

Part 1
Ebenezer Project
Progressive Rehabilitation Closure Plan
Environmental Authority EPML00594013

Mining Lease 4712

Version 1

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Contents

Contents.....	iii
List of Tables	vii
List of Images	viii
List of Figures	ix
Limitations	x
Glossary of Acronyms	xi
1 Introduction	13
2 Part 1 - Rehabilitation Planning	17
2.1 Project Planning	17
2.1.1 Background	18
2.1.2 Domains	21
2.1.3 Post-Mining Landform	27
2.2 Objective of the PCRCP	29
2.3 Project Description.....	30
2.3.1 Site Location.....	30
2.3.2 Tenure Details	33
2.3.3 Transportation	34
2.3.4 Past Land Use	35
2.3.5 Present Land Use	36
2.3.6 Surrounding Land Use.....	38
2.3.7 Buffer Distances	40
2.3.8 Meteorological Data	42
2.3.9 Elevation.....	43
2.3.10 Waters and Drainage	46

2.3.11	Flooding.....	48
2.3.12	Geology and Soils.....	50
2.3.13	Groundwater and Hydrology.....	52
2.3.14	Wetlands.....	59
2.3.15	Vegetation, Biodiversity and Conservation.....	62
2.3.16	MSES.....	85
2.3.17	Bushfires.....	89
2.3.18	Notifiable Activities.....	91
2.3.19	Rehabilitation Performed.....	91
2.4	Planned Rehabilitation/Improvement.....	92
2.4.1	Domain 1.....	92
2.4.2	Domain 2.....	92
2.4.3	Domain 3.....	92
2.4.4	Domain 4.....	92
2.4.5	Domain 5.....	93
2.4.6	Domain 6.....	93
2.4.7	Domain 7.....	93
2.4.8	Domain 8.....	94
2.4.9	Domain 9.....	94
2.4.10	Domain 10.....	94
2.4.11	Domain 11.....	94
2.4.12	Domain 12.....	94
2.4.13	Domain 13.....	94
2.4.14	Domain 14.....	94
2.4.15	Domain 15.....	94
2.5	Community Consultation.....	97

2.6	Post-Mining Land Use	97
2.7	Non-Use Management Areas.....	103
2.8	Rehabilitation Management Methodology	103
2.8.1	Landform Design	103
2.8.2	Overview	104
2.8.3	Cover Design	117
2.8.4	Material Availability	117
2.8.5	Revegetation	118
2.8.6	Drainage and Surface Water Management	119
2.8.7	Tailings Pond	122
2.8.8	Voids.....	125
2.8.9	Underground Mining.....	129
2.8.10	Built Infrastructure.....	129
2.8.11	Plant and Equipment.....	129
2.9	Risk Assessment	129
2.10	Monitoring and Maintenance	129
2.10.1	RM1 - Landform reshaping/reprofiling	130
2.10.2	RM2 - Surface preparation.....	131
2.10.3	RM3 – Revegetation.....	131
2.10.4	RM4 - Land is suitable for light cattle grazing.....	131
2.10.5	RM5 - Achievement of post-mining land use to stable condition	133
2.10.6	RM6 - Voids are suitable for the storage of water and as fauna habitat.....	133
2.10.7	RM7 - Voids access is restricted.....	133
2.10.8	RM8 - Infrastructure decommissioning and removal	134
2.10.9	RM9 - Infrastructure to remain achieves the requirements of the landowner.....	134
2.11	References	135

Appendix 1 Terms and Definitions.....	139
Appendix 2 Images.....	144
Appendix 3 REMP Monitoring Data	175
Appendix 4 Flood Maps	184
Appendix 5 Plans.....	190
Appendix 6 OPD Remediation Detail	231
Appendix 7 Void Water Quality	239
Appendix 8 Groundwater Quality	254
Appendix 9 Community Consultation Plan	255
Appendix 10 Risk Assessment.....	263
Appendix 11 Ebenezer Mining Voids – Storage Volumes to Natural Surface - Spreadsheet	315
Part 2 – PRC PLAN Schedule.....	318

List of Tables

Table 1: Tenure details.....	33
Table 2: Buffer Distances	41
Table 3: Predominant Wind Directions.....	42
Table 4: Areas of Ebenezer Catchment.....	47
Table 5: Registered Water Bore Information.....	52
Table 6: Regional Ecosystems	67
Table 7: Koala Habitat	74
Table 8: Vegetation West of Lanes Void	76
Table 9: Vegetation Categories.....	77
Table 10: RE, VMA Status and Essential Habitat.....	79
Table 11: First-Order Streams.....	79
Table 12: Land Parcels Containing High Risk Vegetation	80
Table 13: Land Parcels Containing Core Koala Habitat	81
Table 14: Land Parcels Containing Endangered or Vulnerable Species	83
Table 15: Threatened Species	83
Table 16: PBA Priority Species	83
Table 17: ACA Priority Species - Riverine	84
Table 18: ACA Priority Species - Non – Riverine	84
Table 19: Table F1 – Final Land Use and Rehabilitation Schedule (Source: EA)	98
Table 20: Listing Domain areas	103
Table 21: Summary of Sodic Soil Laboratory Test Results (Douglas Partners, 2020)	104
Table 22: Critical Cross-Section Summary of Calculated FOS-Lanes Void (Source CMG 2022)	111
Table 23: Mine Affected Water – Tailings Pond and Inventory as of 30 June 2021	124
Table 24: Mine Affected Water and Inventory as of 30 June 2021	127
Table 25: Rehabilitation Milestones	130

List of Images

Image 1: Project Location	31
Image 2: Suburb of Ebenezer	31
Image 3: Lot and Plan Details and ML 4712 Boundary	32
Image 4: Current ML4712 Boundary.....	33
Image 5: Pre-Mining Land Aerial Photograph: 1 May 1982.....	35
Image 6: Land Use 1	37
Image 7: Land Use 2	39
Image 8: Elevation Contours	44
Image 9: Elevation, Hillshade Multidirectional	45
Image 10: Watercourses	47
Image 11: Referable Dam Inundation	48
Image 12: Geology	51
Image 13: Indicative Groundwater Flow – Post Mining Groundwater Contours (Source: Taft Engineering, 2021)	54
Image 14: Lacustrine and Palustrine Wetlands	60
Image 15: Non-Riverine Wetlands – Conservation Significance.....	61
Image 16: Remnant Vegetation (VMA).....	63
Image 17: Essential Habitat	68
Image 18: Protected Plants.....	69
Image 19: Proposed Highwall, Lanes Void	75
Image 20: Streams and Wetlands	80
Image 21: Koala Habitat (Core & locally Refined), Koala Sighting	82
Image 22: MSES - Regulated Vegetation (Cat B - Endangered or Of Concern).....	85
Image 23: MSES - Regulated Vegetation (Cat C - Endangered or Of Concern).....	86
Image 24: MSES - Regulated Vegetation (Essential Habitat)	87
Image 25: MSES - Regulated Vegetation (100 m from Wetland)	88
Image 26: Bushfire Prone Areas.....	90
Image 27: Location of the Maxam Facility	101
Image 28: Location of Slippage on Western Edge of Compost Pad.....	109
Image 29: Proposed Drain on Composting Pad	109

List of Figures

Figure 1: Area Surrendered (shaded green) and Area of ml4712 Retained (shaded pink)	19
Figure 2: Domains Identified in the Previous PoOP that are Disturbed and Require Rehabilitation ...	20
Figure 3: Extent of Extracted Coal within prescribed domains.....	27
Figure 4: Domains within ML4712	28
Figure 5: Stiff Diagrams – Groundwater	56
Figure 6: Stiff Diagrams and Ionic Balance Diagrams – Voids.....	57
Figure 7: Groundwater Schoeller Diagram Comparing Groundwater Bores	58
Figure 8: Schoeller Diagrams for the Tailings Pond, Lanes Void and the Ironbark North Void	58
Figure 9: Proposed Rehabilitation Areas and Improvements.....	95
Figure 10: Final Land Use and Infrastructure to Remain	96
Figure 11: Rainfall during 2022 Compared to Mean Rainfall (1991-2020)	124
Figure 12: Location of Stock Fence around Domain 3 and 5	128
Figure 13: Example of Deep Excavation Sign	129

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.

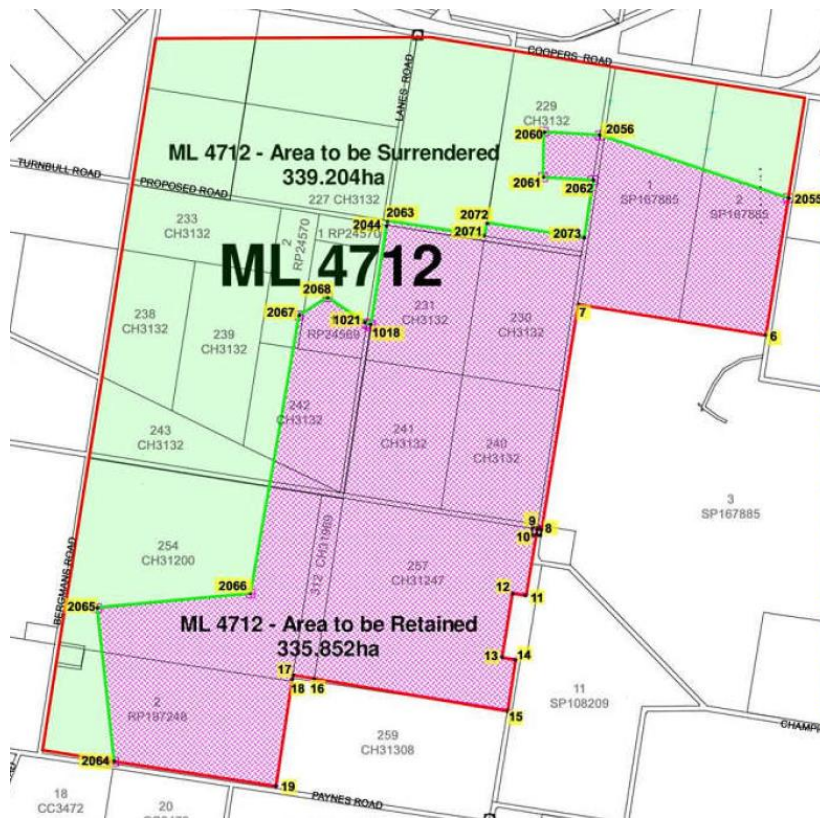


FIGURE 1: AREA SURRENDERED (SHADED GREEN) AND AREA OF ML4712 RETAINED (SHADED PINK)

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:

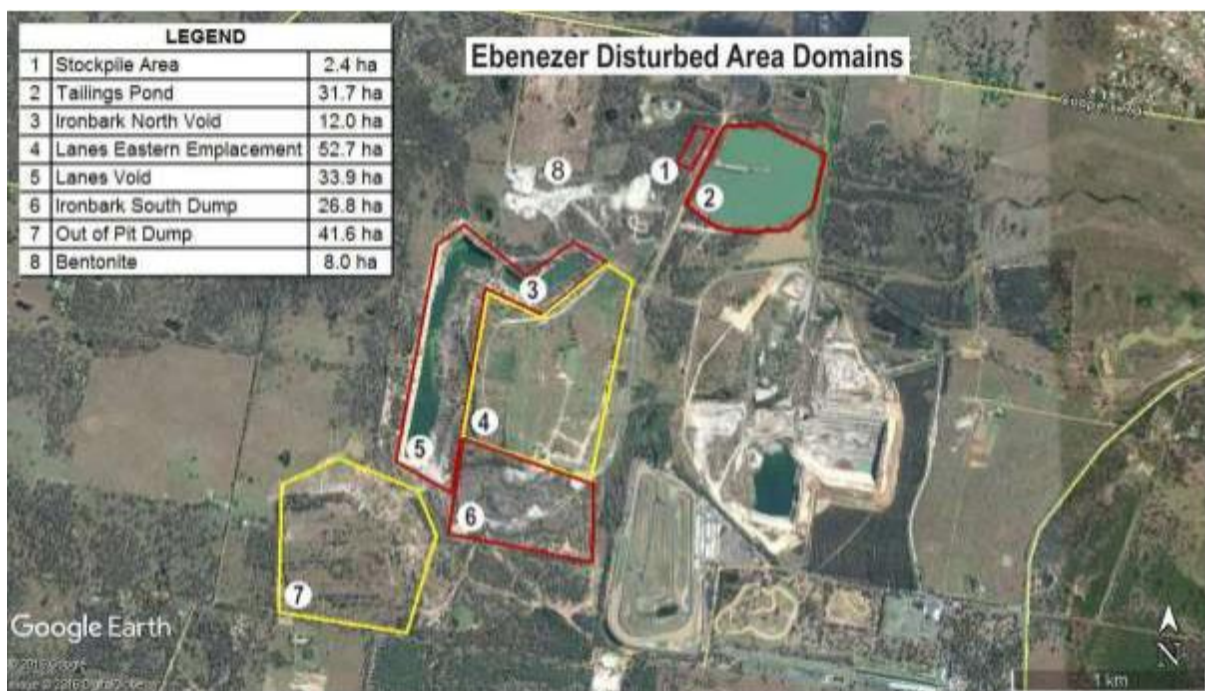


FIGURE 2: DOMAINS IDENTIFIED IN THE PREVIOUS POOP THAT ARE DISTURBED AND REQUIRE REHABILITATION

2.1.2 Domains

Note that in preparing the shape files for the previous estimated rehabilitation (ERC) submission, some domains have increased in size and further domains have been introduced that further describes particular areas. The following describes each area:

- **Domain 1 (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. Shape files prepared for this area by Taylor Mining Services Pty Ltd (TMS) indicate that 3.2 ha will be retained. Proposed works are described in **section 2.4.1**.

- **Domain 2 (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.

The Tailings Pond is to be retained for water storage and fauna habitat. Shape files prepared for this area) by TMS indicate that 31.7 ha will be retained. Proposed works are described in **section 2.4.2**.

- **Domain 3 (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. Shape files prepared for this area by TMS indicate that 12.2ha will be retained. Proposed works are described in **section 2.4.3**.

- **Domain 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 2.4.4** regarding the compost area and two minor erosion areas. Shape files prepared for this area by TMS indicate that Domain 4 equates to 76.6 ha.

- **Domain 5 (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, Domain 5 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 2.4.5**.

- **Domain 6 (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) 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 2.4.6**.

All sediment dams located within Domain 6 are to be retained for water storage and fauna habitat. The total area equates to 2.372 ha. Shape files prepared for Domain 6 by TMS indicate the IBSD area is 35.9 ha.

- **Domain 7 (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 2.4.7**. Shape files prepared for this area by TMS indicate that Domain 7 equates to 56.5ha.

- **Domain 8 (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. Shape files prepared for this area by TMS indicate that Domain 8 equates to 10ha. Proposed works are described in **section 2.4.8**.

In addition to the above domains, a further eight domains have been included within this PRC PLAN. They are listed as follows:

- **Domain 9 (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 2.4.9**. Shape files prepared for this area by TMS indicate that 3.7ha will be retained for storage. This area has not been previously identified as it had planning approval and is an ongoing use. The area has now been added due to its location within the ML.

- **Domain 10 (Haulage Roads) – Provide access throughout site**

The landowner wishes to retain the existing haulage roads for future access. Shape files prepared for this area by TMS indicate 15.2 ha to be retained. This area has not been previously identified and has been added. Proposed works are described in **section 2.4.10**.

- **Domain 11 (Wet Weather Storage Area)**

This area is utilised for storage of paunch and abattoir pond sludge during wet weather and access is limited to the compost pad. Proposed works are described in **section 2.4.11**. Shape files prepared for this area by TMS indicate a size of 0.76 ha.

- **Domain 12 (Bentonite B Area)**

Stormwater from the bentonite storage area is diverted into an adjacent vegetated area immediately to the south. Proposed works are described in **section 2.4.12**. Shape files prepared for this area by TMS indicate a size of 8.1 ha.

- **Domain 13 (Overburden Spoil Heap)**

This area includes a mound of overburden that was placed in the location during mining (refer to **Appendix 5 - Plan 36**). The area is practically revegetated. Proposed works are described in **section 2.4.13**. Shape files prepared for this area by TMS indicate a size of 2.2 ha.

- **Domain 14 (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 2.4.14**. Shape files prepared for this area by TMS indicate a size of 0.87ha.

- **Domain 15 (Remaining Area)**

This domain makes up the balance of land not disturbed within ML4712. Shape files prepared for this area by TMS indicates 66.97 ha. Proposed works are described in **section 2.4.15**.

Note that some areas that have previously been rehabilitated require some rectification works to stabilise the land (i.e., Domain 4 and Domain 7). Refer to **Figure 4** which shows the locations of the domains.

Figure 4 portrays the extent of extracted coal overlaid by the above-described domains.

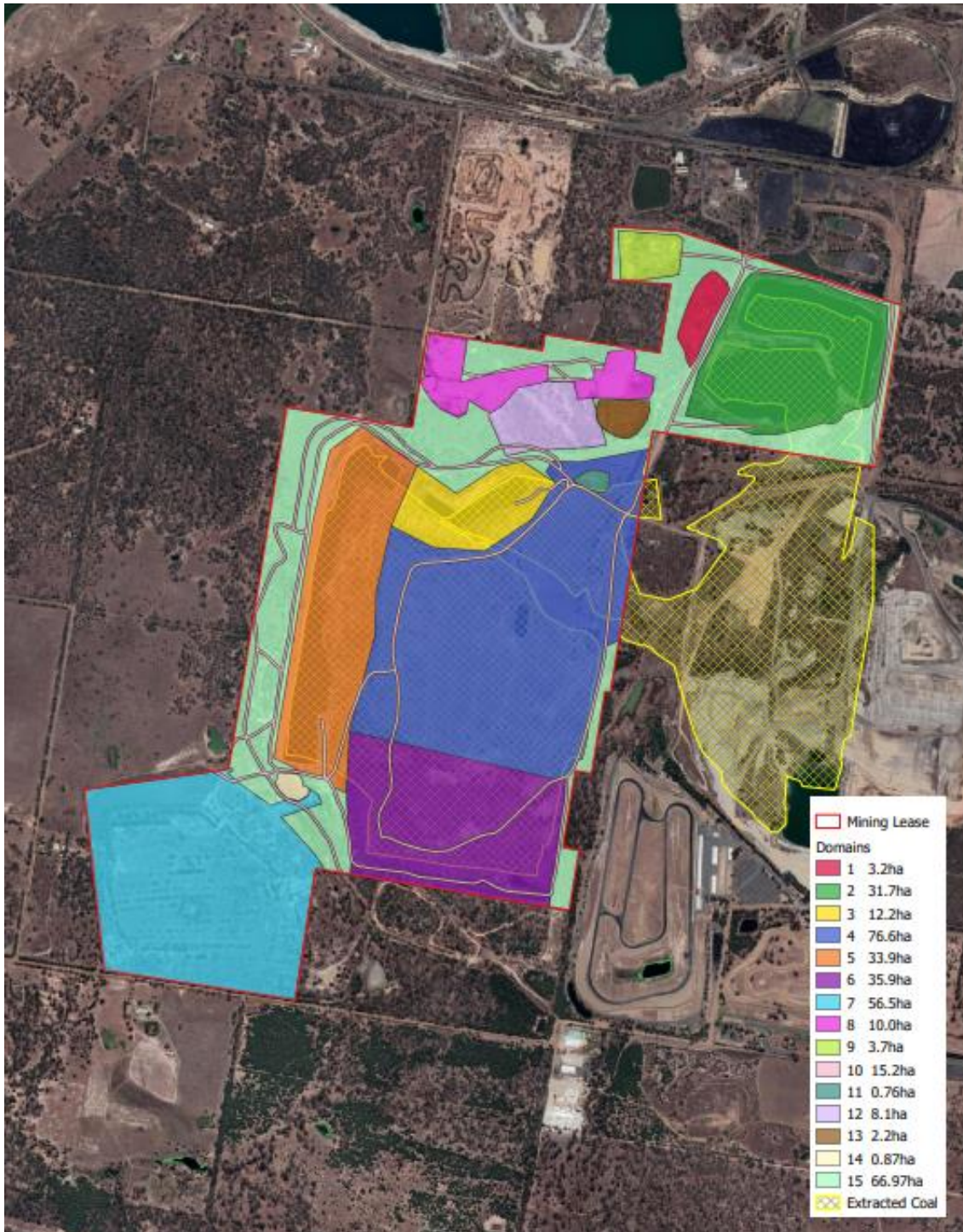


FIGURE 3: EXTENT OF EXTRACTED COAL WITHIN PRESCRIBED DOMAINS

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.

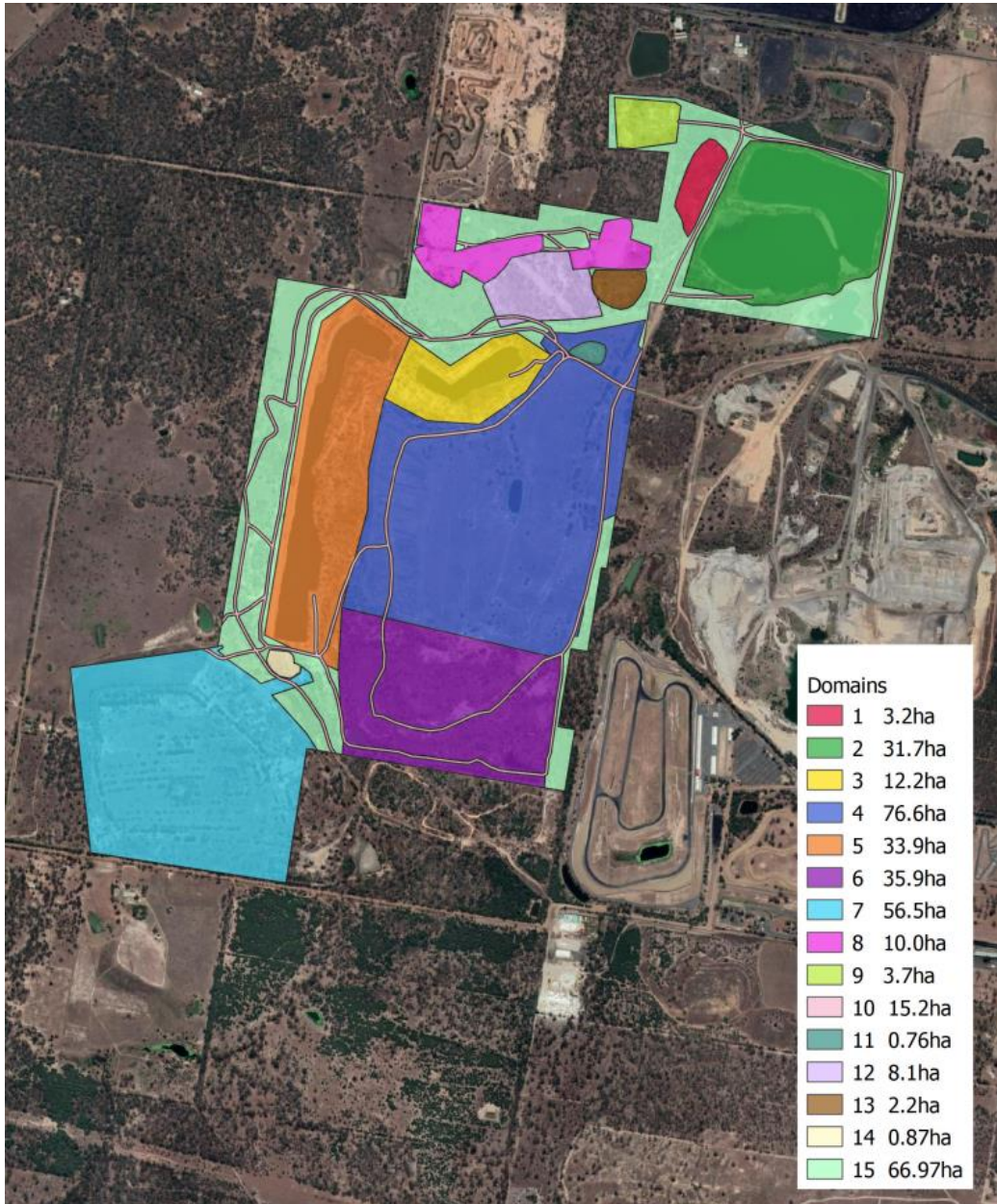


FIGURE 4: DOMAINS WITHIN ML4712

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.

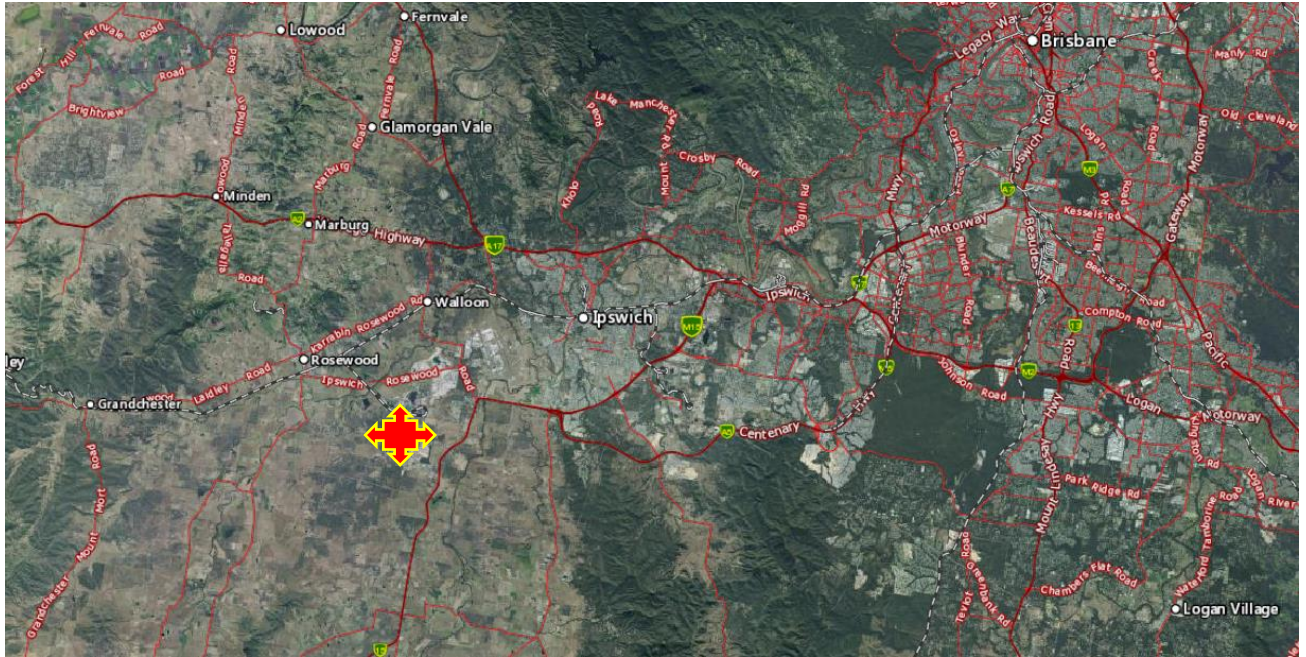


IMAGE 1: PROJECT LOCATION

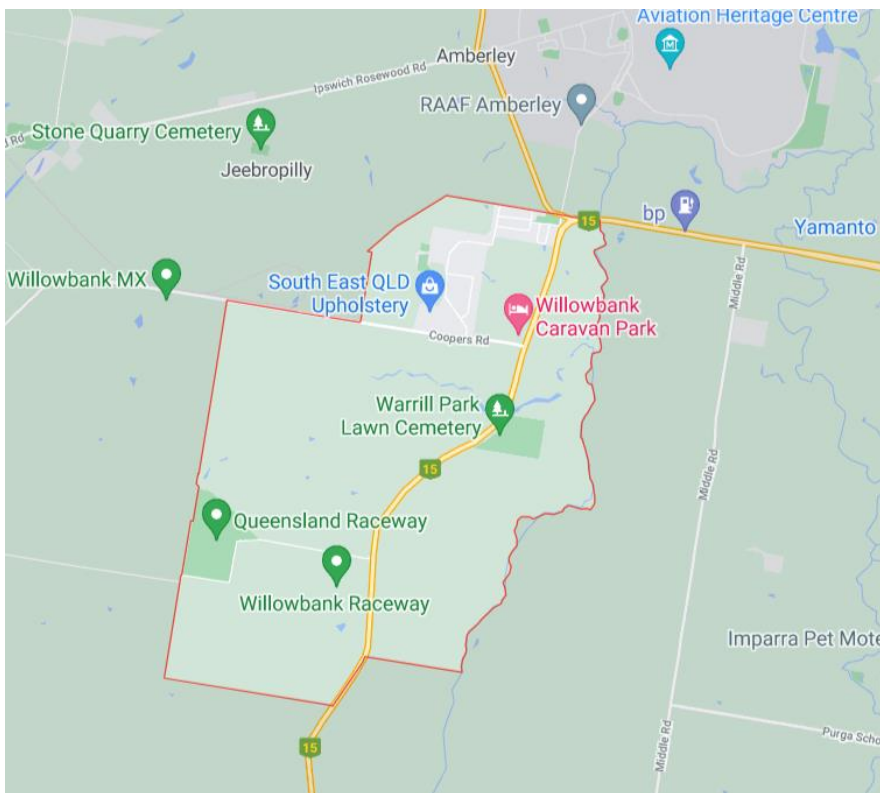


IMAGE 2: SUBURB OF EBENEZER



IMAGE 3: LOT AND PLAN DETAILS AND ML 4712 BOUNDARY

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, within Domain 8. 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 Domain 9 which is 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 Domain 7.

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



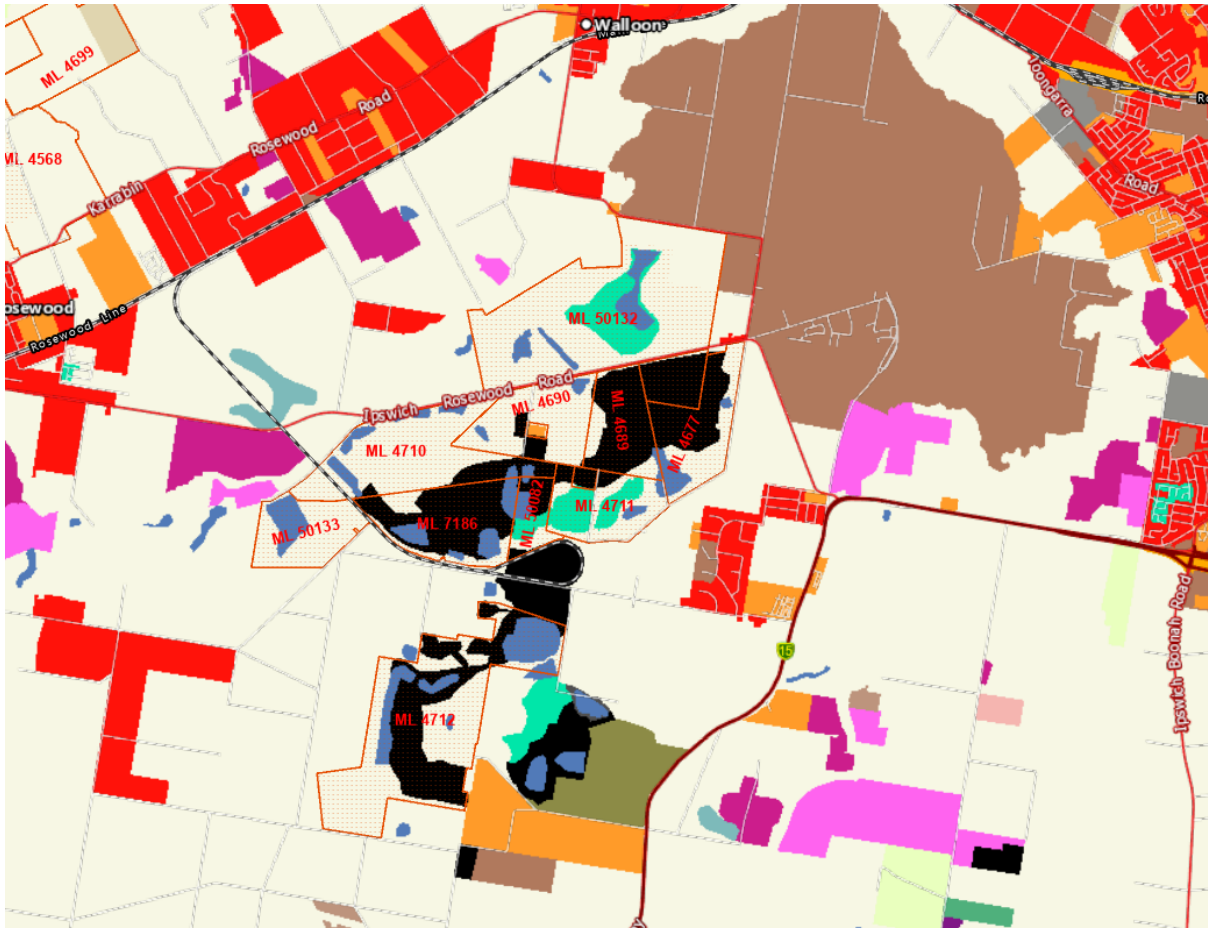
IMAGE 6: LAND USE 1

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 (Domain 4) 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 Domain 7 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”.

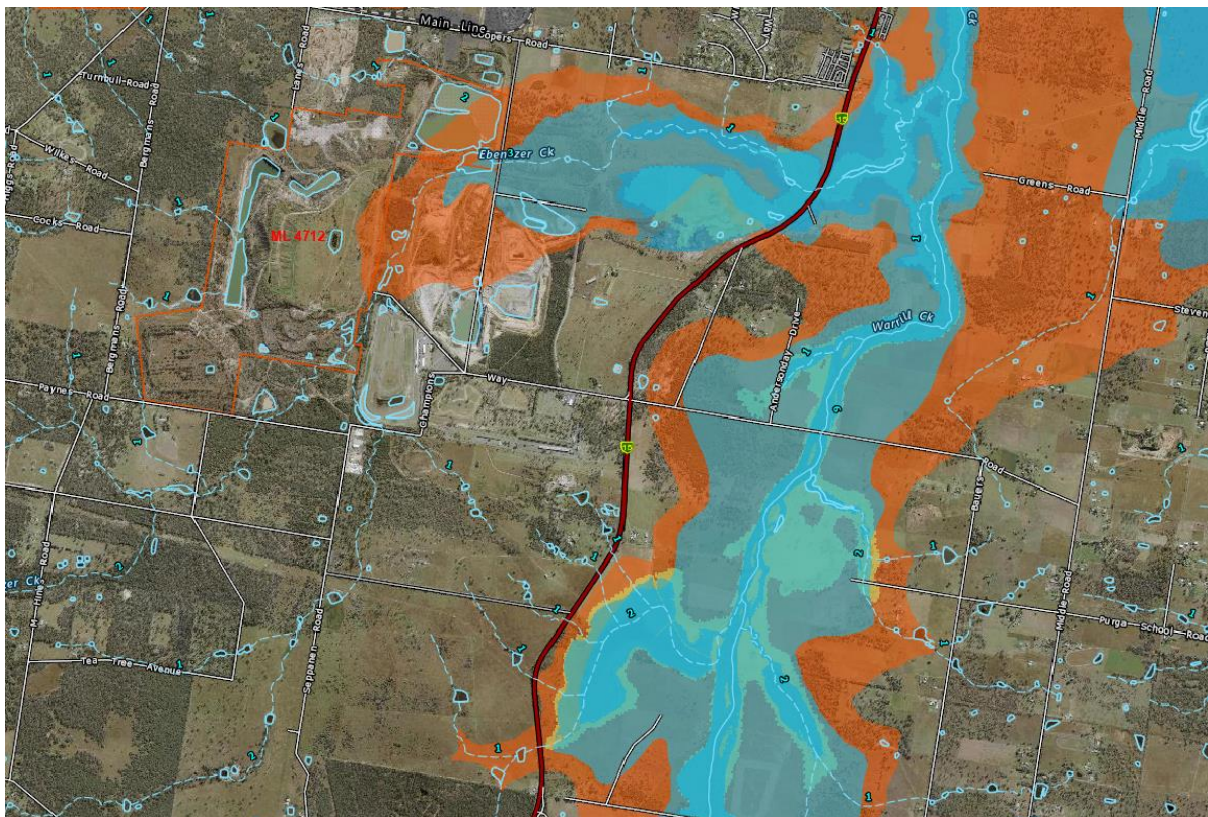


IMAGE 10: WATERCOURSES

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.**

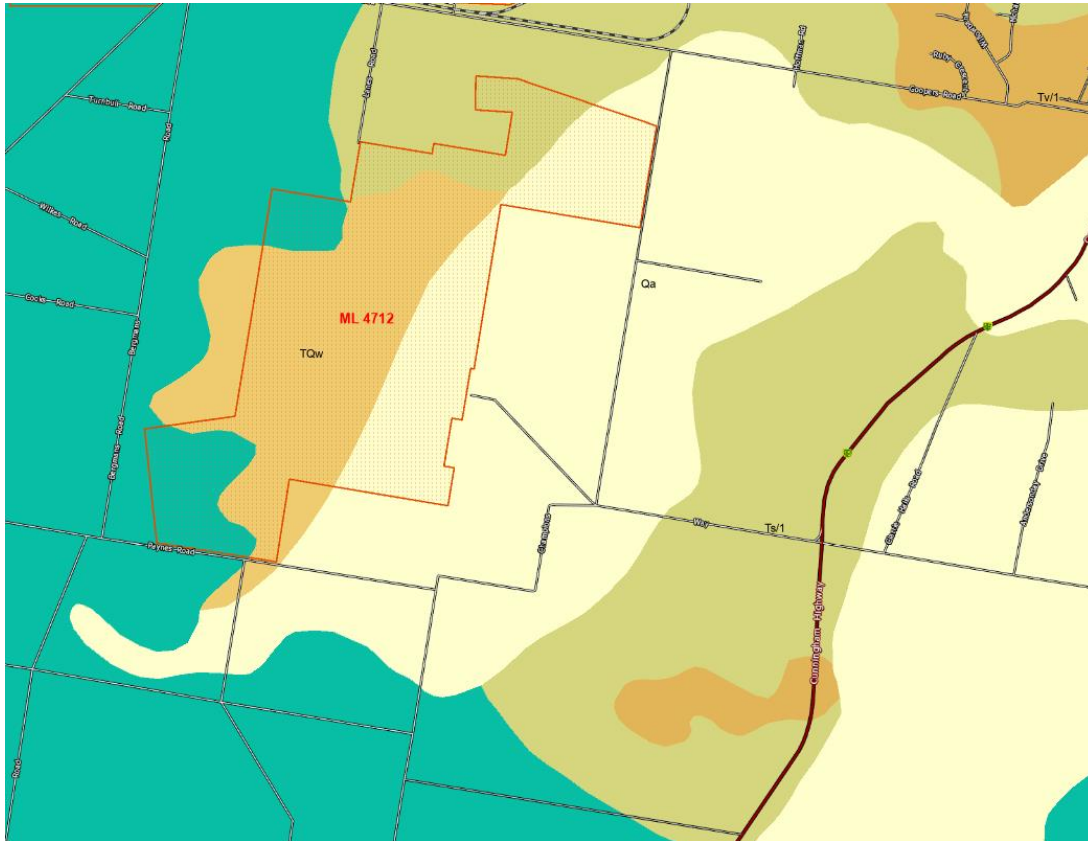
Site specific information on soils and geology is available from drilling activities of ten new groundwater monitoring wells between 27 November and 14 December 2018 (Taft Engineering, 2019).

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 5** which shows Stiff diagrams for the individual monitoring wells, clearly illustrating the cation/anion concentrations in each well. Refer to **Figure 6** which shows Stiff diagrams for the three voids. **Figure 7** and **Figure 8** 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.

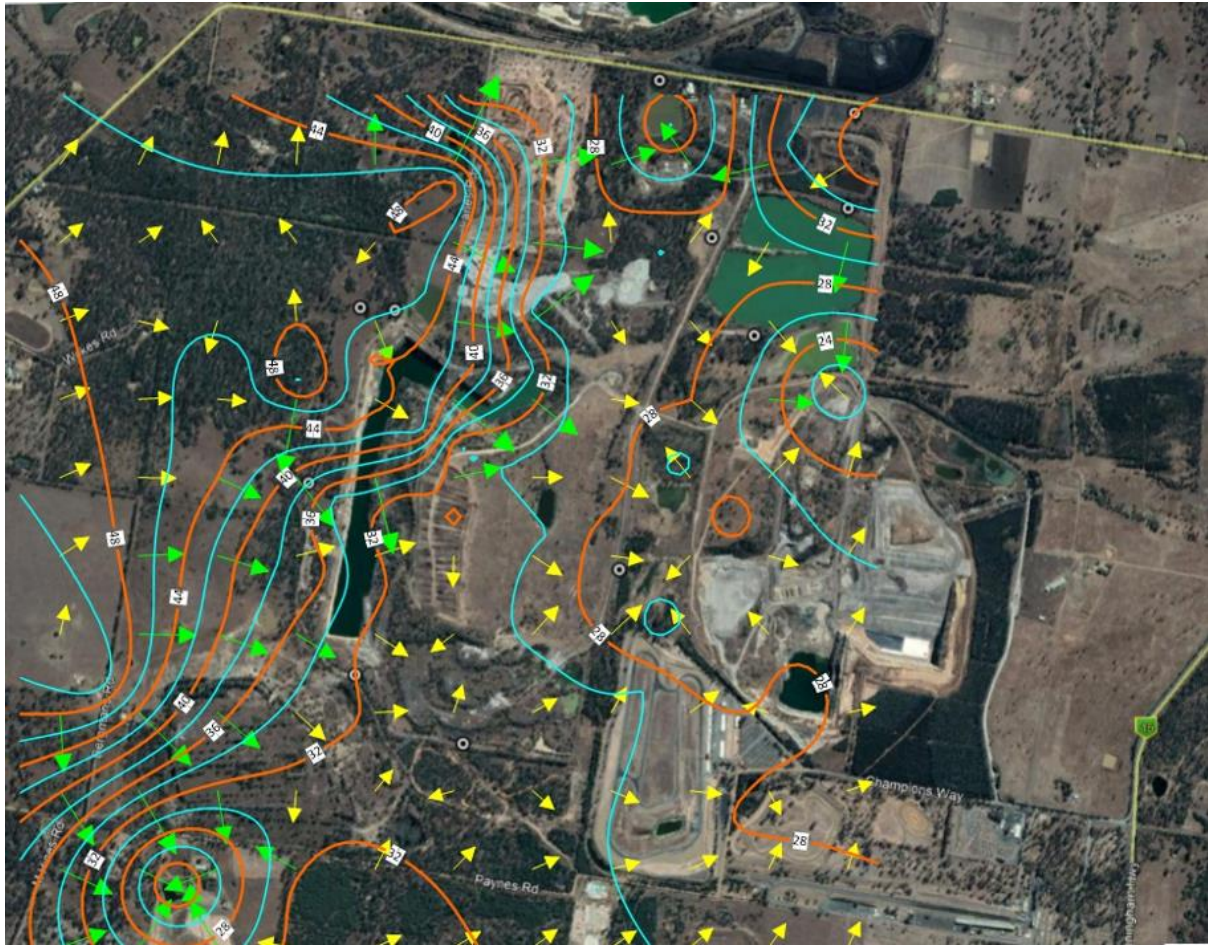
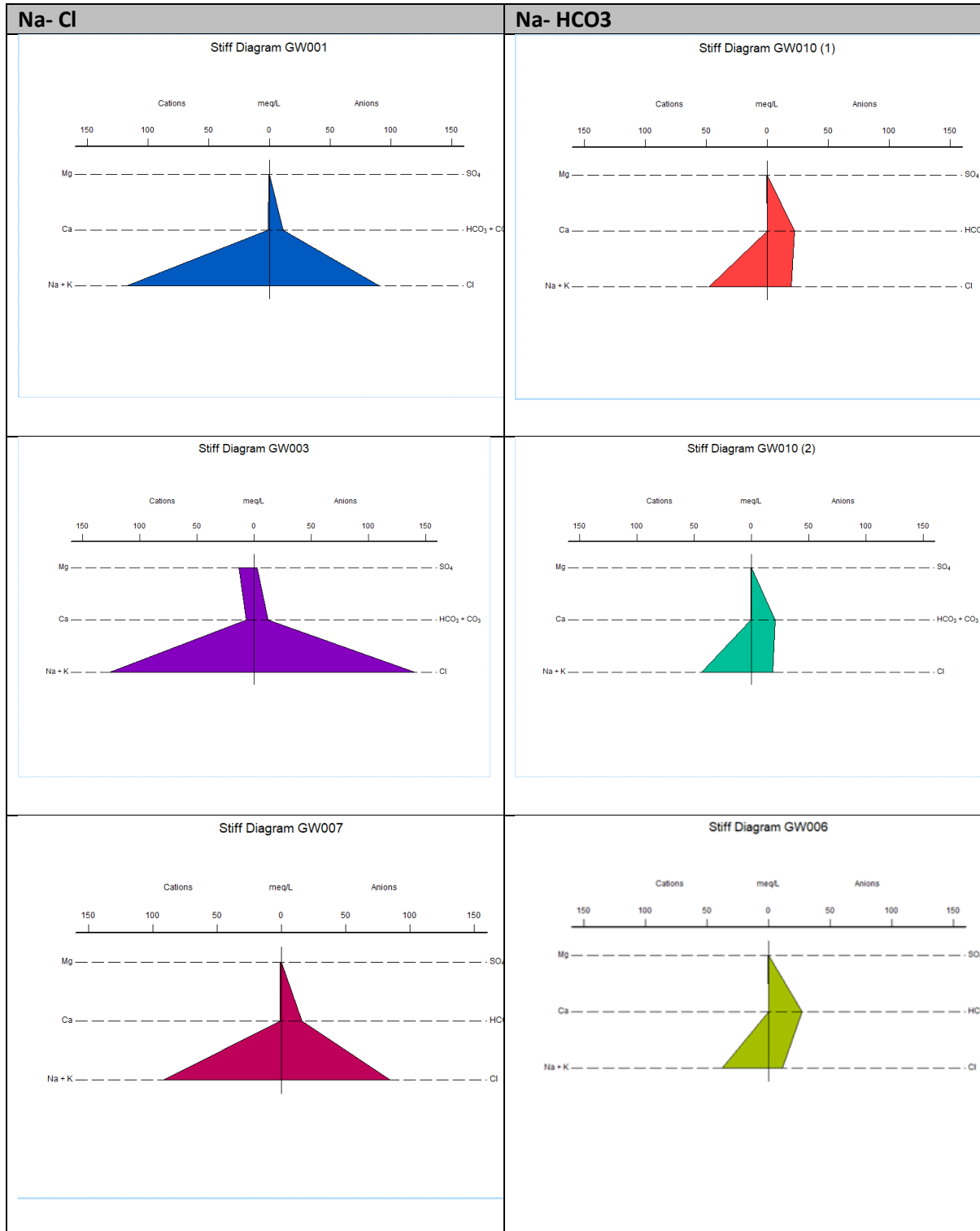


IMAGE 13: INDICATIVE GROUNDWATER FLOW – POST MINING GROUNDWATER CONTOURS (SOURCE: TAFT ENGINEERING, 2021)



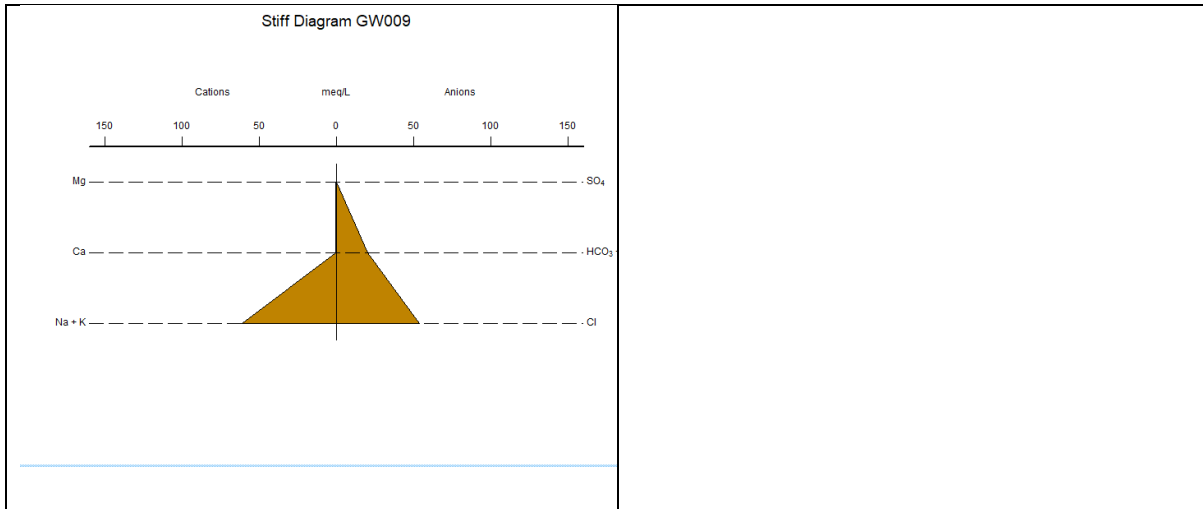


FIGURE 5: STIFF DIAGRAMS – GROUNDWATER

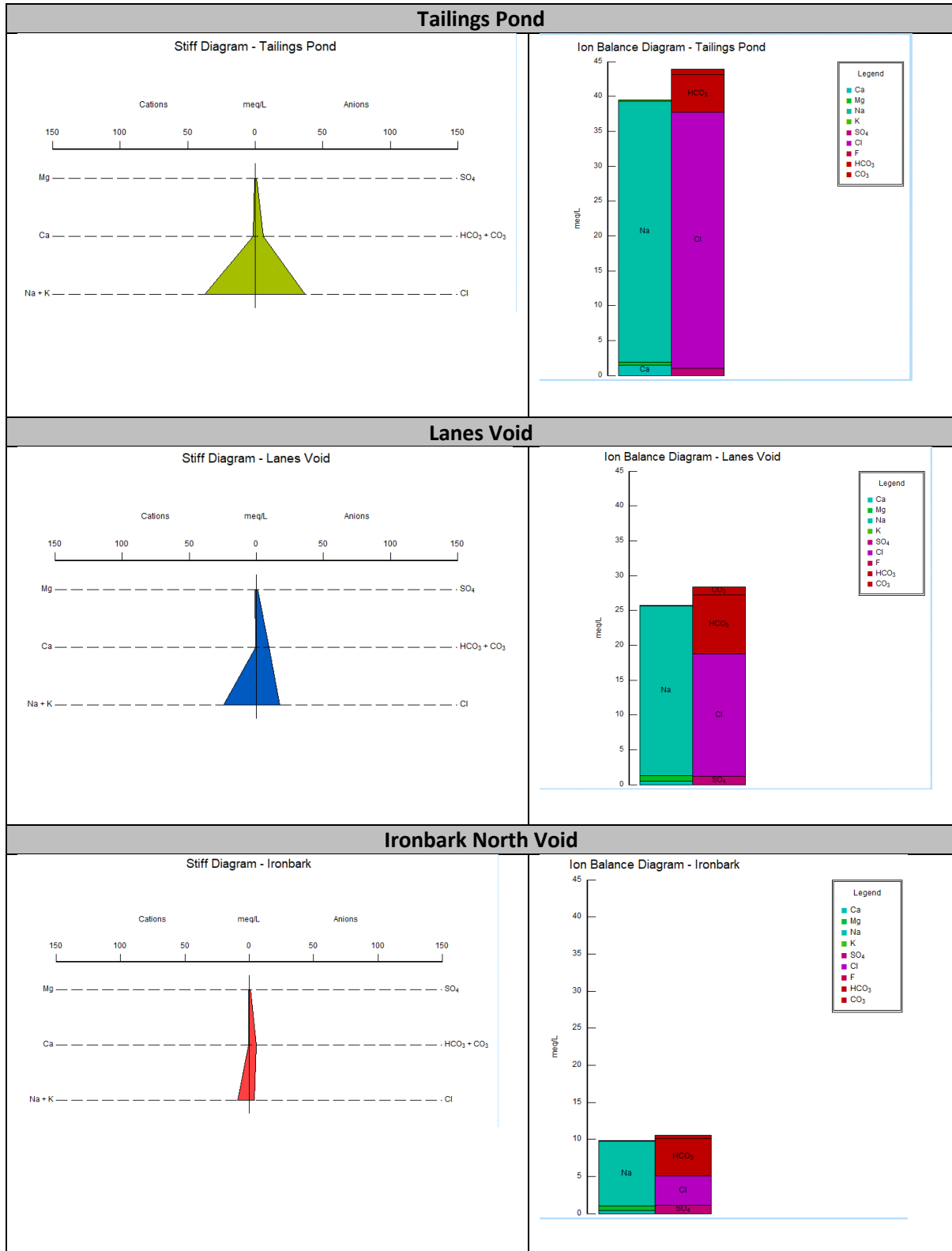


FIGURE 6: STIFF DIAGRAMS AND IONIC BALANCE DIAGRAMS – VOIDS

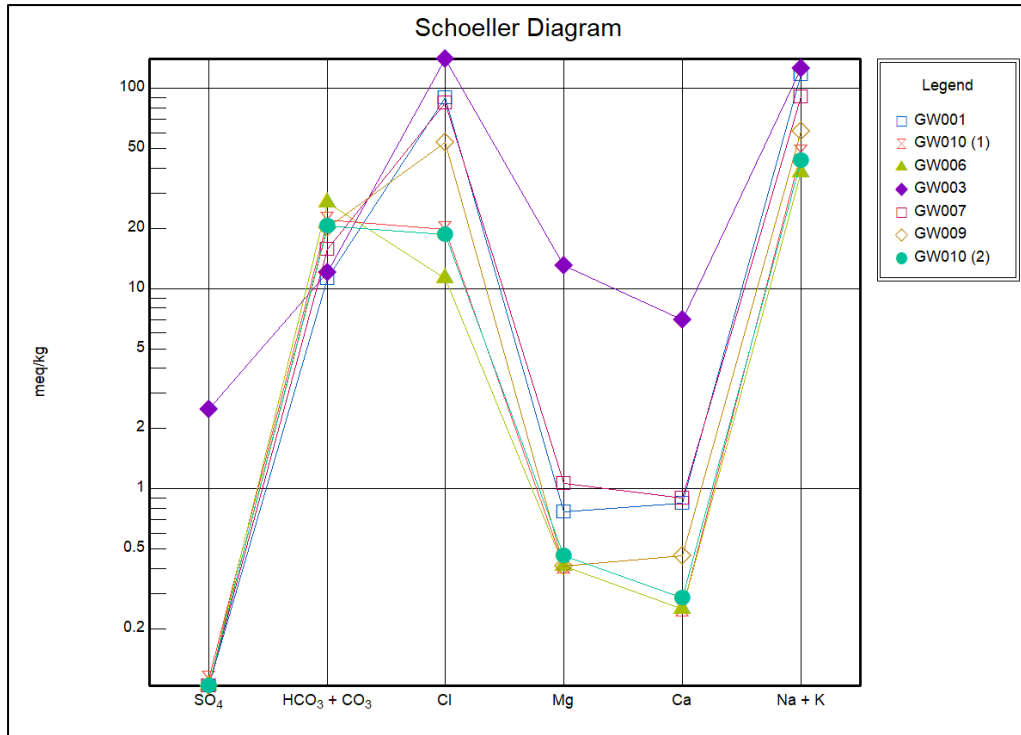


FIGURE 7: GROUNDWATER SCHOELLER DIAGRAM COMPARING GROUNDWATER BORES

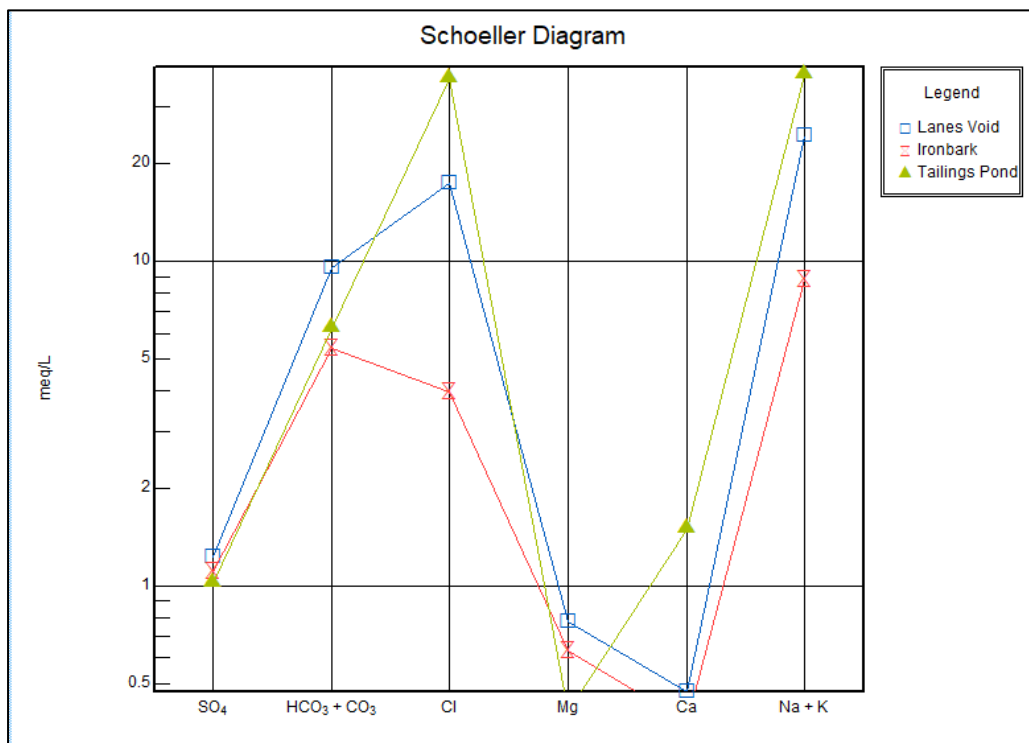


FIGURE 8: SCHOELLER DIAGRAMS FOR THE TAILINGS POND, LANES VOID AND THE IRONBARK NORTH VOID

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**.

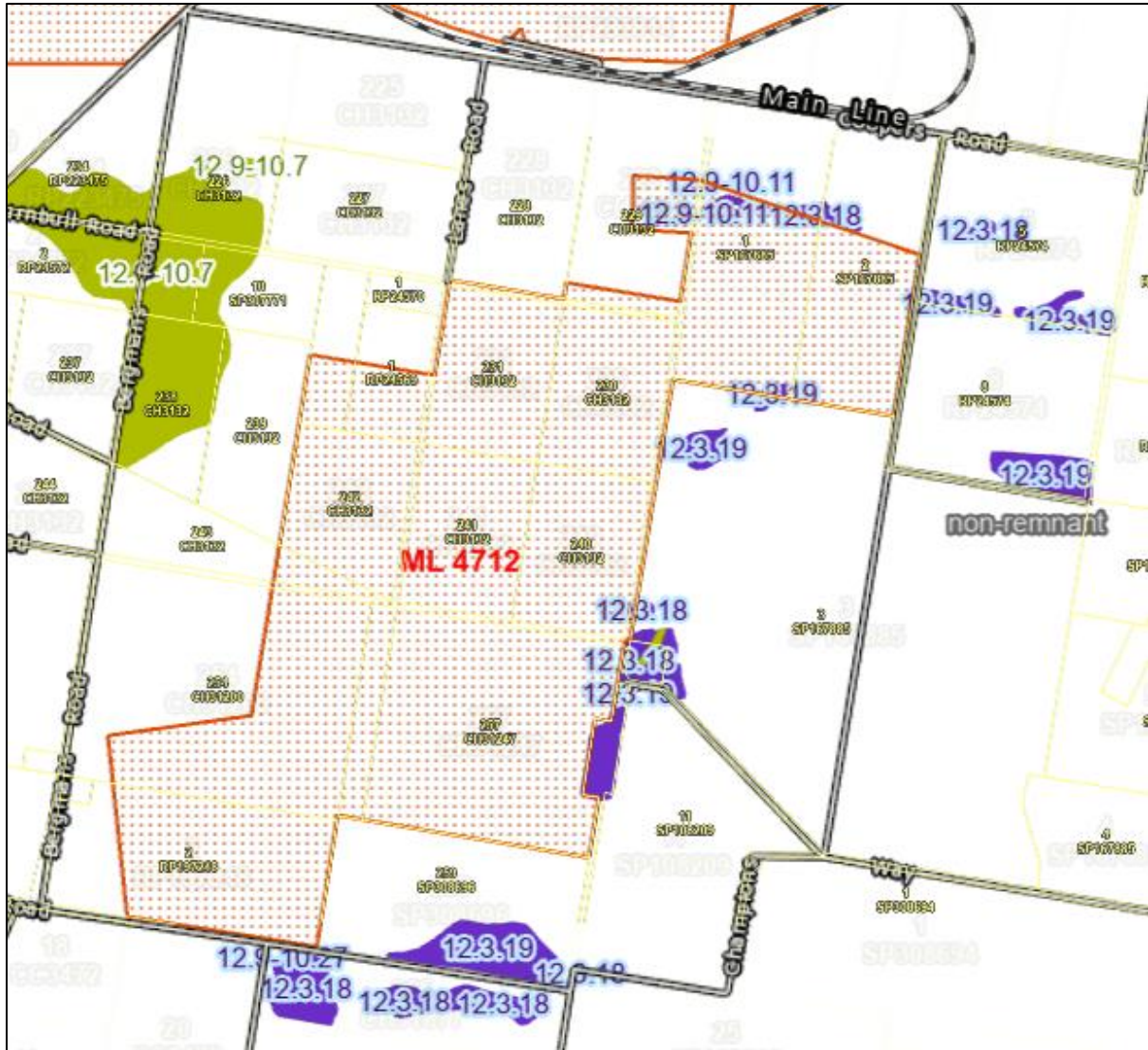

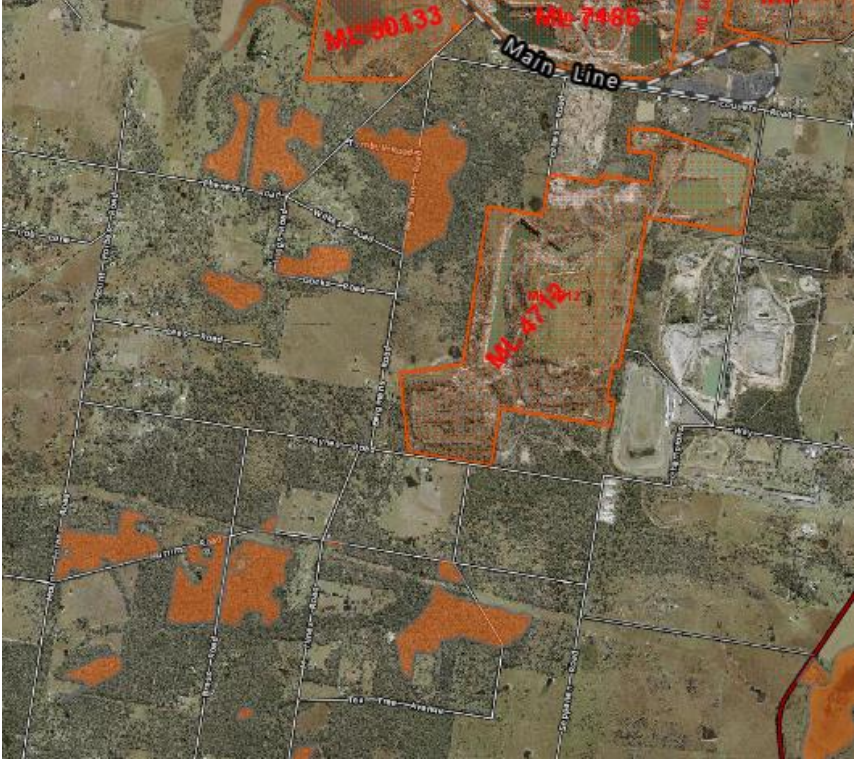



IMAGE 16: REMNANT VEGETATION (VMA)

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

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



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



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**.

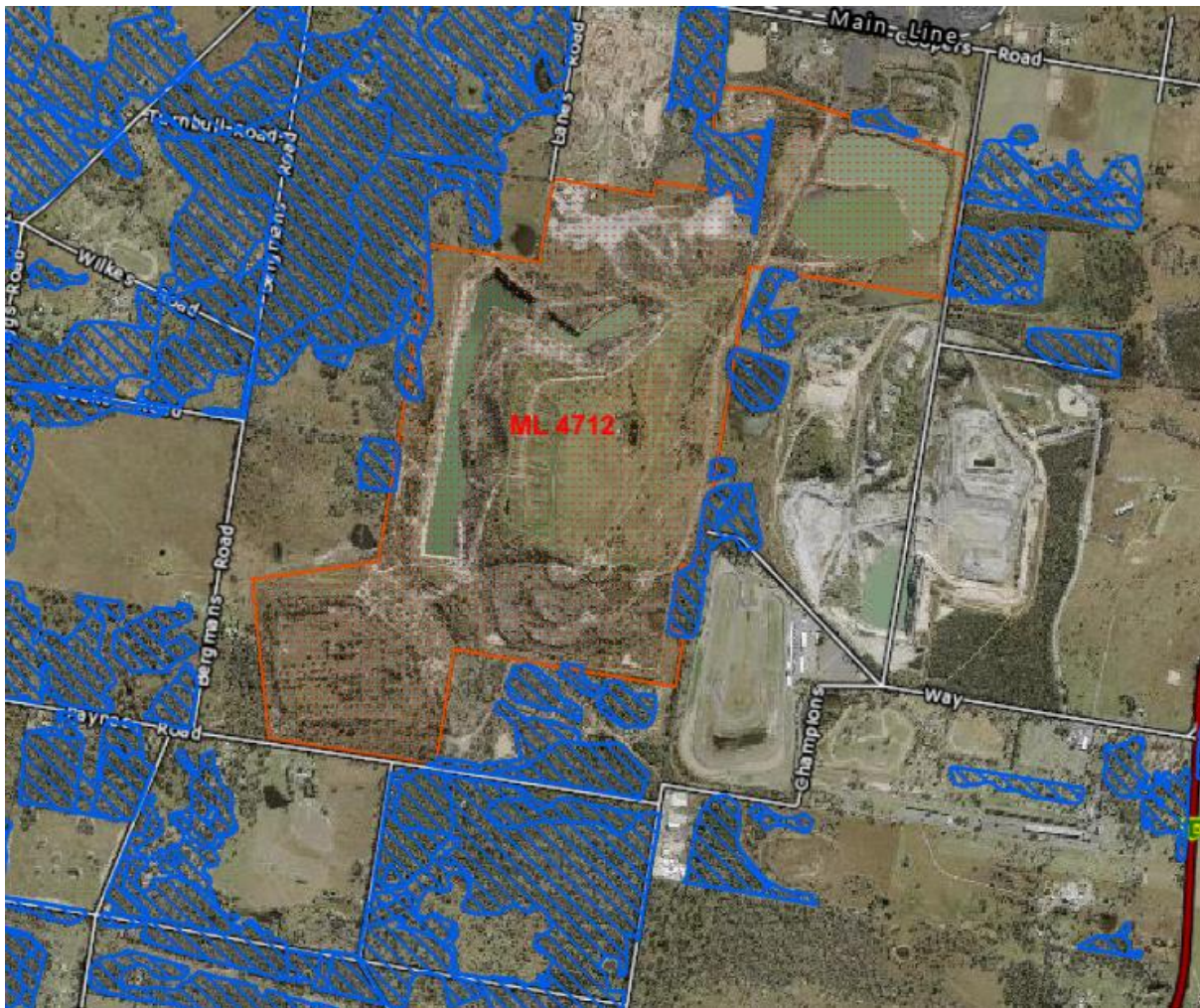


IMAGE 17: ESSENTIAL HABITAT

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).

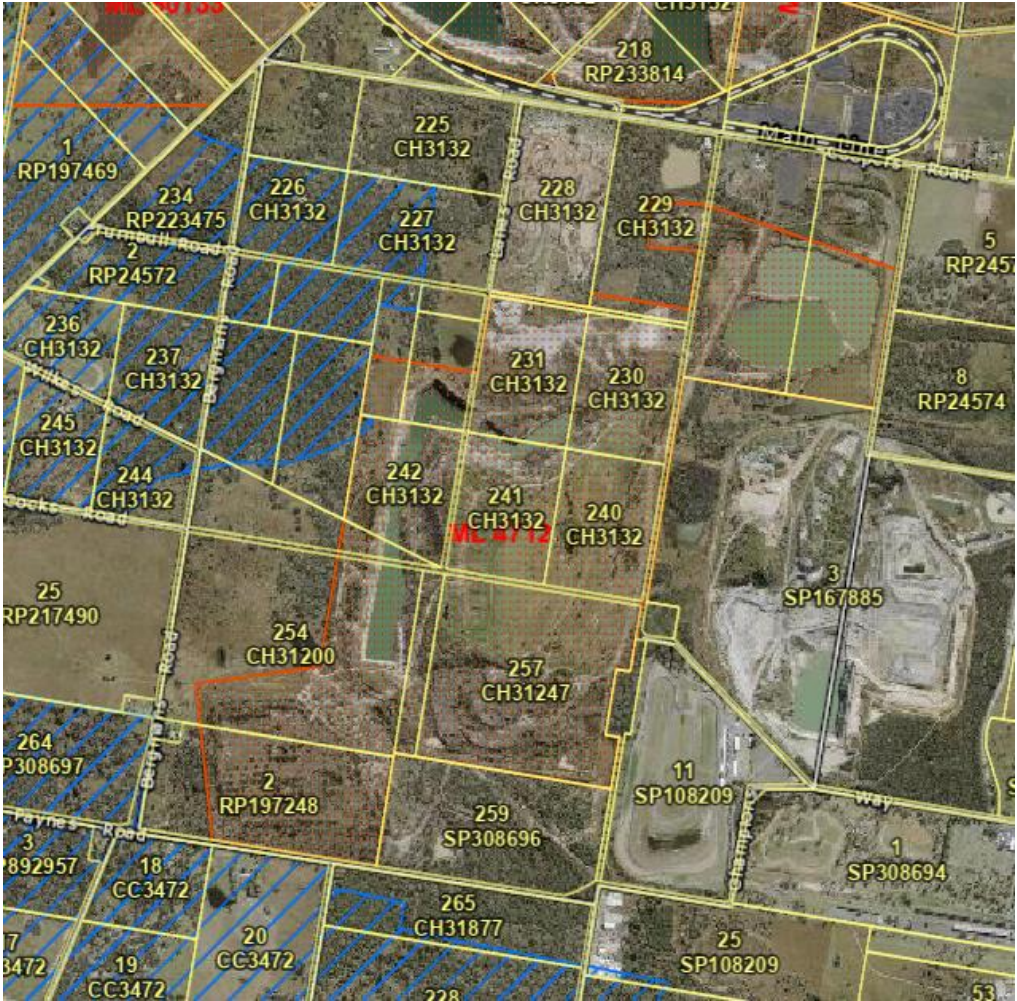


IMAGE 18: PROTECTED PLANTS

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	<p>Only a very small area is located on the western site boundary of the ML.</p>  <p>The map displays a grid of land parcels. A small area on the western boundary of Mining Lease 4712 is highlighted with a red outline. The map includes various planning codes such as RP197469, CH3132, RP223475, RP24572, CH31200, RP197248, RP197248, SP308696, and CC3472. The mining lease boundary is marked with a red line and labeled 'ML 4712'.</p>

Core Koala
Habitat
Area

Core Koala Habitat is bordering the ML in several locations. A small area is situated on near the western ML boundary, and two very small are situated at the northern and southern ML boundary.



<p>Locally Refined Koala Habitat</p>	<p>None present within the ML. Small areas are located south and south-west in close proximity to the ML.</p> 
<p>Koala Habitat Restoration Area</p>	<p>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.</p>

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



TABLE 7: KOALA HABITAT

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.

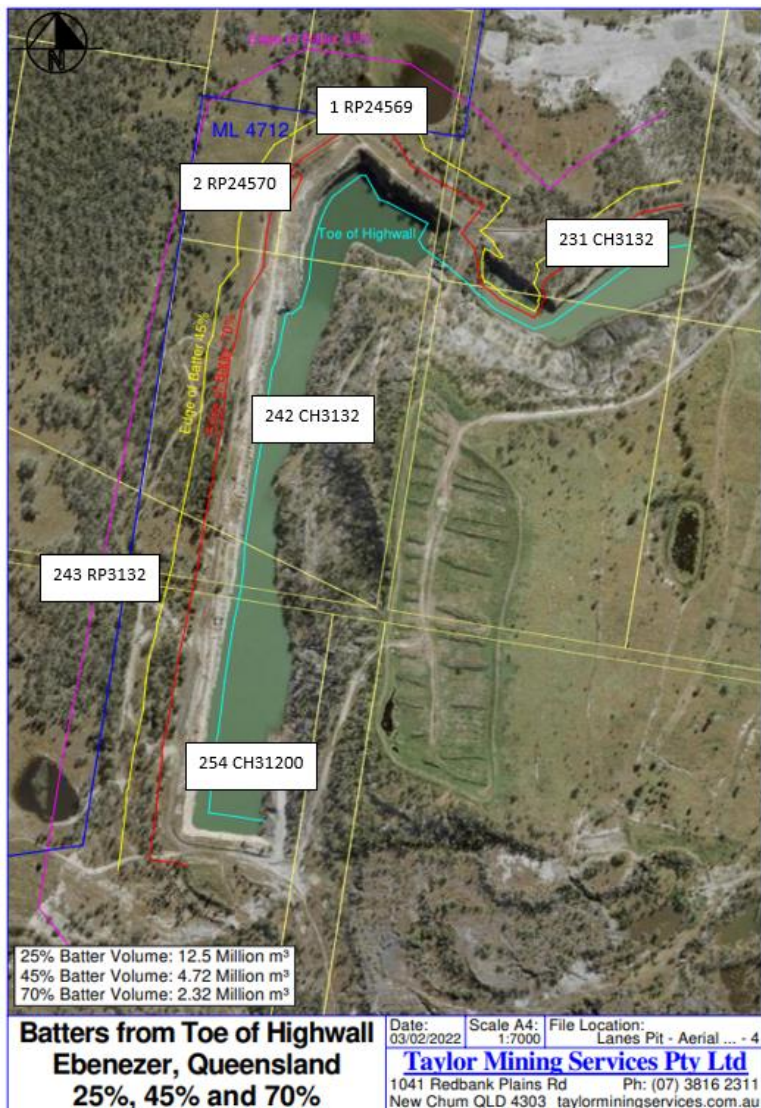


IMAGE 19: PROPOSED HIGHWALL, LANES VOID



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 Melaleuca irbyana	Vulnerable Endangered	yes
	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.



Note: Koala Core Habitat: Dark Green, locally Refined: Light Green

IMAGE 21: KOALA HABITAT (CORE & LOCALLY REFINED), KOALA SIGHTING

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

2.3.15.7.6 BIODIVERSITY AND CONSERVATION VALUES

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).

2.3.15.7.7 THREATENED SPECIES

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 (**Category C – endangered or of concern**). Minor, localised presence on the ML boundary, including the western ML boundary and off site.



IMAGE 23: MSES - REGULATED VEGETATION (CAT C - ENDANGERED OR OF CONCERN)

- Regulated Vegetation (**Essential Habitat**). 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**.

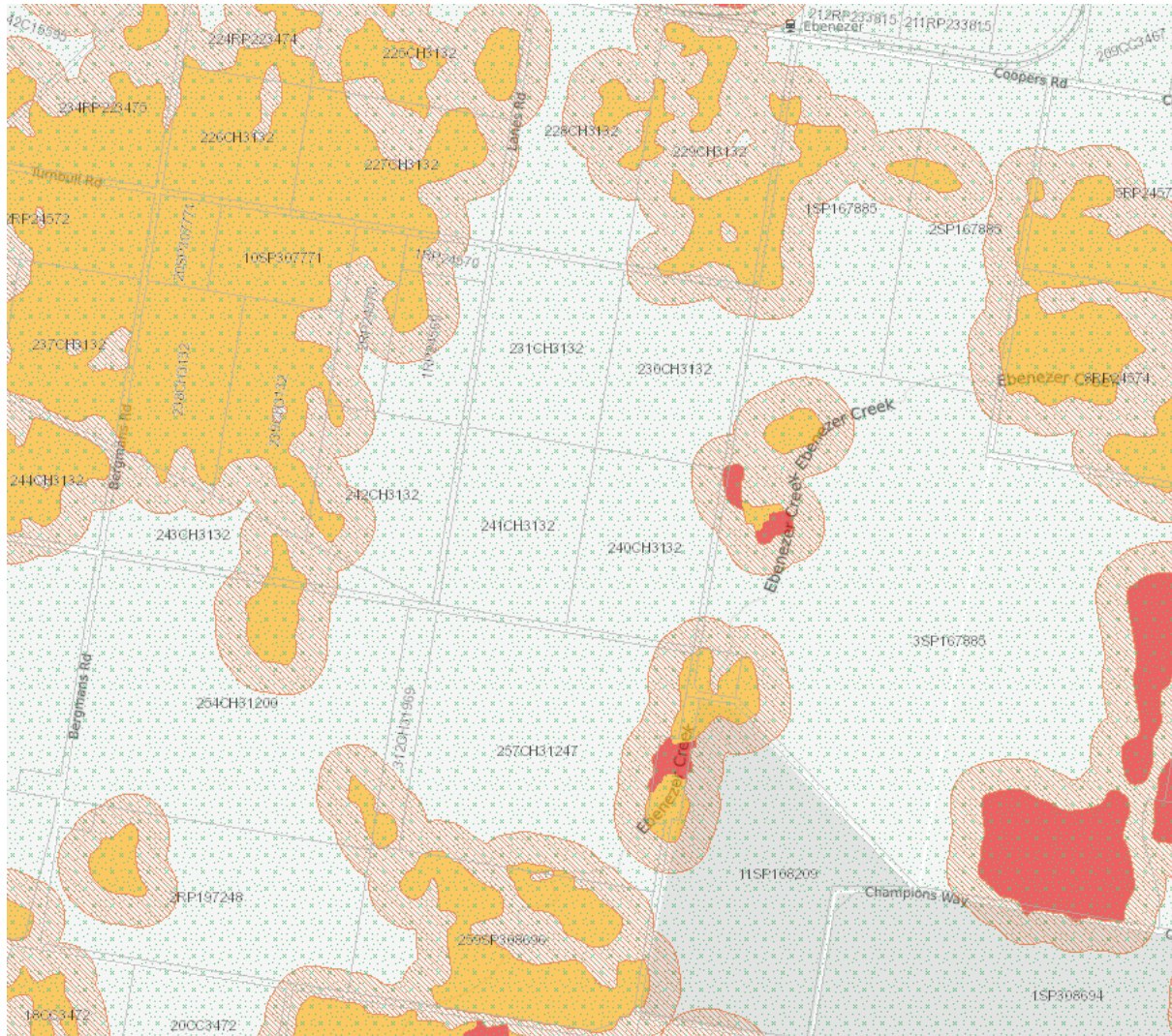
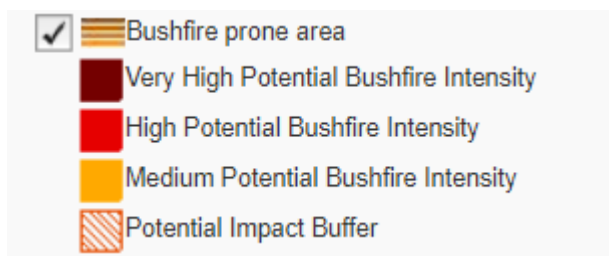


IMAGE 26: BUSHFIRE PRONE AREAS



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 (Domain 7) 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 (Domain 6) 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 (Domain 6).
- 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 Planned Rehabilitation/Improvement

The following sections provide detail surrounding rehabilitation to improve the land.

2.4.1 Domain 1

No rehabilitation is proposed. The area is currently used by the landowner for the storage of plant and equipment. Slashing of grass will occur when required.

2.4.2 Domain 2

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.

2.4.3 Domain 3

- Construction of stock fence (total length including Domain 5 is 2.51km).
- Erect signs on stock fence advising 'danger do not enter'.
- Install 4 gates to access Ironbark North Void ramp and haulage road within stock fenced area.
- Install access road outside stock fence and safety bund.
- Construct safety bund restricting access to high-wall and low-wall.

2.4.4 Domain 4

- 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 Domain 6.
- Construct bench to stabilise crest (total length 235m).
- Construct stock fence (total length 1.6km).
- Install 3 gates to access Lanes Void Southern Ramp (Domain 3) and IBSD area (Domain 6).

- 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.

2.4.5 Domain 5

- Construction of stock fence (total length including Domain 3 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.

2.4.6 Domain 6

- Bulk earthworks to rectify drainage paths and erosion.
- Spread gypsum over ripped surface (total area of 4.413ha).
- Spread topsoil over bare ground surfaces to establish vegetation (total area 4.413ha).
- 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 Domain 6 to Domain 4.

2.4.7 Domain 7

- Bulk earthworks to rectify drainage paths and erosion. This includes the addition of deep ripping a further 1.568ha not covered by the JCB Quote #91194 for OPD batter slope repair.
- Spread gypsum over 16.968 ha of ripped surface.
- Spread topsoil over ripped bare ground surfaces to establish vegetation. This includes the addition of spreading topsoil over a further 1.568 ha combined area not covered by JCB quote for OPD batter slope repair.
- Construction of two rock/geofabric lined down chutes to convey stormwater from the top surface of the out of pit dump.
- Repair contour drains.

2.4.8 Domain 8

Terrequip Miles Pty Ltd (current tenant) will 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.

2.4.9 Domain 9

Maxam (current tenant) will remove plant and equipment, portable infrastructure such as demountable buildings, and items associated with the storage of explosives. Maxam will remediate any contaminated land.

2.4.10 Domain 10

Further to the connection of the haulage road from Domain 4 to Domain 6, a new haulage road (approximately 1.03km) will be constructed outside the stock fence surrounding Domain 3 and 5 which will link up with existing haulage roads located west of the voids.

2.4.11 Domain 11

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.

2.4.12 Domain 12

5,536m³ of topsoil and compost will be spread following grass seed to establish vegetation on existing bare areas (2.768ha).

2.4.13 Domain 13

572m³ of topsoil and compost will be spread over small areas of bare ground, followed by grass seed to establish vegetation (0.286ha).

2.4.14 Domain 14

Compost will be spread with remaining topsoil, followed by grass seed to establish vegetation (0.87ha).

2.4.15 Domain 15

No improvement works are proposed for the balance of ML4712. Land is considered undisturbed.

Figure 9 below shows the locations of proposed infrastructure and areas proposed for improvement. Figure 10 illustrates the final land use (i.e. areas rehabilitated for cattle grazing, water storage, including areas to be retained for storage) and infrastructure to remain. These figures and Figure 4 form the bases for the spatial file information submitted as part of the supporting information for the ERC determination.

