low volume of traffic on site.

18	Lanes Void Low-wall- Unsuccessful vegetation cover which causes environmental harm or failure to meet post mining land use.	Successful coverage of bare surfaces with vegetation does not occur which results in sediment deposition into Ironbark North Void resulting in releases to the receiving water environment.	• Whilst it is acknowledged that vegetation coverage is sparse to non-existent, the result is increased sediment being released to the void. • No impact on the receiving environment is occurring. • No effect on post mining land use.
19	Lanes Void High-wall - Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Ironbark North Void resulting in releases to the receiving water environment.	• Whilst a bund exists close to the crest of the high-wall, a stock fence, set back from the crest of the high-wall is to be constructed. • Existing bunding diverts stormwater away from the void. • No impact on the receiving environment is occurring. • No effect on post mining land use.
20	Lanes Void High-wall - Instability which causes environmental harm or failure to meet post mining land use.	Instability that results in the failure of the high-wall resulting in a significant mass of earthen material entering Lanes Void resulting in releases to the receiving water environment.	• Whilst there is a possibility that the high-wall could be subject to a failure, the Lanes Void would contain the earthen material.

21	Lanes Void High-wall - Animal and Human Access	Access by animals or humans resulting in injury or death.	• Stock fence not constructed. • Warnings signs not in place.
22	Lanes Void High-wall - Vehicle Access	Access by vehicles resulting in injury or death.	• Whilst a safety bund exists, a stock fence set back from the crest of the high-wall is to be constructed.
23	Ironbark South Dump - Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment release to the receiving water environment.	• Deep gully erosion is occurring along main drainage channels. • Bare surface areas are not topsoiled, and colloidal clay is being re-entrained. • Sediment basins are in place to minimise release of sediment to receiving environment. • Rock check dams with bidim in place at outlet.

24	Ironbark South Dump - Instability which causes environmental harm or failure to meet post mining land use.	Instability that results in the failure of the batter slope resulting in a significant mass of earthen material entering IBSD area resulting in releases to the receiving water environment.	Ground surface in proximity to batter slopes require reshaping and grading to direct stormwater to a main drainage channel.
25	Ironbark South Dump - Vehicle Access	Access by vehicles resulting in injury or death.	- Deep cracks exist along drainage channels in areas where there is vehicle access. - Low volume of traffic.
26	Ironbark South Dump – Animal and Human Access	Access by animals or humans resulting in injury or death.	Deep cracks exist along drainage channels in areas where there is animal access.
27	Ironbark South Dump - Unsuccessful Vegetation Cover which causes environmental harm or failure to meet post mining land use.	Successful coverage of bare surfaces with vegetation does not occur which results in sediment deposition into sediment ponds resulting in releases to the receiving water environment.	- Bare surface areas are not topsoiled, sediment and colloidal clay is being re-entrained in stormwater. - Sediment basins are in place to minimise release of sediment to receiving environment. - Rock check dams with bidim in place at outlet.

28	Lanes Eastern Emplacement – Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment release to the receiving environment.	• Minor erosion channels exist. • Vegetation between erosion channel and Ebenezer Creek exists and no impact to receiving environment. • No impact on post mining land use.
29	Lanes Eastern Emplacement – Instability which causes environmental harm or failure to meet post mining land use.	Compost pad stormwater runoff pools/ponds within drain on western side resulting in low-wall failure at crest of western batter.	• Ponding and pooling exist behind bund wall. • No impact on receiving environment as Lanes Void would contain sediment. • Stock fence not in place and access by animals could occur.
30	Lanes Eastern Emplacement – Unsuccessful Vegetation Cover which causes environmental harm or failure to meet post mining land use.	Successful coverage of bare surfaces with vegetation does not occur which results in sediment releases to the receiving water environment.	• Good grass coverage exists. • Environmental harm would not occur. • No impact to post mining land use.
31	Out of Pit Dump – Erosion which causes environmental harm or failure to meet post mining land use.	Erosion channels caused by stormwater runoff become larger which causes sediment release to the receiving environment.	• Significant erosion exists. • Post mining land use not being achieved in all areas.

