Soil & Rock Engineering Pty Ltd (SRE)

ABN 98 675 219 020

ANDY WELL PROJECT

Tailings Storage Facility 3 Design Report

Ref: **TSF3 Design Report Rev 1**

Date: **20 June, 2024**

Prepared by: **SRE P/L**
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20 June, 2024

Meeka Metals Limited
Level 2, 46 Ventnor Street
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Attention: [redacted]

Dear [redacted]

RE: Andy Well Project – Tailings Storage Facility 3 - Design Report

Soil & Rock Engineering Pty Ltd (SRE) is pleased to provide the Design Report (Rev 1) for the Tailings Storage Facility 3 (TSF3) at the Andy Well Project, near Meekatharra, Western Australia.

Should you require further information or clarification of any details, please do not hesitate to contact this office.

Yours faithfully
pp Soil & Rock Engineering Pty Ltd

[redacted]

Managing Director - Principal Tailings Consultant

[redacted]

Director - Principal Geotechnical Engineer

Soil & Rock Engineering Pty Ltd (SRE)

Disclaimer

Document Control

Date	Revision	Purpose	Author
27/05/2024	A	Internal Review	[redacted]
11/06/2024	B	Issued for Client Review	
14/06/2024	0	Issued for Use	
19/06/2024	1	Issued for Use	

Abbreviations and Terminology

The following abbreviations have been used in this document

AEP	Annual Exceedance Probability
ANCOLD	Australian National Committee on Large Dams
AWP	Andy Well Project
BOM	Bureau of Meteorology
CMW	CMW Geosciences Pty Ltd
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety (from 1 July 2017), previously referred to as Department of Mines and Petroleum (DMP)
DEMIRSWA	Department of Energy, Mines, Industry, Regulation and Safety Western Australia, previously referred to as DMPWA
DWER	Department of Water and Environmental Regulation (from 1 July 2017), previously referred to as Department of Environment Regulation (DoER)
FoS	Factor of Safety
ha	hectare
hrspa	Hours per annum
H:V	Horizontal : Vertical
TSFs	In-pit Tailings Storage Facility (Facilities)
LoM	Life of Mine
m/a	metres per annum
mmpa	millimetres per annum
MB	Monitoring Bore
MRF	Mine Rehabilitation Fund
m^3/d	cubic metres per day
Mm^3	Million cubic metres
Mt	Million tonnes
Mt/a	Million tonnes per annum
Mtpa	Million tonnes per annum
ML	Mine Lease
oh/a	operating hours per annum, assumed as 8,000
OM	Operations Manual(s)
pa	per annum
PSD	Particle Size Distribution
P_{80}	80% passing, and refers to a particular particle size as stated, i.e. a P_{80} of 75 microns means 80% of the total weight of materials is finer than 75 microns
RL	Reduced Level relative to a fixed datum
SP	Standpipe Piezometers
TSF3	Tailings Storage Facility 3
tpa	tonnes per annum
tpd	tonnes per day
t/m^3	tonnes per cubic metre
TDS	total dissolved solids
WADCN	weak acid dissociable cyanide

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Checklist

Code of Practice

ANDY WELL PROJECT

Tailings Storage Facility 3 Design Report

Item	Item	Comment (as appropriate)	Completed
1	**Classification**		
	Hazard Rating		Yes, refer to the Design Report Section 3.2.1 and 3.2.2
	Seepage		Yes, refer to the Design Report Section 4.3
	Overflow or leakage		Yes, refer to the Design Report Sections 3.5, 3.8 and 4
	Dust Generation		Yes, refer to the Design Report Section 4
	Release of tailings		Yes, refer to the Design Report Section 3.2.2
	Abrupt failure of TSF		Yes, refer to the Design Report Section 3.2
	Dam Break Study		Yes, refer to the Design Report Section 3.2.2
	TSF Category	Assigned for TSF 3	Yes, refer to the Design Report Section 3.2
2	**Site Selection**		Yes, refer to Design report
3	**Design**		
	Design needs		Yes, refer to the Design Report Section 2.2
	Normal operation		Yes, refer to the Design Report Section 4.0
	Abnormal operation		Yes, refer to the Design Report Section 4.0
	Extreme events		Yes, refer to the Design Report Section 4.0
	Decommissioning		Yes, refer to the Design Report Section 5.0
	Design Factors		Yes, refer to the Design Report Section 2.2
	Hazard rating		Yes, refer to the Design Report Section 3.2
	Environmental requirements		Yes, refer to the Design Report Section 3.3
	Decommissioning		Yes, refer to the Design Report Section 5.0
	Site Conditions		Yes, refer to the Design Report Section 2.4
	Geology		Yes, refer to the Design Report Section 2.4.4
	Geomorphology		Yes, refer to the Design Report Section 2.4.2
	Foundation Conditions		Yes, refer to the Design Report Section 2.4.3
	Hydrogeology		Yes, refer to the Design Report Section 2.4.7
	Terrain		Yes, refer to the Design Report Section 2.4.2