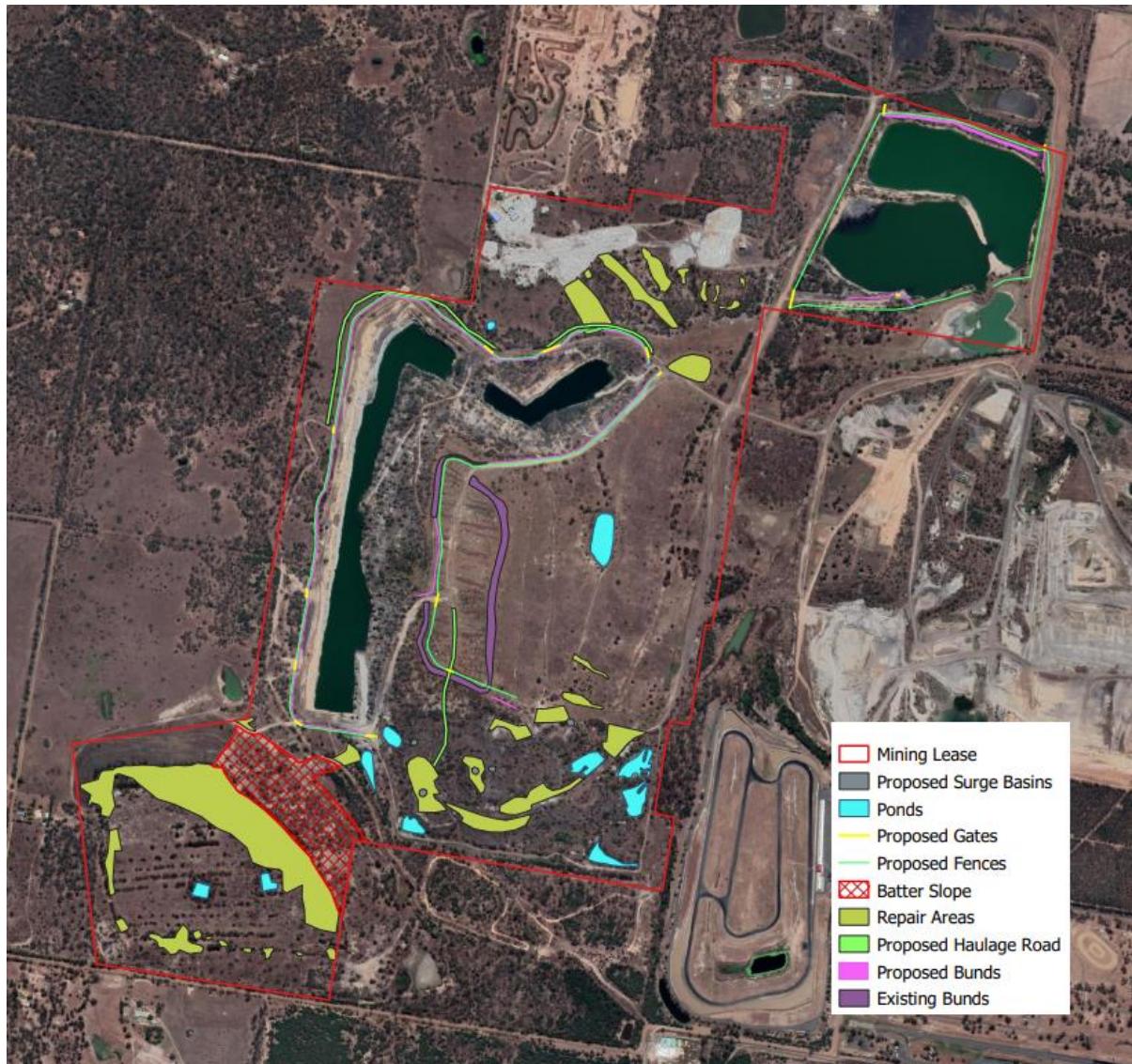


FIGURE 9: PROPOSED REHABILITATION AREAS AND IMPROVEMENTS

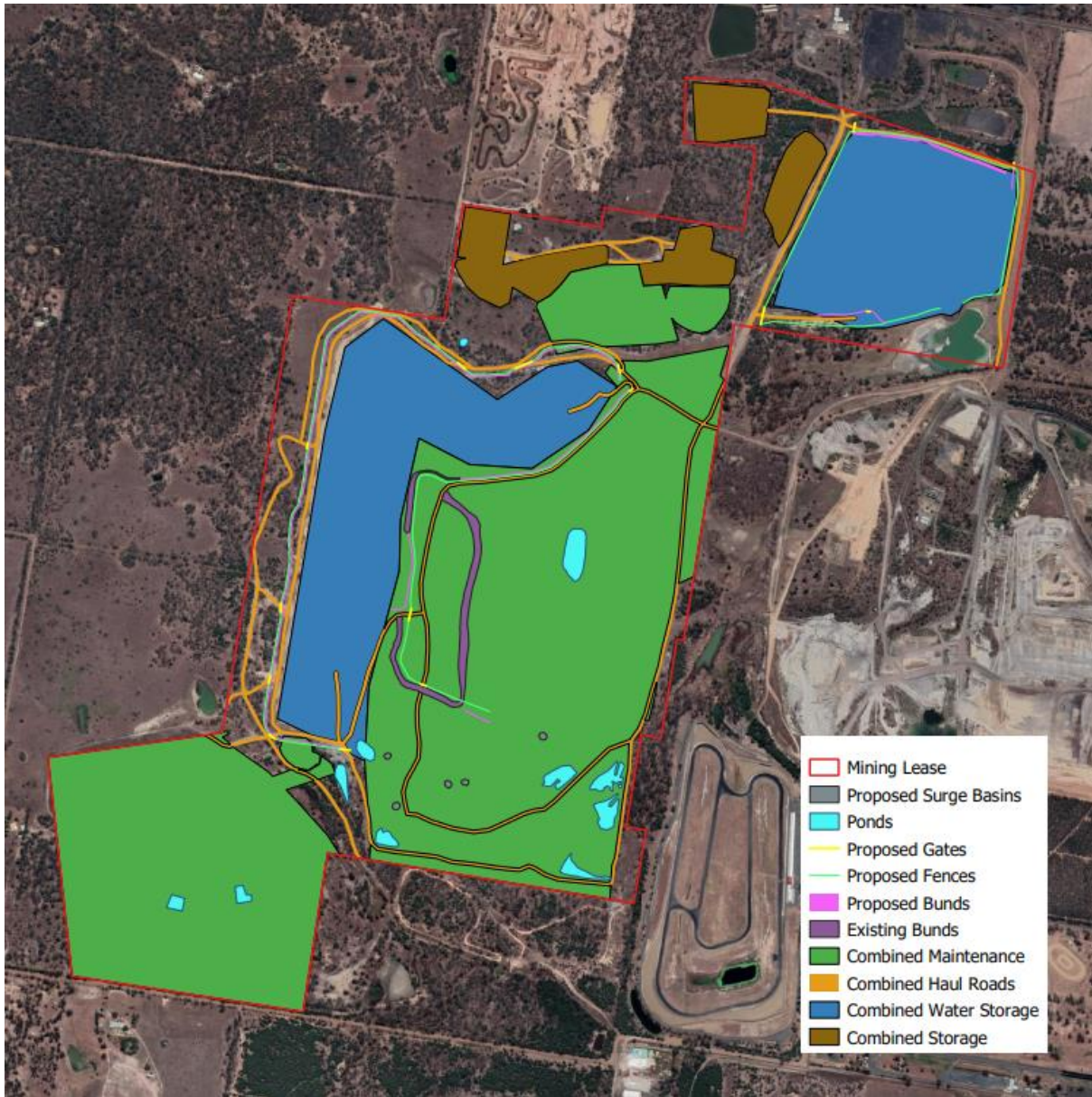


FIGURE 10: FINAL LAND USE AND INFRASTRUCTURE TO REMAIN

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. It is to be noted that the 15 Domains identified within this PRC plan, in total, equate to the approved area. 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 Domain 4 – 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 19: 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 ML4172.

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. **Figure 4** provides an illustration of the domains associated with this PRC plan, including domain area sizes.

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 Domain 8 – Bentonite (i.e., all buildings, and the hardstand areas). The previous PoOP indicated Domain 8 encompassed a net disturbed area of 8ha shown in **Figure 2**. Preparation of the Domain 8 shape file for this PRC plan indicates an area of 10ha.

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** or **Figure 4**. 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 Domain 2 – Tailings Pond as shown within **Figure 2** and **Figure 4**.

When considering the area of 45.9ha for the active pit (final void) listed within Table F1 of the EA, Domain 3 – Ironbark North Void and Domain 5 – 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 Domain 7 – 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 within Domain 9 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 Domain 4-Lanes Eastern Emplacement (52.7 ha, **Figure 2**; now determined to be 76.6 ha **Figure 3**) and Domain 7 – Out of Pit Dump area, now determined to be 56.5 ha. The combined increase in area for Domain 4 and Domain 7 is 38.4 ha, leaving a remaining difference of 3.9 ha. However considering that Domain 6 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 domains 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.

Therefore, when considering the PMLU for each domain identified within **Figure 4**, the following Table is provided. Note that the previous values identified in **Figure 2** are shown also.

Domain #	Domain Name	Area (ha) Figure 2	Area (ha) Figure 3	PMLU
1	Stockpile Area	2.4	3.2	Request by landowner for area to be retained for use as storage area.
2	Tailings Pond	31.7	31.7	Fauna habitat.
3	Ironbark North Void	12.0	12.2	Water Storage / Fauna Habitat.
4	Lanes Eastern Emplacement	52.7	76.6	Light Cattle Grazing.
5	Lanes Void	33.9	33.9	Water Storage / Fauna Habitat.
6	Ironbark South Dump	26.8	35.9	Light Cattle Grazing.
7	Out of Pit Dump	41.6	56.5	Light Cattle Grazing.
8	Bentonite	8.0	10	Request by landowner for infrastructure and hardstand areas are to be retained for use as storage areas.
9	Maxam	2.9	3.7	Request by landowner for infrastructure and surrounding areas are to be

				retained for use as storage areas.
10	Haulage Roads	15.0	15.2	Request by landowner for roads to be retained for site access.
11	Wet weather storage area		0.76	Light cattle grazing
12	Bentonite B area		8.1	Light cattle grazing
13	Overburden mound		2.2	Light cattle crazing
14	Topsoil stockpile		0.87	Light cattle grazing
15	Balance of mining lease undisturbed		66.97	Light cattle grazing
Total		227.0	357.80	

TABLE 20: LISTING DOMAIN AREAS

2.7 Non-Use Management Areas

No non-use management areas are proposed.

2.8 Rehabilitation Management Methodology

This section will include information describing how the proposed rehabilitation and management methodology have been develop 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 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 Domain 6 – IBSD area and Domain 7 – 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 sections provide details for each domain with regard to landform design.

2.8.2.1 Domain 1

No further rehabilitation is proposed for Domain 1. The landowner is currently utilising this area for the storage of plant and equipment.

2.8.2.2 Domain 2

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 IBSD area (Domain 6).

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 within 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 9**).

2.8.2.3 Domain 3

No change to the current landform is proposed. Whilst bunding exists restricting vehicle access to the high wall, along the existing haulage road, further controls are detailed in **Section 2.4.3**.

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 North Void. For further information regarding the CMG report, readers are directed to **Section 2.8.2.5**.

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 19**).

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 9**). 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 2.8.2.5.**

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**

2.8.2.4 Domain 4

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 (Domain 3 and Domain 5) and the IBSD area (Domain 6).

2.8.2.5 Domain 5

No change to the current landform is proposed for the same reasons provided for in **section 2.8.2.3**.

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**.

2.8.2.6 Domain 6

A combination of coarse reject coal stone generated at the wash plant and overburden was emplaced in the former Ironbark South Void. 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 Domain 6 – IBSD, 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 Domain 6, primarily associated with stormwater flow.

The southern batter slope of the compost pad, leading down into Domain 6 (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 Domain 6 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 Domain 6 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 Domain 6. 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 Domain 6 which are to remain as water storage and fauna habitat.

2.8.2.7 Domain 7

Overburden from the original boxcut was transported to the OPD (Domain 7). 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 Domain 7. 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 within Domain 7-** 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.

2.8.2.8 Domain 8

There is no proposed change to the landform. The landowner has expressed that the hardstand pads, sheds and buildings are to remain.

2.8.2.9 Domain 9

There is no proposed change to the landform. The landowner has expressed that land, sheds and buildings are to remain.

2.8.2.10 Domain 10

There is no proposed change to existing haulage paths. 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 North Void and Lanes Void to the western areas of the site. The current

haulage path located within Domain 6 will connect to Domain 4 through the proposed earthworks for Domain 6.

2.8.2.11 Domain 11

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.

2.8.2.12 Domain 12

Stormwater generated on the bentonite storage pads has deposited bentonite clay on the ground surface in and amongst the trees within the domain. 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.

2.8.2.13 Domain 13

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.

2.8.2.14 Domain 14

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

2.8.2.15 Domain 15

This area is the balance of the land within ML4712. No proposed changes to the landform are proposed.

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 Domain 7, 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 within Domain 2 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 within Domain 3, 4 and 5 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 Domain 4 - 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 within Domain 4, Domain 6 and Domain 7.

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 domains. 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 Domain 6 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 Domain 4 – 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	<p>Release to waters</p> <p>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.</p>
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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	µS/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 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 spreadsheet. 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 (ML)	Storage 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).

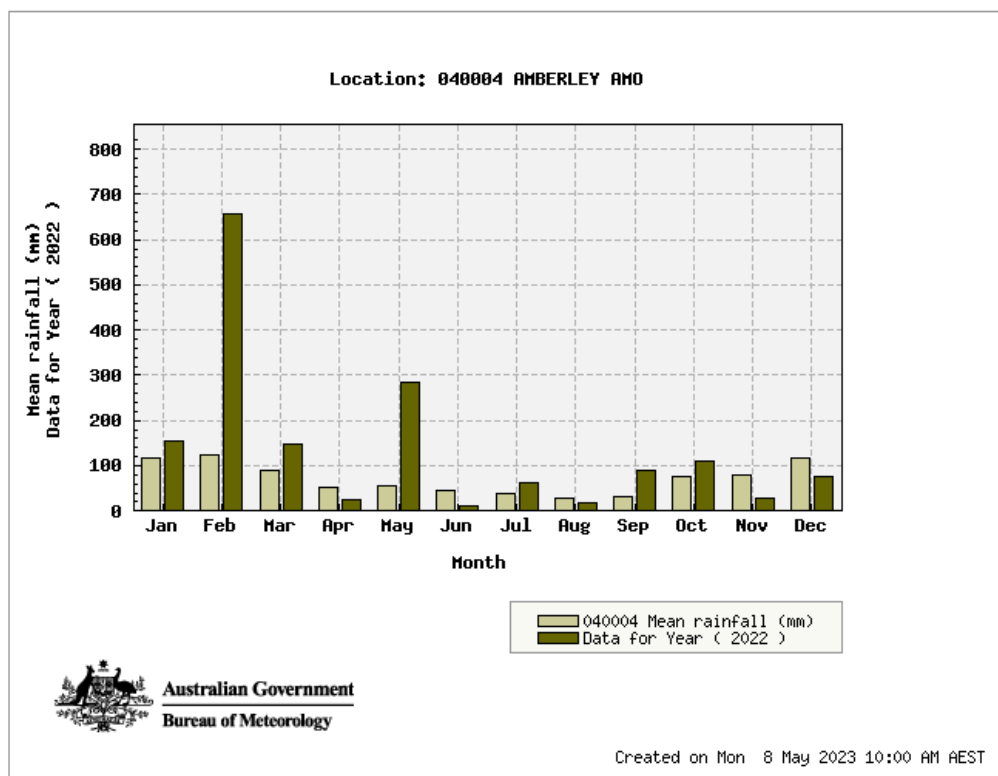


FIGURE 11: RAINFALL DURING 2022 COMPARED TO MEAN RAINFALL (1991-2020)

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 µS/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 µS/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 estimated 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 (ML)	Storage Capacity	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 12: LOCATION OF STOCK FENCE AROUND DOMAIN 3 AND 5

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



FIGURE 13: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 within Domain 8 and Domain 9 which is to remain for use as storage areas.

Existing ponds located within Domains 4, 6 and 7 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 Monitoring and Maintenance

This section provides a monitoring and maintenance program for nominated areas within ML4712. Detail is provided that identifies and describes the monitoring systems that will be undertaken to demonstrate that milestone and milestone criteria have been achieved.

Nine rehabilitation milestones are described within the PRC Plan Schedule (refer to **Part 2 – PRC PLAN Schedule**). A monitoring program has been developed to determine whether milestone criteria have been achieved. The program is described below for each milestone listed in the following table.

Code	Milestone
RM1	Landform reshaping/reprofiling.
RM2	Surface preparation.
RM3	Revegetation.
RM4	Land is suitable for light cattle grazing.
RM5	Achievement of post-mining land use to stable condition.
RM6	Voids are suitable for the storage of water and as fauna habitat.
RM7	Voids access is restricted
RM8	Infrastructure decommissioning and removal.
RM9	Removal of EMR listing for Explosives Storage.
RM10	Infrastructure to remain achieves the requirements of the landowner.

TABLE 25: REHABILITATION MILESTONES

2.10.1 RM1 - Landform reshaping/reprofiling

There is no significant change proposed to the current landform with regards to the disturbed areas within the respective domains identified in the PRC Plan Schedule. The domains that require earthworks are Domain 2, 4, 6, 7 and 10.

Whilst there is cut and fill works to be performed within Domain 7, the works will not result in a significant change to the landform. Once erosion as described earlier has been corrected, grading will occur and contour drains will be reinstated. Two geofab/rock lined stormwater down chutes will be constructed within Domain 7.

Within Domain 6, drainage pathways will be reshaped in readiness for topsoil to be placed over the surface. Small surge basins will be placed within the flow path to slow the velocity of stormwater.

Safety bunds will be constructed at the Tailings Pond – Domain 2 to restrict vehicle access.

New haulage roads with Domain 10 are required to provide access outside the stock fence and safety bund to be installed within Domain 3, 4 and 5.

Following the above earthworks, an inspection will occur to determine that the above works occurred in accordance with the plans prepared by TMS and Zambelli Environmental. Any deviation from the design plans will be identified and highlighted.

2.10.2 RM2 - Surface preparation

An assessment of available topsoil will occur by a suitably qualified person prior to placement over reshaped/reprofiled soil. Any soil ameliorants required to be spread before the placement of topsoil will be documented. A record of the milestone completion will occur. This will include the date when topsoil spreading occurred in each area and the depth of topsoil applied. The domains where this will occur are, Domain 2, 4, 6, 7, 11, 12, 13, 14.

2.10.3 RM3 – Revegetation

The date when and area, where seed is applied will be recorded. The date when and area, where water is applied will be recorded. Monitoring will occur monthly initially to determine strike and growth of established grass. Once 30% cover is achieved, monitoring will be 6 monthly. Photos will be obtained and recorded. The domains where this will occur are, Domain 2, 4, 6, 7, 11, 12, 13, 14.

2.10.4 RM4 - Land is suitable for light cattle grazing

Visual observation will occur for signs of erosion (i.e. channel or sheet erosion) before cattle are allowed entry to areas for light grazing. An assessment of groundcover will also occur before cattle are permitted to graze upon rehabilitated land. The domains where this will occur are, Domain 2, 4, 6, 7, 11, 12, 13, 14. The aim is to retain a 30% groundcover, weather permitting.

Prompt rectification will occur when erosion is observed. The date when repair of erosion occurred will be recorded. Repair will occur before cattle are allowed to graze the area.

Routine water quality monitoring will continue until surrender. Any significant increase in either, electrical conductivity or suspended solids or a significant change in pH will be investigated. Prompt repair of failure of land will occur.

The step transect method will be employed to estimate cover at systematic points along the transect.

The survey method involves walking along a transect and noting the cover at the tip of the boot. The cover will be assessed at every step (datapoint) along the transect and recorded. Cover will be classified according to the following categories:

- **Bare Soil** - Bare soil is defined as any area that does not contain vegetation (excepting roads). This includes any soil that is eroded and areas on slopes. Rocks will also be categorized as bare soil.
- **Grass: Basal and Aerial Vegetation** - These two categories will be defined by the appearance of the grass at the tip of the boot. Where the vegetative cover at the point is the base of the plant, it will be classified as basal vegetation and where the ground at that point was under the canopy of the vegetation, this will be classified as aerial vegetation. Where grass growth is too thick to see the tip of the boot cover will be classed as basal. Dead grass was classified as “litter”.
- **Litter - Litter** is defined as plant matter that was not living. This will be most often dead grass and leaves.

Not until the milestone criteria for the percentage of cover is achieved will cattle be allowed to graze upon a particular area. Land will be considered suitable for grazing when land maintains a percentage of ground cover of 50% where grass coverage (basal and aerial vegetation) is > 30% of the cover, except in seasons when average rainfall is less than the 20th percentile.

Table F1 of the EA indicates that the post-mine land capability will be classified as 4 or 5 out of the five rank system. The following definitions are provided.

Class 4:

Agricultural – Marginally Suitable Land – land which is marginally suited for a proposed use and would require major inputs to ensue sustainability. The inputs may not be justified by the benefits to be obtained in using the land for the particular purpose and is hence considered presently unsuited.

Class 5:

Agricultural – Unsuitable Land with extreme limitations – Land which is unsuited and cannot be sustainably used for a proposed use ((Queensland Government, 1995).

2.10.5 RM5 - Achievement of post-mining land use to stable condition

Visual monitoring will occur to determine that rehabilitation has resulted in a stable landform being created. A record of observations will be provided as supporting information as part of the final surrender application.

Routine water quality monitoring will continue until surrender. Any significant increase in either, electrical conductivity or suspended solids or a significant change in pH will be investigated. Prompt repair of failure of land will occur.

2.10.6 RM6 - Voids are suitable for the storage of water and as fauna habitat.

Water quality data exists that indicates that the water quality contained within the voids is fit for stock and fauna. Water will be utilised for rehabilitation (i.e. control dust and providing moisture for vegetation growth). Water will be analysed again before the final surrender application is submitted. Results will form part of the information provided.

2.10.7 RM7 - Voids access is restricted

Visual observation during the construction of earthen safety bunds at the Tailings Pond will occur daily.

Visual observation during the construction of a 5-strand stock fence around the voids will occur. Visual inspection of gates will occur when attached to posts. The date when the stock fence and gates have been installed will be recorded. The stock fence will include Domain 3, 4 and 5. The date when signage is attached to the stock fence will be recorded.

Visual observation during the construction of a 5-strand stock fence around the Tailings Pond will occur daily. The top wire will be plain to minimise potential injury to fauna. The bottom four strands will be barbed wire. The date when the stock fence has been installed will be recorded.

Void access will be determined as restricted when observations determine:

- grass has established along the full length and width on the earthen safety bunds within Domain 2 and which achieves milestone criteria associated with milestone RM6.
- The construction of stock fencing, erection of warning signs and access gates have been signed off as being completed within Domain 2.

- The stock fence construction, erection of warning signs and access gates have been signed off as being complete within Domain 3, 4 and 5.

2.10.8 RM8 - Infrastructure decommissioning and removal.

Prior to accepting responsibility for Domain 8 and Domain 9, an inspection will be performed to determine that all plant and equipment and buildings that are not to be retained are removed, that waste and contamination is removed and that all services have been disconnected except where the landowner wishes them to be retained.

2.10.9 RM9 - Infrastructure to remain achieves the requirements of the landowner

During the same visual inspection performed for milestone RM8, the landowner will inspect infrastructure, including, hardstand areas, water tank, buildings and sheds and determine the retainment of the infrastructure is appropriate.

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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)

<p>Available for improvement</p>	<p>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–</p> <p>a) the land is being used for operating infrastructure or machinery for mining, including, for example, a dam or water storage facility;</p> <p>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;</p> <p>c) the land is required for the mining of a probable or proved reserve mentioned in paragraph (b).</p>
<p>Available for rehabilitation</p>	<p>For a rehabilitation area, means land in the area is not being mined, unless–</p> <p>a) the land is being used for operating infrastructure or machinery for mining,</p>

	<p>including, for example, a dam or water storage facility; or</p> <p>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</p> <p>ba) the land is required for the mining of a probable or proved reserve mentioned in paragraph (b); or</p> <p>c) the land contains permanent infrastructure identified in the proposed PRC PLAN schedule as remaining on the land for a post-mining land use.</p>
<p>Land outcome document</p>	<p>For land, means the following documents relating to the land–</p> <p>a) an environmental authority for a resource activity on the land;</p> <p>b) a document made under a condition of an environmental authority mentioned in paragraph (a), if–</p> <p>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</p>

	<p>ii. the document was received by the administering authority before the assent date; and</p> <p>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</p> <p>iv. before the assent date, the document has not been superseded;</p> <p>c) a document made under a condition of an environmental authority mentioned in paragraph (a), if–</p> <p>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</p> <p>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</p> <p>iii. the document is received by the administering authority within three years after the assent date; and</p> <p>iv. the administering authority does not, within 20 business days after receiving the document,</p>
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	<p>give the environmental authority holder a notice that the document is insufficient in a material particular relevant to a matter in subparagraph (i);</p> <p>d) a report evaluating an EIS under the State Development and Public Works Organisation Act 1971, section 34D;</p> <p>e) an EIS assessment report;</p> <p>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.</p>
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	<p>For a non-use management area, means each significant event or step necessary to–</p> <p>a) achieve best practice management of the area; and</p> <p>b) minimise risks to the environment.</p>
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.

Appendix 2 Images

Appendix 2 - Image 1: Ebenezer Mine, Looking South, 1991 (Source: QImagery)	146
Appendix 2 - Image 2: Mining Disturbance ca. 1992	147
Appendix 2 - Image 3: Ebenezer Mine, 1994 (Source: QImagery)	148
Appendix 2 - Image 4: Ebenezer Mine in the Foreground, Looking East (Source: QImagery)	149
Appendix 2 - Image 5: Mining Disturbance, June 1998	150
Appendix 2 - Image 6: Sheet and Channel Erosion on OPD North-Eastern Batter Slope	151
Appendix 2 - Image 7: Transition Between 6 ha Area of Repaired Batter Slope and Area Requiring Repair	152
Appendix 2 - Image 8: Recently Repaired OPD Northern Batter Slope	153
Appendix 2 - Image 9: Rehabilitated 6 ha OPD Northern Batter Slope (21/12/2021)	154
Appendix 2 - Image 10: Areas within Domain 4 - Lanes Eastern Emplacement Requiring Rehabilitation	155
Appendix 2 - Image 11: Drone Image Showing Areas within Domain 4 Requiring Rehabilitation	156
Appendix 2 - Image 12: Realignment of the Western Bund Wall	157
Appendix 2 - Image 13: Land Slip on Low-Wall (15/12/2021)	158
Appendix 2 - Image 14: Western Section of Domain 6 -Ironbark South.....	159
Appendix 2 - Image 15: Western Section of Ironbark South Batter Slope	160
Appendix 2 - Image 16: Deep Erosion Requiring Backfilling at Ironbark South.....	161
Appendix 2 - Image 17: Batter Slopes of Ironbark South.....	162
Appendix 2 - Image 18: Drain Requiring Stabilisation in the South-West Corner of Ironbark South.	163
Appendix 2 - Image 19: Areas where Deep Ripping and Topsoil Placement is Required of Ironbark South	164
Appendix 2 - Image 20: Eroded Drainage Channels within the Ironbark South Area and Requirements to Stabilise.....	165
Appendix 2 - Image 21: Existing Sediment Dams to Remain as Water Storage Fauna Habitat.....	166
Appendix 2 - Image 22: Low-Wall (27/10/1997).....	167
Appendix 2 - Image 23: Low-Wall (01/11/2004).....	168
Appendix 2 - Image 24: Low-Wall Failure (06/07/2007).....	169
Appendix 2 - Image 25: Southern Drain in IBSD Area before Rehabilitation, November 2018.....	170
Appendix 2 - Image 26: Southern Drain in IBSD Area after Rehabilitation (12/01/2022)	170

Appendix 2 - Image 27: Rehabilitated Drainage Channel at Water Monitoring Location EW35
(12/01/2022)..... 171

Appendix 2 - Image 28: Grass Cover over Compost Area within Domain 4 (06/02/2022) 172

Appendix 2 - Image 29: Locations of recent Drainage Woks 173



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



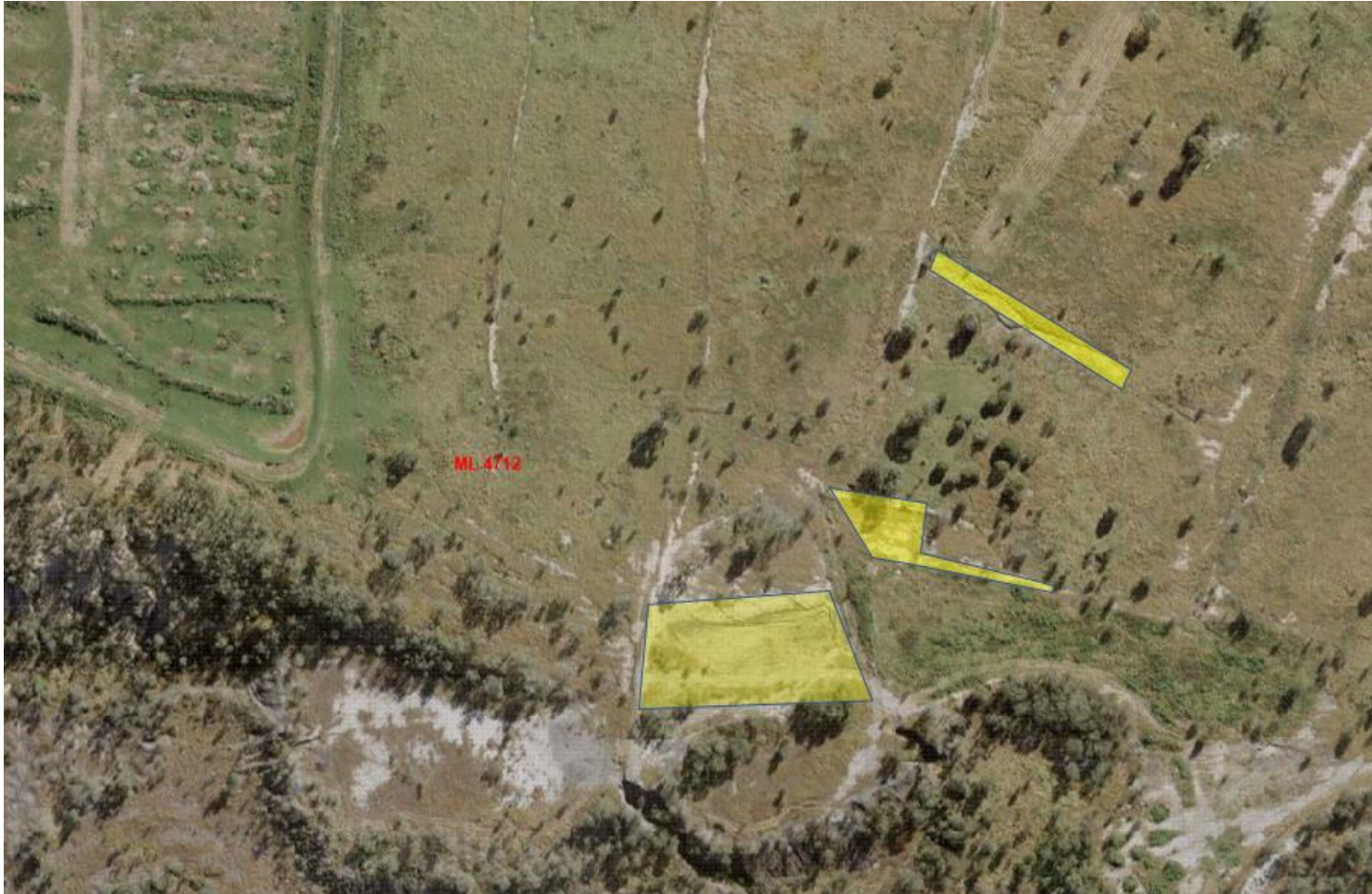
APPENDIX 2 - IMAGE 7: TRANSITION BETWEEN 6 HA AREA OF REPAIRED BATTER SLOPE AND AREA REQUIRING REPAIR



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 DOMAIN 4 - LANES EASTERN EMPLACEMENT REQUIRING REHABILITATION



APPENDIX 2 - IMAGE 11: DRONE IMAGE SHOWING AREAS WITHIN DOMAIN 4 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 DOMAIN 6 -IRONBARK SOUTH

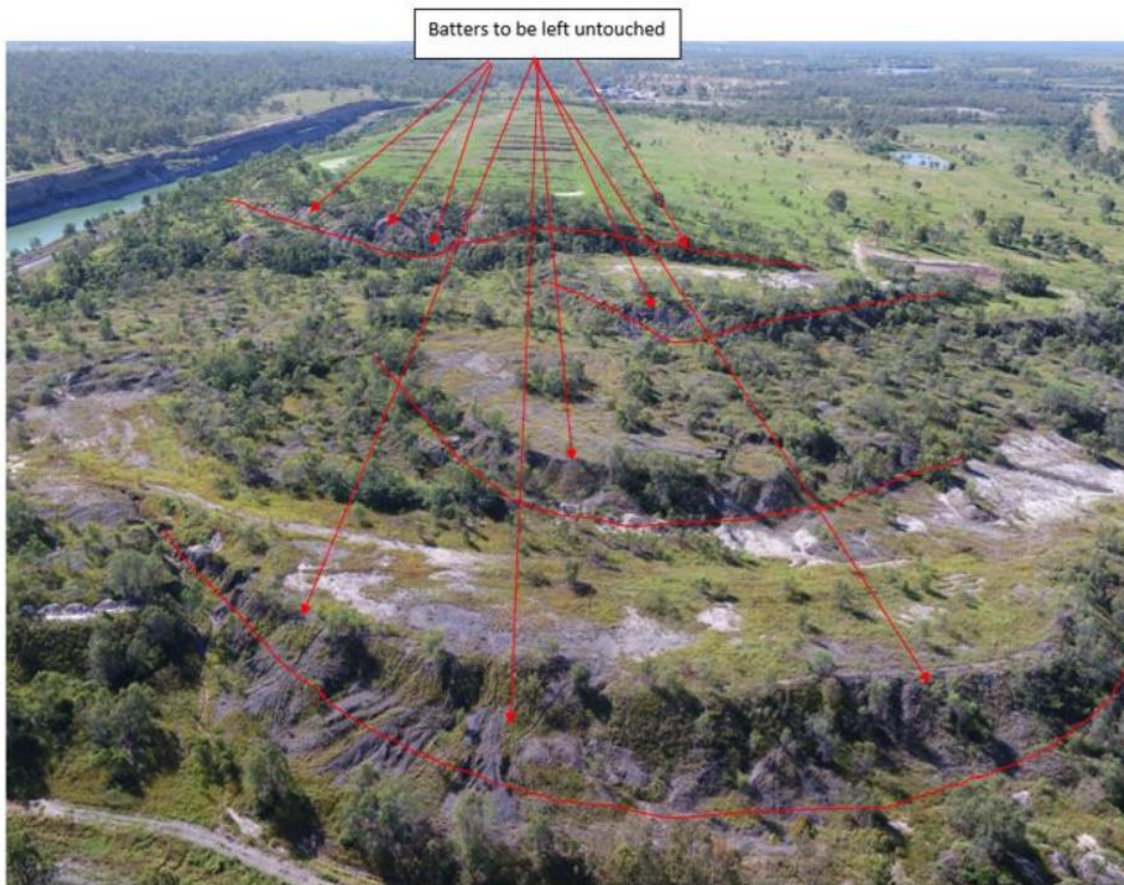


APPENDIX 2 - IMAGE 15: WESTERN SECTION OF IRONBARK SOUTH BATTER SLOPE



Deep Erosion Requiring Backfilling

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



APPENDIX 2 - IMAGE 17: BATTER SLOPES OF IRONBARK SOUTH



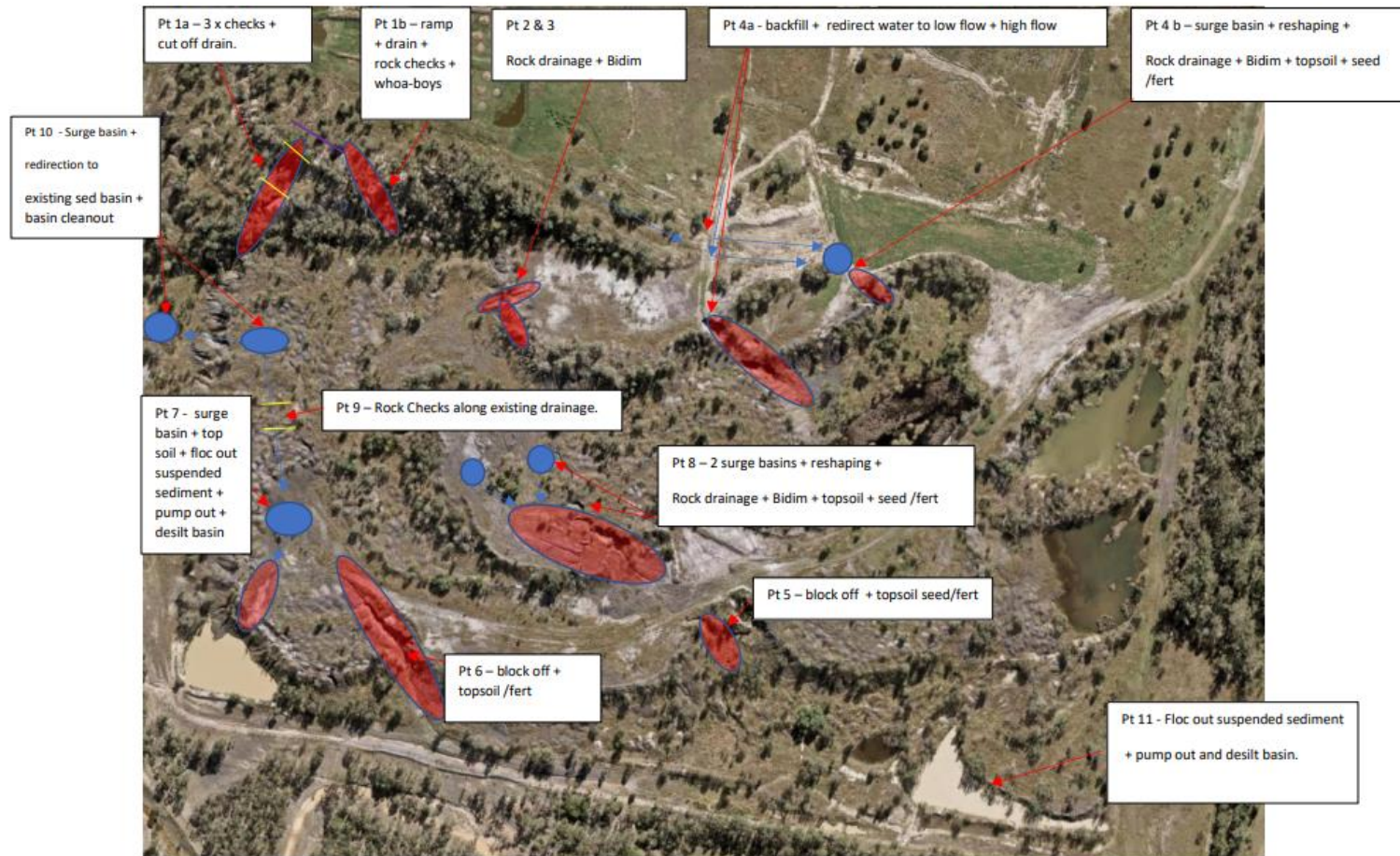
Drain to be stabilised

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



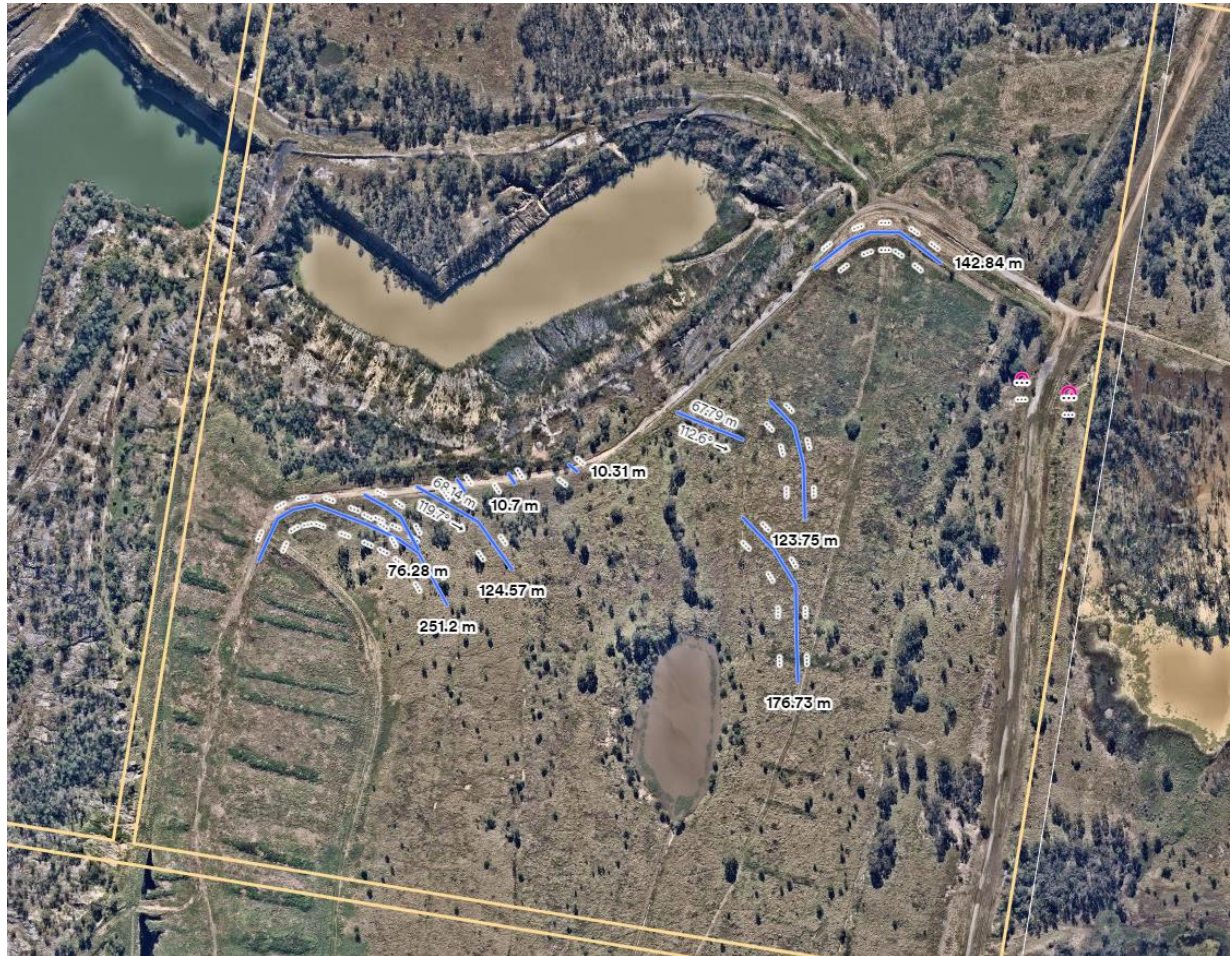
APPENDIX 2 - IMAGE 26: SOUTHERN DRAIN IN IBSD AREA AFTER REHABILITATION (12/01/2022)



**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 DOMAIN 4 (06/02/2022)



APPENDIX 2 - IMAGE 29: LOCATIONS OF RECENT DRAINAGE WOKS

Appendix 3 REMP Monitoring Data

Date	Rainfall since last sample	EW1: Upstream			EW3: Highway			EW7: Downstream			EW25: Ervino Dam			EW33: Tailings Storage			EW 31: Water Reserve		
		pH	Cond	TSS	pH	Cond	TSS	pH	Cond	TSS	pH	Cond	TSS	pH	Cond	TSS	pH	Cond	TSS
03-May-05				Dry															
03-Jun-05				Dry															
04-Jul-05		7.0	153	100	NR														
03-Aug-05				Dry															
05-Sep-05				Dry															
03-Oct-05				Dry															
02-Nov-05		6.7	514	352	NR														
04-Dec-05		7.4	175	770	NR														
04-Jan-06		7.6	296	452	NR														
27-Jan-06		6.7	351	90	NR														
04-Mar-06		6.3	213	224	NR														
25-May-06		7.6	872	30	NR														
02-Aug-06		6.5	162	212	NR														
31-Oct-06		7.7	737	16	NR														
07-Feb-07		7.4	947	47	NR														
04-May-07		7.6	362	128	NR														
07-Aug-07		8.3	756	66	NR														
20-Nov-07		7.2	206	282	NR														
15-Feb-08		6.9	126	39	NR														
03-May-08		7.8	298	27	NR														
02-Aug-08	245.0	7.2	224	122	NR														
08-Nov-08	199.0	7.4	182	100	NR														
03-Feb-09	472.0	7.8	986	77	NR														
05-May-09	240.0	6.9	142	36	NR														
03-Aug-09	299.0	7.2	262	44	NR														
02-Nov-09	76.6			Dry															
15-Feb-10	231.0	8.1	563	58	NF														
10-May-10	245.6	6.7	173	64	NF														
20-Jul-10	53.4			Dry															
22-Nov-10	348.5	7.6	157	40	NF														
03-Feb-11	697.0	7.9	690	84	NF														
03-May-11	297.0	7.5	148	87	F														
01-Aug-11	95.2	7.5	271	80	NF														
03-Nov-11	205.0	6.8	164	56	F														
15-Feb-12	374.0	7.0	129	27	F														
03-May-12	204.0	7.2	167	288	NF														
07-Aug-12	117.0	6.9	192	41	NF														
17-Nov-12	65.4	7.2	384	104	NF														
07-Feb-13	360.0	7.2	253	126	F														
02-May-13	349.0	7.2	191	98	NF														
08-Aug-13	126.0	7.6	274	58	NF														
01-Nov-13	46.0	7.7	402	59	NF														
03-Feb-14	276.8	7.1	198	163	NF														
01-May-14	216.2	7.4	134	57	NF														
04-Aug-14	68.8	8.0	190	149	NF														
04-Nov-14	69.8			Dry															
26-Jan-15	269.2	7.0	123	24	F														
06-May-15	457.2	6.9	69	32	F														
06-Aug-15	38.8	7.0	90	25	NF														
03-Nov-15	131.0	7.0	167	132	NF														
03-Feb-16	323.8	7.4	198	61	NF														
03-May-16	140.6	7.3	181	19	NF														
03-Aug-16	223.0	7.0	119	12	NF														
03-Nov-16	163.0	7.3	256	29	NF														
2-Feb-17	299.0	7.1	175	174	NF														
4-May-17	326.6	7.7	97	21	NF														
7-Aug-17	115.2	7.4	128	40	NF														
02-Nov-17	147.6	6.9	176	70	NF														
01-Feb-18	246.2	7.4	134	26	NF														
03-May-18	342.4	7.0	142	120	NF														
03-Aug-18	41.0	7.1	180	27	NF														
04-Nov-18	104.0	7.2	248	18	NF														
02-Feb-19	151.8	7.5	213	24	NF														
11-May-19	162.8	7.3	248	12	NF														
01-Aug-19	48.0	7.4	285	177	NF														
05-Nov-19	58.2			Dry															
03-Feb-20	163.2	7.2	277	48	NF														
03-May-20	276.2	7.6	267	35	NF														
03-Aug-20	61.4	7.9	275	45	NF														
03-Nov-20	71.8	7.0	142	234	NF														
11-Feb-21	329.4	7.2	125	143	NF														
03-May-21	305.4	7.2	121	14	NF														
02-Aug-21	111.4	7.3	128	86	NF														
03-Nov-21	194.8	7.4	95	30	NF														
4-Feb-22	402.6	7.22	91	69	NF														
03-May-22	782.6	7.60	185	19	NF														
03-Aug-22	357.2	6.87	128	20	NF														
03-Nov-22	229.8	6.67	109	26	NF														
03-Feb-23		7.39	118	145	F														
04-May-23		7.04	171	612	NF														
Median		210.6	7.2	182	59														
Mean (average)		226.3	7.3	255	105														
Minimum		38.8	6.3	69	12														
90 percentile		364.2	7.7	514	224														
95 percentile		475.1	7.9	747	320														
99 percentile		733.8	8.2	959	659														
Maximum		782.6	8.3	986	770														

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 sp		EW34: Culvert ex Spoil		EW35: OOPS discharge		EWSD: Southern Drain	
	24 hour	5 day	10 day	pH	ConcTSS	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	6.7	158 736					6.9	119 3530 F	8.1	6690 402 F		
21-Mar-17	30.2	43.2	49.2	6.7	150 236					7.1	128 652 F	7.8	2410 255 F		
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		NA	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	0.0	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	NF	NF	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	NF	
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

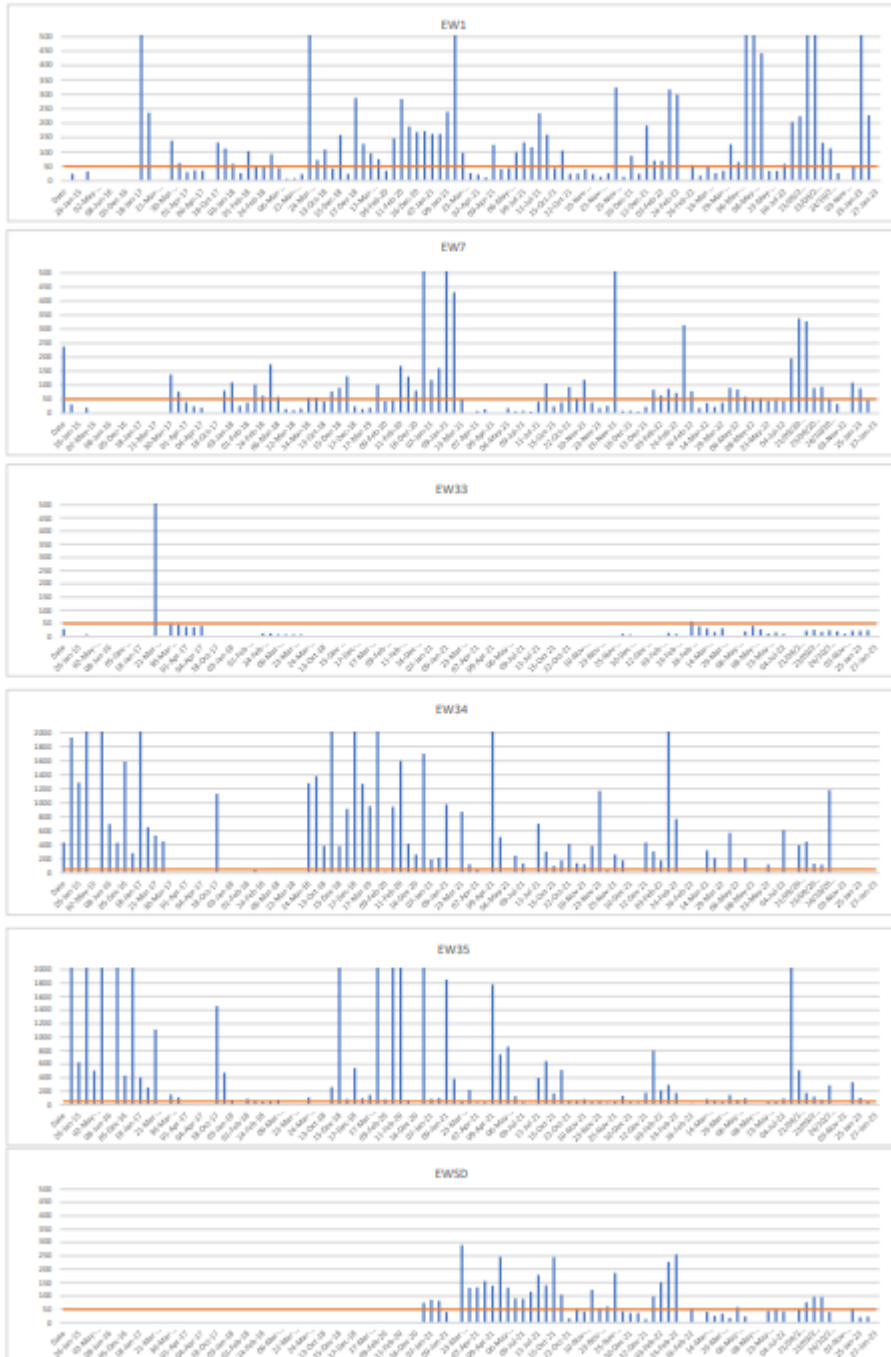
EC Runoff Monitoring Results - Ebenezer ML4712



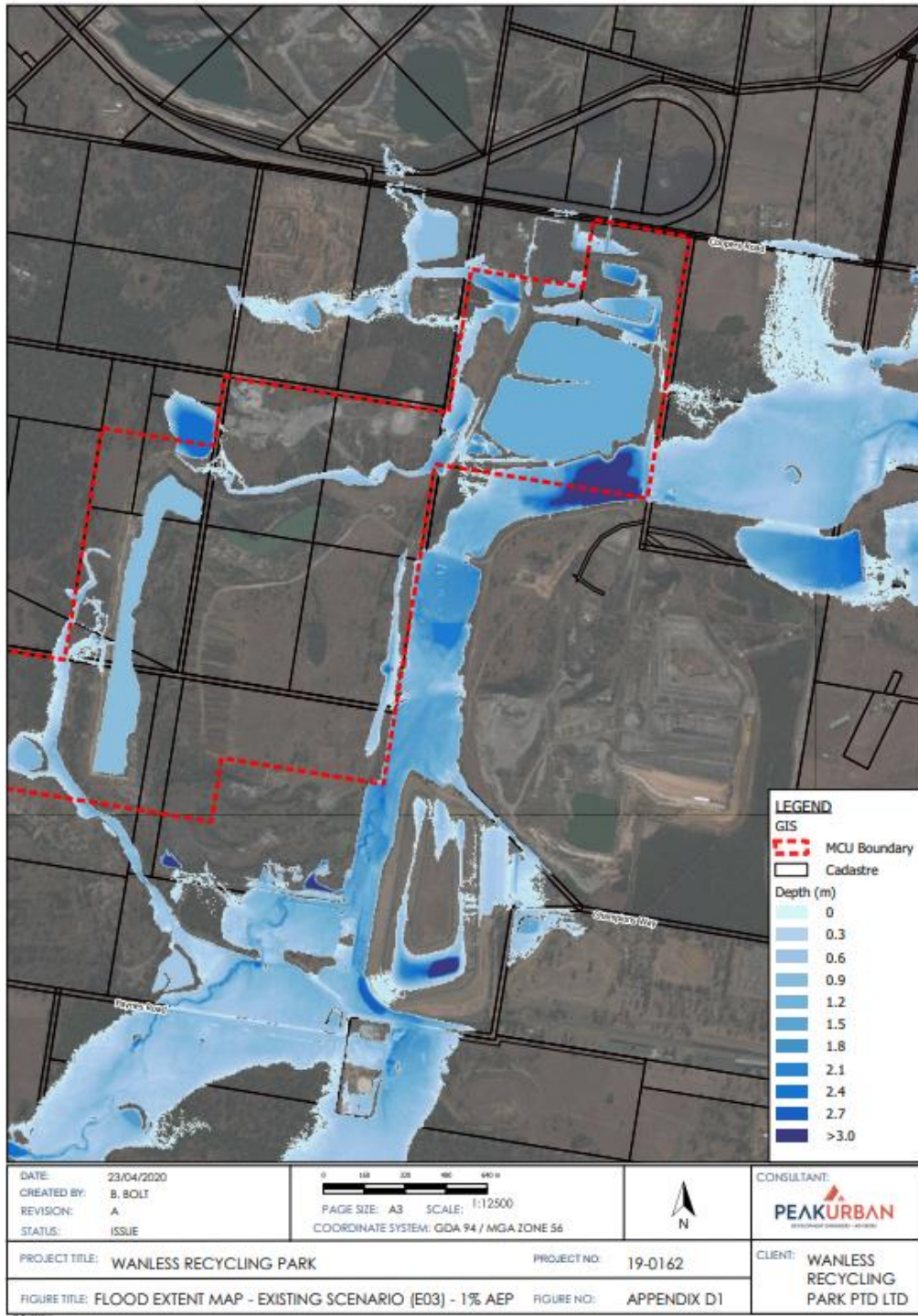
pH Runoff Monitoring Results - Ebenezer ML4712



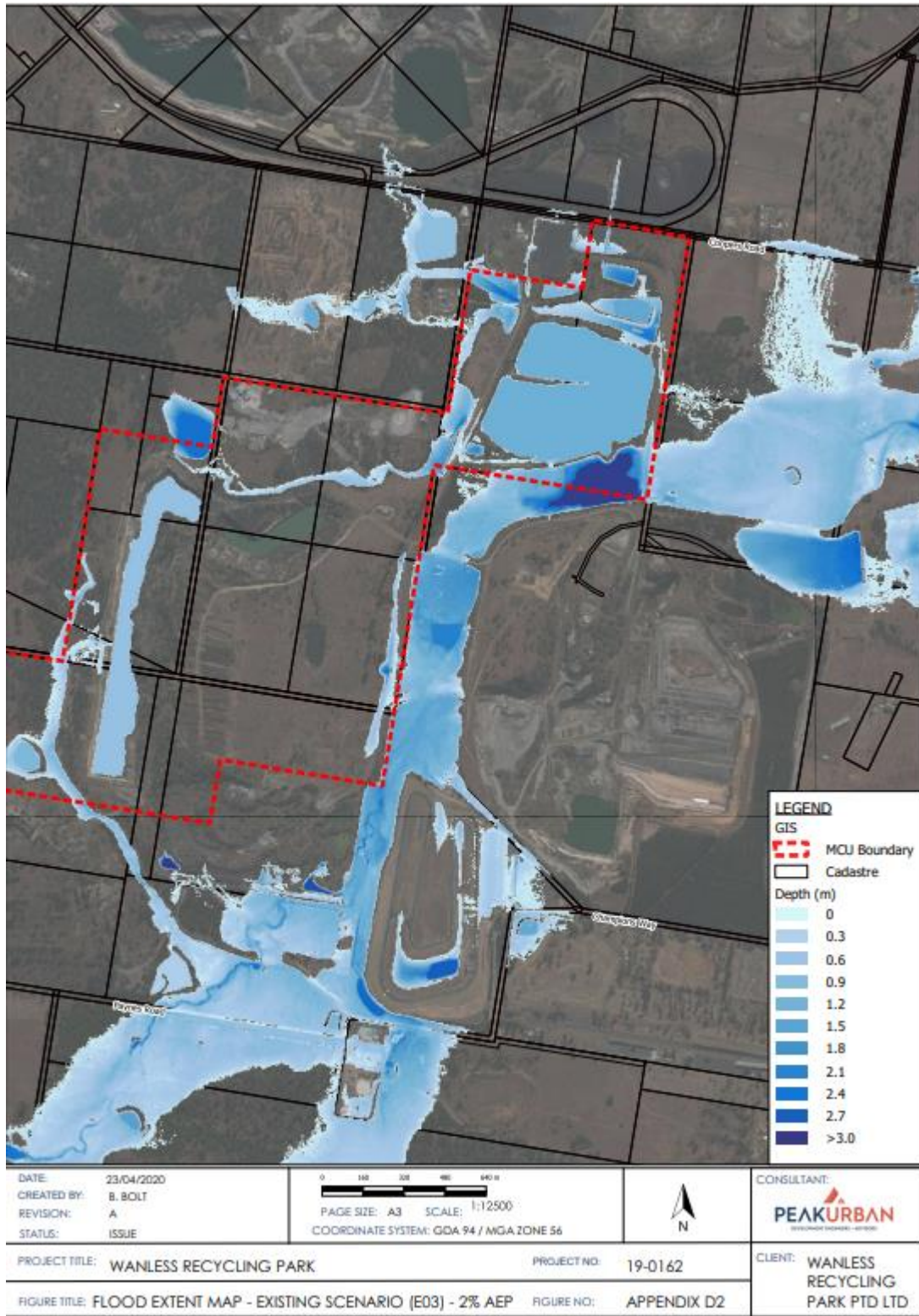
TSS Runoff Monitoring Results - Ebenezer ML4712



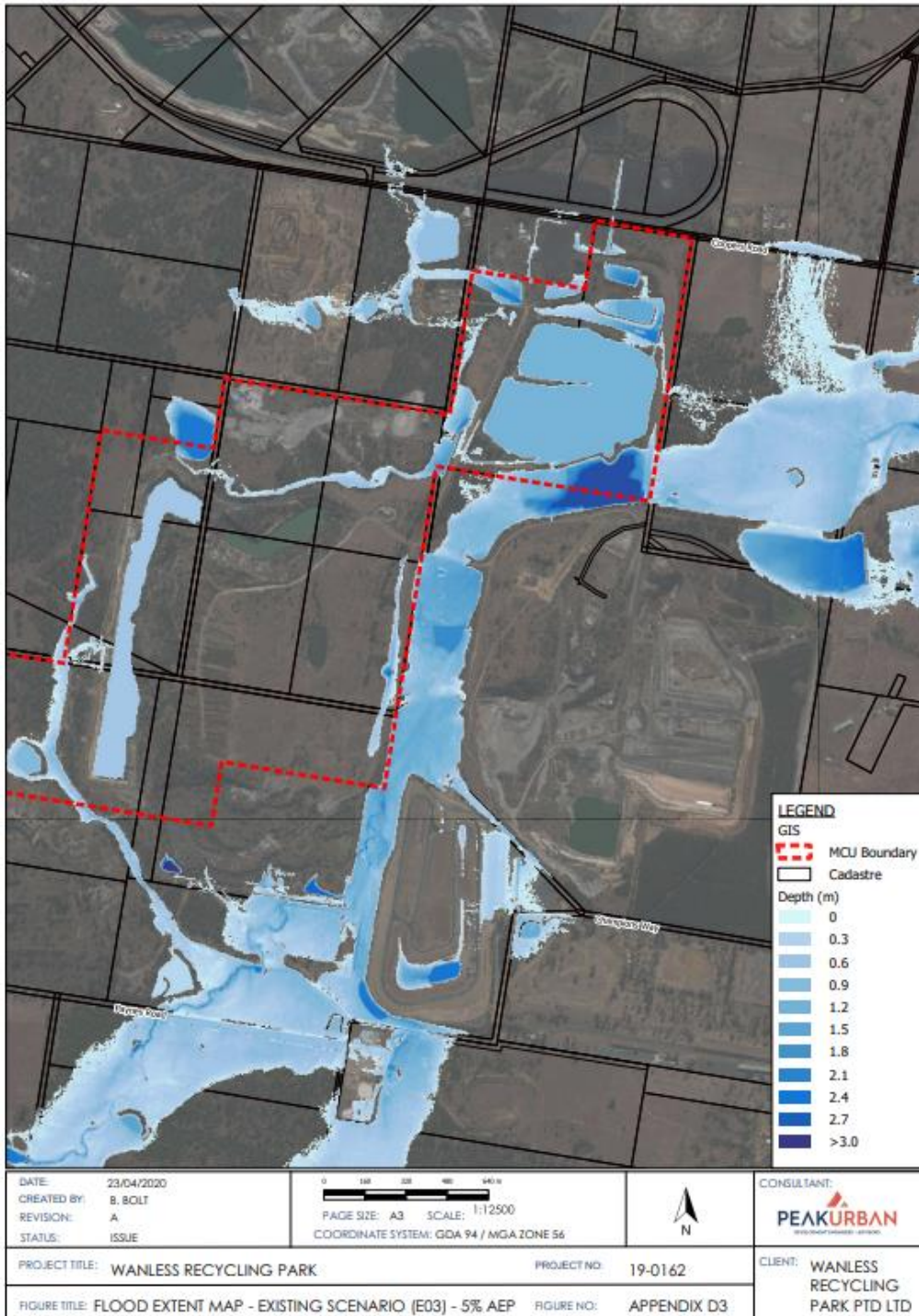
Appendix 4 Flood Maps



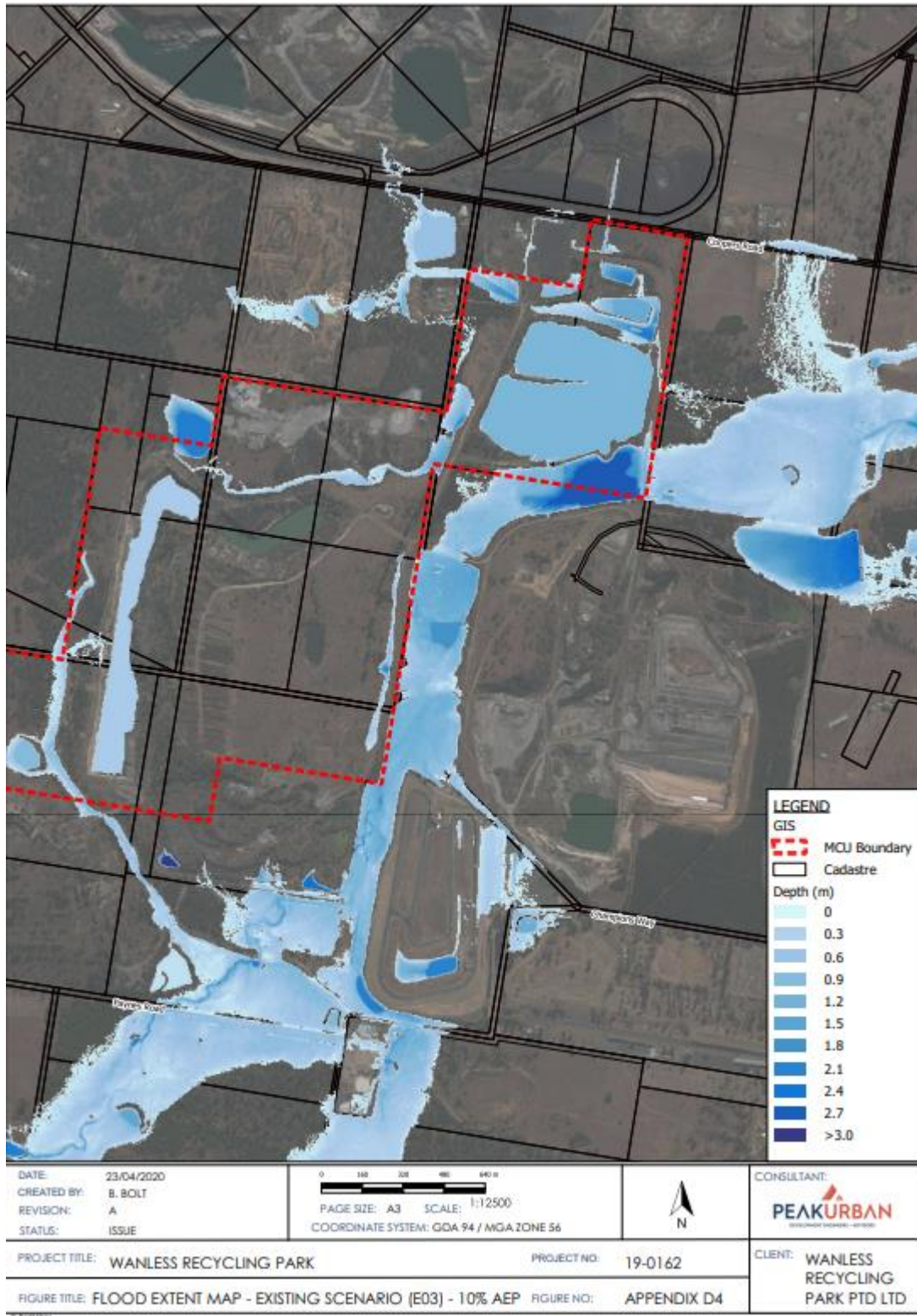
APPENDIX 4 - FLOOD MAP 1: 1% AEP EVENT



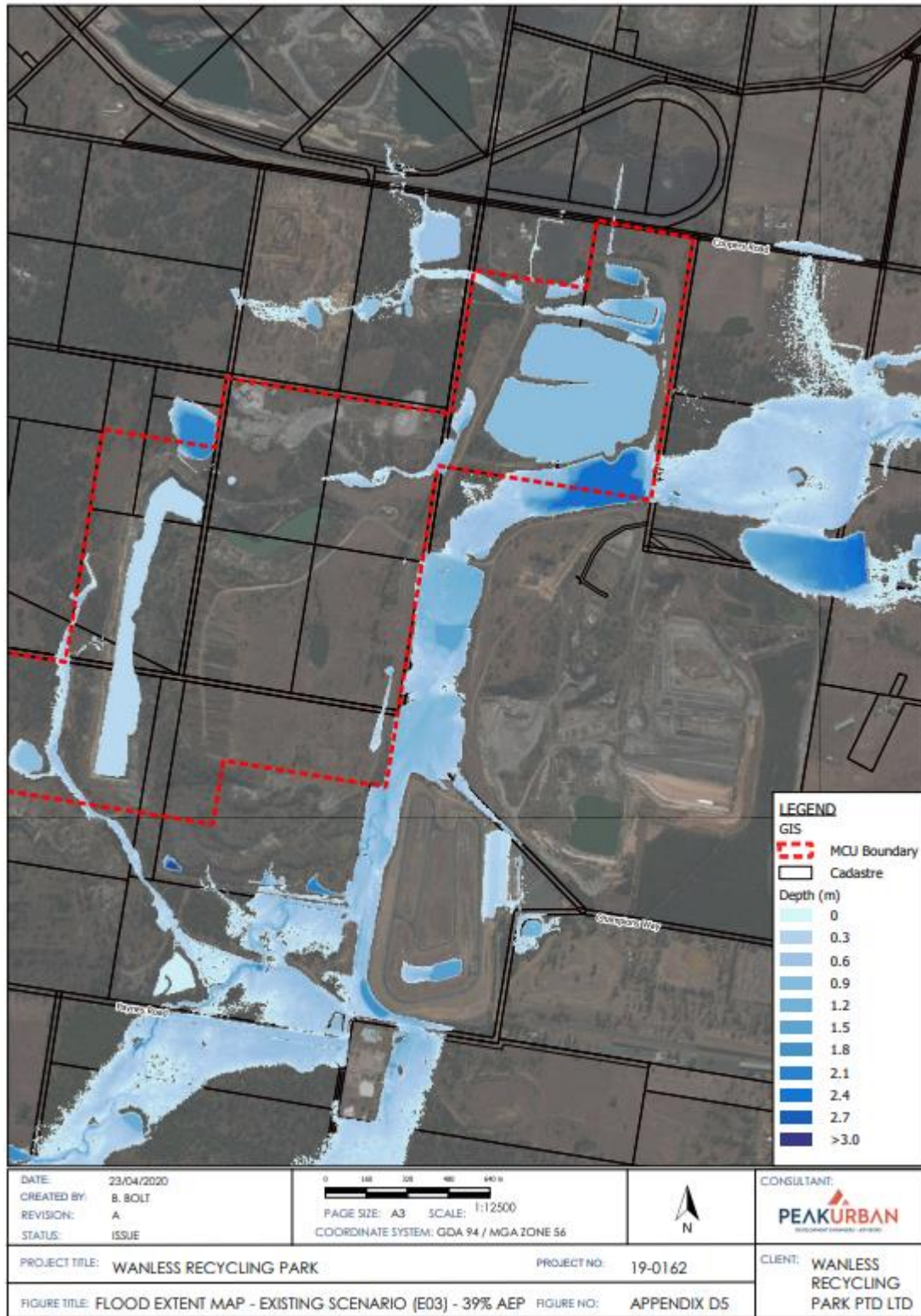
APPENDIX 4 - FLOOD MAP 2: 2 % AEP EVENT



APPENDIX 4 - FLOOD MAP 3: 5% AEP EVENT



APPENDIX 4 - FLOOD MAP 4: 10% AEP EVENT

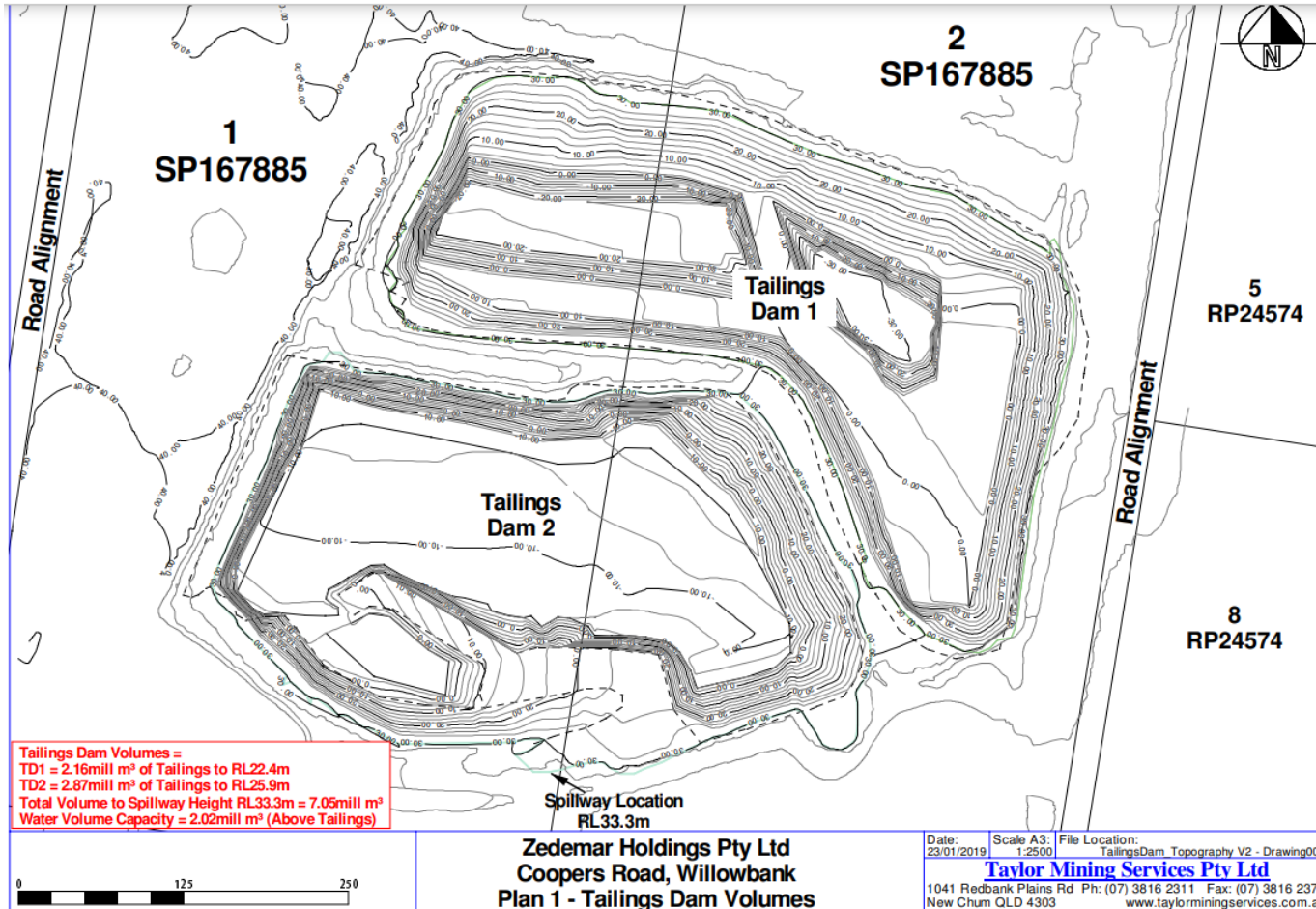


APPENDIX 4 - FLOOD MAP 5: 39% AEP EVENT

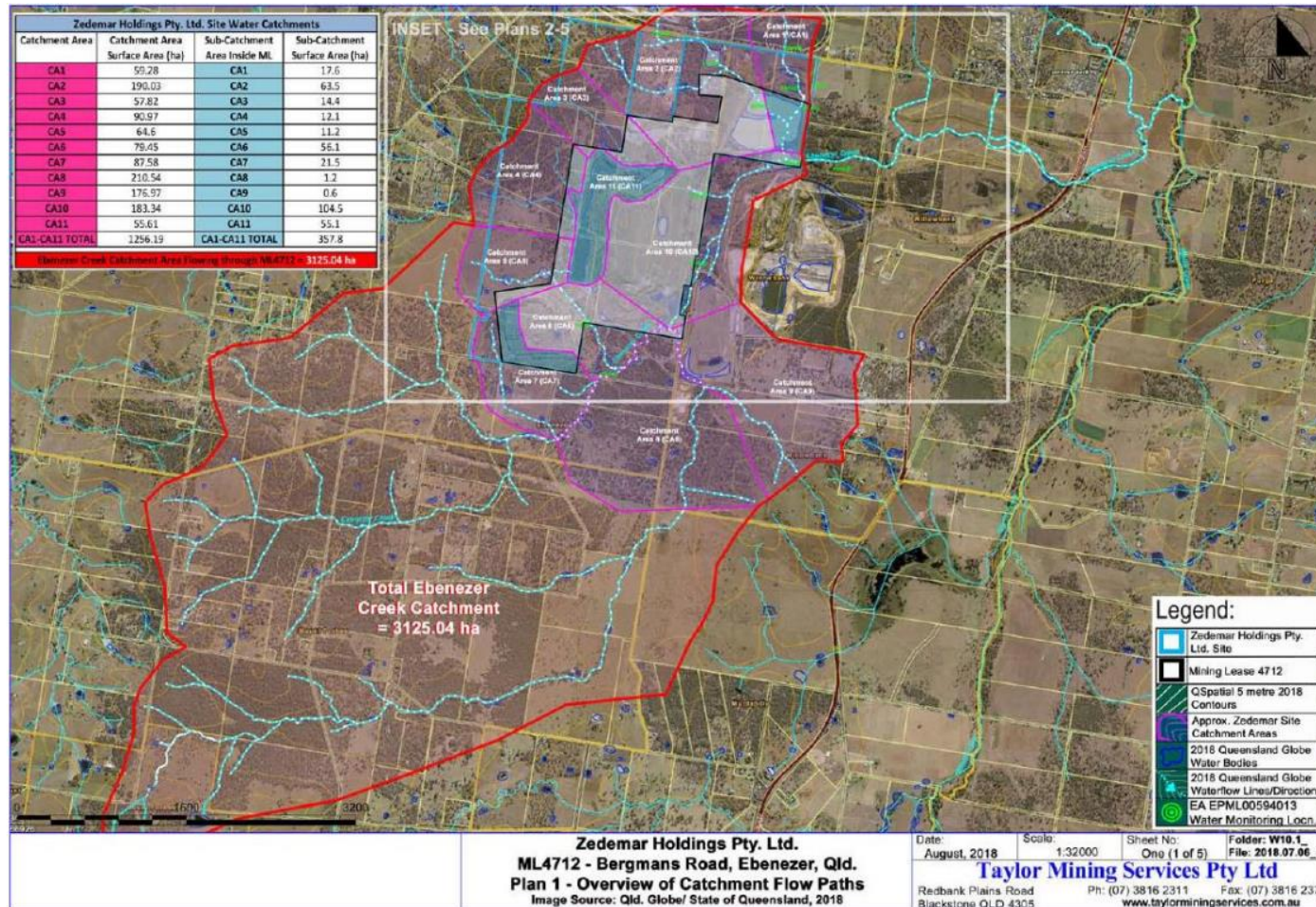
Appendix 5 Plans

Appendix 5 - Plan 1: Tailings Dam Volumes & Contours	192
Appendix 5 - Plan 2: Catchment Flow Paths	193
Appendix 5 - Plan 3: Drone Image Showing Highwall Batter Slopes.....	194
Appendix 5 - Plan 4: Void Water Levels (12/08/2021).....	195
Appendix 5 - Plan 5: Groundwater Monitoring Well Locations	196
Appendix 5 - Plan 6: Sidescan Mosaic of Lanes Void (30/07/2020).....	197
Appendix 5 - Plan 7: Depth Contours of Lanes Void	198
Appendix 5 - Plan 8: Sidescan Mosaic of Ironbark North Void (31/07/2020).....	199
Appendix 5 - Plan 9: Depth Contours of Ironbark North Void (31/07/2020).....	200
Appendix 5 - Plan 10: Mine Levels in Relation to Ebenezer and Warrill Creek.....	201
Appendix 5 - Plan 11: Void Water Volumes, August 2020.....	202
Appendix 5 - Plan 12: Small Scale Water Flows/Bunding, 2018	203
Appendix 5 - Plan 13: Sidescan Mosaic of the Tailings Pond (23/07/2020)	204
Appendix 5 - Plan 14: Depth contours of the Tailings Pond (23/07/2020).....	205
Appendix 5 - Plan 15: Surface Water Monitoring Locations.....	206
Appendix 5 - Plan 16: Original ML4712 and ML50100 Boundaries (Source: TMS 20/12/2021).....	207
Appendix 5 - Plan 17: The OPD within Domain 7.....	208
Appendix 5 - Plan 18: Proposed Earthworks Location at OPD Top Surface.....	209
Appendix 5 - Plan 19: Proposed Drainage Channel and Drop Structure Channels at OPD Top Surface	210
Appendix 5 - Plan 20: Proposed Cut and Fill at OPD Top Surface.....	211
Appendix 5 - Plan 21: Sink Hole Location at OPD Top Surface	212
Appendix 5 - Plan 22: Proposed Drainage Design Plan at OPD Top Surface.....	213
Appendix 5 - Plan 23: Erosion Remediation Plan at OPD Top Surface	214
Appendix 5 - Plan 24: Stormwater Catchment Plan at OPD Top Surface	215
Appendix 5 - Plan 25: 8.16ha Area on OPD North-Eastern Batter Slope Requiring Repair	216
Appendix 5 - Plan 26: 2014 LIDAR contours, May 2020	217
Appendix 5 - Plan 27: Bremer Subcatchments	218
Appendix 5 - Plan 28: Catchment and Subcatchments of Ebenezer Creek	219
Appendix 5 - Plan 29: Registered Water Bores.....	220

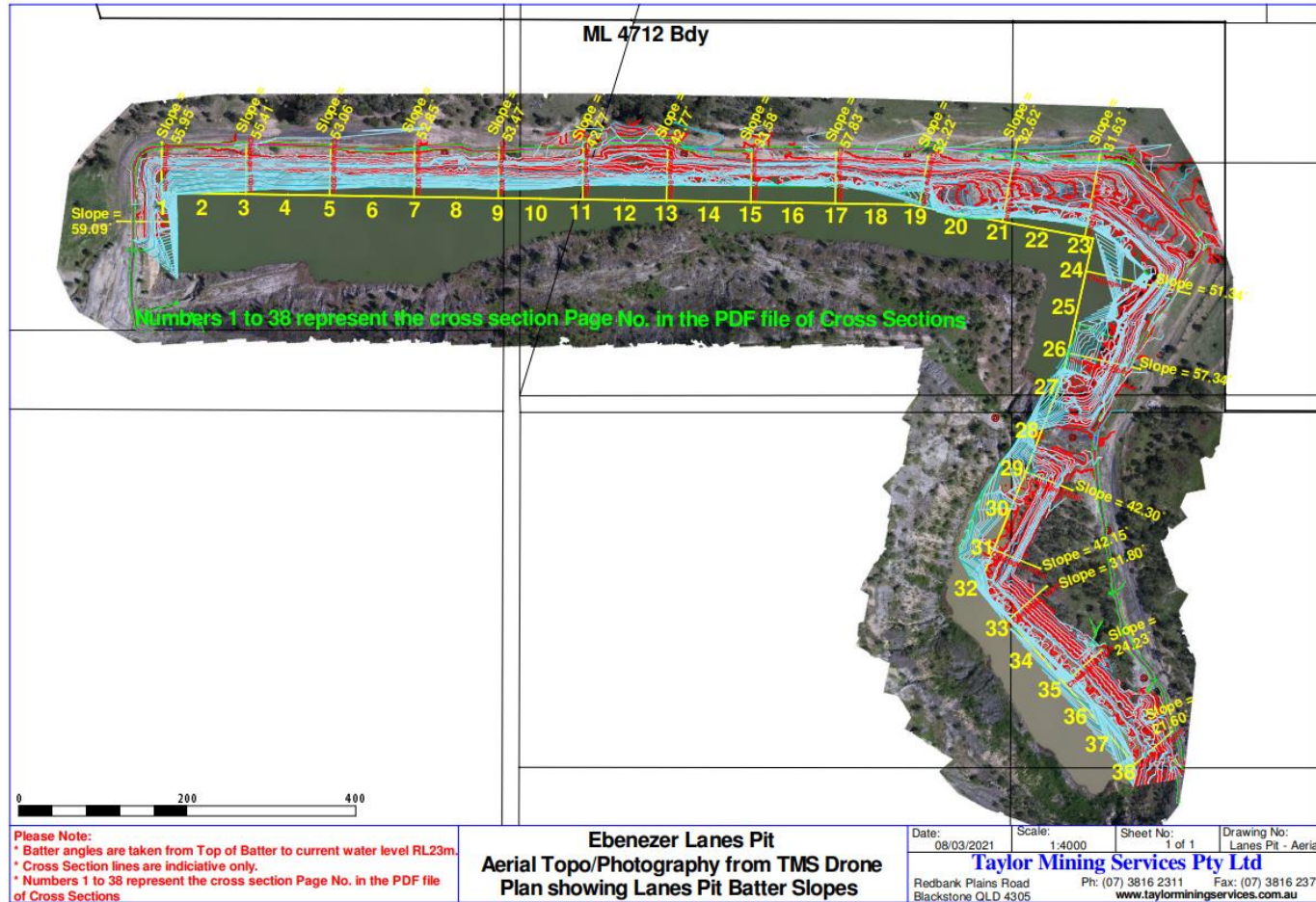
Appendix 5 - Plan 30: F Seam Floor Data for Lanes Void and Ironbark North Void.....	221
Appendix 5 - Plan 31: Rehabilitation Areas and Activities Since 2018.....	222
Appendix 5 - Plan 32: Cut and Fill Plan for Low-Wall.....	223
Appendix 5 - Plan 33: Cross Section of Existing Low-Wall and Considered Cut and Fill Profile.....	224
Appendix 5 - Plan 34: Soil Sampling Locations, 2020.....	225
Appendix 5 - Plan 35: Combined Topographical and Sonar Scan for Lanes Void and Ironbark North Void	226
Appendix 5 - Plan 36: Location of Domain 13, Overburden Mound.....	227
Appendix 5 - Plan 37: High-Wall Crest At 25%, 45% and 70% Slope	228
Appendix 5 - Plan 38: 2014 LIDAR and August 2020 Bathymetry Tailings Dam Water Volumes	229
Appendix 5 - Plan 39: Final Rehabilitated Areas	230