32	Out of Pit Dump Waterlogging resulting in erosion which causes environmental harm or failure to meet post mining land use.	Waterlogged sodic soil results in tunnel and pipe erosion which causes sediment release to the receiving water environment.	• Significant tunnel erosion and pipe erosion exists. • Post mining land use not being achieved in all areas.
33	Out of Pit Dump Unsuccessful Vegetation Cover which causes environmental harm or failure to meet post mining land use.	Successful coverage of bare surfaces with vegetation does not occur which results in sediment releases to the receiving water environment.	• Significant tunnel erosion and pipe erosion exists. • Post mining land use not being achieved in all areas.

APPENDIX 10 - TABLE 6: REASONS FOR SELECTED LIKELIHOOD AND CONSEQUENCE

5 Risk Treatment (ISO 31000: 2.25)

The following table is provided to illustrate the risk treatment and management measures for the identified risks associated with the rehabilitation at the Ebenezer site. The control measures to eliminate risks are illustrated.

#	Identified Risk Item	L	C	RRL	Control Measures	L	C	RRL
1	Tailings Pond – Erosion which causes environmental harm or failure to meet post mining land use.	1	2	2	- Retain existing water courses that drain into the Tailings Pond. - Retain surface water ponds located with water courses that drain into the Tailings Pond. - Maintain vegetation cover over ground surface (other than areas being retained as storage pads) in areas that drain to the Tailings Pond.	1	2	2
2	Tailings Pond –Instability which causes environmental harm or failure to meet post mining land use.	1	2	2	- Retain spillway location and width. - Retain vegetation between edge of rock lined spillway and Ebenezer Creek.	1	2	2
3	Tailings Pond -Animal and Human Access	3	6	18	- Construct a 5-strand perimeter fence (bottom 4 strands barbed wire and top strand plain wire). - Place signs along fence at 250 m intervals warning of danger do not enter. - Construct safety bunds.	1	6	6

4	Tailings Pond– Vehicle Access	1	6	6	- Install bunding in areas identified as being accessible. - Gate haulage road at southwest corner and north-western and eastern corner of Tailings Pond. - Construct safety bunds.	1	6	6
5	Ironbark North Void Low-wall– Erosion which causes environmental harm or failure to meet post mining land use.	1	1	1	Retain bund and drainage channels along haulage road directing stormwater away from the crest of the low wall.	1	1	1
6	Ironbark North Void Low-wall - Instability which causes environmental harm or failure to meet post mining land use.	1	1	1	Retain bund and drainage channels along haulage road directing stormwater away from the crest of the low wall.	1	1	1
7	Ironbark North Void Low-wall - Animal and Human Access	3	6	18	- Construct stock fence. - Place signs along fence at 250 m intervals warning of danger do not enter. - Construct safety bund.	1	6	6

8	Ironbark North Void Low-wall - Vehicle Access	2	6	12	- Construct stock fence. - Construct safety bunding. - Retain locked gate at entrance to Lanes Eastern Emplacement Haulage Road. - Place signs on gates stating danger do not enter or authorised access only.	1	6	6
9	Ironbark North Void Low-wall - Unsuccessful vegetation cover which causes environmental harm or failure to meet post mining land use.	1	1	1	Retain the Ironbark North Void to contain any displaced rock or sediment.	1	1	1
10	Ironbark North Void High-wall - Erosion which causes environmental harm or failure to meet post mining land use.	1	1	1	Retain existing diversion bunding that redirects stormwater generated up-gradient of the Ironbark North Void.	1	1	1

11	Ironbark North Void High-wall - Instability which causes environmental harm or failure to meet post mining land use.	1	1	1	Retain the Ironbark North Void to contain any displaced rock or sediment.	1	1	1
12	Ironbark North Void High-wall - Animal and Human Access	3	6	18	- Construct stock fence. - Install access gates. - Construct safety bund. - Construct new haulage road outside stock fence fence and safety bund. - Place signs along fence at 250 m intervals warning of danger do not enter.	1	6	6
13	Ironbark North Void High-wall - Vehicle Access	2	6	12	- Retain existing bund at crest of high-wall. - Construct stock fence. - Place signs along fence at 250 m intervals warning of danger do not enter. - Install access gates. - Construct safety bunding.	1	6	6
14	Lanes Void Low-wall— Erosion which causes environmental harm or	1	1	1	- Retain bund and drainage channel on western side of compost pad within Lanes Eastern Emplacement. - Construct new section of bund offset from crest of low wall.	1	1	1