	Climate		Yes, refer to the Design Report Section 2.4.1
	Seismicity		Yes, refer to the Design Report Section 2.4.8
	Surface Hydrology		Yes, refer to the Design Report Section 2.4.5
	Minimum Freeboard		Yes, refer to the Design Report Section 3.11
	Decant pond design		Yes, refer to the Design Report Sections 2.5.1, 3.5 and 4.0
	Tailings characteristics		Yes, refer to the Design Report Section 2.5
	Seepage control measures	Upstream toe drain is included and decant water recovery has a specified minimum design of 70% of the tailings slurry volume	Yes, refer to the Design Report Sections 3.5 and 4.3
	Construction materials		Yes, refer to the Design Report Section 3.1.3 and Appendix 4
	Construction methodology		Yes, refer to the Design Report Section 3.1.3 and Appendix 4
	Embankment characteristics		Yes, refer to the Design Report Section 3.1.3 and Appendix 4
	Operating strategy	Operations manual completed	Yes, refer to the Design Report Section 4 and Appendix 5
	Requirements for access	Refer to drawings	Yes, refer to the Design Report Drawings in Appendix 4
	Characteristics and availability of cover materials	Yes, mine waste	Yes, refer to Section 5
	Decommissioning aspects	Yes, included in the design report	Yes, refer to the Design Report Section 5
4	**Construction**		
	Construction Plan		Yes, refer to the Design Report Section 3.1.3 and Appendix 4
	Scope of Works for Embankment Construction		Yes, refer to Appendix 4
	Construction Report Submission	Not applicable for In-Pit TSF	N/A
5	**Operation**		
	Operation and Maintenance Manual	Attached to submission	Yes, refer to the Design Report Appendix 5

	Operational Record	Not required for approval	N/A
	Operational Review	Not required for approval	N/A
6	**Emergency Preparedness**	Included in the Operations Manual	Yes, refer to the Design Report Appendix 5
7	**Closure**		
	Planning for closure	Included in Design Report	Yes, refer to the Design Report Section 5
	Decommissioning review	Not required for approval	N/A
8	**Information instruction training and supervision**		
	Information	Design Report and Appendices	Refer to the Design Report Section 4 and Appendix 5
	Instruction		Refer to the Design Report Section 4 and Appendix 5
	Training		Refer to the Design Report Section 4 and Appendix 5
	Supervision		Refer to the Design Report Section 4 and Appendix 5

Soil & Rock Engineering Pty Ltd (SRE)

Project: Andy Well Project

Subject: Tailings Storage Facility 3 Design Report

1 TSF PROPOSAL SUMMARY

This document presents the details required by the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) Western Australia, for the assessment of the use of the Tailings Storage Facility 3 (TSF3) located on ML 51/870 for storage of tailings at Meeka Metals Limited (MML) Andy Well Project (AWP). Details contained in this document were compiled in accordance with the requirements of the following documents, as appropriate:

i) DEMIRS '*Guide to the preparation of a design report for tailings storage facilities (TSFs)*', dated August 2015[1].

ii) DEMIRS Code of Practice '*Tailings storage facilities in Western Australia*', dated 2013[2].

iii) Australian National Committee on Large Dams (ANCOLD) '*Guidelines on Tailings Dams - Planning, Design, Construction, Operation and Closure*', Rev 1 dated July 2019.

iv) Australian National Committee on Large Dams (ANCOLD) *'Guidelines on the Consequence Categories for Dams'*, dated Oct 2012.

The structure of this Design Report conforms to the DEMIRS Guide[1] and includes the following:

i) TSF Proposal Summary, Section 1.

ii) Input parameters used to develop the TSF, Section 2, which in this document is titled TSF Design Considerations.

iii) Details of the TSF design process, Section 3, which in this document is titled TSF Design.

iv) Operational requirements, Section 4.

v) Closure considerations, Section 5.

A checklist, located behind the Table of Contents, provides a cross reference from the items listed by the DEMIRS Code[2], to the location within this document and comments, as appropriate.

The following attachments, located after Section 7, complete this report.

Appendix 1	Certification, Tailings Storage Data Sheets and Explanatory Notes
Appendix 2	Geotechnical Assessment
Appendix 3	Geochemical Testwork
Appendix 4	Scope of Works/Drawings/Schedule of Materials/Technical Specification
Appendix 5	Operations Manual
Appendix 6	Water Balance

1.1 Location of Project

The AWP is owned by MML and is located approximately 40 km north of Meekatharra. The TSF3 is located approximately 1.7 km southwest of the processing plant at AWP. The project location with the tenement details is presented as Figure 1.1. Figures 1.2 and 1.3 show the layout of the existing project infrastructure.