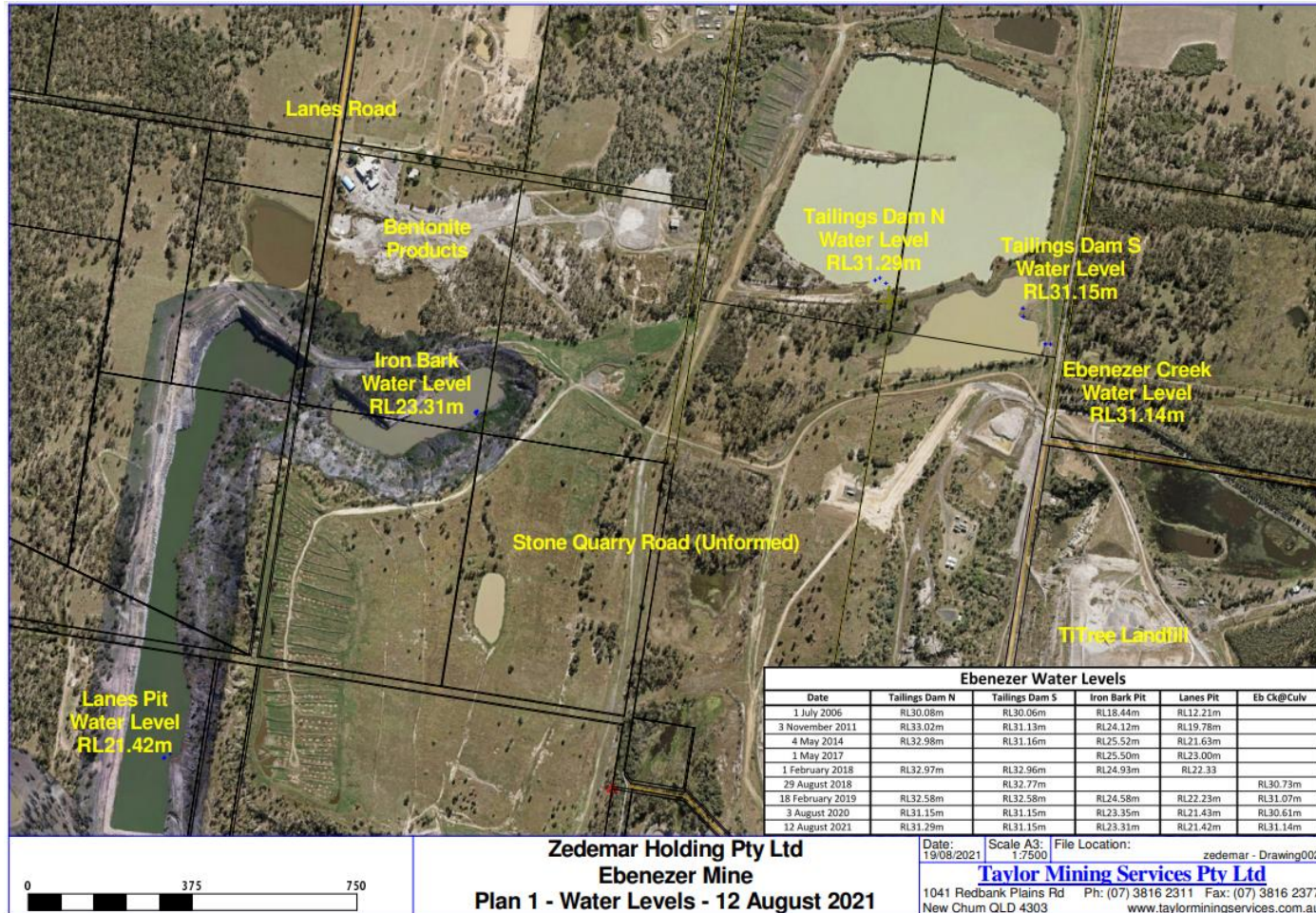
APPENDIX 5 - PLAN 1: TAILINGS DAM VOLUMES & CONTOURS



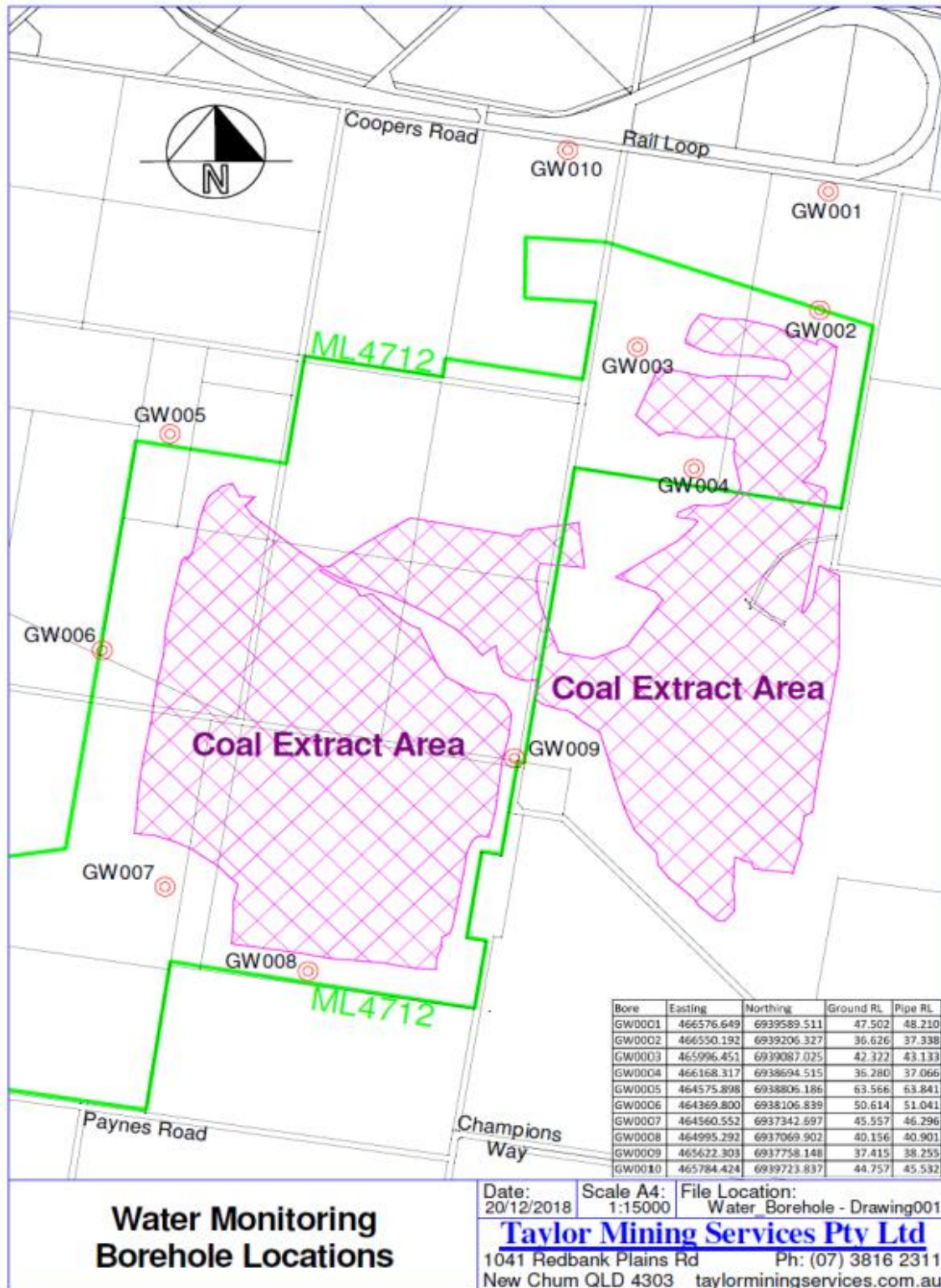
APPENDIX 5 - PLAN 2: CATCHMENT FLOW PATHS



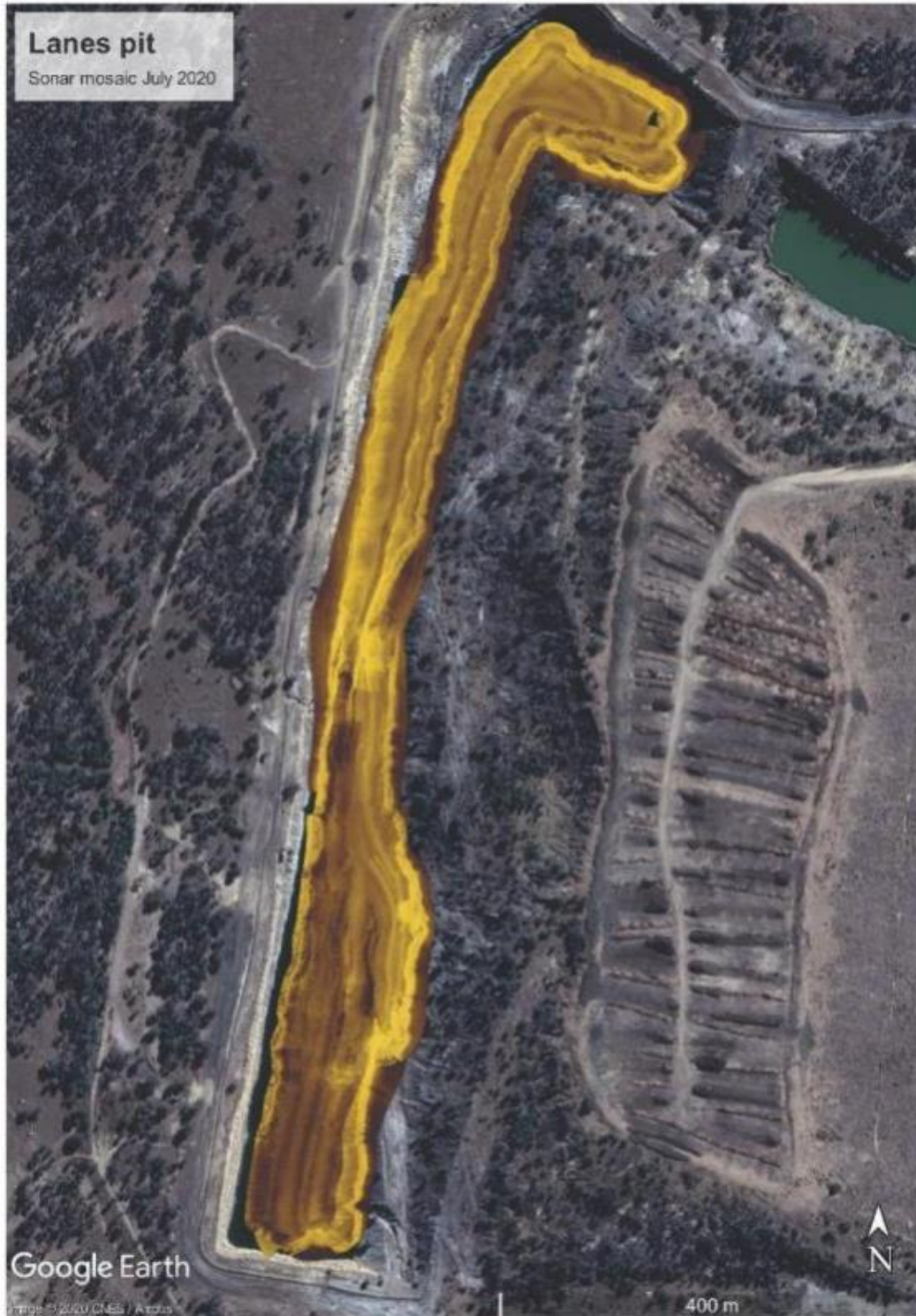
APPENDIX 5 - PLAN 3: DRONE IMAGE SHOWING HIGHWALL BATTER SLOPES



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



APPENDIX 5 - PLAN 5: GROUNDWATER MONITORING WELL LOCATIONS



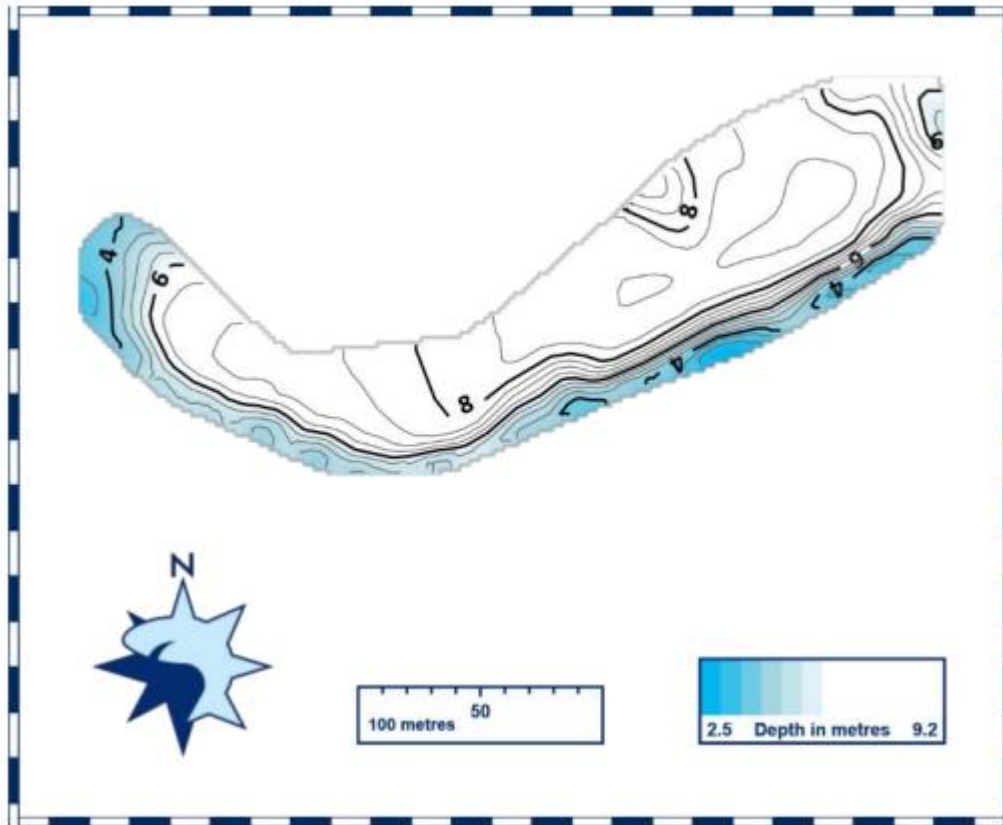
APPENDIX 5 - PLAN 6: SIDESCAN MOSAIC OF LANES VOID (30/07/2020)



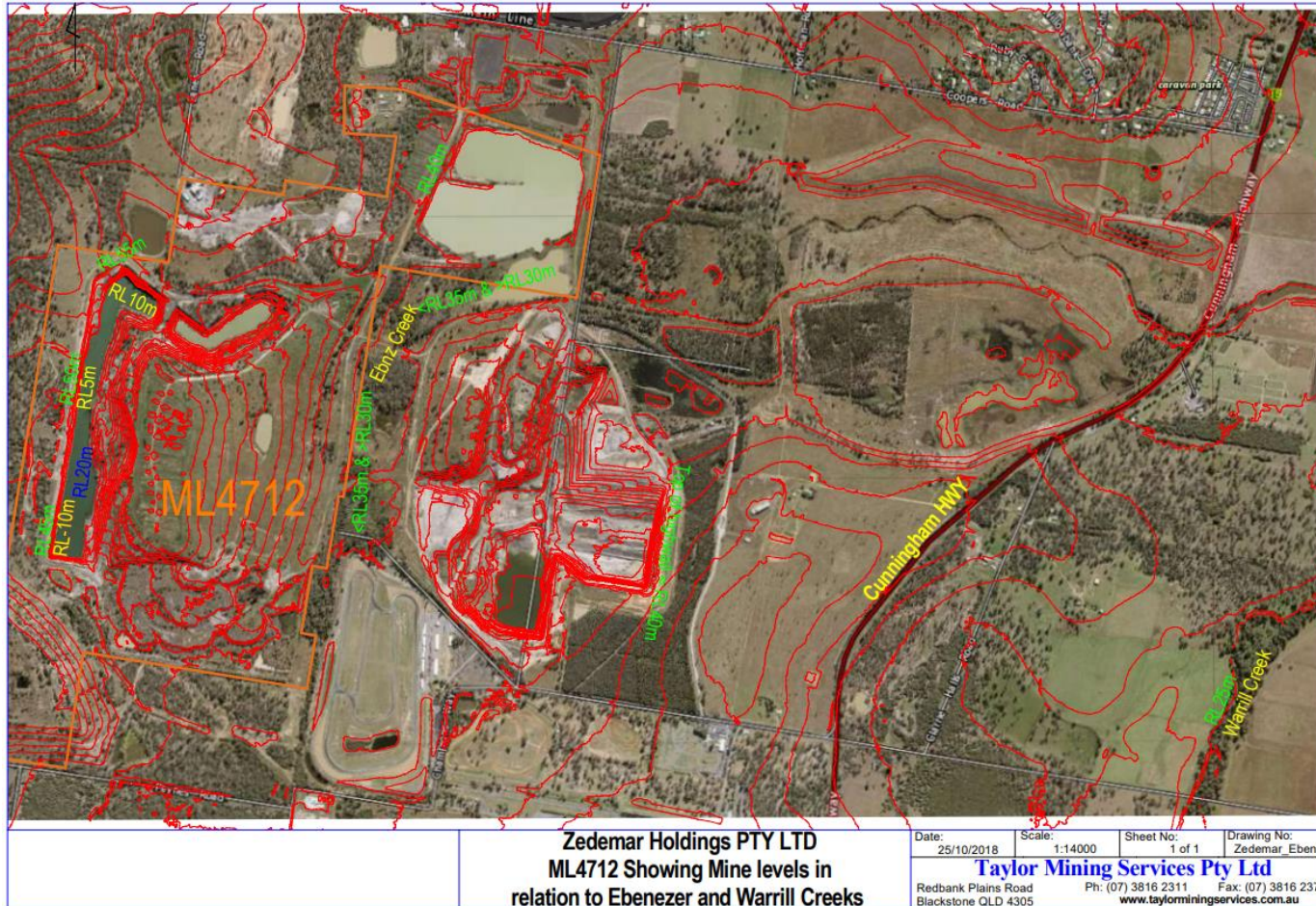
APPENDIX 5 - PLAN 7: DEPTH CONTOURS OF LANES VOID



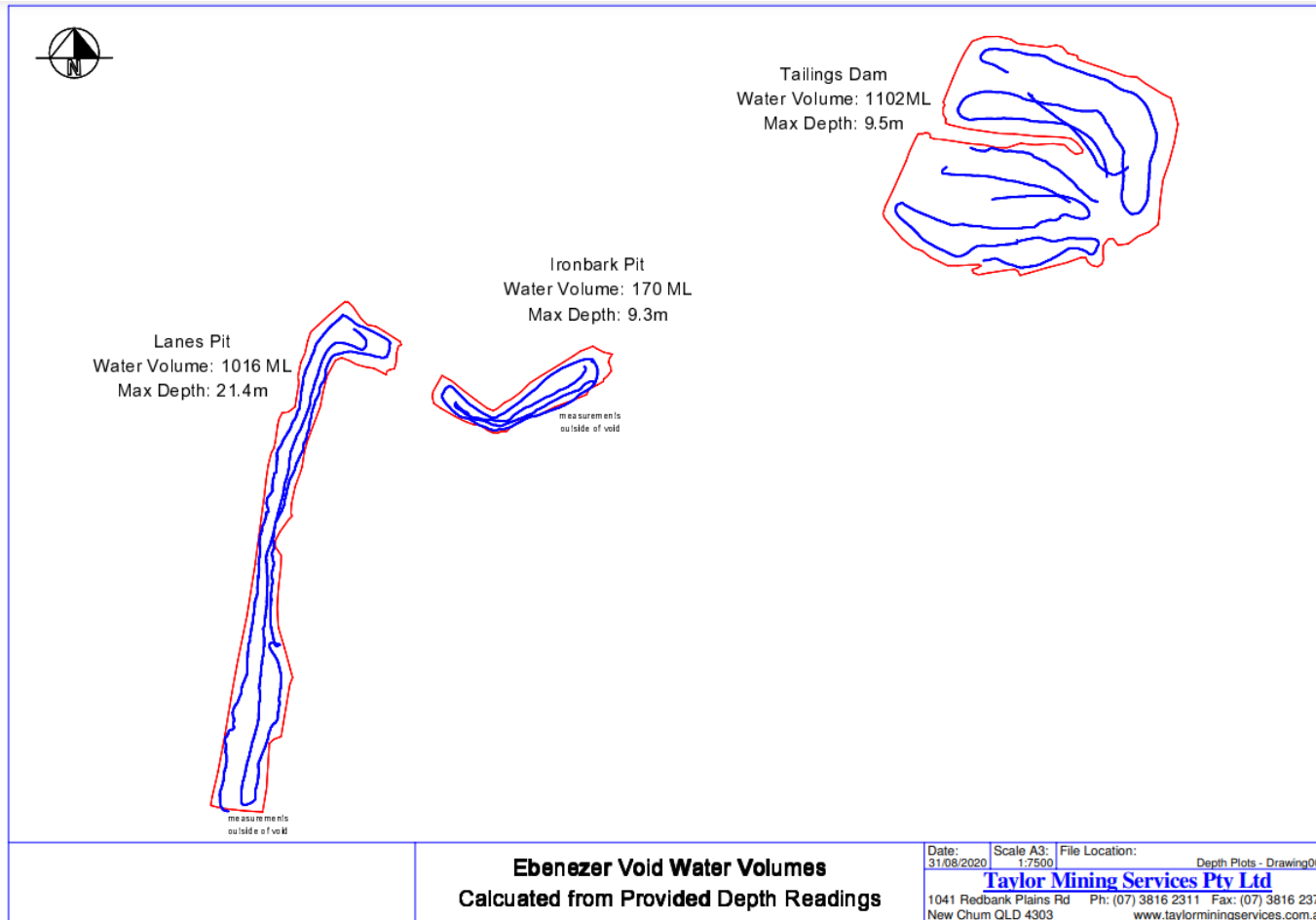
APPENDIX 5 - PLAN 8: SIDESCAN MOSAIC OF IRONBARK NORTH VOID (31/07/2020)



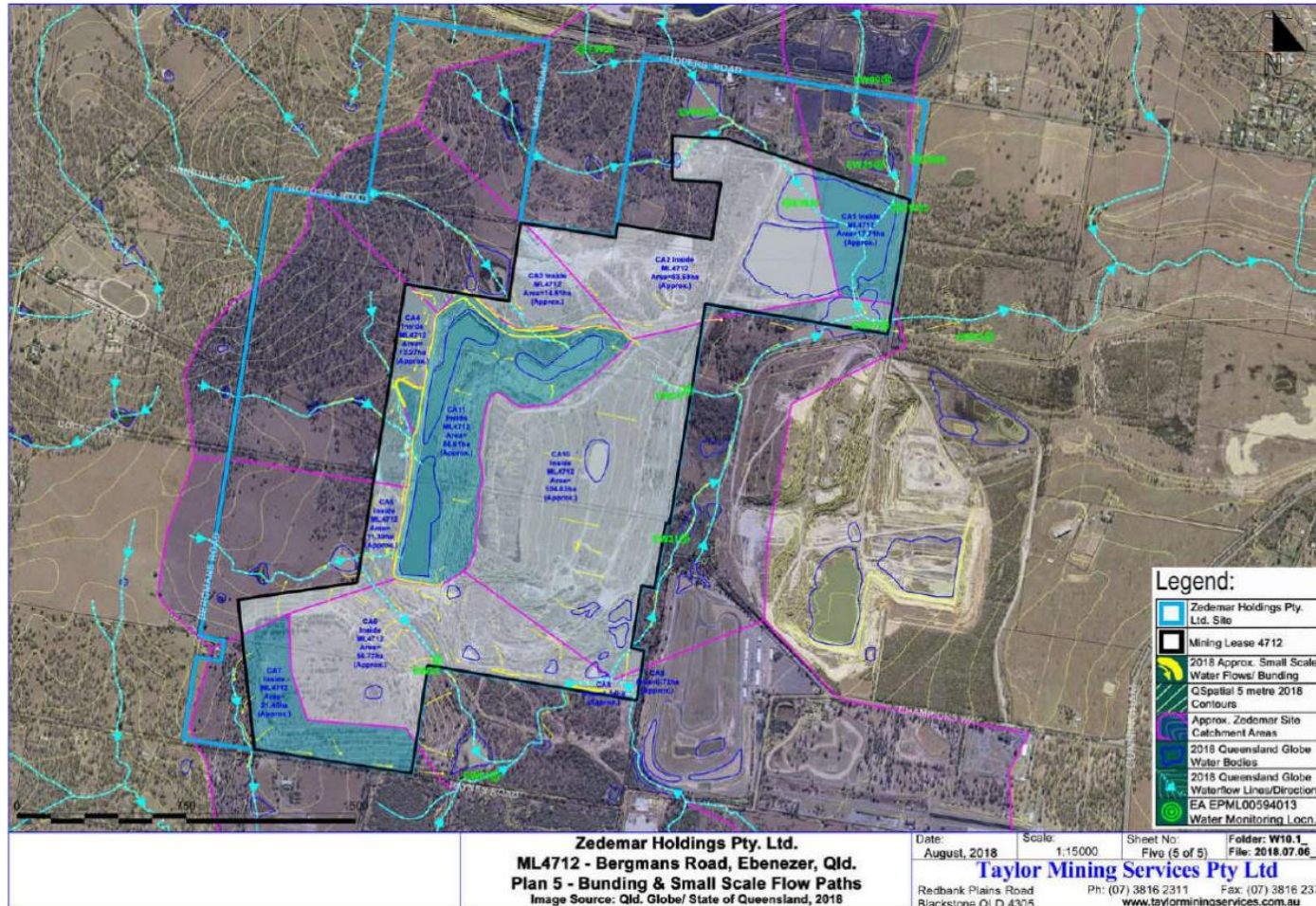
APPENDIX 5 - PLAN 9: DEPTH CONTOURS OF IRONBARK NORTH VOID (31/07/2020)



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



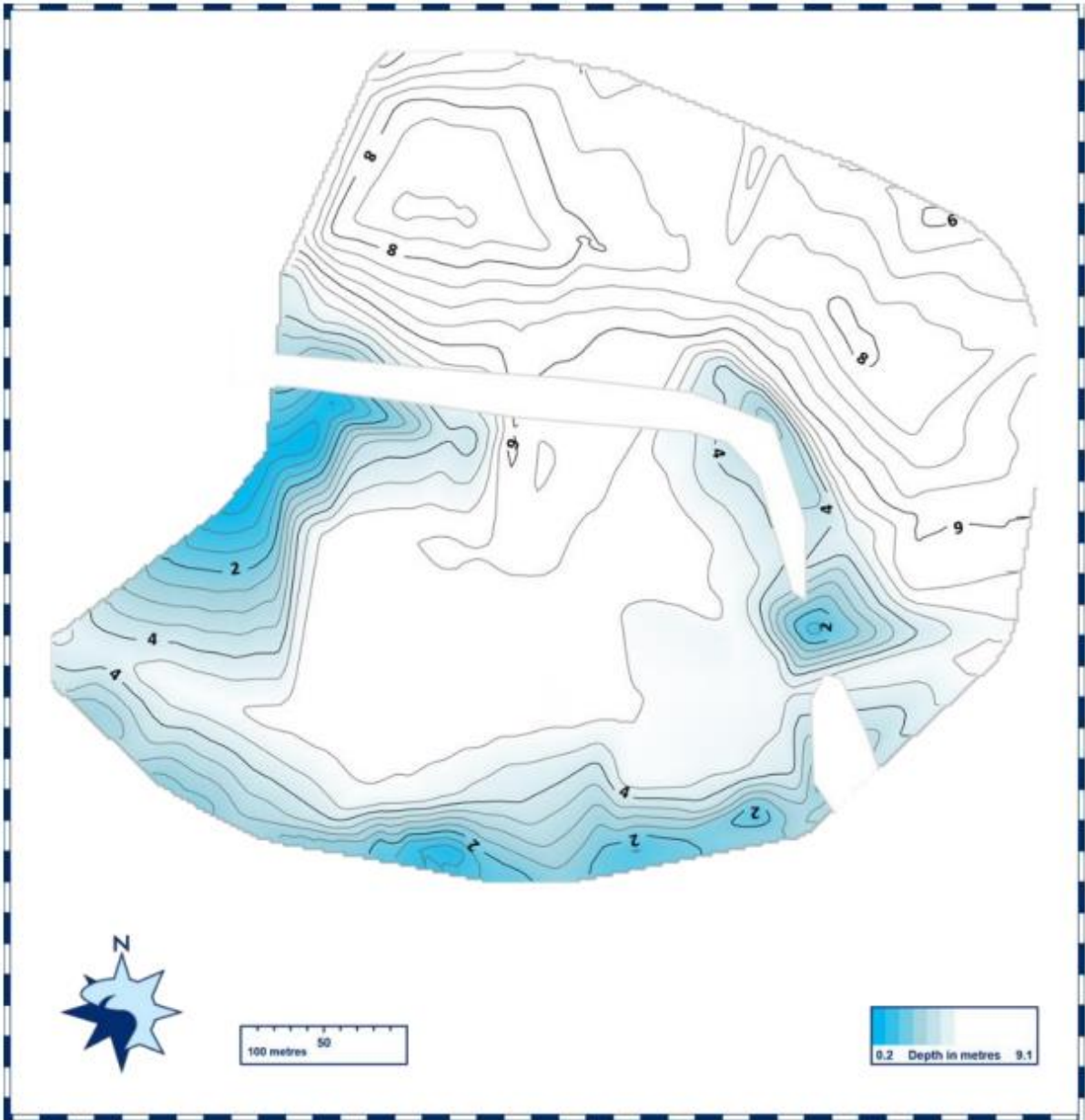
APPENDIX 5 - PLAN 11: VOID WATER VOLUMES, AUGUST 2020



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



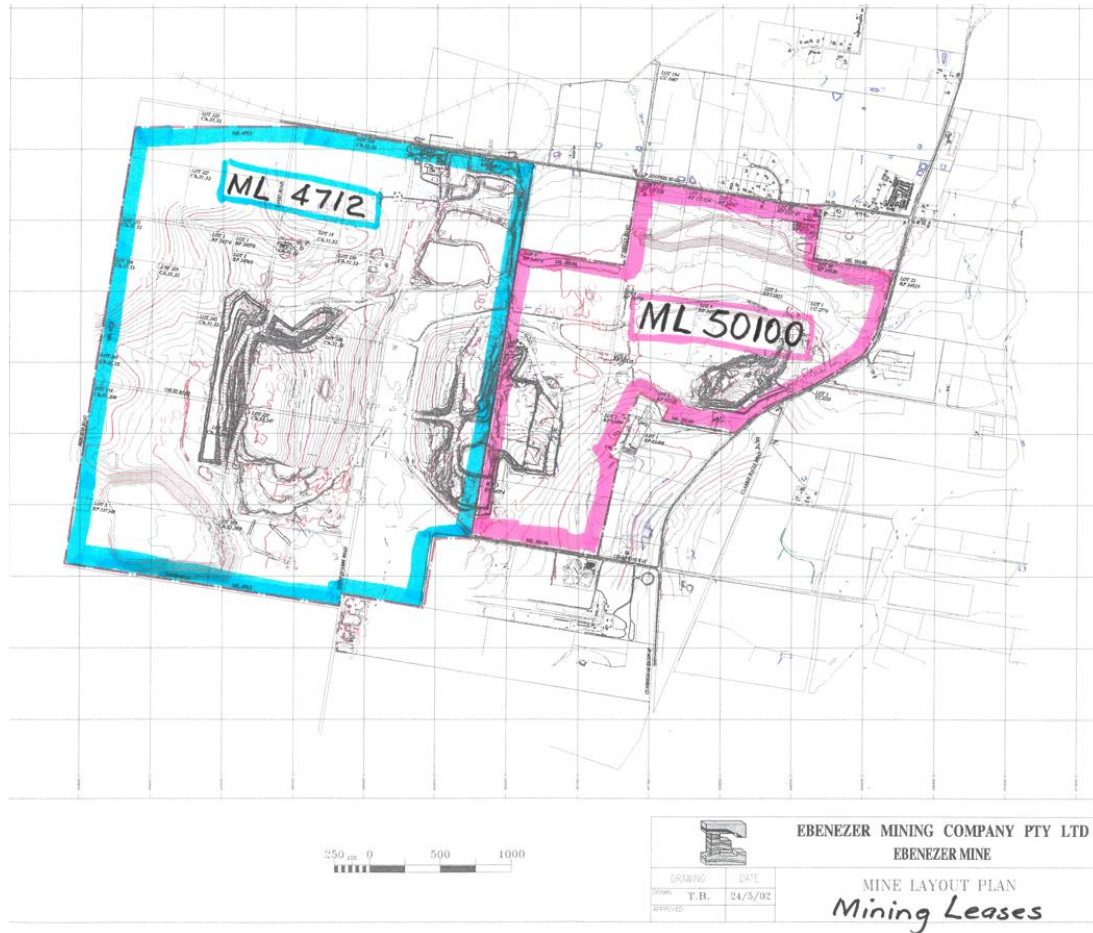
APPENDIX 5 - PLAN 13: SIDESCAN MOSAIC OF THE TAILINGS POND (23/07/2020)



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



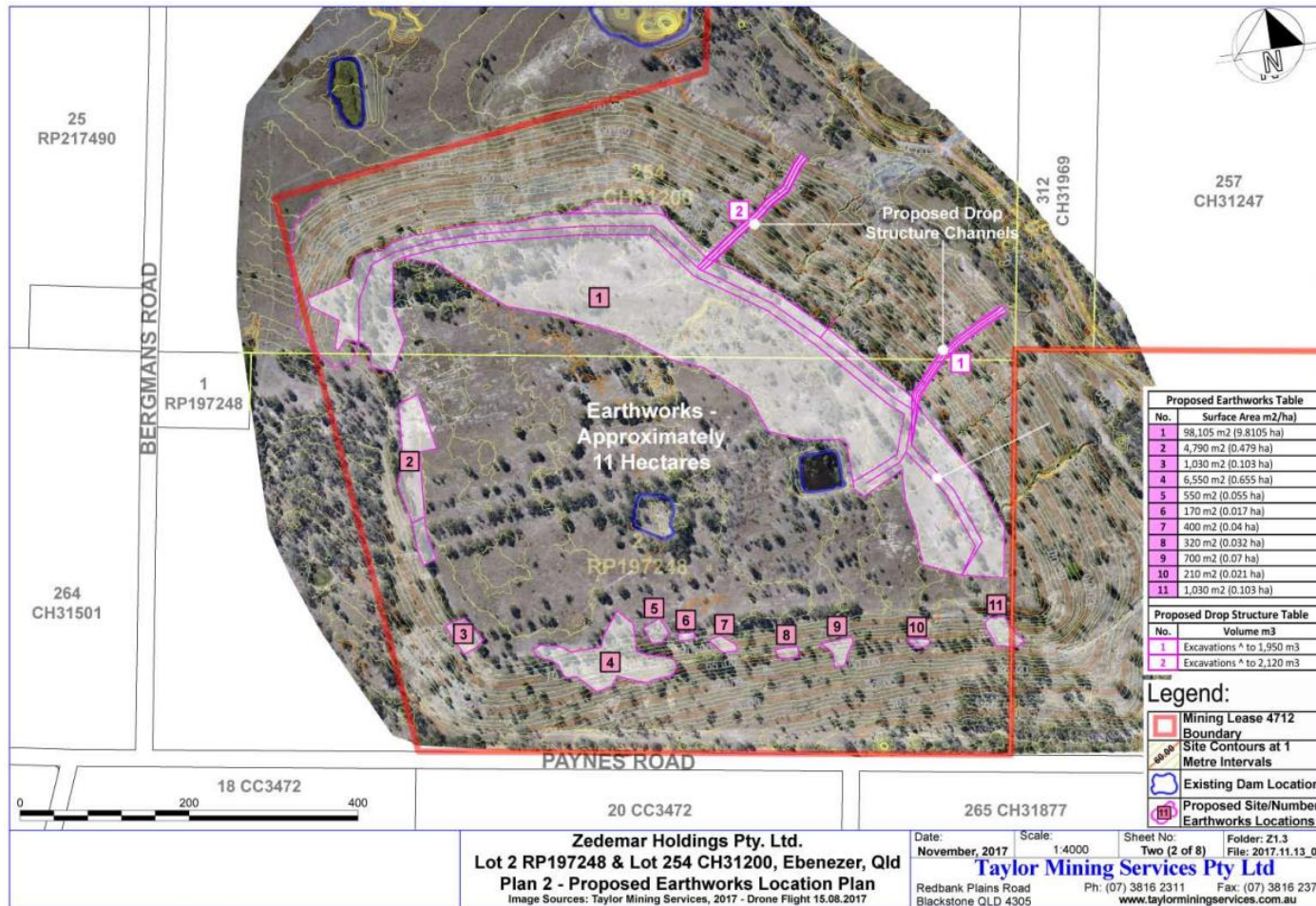
APPENDIX 5 - PLAN 15: SURFACE WATER MONITORING LOCATIONS



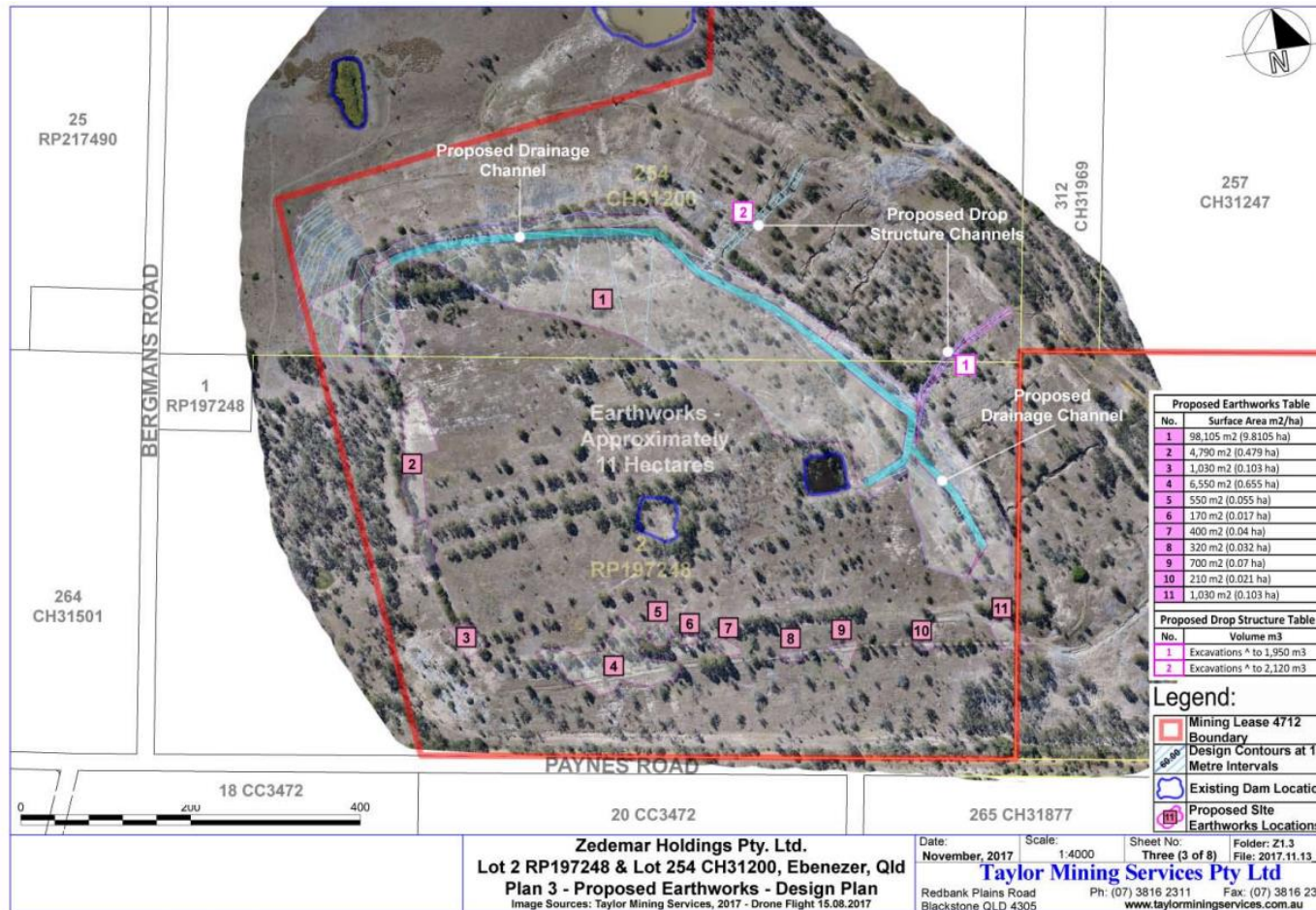
APPENDIX 5 - PLAN 16: ORIGINAL ML4712 AND ML50100 BOUNDARIES (SOURCE: TMS 20/12/2021)



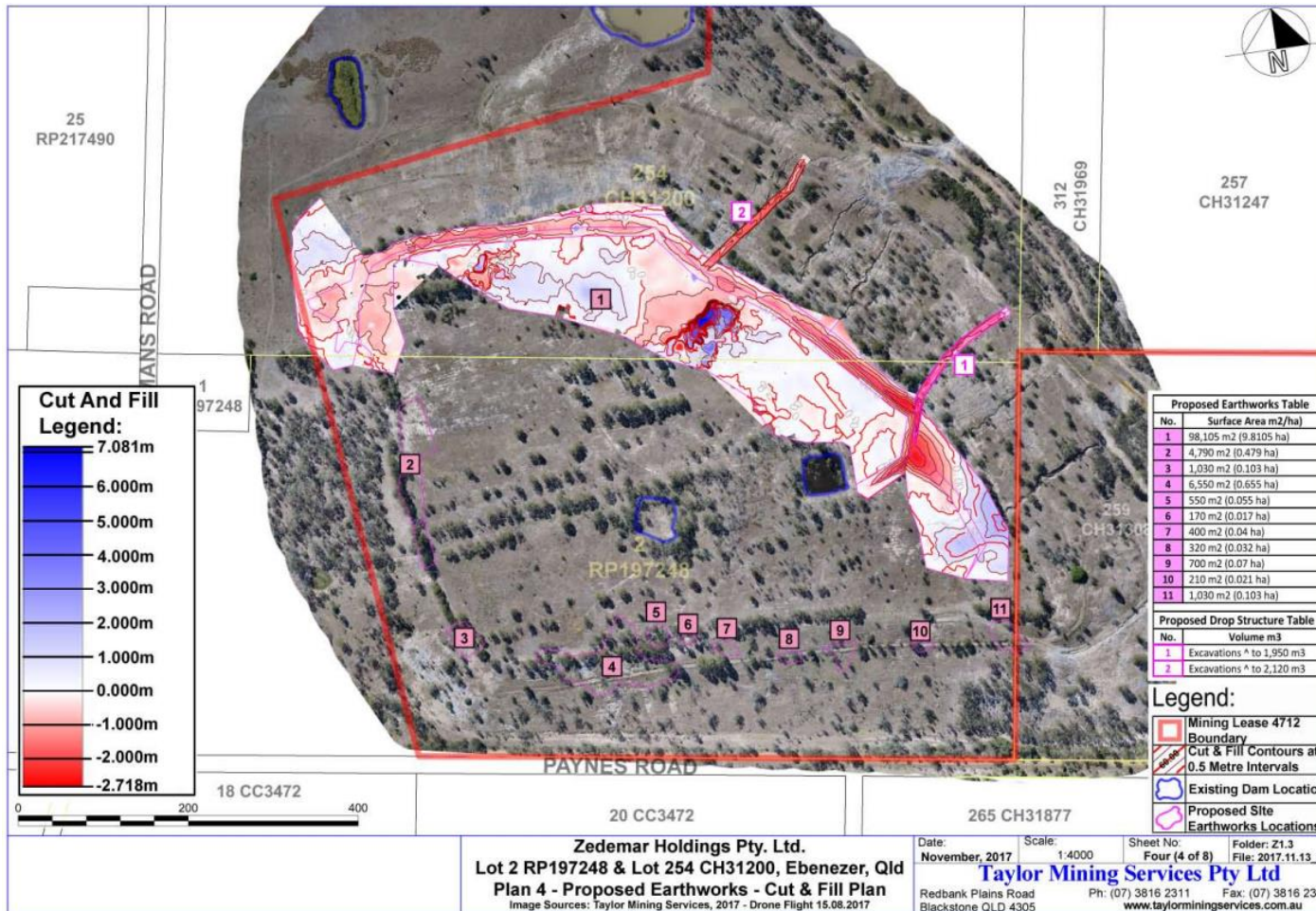
APPENDIX 5 - PLAN 17: THE OPD WITHIN DOMAIN 7



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



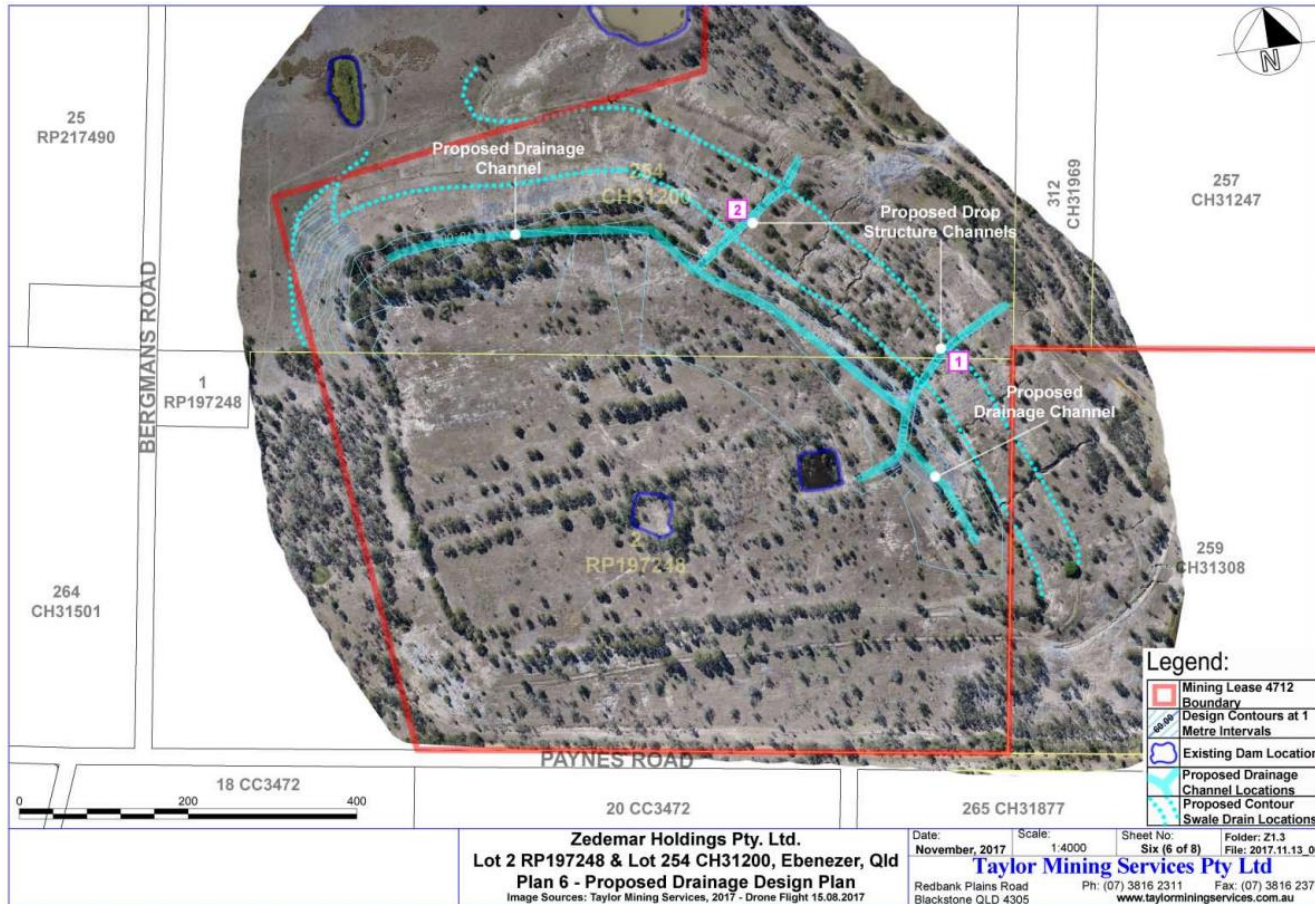
APPENDIX 5 - PLAN 19: PROPOSED DRAINAGE CHANNEL AND DROP STRUCTURE CHANNELS AT OPD TOP SURFACE



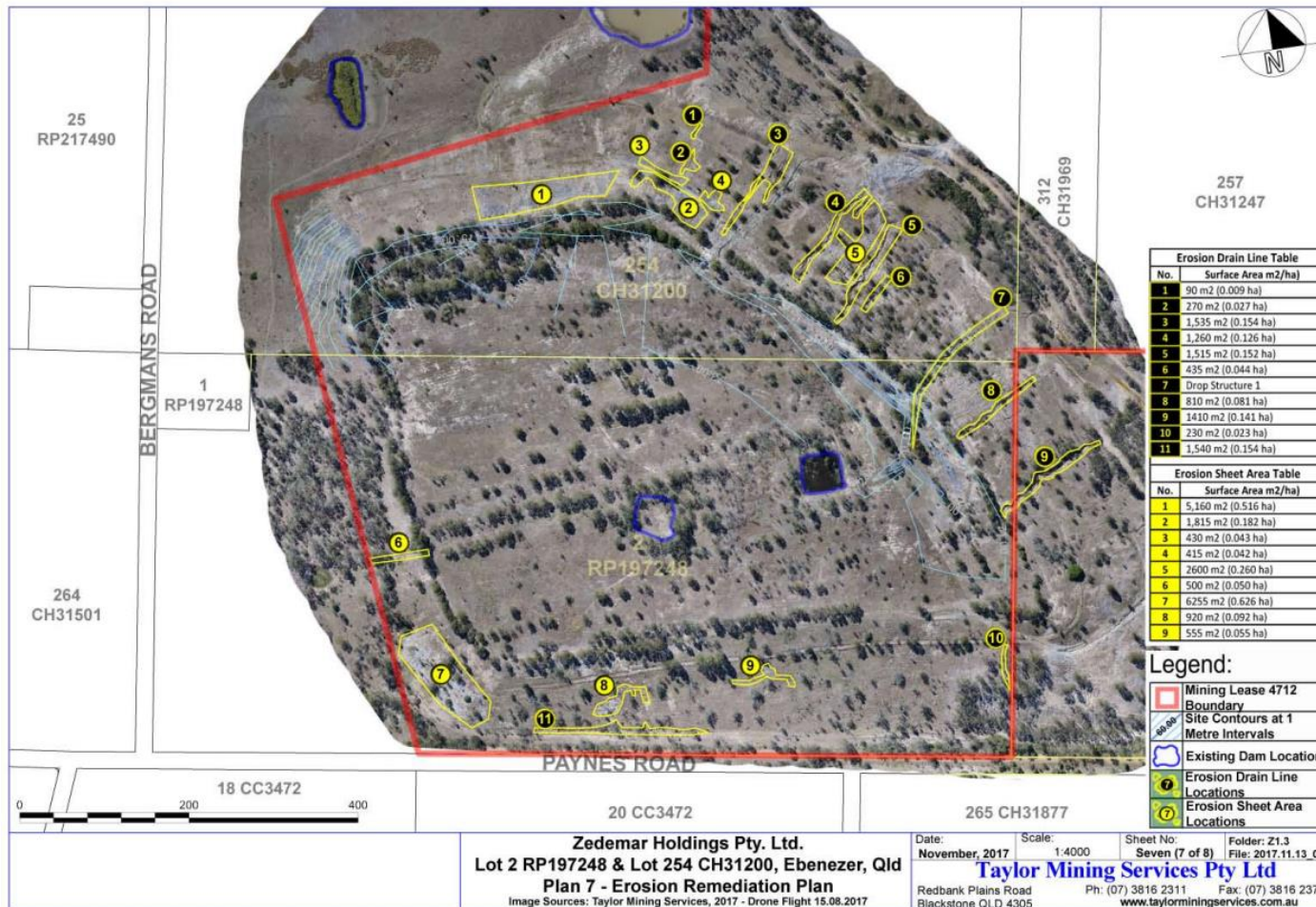
APPENDIX 5 - PLAN 20: PROPOSED CUT AND FILL AT OPD TOP SURFACE



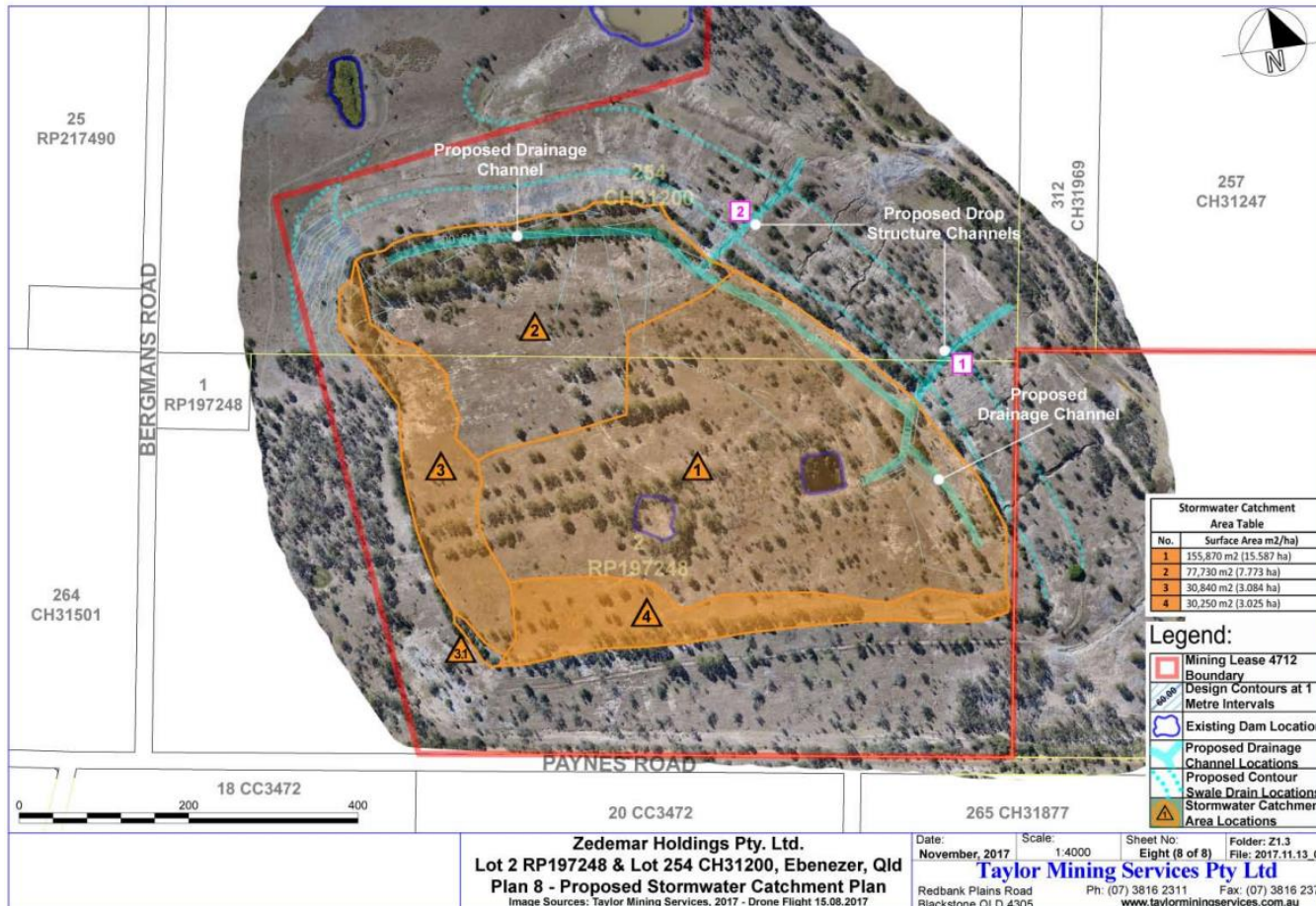
APPENDIX 5 - PLAN 21: SINK HOLE LOCATION AT OPD TOP SURFACE



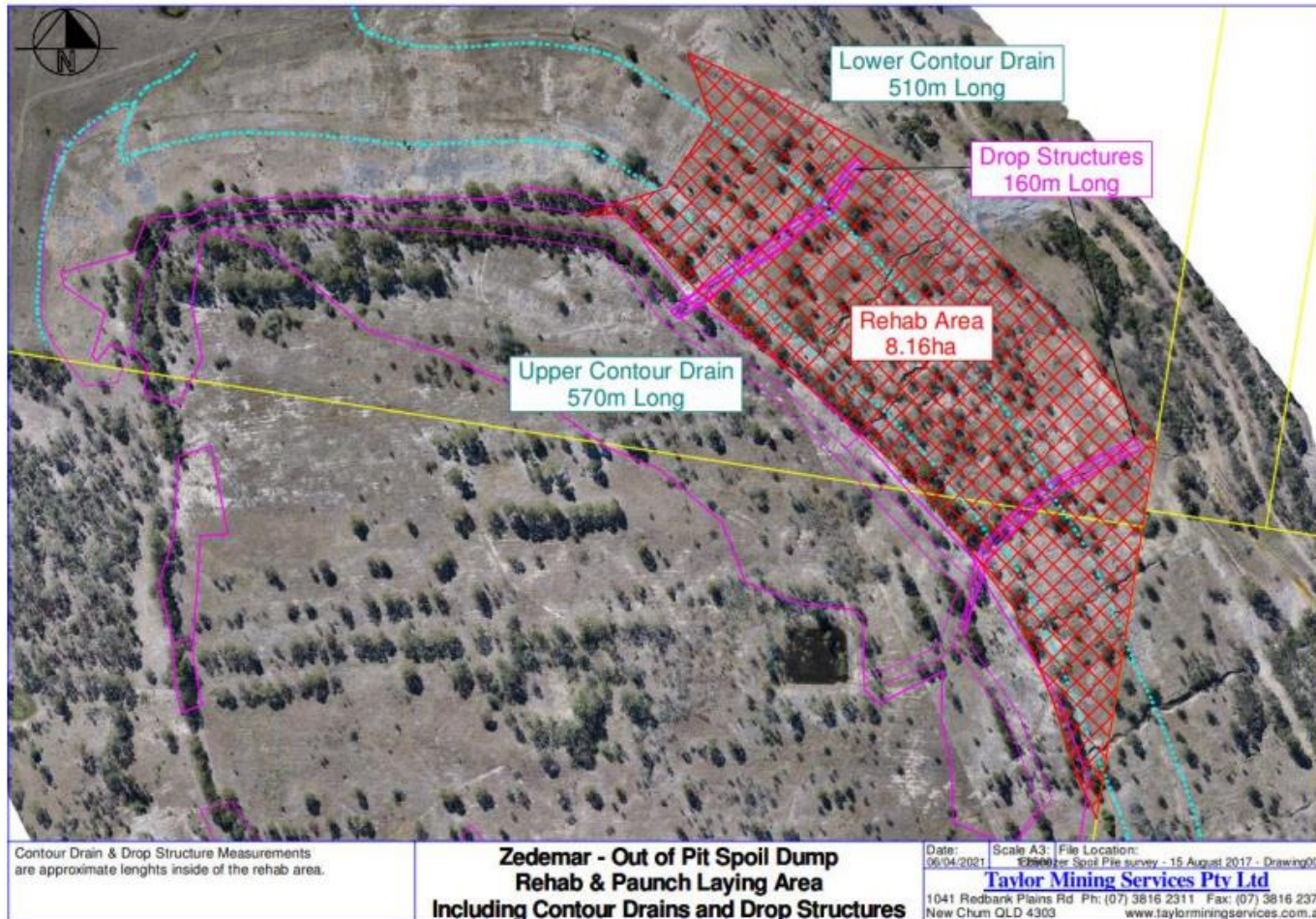
APPENDIX 5 - PLAN 22: PROPOSED DRAINAGE DESIGN PLAN AT OPD TOP SURFACE



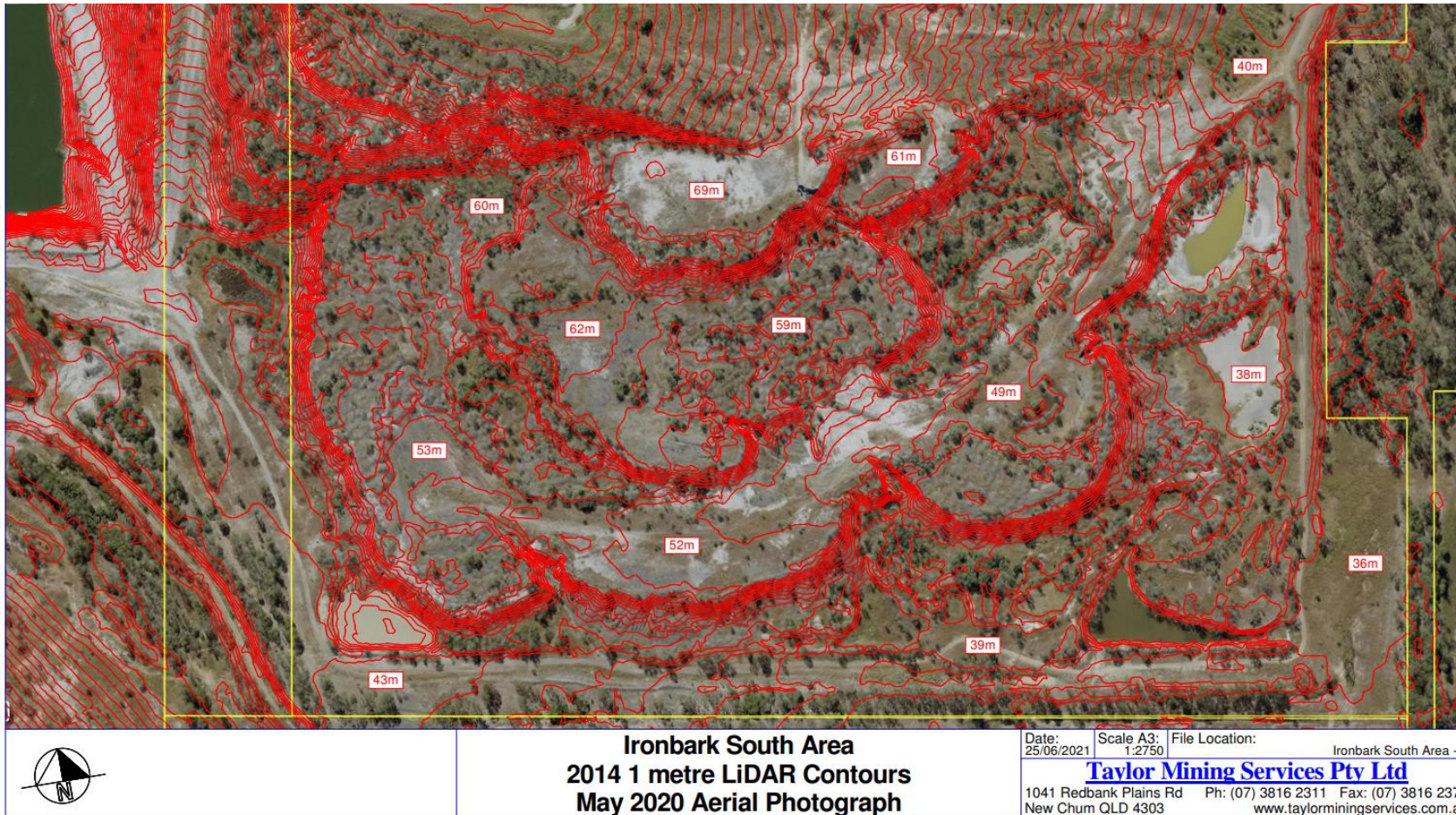
APPENDIX 5 - PLAN 23: EROSION REMEDIATION PLAN AT OPD TOP SURFACE



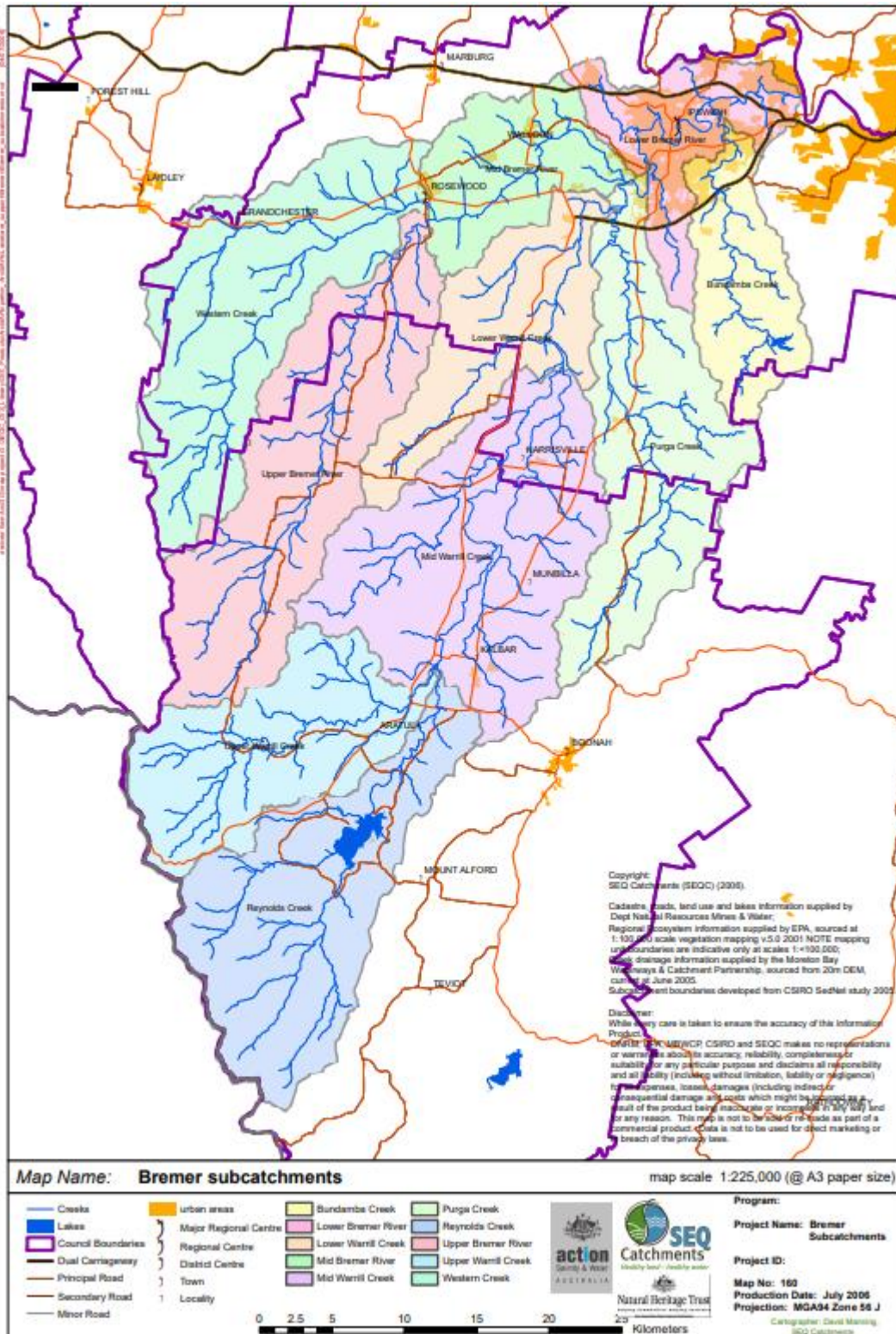
APPENDIX 5 - PLAN 24: STORMWATER CATCHMENT PLAN AT OPD TOP SURFACE



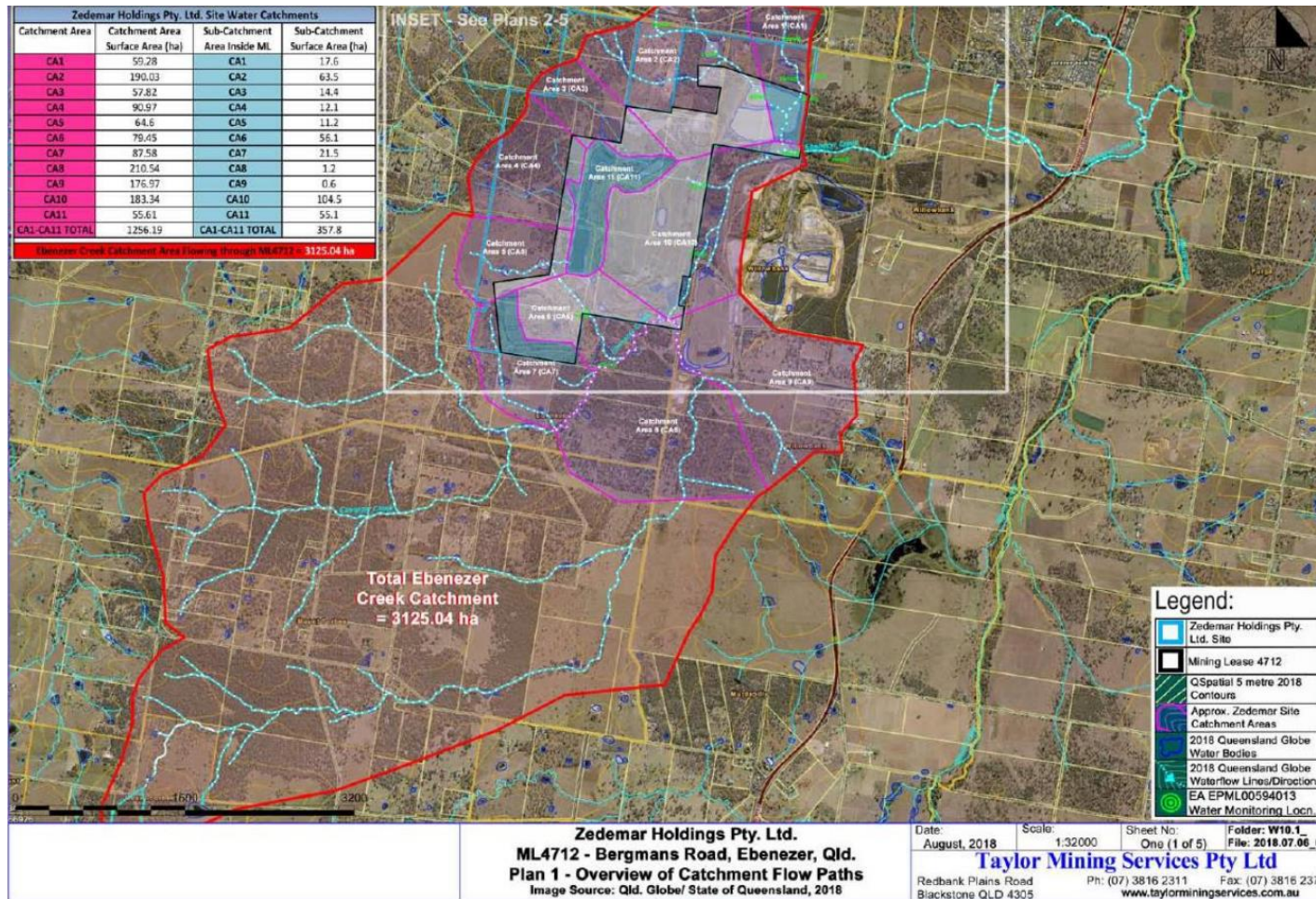
APPENDIX 5 - PLAN 25: 8.16HA AREA ON OPD NORTH-EASTERN BATTER SLOPE REQUIRING REPAIR



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



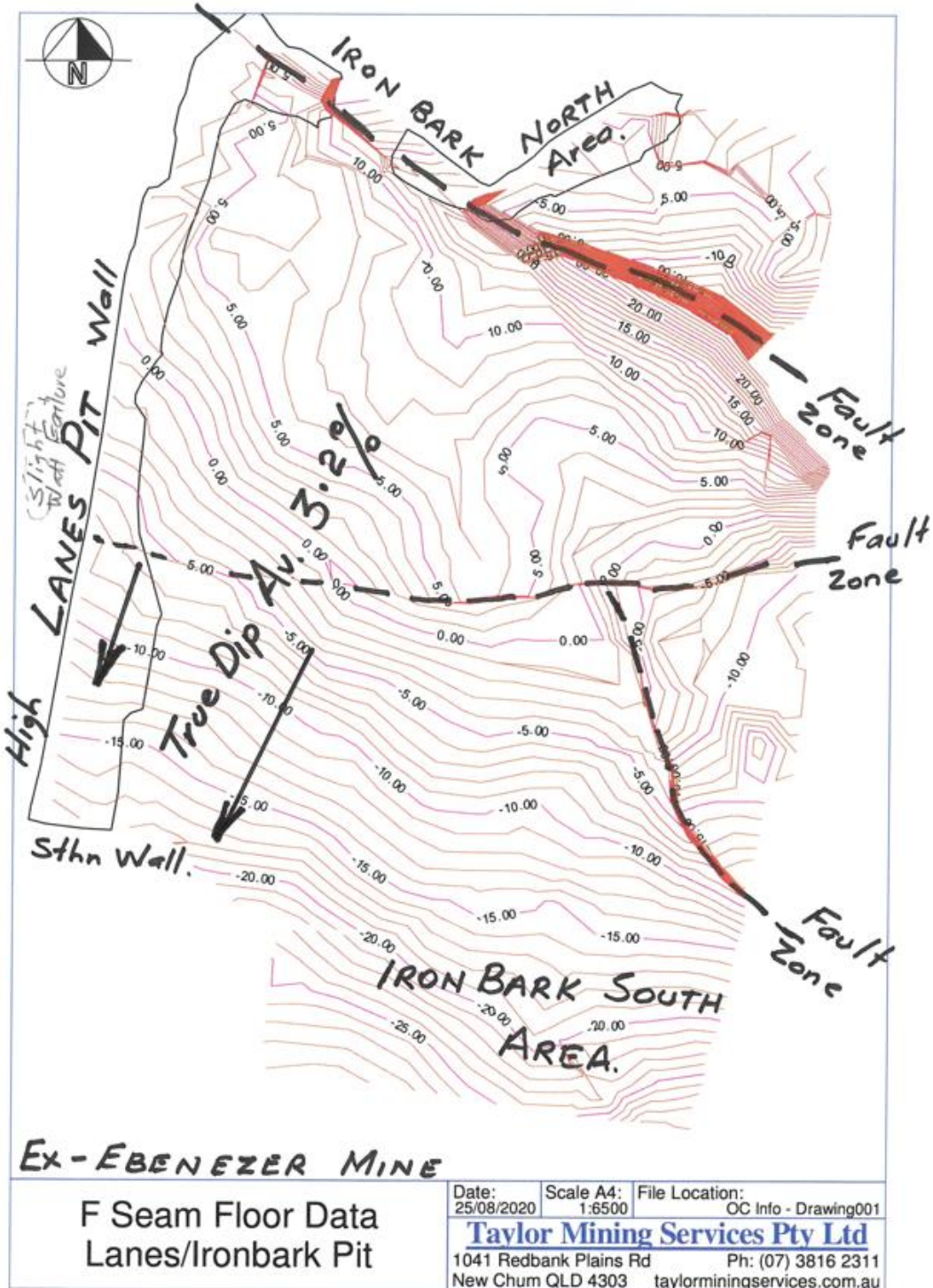
APPENDIX 5 - PLAN 27: BREMER SUBCATCHMENTS



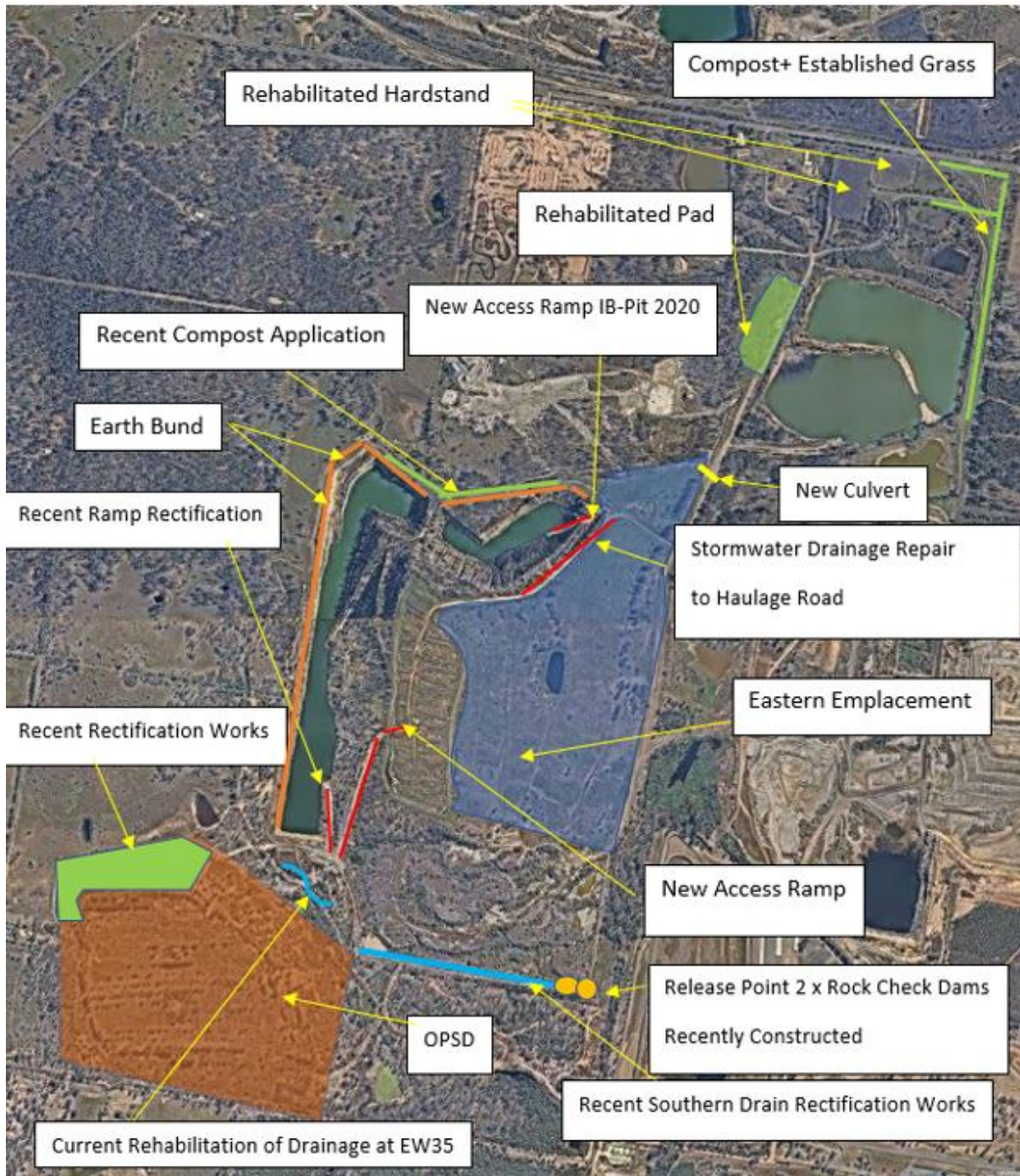
APPENDIX 5 - PLAN 28: CATCHMENT AND SUBCATCHMENTS OF EBENEZER CREEK



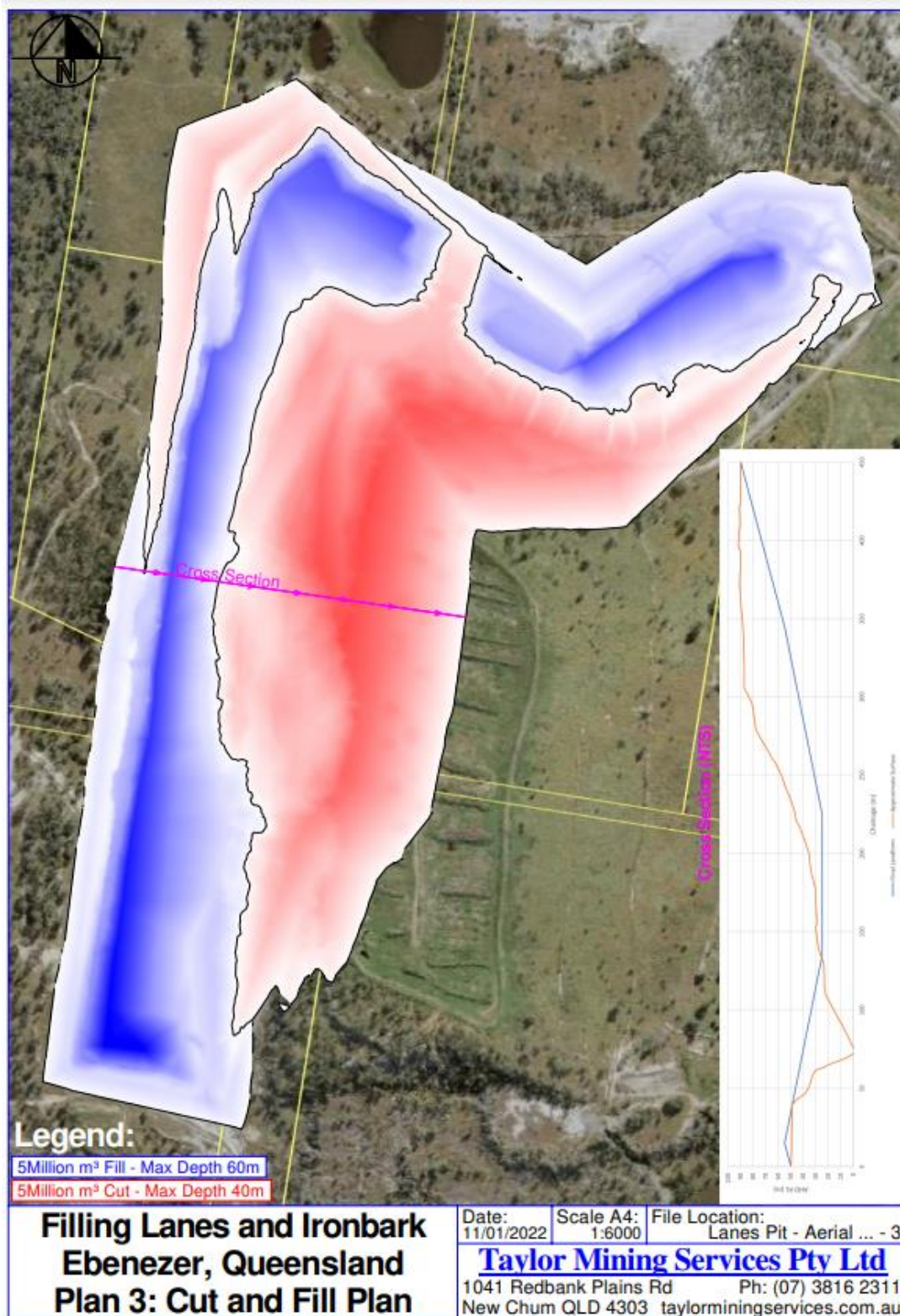
APPENDIX 5 - PLAN 29: REGISTERED WATER BORES