	failure to meet post mining land use.							
15	Lanes Void Low-wall- Instability which causes environmental harm or failure to meet post mining land use.	1	1	1	Retain bund and drainage channels along haulage road directing stormwater away from the crest of the low wall.	1	1	1
16	Lanes Void Low-wall- Animal and Human Access	3	6	18	- Construct stock fence. - Place signs along fence at 250 m intervals warning of danger do not enter. - Retain locked gate at entrance to Lanes Eastern Emplacement Haulage Road. - Retain locked gate access along haulage road at southern end of Lanes Void. - Construct safety bund.	1	6	6
17	Lanes Void Low-wall- Vehicle Access	2	6	12	- Retain bunding along western perimeter of compost pad within the Lanes Eastern Emplacement. - Construct stock fence. - Install access gate. - Retain locked gate at entrance to Lanes Eastern Emplacement Haulage Road.	1	6	6

					- Retain locked gate access along haulage road at southern end of Lanes Void. - Construct safety bunding.			
18	Lanes Void Low-wall- Unsuccessful vegetation cover which causes environmental harm or failure to meet post mining land use.	1	1	1	Retain the Lanes Void to contain any displaced rock or sediment.	1	1	1
19	Lanes Void High-wall - Erosion which causes environmental harm or failure to meet post mining land use.	1	1	1	Retain existing diversion bunding that redirects stormwater generated up-gradient of the Lanes Void.	1	1	1
20	Lanes Void High-wall -- Instability which causes environmental harm or failure to meet post mining land use.	1	1	1	Retain the Lanes Void to contain any displaced rock or sediment.	1	1	1

21	Lanes Void High-wall - Animal and Human Access	3	6	18	- Construct safety bunding. - Construct stock fence. - Install access gates. - Place signs along fence at 250 m intervals warning of danger do not enter.	1	6	6
22	Lanes Void High-wall - Vehicle Access	2	6	12	- Construct safety bund. - Construct stock fence. - Install access gates. - Retain existing bund along crest of high-wall. - Retain locked gate at entrance to Lanes Eastern Emplacement Haulage Road. - Retain locked gate access along haulage road at southern end of Lanes Void	1	6	6
23	Ironbark South Dump - – Erosion which causes environmental harm or failure to meet post mining land use.	5	3	15	- Retain perimeter bund and vegetation at southern end of compost pad within the Lanes Eastern Emplacement. - Cover disturbed areas with topsoil to establish grass to prevent the re-entrainment of soil particles. - Stabilise draining channels with a combination of regrading, top soiling and grassing, installing rock check dams, rock lined chutes and geofabric. - Retain sediment basins. - Retain rock check dam with bidim at release point of IBSD.	2	1	2

24	Ironbark South Dump - Instability which causes environmental harm or failure to meet post mining land use.	2	3	6	- Retain perimeter bund and vegetation at southern end of compost pad within the Lanes Eastern Emplacement. - Stabilise draining channels with a combination of regrading, top soiling and grassing, installing rock check dams, rock lined chutes and geofabric. - Construct haulage road from southern end of compost pad to join with haulage road in IBSD. - Retain sediment basins. - Retain rock check dam with bidim at release point of IBSD.	1	3	3
25	Ironbark South Dump - Vehicle Access	2	6	12	- Retain bund and drainage channel at southern end of Compost Pad within the Lanes Eastern Emplacement. - Construct safety bund. - Construct stock fence along southern edge of compost pad. - Retain bunds on crest of lower batter slopes. - Retain haulage paths. - Repair deep cracks in drainage channels.	1	6	6
26	Ironbark South Dump - Animal and Human Access	2	6	12	- Construct stock fence along southern edge of compost pad. - Retain bunds on crest of lower batter slopes. - Construct safety bund. - Retain haulage paths. - Repair deep cracks in drainage channels.	1	6	6