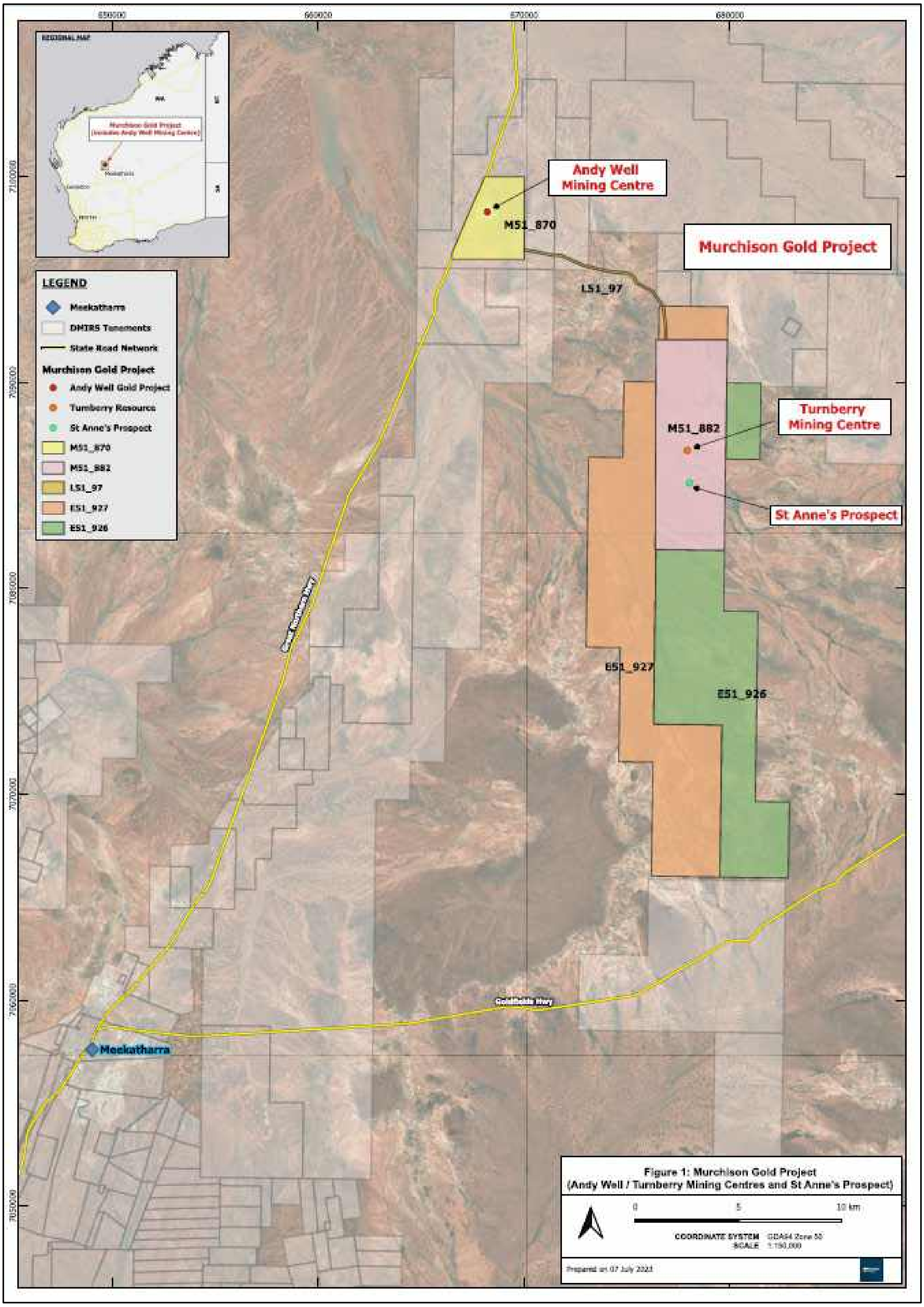

Figure 1.1 – Project location and Tenements Details (source Kevin McCormick - Enviro Mining Support)