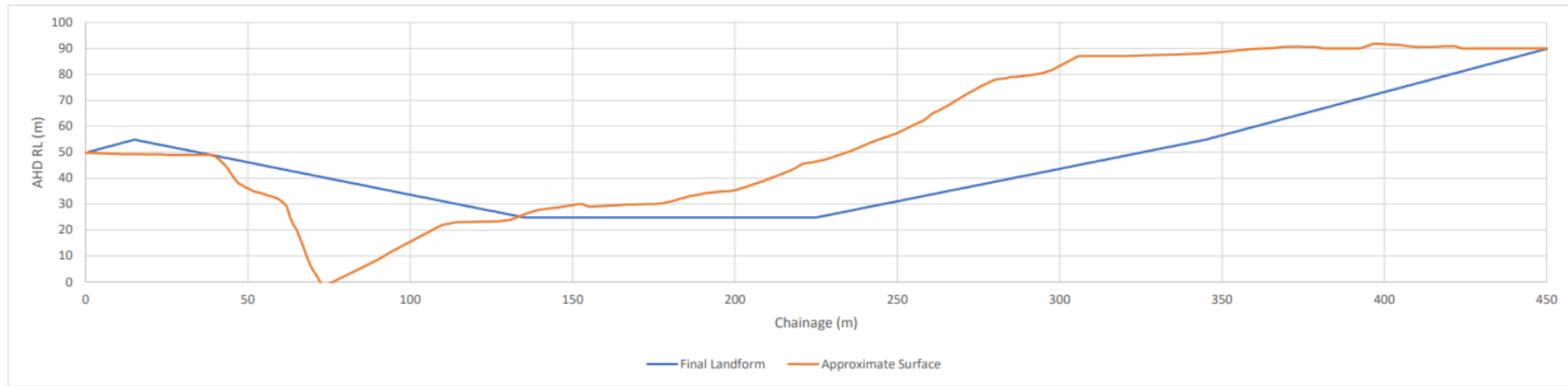
APPENDIX 5 - PLAN 30: F SEAM FLOOR DATA FOR LANES VOID AND IRONBARK NORTH VOID



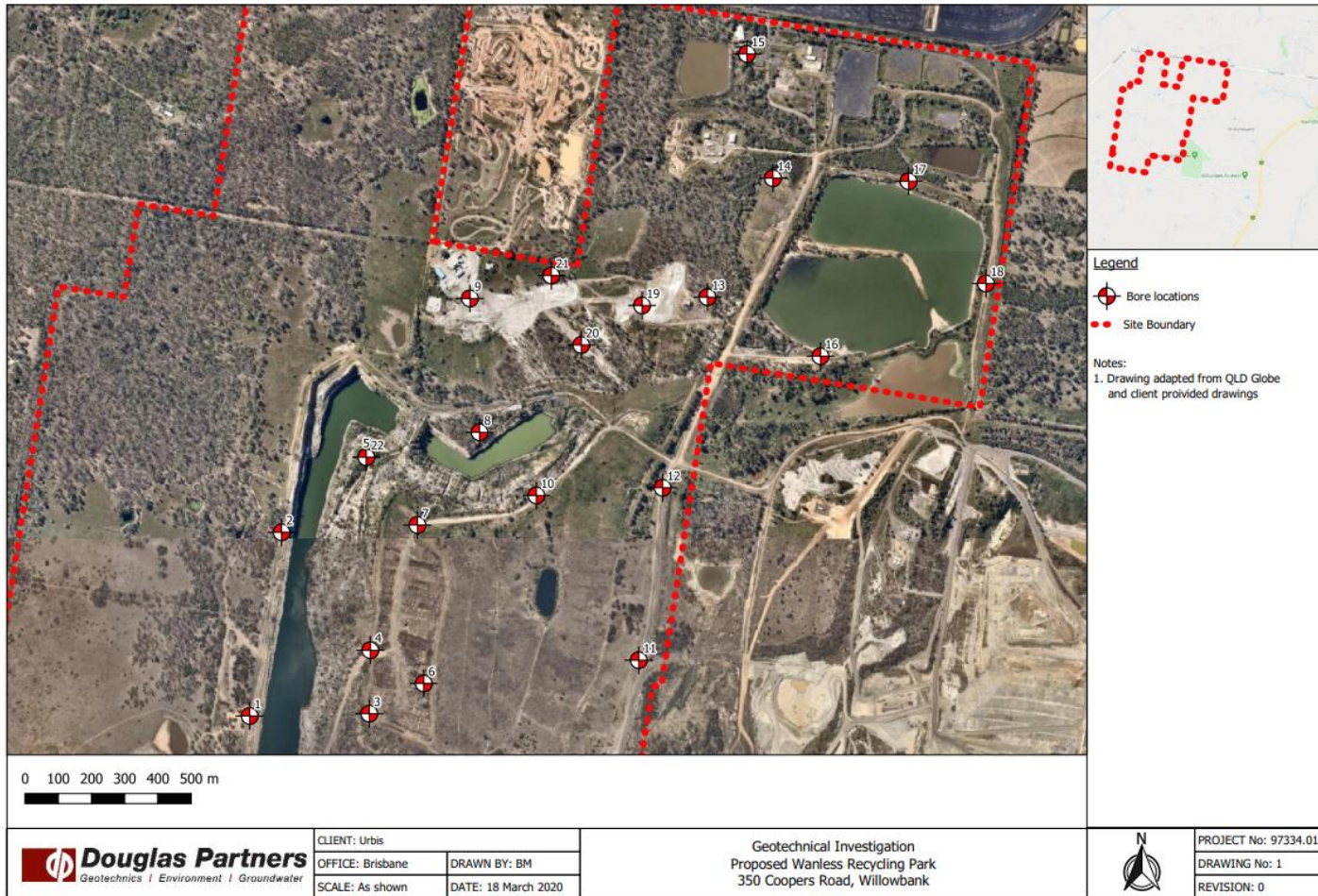
APPENDIX 5 - PLAN 31: REHABILITATION AREAS AND ACTIVITIES SINCE 2018



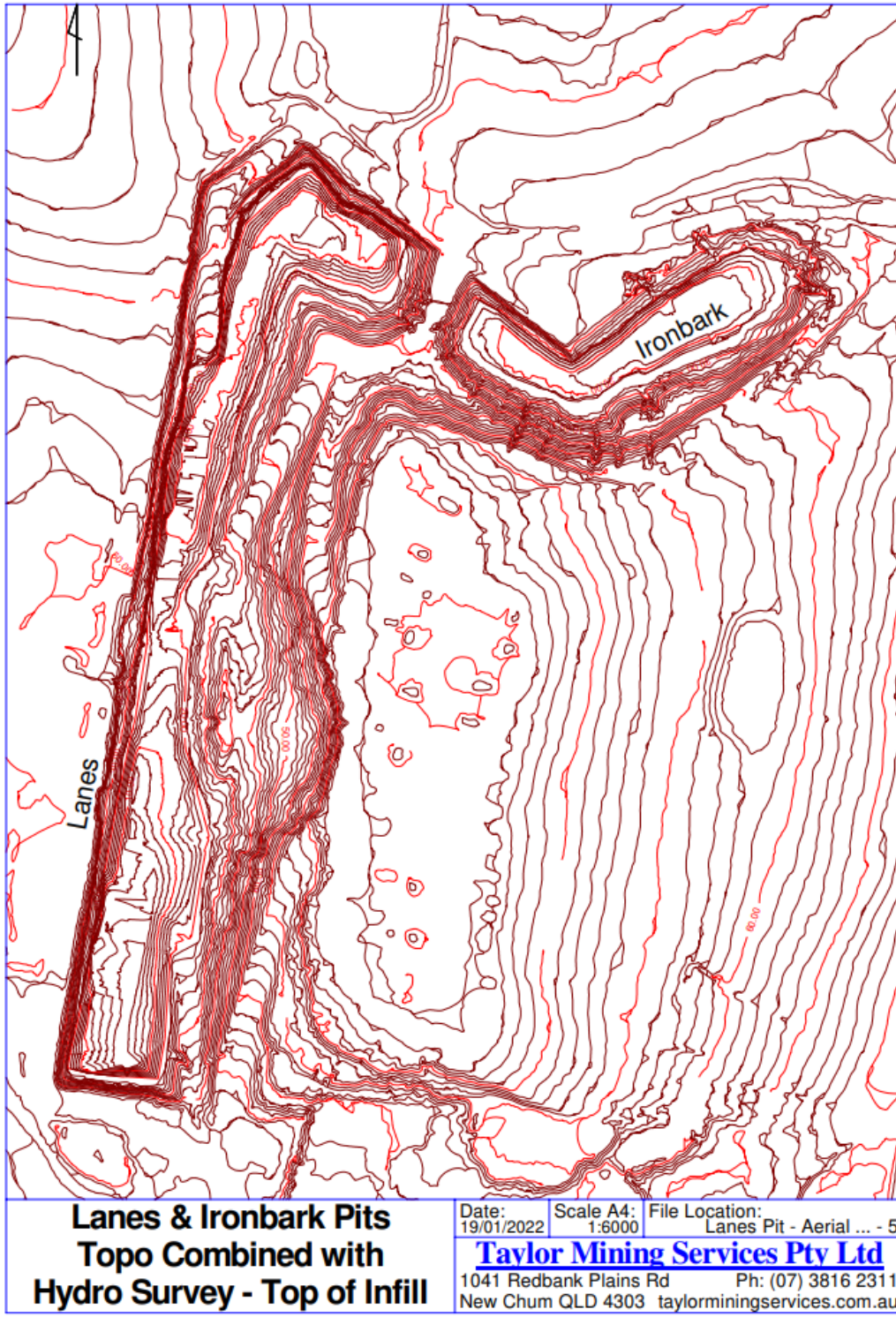
APPENDIX 5 - PLAN 32: CUT AND FILL PLAN FOR LOW-WALL



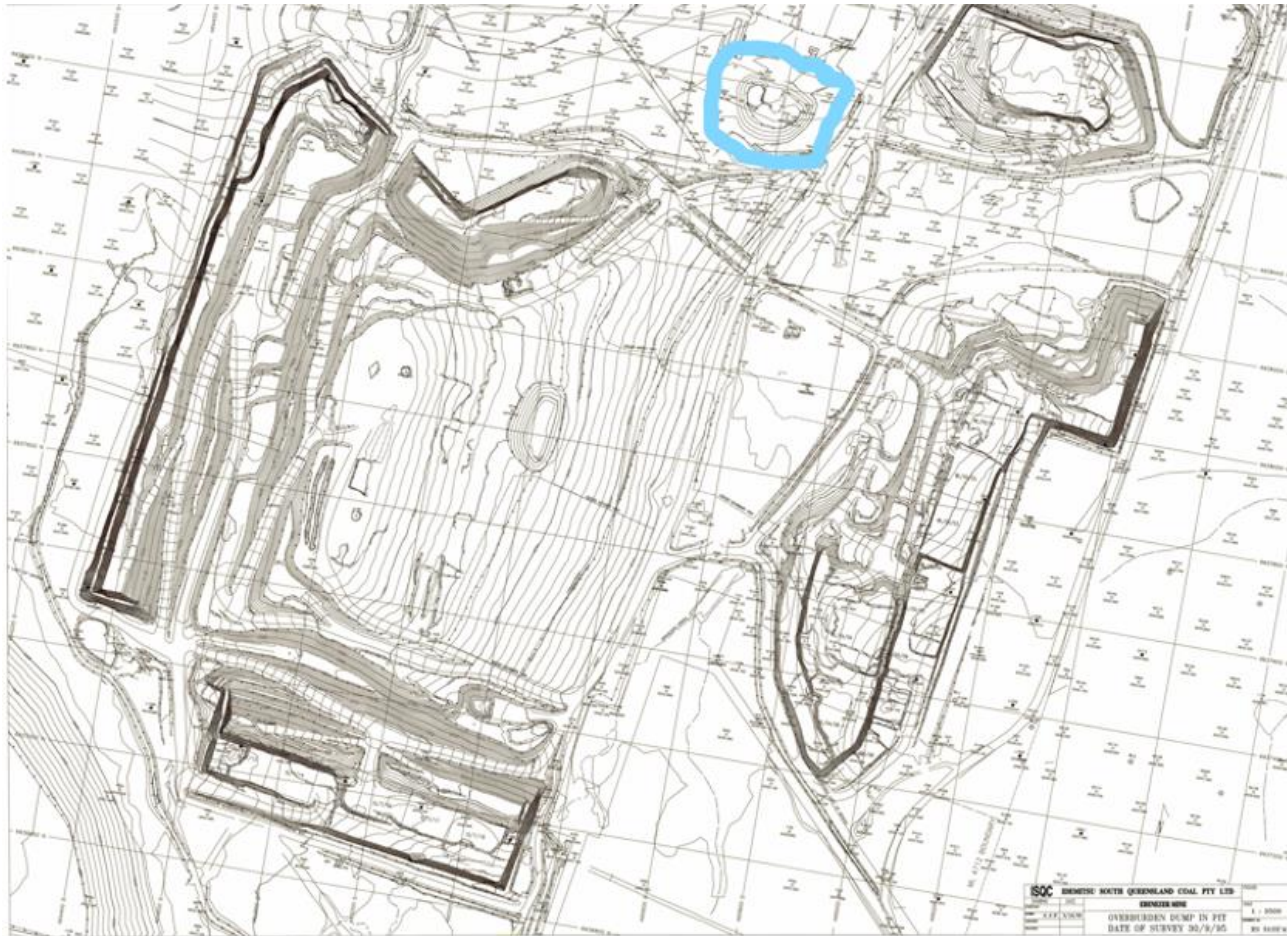
APPENDIX 5 - PLAN 33: CROSS SECTION OF EXISTING LOW-WALL AND CONSIDERED CUT AND FILL PROFILE



APPENDIX 5 - PLAN 34: SOIL SAMPLING LOCATIONS, 2020



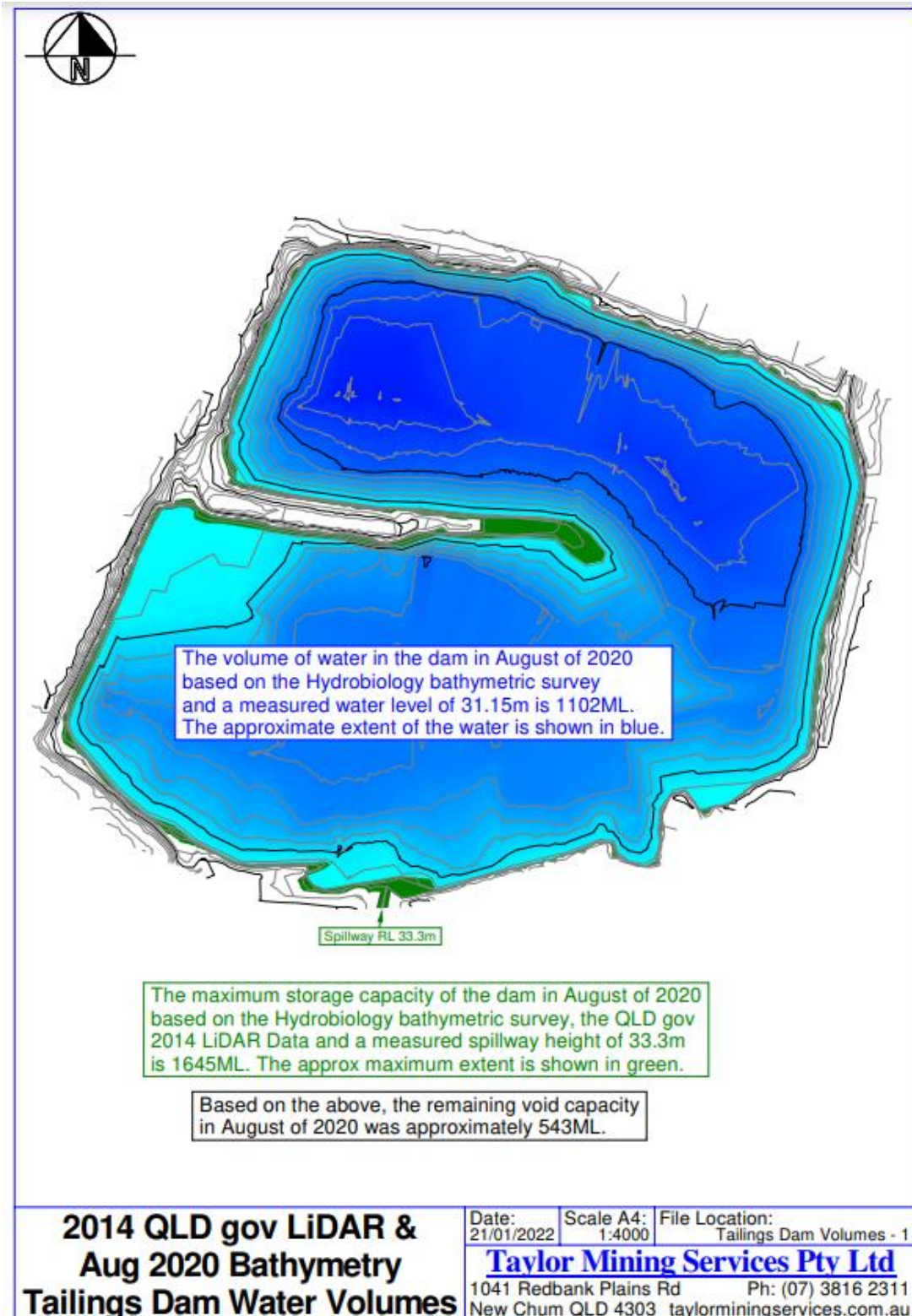
APPENDIX 5 - PLAN 35: COMBINED TOPOGRAPHICAL AND SONAR SCAN FOR LANES VOID AND IRONBARK NORTH VOID



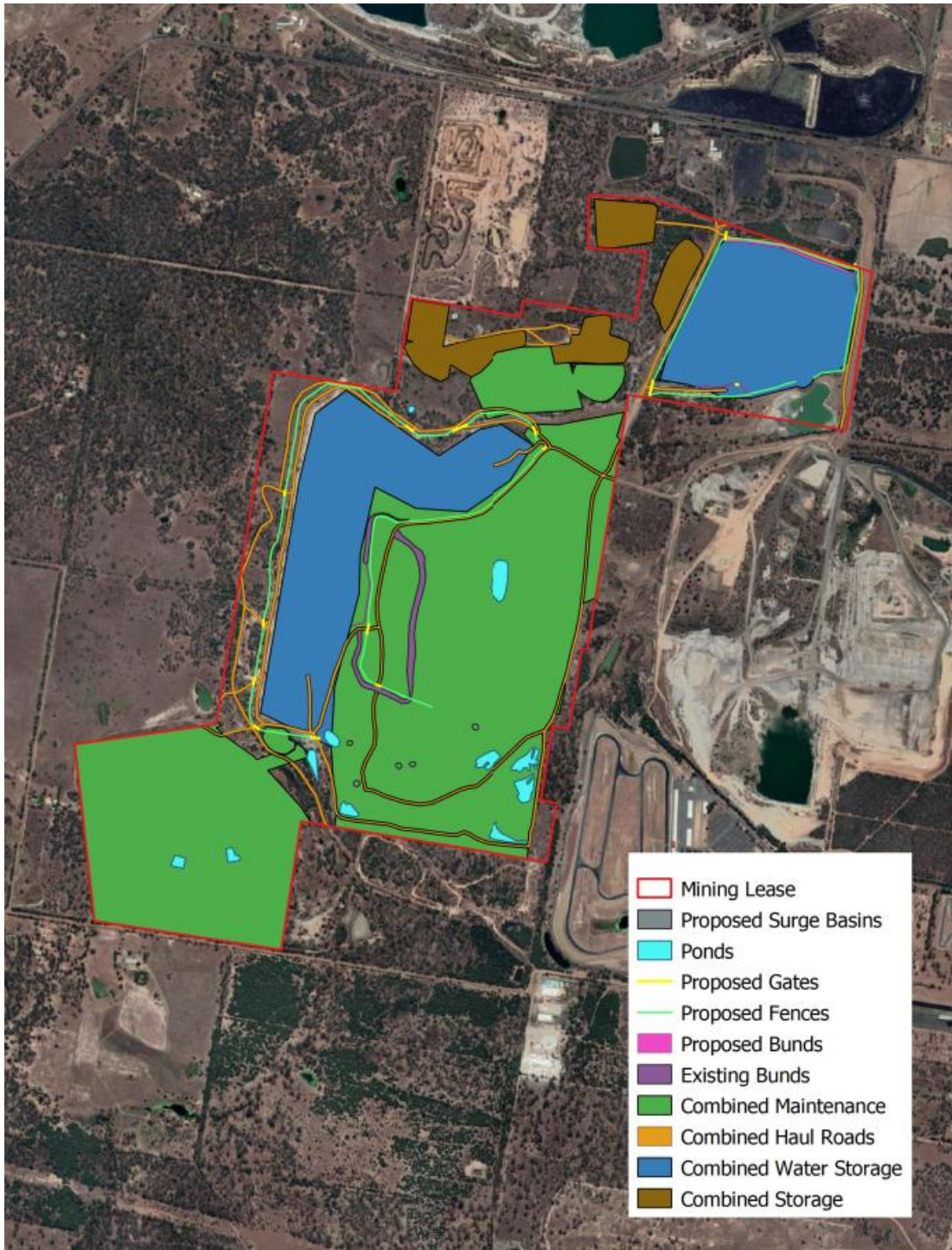
APPENDIX 5 - PLAN 36: LOCATION OF DOMAIN 13, OVERBURDEN MOUND



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)

November 27, 2017
Page 2

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.

November 27, 2017
Page 3

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.

November 27, 2017
Page 4

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

November 27, 2017
Page 5

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)

*November 27, 2017
Page 6*

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

*November 27, 2017
Page 7*

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

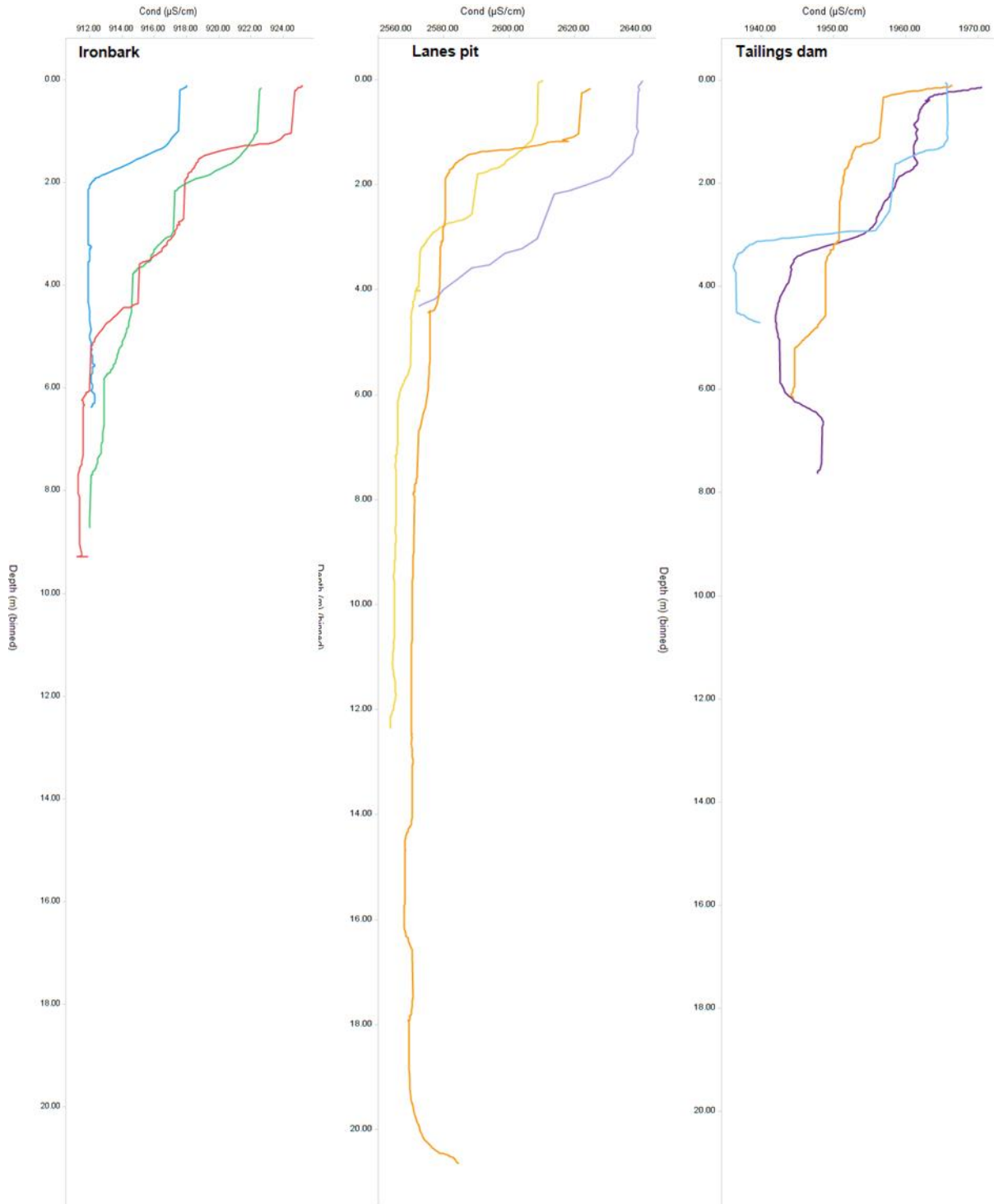
No earthworks volumes have been prepared for these works as they will have to be assessed at the time of reshaping. Some additional fill may be required as well as topsoiling for vegetation growth. Mounding of areas such as this is recommended

Regards,

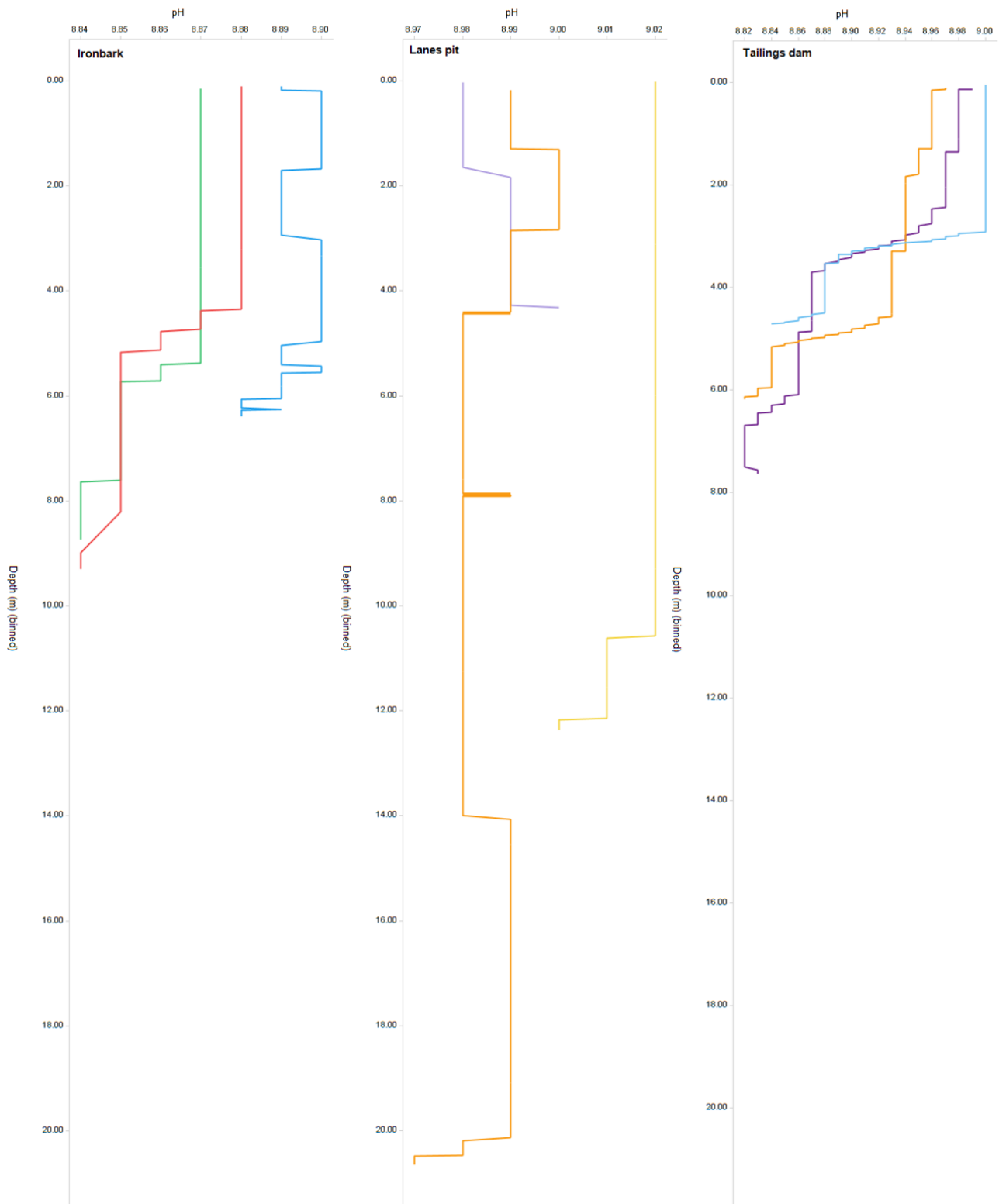
Hugh Taylor,
Site Senior Executive (SSE Coal, Notice Holder)
Registered Surveyor, Mining UC, UM & OC
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E-Mail: hugh-taylor@bigpond.com

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 Water	T1B Water	T2S Water	T2B Water
Sample Matrix			B20-JI43092	B20-JI43093	B20-JI43094	B20-JI43095
Eurofins Sample No.			Jul 23, 2020	Jul 23, 2020	Jul 23, 2020	Jul 23, 2020
Date Sampled						
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 SO4)	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 CaCO3/L	5	mg/L	89	91	110	110
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	410	390	420	390
Carbonate Alkalinity (as CaCO3)	10	mg/L	48	31	41	54
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	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



Environment Testing

Client Sample ID			T1S Water	T1B Water	T2S Water	T2B Water
Sample Matrix			B20-JI43092	B20-JI43093	B20-JI43094	B20-JI43095
Eurofins Sample No.			Jul 23, 2020	Jul 23, 2020	Jul 23, 2020	Jul 23, 2020
Date Sampled	LOR	Unit				
Test/Reference						
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	LOR	Unit	Jul 23, 2020	Jul 23, 2020	Jul 23, 2020	Jul 23, 2020
Test/Reference						
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 CaCO3)	20	mg/L	400	380	390	-
Carbonate Alkalinity (as CaCO3)	10	mg/L	56	54	31	-
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	-
Total Alkalinity (as CaCO3)	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	16	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 28794

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 SO4)	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 CaCO3/L	5	mg/L	94	61	84	82
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	620	640	650	710
Carbonate Alkalinity (as CaCO3)	10	mg/L	81	85	85	100
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	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	-



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.			Jul 30, 2020	Jul 30, 2020	Jul 30, 2020	Jul 30, 2020
Date Sampled						
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 SO4)	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 CaCO3/L	5	mg/L	81	63	65	-
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	600	630	520	-
Carbonate Alkalinity (as CaCO3)	10	mg/L	91	82	82	-
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	-
Total Alkalinity (as CaCO3)	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)	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 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				
Phosphorus reactive (as P)	0.01	mg/L	-	< 0.01	< 0.01	< 0.01
Sulphate (as SO4)	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	28	25
Total Suspended Solids Dried at 103–105°C	1	mg/L	-	4.8	6.8	6.0
Hardness mg equivalent CaCO3/L	5	mg/L	-	64	68	71
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	-	370	350	340
Carbonate Alkalinity (as CaCO3)	10	mg/L	-	34	30	49
Hydroxide Alkalinity (as CaCO3)	20	mg/L	-	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	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



Environment Testing

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				
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 Water	IW5 Water	IW6 Water
Sample Matrix			B20-Au01475	B20-Au01476	B20-Au01477
Eurofins Sample No.					
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)	0.01	mg/L	< 0.01	0.01	0.04
Chloride	1	mg/L	130	140	140
Conductivity (at 25°C)	10	uS/cm	990	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
Phosphorus reactive (as P)	0.01	mg/L	< 0.01	< 0.01	< 0.01
Sulphate (as SO4)	5	mg/L	44	44	45
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	580	590	570
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.4	0.3	0.4
Total Nitrogen (as N)*	0.2	mg/L	0.4	0.3	0.4
Total Organic Carbon	5	mg/L	24	21	12
Total Suspended Solids Dried at 103–105°C	1	mg/L	6.8	8.6	6.0
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.					
Date Sampled			Jul 31, 2020	Jul 31, 2020	Jul 31, 2020
Test/Reference	LOR	Unit			
Alkalinity (speciated)					
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	320	340	360
Carbonate Alkalinity (as CaCO3)	10	mg/L	34	25	28
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	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	0.06	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 (Domain 7), abut 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 Domain 7, 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.

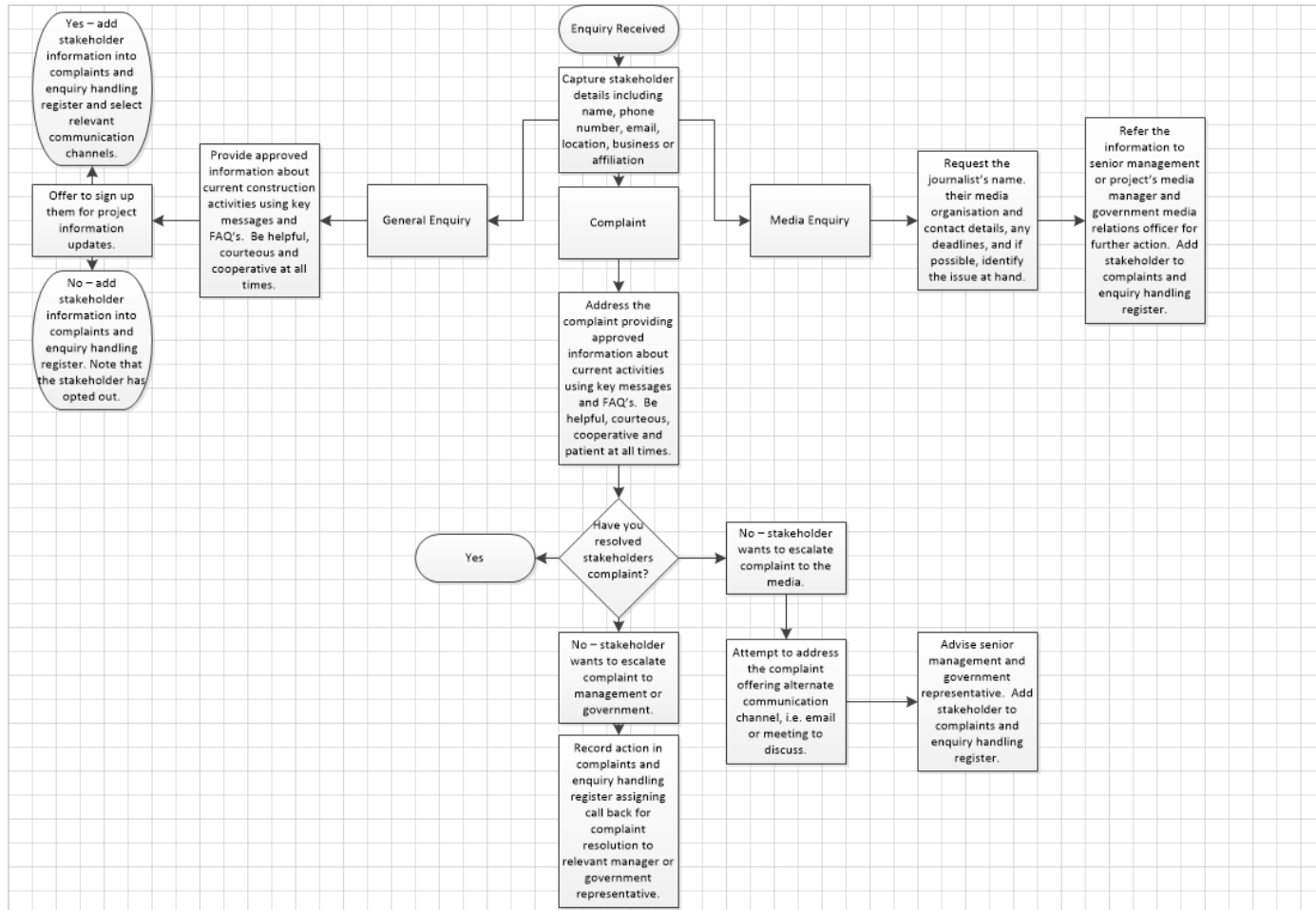
Zedemar has an existing complaint procedure whereby all complaints received are recorded and investigated. Complaints, general and media enquiries shall be handled in a consultative way and promptly dealt with. All complaints received will be responded to within 1 week using Zedemar's complaints handling 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— <ul style="list-style-type: none">• 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— <ul style="list-style-type: none">• 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 domains 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 – (Domain 2) – Erosion which causes environmental harm or failure to meet post mining land use.	<ul style="list-style-type: none"> • 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 – (Domain 2) – Instability which causes environmental harm or failure to meet post mining land use.	<ul style="list-style-type: none"> • 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 – (Domain 2) - Animal and Human Access	<ul style="list-style-type: none"> • Access by animals or humans resulting in injury or death.
Tailings Pond – (Domain 2) – Vehicle Access	<ul style="list-style-type: none"> • Access by vehicles resulting in injury or death.

<p>Ironbark North Void Low-wall - (Domain 3) – Erosion which causes environmental harm or failure to meet post mining land use.</p>	<ul style="list-style-type: none"> Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Ironbark North Void resulting in releases to the receiving water environment.
<p>Ironbark North Void Low-wall - (Domain 3) – Instability which causes environmental harm or failure to meet post mining land use.</p>	<ul style="list-style-type: none"> 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.
<p>Ironbark North Void Low-wall - (Domain 3) – Animal and Human Access</p>	<ul style="list-style-type: none"> Access by animals or humans resulting in injury or death.
<p>Ironbark North Void Low-wall - (Domain 3) – Vehicle Access</p>	<ul style="list-style-type: none"> Access by vehicles resulting in injury or death.
<p>Ironbark North Void Low-wall - (Domain 3) – Unsuccessful vegetation cover which causes environmental harm or failure to meet post mining land use.</p>	<ul style="list-style-type: none"> 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.
<p>Ironbark North Void High-wall - (Domain 3) – Erosion which causes environmental harm or failure to meet post mining land use.</p>	<ul style="list-style-type: none"> Erosion channels caused by stormwater runoff become larger which causes sediment deposition into Ironbark North Void resulting in releases to the receiving water environment.
<p>Ironbark North Void High-wall - (Domain 3) – Instability which causes environmental harm or failure to meet post mining land use.</p>	<ul style="list-style-type: none"> 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.
<p>Ironbark North Void High-wall - (Domain 3) – Animal and Human Access</p>	<ul style="list-style-type: none"> Access by animals or humans resulting in injury or death.

Ironbark North Void High-wall - (Domain 3) – Vehicle Access	<ul style="list-style-type: none"> • Access by vehicles resulting in injury or death.
Lanes Void Low-wall- (Domain 5) – Erosion which causes environmental harm or failure to meet post mining land use.	<ul style="list-style-type: none"> • 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- (Domain 5) – Instability which causes environmental harm or failure to meet post mining land use.	<ul style="list-style-type: none"> • 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- (Domain 5) – Animal and Human Access	<ul style="list-style-type: none"> • Access by animals or humans resulting in injury or death.
Lanes Void Low-wall- (Domain 5) – Vehicle Access	<ul style="list-style-type: none"> • Access by vehicles resulting in injury or death.
Lanes Void Low-wall- (Domain 5) – Unsuccessful vegetation cover which causes environmental harm or failure to meet post mining land use.	<ul style="list-style-type: none"> • 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 - (Domain 5) – Erosion which causes environmental harm or failure to meet post mining land use.	<ul style="list-style-type: none"> • 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 - (Domain 5) - Instability which causes environmental harm or failure to meet post mining land use.	<ul style="list-style-type: none"> • 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 - (Domain 5) – Animal and Human Access	<ul style="list-style-type: none"> • Access by animals or humans resulting in injury or death.

Lanes Void High-wall - (Domain 5) – Vehicle Access	<ul style="list-style-type: none"> • Access by vehicles resulting in injury or death.
Ironbark South Dump - (Domain 6) – Erosion which causes environmental harm or failure to meet post mining land use.	<ul style="list-style-type: none"> • Erosion channels caused by stormwater runoff become larger which causes sediment release to the receiving water environment.
Ironbark South Dump - (Domain 6) - Instability which causes environmental harm or failure to meet post mining land use.	<ul style="list-style-type: none"> • 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 - (Domain 6) – Vehicle Access	<ul style="list-style-type: none"> • Access by vehicles resulting in injury or death.
Ironbark South Dump - (Domain 6) – Animal and Human Access	<ul style="list-style-type: none"> • Access by animals or humans resulting in injury or death.
Ironbark South Dump - (Domain 6) – Unsuccessful Vegetation Cover which causes environmental harm or failure to meet post mining land use.	<ul style="list-style-type: none"> • 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 – (Domain 4) – Erosion which causes environmental harm or failure to meet post mining land use.	<ul style="list-style-type: none"> • Erosion channels caused by stormwater runoff become larger which causes sediment release to the receiving environment.
Lanes Eastern Emplacement – (Domain 4) – Instability which causes environmental harm or failure to meet post mining land use.	<ul style="list-style-type: none"> • Compost pad stormwater runoff pools/ponds within drain on western side resulting in low-wall failure at crest of western batter.
Lanes Eastern Emplacement – (Domain 4) – Unsuccessful Vegetation Cover which causes	<ul style="list-style-type: none"> • Successful coverage of bare surfaces with vegetation does not occur which results in sediment

environmental harm or failure to meet post mining land use.	deposition into sediment ponds resulting in releases to the receiving water environment.
Out of Pit Dump – (Domain 7) – Erosion which causes environmental harm or failure to meet post mining land use.	<ul style="list-style-type: none"> Erosion channels caused by stormwater runoff become larger which causes sediment release to the receiving environment.
Out of Pit Dump – (Domain 7) – Waterlogging resulting in erosion which causes environmental harm or failure to meet post mining land use.	<ul style="list-style-type: none"> Waterlogged sodic soil results in tunnel and pipe erosion which causes sediment release to the receiving water environment.
Out of Pit Dump – (Domain 7) - Unsuccessful Vegetation Cover which causes environmental harm or failure to meet post mining land use.	<ul style="list-style-type: none"> 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 domains due to reasons provided below:

- Stockpile Area –(Domain 1):**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 – (Domain 8):** 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 – (Domain 9):** 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 – (Domain 10):** 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 – (Domain 11):** Area is too small to cause environmental harm.
- Bentonite B area - (Domain 12):** No environmental harm is being caused, minor topsoiling and grass seeding is required.

- **Overburden Mound – (Domain 13):** Small areas requiring topsoil and grass seed. No potential for environmental exists.
- **Topsoil stockpile area – (Domain 14):** Small area and no potential for harm.
- **Balance of mining lease – (Domain 15):** 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	Minor medium term social impacts	Minor legal issues, non-compliances,	Low Financial Loss <\$10,000.	2

	physical environment.		and breaches of regulation.		
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 – (Domain 2) – 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 – (Domain 2) – 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 – (Domain 2) - Animal and Human Access	Access by animals or humans resulting in injury or death.	3	6	18	
4	Tailings Pond – (Domain 2) – Vehicle Access	Access by vehicles resulting in injury or death.	1	6	6	
5	Ironbark North Void Low-wall - (Domain 3) – 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 - (Domain 3) – 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 - (Domain 3) – Animal and Human Access	Access by animals or humans resulting in injury or death.	3	6	18
8	Ironbark North Void Low-wall - (Domain 3) – Vehicle Access	Access by vehicles resulting in injury or death.	2	6	12
9	Ironbark North Void Low-wall - (Domain 3) – 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 - (Domain 3) – 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 - (Domain 3) – 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 - (Domain 3) – Animal and Human Access	Access by animals or humans resulting in injury or death.	3	6	18
13	Ironbark North Void High-wall - (Domain 3) – Vehicle Access	Access by vehicles resulting in injury or death.	2	6	12

14	Lanes Void Low-wall- (Domain 5) – 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- (Domain 5) – 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- (Domain 5) – Animal and Human Access	Access by animals or humans resulting in injury or death.	3	6	18
17	Lanes Void Low-wall- (Domain 5) – Vehicle Access	Access by vehicles resulting in injury or death.	2	6	12
18	Lanes Void Low-wall- (Domain 5) – 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 - (Domain 5) – 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 - (Domain 5) - Instability which causes environmental	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

	harm or failure to meet post mining land use.				
21	Lanes Void High-wall - (Domain 5) – Animal and Human Access	Access by animals or humans resulting in injury or death.	3	6	18
22	Lanes Void High-wall - (Domain 5) – Vehicle Access	Access by vehicles resulting in injury or death.	2	6	12
23	Ironbark South Dump - (Domain 6) – 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 - (Domain 6) - 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 - (Domain 6) – Vehicle Access	Access by vehicles resulting in injury or death.	2	6	12
26	Ironbark South Dump - (Domain 6) – Animal and Human Access	Access by animals or humans resulting in injury or death.	2	6	12
27	Ironbark South Dump - (Domain 6) – 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 – (Domain 4) – 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 – (Domain 4) – 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 – (Domain 4) – 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 – (Domain 7) – 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 – (Domain 7) – 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 – (Domain 7) - Unsuccessful Vegetation Cover which	Successful coverage of bare surfaces with vegetation does not occur which results in sediment releases to the receiving water environment.	6	3	18

	causes environmental harm or failure to meet post mining land use.				
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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 – (Domain 2) – 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.	<ul style="list-style-type: none"> • 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 – (Domain 2) – Instability which causes	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.	<ul style="list-style-type: none"> • Tailings Pond is not an above ground structure. • Volume of water contained when full is ~ 1.6 GL.

	environmental harm or failure to meet post mining land use.		<ul style="list-style-type: none"> • 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 – (Domain 2) - Animal and Human Access	Access by animals or humans resulting in injury or death.	<ul style="list-style-type: none"> • 4 strand barbed wire fence with a top plain wire not constructed. • Warnings signs not in place.
4	Tailings Pond – (Domain 2) – Vehicle Access	Access by vehicles resulting in injury or death.	<ul style="list-style-type: none"> • Small area requires safety bunding to be constructed. • Low volume of traffic on site.
5	Ironbark North Void Low-wall - (Domain 3) – 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.	<ul style="list-style-type: none"> • 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.

			<ul style="list-style-type: none"> • 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 - (Domain 3) – 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.	<ul style="list-style-type: none"> • 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 - (Domain 3) – Animal and Human Access	Access by animals or humans resulting in injury or death.	<ul style="list-style-type: none"> • 4 strand barbed wire fence with a top plain wire not constructed. • Warnings signs not in place.
8	Ironbark North Void Low-wall - (Domain 3) – Vehicle Access	Access by vehicles resulting in injury or death.	<ul style="list-style-type: none"> • Stock fence to be installed to restrict access. • Low volume of traffic on site.

9	Ironbark North Void Low-wall - (Domain 3) – 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.	<ul style="list-style-type: none"> • 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 - (Domain 3) – 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.	<ul style="list-style-type: none"> • 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 - (Domain 3) – 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.	<ul style="list-style-type: none"> • 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 - (Domain 3) – Animal and Human Access	Access by animals or humans resulting in injury or death.	<ul style="list-style-type: none"> • Stock fence not constructed. • Warnings signs not in place. • Diversion bund does exist.
13	Ironbark North Void High-wall - (Domain 3) – Vehicle Access	Access by vehicles resulting in injury or death.	<ul style="list-style-type: none"> • 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- (Domain 5) – 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.	<ul style="list-style-type: none"> • 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.

			<ul style="list-style-type: none"> No effect on post mining land use.
15	Lanes Void Low-wall- (Domain 5) – 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.	<ul style="list-style-type: none"> 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- (Domain 5) – Animal and Human Access	Access by animals or humans resulting in injury or death.	<ul style="list-style-type: none"> Stock fence not constructed. Warnings signs not in place.
17	Lanes Void Low-wall- (Domain 5) – Vehicle Access	Access by vehicles resulting in injury or death.	<ul style="list-style-type: none"> 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- (Domain 5) – 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.	<ul style="list-style-type: none"> • 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 - (Domain 5) – 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.	<ul style="list-style-type: none"> • 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 - (Domain 5) - 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.	<ul style="list-style-type: none"> • 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 - (Domain 5) – Animal and Human Access	Access by animals or humans resulting in injury or death.	<ul style="list-style-type: none"> • Stock fence not constructed. • Warnings signs not in place.
22	Lanes Void High-wall - (Domain 5) – Vehicle Access	Access by vehicles resulting in injury or death.	<ul style="list-style-type: none"> • 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 - (Domain 6) – 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.	<ul style="list-style-type: none"> • 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 - (Domain 6) - 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.	<ul style="list-style-type: none"> • Ground surface in proximity to batter slopes require reshaping and grading to direct stormwater to a main drainage channel.
25	Ironbark South Dump - (Domain 6) – Vehicle Access	Access by vehicles resulting in injury or death.	<ul style="list-style-type: none"> • Deep cracks exist along drainage channels in areas where there is vehicle access. • Low volume of traffic.
26	Ironbark South Dump - (Domain 6) – Animal and Human Access	Access by animals or humans resulting in injury or death.	<ul style="list-style-type: none"> • Deep cracks exist along drainage channels in areas where there is animal access.
27	Ironbark South Dump - (Domain 6) – 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.	<ul style="list-style-type: none"> • 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 – (Domain 4) – 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.	<ul style="list-style-type: none"> • 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 – (Domain 4) – 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.	<ul style="list-style-type: none"> • 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 – (Domain 4) – 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.	<ul style="list-style-type: none"> • Good grass coverage exists. • Environmental harm would not occur. • No impact to post mining land use.
31	Out of Pit Dump – (Domain 7) – 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.	<ul style="list-style-type: none"> • Significant erosion exists. • Post mining land use not being achieved in all areas.

32	Out of Pit Dump – (Domain 7) – 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.	<ul style="list-style-type: none"> • Significant tunnel erosion and pipe erosion exists. • Post mining land use not being achieved in all areas.
33	Out of Pit Dump – (Domain 7) - 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.	<ul style="list-style-type: none"> • 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 – (Domain 2) – Erosion which causes environmental harm or failure to meet post mining land use.	1	2	2	<ul style="list-style-type: none"> 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 – (Domain 2) – Instability which causes environmental harm or failure to meet post mining land use.	1	2	2	<ul style="list-style-type: none"> Retain spillway location and width. Retain vegetation between edge of rock lined spillway and Ebenezer Creek. 	1	2	2
3	Tailings Pond – (Domain 2) - Animal and Human Access	3	6	18	<ul style="list-style-type: none"> 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 – (Domain 2) – Vehicle Access	1	6	6	<ul style="list-style-type: none"> 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 - (Domain 3) – Erosion which causes environmental harm or failure to meet post mining land use.	1	1	1	<ul style="list-style-type: none"> 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 - (Domain 3) – Instability which causes environmental harm or failure to meet post mining land use.	1	1	1	<ul style="list-style-type: none"> 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 - (Domain 3) –	3	6	18	<ul style="list-style-type: none"> Construct stock fence. Place signs along fence at 250 m intervals warning of danger do not enter. Construct safety bund. 	1	6	6

	Animal and Human Access							
8	Ironbark North Void Low-wall - (Domain 3) – Vehicle Access	2	6	12	<ul style="list-style-type: none"> 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 - (Domain 3) – Unsuccessful vegetation cover which causes environmental harm or failure to meet post mining land use.	1	1	1	<ul style="list-style-type: none"> Retain the Ironbark North Void to contain any displaced rock or sediment. 	1	1	1
10	Ironbark North Void High-wall - (Domain 3) – Erosion which causes environmental harm or	1	1	1	<ul style="list-style-type: none"> Retain existing diversion bunding that redirects stormwater generated up-gradient of the Ironbark North Void. 	1	1	1

	failure to meet post mining land use.							
11	Ironbark North Void High-wall - (Domain 3) – Instability which causes environmental harm or failure to meet post mining land use.	1	1	1	<ul style="list-style-type: none"> Retain the Ironbark North Void to contain any displaced rock or sediment. 	1	1	1
12	Ironbark North Void High-wall - (Domain 3) – Animal and Human Access	3	6	18	<ul style="list-style-type: none"> 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 - (Domain 3) – Vehicle Access	2	6	12	<ul style="list-style-type: none"> 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- (Domain 5) – Erosion	1	1	1	<ul style="list-style-type: none"> Retain bund and drainage channel on western side of compost pad within Lanes Eastern Emplacement. 	1	1	1

	which causes environmental harm or failure to meet post mining land use.				<ul style="list-style-type: none"> Construct new section of bund offset from crest of low wall. 			
15	Lanes Void Low-wall- (Domain 5) – Instability which causes environmental harm or failure to meet post mining land use.	1	1	1	<ul style="list-style-type: none"> 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- (Domain 5) – Animal and Human Access	3	6	18	<ul style="list-style-type: none"> 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- (Domain 5) – Vehicle Access	2	6	12	<ul style="list-style-type: none"> Retain bunding along western perimeter of compost pad within the Lanes Eastern Emplacement. Construct stock fence. 	1	6	6

				1	<ul style="list-style-type: none"> • Install access gate. • 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 bunding. 			1
18	Lanes Void Low-wall- (Domain 5) – Unsuccessful vegetation cover which causes environmental harm or failure to meet post mining land use.	1	1	1	<ul style="list-style-type: none"> • Retain the Lanes Void to contain any displaced rock or sediment. 	1	1	1
19	Lanes Void High-wall - (Domain 5) – Erosion which causes environmental harm or failure to meet post mining land use.	1	1	1	<ul style="list-style-type: none"> • Retain existing diversion bunding that redirects stormwater generated up-gradient of the Lanes Void. 	1	1	1

20	Lanes Void High-wall - (Domain 5) - Instability which causes environmental harm or failure to meet post mining land use.	1	1	1	<ul style="list-style-type: none"> Retain the Lanes Void to contain any displaced rock or sediment. 	1	1	1
21	Lanes Void High-wall - (Domain 5) – Animal and Human Access	3	6	18	<ul style="list-style-type: none"> 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 - (Domain 5) – Vehicle Access	2	6	12	<ul style="list-style-type: none"> 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 - (Domain 6) – Erosion which causes environmental harm or failure to meet post mining land use.	5	3	15	<ul style="list-style-type: none"> 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 - (Domain 6) - Instability which causes environmental harm or failure to meet post mining land use.	2	3	6	<ul style="list-style-type: none"> 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 - (Domain 6) – Vehicle Access	2	6	12	<ul style="list-style-type: none"> 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. 	1	6	6

					<ul style="list-style-type: none"> Repair deep cracks in drainage channels. 			
26	Ironbark South Dump - (Domain 6) – Animal and Human Access	2	6	12	<ul style="list-style-type: none"> 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 - (Domain 6) – Unsuccessful Vegetation Cover which causes environmental harm or failure to meet post mining land use.	2	3	3	<ul style="list-style-type: none"> Cover bare surfaces with topsoil and establish grass. Reshape drainage channels and topsoil and establish grass. 	1	3	3
28	Lanes Eastern Emplacement – (Domain 4) – Erosion which causes environmental harm or failure to meet post mining land use.	1	1	1	<ul style="list-style-type: none"> Repair eroded drainage channels. Cover small area of bare surface with topsoil and establish grass. 	1	1	1

29	Lanes Eastern Emplacement – (Domain 4) – Instability which causes environmental harm or failure to meet post mining land use.	1	1	1	<ul style="list-style-type: none"> Retain contour drains and draining channels. 	1	1	1
30	Lanes Eastern Emplacement – (Domain 4) – Unsuccessful Vegetation Cover which causes environmental harm or failure to meet post mining land use.	1	2	2	<ul style="list-style-type: none"> Retain existing grass coverage. Cover small area of bare surface with topsoil and establish grass. 	1	1	1
31	Out of Pit Dump – (Domain 7) – Erosion which causes environmental harm or failure to meet post mining land use.	6	3	18	<ul style="list-style-type: none"> 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 – (Domain 7) – Waterlogging resulting in erosion which causes environmental harm or failure to meet post mining land use.	6	3	18	<ul style="list-style-type: none"> • 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 – (Domain 7) - Unsuccessful Vegetation Cover which causes environmental harm or failure to meet post mining land use.	6	3	18	<ul style="list-style-type: none"> • Cover bare surfaces with topsoil and establish grass. 	2	2	4

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.

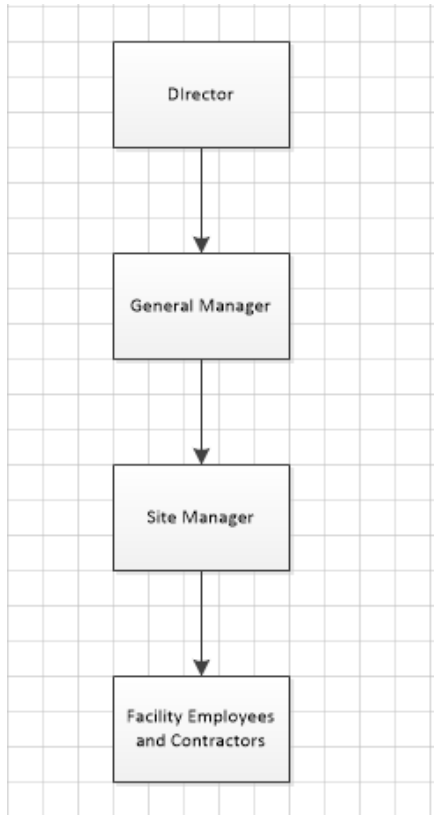
Safety bunds will be constructed to restrict vehicle access to the Lanes Void, Ironbark North Void and the Tailings Pond at certain areas determined. Stock fencing will restrict animal access to the Lanes Void, Ironbark North Void, and the Tailings Pond. Gates will be strategically positioned and locked 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.

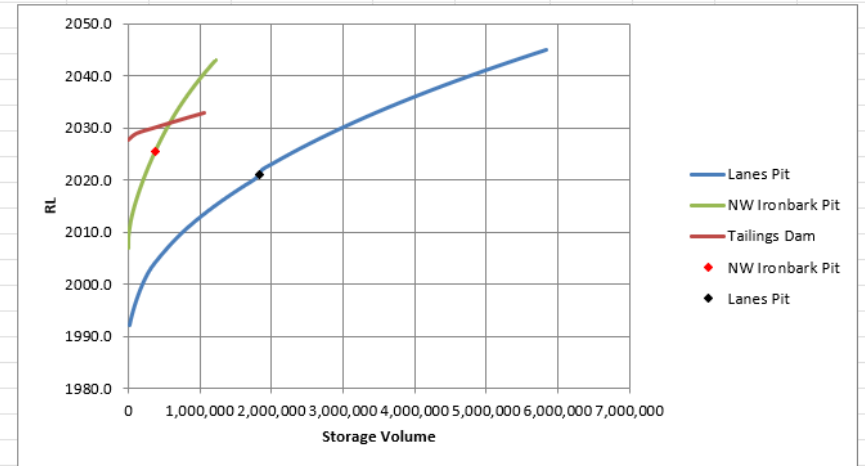
Position: Facility Employees and Contractors

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											



	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.



Part 2
Ebenezer Project
Progressive Rehabilitation and Closure Plan
Schedule
Tenure number ML4712
Environmental Authority EPML00594013
Mining Lease 4712
Version 1
18 May 2023

EA Holder: Zedemar Holdings Pty Ltd

Document ID: PRCPISp2

Date of Submission: 19 May 2023

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Contents

Contents.....	iii
Limitations	v
1 Introduction	6
1.1 Final Site Design	7
1.1.1 Rehabilitation Areas.....	8
1.2 Schedule of Land Availability	14
1.3 Rehabilitation Milestones	15
1.3.1 Milestone Criteria	17
2 PRCP Schedule	19

Figures

Figure 1: Final Site Design	7
Figure 2: Domains of ML4712	11
Figure 3: Extent of open cut mining overlaying domains	12
Figure 4: Proposed areas for Rehabilitation and Improvements.....	13

Tables

Table 1: Schedule of rehabilitation in each year.....	14
Table 2: Rehabilitation Milestones	16
Table 3: Milestone Criteria	18
Table 4: PRCP Schedule for Domain 1.....	19
Table 5: PRCP Schedule Domain 2	20
Table 6: PRCP Schedule for Domain 3.....	21
Table 7: PRCP Schedule for Domain 4.....	22
Table 8: PRCP Schedule for Domain 5.....	23
Table 9: PRCP Schedule for Domain 6.....	24
Table 10: PRCP Schedule for Domain 7.....	25
Table 11: PRCP Schedule for Domain 8.....	26
Table 12: PRCP Schedule for Domain 9.....	27
Table 13: PRCP Schedule for Domain 10.....	28
Table 14: PRCP Schedule for Domain 11.....	29
Table 15: PRCP Schedule for Domain 12.....	30
Table 16: PRCP Schedule for Domain 13.....	31
Table 17: PRCP Schedule for Domain 14.....	32

Limitations

This report has been prepared using current environmental legislation, guidelines and accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

This report is based on information gained from third parties as identified in the PRCP, referenced sources, observations made during site visits and professional experience.

This report has been prepared in good faith in accordance with Zambelli Environmental's understanding of the client's brief.

This report was prepared for Zedemar Holdings Pty Ltd for activities carried out within ML4712 at 266 – 304 & 350 Coopers Road, Ebenezer, QLD 4340 and is only intended to be used for the purposes as described in **section 1** in this report.

1 Introduction

This PRCP schedule (Part 2 of PRCP) has been prepared in accordance with Guideline – Progressive rehabilitation and closure plans (PRC plans) (ESR/2019/4964 Version 3.00, 4 April 2021, produced by Department of Environment and Science. It contains a description of each rehabilitation area, a schedule of land availability for rehabilitation and a detailed description of the rehabilitation milestones to achieve the post mining land uses contained within Table F1 of Environmental Authority (EPML00594013). Milestone criteria is also provided that demonstrates when the milestone has been completed within each rehabilitation area. Completion dates for each milestone are also provided.

For the purpose of continuity with the PRCP, particular rehabilitation areas will be referred to as Domains.

1.1 Final Site Design

The final site design within ML4712 is shown in Figure 1 below.

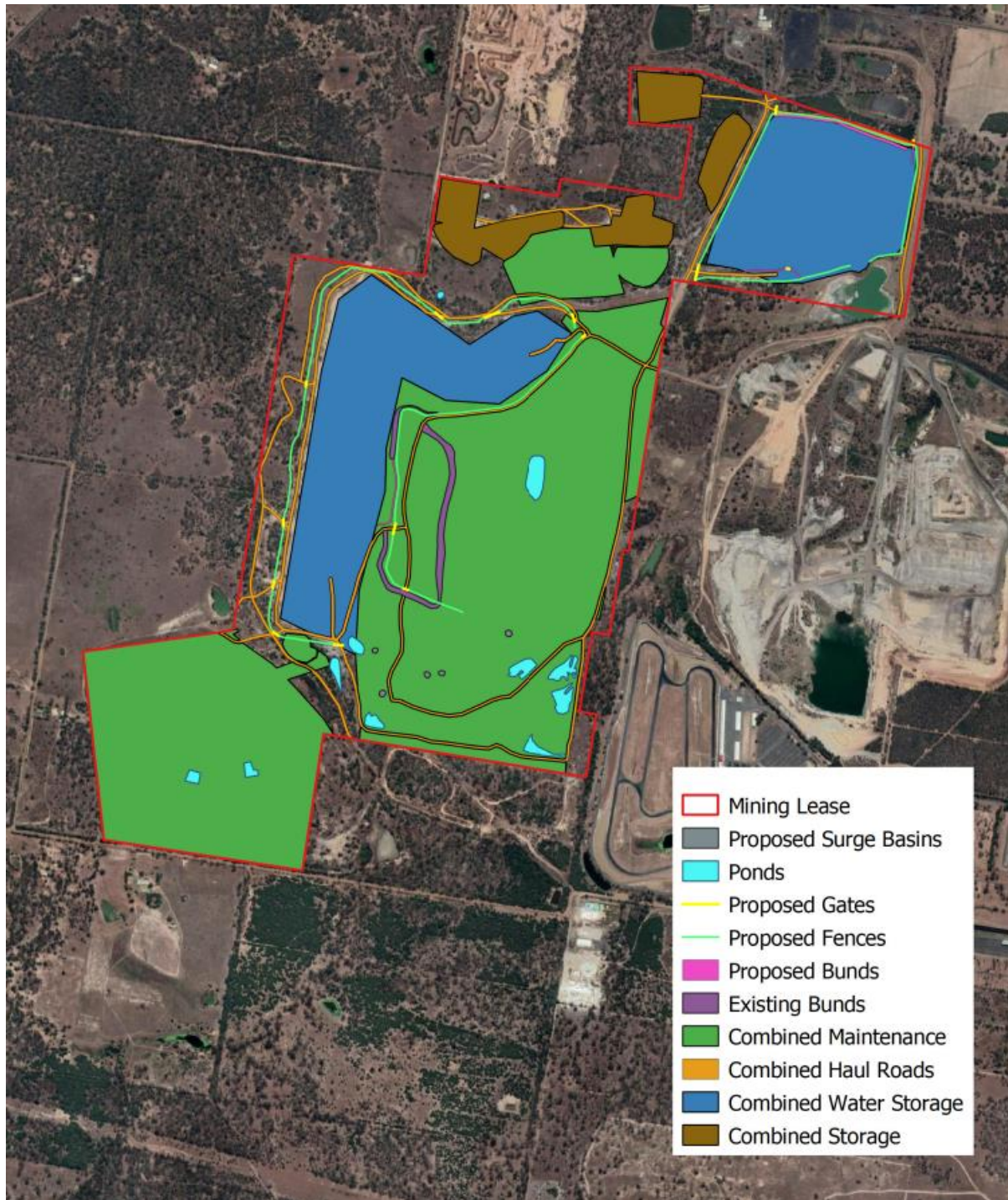


FIGURE 1: FINAL SITE DESIGN

1.1.1 Rehabilitation Areas

The disturbance footprint of the Ebenezer Project has been divided into the following domains.

- **Domain 1 (Stockpile Area) – This area (3.2 ha) was used as a secondary 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 and is currently being used to store plant and equipment.

- **Domain 2 (Tailings Pond) – This area (31.7 ha) was a previously mined pit which was subsequently used for tailings deposition until mining ceased in 2003**

The tailings pond was 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.

Mining at Ebenezer ceased in 2002 with the last coal washed in February 2003. Tailings ceased to be deposited into the pond from that time. The level of tailings is approximately 4 to 13.5 m below the natural topography and thus there is no constructed “tailings dam wall” that could fail.

- **Domain 3 (Ironbark North Void)– Mining void area (12.2 ha) where mining ceased in 1996;**

Given the location of the final void, the opportunity to use the void as a 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.

- **Domain 4 (Lanes Eastern Emplacement) – Area (76.6 ha) where overburden emplacement from mining of the Lanes and Ironbark North Voids as mining progressed to the west occurred;**

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 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 site.

The area has been grazed since completion. The grass coverage on this area meets the acceptance criteria except for some minor areas where erosion has been identified and where bare ground surface has been identified. These areas have been included within the ERC calculator.

The bund wall located on the western side of the compost requires to be offset further from the crest of the low-wall due to slippage that occurred early in December 2021 (refer to Appendix 2 – Image 12 of the PRCP).

- **Domain 5 (Lanes Void) – Mining Void area (33.9 ha) where mining ceased in 1996;**

Mining ceased in the Lanes Void in 1996. Similar to 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 of the site for industrial uses, water storage for industrial uses is also possible.

- **Domain 6 (Ironbark South Dump) – a previously mined pit area (35.9 ha) which was being backfilled as part of the Lanes mining operation until mining ceased;**

This area is a backfilled mining pit. Waste from the Lanes Void mining development was placed into the void. It was also used for depositing coarse reject. The surface of the Ironbark South dump (IBSD) 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, and the dump elevation is currently around 30 m below the top of the Lanes Eastern Emplacement. As you move eastwards, the topography of the IBSD becomes terraced as a result of the way spoil was being dumped (refer to Appendix 5 – Plan 26 of the PRCP). The IBSD was retained for future spoil emplacement when the originally proposed mining was to recommence in the Lanes Void.

- **Domain 7 (Out of Pit Dump) – The original dump area (56.5 ha) for the original box cut from when operations commenced in 1986;**

The out of pit dump was created from the first overburden from the initial pit on ML 4712. Overburden was placed to tie in with an original ridge line on the southern boundary of the site. 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 1.8.2.7 of the PRCP.

- **Domain 8 (Bentonite work area) – bentonite stockpile and processing area (10 ha);**

Buildings and ancillary services will be retained by the landowner for future use. Similarly, the bentonite stockpile hardstand pads will also be retained by the landowner.

- **Domain 9 (Maxam Area) – Explosive storage facility area (3.7 ha);**

Buildings and ancillary services will be retained by the landowner for future use.

- **Domain 10 (Haulage Roads) – Area (15.2 ha) used for site access;**

Existing haulage roads will be retained at the request of the landowner. Further to the connection of the haulage road from Domain 4 to Domain 6, a new haulage road will be constructed outside the safety bund and stock fence surrounding Domain 3 and 5 which will link up with existing haulage roads located west of the voids.

- **Domain 11 (Wet Weather Storage Pad) – Area (0.76 ha) used for wet weather storage of abattoir pond mud and paunch;**

This area has been utilised as a wet weather storage pad for incoming paunch and abattoir pond mud for composting. The perimeter bunds constructed to contain stormwater will be dozed and spread

across the ripped hardstand area. Topsoil and compost will be spread over the reshaped surface, followed by grass seed to establish vegetation.

- **Domain 12 – (Bentonite B Area) – Vegetated area (8.1 ha);**

Stormwater generated within Domain 8 has resulted in bentonite depositing over the ground surface underneath and around trees. Topsoil and compost will be spread following grass seed to establish vegetation.

- **Domain 13 – (Overburden Mound) – Vegetated area (2.2 ha);**

This overburden mound was created during mining. The mound is practically covered by vegetation. Topsoil and compost will be spread over bare ground surfaces, followed by grass seed to establish vegetation.

- **Domain 14 – (Topsoil Stockpile) – Area (0.87 ha) used for topsoil storage;**

This area has been utilised to stockpile topsoil stripped during mining. The topsoil will be utilised in rehabilitation works. Compost will be spread with remaining topsoil (200 mm thick), followed by grass seed to establish vegetation.

- **Domain 15 – (Balance of Mining Lease Undisturbed) – Area (66.7 ha) considered to be undisturbed;**

This area is considered to be undisturbed and includes areas in the south-eastern portion of the ML located within Ebenezer Creek, vegetated areas to the west and south of Lanes Voids, north of Ironbark North Void and within the north-eastern area of the ML. There is a small area south of the Tailings Pond that was disturbed by mining, but which is located within Ebenezer Creek. Rehabilitation of that area was completed with the realignment of Ebenezer Creek. No improvements works are proposed for the balance of ML4712.

Figure 2 portrays, the respective domains described above and Figure 3 portrays the extent of open cut mining, overlaid with the domains. Figure 4 portrays the areas proposed to be rehabilitated, ponds to remain, new haulage road path locations to provide access, proposed and stock fencing, proposed and existing bunds that will be retained.

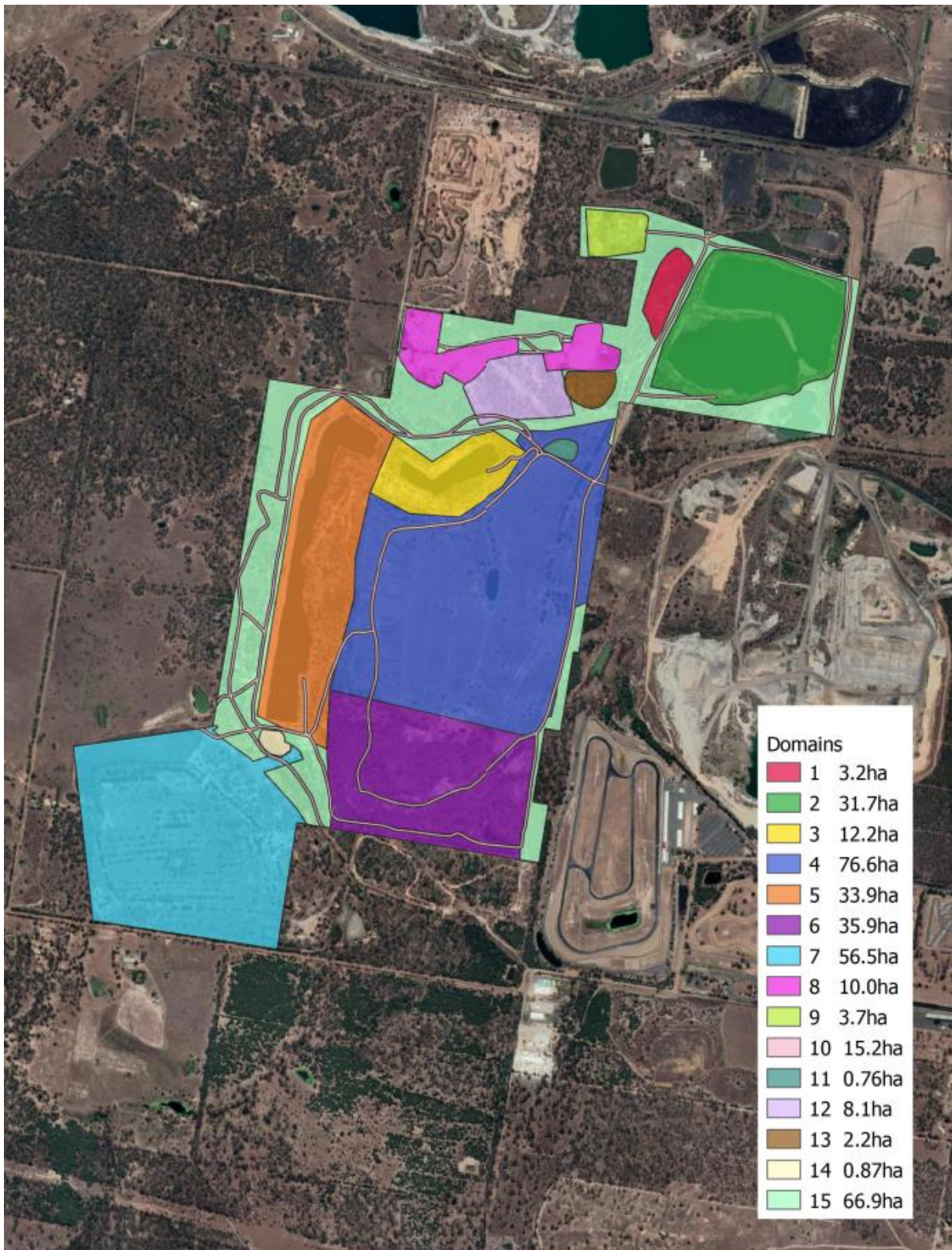


FIGURE 2: DOMAINS OF ML4712

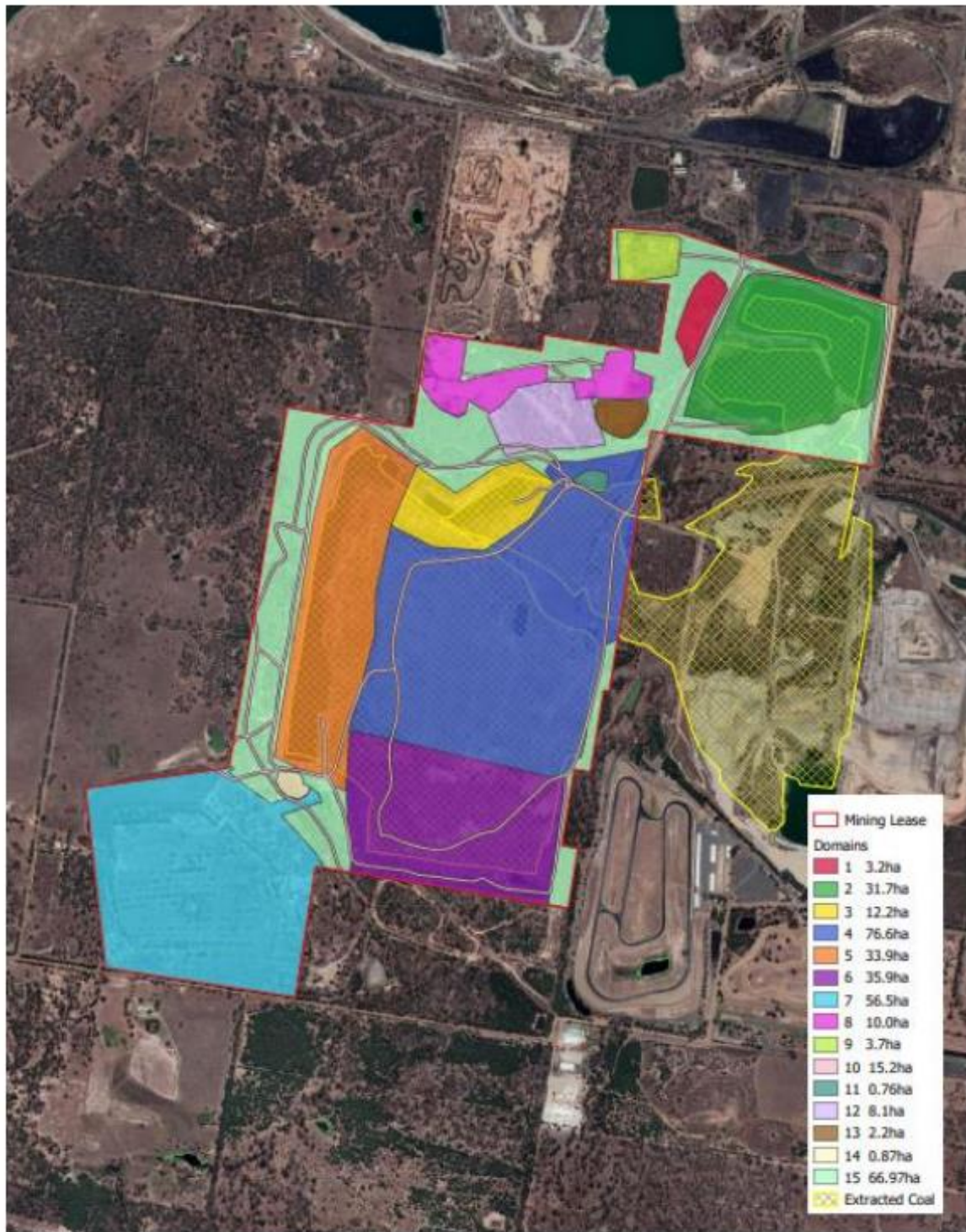


FIGURE 3: EXTENT OF OPEN CUT MINING OVERLAYING DOMAINS

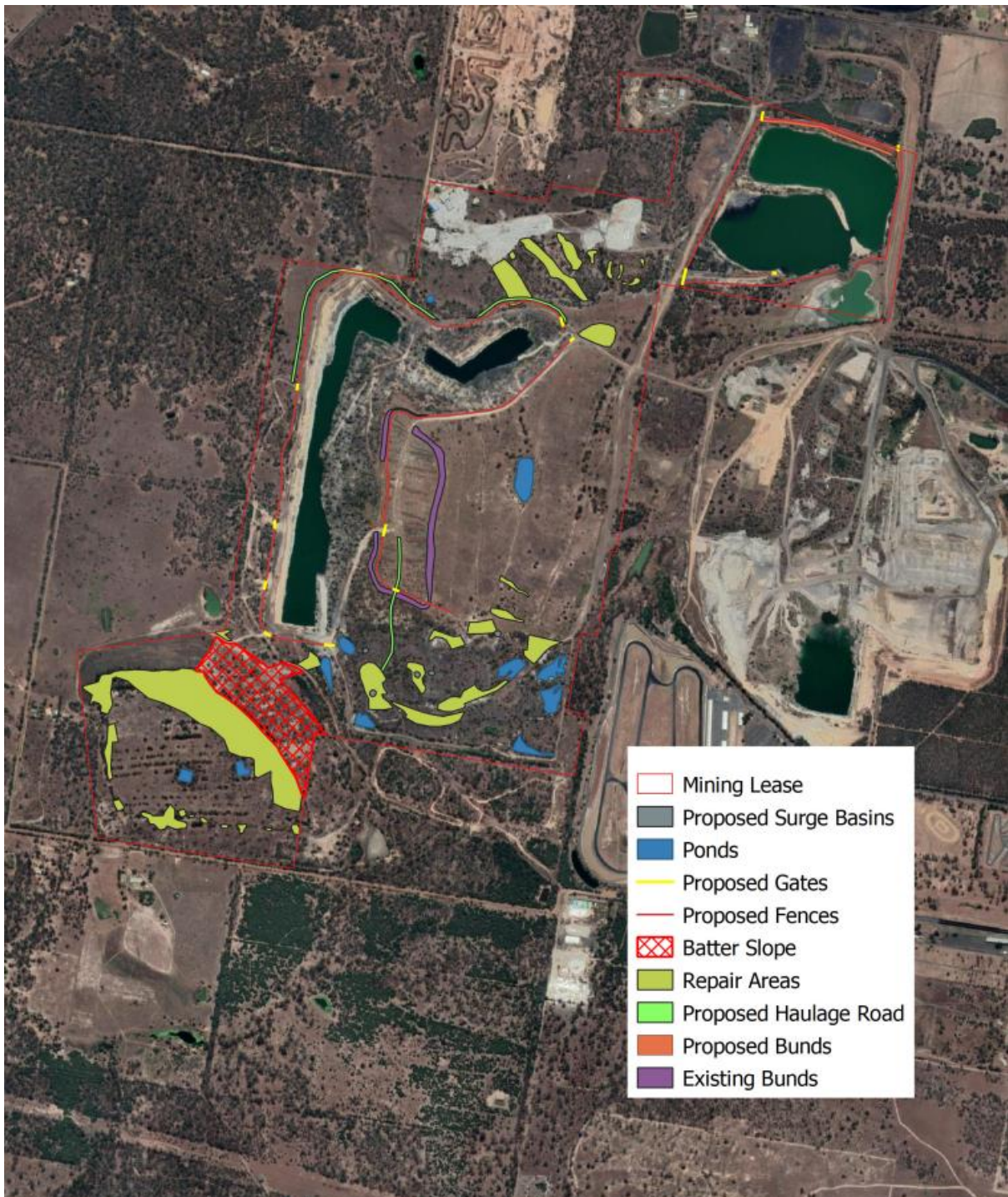


FIGURE 4: PROPOSED AREAS FOR REHABILITATION AND IMPROVEMENTS

1.2 Schedule of Land Availability

The land is no longer being mined and no further overburden dumping is required. No mining infrastructure is being operated. All disturbance within domains requiring rehabilitation is available.

The schedule for rehabilitation is provided in the following table to illustrate the transition in rehabilitated areas. Yellow depicts when rehabilitation activities will commence.