27	Ironbark South Dump - Unsuccessful Vegetation Cover which causes environmental harm or failure to meet post mining land use.	2	3	3	- Cover bare surfaces with topsoil and establish grass. - Reshape drainage channels and topsoil and establish grass.	1	3	3
28	Lanes Eastern Emplacement -Erosion which causes environmental harm or failure to meet post mining land use.	1	1	1	- Repair eroded drainage channels. - Cover small area of bare surface with topsoil and establish grass.	1	1	1
29	Lanes Eastern Emplacement – Instability which causes environmental harm or failure to meet post mining land use.	1	1	1	Retain contour drains and draining channels.	1	1	1
30	Lanes Eastern Emplacement–	1	2	2	Retain existing grass coverage.	1	1	1

	Unsuccessful Vegetation Cover which causes environmental harm or failure to meet post mining land use.				Cover small area of bare surface with topsoil and establish grass.			
31	Out of Pit Dump – Erosion which causes environmental harm or failure to meet post mining land use.	6	3	18	- Repair drainage channels and diversion bunds. - Repair contour drains. - Back fill depressions, pipe, and tunnel erosion. - Cover bare surfaces with topsoil and establish grass. - Construct two rock lined down chutes with geofabric base.	2	2	4
32	Out of Pit Dump – Waterlogging resulting in erosion which causes environmental harm or failure to meet post mining land use.	6	3	18	- Repair drainage channels and diversion bunds. - Repair contour drains. - Back fill depressions, pipe, and tunnel erosion. - Cover bare surfaces with topsoil and establish grass. - Construct two rock lined down chutes with geofabric base.	2	2	4
33	Out of Pit Dump – Unsuccessful Vegetation Cover which causes environmental harm or	6	3	18	Cover bare surfaces with topsoil and establish grass.	2	2	4

	failure to meet post mining land use.								
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APPENDIX 10 - TABLE 7: RISK TREATMENT – RISK LEVEL RATING REDUCTION AFTER CONTROL MEASURES ARE IMPLEMENTED

5.1 Risk Control (ISO 31000: 2.26)

Risk control will occur via the implementation of control measures tabled in the previous section. As can be seen risk elimination is not possible in all instances, However, control measures represent best practice for the mining constraints that exist. Where risk cannot be completely eliminated, the likelihood of the consequence has been reduced in order to reduce the risk ratings.

The cost associated with reshaping the low-wall and high-wall of both the Lanes Void and the Ironbark North Void is prohibitive considering that the reshaping would include potentially removing in excess of 17 million m³ of material to create a stable landform.

The reshaping would not result in any net gain to the receiving environment and presents a problem because there is not enough topsoil available on site to effectively protect the exposed surfaces.

With regards to the reshaping the high-walls to 45%-70% slope impact to rare and threatened vegetation and vegetation of concern mapped within ML4712 would occur. Coal would be removed in the process of reshaping the high-walls and currently the tenement does not include mining black coal. Between 4.72 – 2.32 million m³ of material would be removed to create either a 45% - 70% slope respectively.

To ensure stability in such material as to what is present within the lithology of the immediate area of ML4712, a 1: 4 slope would need to be created from the toe of the high-wall batter, removing an estimated 12 million m³ of material. This is after the void is dewatered.

In some instances the crest of the reshaped batter would be outside of the ML4712 boundary. For the likely erosion that will occur from the low-wall and the possible failure of the high-wall, the voids provide the long-term treatment option to prevent impact to the receiving environment. The risk assessment identifies that the current landform is not impacting the receiving environment and does not prevent the final land use of water storage and water habitat. The PRC PLAN contains information that describes the water quality of the voids and indicates that it is suitable for use as a fauna habitat.

The rehabilitation of drainage channels where identified will limit sediment transport to the receiving environment. Retaining sedimentation basins will facilitate further treatment before releases occur until disturbed areas have stabilised with appropriate vegetative cover. Ebenezer Creek has been

significantly modified as described within the PRC PLAN and this has been considered in performing this risk assessment.