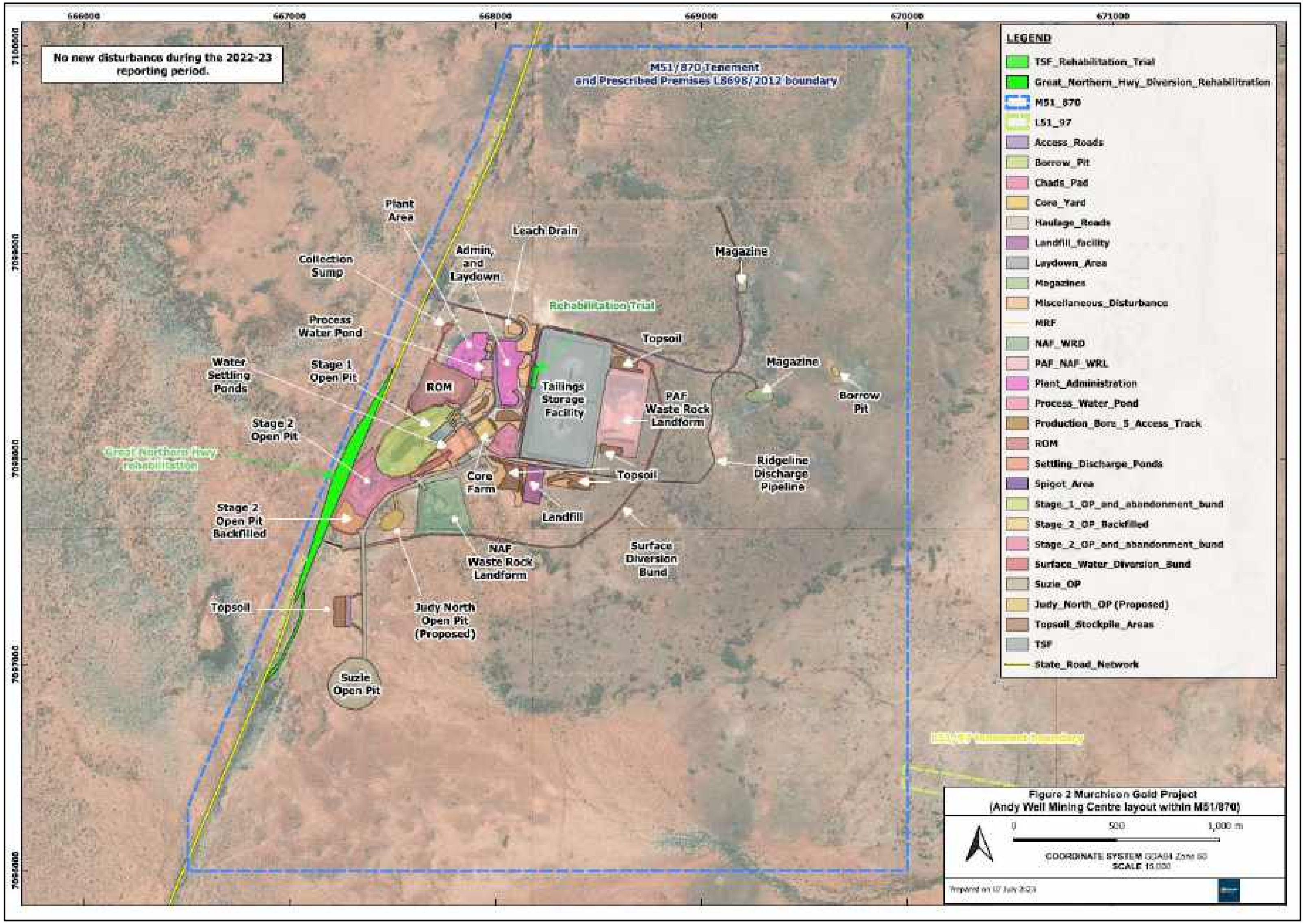

Figure 1.2 - Existing project infrastructure (source Kevin McCormick - Enviro Mining Support)

1.2 Description of Project

The project area was historically used for grazing until Doray Minerals Limited commenced a gold mining operation on 15 November 2012 with the processing plant commissioned in July 2013. Both underground and open pit activities ran concurrently until October 2015 when the last open pit ore was excavated from the small satellite Suzie deposit. Underground operations were continued and focused on ore extraction from both the Wilber and Judy lodes until Andy Well was placed into care and maintenance on at 1640 on 8 November 2017. Andy Well was acquired by MML in February 2021 from Silver Lake Resources.

MML proposes to restart operations in late 2024, with the first tailings being deposited into the SPTSF whilst TSF3 is being constructed.

When the TSF3 is filled to the proposed embankment crest level, tailings may, with the approval of the regulatory authorities, be discharged into the approved above-ground TSFs (TSF1, TSF2 and TSF3) assuming that design work has been completed to demonstrate that these are geotechnically stable for further use.

TSF1 and TSF 2 have approval to be raised to RL 491 and the construction work on TSF 1 was completed at the end of May 2017. TSF2 has not been raised. The approved tonnes for processing was, at the time of the previous operations, 365,000 tpa.

TSF3 is to be located to the south of TSF2 and will be constructed during the operation of the SPTSF. A separate Design Report has been prepared for SPTSF.

A pipeline corridor from the process plant to the TSF3 along existing access roads will be established. Some minor clearing may be required where the tailings pipeline deviates from the existing track alignment. Table 1.1 summarises the physical characteristics of the TSF3.

Table 1.1 – Physical Characteristics – TSF3

Useable Storage Volume (Mm^3)	Greatest Depth (m)	Expected Depth of Tailings (m)	Footprint Area (ha)	Downstream Slopes (H:V)
4.8	16.2	15.5	46.5	3 : 1

Table 1.2 summarises the area of the tailings surface when the TSF3 is filled with the projected production target, expected depth of tailings, tonnes of tailings to be stored at the average design dry density of 1.50 t/m³ and storage life in months for the upper bound production rates.

Table 1.2 – Summary of TSF 3 Features

Expected Tailings Surface Area (ha)	Expected Depth of Tailings (m)	Tonnes of Tailings to be Stored (1.5 t/m³)	Storage Life (months) at 0.65×10^6 tpa
35	15.5	6.75	10.39 (Stages 1 and 2)

The design concept for the TSF3 incorporates a decant rock filter with a pontoon-mounted pump inside the filter to return water to the process plant. Perimeter monitoring recovery bores are to be along strike to the southwest, adjacent to this facility to supplement the existing monitoring bores installed for TSF1 and TSF2. These bores can be fitted with pumps, if necessary, in order to return water to the plant. The monitoring/recovery are bores to be located by the project hydrogeologist to ensure they are within the potential flow paths, which are controlled structurally and lithologically by fractured rock beneath TSF3.

This tailings storage study commenced with a consideration of alternative storage options. However, with commitment to the SPTSF and the limited capacity of the existing TSF 1 and TSF2, which have a combined surface area of around 15 hectares, which is insufficient for the proposed operation, the preferred option was to construct TSF3 given:

i) The availability of the mine waste for downstream embankment construction.

ii) The proximity of the southern embankment of TSF2, which could form part of the containment structure for TSF3.

Similar design concepts to that proposed in this document have been utilised successfully at numerous mine sites in Western Australia. The TSF3 has been assigned a hazard rating of Low, Category 3, based on classification criteria outlined in accordance with the DEMIRS Code of Practice (2013) and Severity Level Medium and Consequence Category of Medium in accordance with ANCOLD (2019) Guidelines.