Rehabilitation Area	Area (ha)	Schedule of Rehabilitation in each year (ha)																							
		2023												2024											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Domain 1 - Stockpile area	3.2																								
Domain 2 - Tailings Pond	31.7																								
Domain 3 - Ironbark North Void	12.2																								
Domain 4 - Lanes Eastern Emplacement	76.6																								
Domain 5 - Lanes Void	33.9																								
Domain 6 - Ironbark South Dump	35.9																								
Domain 7 - Out of Pit Dump	56.5																								
Domain 8 - Bentonite	10																								
Domain 9 - Maxam	3.7																								
Domain 10 - Haulage Roads	15.2																								
Domain 11- Wet Weather Storage Area	0.76																								
Domain 12 - Bentonite B area	8.1																								
Domain 13 - Overburden Mound	2.2																								
Domain 14 - Topsoil Stockpile	0.87																								
Domain 15 - Balance of Mining Lease Undisturbed	66.97																								
Total	357.8																								

TABLE 1: SCHEDULE OF REHABILITATION IN EACH YEAR

1.3 Rehabilitation Milestones

Rehabilitation milestones relevant to the Ebenezer Project area are listed in the following table.

Code	Milestone	Description	Applicable Rehabilitation Areas
RM1	Landform reshaping/reprofiling.	<ul style="list-style-type: none"> Bulk earthworks to achieve required landform has been completed; Correction of subsidence and erosion channels are complete; and General reshaping to achieve final landform is complete. 	Domains 2, 3, 4, 5, 6, 7, 14
RM2	Surface preparation.	<ul style="list-style-type: none"> Deep ripping has been completed; Topsoil/compost has been sourced, carted and spread; and Fertiliser or ameliorants to improve or stabilise soils have been added. 	Domain 2, 4, 6, 7, 11, 12, 13, 14
RM3	Revegetation.	<ul style="list-style-type: none"> The spreading of grass seed is complete. Grass has successfully emerged. 	Domain 2, 4, 6, 7, 11, 12, 13, 14
RM4	Land is suitable for light cattle grazing.	<ul style="list-style-type: none"> Established grass is suitable to support light cattle grazing. Stock fence and gates have been installed. Warning signs have been erected. 	Domain 4, 6, 7, 11, 12, 13, 14
RM5	Achievement of post-mining land use to stable condition.	<ul style="list-style-type: none"> Monitoring has determined that the land is safe, structurally stable, non-polluting and is able to sustain the post-mining land use of light cattle grazing. 	Domain 4, 6, 7, 11, 12, 13, 14
RM6	Voids are suitable for the storage of water and as fauna habitat.	<ul style="list-style-type: none"> Monitoring of void water has determined that water quality is fit for purpose. Stability assessments have been finalised with associated infrastructure installation completed (i.e. safety bunding and 5-strand stock fence with access gates installed). 	Domain 2, 3, 4, 5
RM7	Voids access is restricted	<ul style="list-style-type: none"> Safety bunding restricting access to Lanes Void, Ironbark North Void and at the Tailings Pond has been completed. Stock fence and gates have been installed around the Tailings Pond. Stock fence and gates surrounding Lanes Void and Ironbark North Void have been installed. 	Domain 2, 3, 5

RM8	Infrastructure decommissioning and removal.	<ul style="list-style-type: none"> All plant and equipment associated with bentonite processing and explosives storage is to be removed to the satisfaction of the landowner. 	Domain 8, 9
RM9	Infrastructure to remain achieves the requirements of the landowner.	<ul style="list-style-type: none"> All buildings and storage sheds are devoid of infrastructure, plant and equipment not required by landowner. All haulage roads are traversable in dry weather. Storage pads are fit for purpose. Stock fences restrict animal access and gates have been inspected and accepted by landowner as being operable. Stock fences surrounding Lanes Void and Ironbark Void have been inspected and confirmed to restrict access. Safety bunding restricts access by vehicles. 	Domain 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

TABLE 2:REHABILITATION MILESTONES

1.3.1 Milestone Criteria

Milestone criteria related to each of the rehabilitation milestone are listed below.

Code	Milestone	Milestone Criteria
RM1	Landform reshaping/reprofiling.	<ul style="list-style-type: none"> All earthworks except topsoiling are complete. All contour bunds and drains are complete. All safety bunds are complete. All sediment and surge basins are complete. All rock lined (geofab where required) drains and down chutes are complete. All rock check dams are complete.
RM2	Surface preparation.	<ul style="list-style-type: none"> An assessment of the topsoil to determine quality has been completed by an appropriately qualified person. Soil ameliorants or fertiliser/compost has been added where recommended. 200 mm of topsoil has been placed over all surfaces following achievement of RM1.
RM3	Revegetation.	<ul style="list-style-type: none"> Seeding has been completed at 2-3 kg/ha. Emergence of grass covers 90% of seeded area.
RM4	Land is suitable for light cattle grazing.	<ul style="list-style-type: none"> Revegetation survey determines that self-sustaining vegetation of suitable pasture species has been established. Grazed land maintains a percentage of ground cover of approximately 50 % where grass coverage (basal and aerial) vegetation is > 30% of the cover except in seasons when average rainfall is less than the 20th percentile. Weeds listed under the Biosecurity Act have ≤2.0 % cover. The productivity of Class 4 Post Mine Land Capability rehabilitated areas for grazing will support one beast per 5 ha except in seasons when average rainfall is less than the 20th percentile. Class 4 Post Mine Land Capability is defined as Marginally Suitable Land – land which is marginally suited for a proposed use and would require major inputs to ensue sustainability. The inputs may not be justified by the benefits to be obtained in using the land for the particular purpose and is hence considered presently unsuited.-

		<ul style="list-style-type: none"> • Stock fence installation has been complete. • All gates have been installed. • Erection of warning signs has been completed.
RM5	Achievement of post-mining land use to stable condition.	<ul style="list-style-type: none"> • A suitably qualified person has certified that the final landform is geotechnically stable.
RM6	Voids are suitable for the storage of water and as fauna habitat.	<ul style="list-style-type: none"> • Water quality results have been reviewed by a suitably qualified person as being fit for purpose (i.e. fauna habitat, light irrigation, stockwater). • Safety bund construction has been completed. • Stock fence installation has been complete. • All gates have been installed.
RM7	Voids access is restricted	<ul style="list-style-type: none"> • Safety bunding at Lanes Void and Ironbark North Void and at the Tailings Pond has been completed. • Stock fence and gates have been installed at Tailings Pond. • Stock fence and gates surrounding Lanes Void and Ironbark North Void and south end of compost pad within Lanes Eastern Emplacement have been installed.
RM8	Infrastructure decommissioning and removal.	<ul style="list-style-type: none"> • All services have been disconnected except where the landowner retains. • All buildings and sheds are demolished and removed except where the landowner retains. • All plant and equipment not retained by the landowner has been removed from Domain 8 and Domain 9. • All rubbish has been removed. • All waste is to be transported, disposed of and handled in accordance with relevant legislation.
RM9	Infrastructure to remain achieves the requirements of the landowner.	<ul style="list-style-type: none"> • Monitoring has been undertaken to confirm the landowner's satisfaction of all items of infrastructure that is to remain (refer to Landowner Statement for relevant items).

TABLE 3: MILESTONE CRITERIA

2 PRCP Schedule

Rehabilitation area		Domain 1								
Relevant activity		Storage								
Total size of rehabilitation area (ha)		3.2								
Commencement of first milestone		1-Jan-23								
PMLU		Storage								
Date area is available	1-Mar-22									
Cumulative area available (ha)	3.2									
	Milestone completed by									
	1-Mar-22									
Milestone code	Cumulative area achieved (ha)									
RM1										
RM2										
RM3										
RM4										
RM5										
RM6										
RM7										

TABLE 4: PRCP SCHEDULE FOR DOMAIN 1

Rehabilitation area				Domain 2						
Relevant activity				Tailings Pond						
Total size of rehabilitation area (ha)				31.7						
Commencement of first milestone				1-Jun-23						
PMLU				Water Storage/Fauna Habitat						
Date area is available	1-Jun-23	1-Jul-23	1-Aug-23	1-Sep-23						
Cumulative area available (ha)	0.377	0.377	31.7	0.377						
	Milestone completed by									
	1-Jul-23	1-Aug-23	1-Sep-23	1-Oct-23						
Milestone code	Cumulative area achieved (ha)									
RM1	0.377									
RM2	0.377									
RM3		0.377								
RM4										
RM5				0.377						
RM6										
RM7	0.377		31.7	0.377						

TABLE 5: PRCP SCHEDULE DOMAIN 2

Rehabilitation area		Domain 3								
Relevant activity		Ironbark Northern Void								
Total size of rehabilitation area (ha)		12.2								
Commencement of first milestone		1-Jun-23								
PMLU		Water Storage/Fauna Habitat								
Date area is available	1-Jun-23									
Cumulative area available (ha)	12.2									
		Milestone completed by								
	1-Sep-23									
Milestone code		Cumulative area achieved (ha)								
RM1										
RM2										
RM3										
RM4										
RM5										
RM6	12.2									
RM7	12.2									

TABLE 6: PRCP SCHEDULE FOR DOMAIN 3

Rehabilitation area		Domain 4								
Relevant activity		Lanes Eastern Emplacement								
Total size of rehabilitation area (ha)		76.6								
Commencement of first milestone		1-Jun-23								
PMLU		Light Cattle Grazing								
Date area is available	1-Jun-23									
Cumulative area available (ha)	76.6									
	Milestone completed by									
	30-Sep-23									
Milestone code	Cumulative area achieved (ha)									
RM1	0.453									
RM2	0.453									
RM3	0.453									
RM4	76.6									
RM5										
RM6										
RM7										

TABLE 7: PRCP SCHEDULE FOR DOMAIN 4

Rehabilitation area		Domain 5								
Relevant activity		Lanes Void								
Total size of rehabilitation area (ha)		33.9								
Commencement of first milestone		1-Jun-23								
PMLU		Water Storage/Fauna Habitat								
Date area is available	1-Jun-23									
Cumulative area available (ha)	33.9									
		Milestone completed by								
	1-Sep-23									
Milestone code		Cumulative area achieved (ha)								
RM1										
RM2										
RM3										
RM4										
RM5										
RM6	33.9									
RM7	33.9									

TABLE 8: PRCP SCHEDULE FOR DOMAIN 5

Rehabilitation area		Domain 6								
Relevant activity		Ironbark South Dump								
Total size of rehabilitation area (ha)		35.9								
Commencement of first milestone		1-Jun-23								
PMLU		Light Cattle Grazing								
Date area is available	1-Jun-23									
Cumulative area available (ha)	35.9									
	Milestone completed by									
	1-Sep-23									
Milestone code	Cumulative area achieved (ha)									
RM1	4.413									
RM2	4.413									
RM3	4.413									
RM4	35.9									
RM5	35.9									
RM6										
RM7	35.9									

TABLE 9:PRCP SCHEDULE FOR DOMAIN 6

Rehabilitation area		Domain 7								
Relevant activity		Out of Pit Dump								
Total size of rehabilitation area (ha)		56.5								
Commencement of first milestone		1-Jun-23								
PMLU		Light Cattle Grazing								
Date area is available	1-Jun-23									
Cumulative area available (ha)	56.5									
	Milestone completed by									
	1-Sep-23									
Milestone code	Cumulative area achieved (ha)									
RM1	15.4									
RM2	15.4									
RM3	15.4									
RM4	56.5									
RM5	56.5									
RM6										
RM7										

TABLE 10: PRCP SCHEDULE FOR DOMAIN 7

Rehabilitation area		Domain 8								
Relevant activity		Bentonite								
Total size of rehabilitation area (ha)		10								
Commencement of first milestone		1-Jul-23								
PMLU		Storage								
Date area is available	1-Jul-23									
Cumulative area available (ha)	10									
	Milestone completed by									
	30-Sep-23									
Milestone code	Cumulative area achieved (ha)									
RM1										
RM2										
RM3										
RM4										
RM5										
RM6										
RM7										
RM8	10									
RM9	10									

TABLE 11: PRCP SCHEDULE FOR DOMAIN 8

Rehabilitation area		Domain 9								
Relevant activity		Maxam								
Total size of rehabilitation area (ha)		3.7								
Commencement of first milestone		1-Jun-23								
PMLU		Storage								
Date area is available	1-Jun-23									
Cumulative area available (ha)	3.7									
	Milestone completed by									
	30-Sep-23									
Milestone code	Cumulative area achieved (ha)									
RM1										
RM2										
RM3										
RM4										
RM5										
RM6										
RM7										
RM8	3.7									
RM9	3.7									

TABLE 12: PRCP SCHEDULE FOR DOMAIN 9

Rehabilitation area		Domain 10								
Relevant activity		Haulage roads								
Total size of rehabilitation area (ha)		15.2								
Commencement of first milestone		1-Sep-23								
PMLU		Access								
Date area is available	1-Sep-23									
Cumulative area available (ha)	15.2									
	Milestone completed by									
	30-Sep-23									
Milestone code	Cumulative area achieved (ha)									
RM1	15.2									
RM2										
RM3										
RM4										
RM5										

TABLE 13: PRCP SCHEDULE FOR DOMAIN 10

Rehabilitation area		Domain 11								
Relevant activity		Wet Weather Storage Area								
Total size of rehabilitation area (ha)		0.759								
Commencement of first milestone		1-Aug-23								
PMLU		Light Cattle Grazing								
Date area is available	1-Aug-23									
Cumulative area available (ha)	0.759									
	Milestone completed by									
	30-Sep-23									
Milestone code	Cumulative area achieved (ha)									
RM1	0.759									
RM2	0.759									
RM3	0.759									
RM4	0.759									
RM5										

TABLE 14: PRCP SCHEDULE FOR DOMAIN 11

Rehabilitation area		Domain 12								
Relevant activity		Bentonite B Area								
Total size of rehabilitation area (ha)		8.1								
Commencement of first milestone		1-Jun-23								
PMLU		Light Cattle Grazing								
Date area is available	1-Jun-23									
Cumulative area available (ha)	8.1									
	Milestone completed by									
	30-Sep-23									
Milestone code	Cumulative area achieved (ha)									
RM1										
RM2	2.768									
RM3	2.768									
RM4	8.1									
RM5										

TABLE 15: PRCP SCHEDULE FOR DOMAIN 12

Rehabilitation area		Domain 13								
Relevant activity		Overburden Mound								
Total size of rehabilitation area (ha)		2.2								
Commencement of first milestone		1-Jun-23								
PMLU		Light Cattle Grazing								
Date area is available	1-Jun-23									
Cumulative area available (ha)	2.2									
	Milestone completed by									
	30-Sep-23									
Milestone code	Cumulative area achieved (ha)									
RM1										
RM2	0.286									
RM3	0.286									
RM4	2.2									
RM5										

TABLE 16: PRCP SCHEDULE FOR DOMAIN 13

Rehabilitation area		Domain 14								
Relevant activity		Topsoil Stockpile								
Total size of rehabilitation area (ha)		0.87								
Commencement of first milestone		1-Jun-23								
PMLU		Light Cattle Grazing								
Date area is available	1-Jun-23									
Cumulative area available (ha)	0.87									
	Milestone completed by									
	30-Sep-23									
Milestone code	Cumulative area achieved (ha)									
RM1										
RM2	0.87									
RM3	0.87									
RM4	0.87									
RM5										

TABLE 17: PRCP SCHEDULE FOR DOMAIN 14

Statement

To:	Zedemar Holdings Pty Ltd
From:	Wanless Recycling Park Pty Ltd
Date:	
Subject:	Retainment of Infrastructure ML4712

As the landowner, I advise that the following items of infrastructure are to remain when the environmental authority is surrendered:

- All haulage roads are to remain providing access to the site.
- All security fencing is to remain restricting access to the Lanes Void and Ironbark Northern Void.
- All stock fencing surrounding the Tailings Pond is to remain.
- All bunding constructed at the tailings pond is to remain.
- All ponds in cattle grazing areas are to remain for stock water and fauna habitat.
- The Lanes Void, Ironbark Northern Void and the Tailings Pond are to remain for water storage and fauna habitat.
- All stormwater infrastructure is to remain. This includes existing sediment basins, Tailings Pond spillway, culverts/drains, drainage paths, check dams, rock lined down chutes and diversion bunds.
- Buildings/sheds located within the area occupied by Bentonite Resources Pty Ltd will be retained for use as storage areas. Hardstand pads and haulage paths within this area will also remain for the purpose of storing plant and equipment and access.
- Buildings/sheds within the area occupied by Maxam Pty Ltd will be retained for use as storage areas. Cleared areas and haulage paths will be retained for access.

Yours sincerely



Dean Wanless

Director

Wanless Recycling Park Pty Ltd

1041 Redbank Plains Road
New Chum Qld 4303PO Box 4065
RACEVIEW Q4305

23 August 2023

Zedemar Holdings Pty Ltd
Ebenezer Mine
Ebenezer QLD 4340

Attn Mr Peter Toole – Project Manager & Mr Luke Zambelli – Environmental Engineer

Re Mining and Backfilling of Ebenezer Mine - Iron Bark South Pit**1. Introduction: -**

This report has been prepared by Taylor Mining Services at the request of Zedemar Holdings Pty Ltd in relation to the Qld Department of Environment & Science (DES) request for information in relation to the characteristics of the mine waste deposited within the Ironbark South Dump Area,

To summarise and provide an understanding of the mining and backfilling of this part of the mine site we have prepared the attached set of plans that show the Iron Bark Pit from pre-mining to backfilling in its current state.

We also refer to the report prepared by Mr Warwick Smyth of Geo Consult dated 31 July 2023.

Plans attached to this report include: -

- 1993 Aerial showing the Iron Bark South Pit - prior to open cut mining.
- 1995 Mine Plan showing the Iron Bark South Pit - Partly Mined.
- 1995 Aerial showing the iron Bark South Pit - Mined Out
- 1995 Mine Plan showing the Iron Bark South Pit – Floor Structure Contours
- 1998 Aerial showing the Iron Bark South Pit – Part Backfilled
- 2000 Aerial showing the Iron Bark South Pit – Part Backfilled
- 2001 Aerial showing the Iron Bark South Pit – Part Backfilled
- 2002 Aerial showing the Iron Bark South Pit – Part Backfilled with Coal Stone Reject

2. Mining: -

Mining in the Iron Bark South Pit commenced about 1993 and was completed by late 1995. The SW corner of the Pit had reached a depth of 70m approx. from the natural surface.

The 1993 Aerial shows the Iron Bark South Pit area not mined and abutting the Iron Bark pit and backfill to the North.

The 1995 Mine Plan, early part of 1995, shows the Iron Bark South Pit partly mined and shows the extent of the open cut operations and developing high walls.

The 1995 Aerial, late 1995, shows the Iron Bark South Pit mostly mined out. The extent of mining and the high walls can again be seen.

The 1995 Mine Plan, late 1995, shows the floor structure contours of the base of the open cut mining in this Pit. The depth from the surface is approx. 70m.

The 1998 Aerial shows the extension of the backfill progressing from the northern Iron Bark Pit into the Iron Bark South Pit area. Note the backfill is consistent with the usual mined overburden from the geology exposed in these coal measures. As described in the Geo Consult Report, 31 July 2023.

The 2000 Aerial again shows the progress of the backfilling of Iron bark South Pit and you can see the final surface and Top Soiling of the northern Iron Bark Pit rehabilitation area. This Aerial also shows the commencement of the coal stone rejects being placed in the backfill of the Iron Bark South Pit.

The southern end of the Lanes final void can also be seen in the new part of the plan.

The 2001 Aerial shows the progression of the backfill with coal stone layering on varying bench levels.

The 2002 Aerial starts to show the coal stone backfill benched area of the Iron Bark South Pit more clearly. The Rehabilitation of the northern Iron Bark Pit shows vegetation cover progressing.

The Ebenezer Mine closed in 2004 / 2005 and whilst we have not included any plans or images showing the Iron Bark South Pit at this time, they show little difference to the 2002 Aerial.

In fact, there is little difference between the 2002 to 2005 to the current site aerials (2022).

Whilst the mine was still very active from 2002 through to the finish in 2004/5 a good proportion of the coarse coal rejects were placed and blended into the backfilling of the Purga Pit, in the eastern part of the mine site.

3. Summary: -

From the attached progression of Aerial Photos and Mine Plans it can be seen that the backfill materials used in the backfilling of the Iron Bark South Pit consisted of the normal geological coal measures mined by the Ebenezer mine open cut operations.

Being a mining operation access to this site was controlled by the mining company operators and security arrangements and in complying with Queensland Safety & Health Mining Acts. As such no access was permitted to the site unless approved. Even post the mining operations the remoteness of this site to be accessed has made the site quite safe and secure from unwanted disposal activities.

Having been associated with this Site since the late 1990s we are not aware of nor have we seen any significant unwanted or unauthorised disposal activities.

4. Conclusion: -

From our knowledge and research of the mining activity on this site we are confident that the characteristics of the mine waste deposited within the Ironbark South Dump Area are simply a matrix of the overburden materials mined within the Ebenezer mining lease area. This includes the coal stone reject materials placed in the later part of the backfill of this pit as well.

The materials and characteristics of the backfill in the Iron Bark South Pit are therefore consistent with the coal measures described in the Geo Consult report 31 July 2023.

Regards

Hugh Taylor
Site Senior Executive (SSE Coal, Notice Holder)
Registered Surveyor, Mining UC, UM & OC
TAYLOR MINING SERVICES Pty Ltd

Ref: 3811Aug



33 Castle Hill Street, Holland Park
Brisbane, Queensland 4121

Ray Ison
0419 729 886
ray@isonenvironmental.com
www.isonenvironmental.com

23 August 2023

Mr Peter Toole
Project Manager
Zedemar Holdings Pty Ltd

Dear Sir,

Ebenezer Coal Mine (ML 4712)
Comment on GeoConsult Pty Ltd letter of 31 July 2023

Mr Warwick Smyth, Principal Consultant, GeoConsult Pty Ltd prepared a letter dated 31 July 2023 to Zedemar Holdings Pty Ltd briefly describe the geology at Ebenezer Site.

I have worked continuously as an environmental consultant at the Ebenezer Mine Site since before commencement of mining and continue to provide environmental services to the current owner. I have undertaken assessment of overburden and soils of the site before commencement of mining activities in the various areas and continue to conduct water monitoring of the site and surrounds. All reports prepared have been provided progressively as required to the appropriate Administering Authority.

I have read the report and found the letter and graphics accurately summarises the geology of the site from my knowledge and experience actively working on site.

Yours faithfully,
ISON ENVIRONMENTAL

Permit

Environmental Protection Act 1994

Environmental authority EPML00594013

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Environmental authority number: EPML00594013

Environmental authority takes effect on 28 April 2020

Environmental authority holder(s)

Name(s)	Registered address
ZEDEMAR HOLDINGS PTY. LTD.	Suite 12, Portman Place 220 Boundary Street SPRING HILL QLD 4000 Australia

Environmentally relevant activity and location details

Environmentally relevant activity/activities	Location(s)
Schedule 3 20: Clay pit mining, dimension stone mining or mining gemstones (including the material from which gemstones are extracted) (c) more than 1,000,000t in a year	ML4712

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority (EA) is issued is a restatement of the ERA as defined by legislation at the time the EA is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an EA as to the scale, intensity or manner of carrying out an ERA, the conditions prevail to the extent of the inconsistency.

An EA authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the EA specifically authorises environmental harm.

Environmental authority EPML00594013

A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).

Contaminated land

It is a requirement of the EP Act that an owner or occupier of contaminated land give written notice to the administering authority if they become aware of the following:

- the happening of an event involving a hazardous contaminant on the contaminated land (notice must be given within 24 hours); or
- a change in the condition of the contaminated land (notice must be given within 24 hours); or
- a notifiable activity (as defined in Schedule 3) having been carried out, or is being carried out, on the contaminated land (notice must be given within 20 business days);

that is causing, or is reasonably likely to cause, serious or material environmental harm.

For further information, including the form for giving written notice, refer to the Queensland Government website www.qld.gov.au, using the search term 'duty to notify'.

Take effect

Please note that, in accordance with section 200 of the EP Act, an EA has effect:

- a) if the authority is for a prescribed ERA and it states that it takes effect on the day nominated by the holder of the authority in a written notice given to the administering authority-on the nominated day; or
- b) if the authority states a day or an event for it to take effect-on the stated day or when the stated event happens; or
- c) otherwise-on the day the authority is issued.

However, if the EA is authorising an activity that requires an additional authorisation (a relevant tenure for a resource activity, a development permit under the *Sustainable Planning Act 2009* or an SDA Approval under the *State Development and Public Works Organisation Act 1971*), this EA will not take effect until the additional authorisation has taken effect.

If this EA takes effect when the additional authorisation takes effect, you must provide the administering authority written notice within 5 business days of receiving notification of the related additional authorisation taking effect.

If you have incorrectly claimed that an additional authorisation is not required, carrying out the ERA without the additional authorisation is not legal and could result in your prosecution for providing false or misleading information or operating without a valid environmental authority.

Juliana McCosker
Department of Environment and Science
Delegate of the administering authority
Environmental Protection Act 1994

Enquiries:
Coal Business Centre
Department of Environment and Science

PO Box 3028, Emerald QLD 4720
Phone: (07) 4987 9320
Email: CRMining@des.qld.gov.au

Date issued: 28 April 2020

Environmental authority EPML00594013

Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

Environmental authority EPML00594013

Conditions of environmental authority

Agency interest: General	
Condition number	Condition
A1	<p>Maintenance of measures, plant and equipment</p> <p>The holder must:</p> <ol style="list-style-type: none"> 1. install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority; and 2. maintain such measures, plant and equipment in a proper condition; and 3. operate such measures, plant and equipment in a proper manner.
A2	<p>Monitoring</p> <p>Record, compile and keep for a minimum of five years all monitoring results required by this environmental authority and make available for inspection all or any of these records upon request by the administering authority.</p>
A3	A competent person must conduct any monitoring required by this environmental authority.
A4	<p>Storage and handling of flammable and combustible liquids</p> <p>Spillage of any flammable or combustible liquids or other chemicals must be contained and rectified to prevent environmental harm (other than of trivial nature).</p>
Agency interest: Air	
Condition number	Condition
B1	<p>Dust nuisance</p> <p>The release of dust or other particulate matter resulting from the mining activities must not cause an environmental nuisance at any sensitive place in the opinion of an authorised person.</p>
B2	<p>For the purposes of condition B1, the mining activities will not cause environmental nuisance where dust or other particulate matter resulting from the activities does not exceed the following limits when measured at any sensitive place:</p> <ol style="list-style-type: none"> 1. Dust deposition of 120 milligrams per square metre per day, when monitored in accordance with Australian Standard 3580.10.1 Methods for sampling and analysis of ambient air - Determination of particulates - Deposited matter - Gravimetric method; or 2. A concentration of suspended particulate matter with an aerodynamic diameter of less than 10 micrometres (PM10) of 150 micrograms per cubic metre over a 24 hour averaging time at a sensitive place downwind, when monitored in accordance with: <ol style="list-style-type: none"> a) Australian Standard AS 3580.9.6 Methods for sampling and analysis of ambient air – Determination of particulate matter – PM (sub) 10 high-volume sampler with size-selective inlet – Gravimetric method; or <p>Any alternative method of monitoring PM10 which may be permitted by the 'Air Quality Sampling Manual' as published from time to time by the administering authority.</p>
B3	Dust or other particulate monitoring must be undertaken as directed by the administering authority to investigate any complaint of environmental nuisance, which in the opinion of an authorised person is not frivolous, vexatious nor based on mistaken belief, and the results thereof notified to the administering authority within 14 days following completion of monitoring. Monitoring must be

Environmental authority EPML00594013

	<p>carried out at a site relevant to the potentially affected sensitive place and at upwind control site(s) and must include:</p> <ol style="list-style-type: none"> 1. for a complaint alleging dust nuisance, dust deposition; and <p>for a complaint alleging adverse health effects caused by dust, the concentration per cubic metre of suspended PM10 over a 24hr averaging time.</p>
B4	<p>If an authorised person's opinion is that environmental nuisance is being caused by dust or other particulate matter from the mining activities, the holder must:</p> <ol style="list-style-type: none"> 1. address the complaint including the use of appropriate dispute resolution if required; or 2. immediately implement abatement measures so that emission of dust or other particulate matter from the activities does not result in further environmental nuisance.
B5	<p>Odour nuisance</p> <p>The release of noxious or offensive odour or any other noxious or offensive airborne contaminant resulting from the mining activities must not cause an environmental nuisance at any sensitive place in the opinion of an authorised person.</p>
B6	<p>Odour monitoring must be undertaken as directed by the administering authority to investigate any complaint of environmental nuisance, which in the opinion of an authorised person is not frivolous, vexatious nor based on mistaken belief, and the results thereof notified to the administering authority within 14 days following completion of monitoring. Monitoring must be carried out at a site relevant to the potentially affected sensitive place and at upwind control site(s).</p>
B7	<p>If an authorised person's opinion is that environmental nuisance is being caused by odour or any other noxious or offensive airborne contaminant from the mining activities, the holder must:</p> <ol style="list-style-type: none"> 1. address the complaint including the use of appropriate dispute resolution if required; or 2. immediately implement abatement measures so that emission of odour or any other noxious or offensive airborne contaminant from the activities does not result in further environmental nuisance.
Agency interest: Water	
Condition number	Condition
C1	Contaminants must not be released directly or indirectly to any waters except as permitted under the conditions of this environmental authority.
C2	<p>Release to waters</p> <p>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.</p>
C3	<p>Exceedance Investigation</p> <p>If quality characteristics of the water at the monitoring point EW33 as specified in Table C1 Surface water monitoring locations, exceeds any of the trigger levels specified in Table C2 Contaminant trigger levels, during discharge, the environmental authority holder must:</p> <ol style="list-style-type: none"> 1. notify the administering authority via WaTERS within 24 hours of receiving the result; and 2. complete an investigation into the potential for environmental harm and provide a written report to the administering authority via WaTERS within 28 days of receiving the result, outlining: <ol style="list-style-type: none"> a) details of the investigations carried out; and

Environmental authority EPML00594013

	<p>b) whether the result is directly associated with discharge from Ebenezer Tailings Dam, and, if so:</p> <ol style="list-style-type: none"> i. whether environmental harm has occurred, and ii. actions taken to prevent environmental harm. <p>Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with C3 (2) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.</p>
C4	<p>Water General</p> <p>All determinations of water quality must be:</p> <ol style="list-style-type: none"> 1. performed by a person or body possessing appropriate experience and qualifications to perform the required measurement; 2. made in accordance with methods prescribed in the latest edition of the administering authority's Water Quality Sampling Manual; and 3. laboratory testing must be undertaken using a laboratory accredited for the method of analysis being used.
C5	<p>Annual Water Monitoring Data Submission</p> <p>The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority via WaTERS by 1 March each year for the previous year of monitoring:</p> <ol style="list-style-type: none"> 1. the date on which the sample was taken; 2. the time at which the sample was taken; 3. the monitoring point at which the sample was taken; and 4. the results of all monitoring and details of any exceedances with the conditions of this environmental authority.
C6	<p>Water management plan</p> <p>A Water Management Plan must be developed by an appropriately qualified person and implemented. This Plan must be made available to the administering authority on request</p>

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	

Environmental authority EPML00594013

Table C2 Contaminant trigger levels

Quality characteristic	Units	Trigger level
pH	pH units	6.0 – 9.0
Electrical conductivity	µS/cm	2,350
Total suspended solids	mg/L	50

Agency interest: Acoustic	
Condition number	Condition
D1	Noise nuisance Subject to conditions D2 and D3, noise from the mining activities must not cause an environmental nuisance at any sensitive place in the opinion of an authorised person.
D2	Noise monitoring must be undertaken as directed by the administering authority to investigate any complaint of environmental nuisance caused by noise, which in the opinion of an authorised person is not frivolous, vexatious nor based on mistaken belief, and the results thereof notified to the administering authority within 14 days following completion of monitoring. For the purposes of this condition, noise monitoring must be done in accordance with the latest edition of the Environmental Protection Agency Noise Measurement Manual and include: <ol style="list-style-type: none"> 1. LA, max adj, T; 2. LA10, adj, 10 mins; 3. LA1, adj, 10 mins; 4. dB (Lin) Peak; 5. relevant background sound level; 6. the level and frequency of occurrence of impulsive or tonal noise; 7. atmospheric conditions including wind speed and direction; and 8. location, date and time of recording.
D3	For the purposes of condition D1, the mining activities will not cause environmental nuisance where noise from the activities does not exceed the limits specified in Table D1 Noise limits at a sensitive place or Table D2 Air blast overpressure level – sensitive place.
D4	Blasting must not be carried out other than during the times specified in Table D2 Air blast overpressure level – sensitive place.
D5	If an authorised person's opinion is that environmental nuisance is being caused by noise from the mining activities, the holder must: <ol style="list-style-type: none"> 1. address the complaint including the use of appropriate dispute resolution if required; or 2. immediately implement noise abatement measures so that emissions of noise from the activities does not result in further environmental nuisance.
D6	Vibration nuisance - Vibration emissions from blasting Subject to conditions D7 and D8, vibration from the mining activities must not cause an environmental nuisance at any sensitive place in the opinion of an authorised person.
D7	Vibration monitoring must be undertaken as directed by the administering authority to investigate any complaint of environmental nuisance caused by vibration, which in the opinion of an authorised person is not frivolous, vexatious nor based on mistaken belief, and the results thereof

Environmental authority EPML00594013

	<p>notified to the administering authority within 14 days following completion of monitoring. For the purposes of this condition, vibration monitoring must include:</p> <ol style="list-style-type: none"> 1. location of blast(s) (including bench level); 2. peak particle velocity; 3. atmospheric conditions including temperature, relative humidity and wind speed and direction; and 4. location, date and time of recording.
D8	For the purposes of condition D6, the mining activities will not cause environmental nuisance where vibration from the activities does not exceed the limit specified in Table D3 Vibration limits – sensitive place.
D9	<p>If an authorised person's opinion is that environmental nuisance is being caused by vibration from the mining activities, the holder must:</p> <ol style="list-style-type: none"> 1. address the complaint including the use of appropriate dispute resolution if required; or 2. immediately implement vibration abatement measures so that vibration from the activities does not result in further environmental nuisance.

Table D1 Noise limits at a sensitive place

Noise level dB(A) measured as	Monday to Saturday			Sundays and public holidays		
	7am-6pm	6pm-10pm	10pm-7am	9am-6pm	6pm-10pm	10pm-9am
Noise measured at a Noise sensitive place						
LA10, adj, 10 mins	b/g + 5	b/g + 5	b/g + 0	b/g + 5	b/g + 5	b/g + 0
LA1, adj, 10 mins	b/g + 10	b/g + 10	b/g + 5	b/g + 10	b/g + 10	b/g + 5
Noise measured at a Commercial place						
LA10, adj, 10 mins	b/g + 10	b/g + 10	b/g + 5	b/g + 10	b/g + 10	b/g + 5
LA1, adj, 10 mins	b/g + 15	b/g + 15	b/g + 10	b/g + 15	b/g + 15	b/g + 10

Note: The method of measurement and reporting of noise levels must comply with the latest editions of the administering authority's Noise Manual.

Table D2 Airblast overpressure level - Sensitive place

Noise parameter	Monday to Friday 9am - 3pm Saturday 9am - 1pm	Other times and public holidays
Air blast overpressure level (dB linear peak)	115dB (80 th percentile)	Nil unless required under the Coal Mining Safety and Health Regulation 2001
Air blast overpressure level (dB linear peak)	120dB (maximum)	

Note: The method of measurement and reporting of noise levels must comply with the latest editions of the administering authority's Noise Manual.

Table D3 Vibration limits - Sensitive place

Vibration parameter	Monday to Friday 9am - 3pm Saturday 9am - 1pm	Other times and public holidays
Peak particle velocity	5mm/second (80 th percentile)	Nil unless required under the Coal Mining Safety and Health Regulation 2001
Peak particle velocity	10mm/second (maximum for any blast)	

Note: The method of measurement and reporting of noise levels must comply with the latest editions of the administering authority's Noise Manual.

Environmental authority EPML00594013

Agency interest: Waste	
Condition number	Condition
E1	<p>Waste</p> <p>This schedule only permits storage and disposal of tyres sourced from the mining activities the subject of this environmental authority.</p>
E2	<p>Storage of tyres</p> <p>Tyres stored awaiting disposal, recycling or removal must be stockpiled less than 3m in height and 200 square metres in area and at least 10m from any other tyre storage area.</p>
E3	<p>Reasonable and practicable fire prevention measures must be implemented for scrap tyre storage areas, including removal of grass and other materials within a 10 metres radius of such an area.</p>
E4	<p>Disposal of tyres</p> <p>Where practicable, scrap tyres can be disposed of in underground stopes provided this practice does not cause an unacceptable fire risk or compromise mine safety.</p>
E5	<p>Disposing of scrap tyres in spoil areas is acceptable, provided the tyres are placed as deep in the spoil as possible but not directly on the pit floor.</p>
E6	<p>Disposal of scrap tyres must not impede saturated aquifers nor compromise the stability of the consolidated landform.</p>
Agency interest: Land	
Condition number	Condition
F1	<p>Rehabilitation landform criteria</p> <p>All areas significantly disturbed by mining activities must be rehabilitated in accordance with Table F1 Final land use and rehabilitation schedule.</p>
F2	<p>Progressive rehabilitation must be achieved for disturbed areas not required for the ongoing conduct of the mining activities.</p>
F3	<p>Grazing pasture outcome</p> <p>Areas which are to be progressively rehabilitated to grazing pasture must comply with the following rehabilitation outcomes:</p> <ol style="list-style-type: none"> 1. self-sustaining vegetation with projective cover of suitable pasture species (e.g. rhodes grass) in Table F1 Final land use and rehabilitation schedule; and 2. all areas disturbed by mining activities must be rehabilitated to the landform design criteria defined in Table F1 Final land use and rehabilitation schedule; and 3. the productivity of Class 4 Post Mine Capability rehabilitated areas for grazing will support one beast per 5 hectares except in seasons when average rainfall is less than the 20th percentile.
F4	<p>Residual void outcome</p> <p>Residual voids must comply with the following rehabilitation outcomes:</p> <ol style="list-style-type: none"> 1. 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; and

Environmental authority EPML00594013

	2. residual void design must comply with Table F2 Residual void design.
F5	Complete an investigation into rehabilitation of residual voids and submit a report to the administering authority proposing rehabilitation acceptance criteria relevant to the rehabilitation outcomes in Condition F4 and relevant to the rehabilitation and landform design criteria in Table F1 Final land use and rehabilitation and Table F2 Residual void design by 31 July 2006.
F6	Infrastructure All infrastructure for the mining activities, including water storage structures, must be removed from the subject land prior to mining lease surrender, except where otherwise agreed to in writing by the post mining land owner.

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 F2 Residual void design

Void identification	Void wall – competent rock slope (%)	Void wall – incompetent rock slope (%)	Void maximum surface area (ha)
Lanes Pit	<70	<45	32
Iron Bark North Pit	<70	<45	12
Ti Tree West Pit	<70	<45	25

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.

Environmental authority EPML00594013

Definitions

Key terms and/or phrases bolded in this environmental authority are defined in this section. Where a term is not defined, the definition in the *Environmental Protection Act 1994*, its regulations or environmental protection policies must be used. If a word remains undefined it has its ordinary meaning.

“EMOS” means the environmental management overview strategy report titled Environmental Management Overview Strategy Ebenezer Mine: ML4712 dated January 2004. Where required, interpretation of this authority should be in the context of the EMOS.

“acceptance criteria” means standards by which actions implemented to rehabilitate land are deemed to be complete.

“administering authority” is the agency that administers the environmental authority provisions under the Environmental Protection Act 1994.

“airblast overpressure” means energy transmitted from blasting through the atmosphere in the form of pressure waves. The maximum excess pressure in which a wave above ambient pressure is the peak airblast overpressure measured in decibels linear (dBL).

“ambient (or total) noise” means the levels of noise at a place from all sources, measured as the Leq for a relevant time interval.

“authority” means the environmental authority (mining activities) under the *Environmental Protection Act 1994*.

“b/g” means relevant background sound level measured in accordance with the administering authority’s Noise Manual.

“blasting” means the use of explosive materials to fracture:

1. rock, coal and other minerals for later recovery
2. structural components or other items to facilitate removal from a site or for reuse.

“commercial place” means a place used as an office or for business or commercial purposes, which is not part of the mining activity and does not include employees’ accommodation or public roads.

“competent person” means a person with sufficient demonstrated skill, knowledge and qualifications required to carry out a task to a necessary standard for protection of the environment.

“holder” for a mining tenement, means the holder of the tenement under the *Minerals Resources Act 1989*, and the holder of the associated environmental authority under the *Environmental Protection Act 1994*.

“infrastructure” means water storage dams, levees, roads and tracks, buildings and other structures built for the purpose of mining activity.

“LA1,adj, 10mins” means the A-weighted sound pressure level, (adjusted for tonal characteristics and impulsiveness of the sound) exceeded for 1% of any 10 minute measurement period, using Fast response.

“LAeq, 1hour” means the time-averaged A-weighted sound pressure level over a one hour measurement period.

Environmental authority EPML00594013

“LA, max adj, T” means the average maximum A-weighted sound pressure level, adjusted for tonal or impulsive noise character, and measured over any 10 minute period, using Fast response.

“LA10, adj, 10mins” means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of the sound) exceeded for 10% of any 10 minute measurement period, using Fast response.

“land in the land schedule” of this document means land excluding waters and the atmosphere, that is, the term has a different meaning from the term as defined in the *Environmental Protection Act 1994*. For the purposes of the *Acts Interpretation Act 1954*, it is expressly noted that the term **land** in this environmental authority relates to physical land and not to interests in land.

“land use” refers to description of the purpose(s) for land after cessation of mining activities thereupon.

“mining activities” has the meaning given in the *Environmental Protection Act 1994* and the *Mineral Resources Act 1989*.

“noise sensitive place” means -

1. a dwelling, mobile home or caravan park, residential marina or other residential premises;
2. a motel, hotel or hostel;
3. a kindergarten, school, university or other educational institution;
4. a medical centre or hospital;
5. a protected area; and
6. a park or gardens; and
7. includes the curtilage of any such place.

“noxious” means harmful or injurious to health or physical well-being, other than trivial harm.

“offensive” means causing reasonable offence or displeasure; is disagreeable to the sense; disgusting, nauseous or repulsive, other than trivial harm.

“peak particle velocity (ppv)” means a measure of ground vibration magnitude which is the maximum rate of change of ground displacement with time, usually measured in millimetres/second (mms).

“progressive rehabilitation” means rehabilitation (defined below) undertaken progressively or in stages as mining activities or operations are ongoing.

“protected area” means

1. a protected area under the Nature Conservation Act 1992; or
2. a marine park under the Marine Parks Act 1992; or
3. a World Heritage Area.

“rehabilitation” means the process of reshaping and revegetating land to restore it to a stable landform and in accordance with the acceptance criteria, and where relevant includes remediation of contaminate land.

“representative” means a sample set which covers the variance in monitoring or other data either due to natural changes or operational phases of the mining activities.

Environmental authority EPML00594013

“self-sustaining” means an area of land which has been rehabilitated and has maintained the required acceptance criteria without human intervention for a period nominated by the administering authority.

“sensitive place means:

1. a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
2. a motel, hotel or hostel, or
3. an educational institution; or
4. a medical centre or hospital; or
5. a protected area under the *Nature Conservation Act 1992*, the *Marine Parks Act 1992* or a World Heritage Area, or
6. a public park or gardens.

“stable” means geotechnical stability of the rehabilitate landform where instability caused by settlement and subsidence has ceased.

“the Act” means the Environmental Protection Act 1994.

“water” is defined under Schedule 4 of the Water Act 2000.

“watercourse” has the same meaning given in the Water Act 2000.

“water quality” means the chemical, physical and biological condition of water.

“waters” includes a river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water being natural or artificial watercourse, bed and back of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, groundwater and any part thereof.

“WaTERS” means Water Tracking and Electronic Reporting System or subsequent updated system, used to submit monitoring data and notify the Queensland Government.[<https://waters.ehp.qld.gov.au/>] or psd.help@qld.gov.au.

Appendices

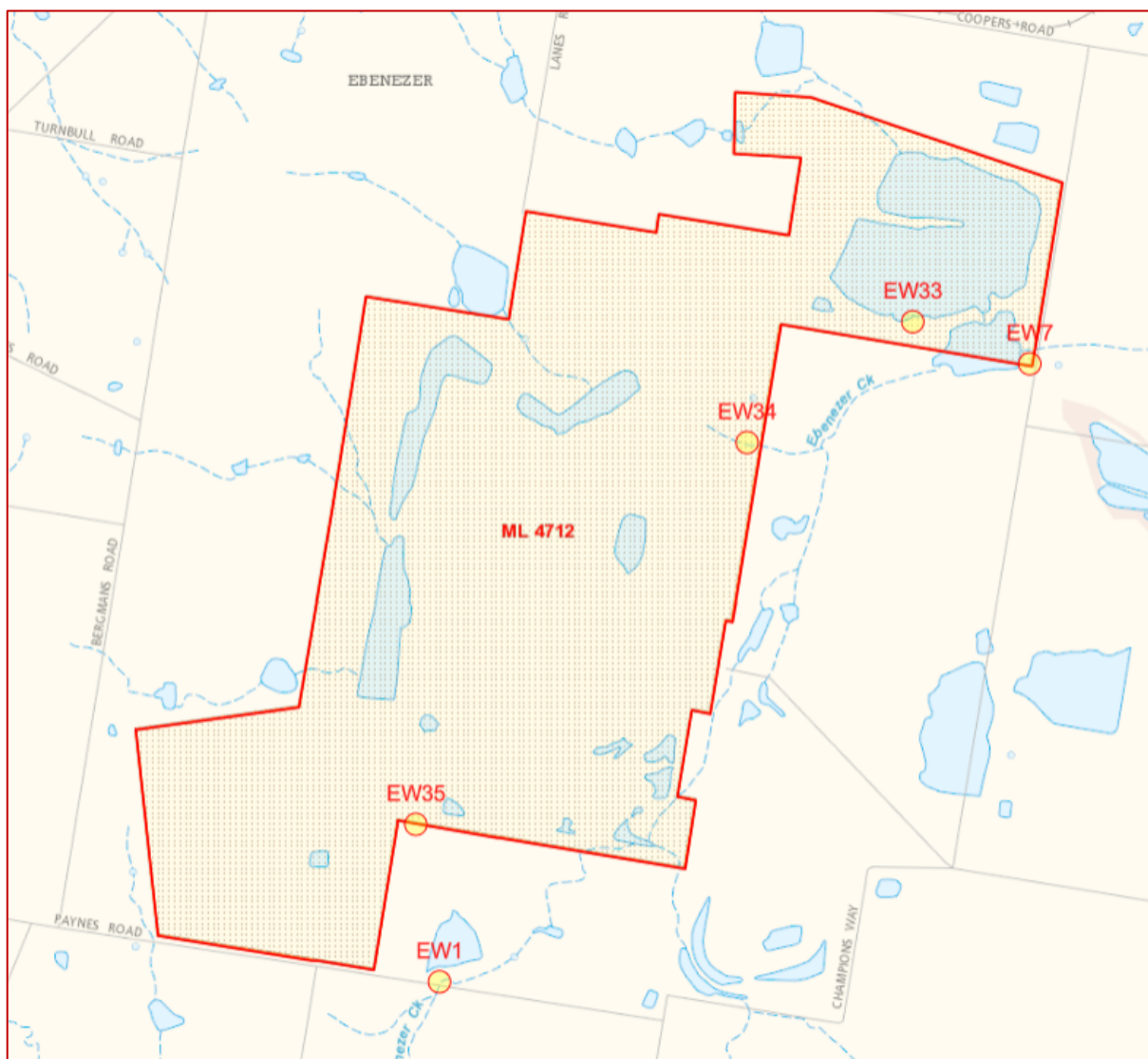
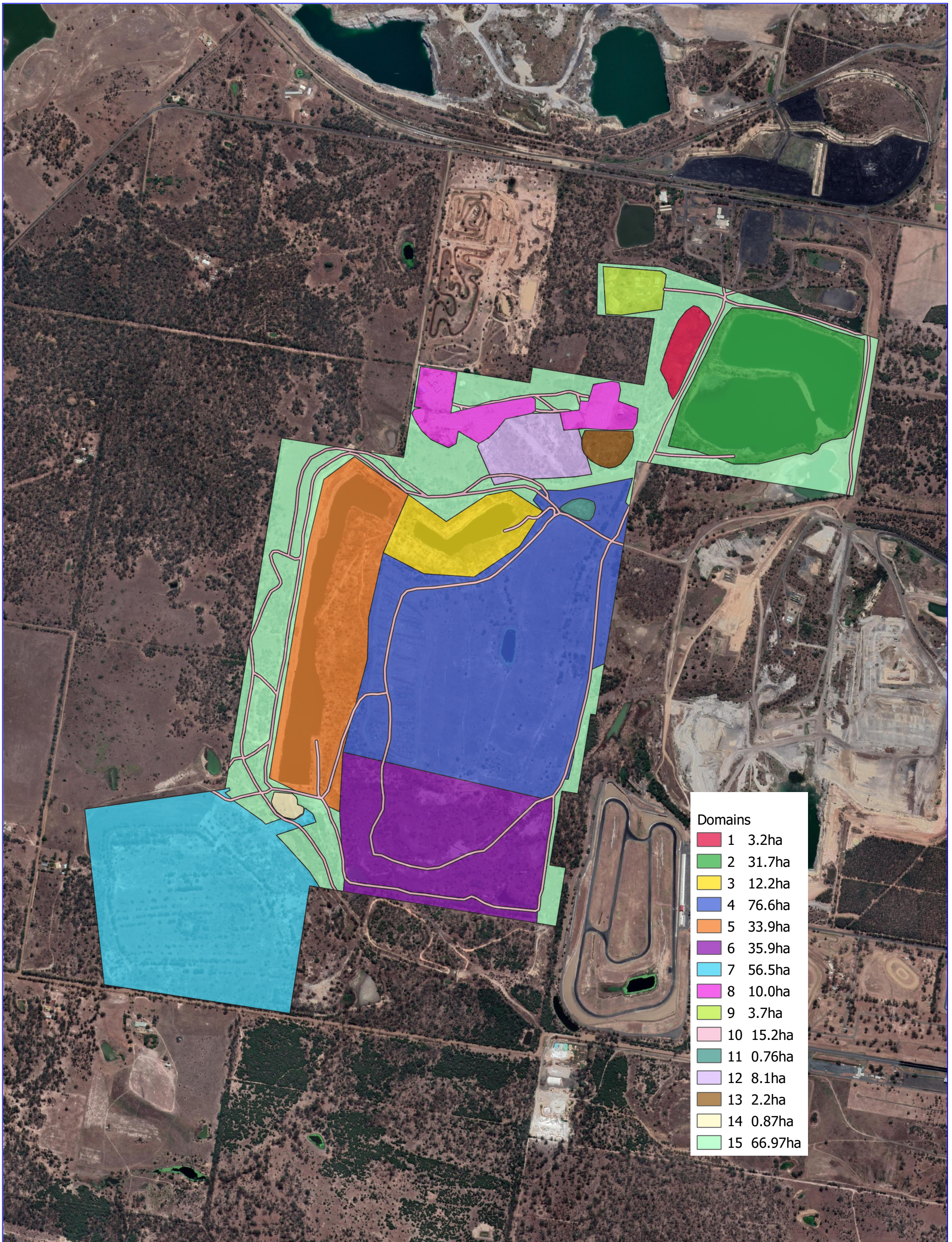


Figure 1 – Surface Water Monitoring Locations (2019 mapping)

END OF ENVIRONMENTAL AUTHORITY



Plan of Domains



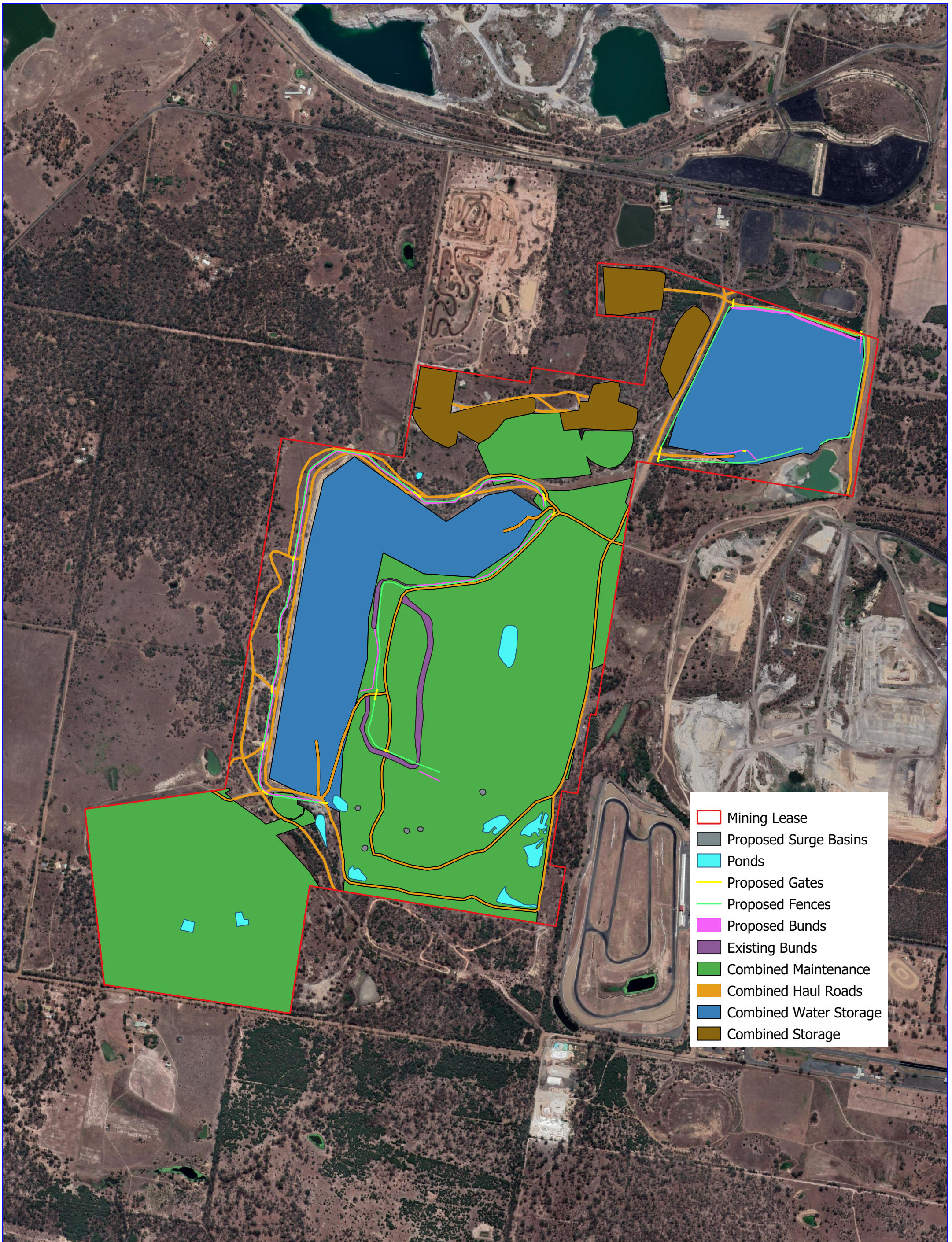
Date:
18/02/2022

Scale A3:
1:12500

File Location:
Zambelli Environmental Ebenezer SHP

Taylor Mining Services Pty Ltd

1041 Redbank Plains Rd Ph: (07) 3816 2311 Fax: (07) 3816 2377
New Chum QLD 4303 www.taylorminingservices.com.au



- Mining Lease
- Proposed Surge Basins
- Ponds
- Proposed Gates
- Proposed Fences
- Proposed Bunds
- Existing Bunds
- Combined Maintenance
- Combined Haul Roads
- Combined Water Storage
- Combined Storage

Plan of Final Areas



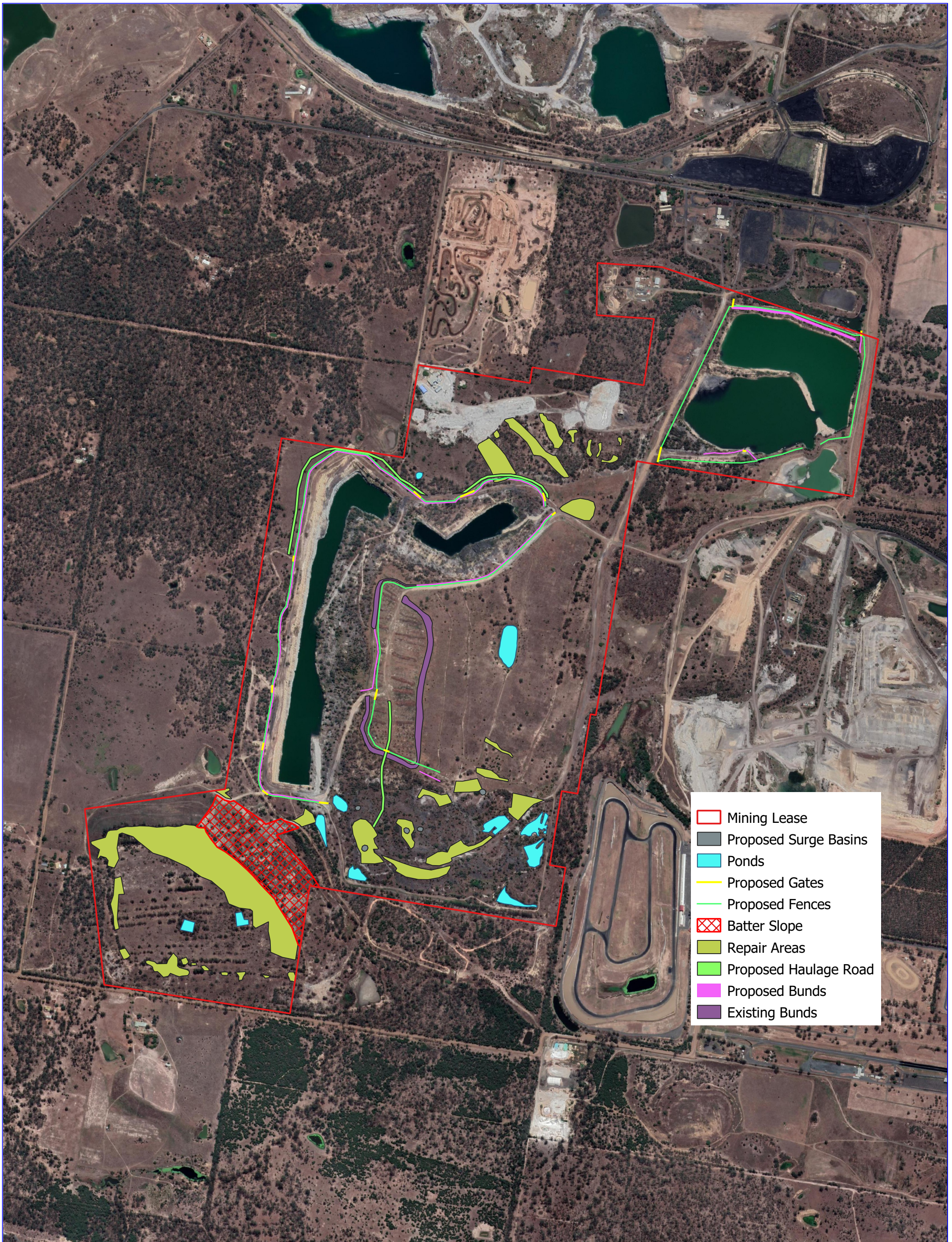
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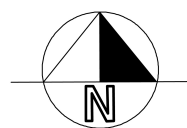
Taylor Mining Services Pty Ltd

1041 Redbank Plains Rd Ph: (07) 3816 2311 Fax: (07) 3816 2377
New Chum QLD 4303 www.taylorminingservices.com.au



- Mining Lease
- Proposed Surge Basins
- Ponds
- Proposed Gates
- Proposed Fences
- Batter Slope
- Repair Areas
- Proposed Haulage Road
- Proposed Bunds
- Existing Bunds

Plan of Features and Areas



Date: 18/02/2022	Scale A3: 1:12500	File Location: Zambelli Environmental Ebenezer SHP
Taylor Mining Services Pty Ltd		
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New Chum QLD 4303 www.taylorminingservices.com.au		



Exploration & Project Management Consultants

GeoConsult Pty Ltd



2023





Exploration, Mining & Project Geological Consultants, Laboratories and Services

P.O.BOX 3324, Newstead, Qld 4006

Phone: (07) 3851 7400, Fax: (07) 3851 7499, Mobile: 0417 604 707,

Email: geoconsult@geoconsult.com.au

ACN 075 698 636 ABN 51 075 698 636

31 July 2023

Zedemar Holdings Pty Ltd

Ebenezer

Attn: Peter Toole

Project Manager

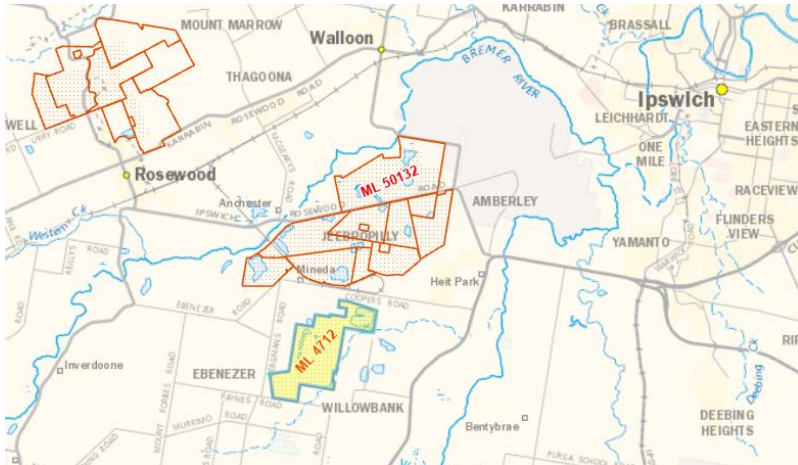
peter.toole@wanless.com.au | M 0408 278 439

Dear Peter,

Thank you for your request for letter to briefly describe the geology at Ebenezer from the records GeoConsult have, for the purpose of advising the department of what the overburden placed within the Ironbark South Dump Area (marked below) is comprised of. The area overburden area is highlighted below.



The mining lease ML 4712 (Ebenezer) is located approximately 14 kilometres southwest of Ipswich, Queensland.

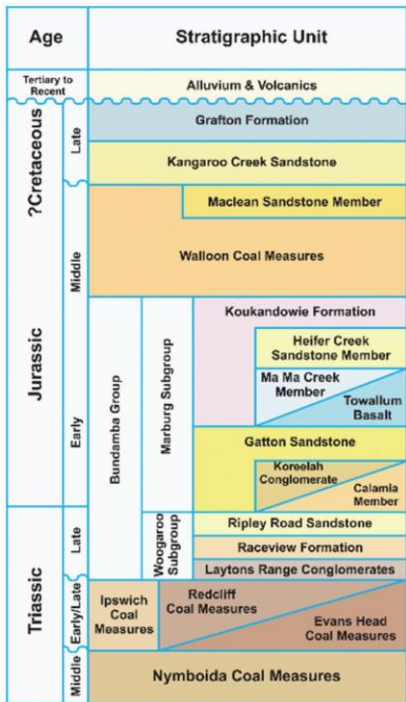


The pit names in the Ebenezer adjacent to the Iron bark dump are highlighted in image below.

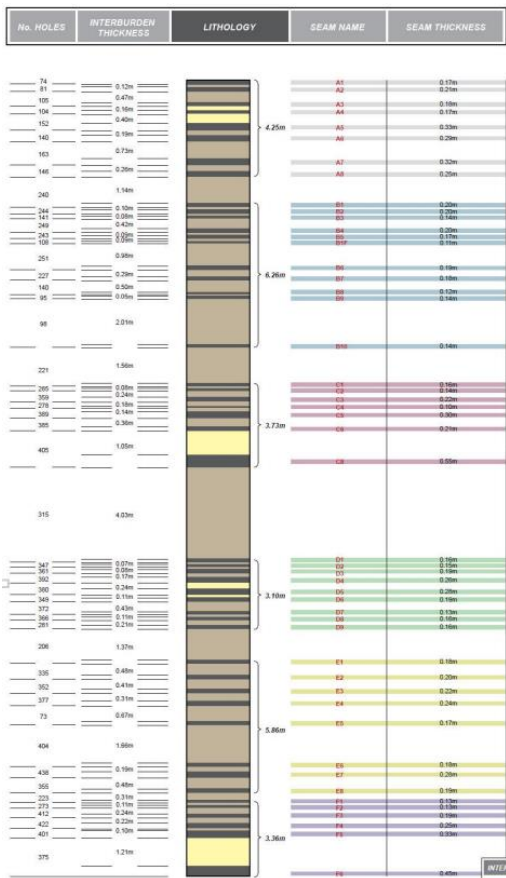


The Walloon Coal Measures can be divided into four main stratigraphic zones; the Lower Barren Zone, the Lower Coal Zone, the Upper Barren Zone and the Upper Coal Zone. The Lower Coal Zone has been the productive zone in the coalfield where mining has been focused for both New Hope and Ebenezer Mining companies. The so called barren zones are obviously devoid of coal seams and contain fluvial sediments, commonly arenites and argillites. The Coal Zones contain similar fluvial sediments, interbedded with coal seams up to seven metres thick (inclusive of stone bands), but commonly only one metre or less thick. The thickest known coal seams occur in the Lower Coal Zone.

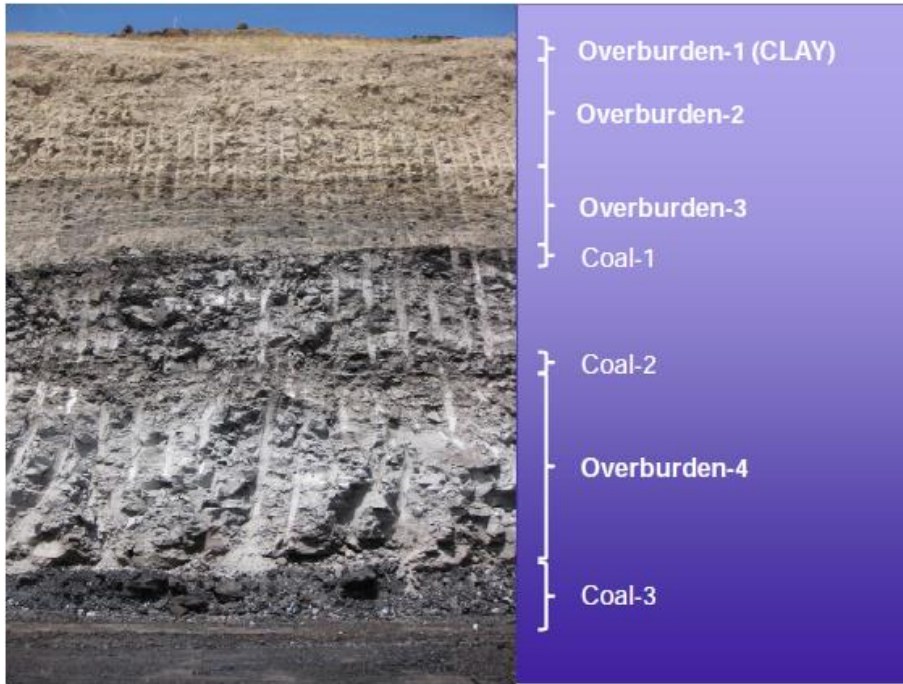
Quaternary alluvial deposits consisting of unconsolidated gravel, sand, silt and clay, occur on the flood plains of the present drainage system. A typical stratigraphic column for the Clarence-Moreton Basin is shown in image below.



The local geology of Ebenezer and previous coal mining operations within the Ebenezer lease have referred to the coal seams sequentially, from A to I, with individual plies numbered. Bentonite was also mined locally and primarily occurs within plies of the E seam. Bentonite units have been identified as BE46, BE78 and BEF. Ebenezer coal seam stratigraphy illustrating numerous plies as seen in the Stratigraphic column below.



General sequence of overburden and coal at Ebenezer open pit is illustrated below.

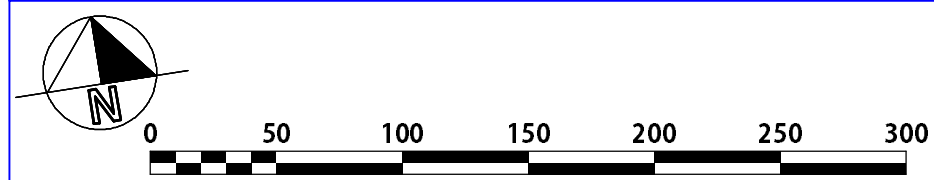
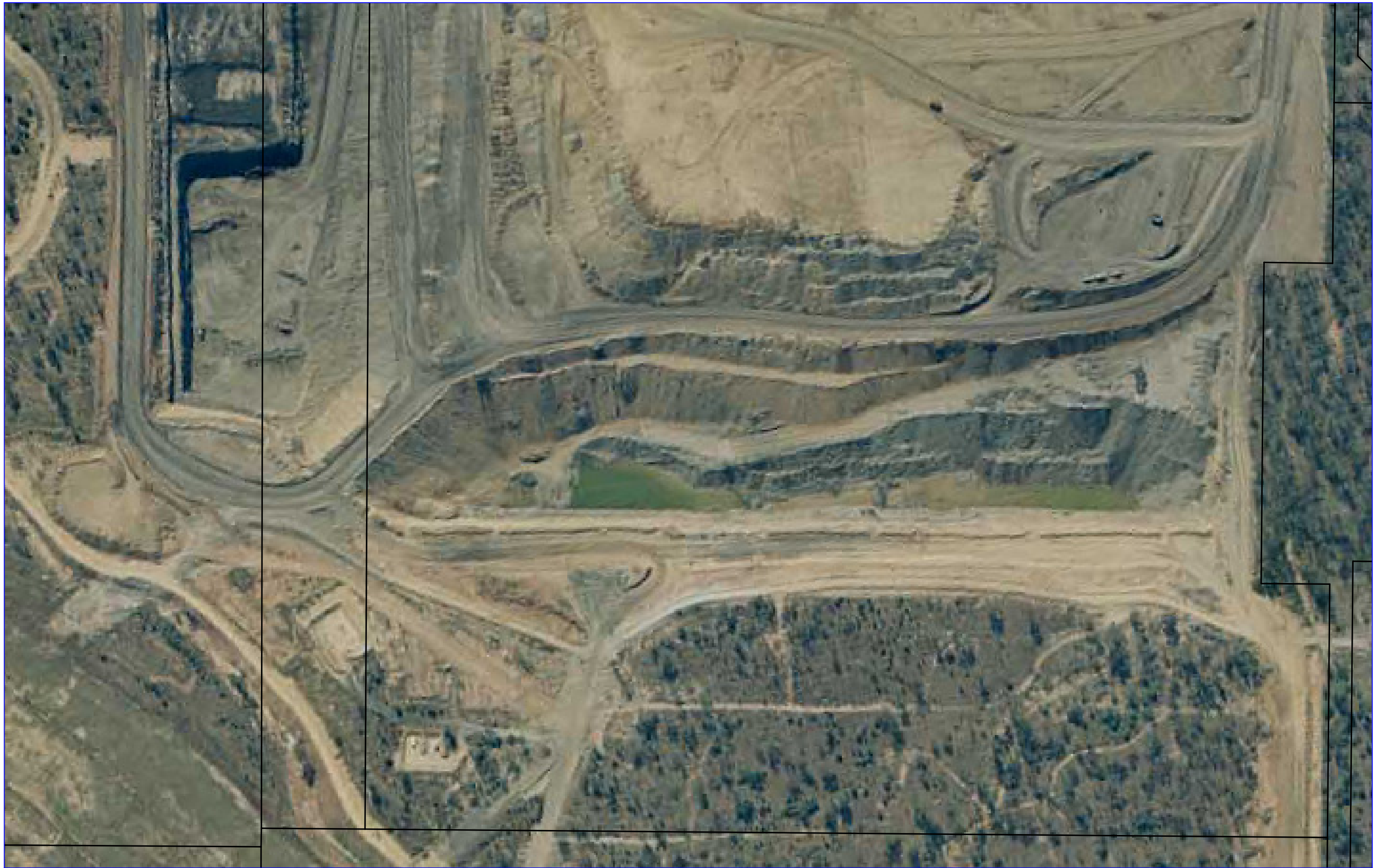


Overburden 1, is typically weathered Tertiary/Quaternary material, clays, silts and sands; Overburden 2 is typically described as weathered sedimentary rock, siltstone, claystone and sandstones; Overburden 2 and 3 are separated by the BOW or Base of Weathering; Overburden 3 is typically described as unweathered (fresh) sedimentary rock, mudstones, siltstone, claystone and sandstones; Overburden 4 is typically described as interbedded sedimentary rock, mudstones, siltstone, claystone and sandstones; The coals were extracted for commercial gain. The bentonite layer is present was also extruded for commercial gain.

Should you have any queries or require any further information please don't hesitate to contact the undersigned. We trust that this is satisfactory.