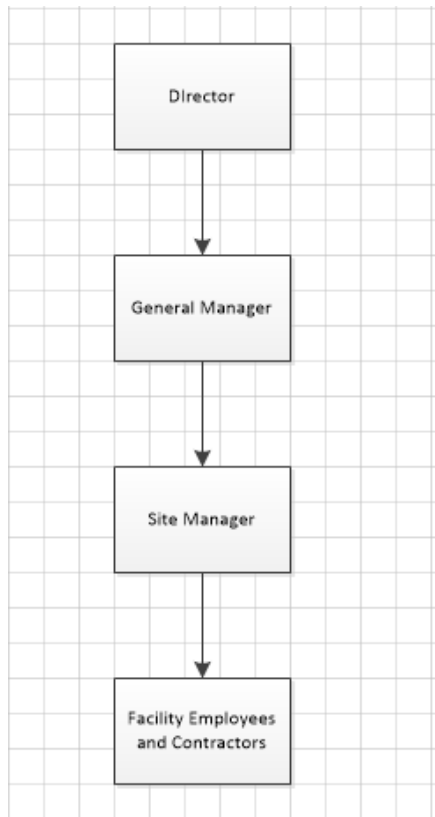
Safety bunds will be constructed to restrict vehicle access to the Lanes Void, Ironbark North Void and the Tailings Pond at certain areas determined. Stock fencing will restrict animal access to the Lanes Void, Ironbark North Void, and the Tailings Pond. Gates will be strategically positioned and locked to prevent access to certain areas. Signs will be erected advising persons of the danger present from the voids.

Successful revegetation of disturbed areas will ensure that light grazing can occur. Rehabilitation of the Lanes Eastern Emplacement and also the northern batter slope of the Out of Pit Dump confirms this.

5.2 Residual Risk Management (ISO 31000: 2.27)

As can be seen in Table 7 of Section 5, even after implementation of control measures the residual risk rating level for a number of identified risks, still remains in the moderate risk category. It is only until identified risks are eliminated that the residual risk rating score would return to a low value. However as the three voids are to remain as water storage and fauna habitat areas, the risk cannot be eliminated.

6 Organisational Structure



APPENDIX 10 - FIGURE 1: ORGANISATIONAL STRUCTURE

6.1 General Contact Detail

	General Manager	Site Manager
Name:	Peter O'Malley	Barry Purchase
Mobile Phone:	0438 737 322	0407 407 644
Phone	1300 926 537	
Address	PO Box 1092 Stanthorpe QLD 4380	2145 Ipswich Rd Oxley QLD 4075
Email	peter.omalley@wanless.com.au	barry.purchase@wanless.com.au

APPENDIX 10 - TABLE 8: GENERAL CONTACT DETAILS

6.2 Roles and Responsibilities

Position: General Manager

Responsibilities:

- Has overall responsibility of ML4712 and reporting to the board of directors
- Has overall responsibility of achieving objectives of the RMP
- Ensures that funds are available when required so as to achieve risk reduction measures
- Ensures that Facility Employees are trained in and have a sound knowledge of the practical and operational aspects of this RMP
- Ensures that monitoring is performed, and the recording of results occurs which are both to be communicated to relevant positions within the organisation
- Oversees the implementation of the risk management procedures
- Makes decisions regarding the management of stormwater at the Ebenezer site, including but not limited to, onsite safety and environmental control measures that result in the reduction of risk
- Is responsible in the first instance to notify the DES of any potential or actual environmental harm
- Is responsible for communicating RMP updates to relevant stakeholders such as DES.

Position: Site Manager

Responsibilities:

- Daily operational management of ML4712
- Ensures that the General Manager is promptly notified of any issues potentially causing environmental harm or nuisance or where short-or medium-term control measures are not achieved to minimise risk rating level
- Ensures that all Facility Employees engaged in operations associated with the activity have been appropriately trained before commencement of any task and that such training is recorded
- Implementation of the risk management procedures on a daily basis and is encouraged to make suggestions for continuous improvement

- Ensures that all contingency measures are in place in the event an emergency occurs; and
- Ensures all monitoring and records demonstrating a reduction in risk are collected at appropriate times and kept orderly for perusal by a representative of the DES.