Geochemical characterisation of the tailings was completed as part of previous studies and the relevant documents are presented in Appendix 3. The Andy Well tailings samples were classified as Non-Acid Forming (NAF). The results from the multi-elemental analysis of both tailings samples indicate that the following elements may become enriched in Silver (Ag), Arsenic (As), Tellurium (Te) and Titanium (Ti). Silver (Ag) occurs as a native metal or an alloy and is stable in air and water. Titanium (Ti) readily reacts with oxygen to form TiO2, a stable compound. Tellurium (Te) has a strong affinity to Au and Ag and is often present as gold tellurides. Te exists in the earth's crust as a rare stable element. Arsenic (As) concentration levels are well below Health Investigation Levels (HIL) classification F – Commercial/industrial sites, and meet HIL classification A – Standard residential, although exceed Ecological Investigation Levels as published by Department of Environment and Conservation (DEC) soil contamination criteria (2010).

The ore to be processed and deposited in the TSF3 is the same as that previously processed and deposited into TSF1 and TSF2 at the AWP.

Geotechnical assessment of the proposed TSF3 indicates that it can be safely operated as a tailings storage facility, provided it is operated in accordance with the intent of the design and the Operations Manual, with the liberated tailings slurry water removed so that the risk of long-term saturation of the containment embankments, which might result in failures, is reduced.

The operation of other similar above-ground TSFs has been safely executed at this site and other sites throughout Western Australia and there was no evidence of distress in the existing embankments of TSF1 and TSF2 during the previous operation of these facilities. It can therefore reasonably be expected that, with good operating practice, the risk of containment embankment failure is very low.

However, it must be stressed that the safe operation of each tailings storage facility relies upon:

i) The execution of all the construction works, in accordance with the Scope of Works, Drawings, Materials Schedule and Earthworks Specification (Appendix 4 of this document).

ii) It being operated in accordance with the Operations Manuals (Appendix 5 of this document). These manuals set out the tailings deposition and water recovery procedures as part of the TSF management, to maximise water return and reduce the potential risk for embankment failure, as well as the inspection and maintenance procedures which are part of the TSF management process.

1.3 Tailings Storage Data Sheet

The tailings storage data sheets for the TSF3 and the Explanatory Notes are located in Appendix 1 behind the text of the report.

1.4 Rehabilitation and Closure Objectives

Once the TSF3 has reached the maximum approved design capacity and there is no further planned use of the facility it will be decommissioned and rehabilitated according to the details presented in Section 5 of this document.

As the supernatant pond develops and is removed, periodic topping-up of TSF3 may be executed, provided the freeboard requirements, refer to Section 3.11, are observed.

The results of preliminary consolidation modelling, excluding allowance for the topping-up process, which assumes overall changes in the in-situ dry density with consolidation, are presented in Section 3.12 of this document.

Section 5 of the Geotechnical Assessment, Appendix 2 of this document, has a summary of the tailings settlement for TSF3 during and beyond its design lifespan.

Interpretation of the tailings consolidation behaviour utilising oedometer consolidation test results, refer to Appendix 2, Table 4.3, is conservatively based on classical Terzaghi's one-dimensional consolidation theory, which indicates that tailings deposited at an annual rate of rise (RoR) not higher than 2 m/year is anticipated to fully-consolidate under its own self-weight, just as fast as it is being deposited into TSF3. The oedometer test certificates are in Appendix C of the Geotechnical Assessment (Appendix 2 of this document).

Considering the proposed TSF3 lifespan is at least 9 years for an embankment height of between 15 and 16 m, full consolidation of the deposited tailings under its own saturated self-weight is anticipated to be achievable at the same time/before the TSF3 lifespan is reached. As such, the contribution of tailings surface settlement response due to saturated self-weight consolidation, can be disregarded for rehabilitation and closure design.

At closure, impounded TSF3 tailings are anticipated to gradually desaturate (due to supernatant recovery, evaporation, and/or seepage through underdrain) and will result in gradual increase in effective self-weight overburden pressure within the in-situ tailings mass over time. The gradual increase in effective self-weight overburden pressure of the in-situ tailings mass is anticipated to also result in on-going primary self-weight consolidation of in-situ tailings, corresponding to tailings surface settlement over time.

Estimation of the total capping surface settlement at complete tailings desaturation has been undertaken, based on conventional one-dimensional consolidation theory, in conjunction with the measured tailings void ratio – effective vertical stress ($e – \sigma_v'$) response estimated from the laboratory oedometer consolidation test result as per (Appendix 2), which is described by the following statistical trendline power function (where σ_v' is in kPa):

$$e = A(\sigma_v')^B$$

Using the above equation in conjunction with laboratory oedometer consolidation test result, with A = 1.17 and B = -0.1, the tailings surface settlement is estimated to be up to 500 mm upon complete desaturation of the entire impounded TSF3 tailings with a total deposited height of between 15 and 16 m. The actual settlement being a function of the timing and volume of tailings placed, and water removal during operation and post operation.

If a mine waste cover with vegetation is selected, the area will be monitored to ensure vegetation is establishing and the site is tracking towards closure. At closure, the objective is to provide a safe stable non-polluting structure, which, with the passage of time, would blend in with the surrounding topography.