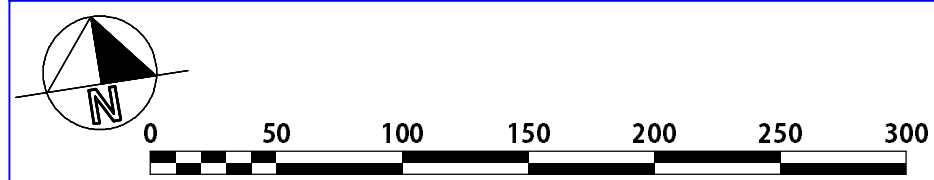
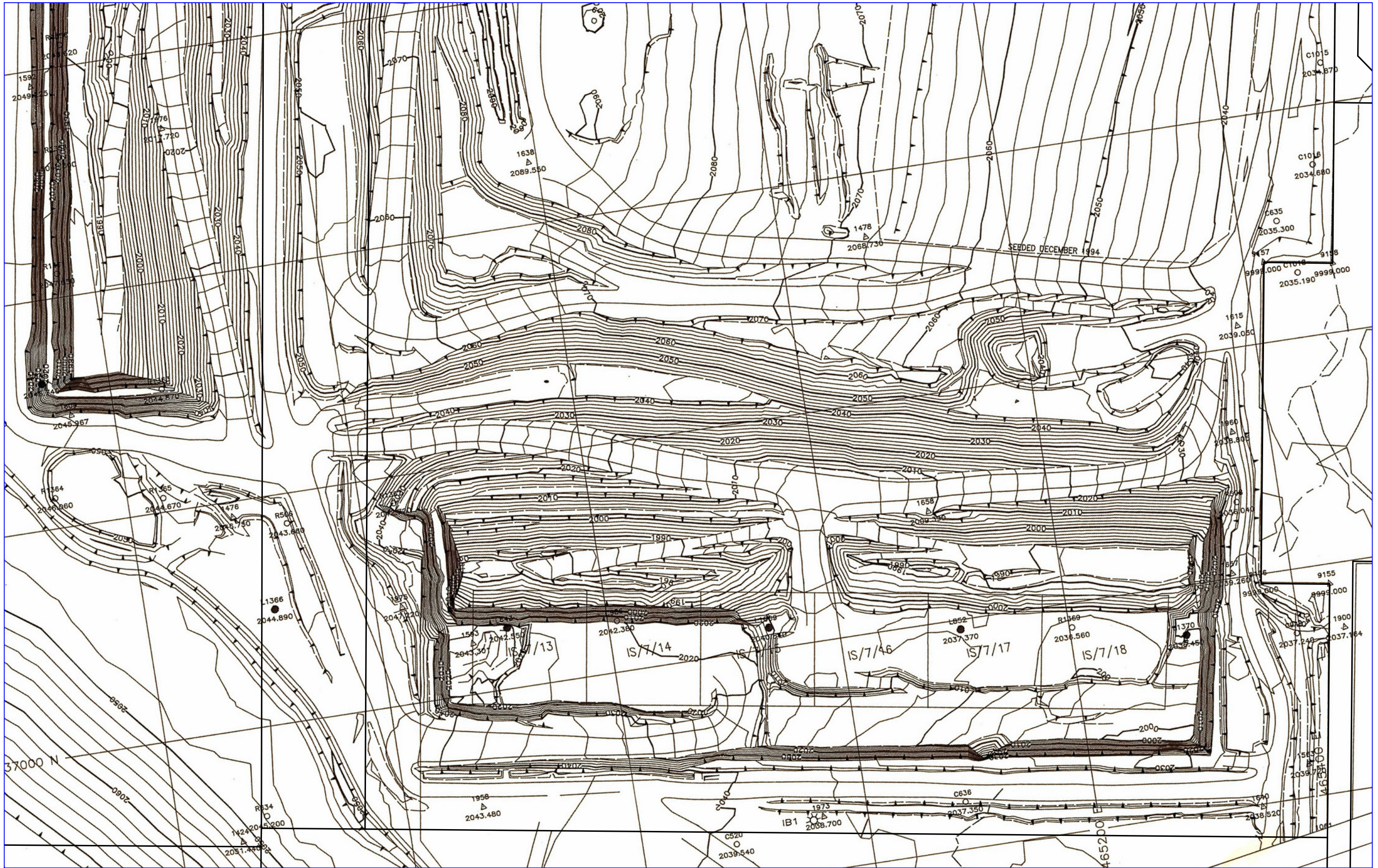
Best Regards

Warwick Smyth
Principal Consultant



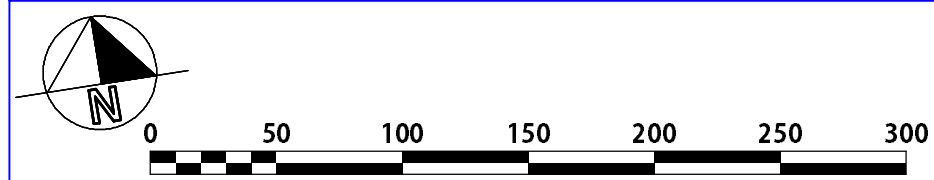
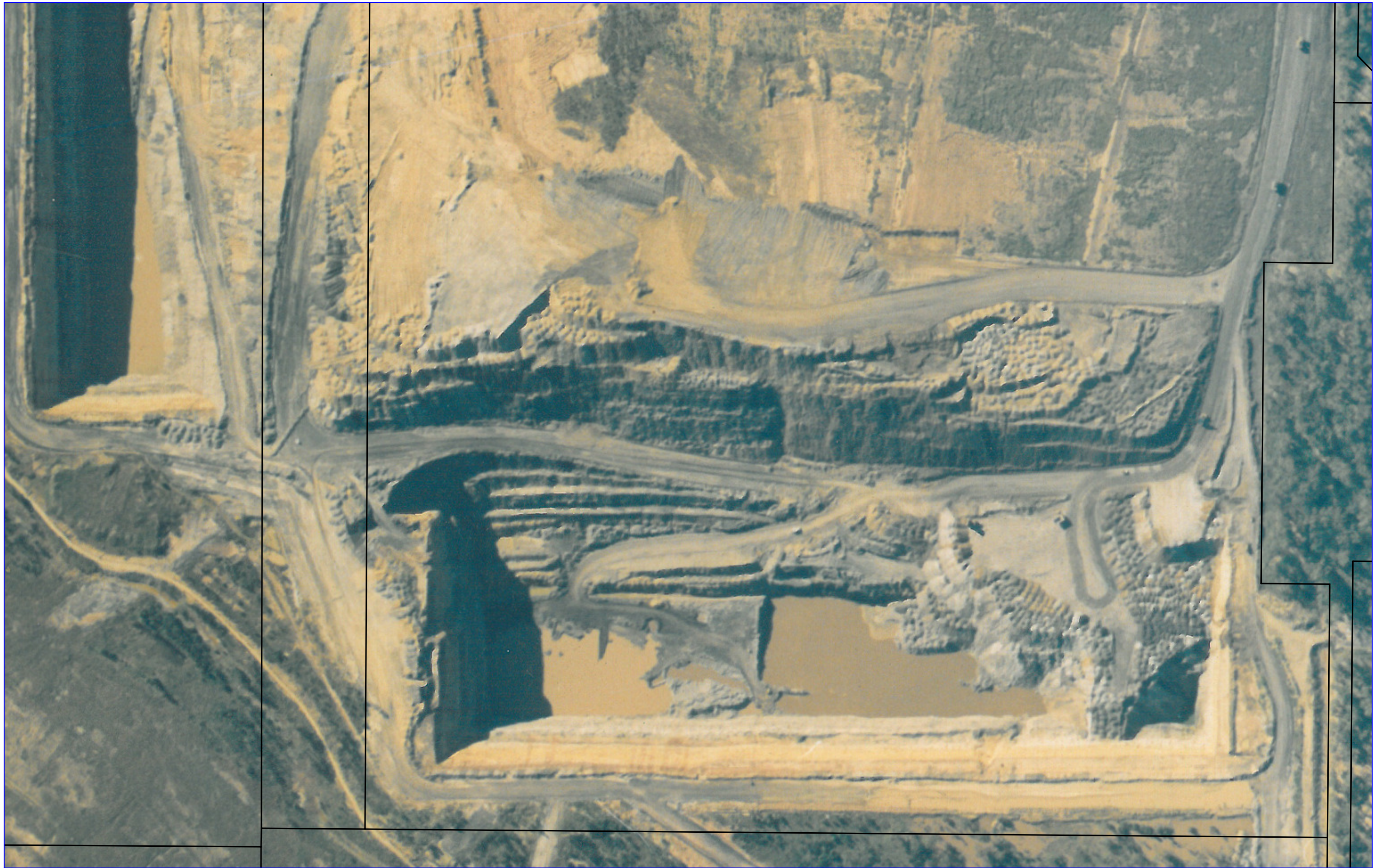
**Zedemar Ebenezer Mine
IRON BARK South Pit
1993 Aerial - Not Mined**

Date: 22/08/2023	Scale A3: 1:3000	File Location: Ironbark South - Drawing001
<u>Taylor Mining Services Pty Ltd</u>		
1041 Redbank Plains Rd Ph: (07) 3816 2311 Fax: (07) 3816 2377 New Chum QLD 4303 www.taylorminingservices.com.au		



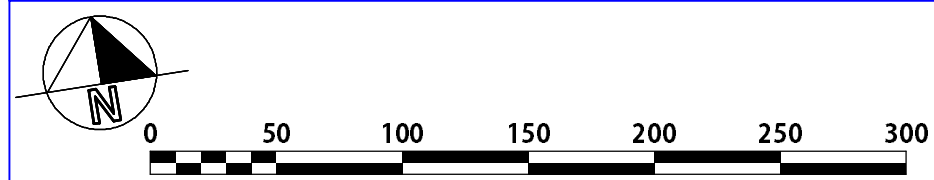
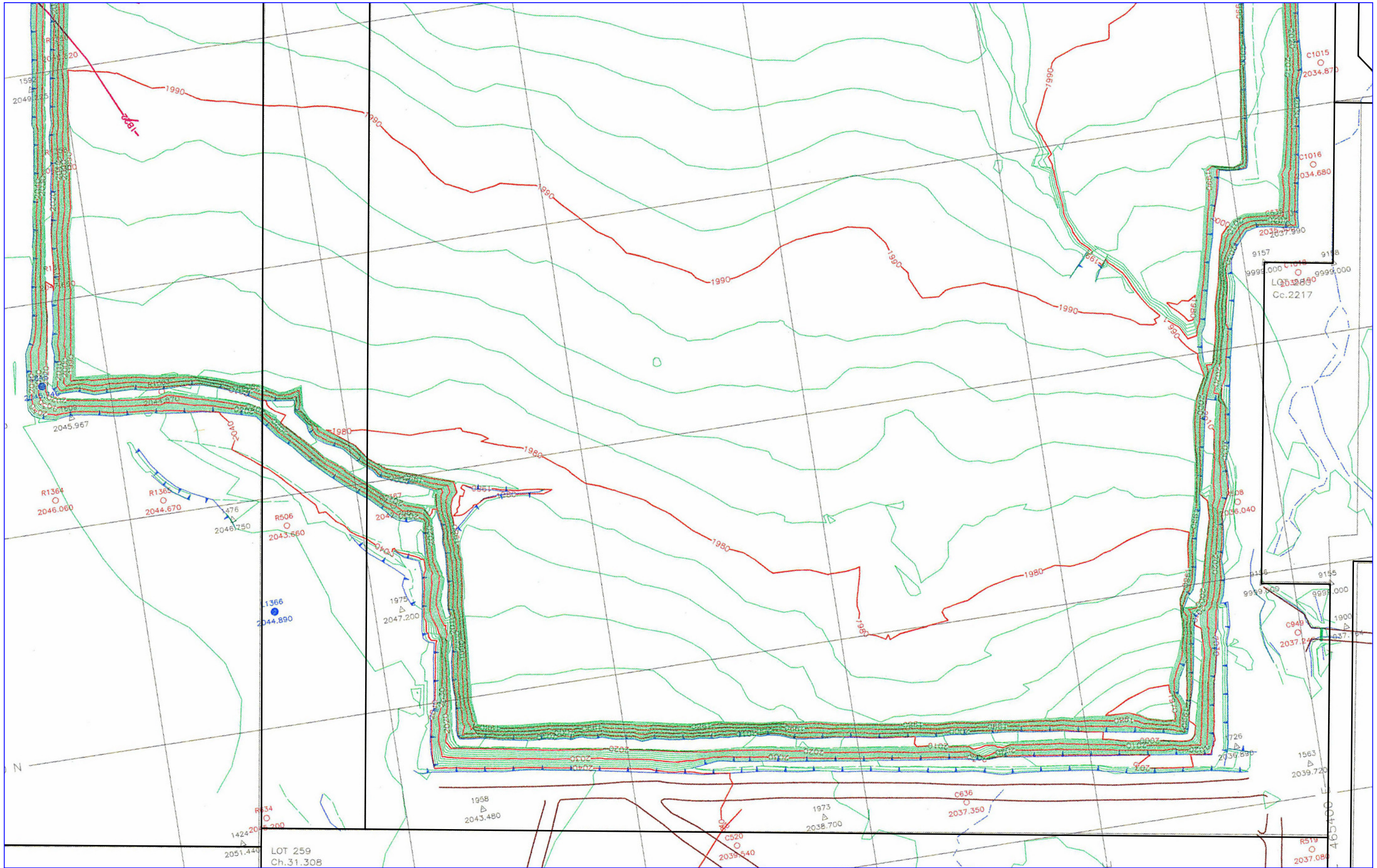
Zedemar Ebenezer Mine
IRON BARK South Pit
1995 Mine Plan - Partly Mined

Date: 22/08/2023	Scale A3: 1:3000	File Location: Ironbark South - Drawing001
Taylor Mining Services Pty Ltd		
1041 Redbank Plains Rd Ph: (07) 3816 2311 Fax: (07) 3816 2377 New Chum QLD 4303 www.taylorminingservices.com.au		



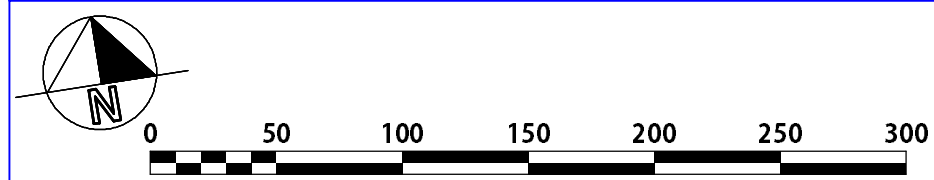
Zedemar Ebenezer Mine
IRON BARK South Pit
1995 Aerial - Mostly Mined Out

Date: 22/08/2023	Scale A3: 1:3000	File Location: Ironbark South - Drawing001
<u>Taylor Mining Services Pty Ltd</u>		
1041 Redbank Plains Rd Ph: (07) 3816 2311 Fax: (07) 3816 2377 New Chum QLD 4303 www.taylorminingservices.com.au		



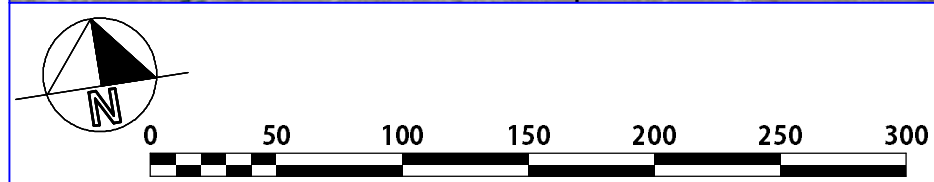
Zedemar Ebenezer Mine
IRON BARK South Pit
1995 Mine Floor Plan - Mined Out

Date: 22/08/2023	Scale A3: 1:3000	File Location: Ironbark South - Drawing001
Taylor Mining Services Pty Ltd		
1041 Redbank Plains Rd Ph: (07) 3816 2311 Fax: (07) 3816 2377 New Chum QLD 4303 www.taylorminingservices.com.au		



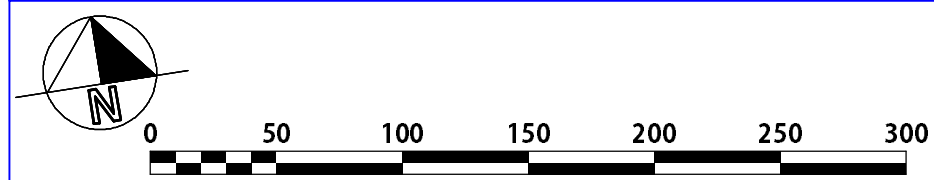
Zedemar Ebenezer Mine
IRON BARK South Pit
1998 Aerial - Part Backfill

Date: 22/08/2023	Scale A3: 1:3000	File Location: Ironbark South - Drawing001
<u>Taylor Mining Services Pty Ltd</u>		
1041 Redbank Plains Rd Ph: (07) 3816 2311 Fax: (07) 3816 2377 New Chum QLD 4303 www.taylorminingservices.com.au		



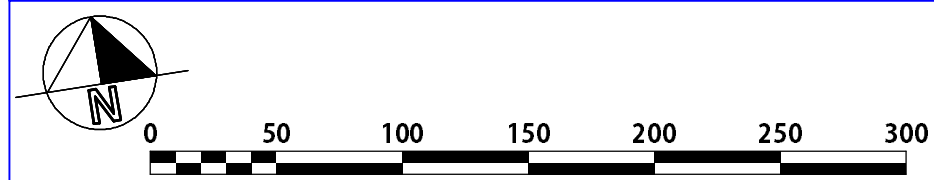
Zedemar Ebenezer Mine
IRON BARK South Pit
2000 Aerial - Part Backfill

Date: 22/08/2023	Scale A3: 1:3000	File Location: Ironbark South - Drawing001
<u>Taylor Mining Services Pty Ltd</u>		
1041 Redbank Plains Rd Ph: (07) 3816 2311 Fax: (07) 3816 2377 New Chum QLD 4303 www.taylorminingservices.com.au		



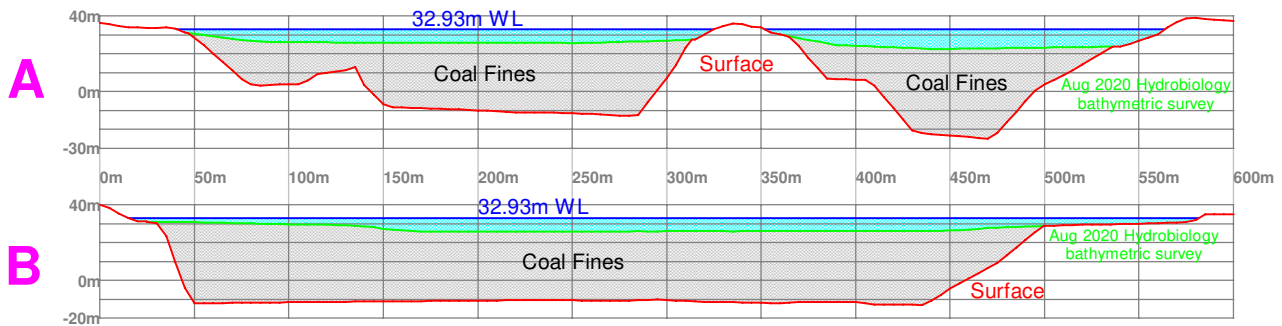
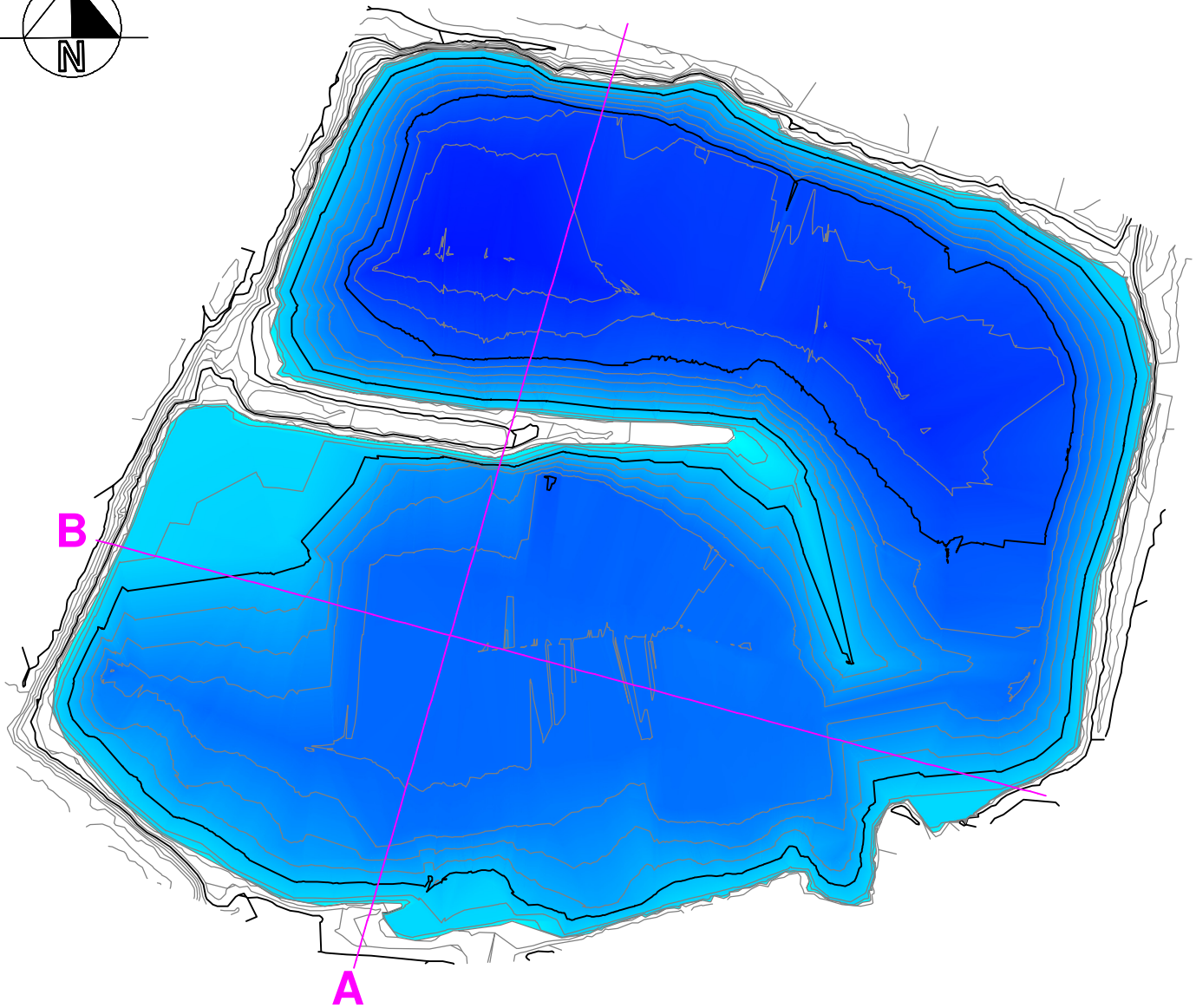
**Zedemar Ebenezer Mine
IRON BARK South Pit
2001 Aerial - Part Backfill**

Date: 22/08/2023	Scale A3: 1:3000	File Location: Ironbark South - Drawing001
<u>Taylor Mining Services Pty Ltd</u>		
1041 Redbank Plains Rd Ph: (07) 3816 2311 Fax: (07) 3816 2377 New Chum QLD 4303 www.taylorminingservices.com.au		



Zedemar Ebenezer Mine
IRON BARK South Pit
2002 Aerial - Part Backfill C/Stone

Date: 22/08/2023	Scale A3: 1:3000	File Location: Ironbark South - Drawing001
<u>Taylor Mining Services Pty Ltd</u>		
1041 Redbank Plains Rd Ph: (07) 3816 2311 Fax: (07) 3816 2377 New Chum QLD 4303 www.taylorminingservices.com.au		



Ebenezer Tailings Dam Cross Sections

Date:
24/08/2023

Scale A4:
1:4000

File Location:
Tailings Dam Volumes - 3

Taylor Mining Services Pty Ltd

1041 Redbank Plains Rd

Ph: (07) 3816 2311

New Chum QLD 4303 taylorminingservices.com.au



CARTLEDGE
MINING AND GEOTECHNICS

Ebenezer Mine Geotechnical Assessment

Highwall Stability Assessment

Report No.: WAN010002-AA_Rev2

February 2022

WANLESS RECYCLING PARK PTY LTD
EBENEZER MINE GEOTECHNICAL ASSESSMENT
HIGHWALL STABILITY ASSESSMENT

Cartledge Mining and Geotechnics
Email: tim.cartledge@cmandg.com.au
Phone: 0407 503 474
Report No.: WAN010002-AA_Rev2
Date: February 2022

Revision	Date	Author	RPEQ Number	Reviewer	RPEQ Number	Issued for
2	21/02/2022	T. Lynch	18593	T. Cartledge	16952	Use
1	21/02/2022	T. Lynch	18593	T. Cartledge	16952	Use
0	24/12/2021	T. Lynch	18593	T. Cartledge	16952	Use

Contents

1	Introduction	1
1.1	Background	1
1.2	Site Location.....	1
1.4	Site Description.....	2
1.5	Purpose	2
1.6	Report Revision.....	2
1.7	Scope of Work.....	3
1.8	Disclaimer	3
2	Literature Review	4
2.1	Boreholes	4
3	Geology	8
3.1	Site Geology	8
3.2	Structural Geology	9
4	Methodology.....	10
4.1	Material Shear Strength Parameters	10
4.2	Stability Assessment of Highwall	10
4.3	Analysis Assumptions.....	12
4.4	Stability Analyses	12
4.5	Summary of Results	12
5	Discussion	14
6	Recommendations	15
7	Conclusions	16
8	References	17
	Appendix A: Pictorial View of Cross-Sectional Slope Stability Analyses.....	

Figures

Figure 1: Site Location Plan	1
Figure 2. Location of the Highwall and Endwall Requiring Assessment (green polygon)	2
Figure 3: Plan showing the selected borehole locations.	5

Figure 4: Except from 1:100,000 Geology Data Sourced from the Queensland Government’s Geo Res Globe Website (<https://georesglobe.information.qld.gov.au/>) 8

Figure 5: Generalised stratigraphic column (taken from scan0141.pdf) 9

Figure 6: Plan of Cross-Sections 1 to 5 11

Tables

Table 1: Summary of Relevant Borehole Located along Lane’s Pit..... 4

Table 2: Register of Provided Information and Data 6

Table 3: Shear Strength Parameters Adopted in the Assessment 10

Table 4: Critical Cross-Section Summary of Calculated FOS 13

1 Introduction

1.1 Background

It is known that the Ebenezer coal mine was mined from 1988 to 2003, produced both domestic and export quality thermal coal, and ceased mining activity in 2003 due to low coal prices. Since then, the mine has been rehabilitated and maintained. Wanless Recycling Park Pty Ltd (Wanless) intends to apply to the Department of Resources to relinquish the mine lease at the historic Ebenezer Mine. A regulatory requirement in the mine lease relinquishment is to reduce the highwall angle to 70%, i.e., 35°. Long-term geotechnical stability is accepted as a slope or batter with a Factor of Safety (FOS) of 1.5 or greater.

On behalf of Wanless, The LZ Environmental Company Pty Limited trading as Zambelli Environmental (Zambelli Environmental) requested that Cartledge Mining and Geotechnics Pty Ltd (CM&G) assess the western highwall of Lane's Pit to determine if it could remain stable in the long-term without the need to flatten the highwall through mechanical excavation or explosive techniques.

1.2 Site Location

Ebenezer Mine is located approximately 10 km southwest of Ipswich City centre, in Southeast Queensland, refer to Figure 1. The site is situated adjacent to other historic coal mines, which mined various coal seams within the relatively near-surface banded Walloon Coal Measures.



Figure 1: Site Location Plan

1.4 Site Description

There are two current mining voids in Ebenezer Mines. The highwalls and associated endwalls to be assessed are along the western side of the Lane’s Pit, which was a previous opencut void and currently ponding with water, refer to Figure 2.



Figure 2. Location of the Highwall and Endwall Requiring Assessment (green polygon)

1.5 Purpose

This report has been prepared to provide Zambelli Environmental with an assessment of the stability of the Lane’s Pit west slopes at Ebenezer Mine, located adjacent to Ipswich, QLD.

CM&G commissioned this assessment following a confirmation of acceptance of quote by Zambelli Environmental, “PRP-WAN0003 Ebenezer Pit Wall Stability Assessment_Rev0”, dated 21/10/2021, for Wanless to demonstrate the long-term stability for western slopes of Lane’s Pit.

1.6 Report Revision

The content of this report has been revised following the receipt of additional information pertinent to the stability assessment of the Lane’s Pit highwall and endwalls. Subsequently, the geotechnical Factor of Safety of the walls has been reassessed, with the relevant sections of the report revised as required.

1.7 Scope of Work

The scope of work involved assessing the highwall and associated endwalls geotechnical stability.

1.8 Disclaimer

This report has been prepared on behalf of and for the exclusive use of Wanless Recycling Park Pty Ltd and its project partner Zambelli Environmental in accordance with the scope of work discussed in Section 1. The report is subject to and issued in accordance with the agreement between Wanless Recycling and Cartledge Mining and Geotechnics (CM&G). This report is not intended for and should not be relied upon by any third party. In preparing this report, CM&G has necessarily relied upon information provided by Wanless Recycling and Zambelli Environmental. This report should be kept in its entirety without the separation of individual pages or sections. This report, or sections from this report, should not be used as part of a specification for a project without review and agreement by CM&G.

Interpretations and recommendations provided in the report are based on the ground conditions at the site, only at the specific observational / sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. This is because ground conditions are subject to change from place to place and with time due to geological processes and because of human influences. Advice provided by CM&G is based upon the conditions encountered on-site at the time of inspection/investigation. If different ground conditions are encountered following the issuance of this report, CM&G should be notified so that further advice can be provided.

2 Literature Review

The information, data, and reports, as presented in Table 2, were made available to CM&G to allow for the desktop review of the materials characterised and the stability assessments made of the Lane's Pit historically.

2.1 Boreholes

Thirteen (13) boreholes from the provided data were considered relevant for the assessment as shown in Table 1.

Table 1: Summary of Relevant Borehole Located along Lane's Pit

Borehole Designation	Easting (m) ⁽¹⁾	Northing (m) ⁽¹⁾	Depth (m)	Reduced Level (RL) of Collar (m) AHD	Source
L853	464851.3	6938507.9	55.52	48.1	Ebenezer Mine Lithology Log
L854	464453.6	6938501.0	66.76	65.1	Ebenezer Mine Lithology Log
L1022	464215.5	6937746.1	61.74	50.28	Ebenezer Mine Lithology Log
L1023	464087.5	6937564.4	70.33	50.46	Ebenezer Mine Lithology Log
L1024	464152.6	6937351.5	71.54	48.41	Ebenezer Mine Lithology Log
L1036	464346.2	6937927.0	74.36	49.65	Ebenezer Mine Lithology Log
L1037	464546.6	6937885.4	72.63	47.58	Ebenezer Mine Lithology Log
L1243	464479.6	6938720.2	68	62.57	Ebenezer Mine Lithology Log
L1244	464673.3	6938680.7	60.3	52.47	Ebenezer Mine Lithology Log
1	464430.8	6937634.0	2.95	47.7	Douglas Partners Report on Preliminary Investigation
2	464527.4	6938187.4	2.53	50.5	Douglas Partners Report on Preliminary Investigation
EB-GW005	464575.9	6938806.2	48	63.566	Taft Engineering Borehole Logging Record
EB-GW006	464369.8	6938106.8	108	50.614	Taft Engineering Borehole Logging Record

Note:

(1) Geocentric Datum of Australia (GDA) 2020 MGA zone 56

A plan showing the location of the selected boreholes is presented below (Figure 3).



Figure 3: Plan showing the selected borehole locations.

Table 2: Register of Provided Information and Data

Date Received	From	Company	Via	Folder	Description	File Name	File Type
24/09/2021	Luke Zambelli	Zambelli Environmental	Email	Geology Model	Draft version of 'Report on Preliminary Geotechnical Investigation Proposed Recycling Park MCU Application', Coopers Road, Willowbank, Project 97334.01, dated April 2020, from Douglas Partners, rev 0	Geotechnical Assessment – Douglas Partners	PDF
24/09/2021	Luke Zambelli	Zambelli Environmental	Email	Borehole Database	Borehole log records by Taft Engineering for monitoring bores installed at Ebenezer	BH Logs- GW001 To GW0010	PDF
24/09/2021	Luke Zambelli	Zambelli Environmental	Email	Borehole Database	Staked water monitoring borehole locations with/without aerial plan	SET_2018.11.1_1-2	PDF
28/09/2021	Luke Zambelli	Zambelli Environmental	Email	Geology Model	Final version of 'Report on Preliminary Geotechnical Investigation Proposed Recycling Park MCU Application', Coopers Road, Willowbank, Project 97334.01.00. R.001.Rev01, dated April 2020, from Douglas Partners, rev 1	Geotechnical Report – Douglas Partners	PDF
11/10/2021	Luke Zambelli	Zambelli Environmental	Email	Borehole Database	Lithology coding form for hole L1037, sheet 7-12, from depth 42.29m to 72.63m.	Scan0151	PDF
11/10/2021	Luke Zambelli	Zambelli Environmental	Email	Borehole Database	Lithology coding form for hole L1037, sheet 1-6, from depth 12m to 42.12m, location is close to Lanes Pit or possibly within in it.	scan0139	PDF
11/10/2021	Luke Zambelli	Zambelli Environmental	Email	Borehole Database	R1037 Coal Seam bed scan #1 gamma and density	scan0148	PDF
11/10/2021	Luke Zambelli	Zambelli Environmental	Email	Borehole Database	R1037 Coal seam bed scan #2	scan0149	PDF
11/10/2021	Luke Zambelli	Zambelli Environmental	Email	Borehole Database	R1037 Coal seam bed scan #3	scan0150	PDF
11/10/2021	Luke Zambelli	Zambelli Environmental	Email	Borehole Database	Generalised stratigraphic sequence with Gamma Ray plot and Coal Bulk Density plot	scan0141	PDF
11/10/2021	Luke Zambelli	Zambelli Environmental	Email	Borehole Database	R1037 Seam Thickness Log #1 density	scan0142	PDF
11/10/2021	Luke Zambelli	Zambelli Environmental	Email	Borehole Database	R1037 Seam Thickness Log #2	scan0143	PDF
11/10/2021	Luke Zambelli	Zambelli Environmental	Email	Borehole Database	R1037 Seam Thickness Log #3	scan0144	PDF
11/10/2021	Luke Zambelli	Zambelli Environmental	Email	Borehole Database	R1037 Seam Thickness Log #4	scan0145	PDF
11/10/2021	Luke Zambelli	Zambelli Environmental	Email	Borehole Database	R1037 Seam Thickness Log #5	scan0146	PDF
11/10/2021	Luke Zambelli	Zambelli Environmental	Email	Borehole Database	R1037 Seam Thickness Log #6	scan0147	PDF
21/10/2021	Luke Zambelli	Zambelli Environmental	Email	Geology Model	Images excerpted from a report associated with the Ebenezer regarding sonar images of what the voids look like under water, including sidescan mosaic of Lanes Pit (30/07/2020), depth contours of lanes pit (30/07/2020), sidescan mosaic of Ironbark Pit (31/07/2020), depth contours of Ironbark Pit (31/07/2020), and estimated void water volumes using sonar depth measurements.	High Wall – Sonar and Water Depth	PDF
21/10/2021	Luke Zambelli	Zambelli Environmental	Email	Survey	Previous water depth contours, relevant contours of the floor of the Lanes void marked in yellow.	2018.10.25_Mine_Creek_Lvls	PDF
21/10/2021	Luke Zambelli	Zambelli Environmental	Email	Survey	Water volume estimated by Hugh Taylor, where he rationalised the sonar depths against previous contours.	Depth Plots	PDF
21/10/2021	Luke Zambelli	Zambelli Environmental	Email	Geology Model	Historic topography information for the mine lease area.	Topography – soils description	PDF
21/10/2021	Luke Zambelli	Zambelli Environmental	Email	Borehole Database	Geochemistry testing for soils	EIAS – Appendix 1 – Laboratory Results of Overburden Analysis	PDF
21/10/2021	Luke Zambelli	Zambelli Environmental	Email	Geology Model	Historic information for stratigraphy of the Walloon Coal Measures	Stratigraphy of the Walloon Coal Measures	PDF

Date Received	From	Company	Via	Folder	Description	File Name	File Type
12/11/2021	Luke Zambelli	Zambelli Environmental	Email	Borehole Database	Location of L1037 and nearby boreholes L1023, L1034, L1035, and L1036	L1037	JEPG
16/11/2021	Hugh Taylor	Taylor Mining Services Pty Ltd	DropBox	Survey	Drone survey for above water slope in 2017, below water mine plans in 2002	2017 Highwalls to F Seam 2002	DXF
17/11/2021	Luke Zambelli	Zambelli Environmental	CouriersPlease	-	Borehole coal lithology form, lithology log, seam thickness log, lab data and analysis of seam intersections for L853, L854, L1243, L1244, L1034, L1035, L1036, L856, L1022, L1021, L1024	-	Physical Paper
04/01/2022	Peter Toole	Wanless	Email	Bentonite	A study on the mining opportunity of the bentonite clays within the Ebenezer Mine	Ebenezer Bentonite - Mining Study 171129 Final	PDF
04/01/2022	Peter Toole	Wanless	Email	Bentonite	A report outlining the resource geological model of the site in terms of coal and bentonite	Ebenezer Geological Modelling Notes 20171127 Final	PDF
19/01/2022	Luke Zambelli	Zambelli Environmental	Email	Sonar	A plan showing the topographic contours of Lane's Pit, including underwater contours derived from sonar readings	Void Approximation Plan	PDF
19/01/2022	Luke Zambelli	Zambelli Environmental	Email	Sonar	The results of the sonar scan of the water-filled void at Lane's Pit	Void Approximation inc Boat Data	CSV

3 Geology

3.1 Site Geology

Based on a review of publicly available geological information, refer to Figure 4, the geological model of the site is considered to consist of

- Quaternary Alluvium (Qa); comprising clay, silt, sand and gravel and flood-plain alluvium
- Late Tertiary - Quaternary Alluvium (TQw); comprising pediment slope wash, clay, scree, and soil
- Tertiary (Ts/1) claystone, siltstone, and sandstone
- Middle Jurassic aged Walloon Coal Measures (Jw), comprising shale, siltstone, sandstone, and coal seams.

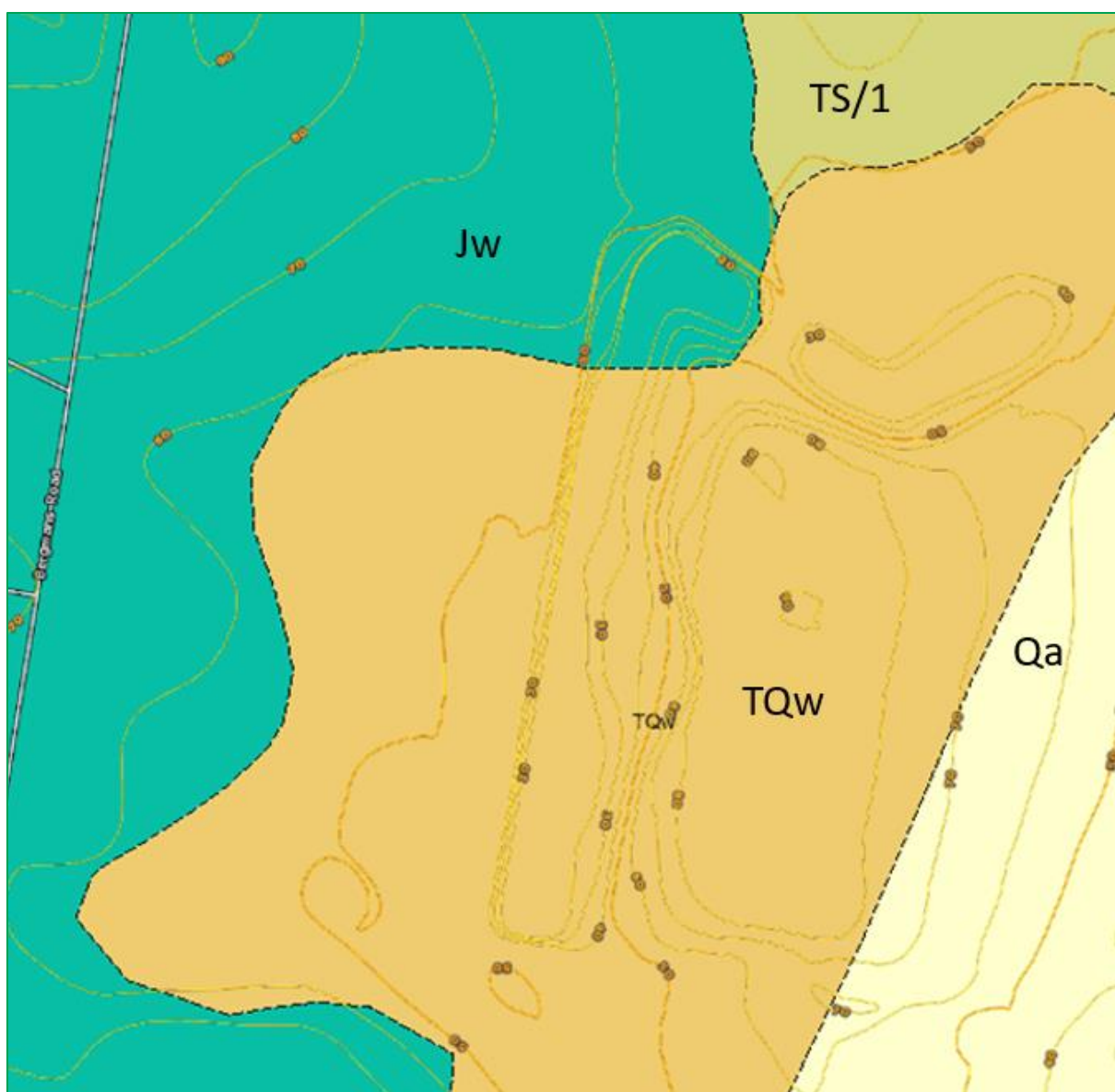


Figure 4: Except from 1:100,000 Geology Data Sourced from the Queensland Government’s Geo Res Globe Website (<https://georesglobe.information.qld.gov.au/>)

Experience in the Walloon coal measures identifies that thin bentonite clay layers occur within the formation and have been associated with pit slope instability. A generalised stratigraphic column

provided in the dataset (file name: scan0141.pdf) identifies the presence of bentonitic claystone interbedded within the A and E coal plys, see Figure 5. Bentonitic clays have very high plasticity and very low frictional strength. These geomechanical properties have resulted in slope failures on floor dips as shallow as 4°.

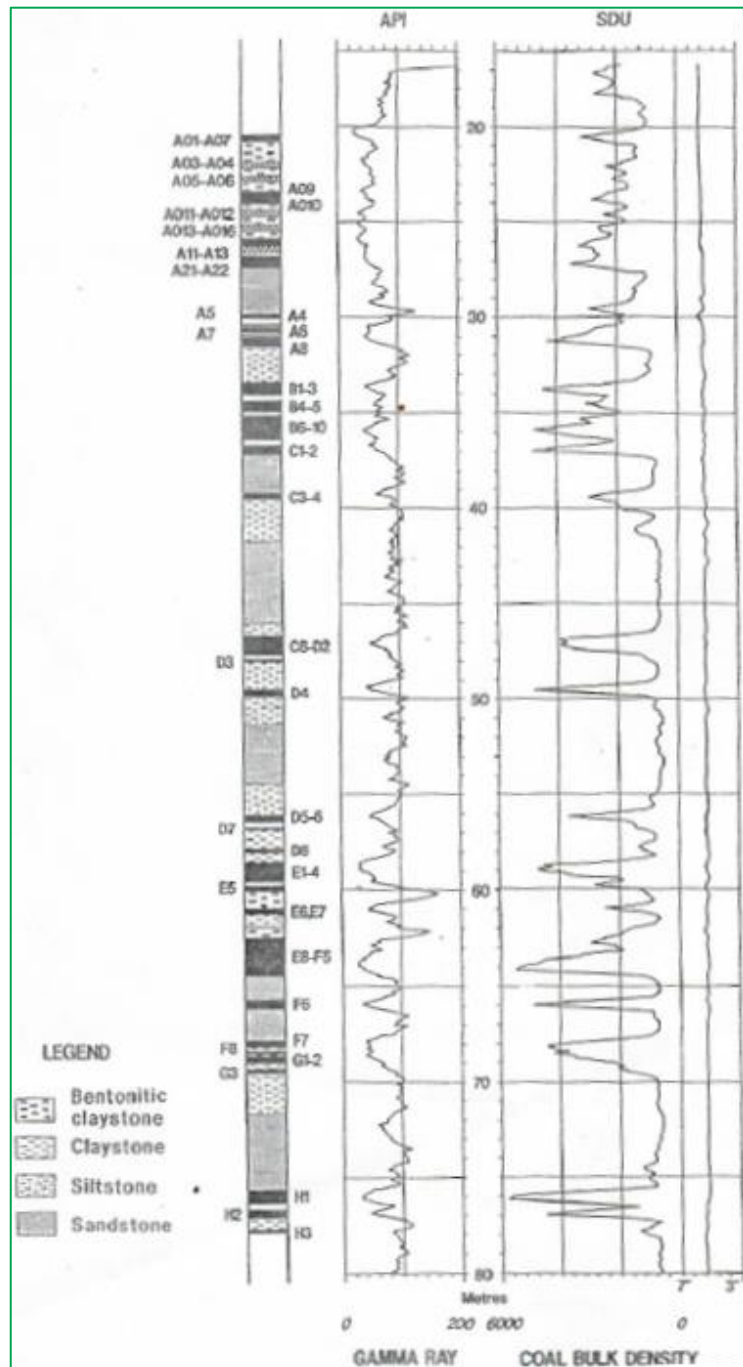


Figure 5: Generalised stratigraphic column (taken from scan0141.pdf)

3.2 Structural Geology

There is no fault data available for the site. The walls performance indicates that it is unlikely that there are unfavourably oriented faults exposed or contained within the final walls. However, the English log for borehole L1037 (see files: scan0129.pdf and scan 0151.pdf) records broken zones and slickensided joints. These features are symptomatic of deformation within the rockmass and could indicate the presence of geological structures or bedding parallel movement along weak planes (clay layers).

4 Methodology

To assess the geotechnical stability, CM&G carried out the following tasks:

- Determination and evaluation of geotechnical parameters for the Lane’s Pit slope materials;
- Slope stability analyses using limit equilibrium software Slide2 by Rocscience, assessing the current site geometry, to determine whether the slopes achieve a recommended Factor of Safety (FOS) of 1.5 (which is considered appropriate for site closure and final landform); and
- Review of the stability analysis results to allow for discussion around improving stability and/or reducing any geotechnical risks identified.

4.1 Material Shear Strength Parameters

Limited geotechnical data were available to assess soil and rock units at Ebenezer Mine, as historic testings provided were mainly for coal processing purposes. Due to the lack of laboratory testing data, the following assumptions were adopted in this assessment:

- ‘BMA Shear Strength Parameters’ were used for the intact rock parameters. These parameters have been extensively used for the analysis of coal mine stability and validated using back-analysis and laboratory testing.
- For the bentonite clay layers, a range of drained and undrained parameters are considered in the assessment for the possible scenarios.
- The sediment which has accumulated across the pit floor, as indicated by the sonar data, has been assigned an undrained shear strength which is considered to be indicative of this material. No actual geotechnical data is available for this material.

Drained and undrained parameters were used to assess short-term and long-term conditions. Drained conditions (cohesion and friction) are considered long-term conditions where pore pressures have time to dissipate. Short-term, or dynamic conditions during deformation, consider undrained parameters; refer to Table 3.

4.2 Stability Assessment of Highwall

CM&G developed five cross-sections for use in the limited equilibrium analysis (one in each endwall and three in the highwall). The geometry and geological profile for the cross-sections were modelled based on the topography survey provided by Taylor Mining Services Pty Ltd and available borehole logs.

The locations of the five cross-sections are shown in Figure 6.

Table 3: Shear Strength Parameters Adopted in the Assessment

Material Name	Drained			Undrained	
	γ (kN/m ³)	c' (kPa)	ϕ' (deg)	γ (kN/m ³)	c_u (kPa)
Topsoil	18	5	30	-	-
Sand	19	5	30	-	-
Clay	19	5	30	-	-
Weathered Sandstone	22	60	30	-	-
Weathered Siltstone	24	60	30	-	-
Weathered Coal	15	0	30	-	-

Material Name	Drained			Undrained	
	γ (kN/m ³)	c' (kPa)	ϕ' (deg)	γ (kN/m ³)	C_u (kPa)
Coal Seam/ Claystone Interbedded	15	30	35	-	-
Sandstone	24	450	42	-	-
Claystone	24	200	20	-	-
Bentonite Clays	24	0	8	-	-
	24	0	12	-	-
	24	0	20	-	-
	-	-	-	24	50
	-	-	-	24	100
-	-	-	24	400	
Sediment	-	-	-	16	10

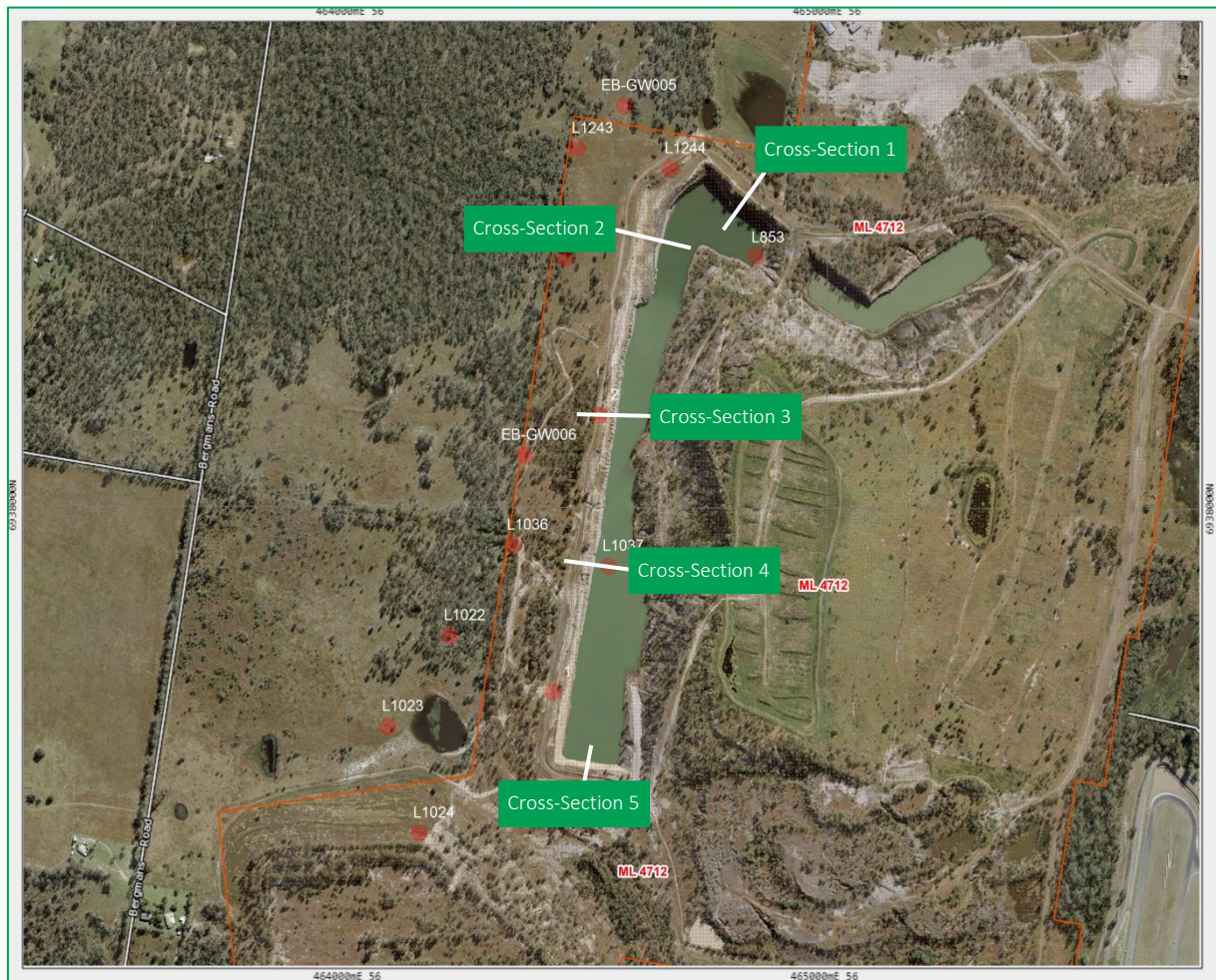


Figure 6: Plan of Cross-Sections 1 to 5

4.3 Analysis Assumptions

The following assumptions were adopted for this analysis:

- The prime floor surface was interpolated from the topography profile provided by Taylor Mining Services Pty Ltd [file reference 2017 Highwalls to F Seam 2002.dxf]. Where the pit floor terminates on coal seam, the pit floor level is lowered to the base of targeted coal seam to allow the analysis model to be developed.
- Standing water level within the void was provided by Zambelli Environmental following sonar investigation of the void [file reference High Wall – Sonar and Water Depth]. From discussions with Zambelli Environmental, it is understood that the water within the void represents the phreatic surface across the site. As such, the void does not act as a dam (in the long term), so this water level is considered representative of the groundwater condition at the site.
- The water level along the slope is assumed to be 13 m below the ground surface based on environmental holes by Taft Engineering.
- Failure surfaces were assumed to develop along or in the vicinity of weak planes in the area. The validity of slip surfaces was tested by deploying the Cuckoo Search function for each scenario.
- Surface levels for the sediment below the water within the pit is taken from the “Void Approximation Plan”.

4.4 Stability Analyses

Slope stability analyses were undertaken on the cross-sections, as shown in Figure 6, using “Slide2” v9.016 for the existing geometry of the highwall.

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 Factor of Safety (FOS).

The analysis involves the calculation of FOS for potential shear failure surfaces. The FOS against shear failure is defined as the proportion of restoring forces versus the destabilising forces of the analysed slope to bring the materials into a state of limiting equilibrium.

4.5 Summary of Results

The results of the analyses, as discussed above, are presented in Table 4. Cross-Sections 1 through 4 returned results with an FOS of greater than 1.5 for all scenarios. Cross-Section 5 returned results between 1.2 and 1.5. Read & Stacey (2009) indicates that an FOS of 1.1 is approximately equivalent to a 30 per cent likelihood of slope failure. An FOS of ≥ 1.5 is approximately equivalent to a ≤ 5 per cent likelihood of failure.

Pictorial representations of the batter cross-sections with the critical sliding surfaces and respective FOS are presented in Appendix A.

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.

5 Discussion

The results indicate that the current slope geometries along the highwall and northern endwall satisfy the long-term requirements for slope stability. The southern endwall did not achieve the recommended minimum FOS of 1.5; however, as this is an endwall, the wall is restrained by the three-dimensional (3D) confinement of the highwall and the lowwall. With this consideration, it is likely that the 3D FOS could be in excess of the recommended minimum of 1.5.

The geotechnical model adopted is based on commonly adopted parameters within the Queensland coal mining industry and experience in the region. The presence of the bentonitic clay layers in the model significantly impacts the stability. These layers (clays) have been known to cause slope failures at very shallow floor angles within the Walloon coal measures around Ipswich.

It is understood that there is no visual indication of instability of the slopes, indicating that the ground conditions are in general agreement with the analyses. However, a geotechnical site investigation is required to verify the ground model and subsequent re-assessment of the slope stability. The investigation needs to provide information on the following:

- Intact and rock mass strength from Unconfined Compressive Strength (UCS) tests and geotechnical logging of the rock core,
- Direct Shear testing of critical units to determine the shear strength of joints and bedding parallel shears,
- Geomechanical characteristics of the bentonitic clays if present within the rock mass. This should provide both undrained and drained parameters.

An alternative approach to mitigating the risk of wall failure is to reduce the likelihood of a failure causing harm to people, property, or wildlife. To achieve this, Wanless have proposed to construct a safety bund (5 m bottom width, 2.5 m high and 1 m top width) and a five-strand wire fence (four strands of barbed wire with one strand at the top of plain wire) around Lane's Pit at an approximate distance of 40 m from the crest edge.

CM&G consider this method appropriate to significantly reduce the risk to people and animals should a highwall failure occur.

6 Recommendations

Considering the above discussions and findings of the stability assessment, the following recommendations are provided:

- Geotechnical site investigation targeting the following:
 - Intact and rock mass strength from Unconfined Compressive Strength (UCS) tests and geotechnical logging of the rock core,
 - Direct Shear testing of critical units to determine the shear strength of joints and bedding parallel shears,
 - Geomechanical characteristics of the bentonitic clays if present with the rock mass. This should provide both undrained and drained parameters.
- The slope stability analyses should be re-run once the ground model has been updated with the data from the geotechnical subsurface investigation.

7 Conclusions

There is insufficient geotechnical information available to complete a robust assessment of Lane's Pit at Ebenezer Mine. Results from the stability analyses based on industry adopted parameters and the author's experience with the Walloon Coal Measures indicate that the current slope geometries generally satisfy the long-term stability requirements for closure. A geotechnical subsurface investigation is required to verify the ground conditions. The analyses presented herein should be re-run once the ground model has been updated.

The bund and stock fence proposed by Wanless is considered to be an appropriate control measure to reduce the likelihood that people would be present at the highwall during a failure event.

8 References

Read, J., & Stacey, P. (2009). *Guidelines for Open Pit Slope Design*. Collingwood: CRC Press.

Appendix A: Pictorial View of Cross- Sectional Slope Stability Analyses

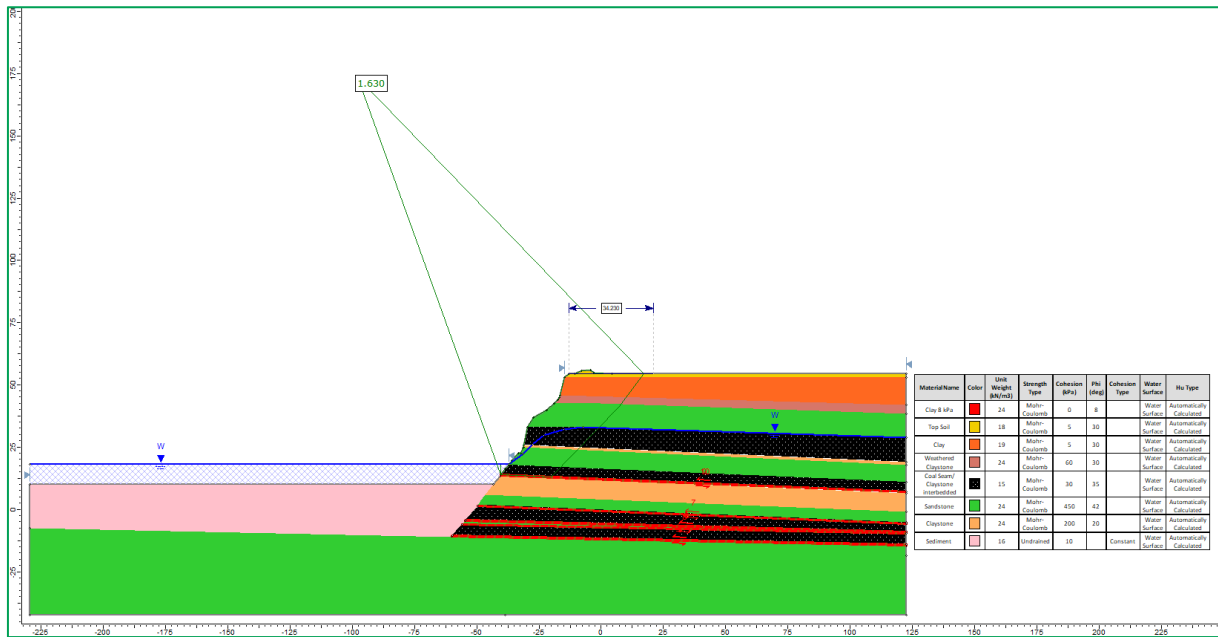


Figure A 1: Cross-Section 1_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 8^\circ$ - Cuckoo Search

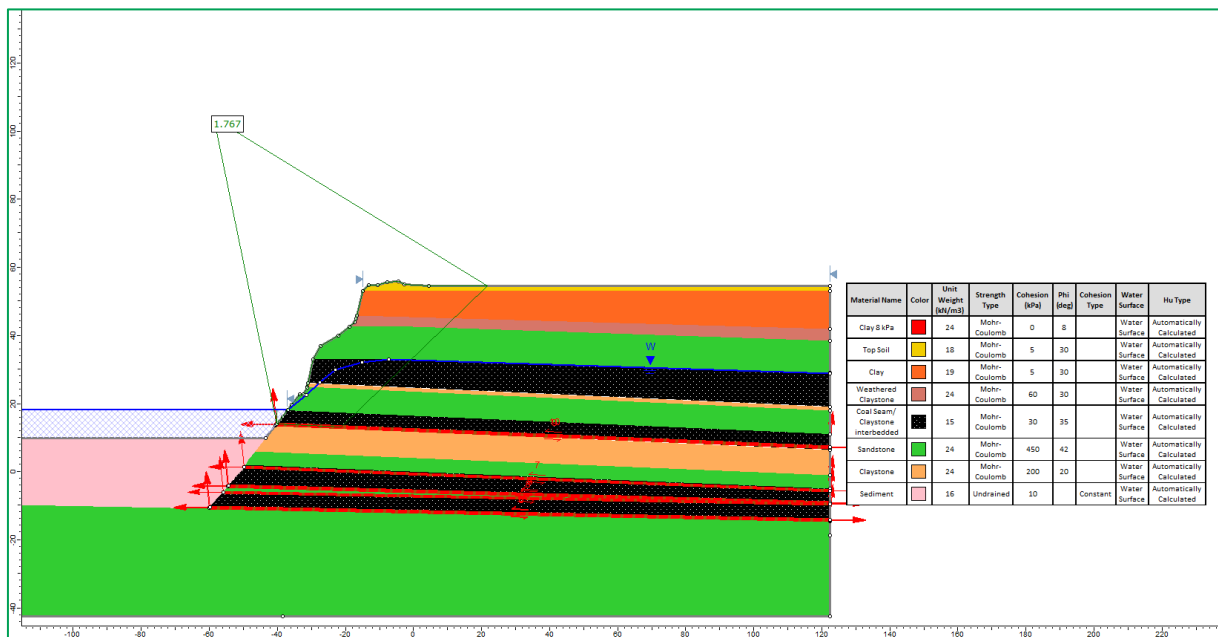


Figure A 2: Cross-Section 1_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 8^\circ$ - Block Search

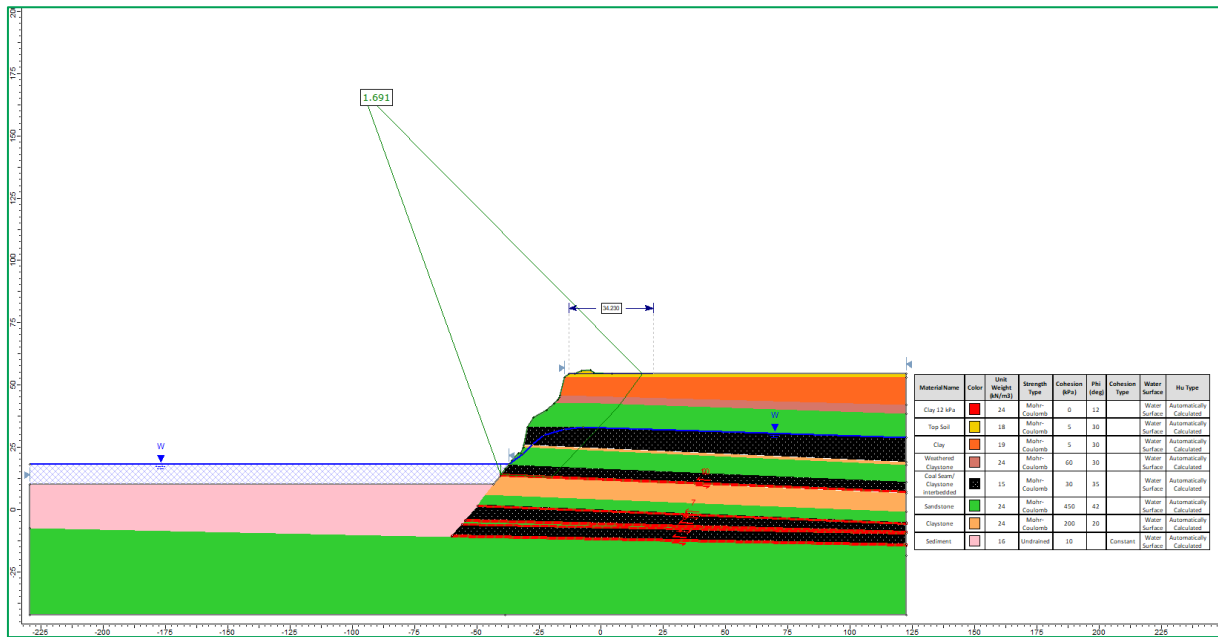


Figure A 3: Cross-Section 1_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 12^\circ$ - Cuckoo Search

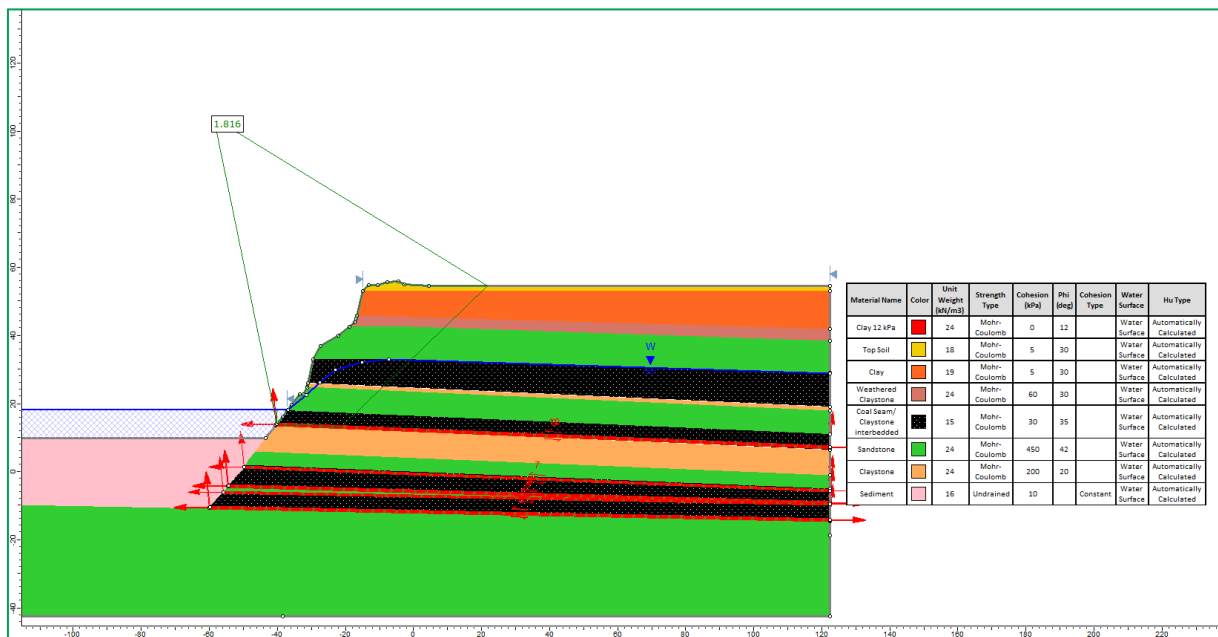


Figure A 4: Cross-Section 1_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 12^\circ$ - Block Search

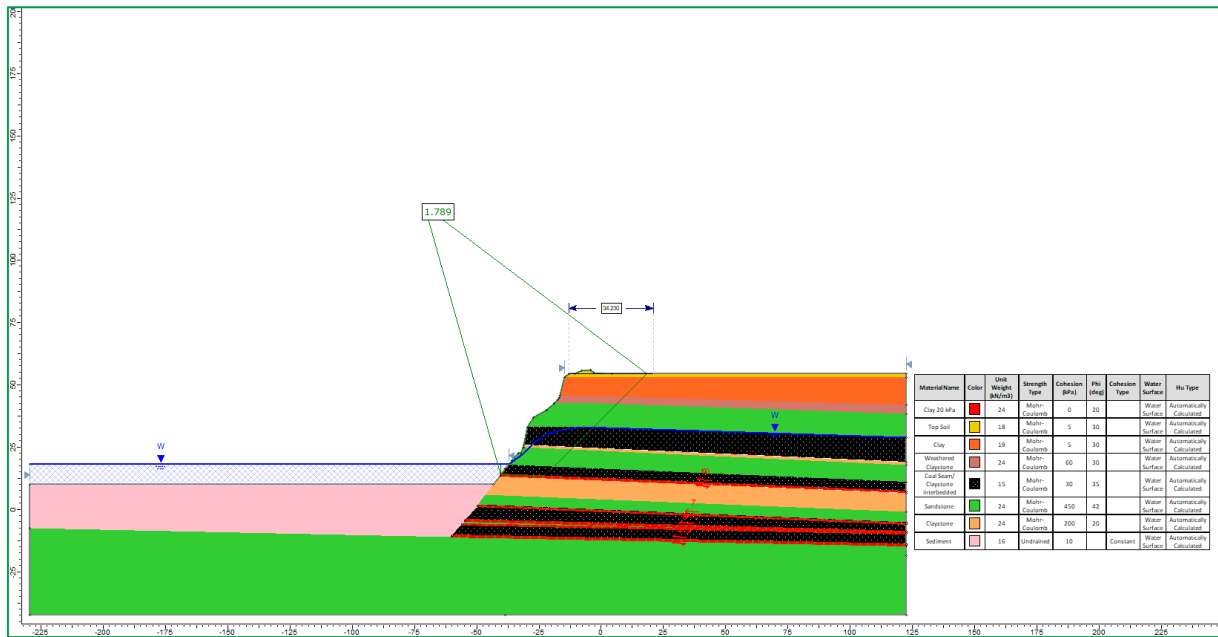


Figure A 5: Cross-Section 1_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 20^\circ$ - Cuckoo Search

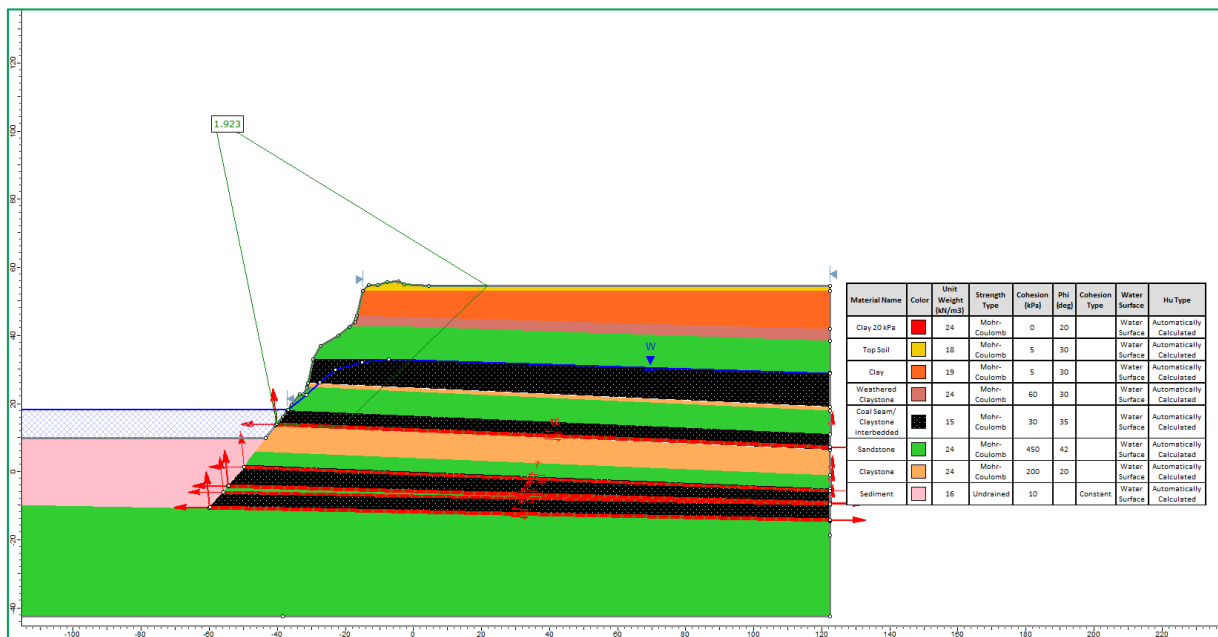


Figure A 6: Cross-Section 1_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 20^\circ$ - Block Search

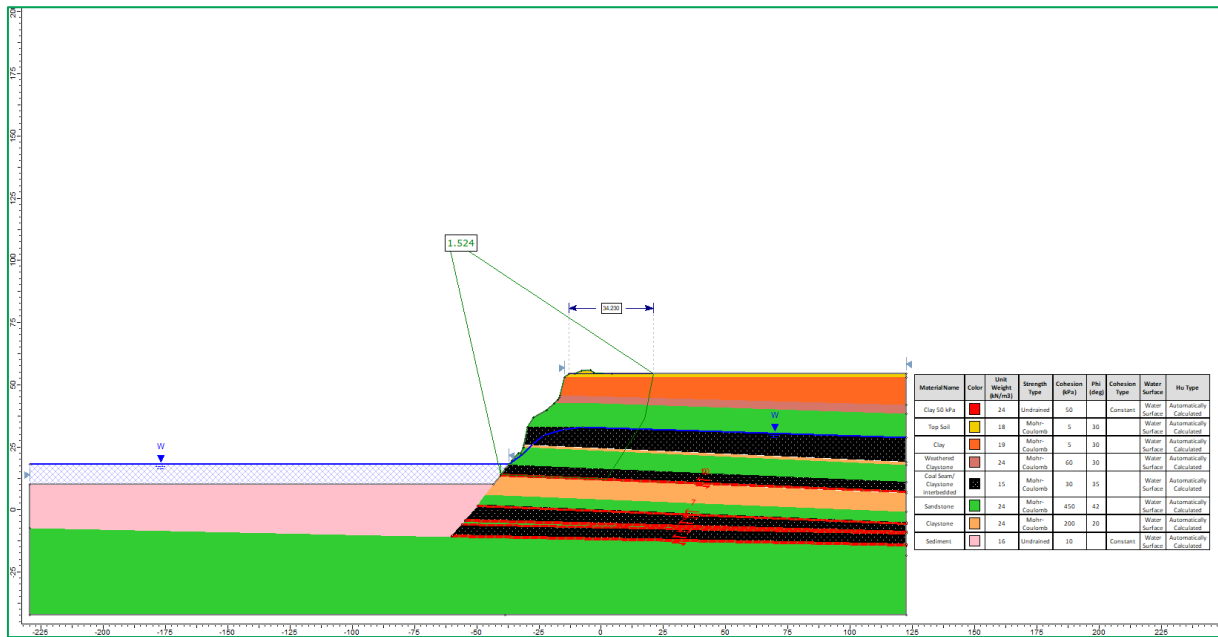


Figure A 7: Cross-Section 1_Bentonite Clay_Undrained_c_u = 50 kPa - Cuckoo Search

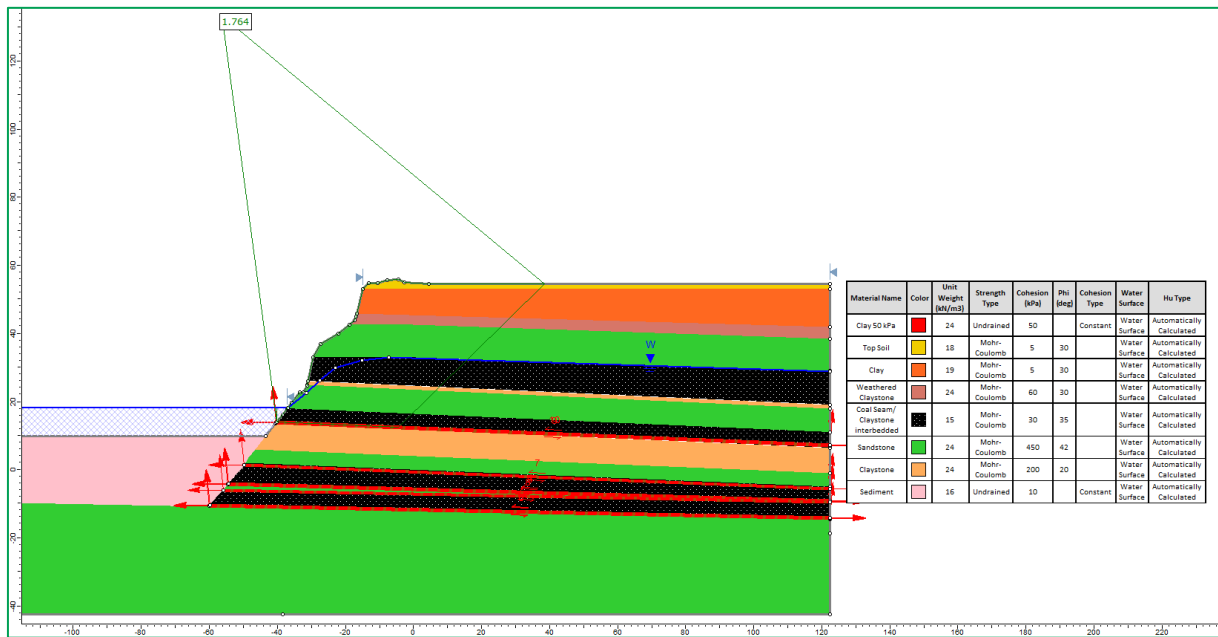


Figure A 8: Cross-Section 1_Bentonite Clay_Undrained_c_u = 50 kPa - Block Search

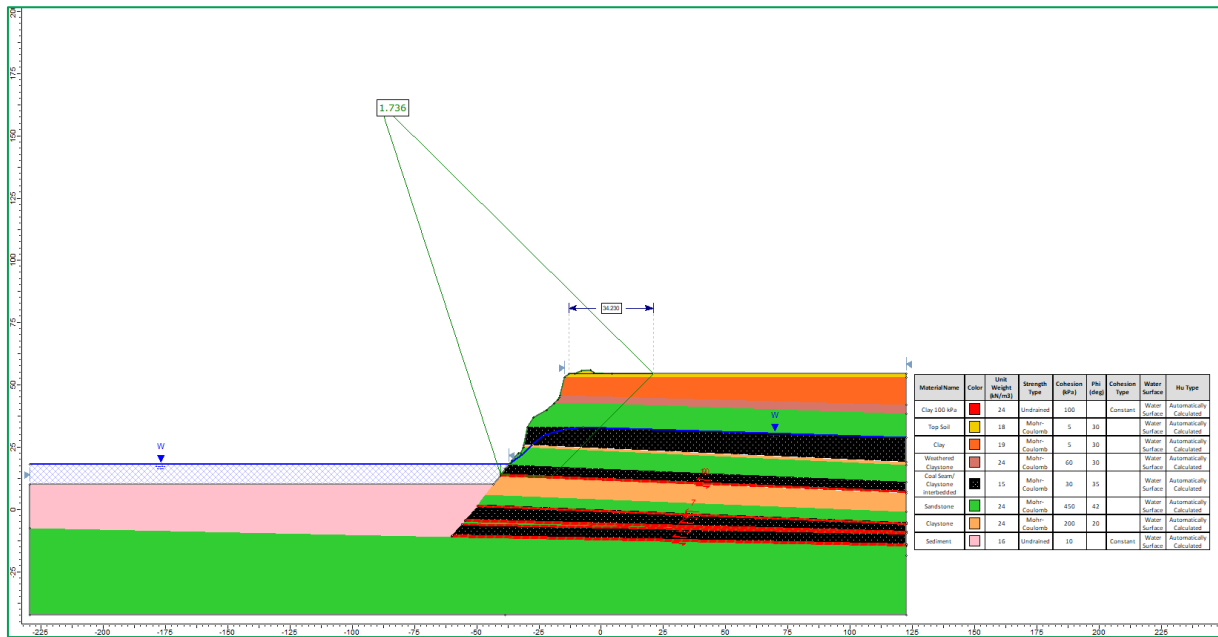


Figure A 9: Cross-Section 1_Bentonite Clay_Undrained_c_u = 100 kPa - Cuckoo Search

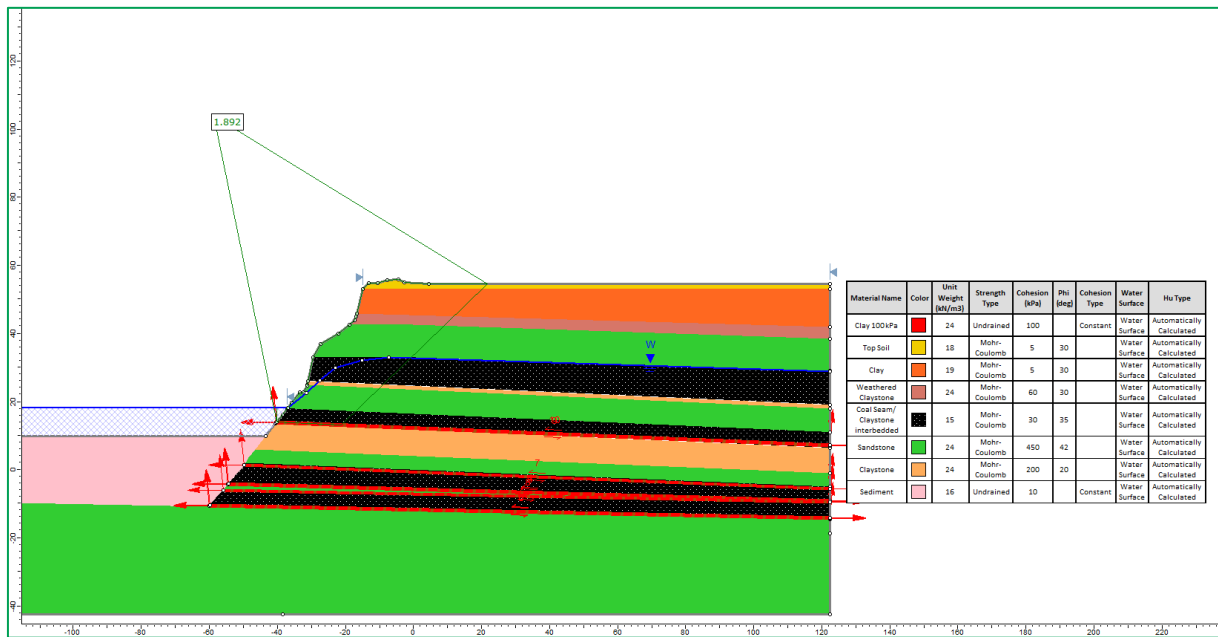


Figure A 10: Cross-Section 1_Bentonite Clay_Undrained_c_u = 100 kPa - Block Search

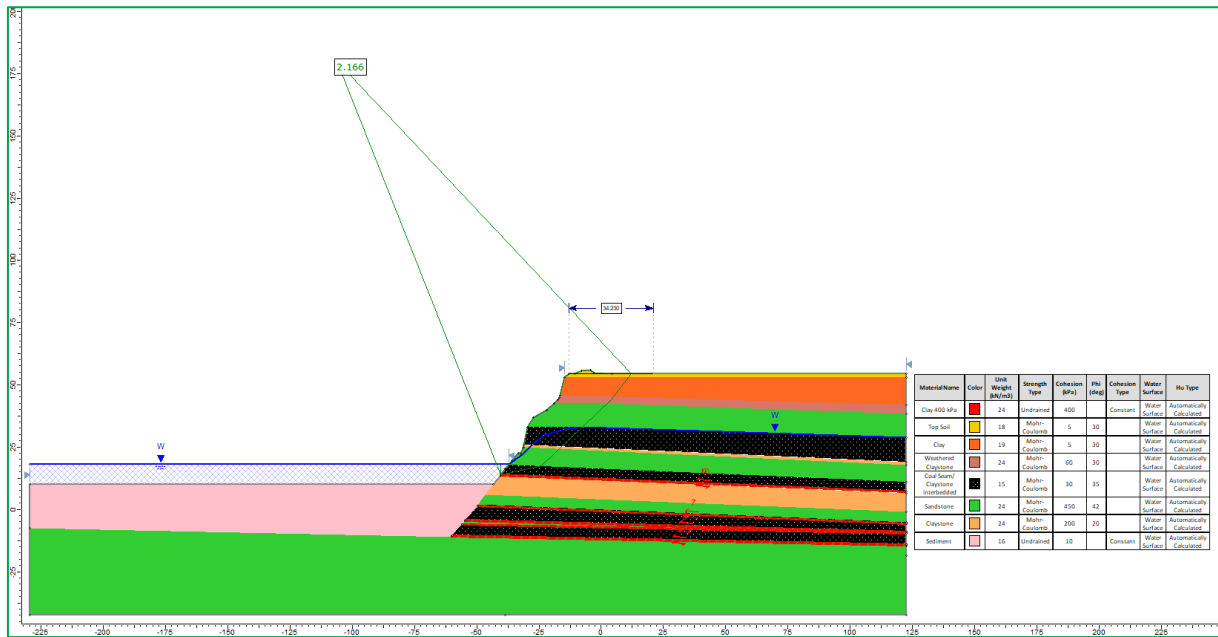


Figure A 11: Cross-Section 1_Bentonite Clay_Undrained_c_u = 400 kPa - Cuckoo Search

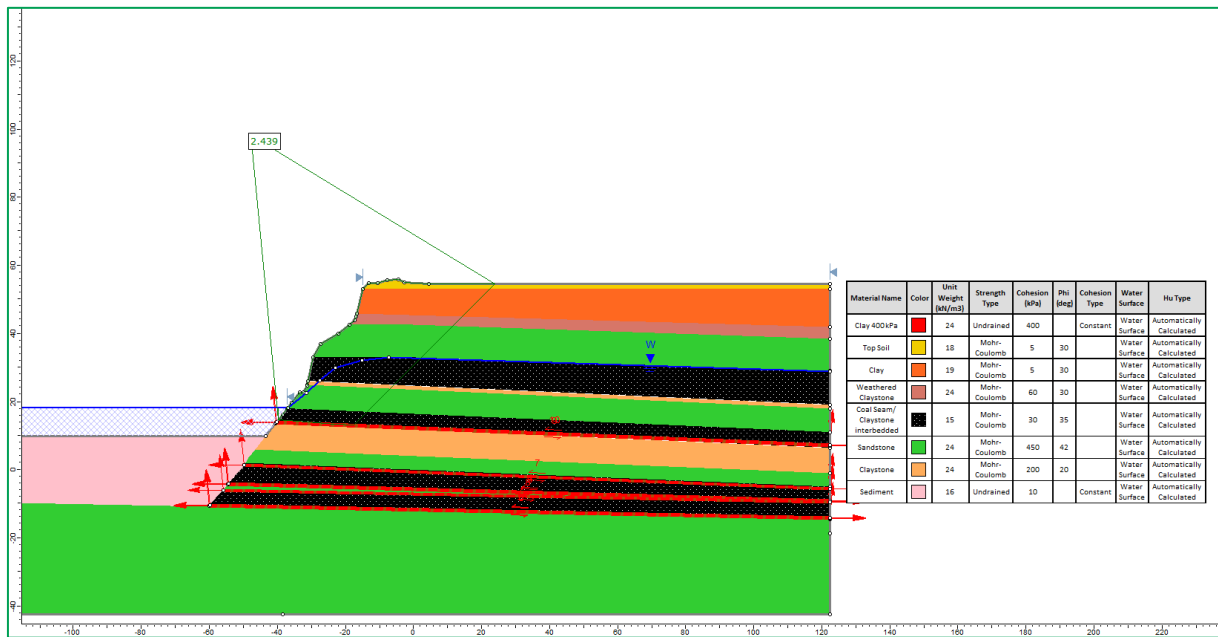


Figure A 12: Cross-Section 1_Bentonite Clay_Undrained_c_u = 400 kPa - Block Search

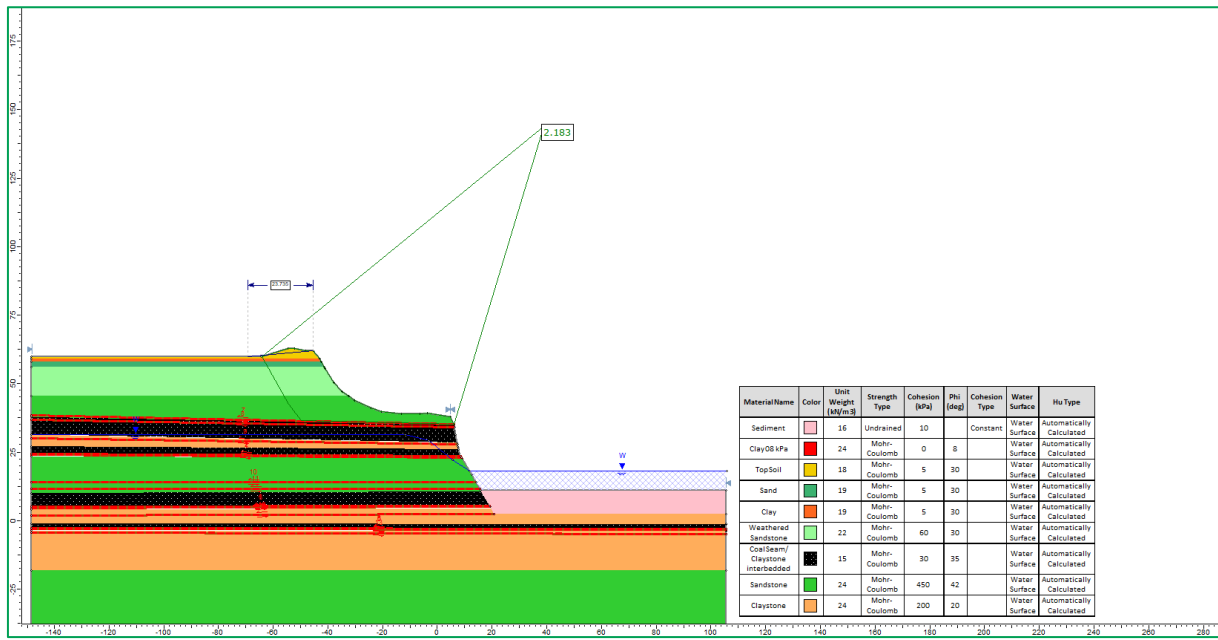


Figure A 13: Cross-Section 2_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 8^\circ$ - Cuckoo Search

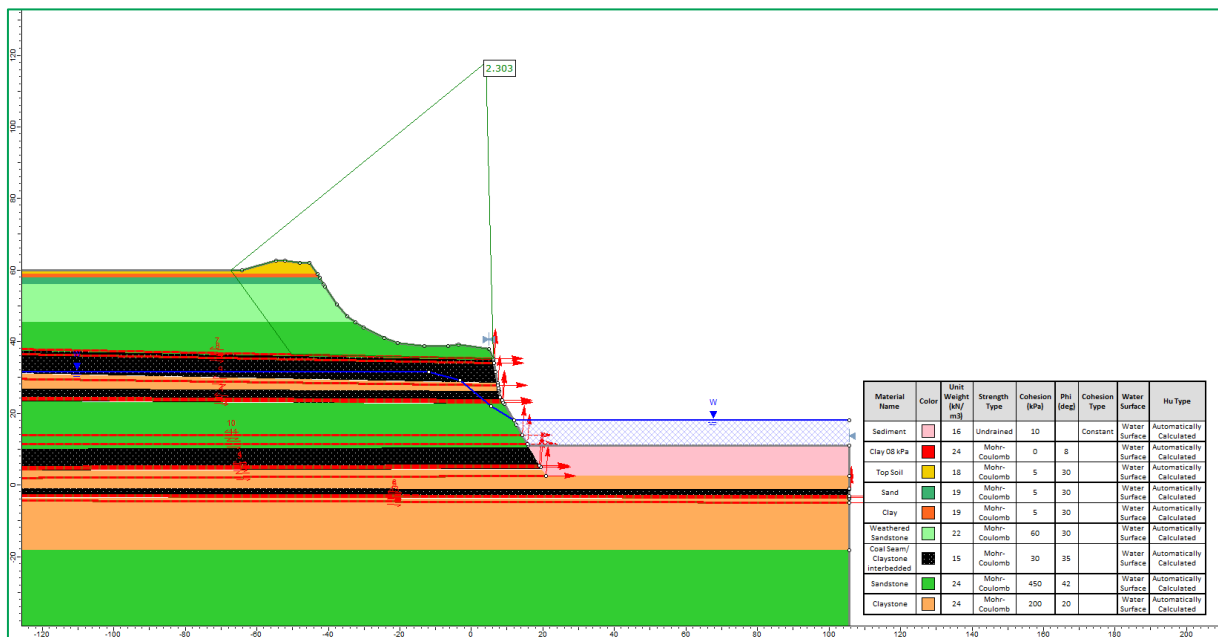


Figure A 14: Cross-Section 2_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 8^\circ$ - Block Search

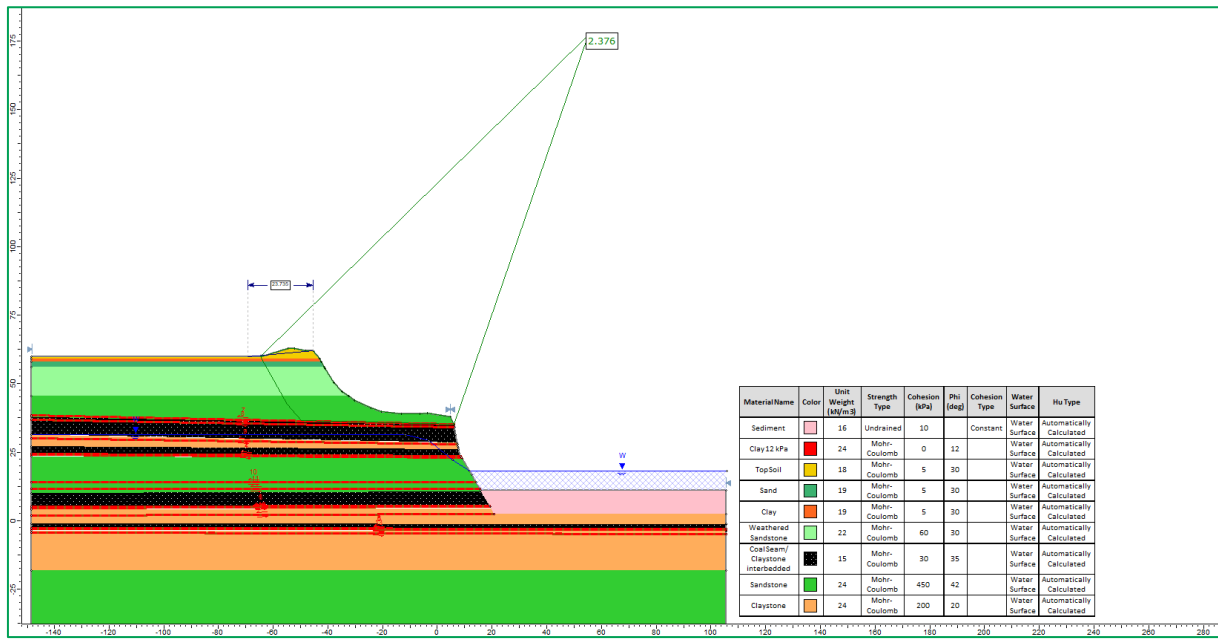


Figure A 15: Cross-Section 2_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 12^\circ$ - Cuckoo Search