Position: Facility Employees and Contractors

Responsibilities:

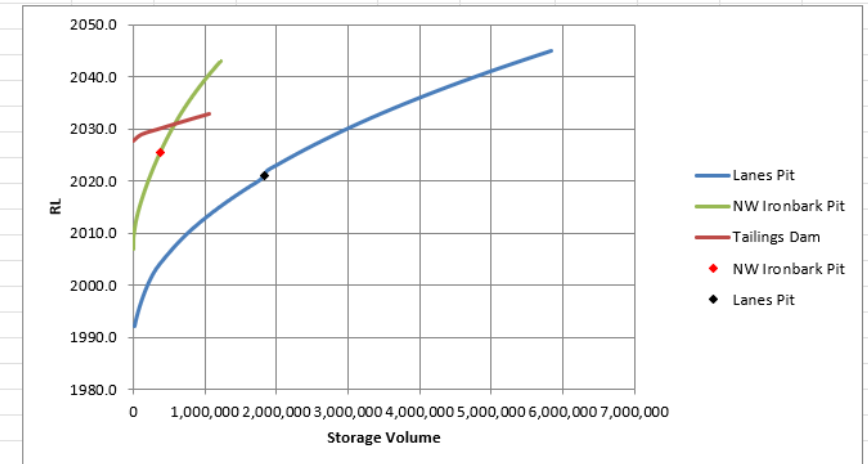
- Follow risk management procedures to ensure effective and safe environmental outcomes from the activity being conducted; and
- Ensure that the Site Manager is promptly notified of any breaches of the procedures outlined in the risk management procedures that fail in meeting the objectives of this RMP or issues potentially causing environmental harm or nuisance. Facility employees are encouraged to make suggestions for continuous improvement to ensure that the RMP is successful at minimising the risks identified.

Appendix 11 Ebenezer Mining Voids – Storage Volumes to Natural Surface - Spreadsheet

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	
1	ESTIMATED WATER VOLUMES - EBENEZER PITS - EFFECTIVE DRAWDOWN FROM TOPOGRAPHIC OVERFLOW																					
2	Date	22/May/14																				
3	CUMULATIVE VOLUMES (Draw-down)																					
4	Lanes Pit					NW Ironbark Pit					Tailings Dam											
5	RLm	Drawdown	Vol cm	Cum Vol	Storage Volume	RLm	Drawdown	Vol cm	Cum Vol	Storage Volume	RLm	Drawdown	Vol cm	Cum Vol	Storage Volume							
6	2045.0	1.0	221,027	221,027	5,839,011	2043.0	1.0	64,746	64,746	1,214,105	2033.0	1.0	245,418	245,418	1,061,889							
7	2044.0	2.0	217,496	438,523	5,617,984	2042.0	2.0	61,607	126,353	1,149,359	2032.0	2.0	241,674	487,092	816,471							
8	2043.0	3.0	213,721	652,244	5,400,488	2041.0	3.0	59,697	186,050	1,087,752	2031.0	3.0	232,881	719,973	574,797							
9	2042.0	4.0	209,554	861,797	5,186,767	2040.0	4.0	57,745	243,795	1,028,055	2030.0	4.0	226,149	946,122	341,916							
10	2041.0	5.0	205,163	1,066,961	4,977,214	2039.0	5.0	55,864	299,659	970,310	2029.0	4.5	115,687	1,061,809	115,767							
11	2040.0	6.0	200,462	1,267,423	4,772,050	2038.0	6.0	53,918	353,577	914,446	2027.7	5.2	80	1,061,889	80							
12	2039.0	7.0	195,081	1,462,503	4,571,588	2037.0	7.0	51,914	405,492	860,528						1,061,889						
13	2038.0	8.0	190,284	1,652,788	4,376,508	2036.0	8.0	49,980	455,472	808,614												
14	2037.0	9.0	185,958	1,838,745	4,186,223	2035.0	9.0	48,045	503,516	758,634												
15	2036.0	10.0	181,486	2,020,232	4,000,266	2034.0	10.0	46,153	549,669	710,589												
16	2035.0	11.0	177,072	2,197,303	3,818,779	2033.0	11.0	43,885	593,554	664,436												
17	2034.0	12.0	172,474	2,369,778	3,641,708	2032.0	12.0	41,750	635,305	620,551												
18	2033.0	13.0	167,607	2,537,385	3,469,233	2031.0	13.0	40,155	675,460	578,800												
19	2032.0	14.0	162,236	2,699,621	3,301,626	2030.0	14.0	38,754	714,214	538,646												
20	2031.0	15.0	157,890	2,857,511	3,139,390	2029.0	15.0	37,402	751,615	499,892												
21	2030.0	16.0	153,887	3,011,398	2,981,500	2028.0	16.0	36,100	787,715	462,490												
22	2029.0	17.0	149,837	3,161,235	2,827,613	2027.0	17.0	34,910	822,625	426,390												
23	2028.0	18.0	145,286	3,306,520	2,677,776	2026.0	17.5	16,358	838,983	391,480												
24	2027.0	19.0	141,001	3,447,522	2,532,491	2025.5	18.0	17,083	856,066	375,122												
25	2026.0	20.0	136,422	3,583,944	2,391,489	2025.0	19.0	32,209	888,275	358,039												
26	2025.0	21.0	132,332	3,716,275	2,255,067	2024.0	20.0	31,195	919,470	325,831												
27	2024.0	22.0	128,743	3,845,018	2,122,736	2023.0	21.0	30,022	949,492	294,635												
28	2023.0	23.0	124,851	3,969,869	1,993,993	2022.0	22.0	28,917	978,409	264,613												
29	2022.0	23.4	46,359	4,016,228	1,869,142	2021.0	23.0	27,746	1,006,154	235,696												
30	2021.0	24.0	74,408	4,090,636	1,822,783	2020.0	24.0	26,569	1,032,724	207,951												
31	2020.0	25.0	116,685	4,207,321	1,748,375	2019.0	25.0	25,398	1,058,122	181,382												
32	2019.0	26.0	112,651	4,319,972	1,631,690	2018.0	26.0	24,308	1,082,430	155,984												
33	2018.0	27.0	108,850	4,428,822	1,519,039	2017.0	27.0	23,167	1,105,596	131,676												
34	2017.0	28.0	105,112	4,533,934	1,410,189	2016.0	28.0	21,732	1,127,329	108,509												
35	2016.0	29.0	101,138	4,635,072	1,305,077	2015.0	29.0	19,977	1,147,306	86,776												
36	2015.0	30.0	97,408	4,732,480	1,203,939	2014.0	30.0	18,011	1,165,317	66,799												
37	2014.0	31.0	93,473	4,825,953	1,106,531	2013.0	31.0	15,824	1,181,141	48,788												