1.5 Commitments

MML makes the following commitments in respect of the TSF3:

i) Minimal disturbance of land will be performed in order to allow the project to proceed. Pipelines to and from TSF3 will be bunded to prevent spillage of tailings or return water into the surrounding area in the event of pipeline failure.

ii) An adequate freeboard of 0.7 m (minimum) will be maintained, which comprises 0.182 m to store the design storm event of a 1% annual exceedance probability (AEP), 72-hour storm event, plus 0.2 m, during the operation of the facility. Operational freeboard for tailings deposition is 0.3 m (minimum). The total freeboard is say, 0.7 m.

iii) Monitoring/recovery bores adjacent to TSF3 will be installed and utilised to monitor water levels and water quality, with the bores along strike used to dewater the tailings. Baseline water levels and samples will be taken prior to tailings deposition. Routine water samples will be taken every three (3) months from monitoring bores to check groundwater quality, with standing water levels in the monitoring bores read on a monthly basis.

iv) To manage and operate the tailings storage in general accordance with the Operations Manuals (OMs), with annual engineering reviews of the TSF3.

v) The TSF3 will be rehabilitated according to the details presented in Section 5. At this stage, the final tailings surface is expected be in the order of 0.7 m to 1.2 m below the final crest level. It is planned to provide an oxide waste cover supplemented with some topsoil. Rehabilitated areas will be monitored to ensure vegetation is establishing and the area is tracking towards closure. At closure, the objective is to provide a safe stable non-polluting structure which, with the passage of time, will blend in with the surrounding topography.

1.6 Associated Documents

This document forms part of the Andy Well Project Mining Proposal being submitted for the approval of the Project. It is understood that MML has contacted the Shire and Pastoralist regard the proposed TSF3.

1.7 Tenure

The TSF3 is located on ML 51/870. Table 2.1 details the site, mining lease number, area for MRF levy calculation and mine grid co-ordinates for TSF3.

Table 2.3 – Area of Disturbance TSF3

Mining Lease No	Area (Ha) in Lease	Total Area (Ha) of Final Tailings Surface	MGA Co-ordinates
ML 51/870	46.5	35.8	668200 m E, 7097760 m

1.8 Design Parameters

Gold ore is to be treated on site using the CIL process. The project design parameters as advised by MML are as follows:

- LOM Capacity (Mm^3) – 4.
- Total Tailings (Mt) – 5.2
- Assumed in-situ dry density (t/m^3) – 1.3 t/m^3.
- Annual production (Mtpa) – 0.65.
- Project Life (years) – 8.
- Slurry density (% solids) – 45.
- Assumed Operating hours (hrspa) - 8,000.

1.9 Storage Capacity

The tailings will be discharged into the TSF3 at approximately 45% solids, at a rate of 0.65 Million tonnes per annum (Mtpa) over a minimum storage life of approximately 9 years, with a minimum total 5.86 Million tonnes (Mt).

The minimum dry insitu dry density of the deposited tailings with good water management and based on the results of the tailings testing is expected to be not less than 1.50 t/m^3, for TSF3. The actual tailings storage capacity based on the testing and expected water management for TSF3 are detailed in Table 2.2.

Table 2.4 – Design Capacity

Stage	Storage Capacity (Mm^3)	Cumulative Storages Capacity (Mm^3)	Storage Capacity (Mt)	Cumulative Storage Capacity (Mt)	Expected Storage Life (years)
1	0.93	0.930	1.396	1.396	2.15
2	0.96	1.892	1.442	2.838	2.22
3	1.022	2.914	1.533	4.371	2.36
4	1.064	3.978	1.596	5.967	2.46
5	0.64	4.623	1.050	6.934	1.5
Total	**4.623**		**6.934**		**10.67**

1.10 Site Conditions

1.10.1 Climate

The climate of the site is typically arid, with hot dry summers and cool winters. Potential evaporation is significantly greater than the annual rainfall. The following climatic data, from Meekatharra Airport (1944 to 2023), has been used in the design:

i) Average annual rainfall has been estimated as approximately 234 mm.

ii) Average annual evaporation is estimated at 3,504 mm/year.

iii) Rainfall for a 1% AEP 72-hour storm event is 182 mm, according to the Australian Government Bureau of Meteorology website http://www.bom.gov.au/water/designRainfalls/ifd/.

iv) Winds, according to the Australian Government Bureau of Meteorology website http://www.bom.gov.au/climate/averages/wind/selection_map.shtml, are predominately from the east and northeast.

1.10.2 Landform

The TSF3 is located on the extreme northern edge in a relatively flat plain with a protective ridge to the east, refer to Figure 2.1 and is within the diversion bund as shown on Figure 1.2.

Figure 2.3 - Natural Drainage around the site (source Google Earth)

1.10.3 Soils

The soils on ML 51/870 can generally be characterised as a surficial soil cover (thickness varying between 0.1 m and 1.2 m, averaging 0.5 m) overlying the Wiluna (i.e. Red Brown) Hardpan, typical of those found in the Murchison Goldfileds.