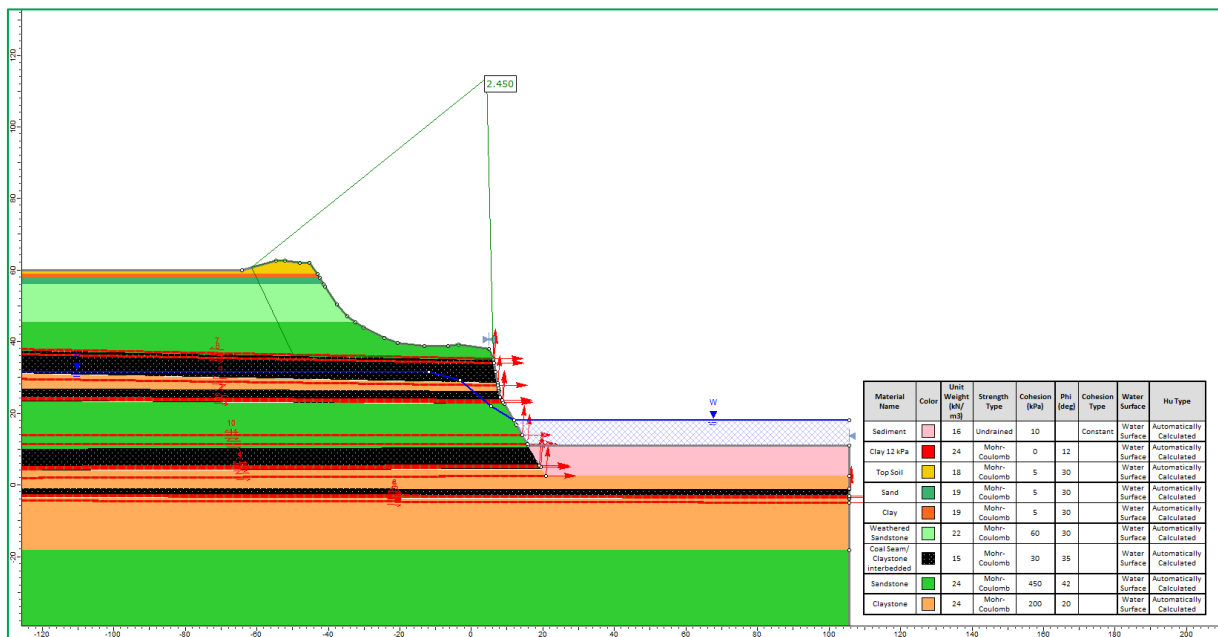


Figure A 16: Cross-Section 2_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 12^\circ$ - Block Search

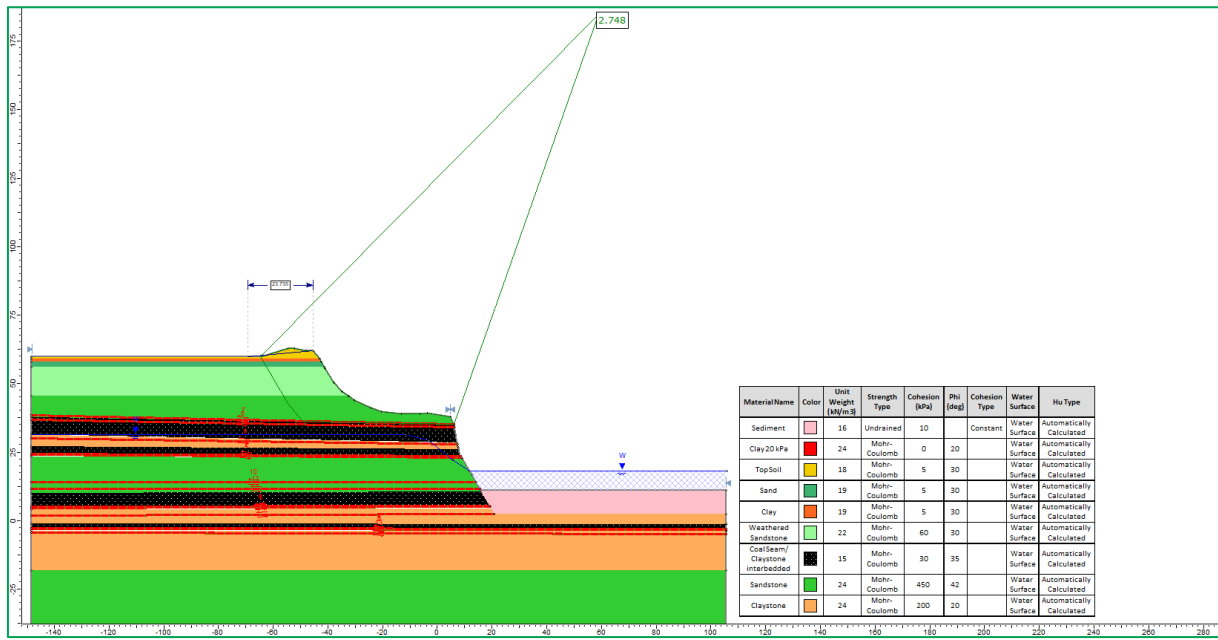


Figure A 17: Cross-Section 2_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 20^\circ$ - Cuckoo Search

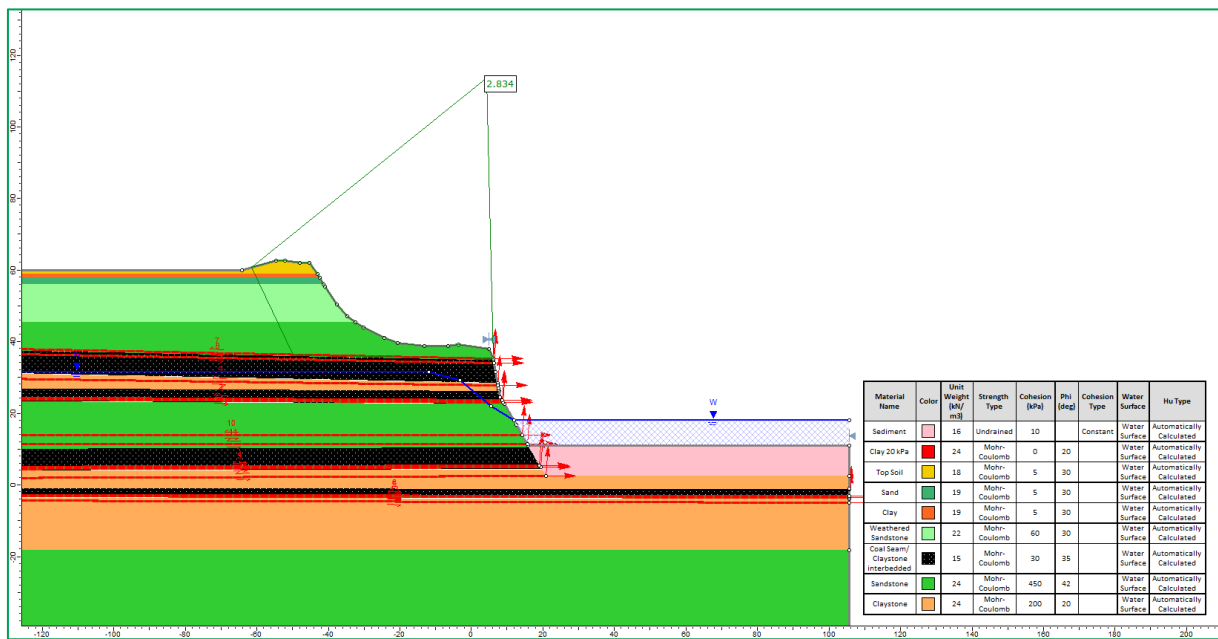


Figure A 18: Cross-Section 2_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 20^\circ$ - Block Search

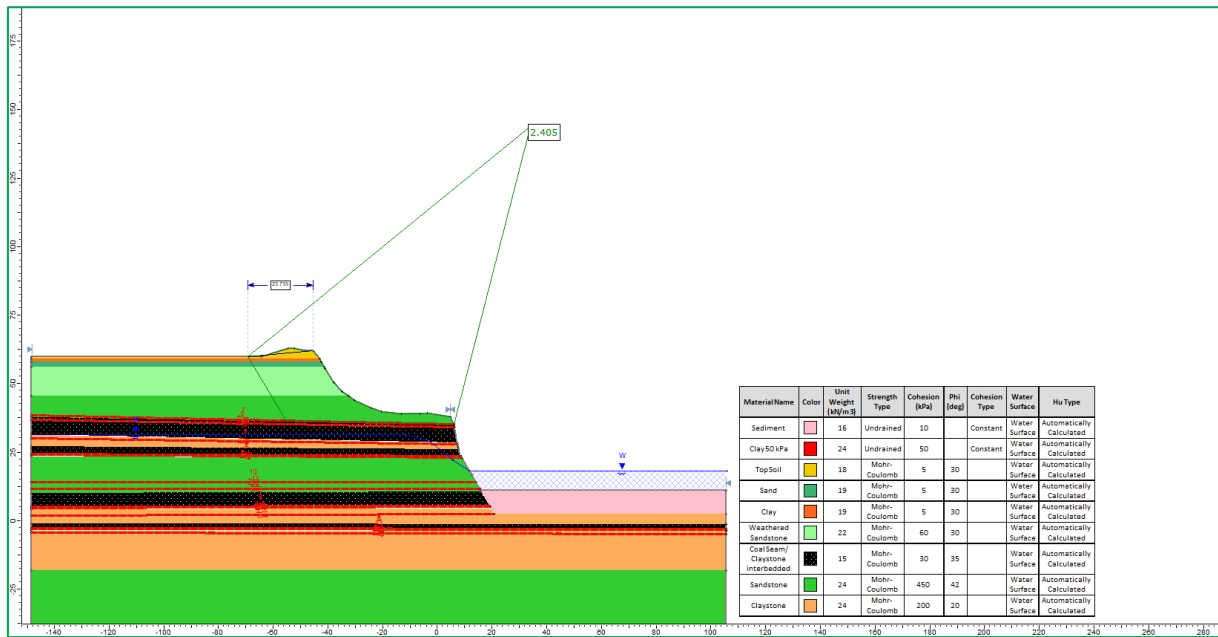


Figure A 19: Cross-Section 2_Bentonite Clay_Undrained_c_u = 50 kPa - Cuckoo Search

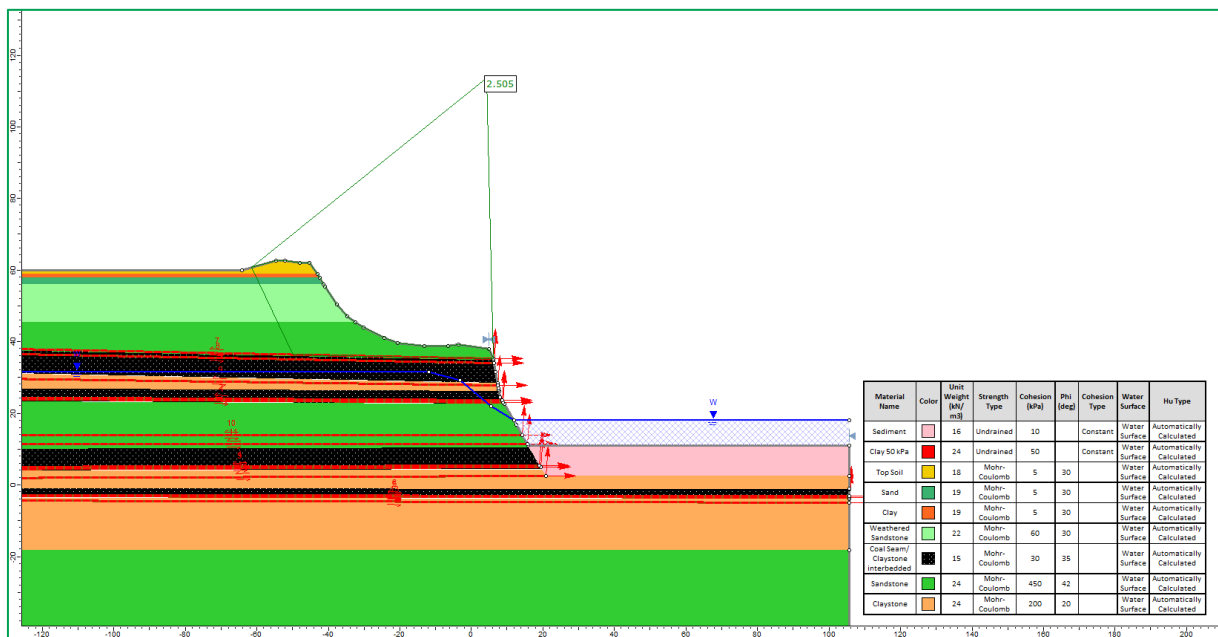


Figure A 20: Cross-Section 2_Bentonite Clay_Undrained_c_u = 50 kPa - Block Search

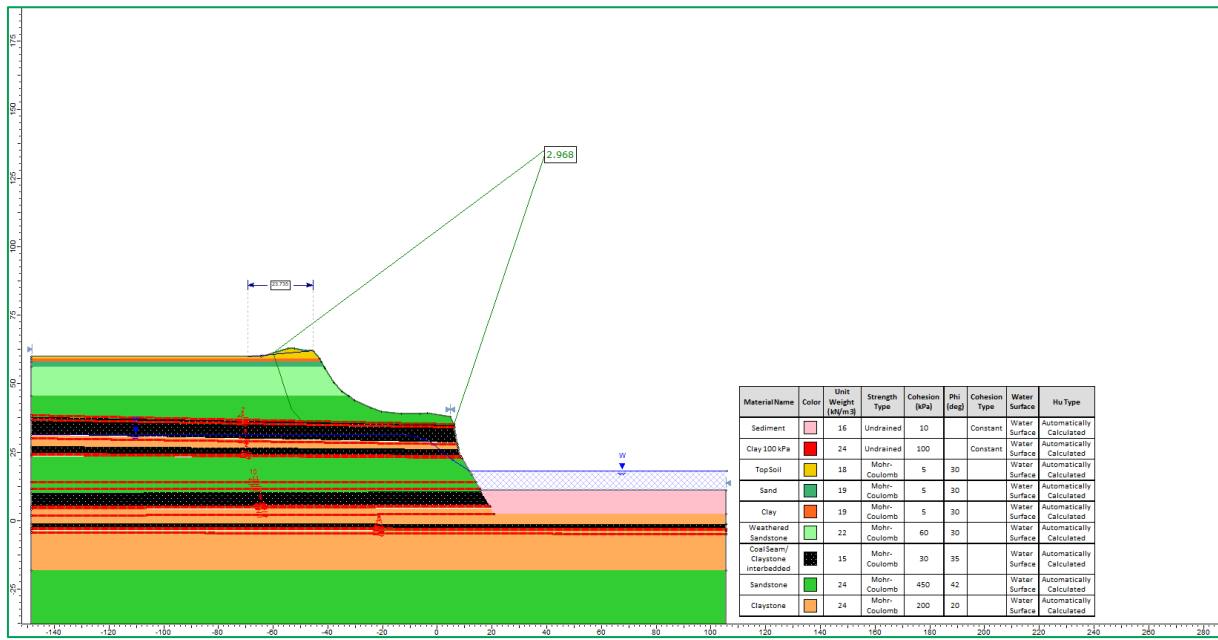


Figure A 21: Cross-Section 2_Bentonite Clay_Undrained_c_u = 100 kPa - Cuckoo Search

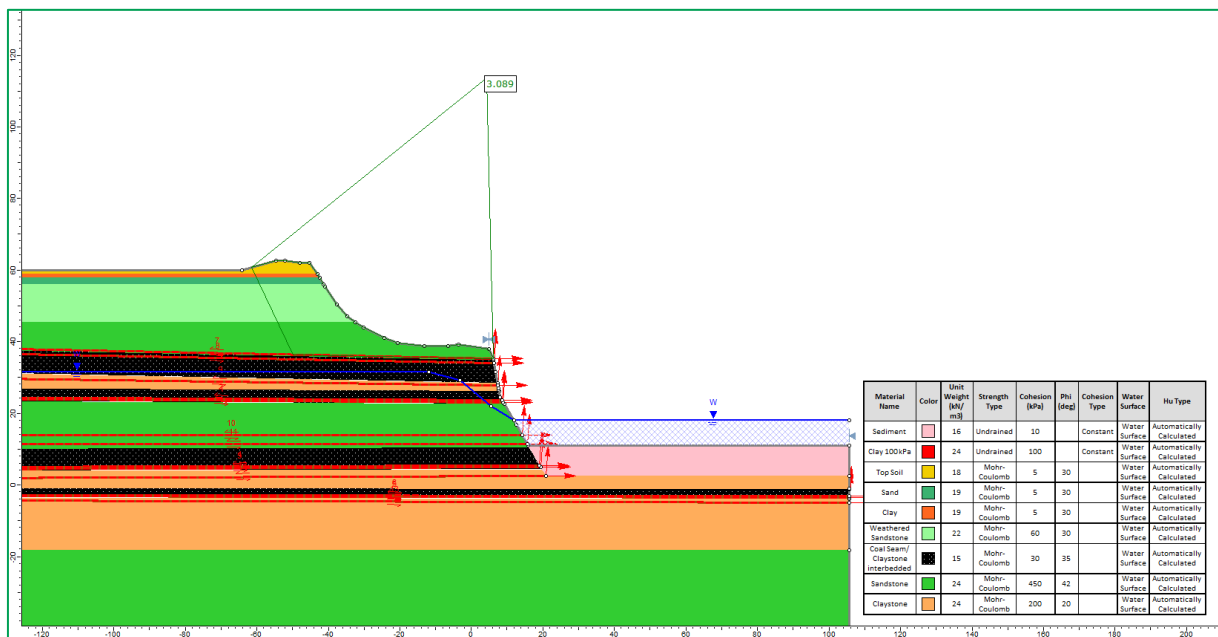


Figure A 22: Cross-Section 2_Bentonite Clay_Undrained_c_u = 100 kPa - Block Search

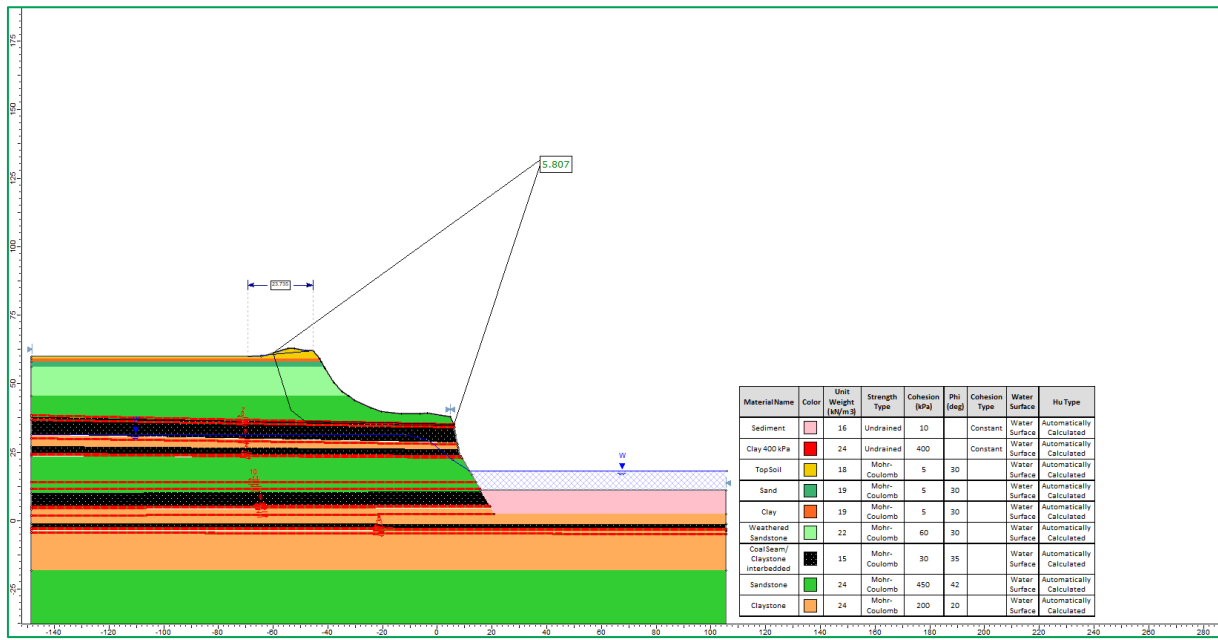


Figure A 23: Cross-Section 2_Bentonite Clay_Undrained_c_u = 400 kPa - Cuckoo Search

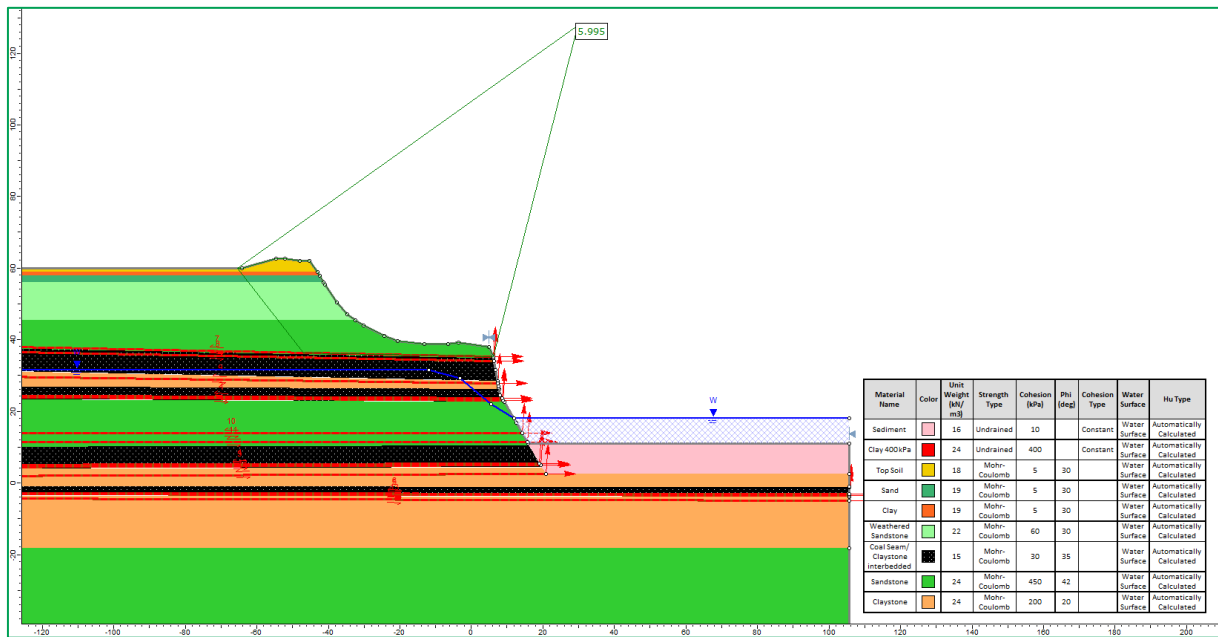


Figure A 24: Cross-Section 2_Bentonite Clay_Undrained_c_u = 400 kPa - Block Search

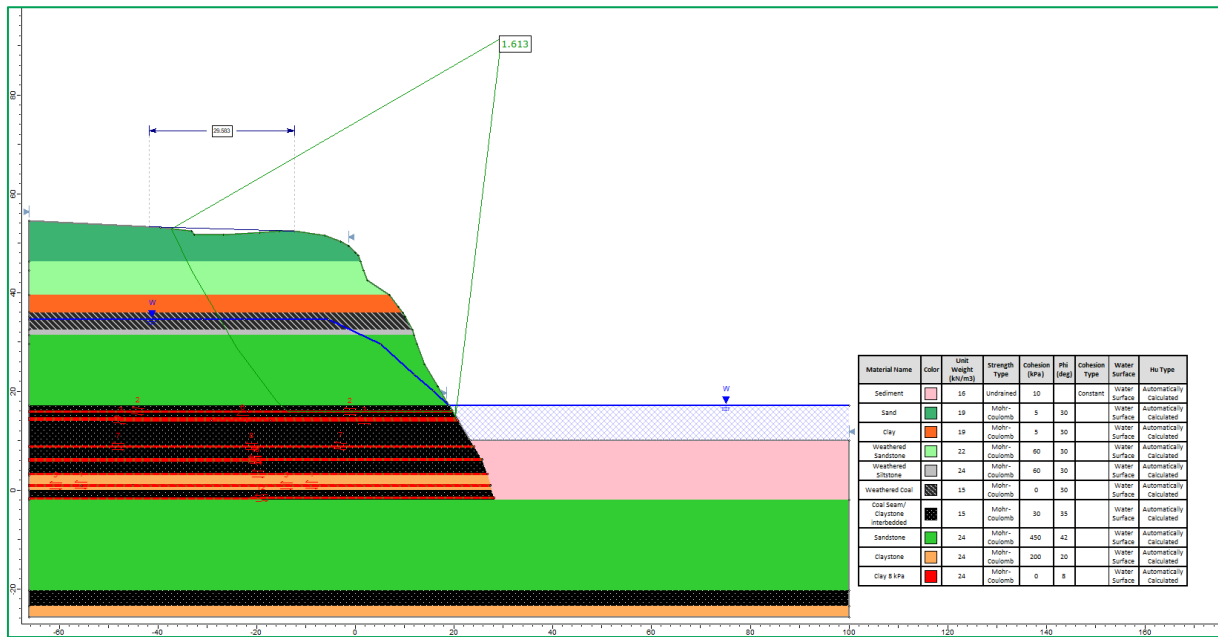


Figure A 25: Cross-Section 3_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 8^\circ$ - Cuckoo Search

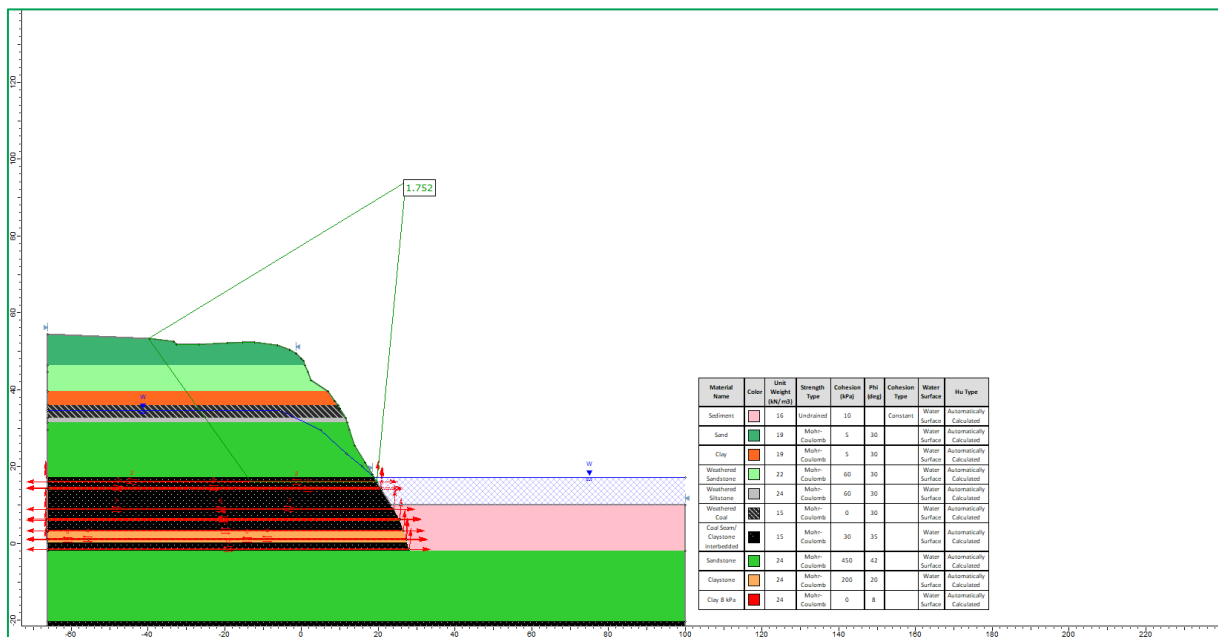


Figure A 26: Cross-Section 3_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 8^\circ$ - Block Search

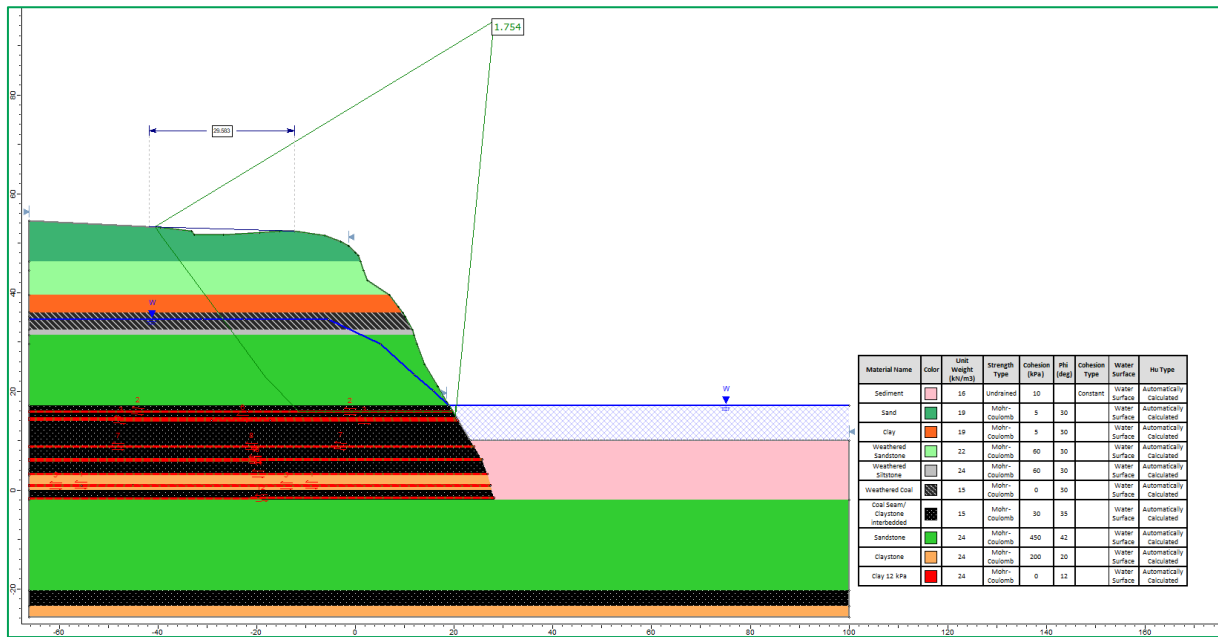


Figure A 27: Cross-Section 3_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 12^\circ$ - Cuckoo Search

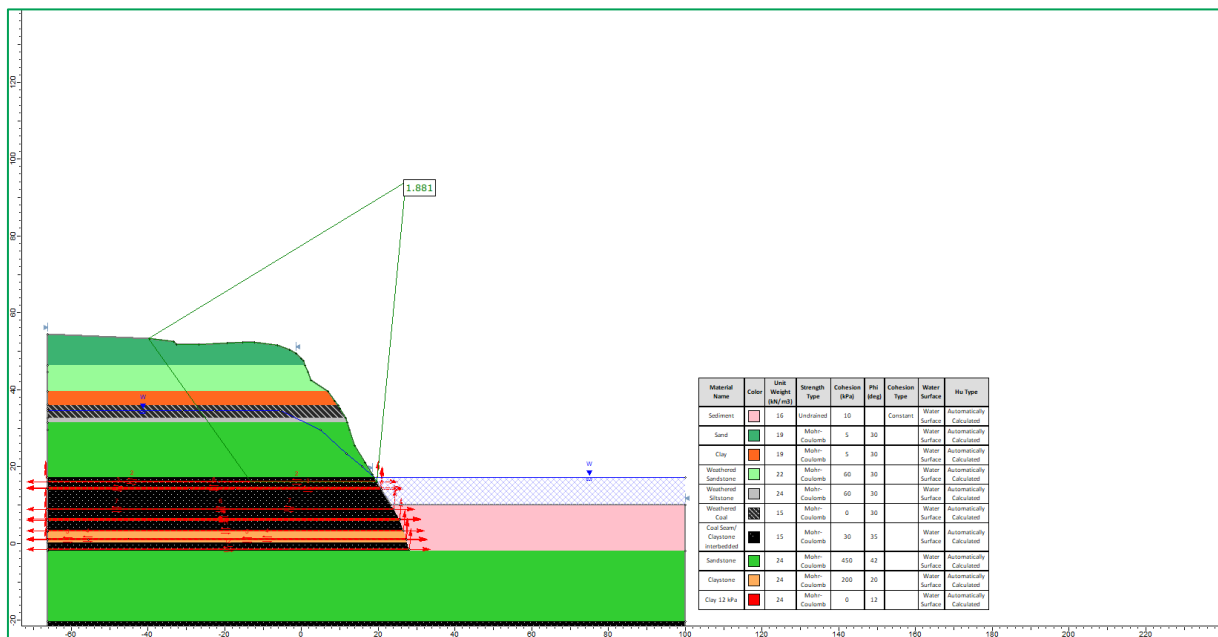


Figure A 28: Cross-Section 3_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 12^\circ$ - Block Search

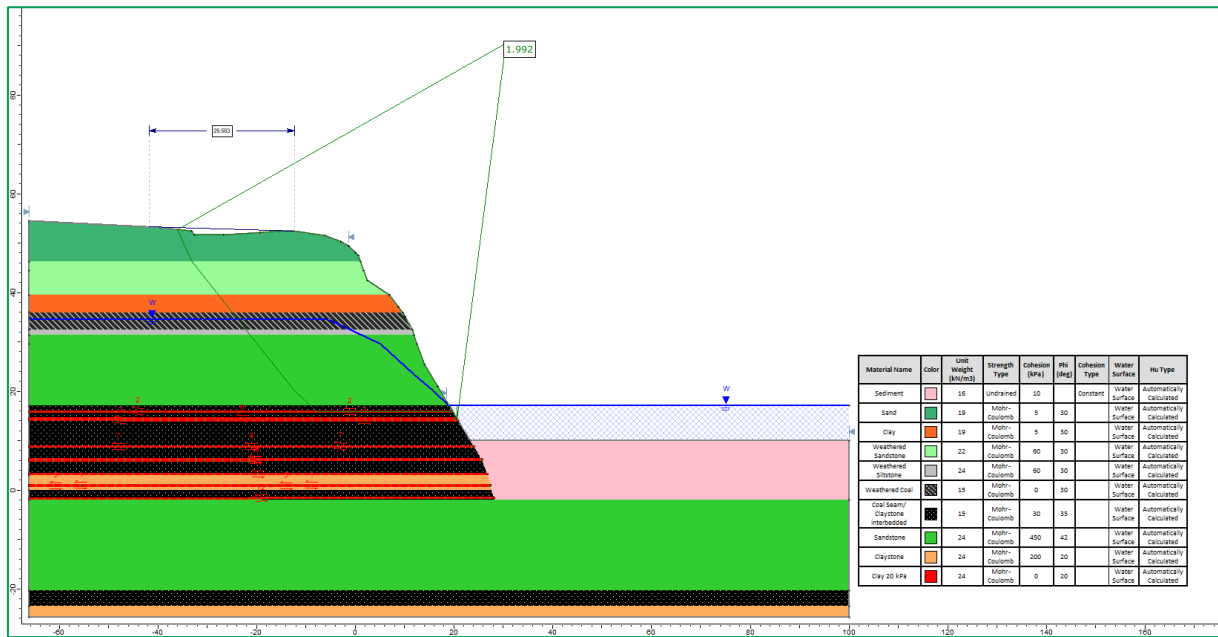


Figure A 29: Cross-Section 3_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 20^\circ$ - Cuckoo Search

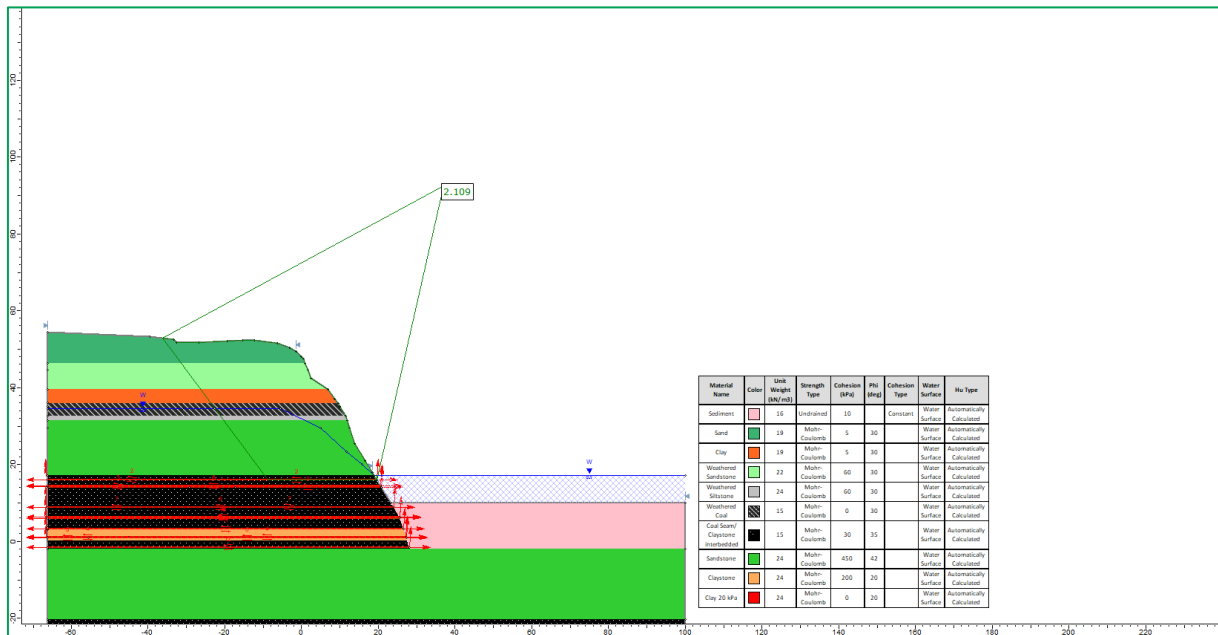


Figure A 30: Cross-Section 3_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 20^\circ$ - Block Search

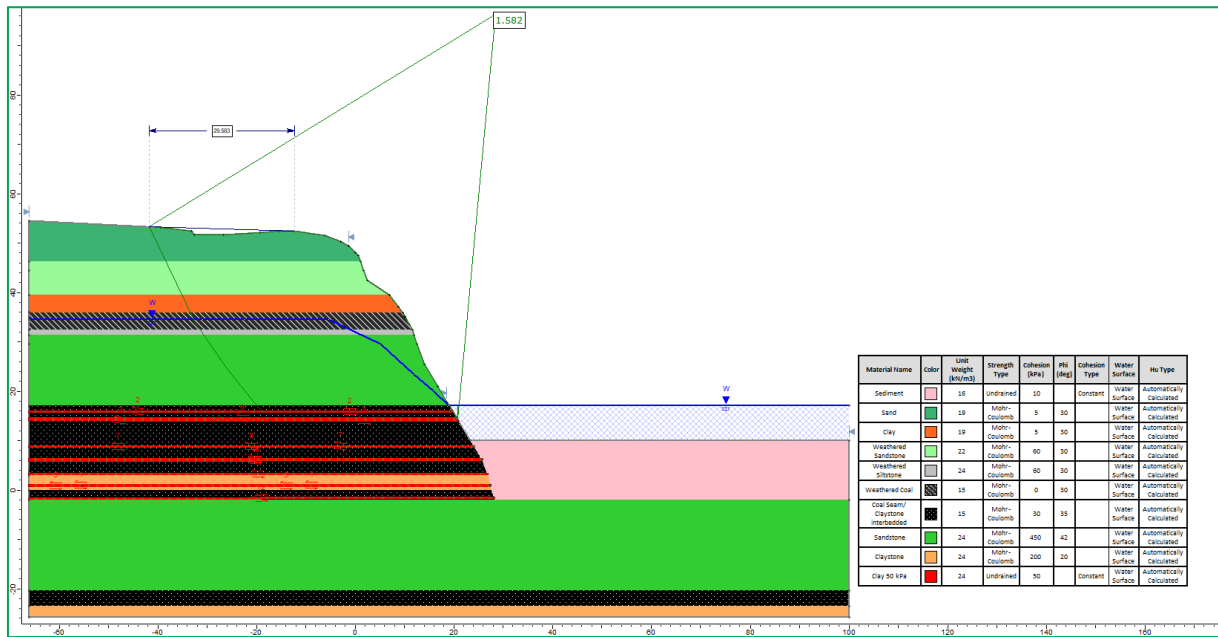


Figure A 31: Cross-Section 3_Bentonite Clay_Undrained_c_u = 50 kPa - Cuckoo Search

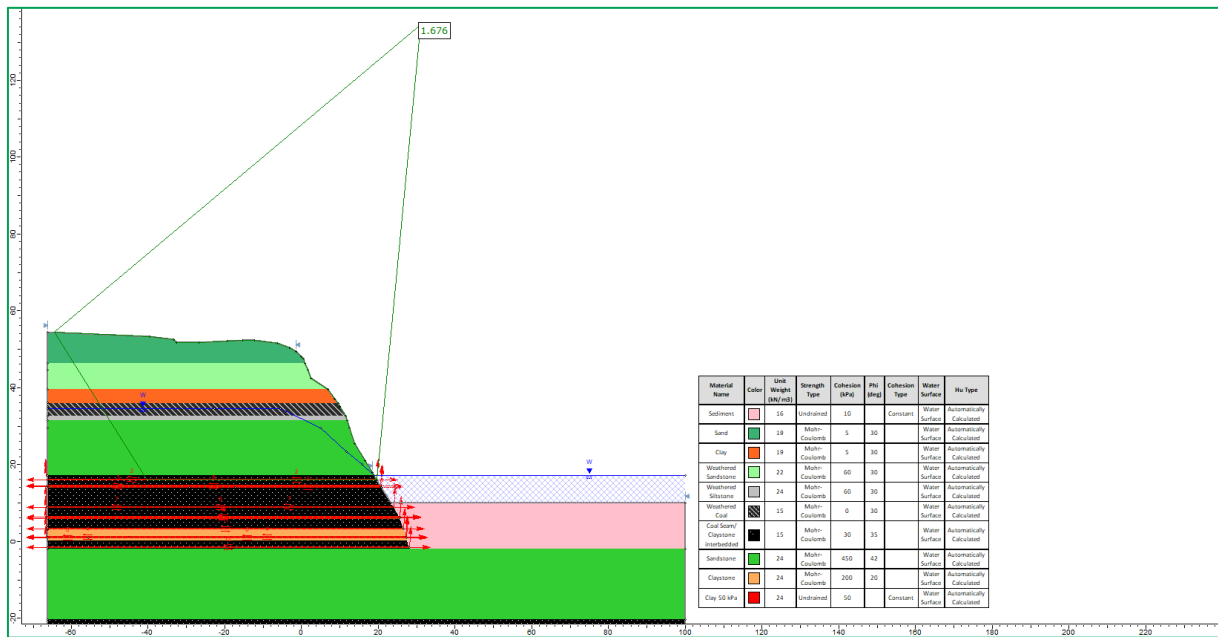


Figure A 32: Cross-Section 3_Bentonite Clay_Undrained_c_u = 50 kPa - Block Search

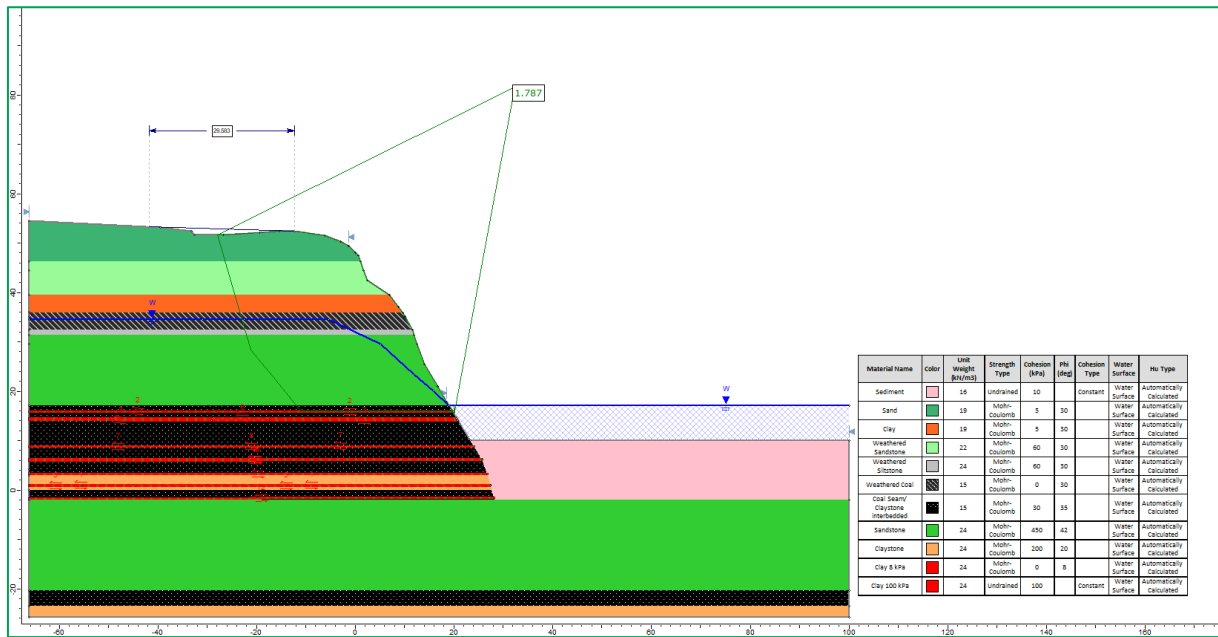


Figure A 33: Cross-Section 3_Bentonite Clay_Undrained_c_u = 100 kPa - Cuckoo Search

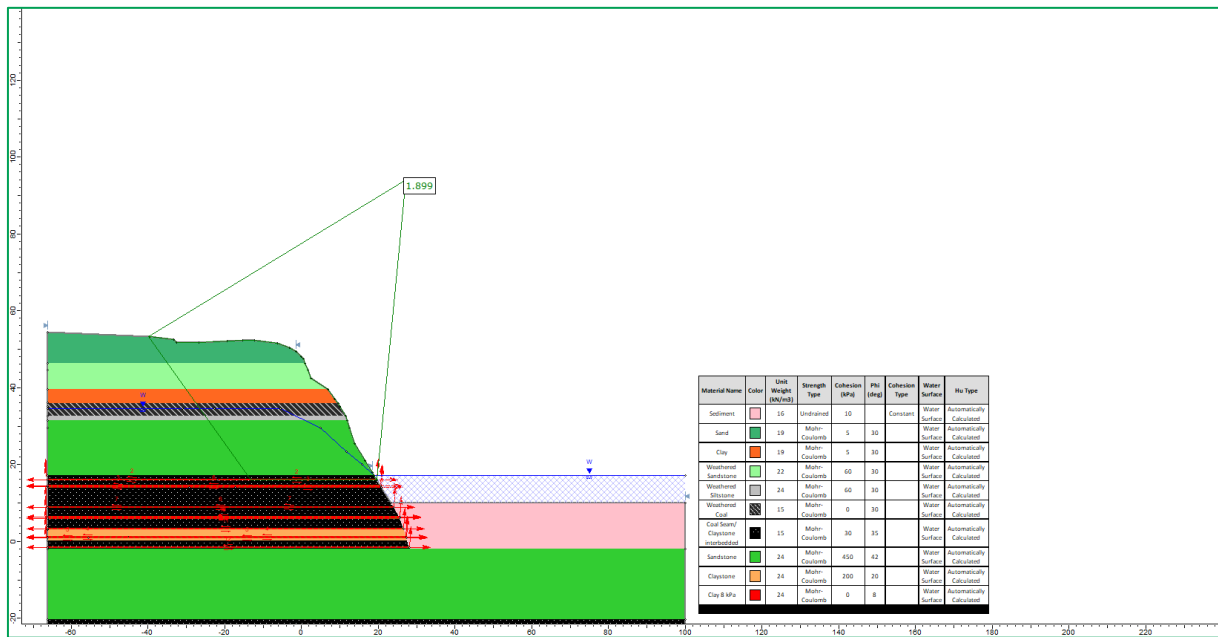


Figure A 34: Cross-Section 3_Bentonite Clay_Undrained_c_u = 100 kPa - Block Search

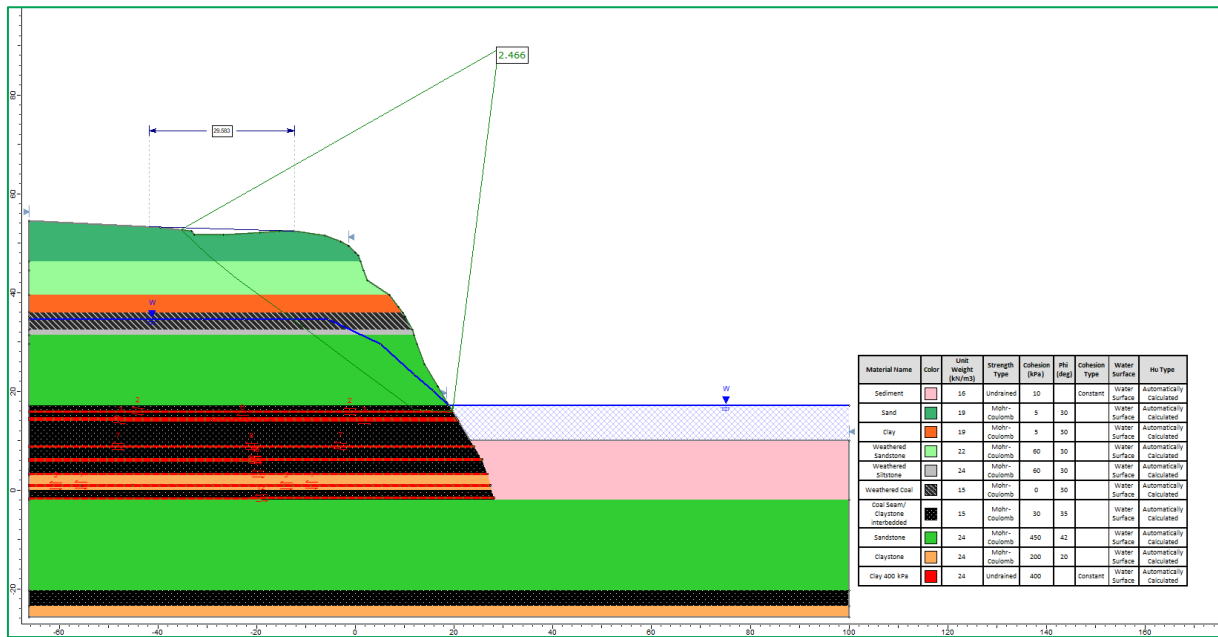


Figure A 35: Cross-Section 3_Bentonite Clay_Undrained_c_u = 400 kPa - Cuckoo Search

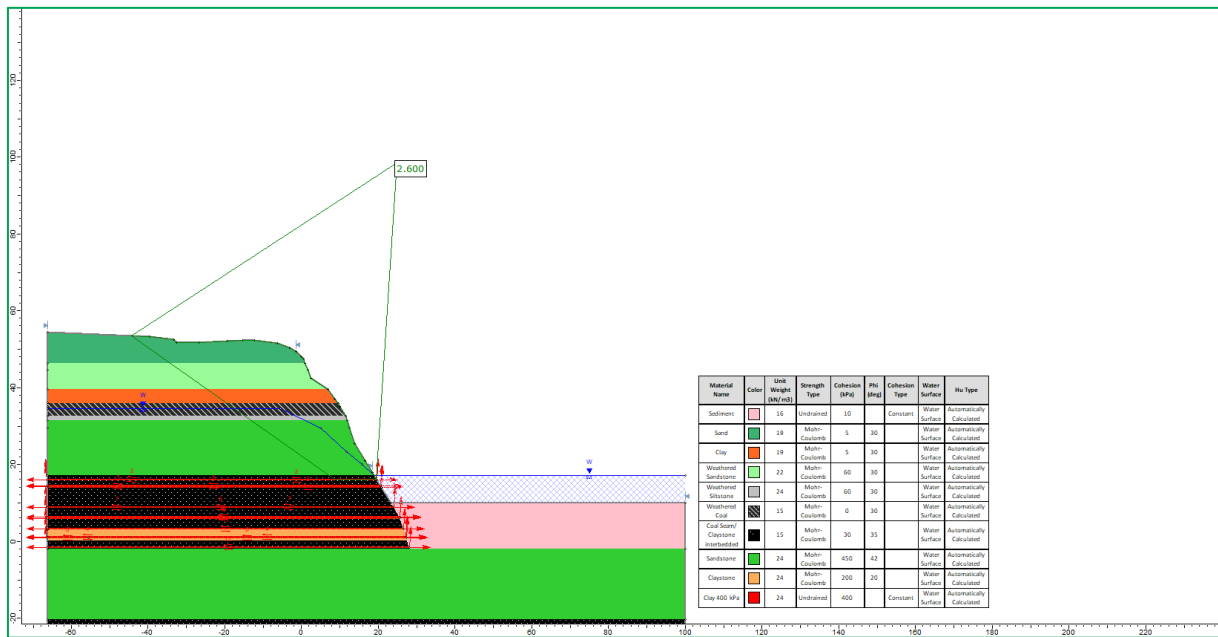


Figure A 36: Cross-Section 3_Bentonite Clay_Undrained_c_u = 400 kPa - Block Search

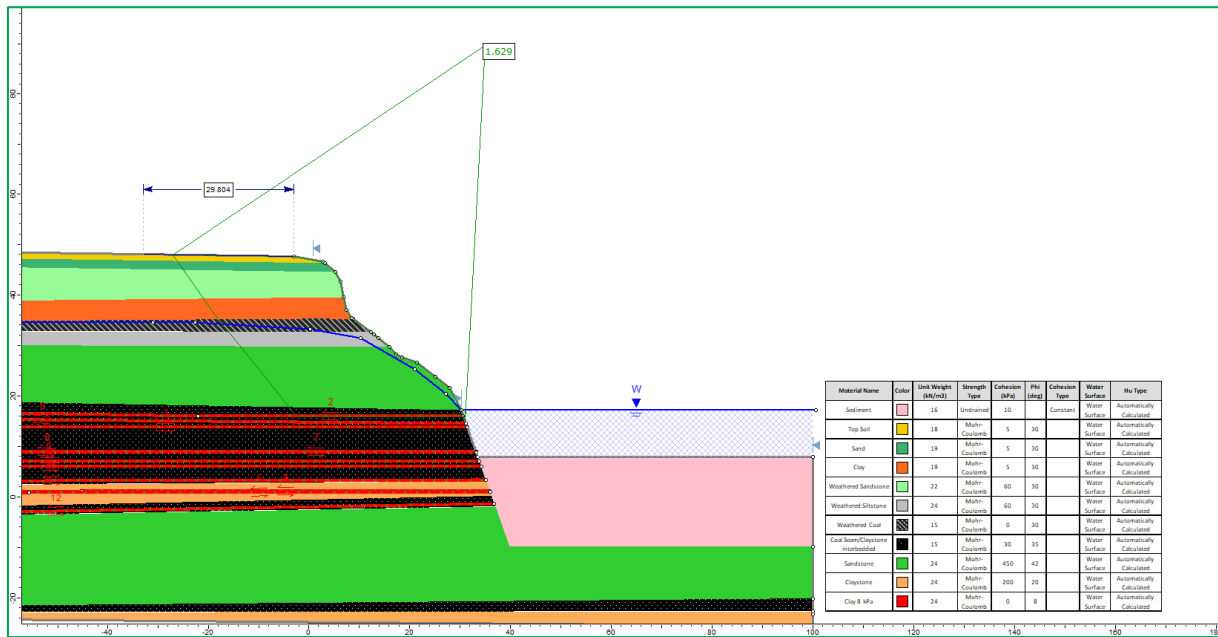


Figure A 37: Cross-Section 4_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 8^\circ$ - Cuckoo Search

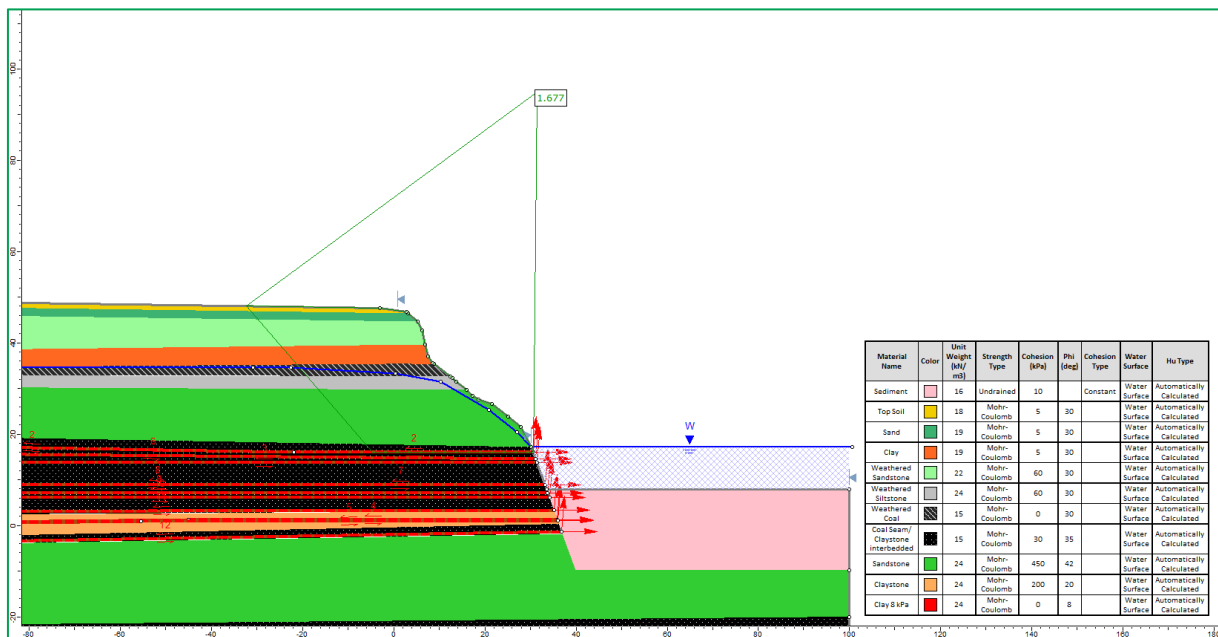


Figure A 38: Cross-Section 4_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 8^\circ$ - Block Search

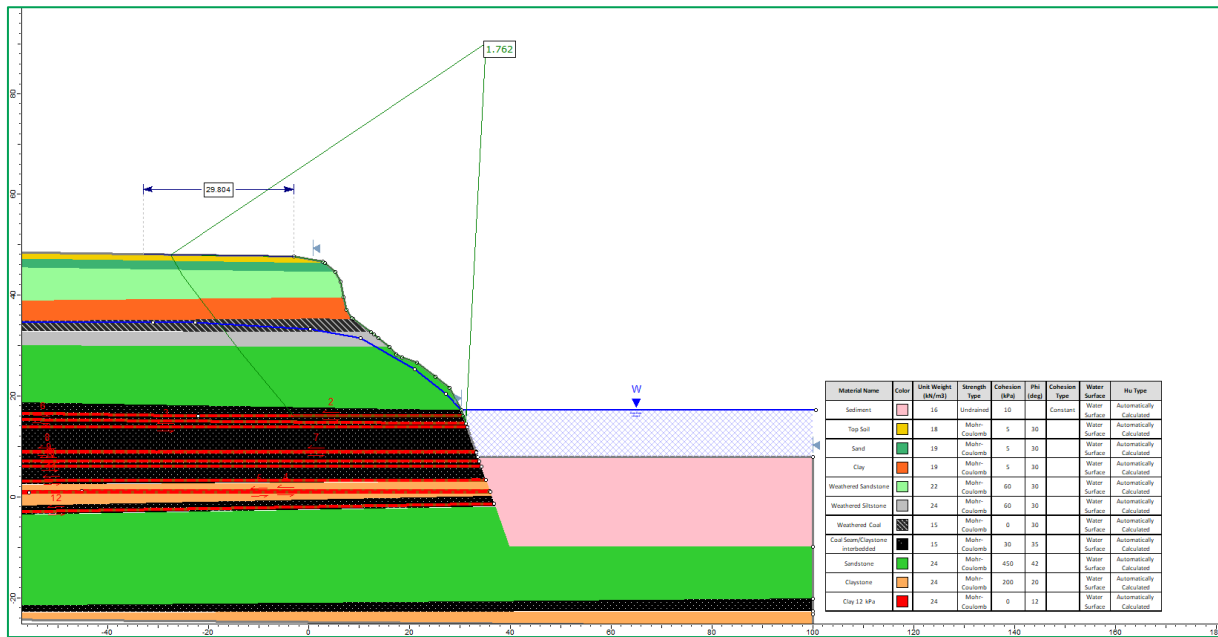


Figure A 39: Cross-Section 4_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 12^\circ$ - Cuckoo Search

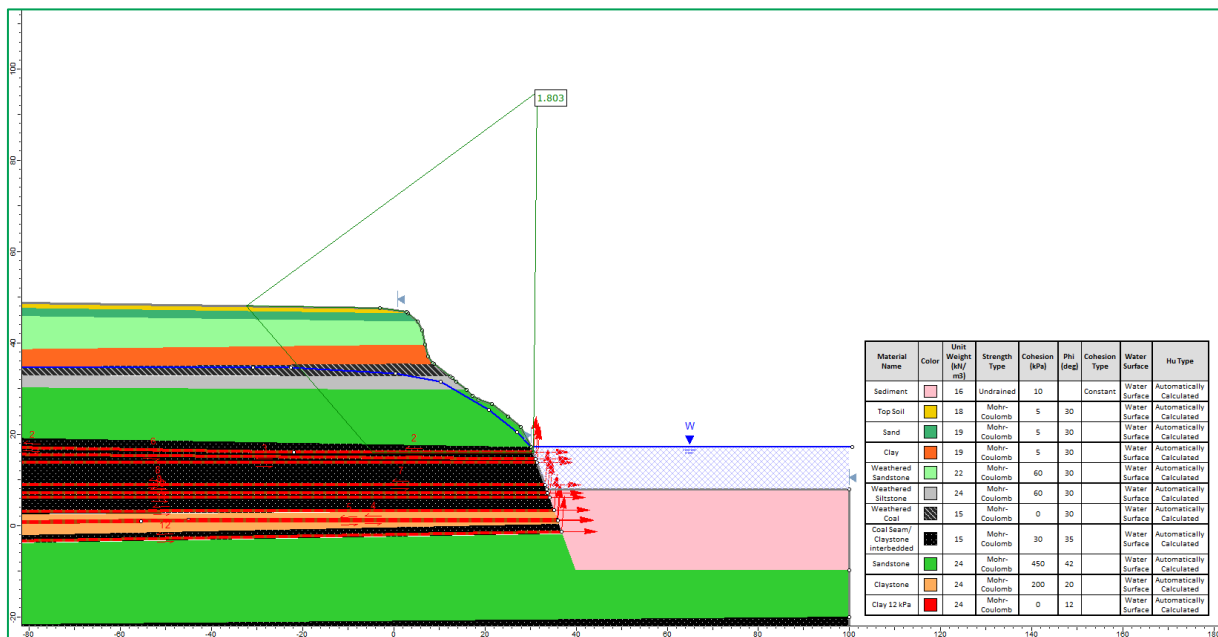


Figure A 40: Cross-Section 4_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 12^\circ$ - Block Search

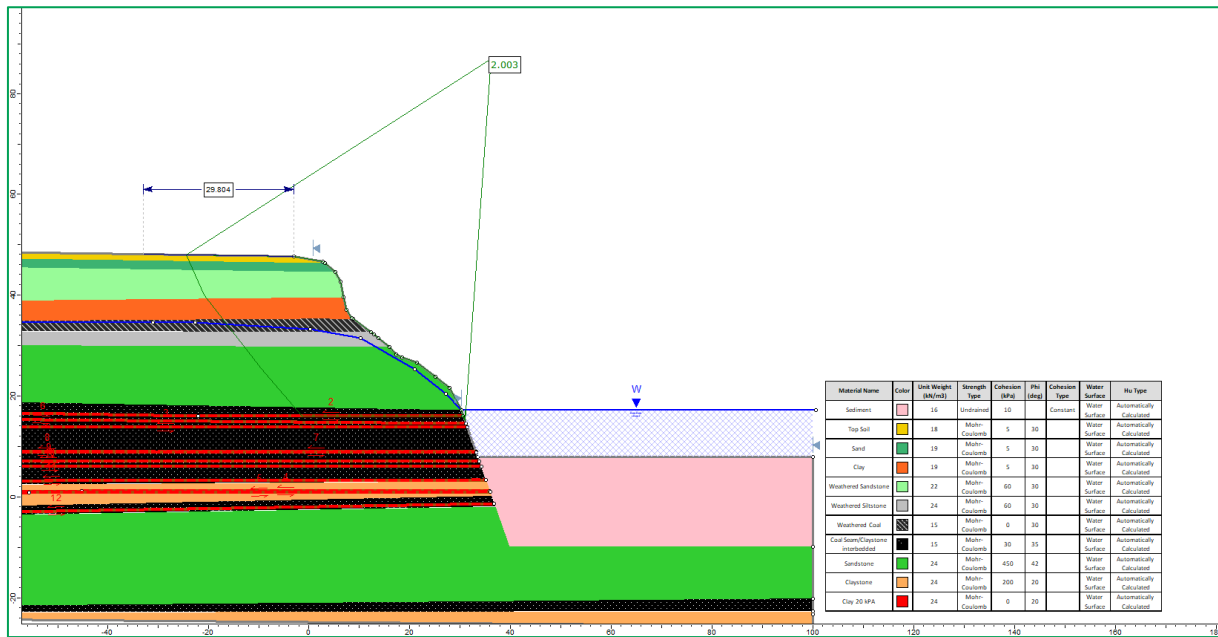


Figure A 41: Cross-Section 4_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 20^\circ$ - Cuckoo Search

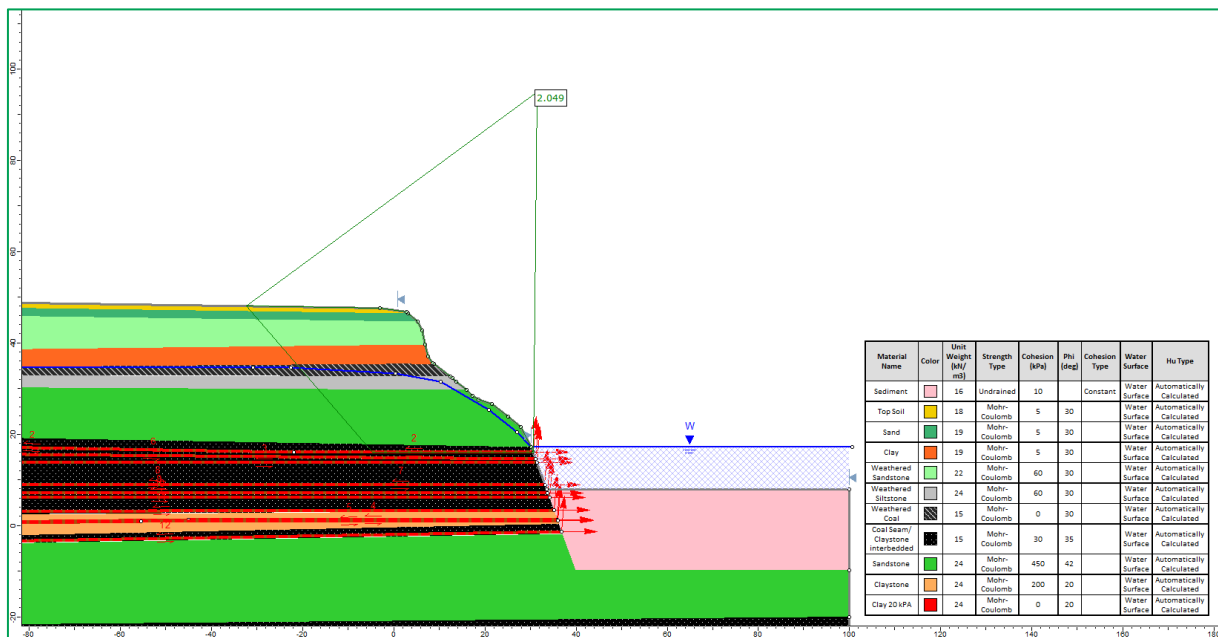


Figure A 42: Cross-Section 4_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 20^\circ$ - Block Search

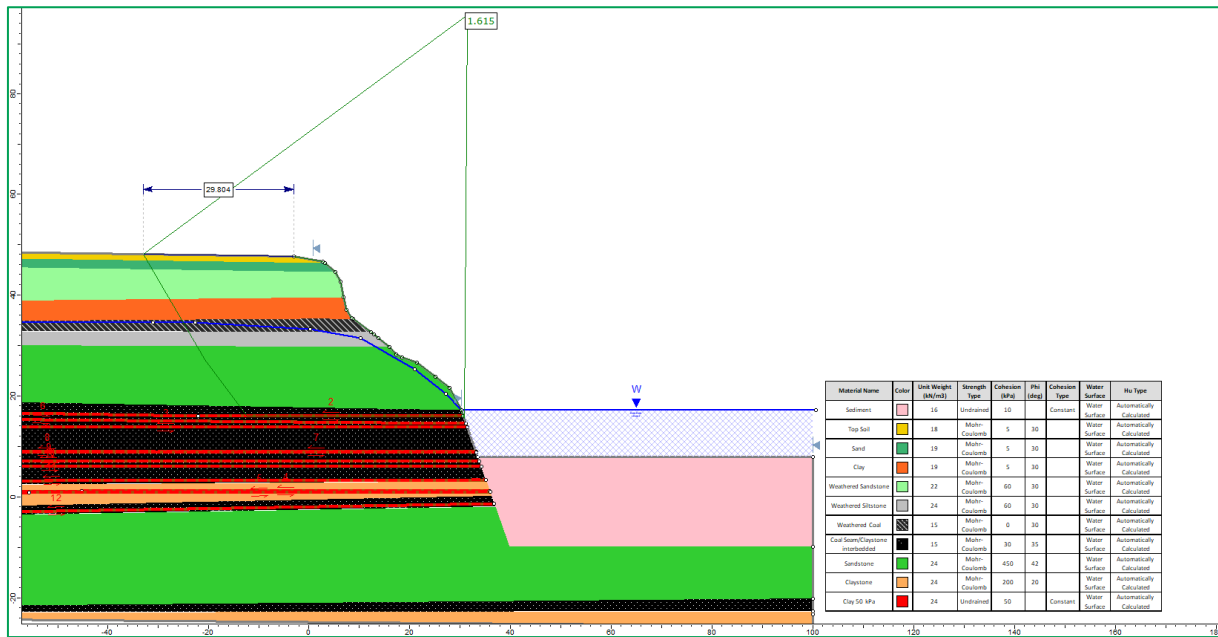


Figure A 43: Cross-Section 4_Bentonite Clay_Undrained_c_u = 50 kPa - Cuckoo Search

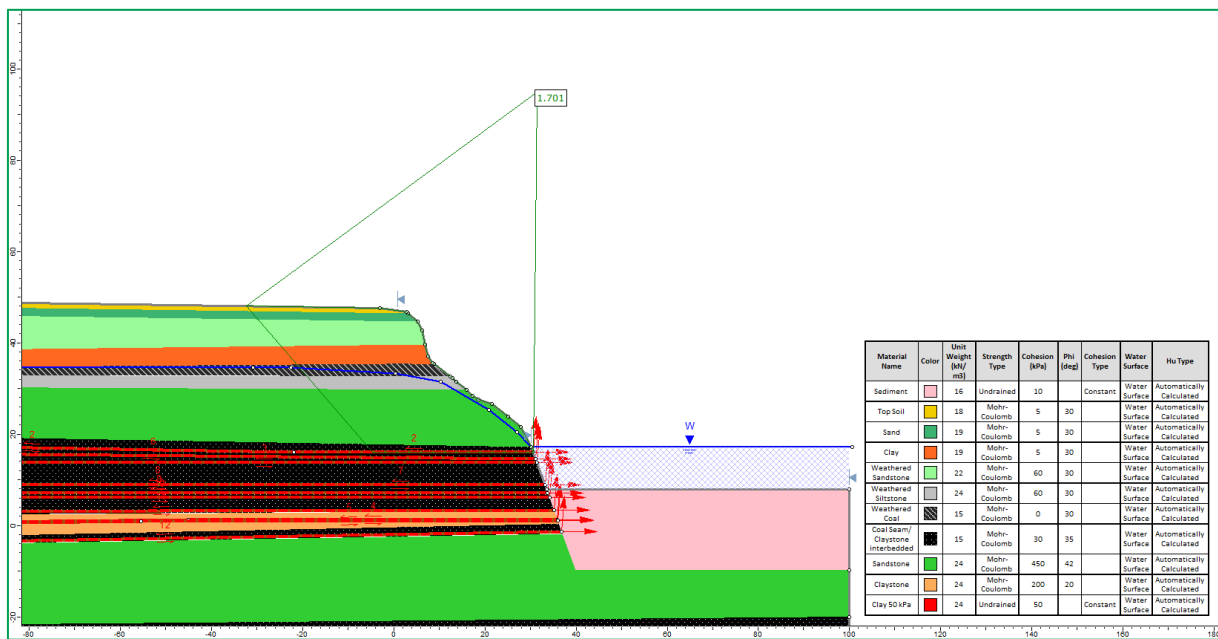


Figure A 44: Cross-Section 4_Bentonite Clay_Undrained_c_u = 50 kPa - Block Search

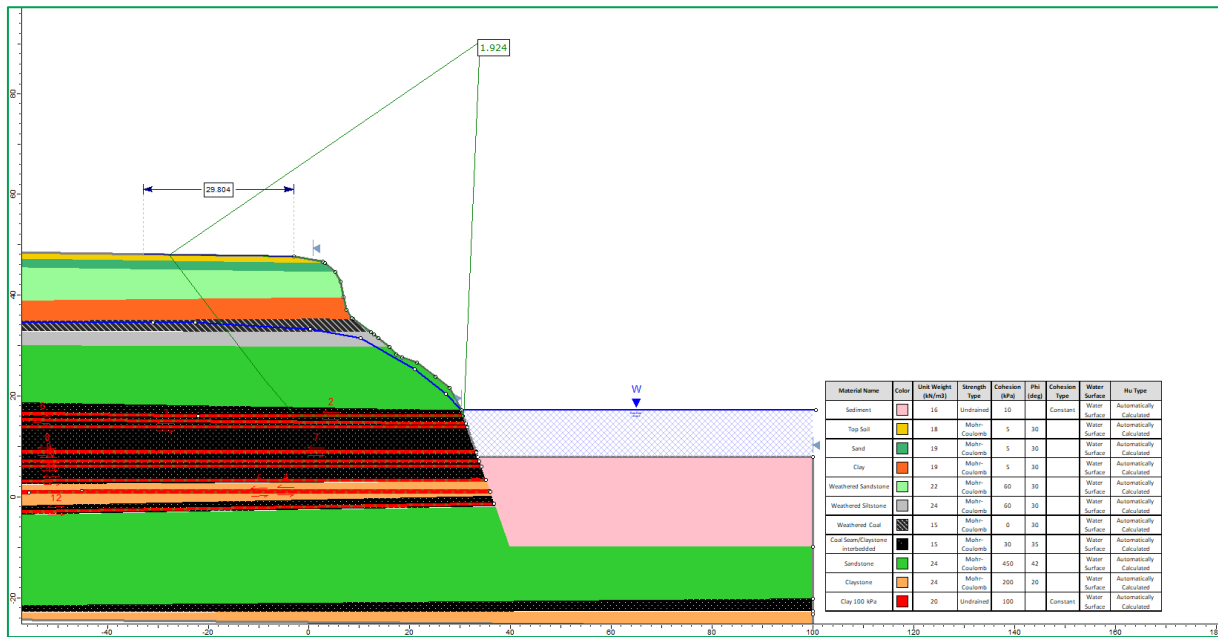


Figure A 45: Cross-Section 4_Bentonite Clay_Undrained_c_u = 100 kPa - Cuckoo Search

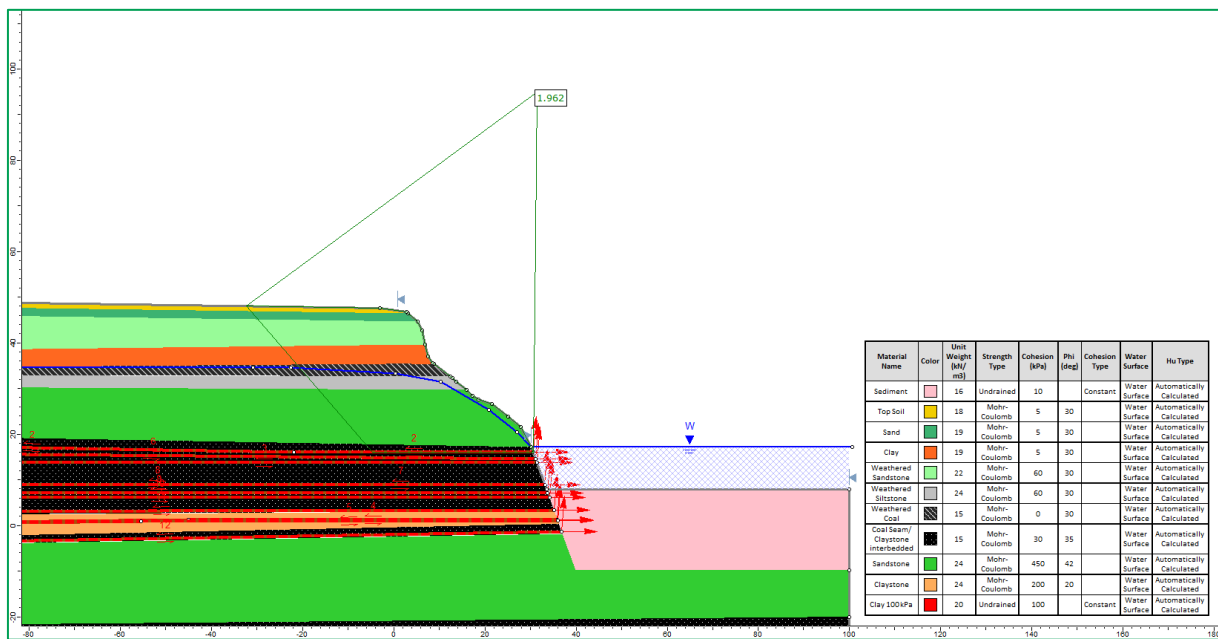


Figure A 46: Cross-Section 4_Bentonite Clay_Undrained_c_u = 100 kPa - Block Search

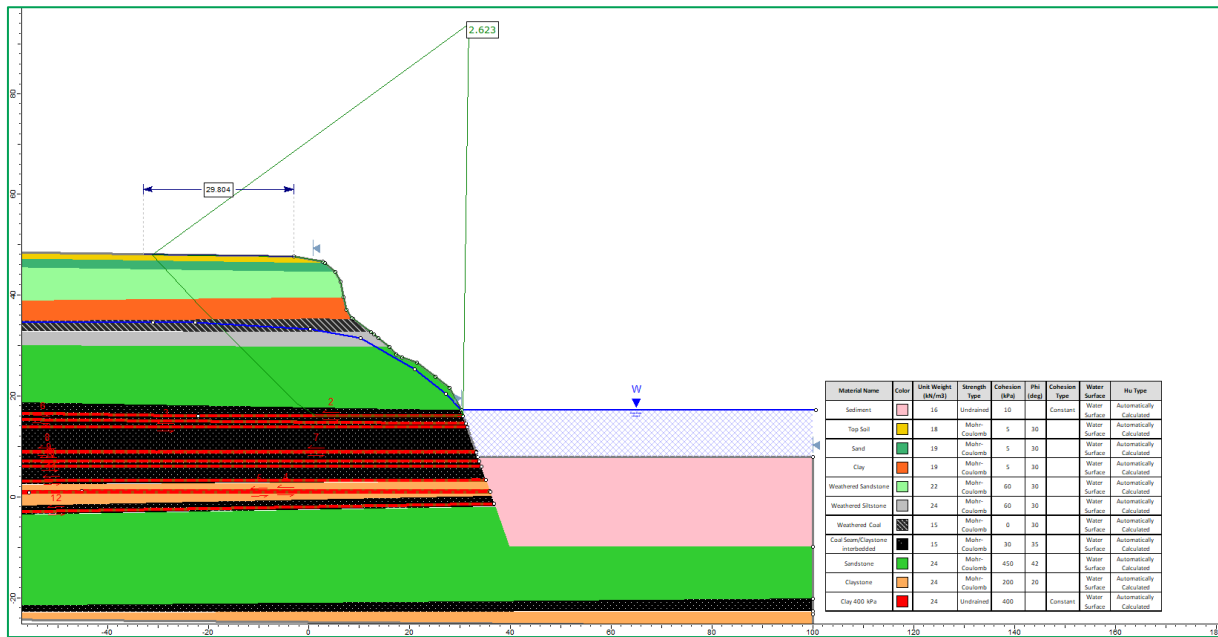


Figure A 47: Cross-Section 4_Bentonite Clay_Undrained_c_u = 400 kPa - Cuckoo Search

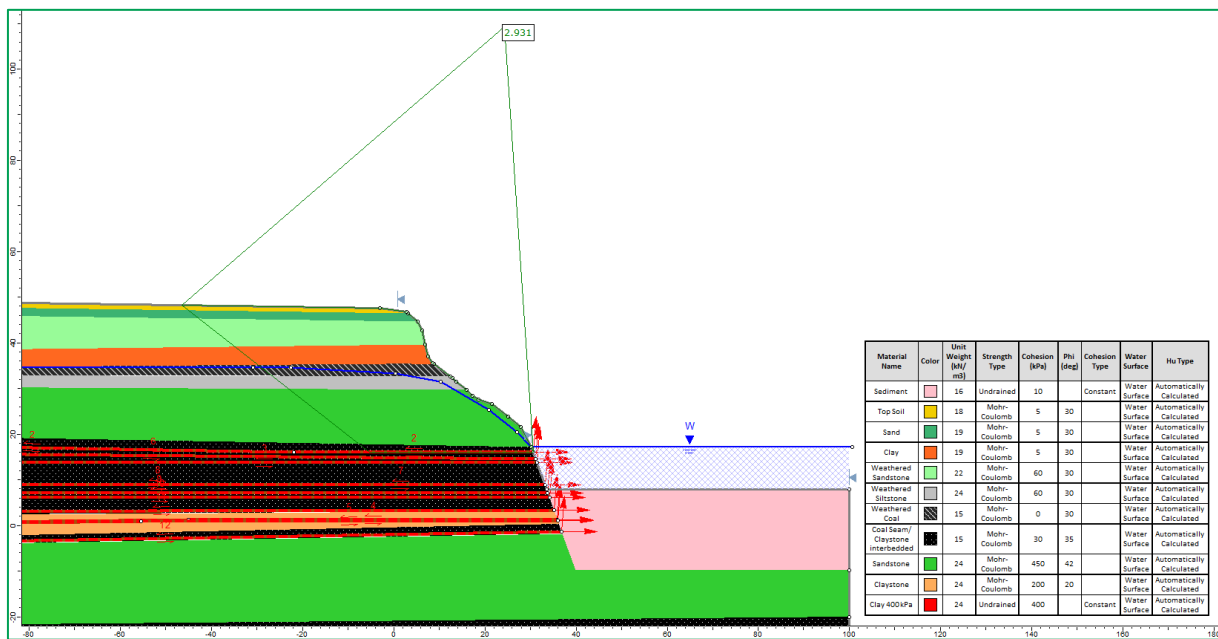


Figure A 48: Cross-Section 4_Bentonite Clay_Undrained_c_u = 400 kPa - Block Search