Legend:

- Lanes Pit
- NW Ironbark Pit
- Tailings Dam
- NW Ironbark Pit
- Lanes Pit



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
37	2014.0	31.0	93,473	4,825,953	1,106,531	2013.0	31.0	15,824	1,181,141	48,788						
38	2013.0	32.0	89,091	4,915,044	1,013,057	2012.0	32.0	12,198	1,193,338	32,965						
39	2012.0	33.0	85,162	5,000,206	923,967	2011.0	33.0	10,603	1,203,941	20,767						
40	2011.0	34.0	80,664	5,080,870	838,805	2010.0	34.0	9,241	1,213,183	10,164						
41	2010.0	35.0	75,076	5,155,946	758,141	2009.0	34.7	826	1,214,008	923						
42	2009.0	36.0	70,009	5,225,956	683,065	2008.0	35.5	93	1,214,101	97						
43	2008.0	37.0	66,602	5,292,558	613,055	2006.8	36.2	4	1,214,105	4						
44	2007.0	38.0	63,794	5,356,352	546,453			1,214,105								
45	2006.0	39.0	61,023	5,417,376	482,659											
46	2005.0	40.0	58,156	5,475,531	421,635											
47	2004.0	41.0	52,712	5,528,243	363,480											
48	2003.0	42.0	45,012	5,573,255	310,768											
49	2002.0	43.0	37,539	5,610,794	265,756											
50	2001.0	44.0	33,675	5,644,469	228,217											
51	2000.0	45.0	30,594	5,675,064	194,542											
52	1999.0	46.0	27,977	5,703,041	163,947											
53	1998.0	47.0	25,852	5,728,893	135,970											
54	1997.0	48.0	23,867	5,752,760	110,118											
55	1996.0	49.0	21,870	5,774,630	86,251											
56	1995.0	50.0	19,933	5,794,564	64,381											
57	1994.0	51.0	17,798	5,812,361	44,447											
58	1993.0	52.0	15,192	5,827,553	26,650											
59	1992.1	52.9	11,458	5,839,011	11,458											
60			5,839,011													

Part 2 – PRC PLAN Schedule

Provided separately in electronic format.