1.10.4 Geology

The regional geology of the area takes in the northern margin of the Yilgarn Craton. The Yilgarn Craton is composed of Archaean rocks, predominantly granitoids, which are crossed by north-northwest trending belts of greenstone. Archaean and the overlaying Proterozoic strata of the Yilgarn Craton have been extensively oxidised to depths of up to 120 m, possibly since the pre-Cretaceous, during the formation of the Western Australian Plateau. The Yilgarn Craton comprises elongate, NNW-SSE-striking belts of sedimentary and volcanic rock (i.e., greenstone) that are enclosed by large areas of granite and granitic gneiss. These rocks formed principally between c. 3.05 and 2.62 Ga, with a minor older component (> 3.7 Ga).

The Yilgarn is divided into four broad tectonic units: the Narryer Terrane, Youanmi Terrane, South West Terrane and Eastern Goldfields Superterrane.

Superficial cover includes degraded laterite profiles and ferruginised rubble and colluvium over areas of subdued relief which grade in to sheetwash deposits 5 to 8 metres thick and alluvium in surrounding watercourses related to northwesterly-flowing tributaries to the Yalgar drainage system.

1.10.5 Hydrological Characteristics – Surface Water

The proposed TSF3 is located in the central area of ML 51/870, refer to Figure 1.2 and is protected by an existing diversion bund constructed prior to the commencement of the Andy Well Project to minimise the impacts on natural drainage systems.

1.10.6 Design Floods

Rainfall for a 1% AEP 72-hour storm event is 182 mm, according to the Australian Government Bureau of Meteorology website http://www.bom.gov.au/water/designRainfalls/ifd/. An adequate freeboard of approximately 0.7 m (minimum), which includes the 0.182 m to store the design storm event of a 1% annual exceedance probability (AEP), 72-hour storm event, plus 0.2 m, during the operation of the facility. Operational freeboard for tailings deposition is 0.3 m (minimum). The total freeboard is say, 0.7 m.

1.10.7 Hydrogeology

TSF3, like the Suzie Pit to the south, sits in what is known as the Upper Transition Zone Aquifer, which extends from the base of saprolite to around 35 to 40 m below ground (445 to 440 mAHD) in a highly weathered and fractured zone. This zone is also highly oxidised with abundant iron staining on fracture surfaces. Near-surface unloading and opening of fractures, enhanced by chemical weathering, has resulted in a transition zone aquifer with potential for moderate to high permeability. At the time of the site visit, the water table level in the Suzie Pit, to the south of the proposed location of TSF3, was approximately 27 m below ground level.

1.10.8 Seismicity

Seismic parameters relevant for engineering assessments are generally the bedrock peak ground acceleration (PGA) and moment wave magnitude (M_w). The bedrock PGA and M_w values have been interpreted based on the Geoscience Australia *2018 National Seismic Hazard Assessment (NSHA) for Australia* document including complementary record catalogue, and considering the proposed TSF3 development will consider a 1,000-

year Annual Exceedance Probability (AEP) earthquake event, based on ANCOLD (2019) *Guidelines for design of dams and appurtenant structures for earthquake* requirements for a TSF with an ANCOLD "Significant" consequence category classification, the adopted design earthquake parameter values are as follows:

- PGA = 0.03 g
- M_w = 7.0

A seismic site classification of "B_e" in accordance with AS1170.4-2007, is deemed appropriate to reflect the natural foundation conditions.

1.11 Tailings Properties

1.11.1 Geotechnical Characteristics

Tailings testwork executed by E-Precision Pty Ltd in May 2024 is the most recent work and the results are presented in the Geotechnical Assessment, in Appendix 2 of this document. The results of this testing and the implications for the operation of the TSFs are summarised as follows:

i) The results of the Particle Size Distribution (PSD) and Atterberg Limits (AL) executed in the 2024 testing, indicate that the tailings can be classified as a low to medium plasticity, sandy silt, according to Table 10, Classification of Fine-Grained Soils in AS 1726:2017, Geotechnical site investigations. Based on the results of the PSD and AL tests, the hydraulic conductivity for the settled, consolidated tailings is estimated to be in the range of 10^{-8} m/s to 10^{-9} m/s. The relevant geotechnical test results (PSD and AL testing) on which the screening for liquefaction is based, include moisture content, particle size distribution, clay content (defined as % passing the 0.005 mm sieve) and Atterberg Limits. The screening implies that there is an overall tendency for the tailings materials tested, which have medium plasticity, not to be susceptible to liquefaction under sufficiently adverse conditions of saturation, in-situ stress, and cyclic loading. However, given that the tailings are to be stored in a downstream constructed TSF, there is no potential for tailings to be released should they liquefy.

ii) The tailings Soil Particle Density (SPD) is in the range of 2.817 to 3.142 t/m^3.

iii) The objective of the UST is to monitor the tailings settlement and the development of clear supernatant water in undrained conditions. By monitoring the percentage of supernatant with respect to the initial water volume, an indication of how much water will be available for recovery and the speed at which this water is released can be assessed. The laboratory results in Appendix 4 show the available supernatant water with respect to the total water discharged to the tailings storage. The points to note from the laboratory results are:

   a) Water available for recovery (approximately 53%) takes 6.75 hours under laboratory conditions.

   b) The dry density of the tailings after 6 hours is 1.08 t/m^3 in the undrained settling test, which does not include the effects of consolidation which would occur within the TSF3.

iv) The objective of the DST, which was top and bottom drained, is to monitor the tailings settlement and the development of clear supernatant water and underdrainage in drained conditions. By monitoring the percentage of supernatant and underdrainage with respect to the initial water volume, an indication of how much water will be available for recovery and the speed at which this water is released can be assessed. The result of this drained settling test is presented in Appendix 4. The points to note from the laboratory results are:

a) The total recovery of water is approximately 68.9% of water available, approximately 21.75 hours after tailings deposition.

b) The dry density of the tailings is 1.156 t/m^3 in the drained settling test, which does not include the effects of consolidation which would occur within the TSF3.