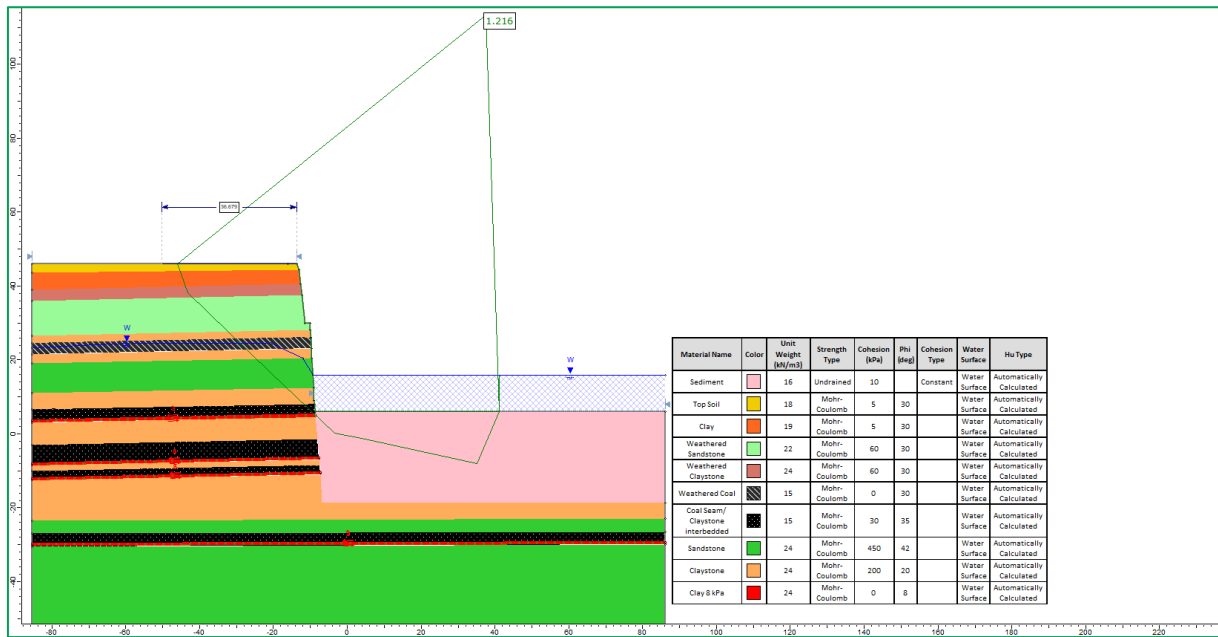


Figure A 49: Cross-Section 5_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 8^\circ$ - Cuckoo Search

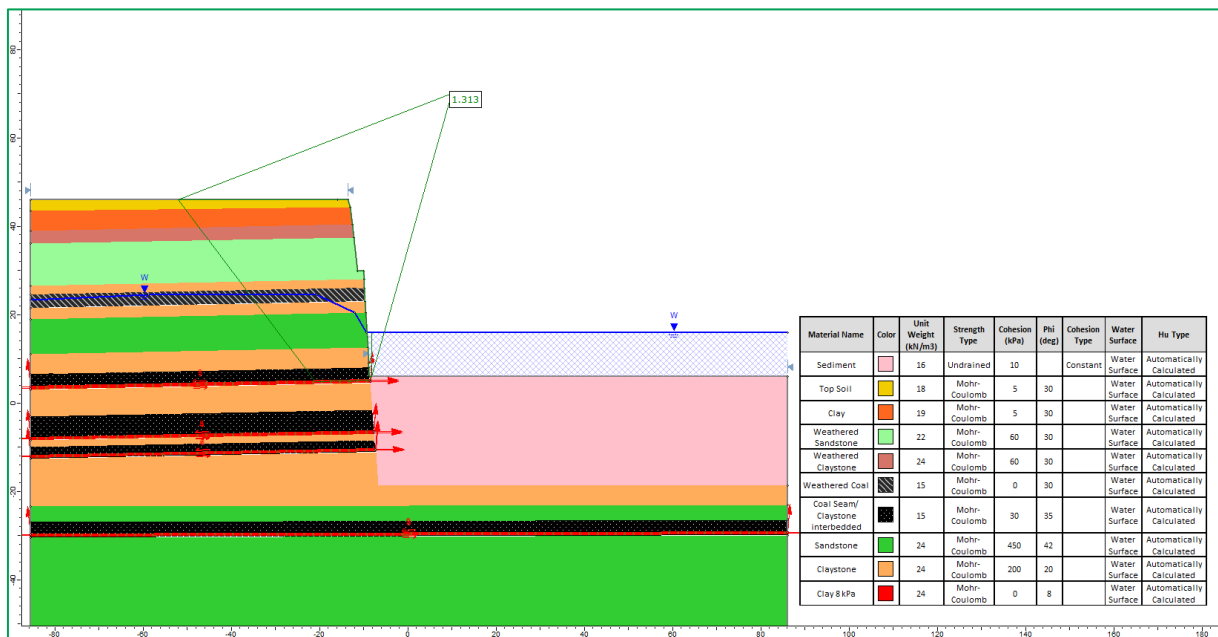


Figure A 50: Cross-Section 5_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 8^\circ$ - Block Search

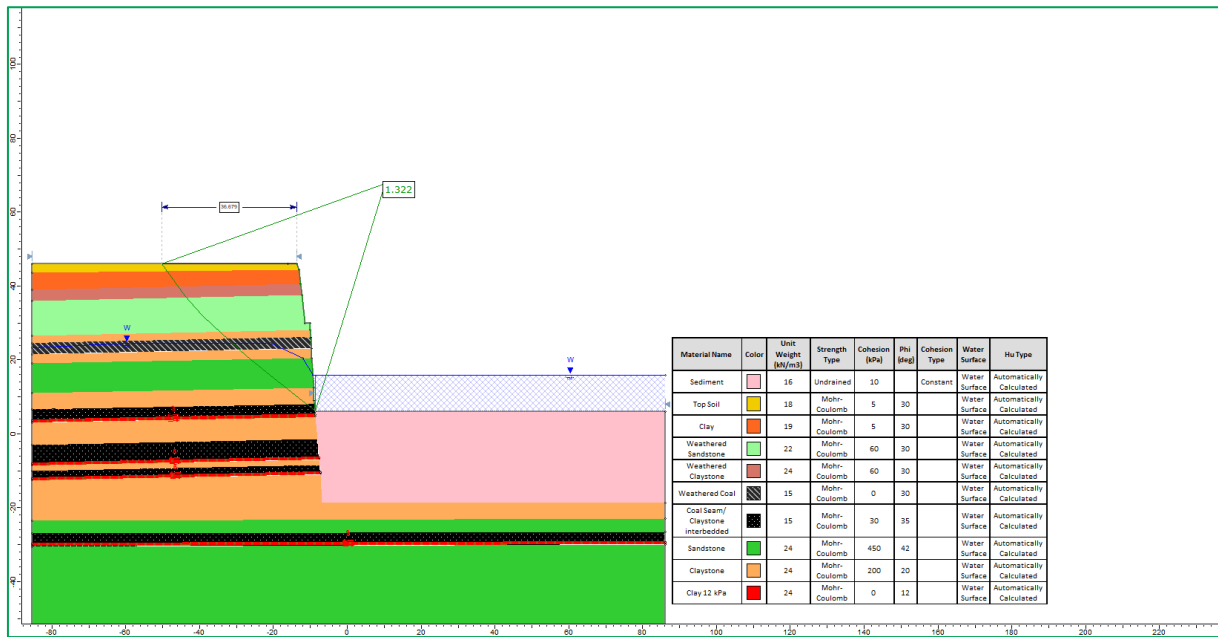


Figure A 51: Cross-Section 5_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 12^\circ$ - Cuckoo Search

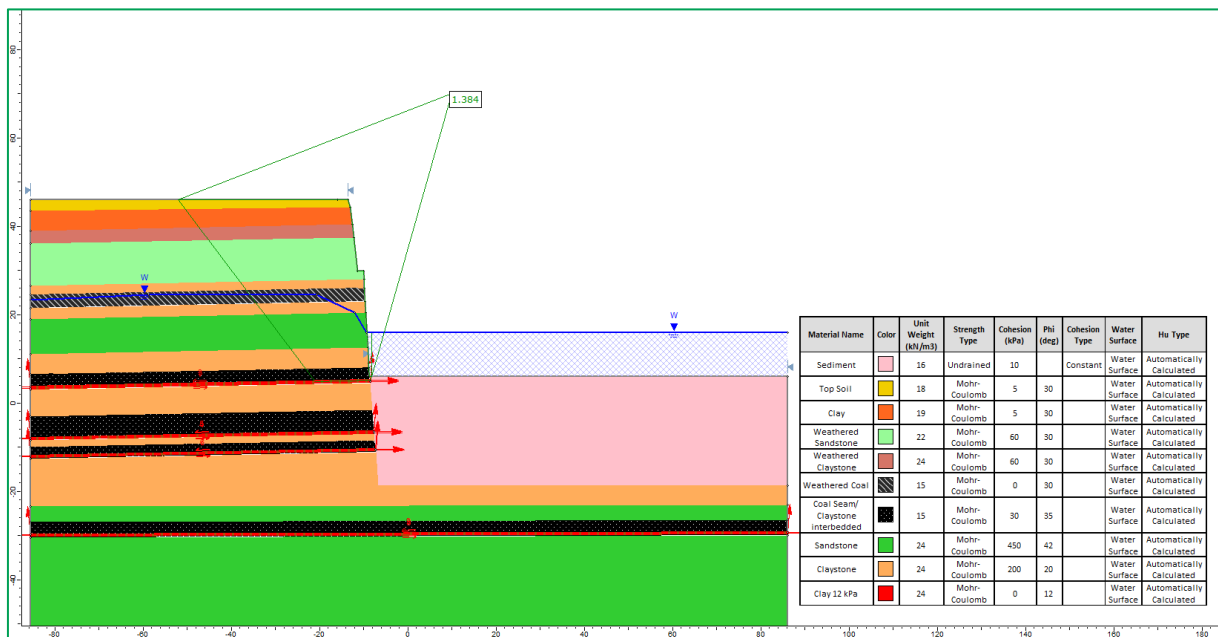


Figure A 52: Cross-Section 5_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 12^\circ$ - Block Search

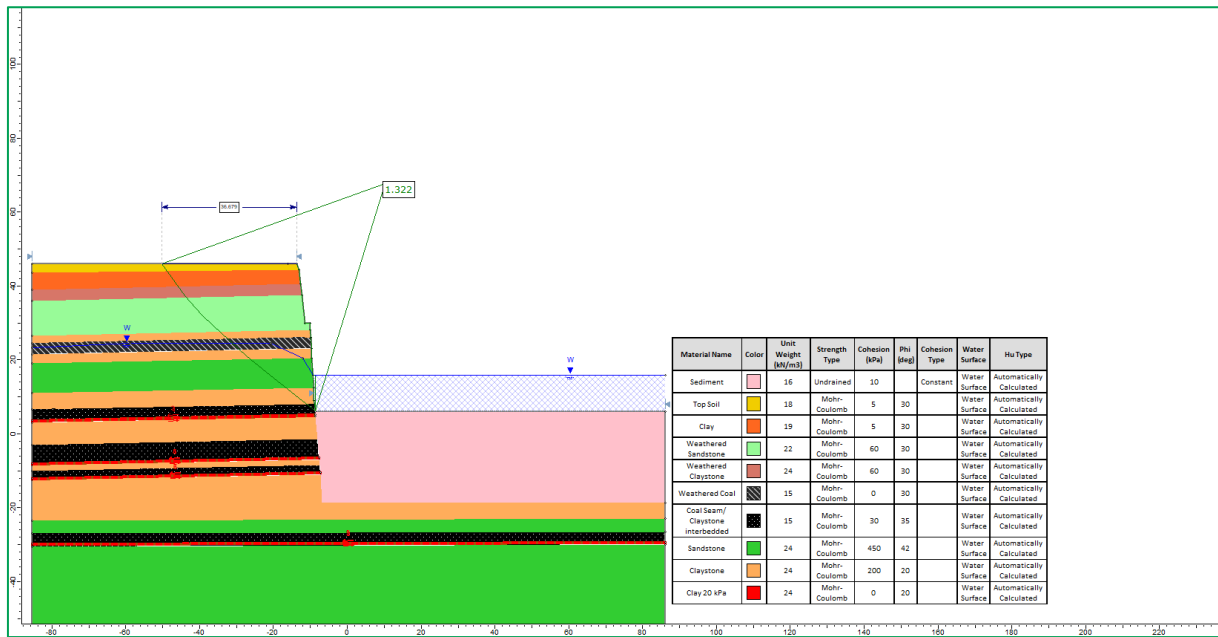


Figure A 53: Cross-Section 5_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 20^\circ$ - Cuckoo Search

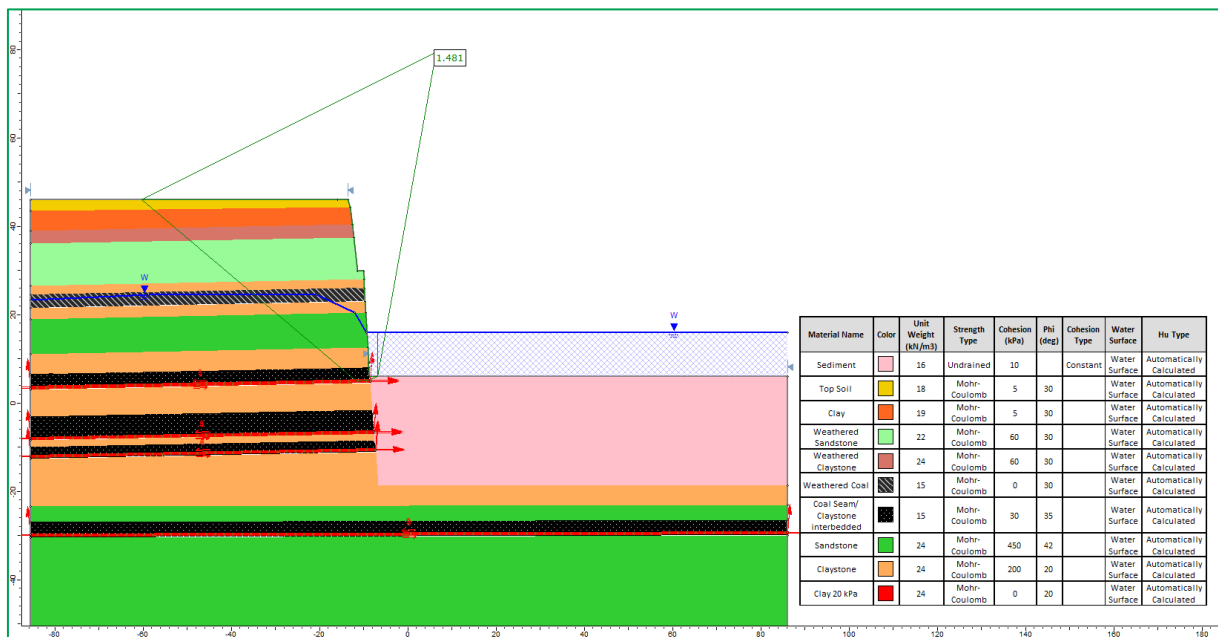


Figure A 54: Cross-Section 5_Bentonite Clay_Drained_c' = 0 kPa, $\phi = 20^\circ$ - Block Search

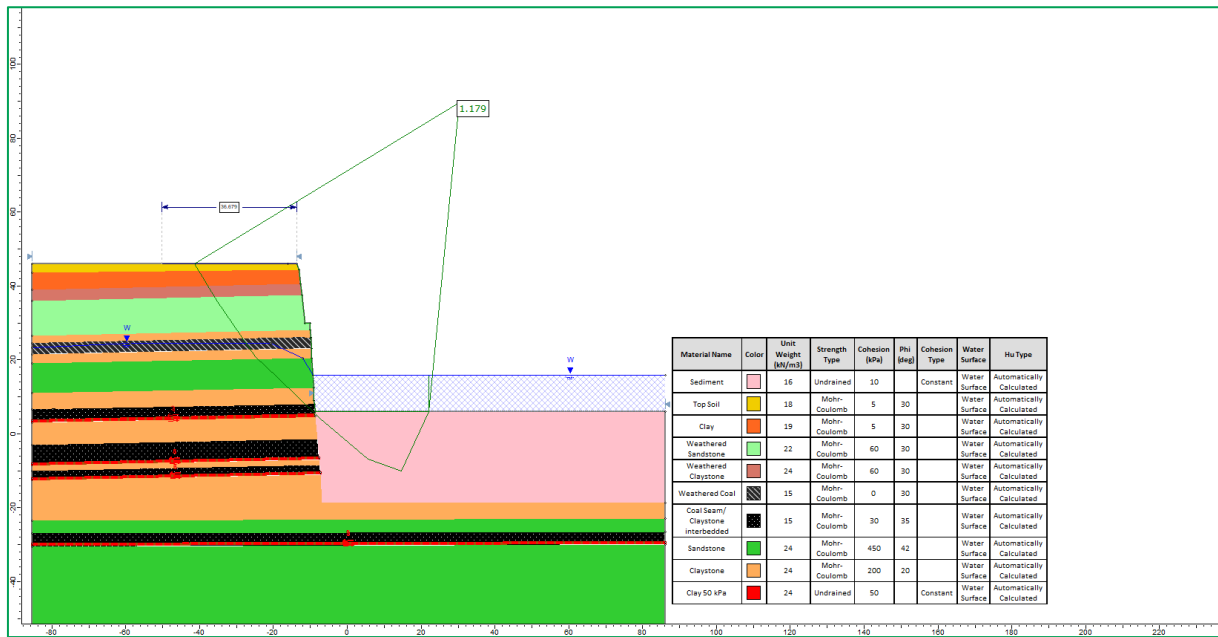


Figure A 55: Cross-Section 5_Bentonite Clay_Undrained_c_u = 50 kPa - Cuckoo Search

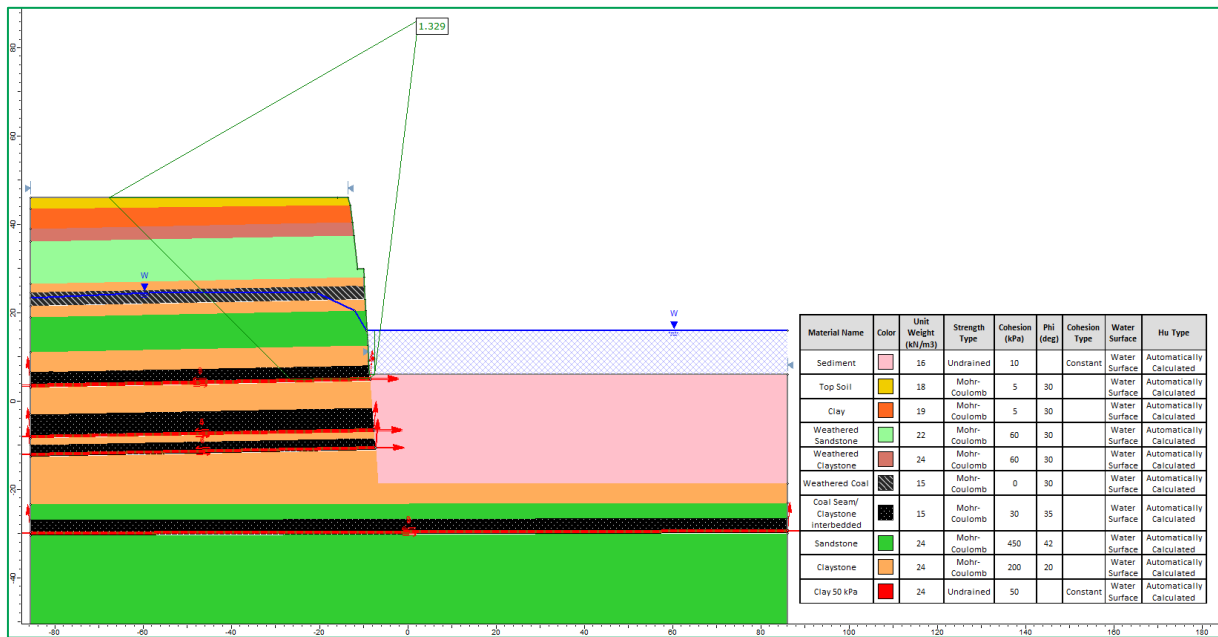


Figure A 56: Cross-Section 5_Bentonite Clay_Undrained_c_u = 50 kPa - Block Search

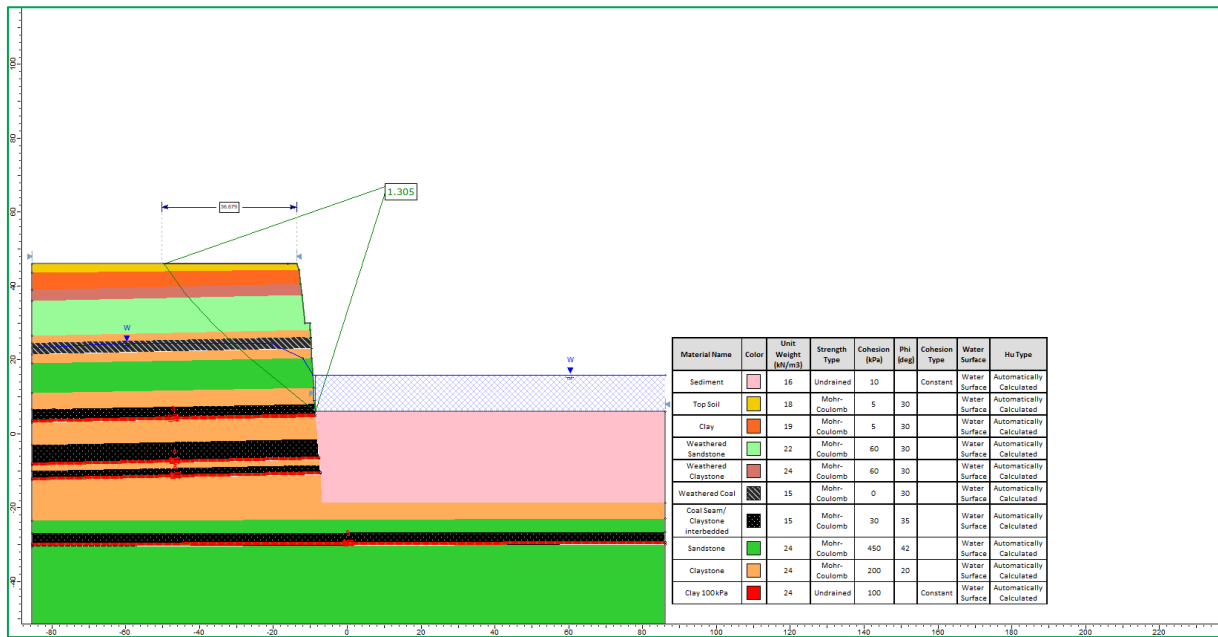


Figure A 57: Cross-Section 5_Bentonite Clay_Undrained_c_u = 100 kPa - Cuckoo Search

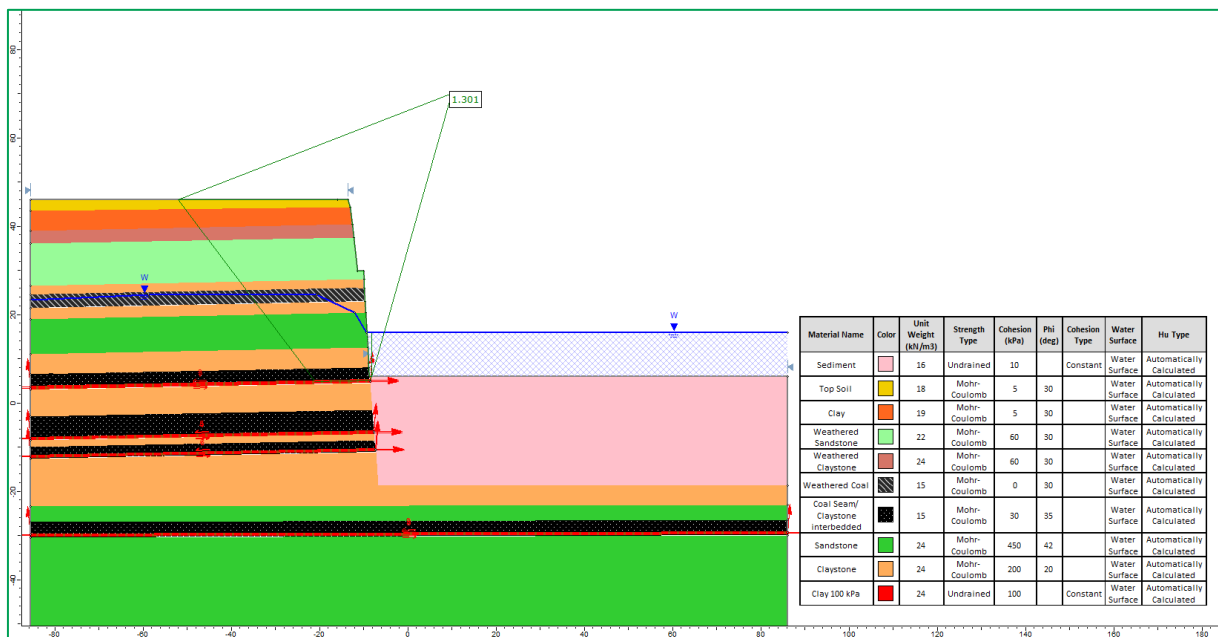


Figure A 58: Cross-Section 5_Bentonite Clay_Undrained_c_u = 100 kPa - Block Search

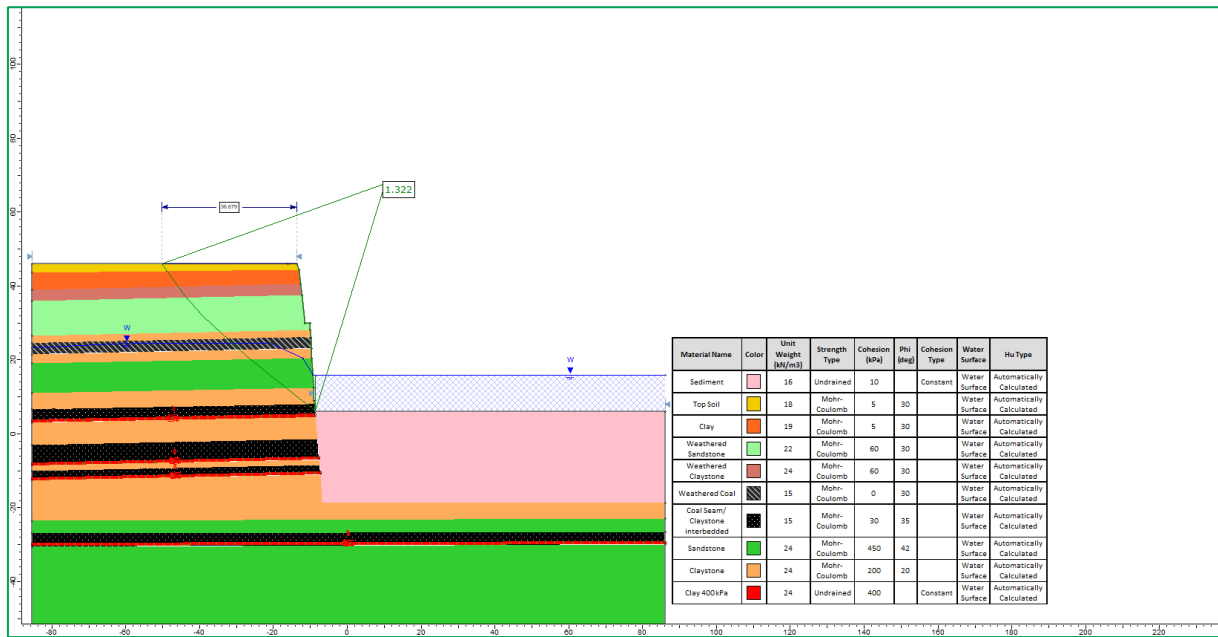


Figure A 59: Cross-Section 5_Bentonite Clay_Undrained_c_u = 400 kPa - Cuckoo Search

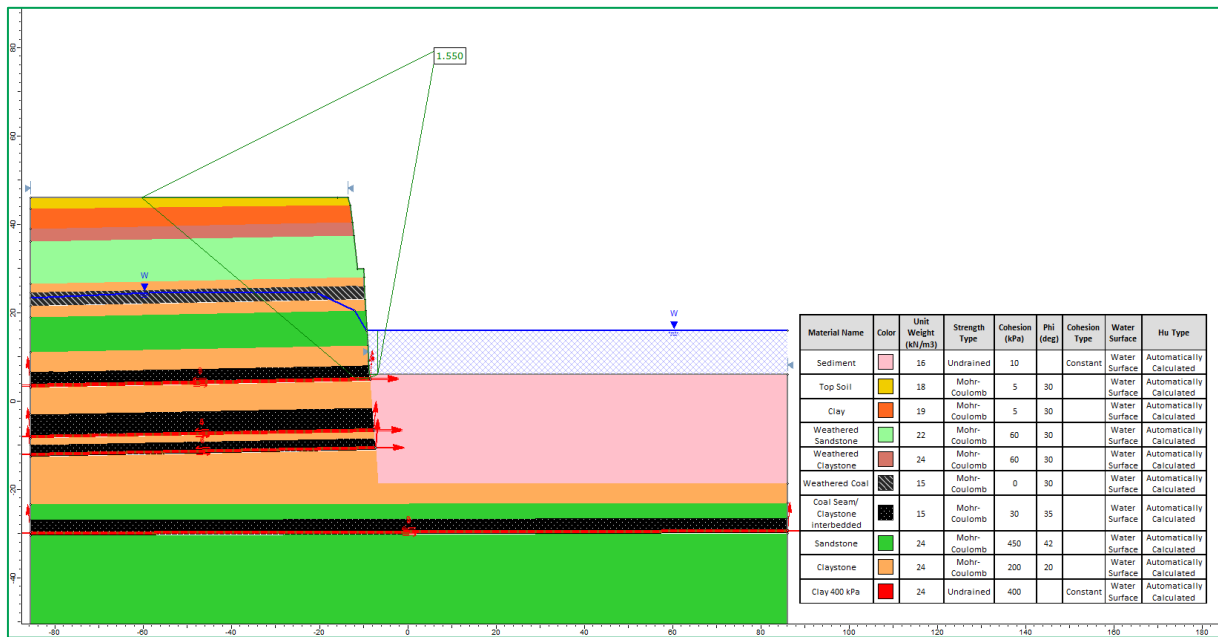


Figure A 60: Cross-Section 5_Bentonite Clay_Undrained_c_u = 400 kPa - Block Search

25 February 2022

Luke Zambelli
Environmental Consultant
The LZ Environmental Company Pty Limited
T/A Zambelli Environmental

on behalf of
Wanless Recycling Park Pty Ltd
Ebenezer Mine

Dear Luke,

EBENEZER MINE

LANE'S PIT LOWWALL STABILITY ASSESSMENT

INTRODUCTION

On behalf of Wanless Recycling Park Pty Ltd (Wanless), Luke Zambelli of The LZ Environmental Company Pty Limited, trading as Zambelli Environmental (Zambelli Environmental) requested that Cartledge Mining and Geotechnics (CM&G) assess the stability of the Lane's Pit lowwall. Further, Wanless are proposing to mitigate the risk of a lowwall failure to people and animals along the crest by constructing a bund and erecting a stock fence at a standoff distance of 40 m from the crest edge. CM&G have been requested to provide comment on the suitability of the bund and fence as a risk control measure and also to the adequacy of the proposed standoff distance.

The Lane's Pit lowwall has experienced a global failure sometime between 2004 and 2007. It is believed that poor surface-water management contributed to the failure. Since then, surface-water management has improved, with surface runoff redirected from the crest edge by contour bunds. Following the implementation of surface-water management, the lowwall has remained stable, with the exception of a minor sloughing failure in December 2021 within the scarp of the historic failure. The sloughing failure occurred during a period of increased rainfall activity.

Purpose

The purpose of this letter is to provide advice on the suitability of the proposed crest bund and stock fence as a risk mitigation option and standoff distance from the Lane's Pit lowwall crest.

INFORMATION PROVIDED

The topographic surface of the lowwall spoil dump was acquired from the raster drawing "Lanes & Ironbark Pits Topo Combined with Hydro Survey – Top of Infill", dated 19/01/2022 by Taylor Mining Services Pty Ltd. The drawing was provided to CM&G by Zambelli Environmental via email on 19/01/2022.

The Lanes Pit floor conditions were taken from interpretations carried out by CM&G for the report "WAN010002-AA_Ebenezer Mine Highwall Stability Assessment_Rev2", dated 21/02/2022.

METHODOLOGY

To assess the geotechnical stability, CM&G carried out the following tasks:

- Determination and evaluation of geotechnical parameters for the mine spoil and foundation material;
- Slope stability analyses using two-dimensional (2D) limit equilibrium software, assessing the current site geometry, to determine whether the slopes achieve a recommended Factor of Safety (FOS) of 1.5 (which is considered appropriate for site closure and final landform); and
- Review of the stability analysis results to allow for discussion around improving stability and/or reducing any geotechnical risks identified, including the use of a crest bund and stock fence to reduce the consequence of a failure.

Mine Spoil Material Description

During the site inspection by CM&G on 22 June 2021, observations indicate that the mine spoil dump comprises general open-cut mine waste material comprising cobbles and boulders of conglomerate, sandstone, siltstone, and coal, supporting a matrix of gravelly, sandy, and clayey soil. The conglomerate and sandstone cobbles and boulders were observed to be moderately weathered to fresh and of high strength; refer to Photograph 1 below.



Photograph 1: Material Observation within the Mine Spoil Dump (22 June 2021)

Assessment of Shear Strength Parameters

Categorising of Mine Spoil Material

Simmons and McManus (2004) developed a framework for the reliable assessment of shear strength parameters of open-cut coal mine spoil dump materials from visual-tactile observations. These parameters have been extensively used for the analysis of coal measure spoil and validated using back-analysis and laboratory testing.

The framework differentiates spoil materials into four categories (Category 1 through to Category 4), each defined by identifiable attributes through field observations.

The spoil material categories are based on the strength profiles of recently formed spoil dumps. The framework also accounts for changes to the spoil materials behaviour due to ageing, where settlement and consolidation will effectively increase the dump materials' strength, refer to Table 1 below.

Table 1: Spoil Categories and Attributes

Category		1	2	3	4
Description Attributes	Weighting (excl. Age)	Fine-grained clay-rich high plasticity	Fine-grained low plasticity with larger clasts	Larger clasts with fine matrix, low plasticity	Large blocks, minor fines, minor slaking
Predominant Particle Size	3/31 = 9.7% (11.6%)	Clay	Sand	Gravel	Cobbles
Consistency: Cohesive Cohesionless	7/31 = 22.6% (26.9%)	Soft to Firm Loose	Stiff Medium Dense	Hard Dense	XLS+ rock Very Dense
Structure	7/31 = 22.6% (26.9%)	Matrix only	Matrix supported	Framework supported	Framework only
Liquid Limit	9/31 = 29.0% (34.6%)	High (>50)	Intermediate (20 – 35)	Low (20 – 35)	Not Plastic (<20)
Age	5/31 = 16.1%	0 – 2y	2 – 10y	10 – 30y	>30y

Note:

XLS+ rock Refers to rock of extremely low strength, or higher

Based on the observation of the mine spoil material, refer to Photograph 1, and applying the appropriate weighting to the various attributes as per Table 1, the material is best described as an in-between Category 2.4, that being the material has some of the Category 2 and Category 3 characteristics; refer to Table 2.

Table 2: Category Selection for Waste Spoil Materials (orange highlighted cells are identified characteristics of the Lane’s Pit spoil)

Weighting	Category				Waste Spoil Material
	1	2	3	4	
3	0.75	1.5	2.25	3	1.875
7	1.75	3.5	5.25	7	3.5
7	1.75	3.5	5.25	7	4.375
9	2.25	4.5	6.75	9	5.625
5	1.25	2.5	3.75	5	3.75
Total:	7.75	15.5	23.25	31	19.125

Table 3 presents the Mohr-Coulomb shear strength parameters associated with each of the four spoil categories, with the inclusion of the additional Category 2.4 values, which have been assigned to the Lane’s Pit spoil material. These parameters have been analysed to provide an assessment on the performance of the spoil slope.

Table 3: Shear Strength Parameters for Categories

Category	Unsaturated			Saturated		
	γ (kN/m ³)	c' (kPa)	ϕ' (deg)	γ (kN/m ³)	c' (kPa)	ϕ' (deg)
1	18	23	25	20	0	18
2	18	30	28	20	15	23
2.4	18	38	28.8	20	17	23.8
3	18	50	30	20	20	25
4	18	50	35	20	0	30

Sedimentary Rock Assessment

The various sedimentary rock units within Lane’s Pit have been consolidated into one material type for the purposes of this assessment. The parameters chosen to represent the sedimentary rock was taken from the report on the Highwall Assessment (CM&G 2022).

The strength parameters assigned to the sedimentary rock material are presented in Table 4 below.

Table 4: Material Parameters for Sedimentary Rock

Material Type	Unit Weight (γ) (kN/m ³)	Cohesion (c') (kPa)	Friction Angle (ϕ') (deg)
Sedimentary Rock	24	450	42

STABILITY ASSESSMENT

Three cross-sections were taken through the lowwall at locations shown in Figure 1 below. The cross-sections were generated using the raster contour image by marking where contours intersected the cross-section line, and then the height of each contour was projected perpendicular to the cross-section line, at the same scale as the horizontal cross-section line. The projected elevations of each contour intersection were joined to generate the cross-section surface.

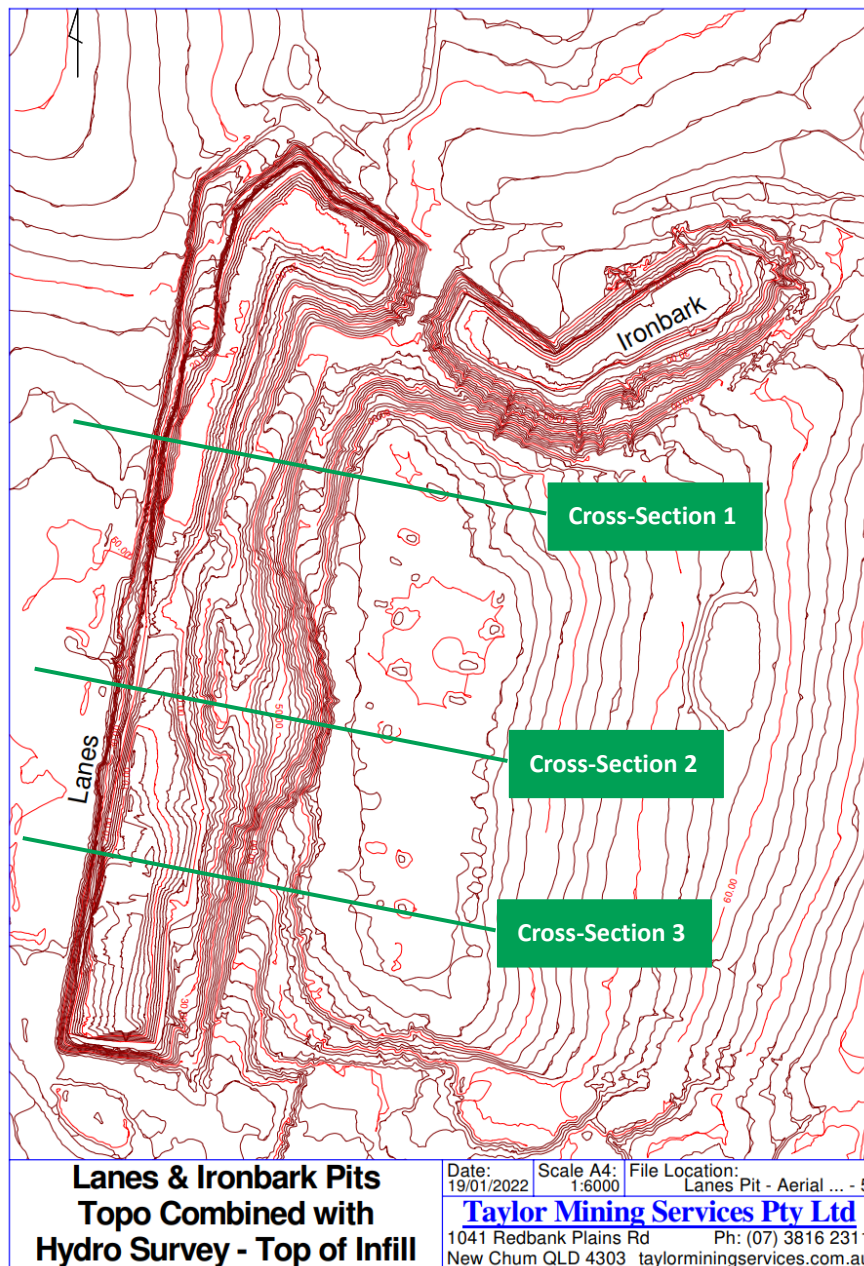


Figure 1: Contour Plan of Lane’s Pit with the location of the analysed cross-section.

Analysis Assumptions

The following assumptions were adopted for this analysis:

- The prime floor surface was interpolated from the cross-sections provided by Taylor Mining Services Pty Ltd. Where the prime model did not extend to the extent of the historical workings, the extents were extrapolated to allow the analysis model to be developed.
- Standing water level within the void was chosen from the water surface provided in the contour survey of the site. From discussions with Zambelli Environmental, it is understood that the water within the void represents the phreatic surface across the site. As such, the void does not act as a dam (in the long term), so this water level is considered representative of the groundwater condition at the site.

- The water level within the mine spoil dump is assumed to be 5.0 m above the standing water surface within the void, based on Simmons and McManus (2004) recommendation.
- Mine spoil material properties are homogeneous throughout the dump.

Stability Analyses

Slope stability analyses were undertaken on the cross-section, as shown in Figure 1, using “Slide2” (Rocscience Inc. of Toronto, Ontario, Canada) for the existing geometry of the spoil dump and highwall.

Based on Simmons and McManus (2004), the “Sarma Non-Vertical Slice” method was adopted with the Block Search (Active Wedge) function used as the most appropriate method for two-dimensional limit equilibrium analysis. Additionally, the Cuckoo Search function was also used as a comparison. The failure surface generated by the Cuckoo Search function is considered by industry to be conservative, and it accepted to provide a conservatively low FOS. However, it is used to help validate the model.

The analysis involves the calculation of factors of safety for potential shear failure surfaces. The Factor of Safety (FOS) against shear failure is defined as the proportion of restoring forces versus the destabilising forces of the analysed slope to bring the materials into a state of limiting equilibrium.

The analyses consisted of evaluating multiple trials showing shear failure surfaces, with the location of the critical (lowest FOS) shear surface being presented. During the review of the analyses, the base normal stresses (Sarma) were plotted to verify the validity of the results. Where the base normal stresses were determined to be non-valid due to the development of tensile stresses, a ‘tension cracking zone’ was included within the model towards the crest of the batter. This zone allowed “Slide” to effectively resolve the forces generated during the analysis and provide a valid base normal stress and, as such, a valid failure shear surface and FOS result.

Summary of Results

The results of the analyses, as discussed above, are presented in Table 5. The results of the Cat2.4 material analyses indicate that the slope has a FOS of between ~1.6 and ~2.1.

Pictorial representations of the batter cross-sections with the critical sliding surfaces and respective FOS are presented in Figure 4 through to Figure 10.

Table 5: Summary of Calculated Factor of Safety (FOS)

Cross-Section	Method	Search Type	Recommended Minimum FOS ⁽¹⁾	Existing Surface FOS
1	Sarma Non-Vertical	Cuckoo	1.5	1.465
		Block Search	1.5	1.855
2	Sarma Non-Vertical	Cuckoo	1.5	1.599
		Cuckoo “Global”	1.5	1.812
		Block Search	1.5	2.080
3	Sarma Non-Vertical	Cuckoo	1.5	1.341
		Block Search	1.5	1.655

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.

Sensitivity Analysis

To gain an understanding of the mechanism of the historic global failure within the spoil dump, historic aerial photographs were provided by Zambelli Environmental showing the slope prior and subsequent to the failure, refer to Figure 2.



Image Date: 01/11/2004

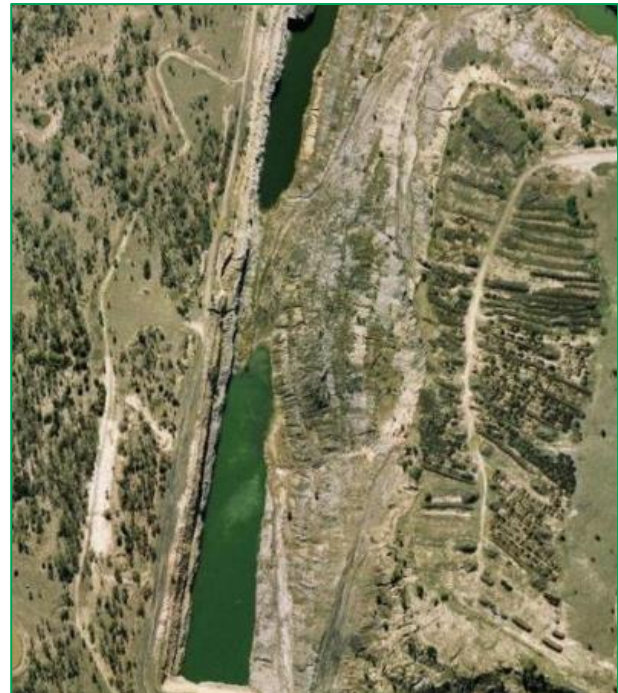


Image Date: 06/07/2007

Figure 2: Aerial imagery of before and after the historic lowwall slope failure

The aerial photographs indicates that the crest line retreated approximately 30 m following the failure.

The failure was back-analysed to understand the causal mechanisms and assess the risk of those occurring again. It is understood that the failure occurred at a location on the slope where the surface water was discharged over the crest onto the slope. This would result in transient saturation conditions of the slope that will result in a reduction in shear strength and increased mass.

To model the failure, the slope was modelled at 27° (assumed to be the approximate slope angle of the intact slope prior to the failure) and analysed as per the methodology used for cross-section 1, 2, and 3. To reduce the FOS to approximately 1.0, at which point a failure would occur, the pore water pressure (PWP) within the spoil material was increased using the Ru Coefficient function within the analysis software (Slide). The results of the analysis are presented in Table 6 below with pictorial representations of the batter cross-section with the critical sliding surfaces and respective FOS are presented in Figure 11 through to Figure 13.

The dimensionless Ru coefficient is defined as a ratio of the pore pressure and normal stress at a certain point within a slope. When the slope is dry, $Ru = 0$; when the groundwater is at the surface of the slope, $Ru = 0.5$. A value of 0.1 was applied to the waste spoil material above the water table, indicating infiltration of water into the waste material, but at a lesser extent than where material is water-conditioned during placement, in which case a value of 0.15 is generally used. An Ru value of 0.5 was applied to the material below the water table.

Table 6: Sensitivity Summary of Calculated Factor of Safety (FOS)

Cross-Section	Method	Waste Category	Recommended Minimum FOS ⁽¹⁾	Existing Surface FOS
Sensitivity	Sarma Non-Vertical	Cuckoo	1.5	0.878
	Spencer	Cuckoo	1.5	0.841
	Sarma Non-Vertical	Block Search	1.5	1.071

DISCUSSION OF RESULTS

These results indicate that the Lane’s Pit lowwall can be considered stable in terms of long-term stability. Shallow sloughing failures are possible along the crest, especially within the historic failure scarp. The sensitivity analysis indicates that changes in the PWP that are consistent with saturation due to surface water discharge are likely to have caused the failure. Drainage bunds have since been established to prevent similar conditions occurring again.

Geotechnical Risk Reduction

Risk is characterised as the product of the likelihood of the hazard occurring and the consequence. Where there is a risk of instability, e.g., crest sloughing, the risk of a failure can be mitigated by reducing the likelihood of a failure occurring and/or reducing the consequences. To improve the stability of the waste dump crest, the steep crest along the historic failure scarp be flattened by dozer pushing or by benching.

The sensitivity analysis indicates that elevating the PWP within the dump can reduce the FOS to where failure may be initiated. To prevent this, good surface-water management should be maintained so that water is not permitted to pond on the dump surface and runoff is directed away from the dump crest.

Likelihood Reduction – Methods to Increase the Factor of Safety

To improve the FOS along the crest, the steep failure scarp should be pushed down with dozers to prevent ongoing retrograde failures, e.g., start 20 m back from the crest, push down at the maximum grade for dozers (nominally 20°). This will reduce the height of the over-steepened crest by approximately 12 m and provide buttress material to the toe of the scarp. This method also reduces the overall slope angle, further increasing the global factor of safety for the slope. Alternatively, benching using an excavator with nominal 3 m flitches and 8.5 m benches would produce similar results. The area recommended to be pushed down is highlighted in Figure 3 below.

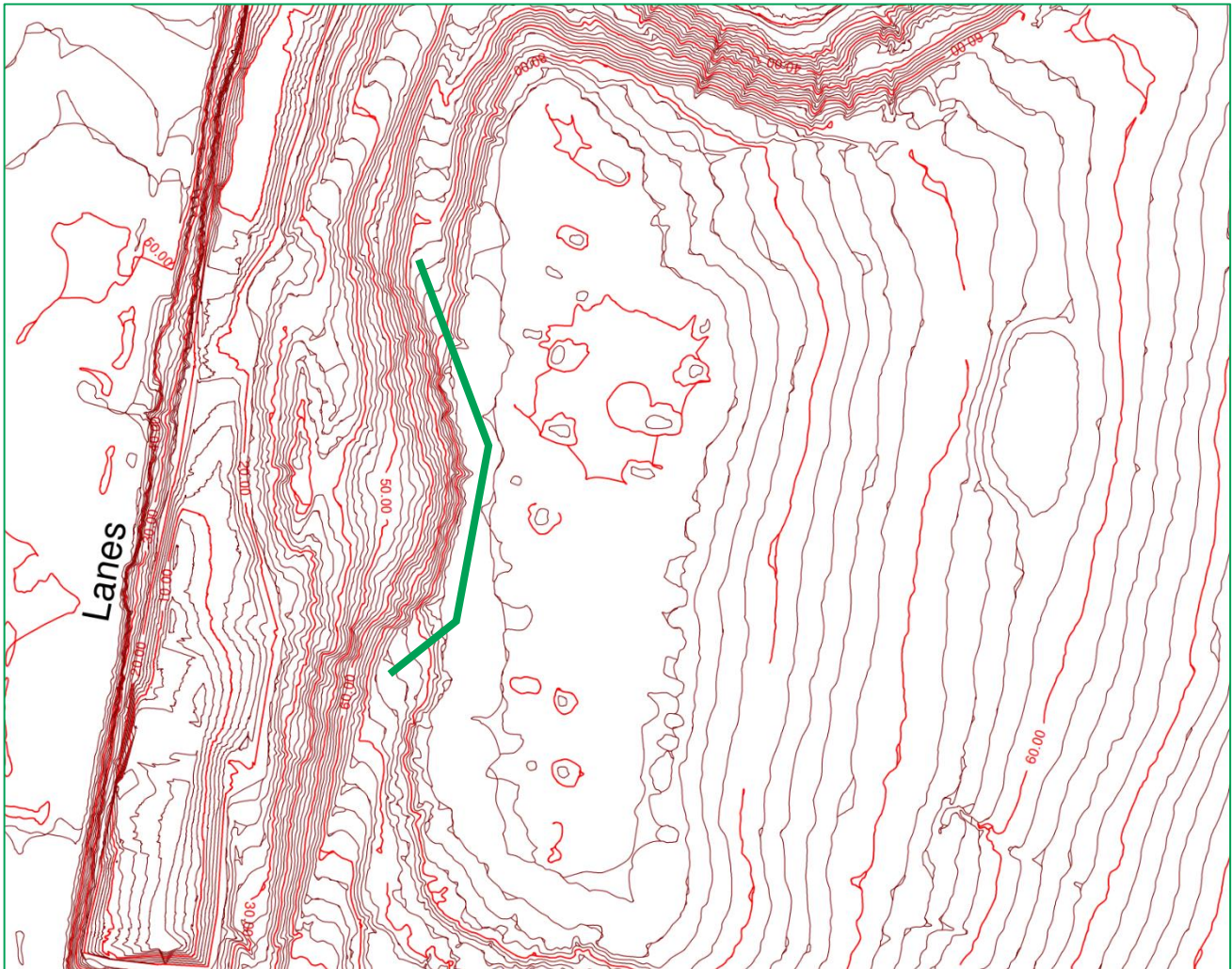


Figure 3: Recommended step slope to be flattened (green line)

Consequence Reduction – Methods to Reduce the Impact of a Hazard

The lowwall dump is inward-facing into the water-filled void. As such, the consequences resulting from a global failure could be effectively managed by Wanless. Wanless is proposing to install a safety bund (5 m bottom width, 2.5 m high, and 1 m top width) plus a five-strand wire fence (four strands of barbed wire and one top plain wire) around Lane's Pit, including across the lowwall spoil dump at a standoff distance of 40 m from the crest edge. This engineering control is proposed to prevent the public and unauthorised personnel from accessing the lowwall crest.

From review of the stability results, lowwall failures are anticipated to constitute shallow sloughing failures, which may daylight behind the dump crest, but would not be expected to encroach past 40 m. This is supported by the scarp of the historical failure extending about 30 m back from the original crest line.

Recommendations

Considering the above discussions and findings of the stability assessment, the following recommendations are provided:

- A suitable perimeter fence, capable of preventing access to the site by the public and unauthorised personnel should be erected.

- Surface water should not be permitted to pond on the crests of any of the dumped surfaces. Surface water management should be implemented to prevent inundation of water into the dump spoil following rainfall events.
- Surface water should be directed away from the dump batter slope to prevent rilling of the batter surface. Crest safety bunds can be used to direct water away from the crest edge.
- Steepened areas along the failure scarp should be flattened by either dozer pushing or excavating benches.

CONCLUSIONS

Based on the results of the analyses and the above discussions, CM&G considers that a global failure within Lane's Pit lowwall is unlikely. Smaller scale, surficial sloughing failures could occur following extreme wet weather.

Sloughing failures are likely to be small and not displace the water within the void to the outside of the site.

Reducing the consequence of a failure is considered the best approach to mitigate against the impact of sloughing failures. Perimeter fencing and safety bunds are recommended to prevent the public and non-authorized personnel from accessing the Lane's Pit lowwall crest, and the water-filled void, where sloughing failures may potentially occur.

REFERENCES

- Simmons, McManus 2004 - Shear Strength Framework for Design of Dumped Spoil Slopes for Open Cut Coal Mines
- "Slide2" (Rocscience Inc. of Toronto, Ontario, Canada)

CLOSURE

I trust that the information provided above satisfies your requirements and if you have any questions or comments regarding the contents of this letter, please contact the undersigned.

Yours sincerely,



Tom Lynch

Senior Geotechnical Engineer

MEngSC, MIEAust, NER, RPEQ (Civil)

Attached: Stability Analysis Results

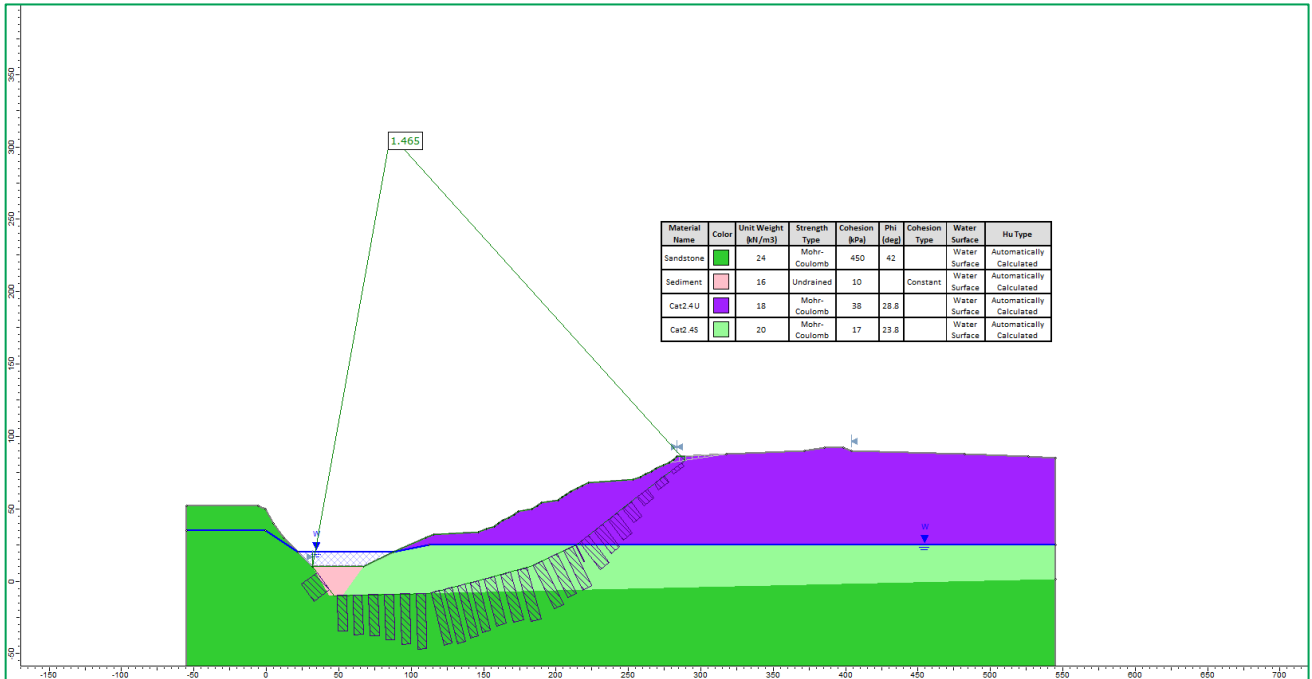


Figure 4: Cross-Section 1_Cat2.4 Spoil_Cuckoo Search_Sarma Non-Vertical

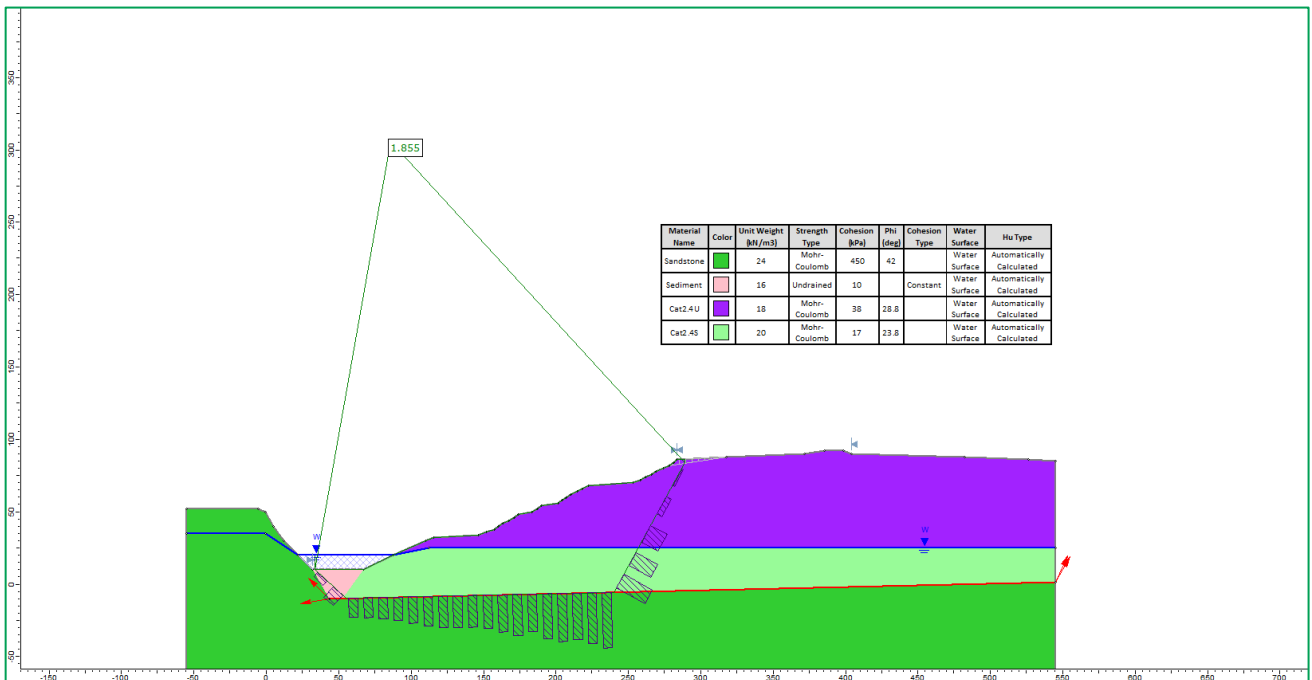


Figure 5: Cross-Section 1_Cat2.4 Spoil_Block Search_Sarma Non-Vertical

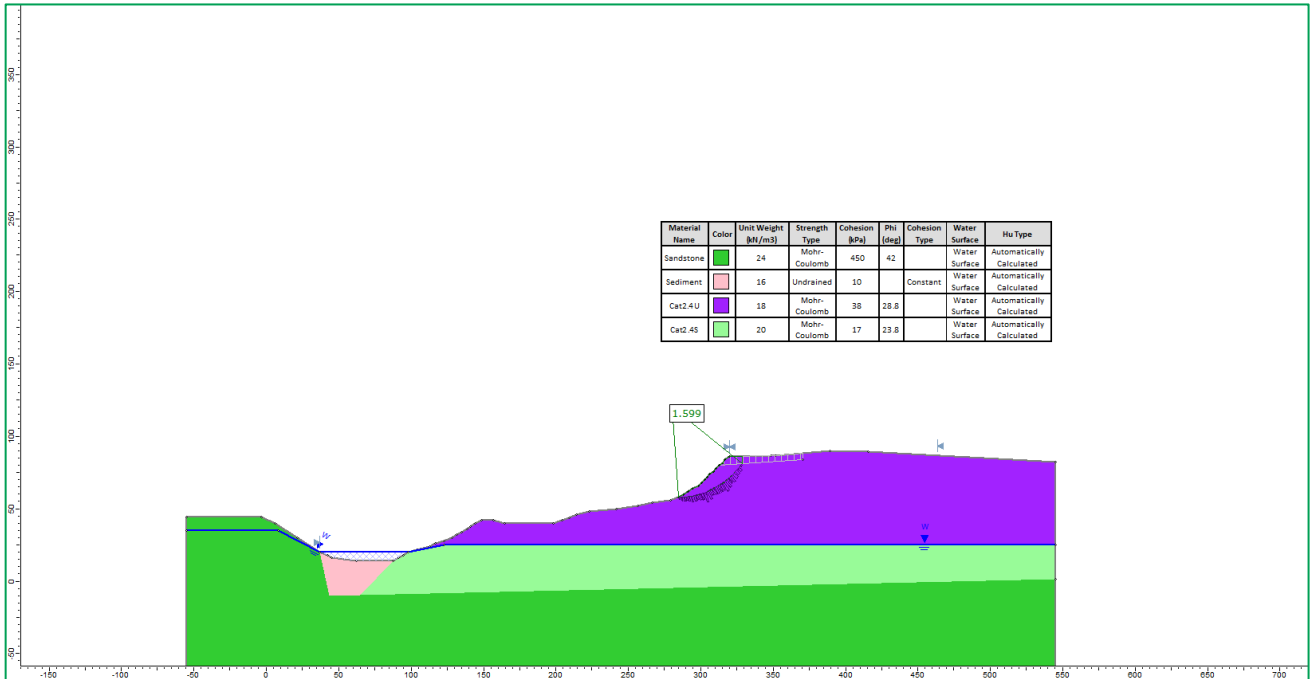


Figure 6: Cross-Section 2_Cat2.4 Spoil_Cuckoo Search_Sarma Non-Vertical

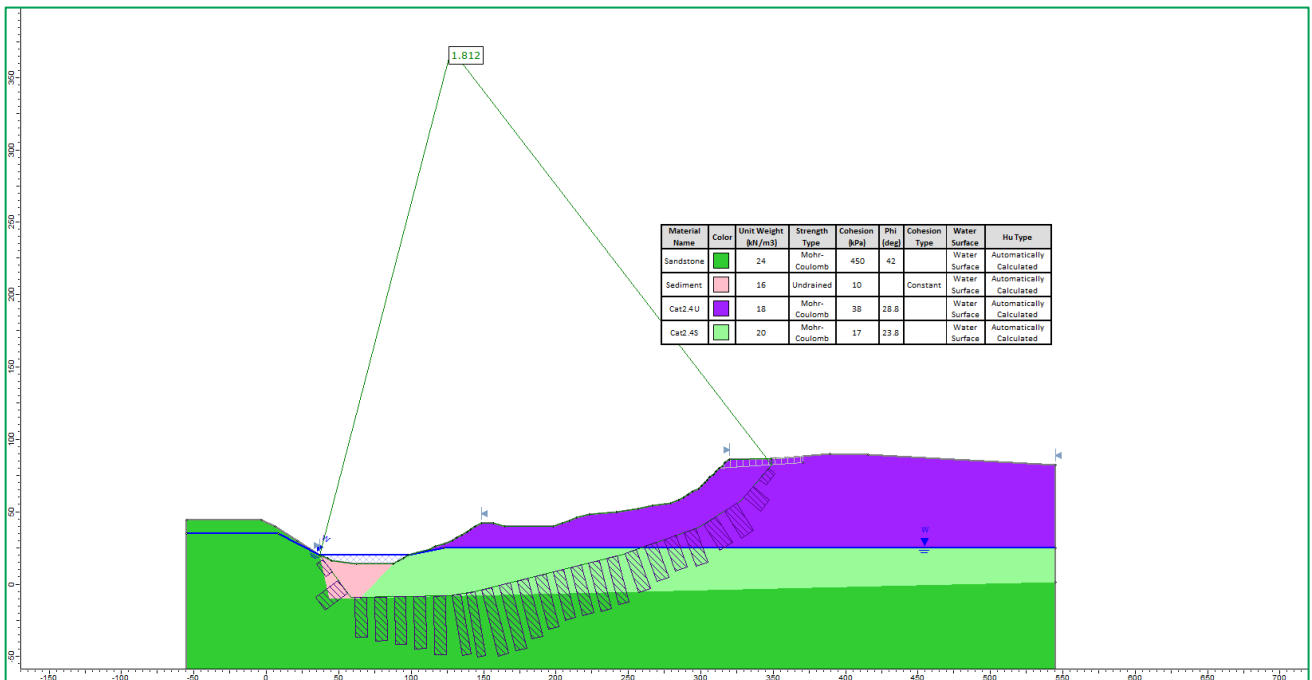


Figure 7: Cross-Section 2_Cat2.4 Spoil_Cuckoo Search (Global)_Sarma Non-Vertical

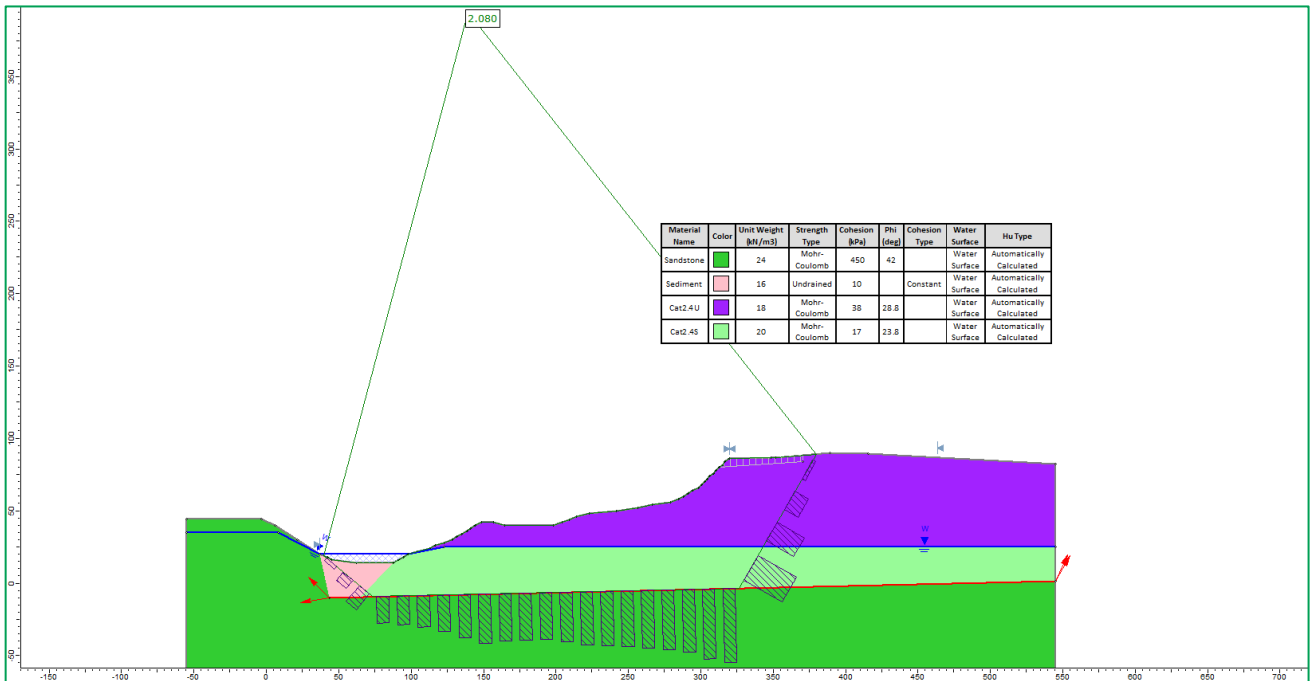


Figure 8: Cross-Section 2_Cat2.4 Spoil_Block Search_Sarma Non-Vertical

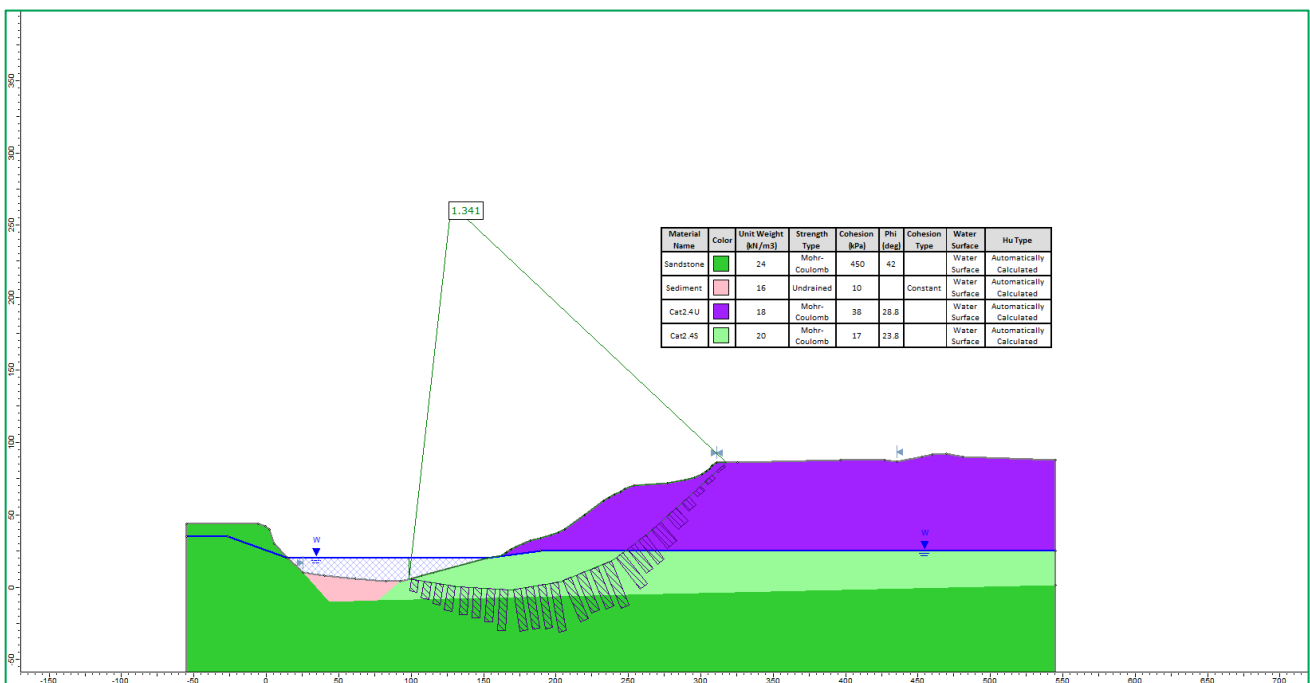


Figure 9: Cross-Section 3_Cat2.4 Spoil_Cuckoo Search_Sarma Non-Vertical

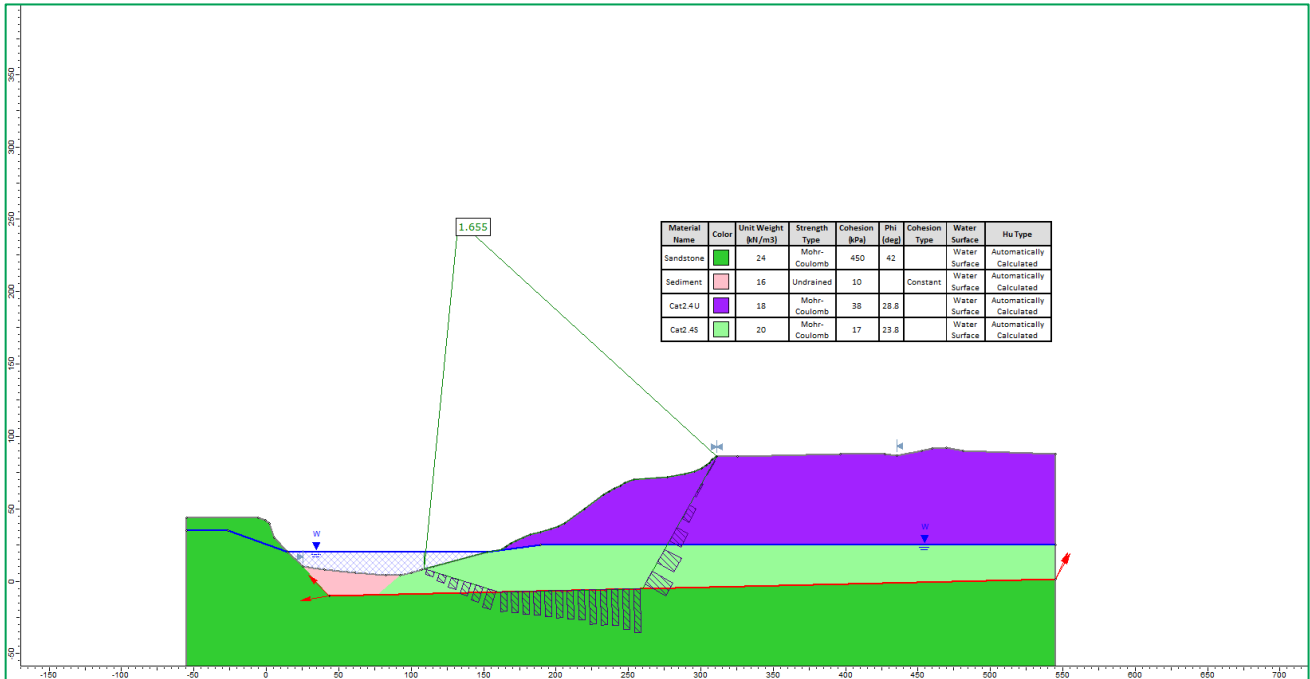


Figure 10: Cross-Section 3_Cat2.4 Spoil_Block Search_Sarma Non-Vertical

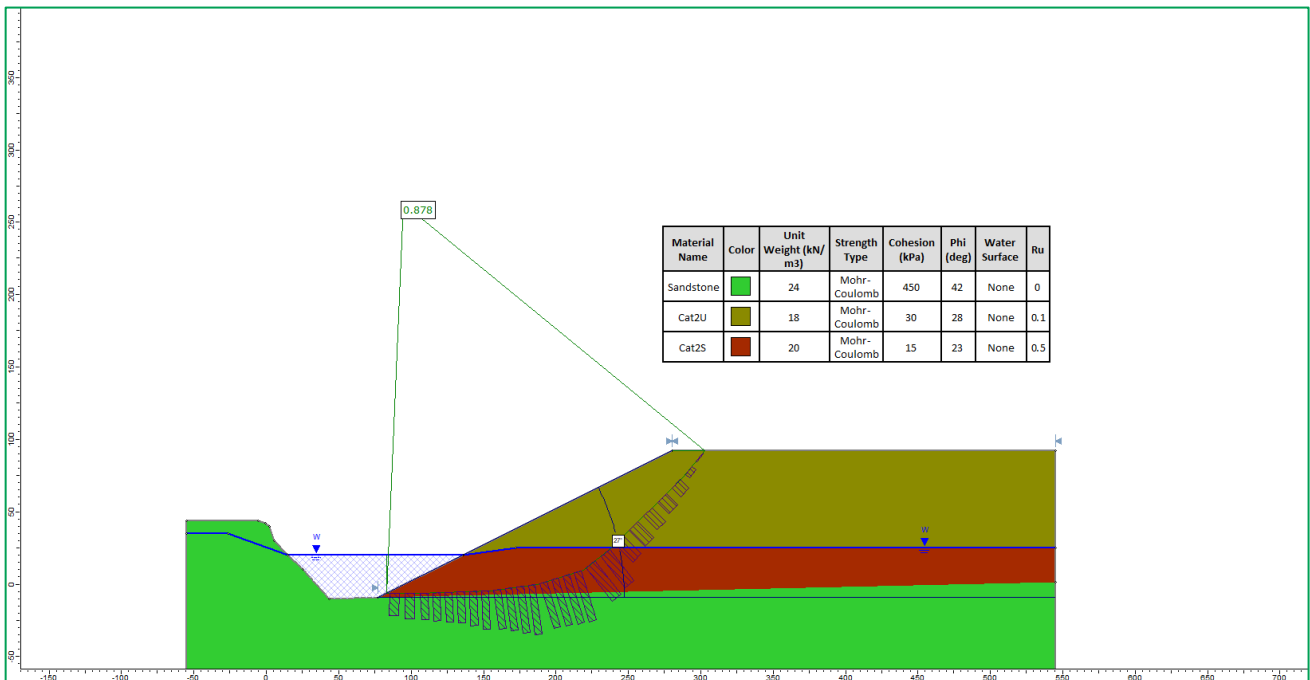


Figure 11: Sensitivity_Cat2 Spoil_Cuckoo Search_Sarma Non-Vertical

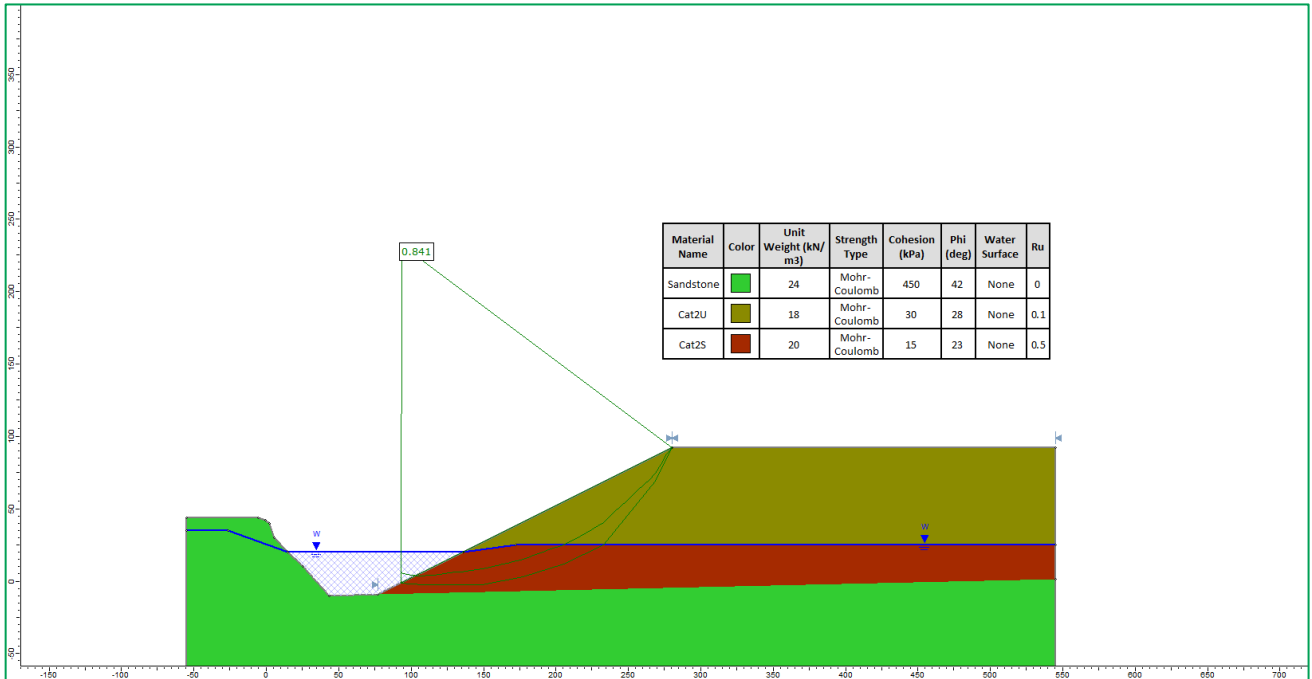


Figure 12: Sensitivity_Cat2 Spoil_Cuckoo Search_Spencer

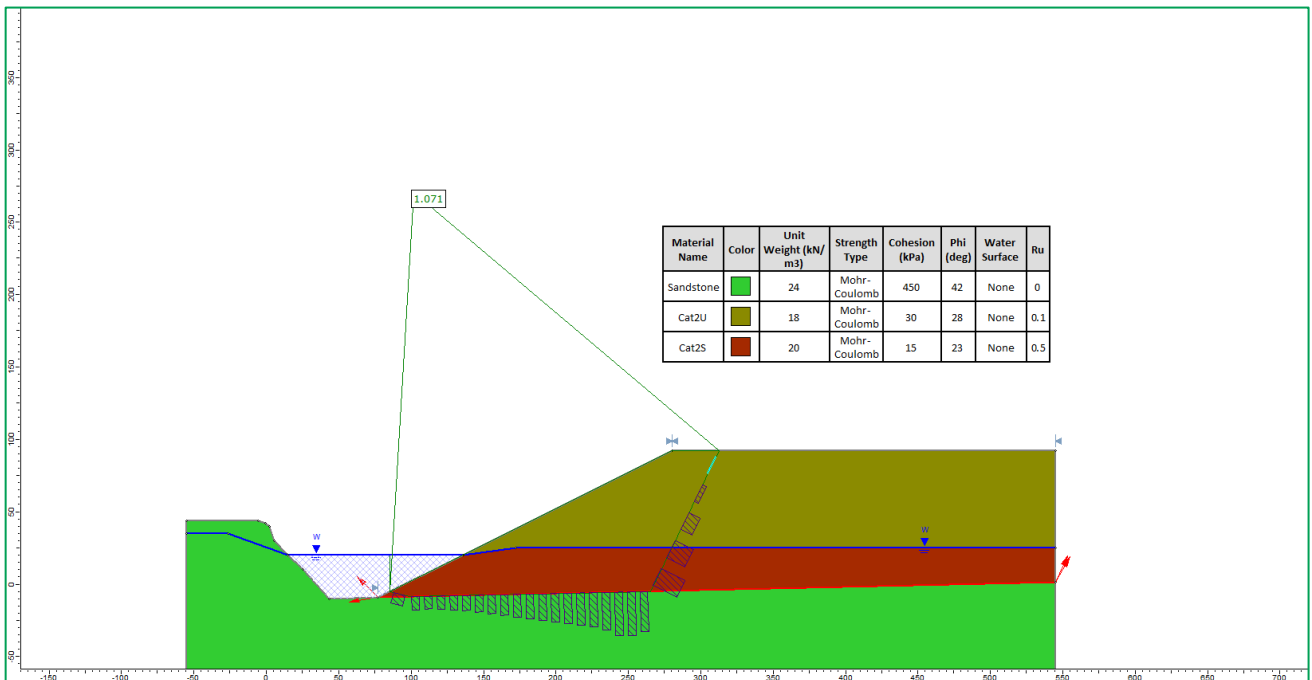


Figure 13: Sensitivity_Cat2 Spoil_Block Search_Sarma Non-Vertical