From the 2018 TSF Geotechnical Review, the reconciled in-situ dry density of the tailings deposited into TSF1 and TSF2 was 1.20 t/m^3. This seems to be low for an above-ground storage facility in a semi-arid environment with a small decant pond. A minimum insitu dry density of 1.35 t/m^3 is more common and would reasonably be expected, unless there are some unusual characteristics in the tailings, such as the presence of talc. The ultimate target insitu dry density of the deposited tailings should be at least 1.50 t/m^3. Figure 2.2 shows the generic moisture density curve and the residual water with a dry density of 1.50 t/m^3.

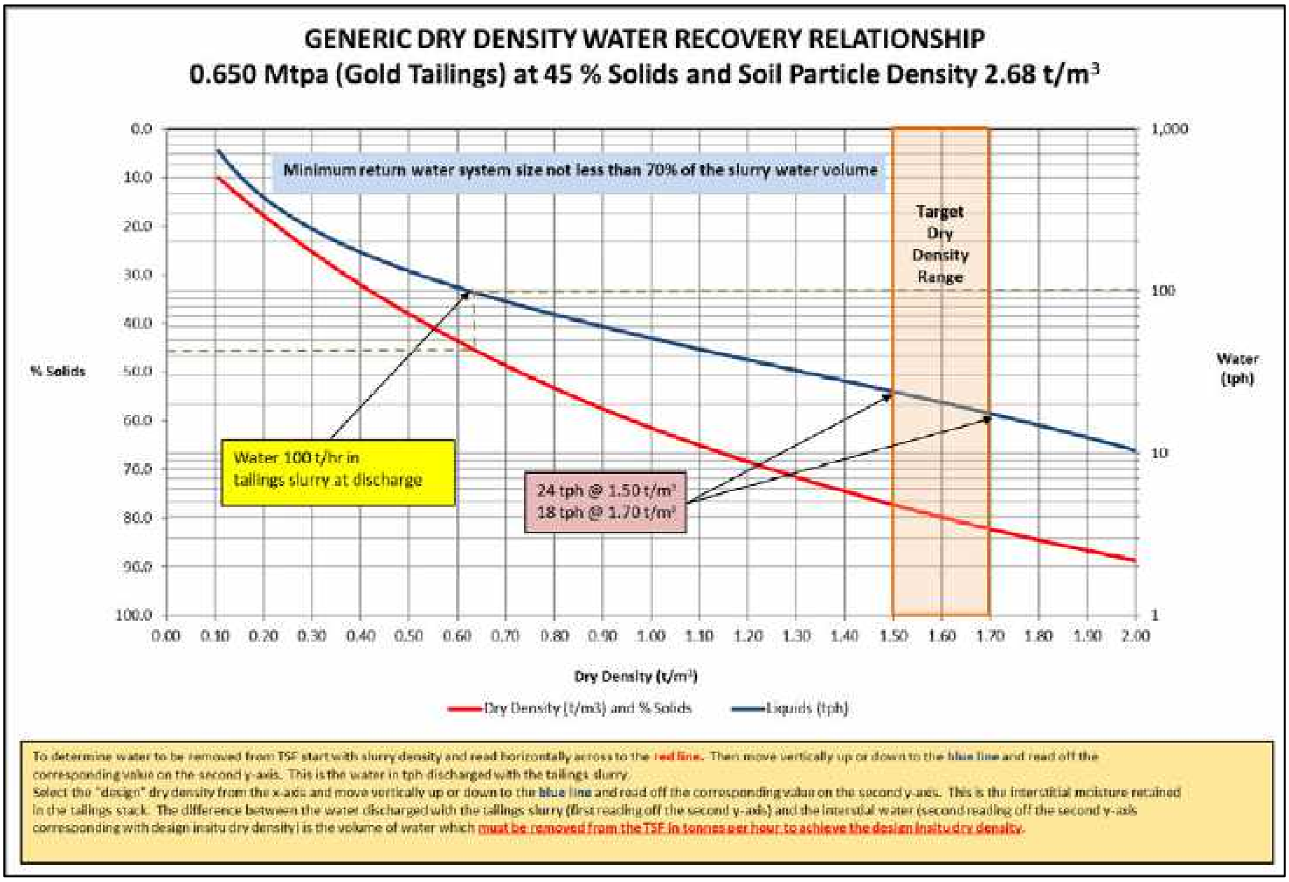

Figure 2.4 - Generic Moisture Density Curve

The tailings properties adopted for the design, based on the testwork executed, are detailed as follows:

• Average slurry density ex-plant	45% solids
• Final tailings density (average)	1.50 t/m^3 (average in-situ dry density)
• Hydraulic Conductivity (estimated)	10^{-9} to 10^{-10} m/s

Interpretation of the laboratory oedometer consolidation test results in Table 4.3 of the Geotechnical Assessment, Appendix 2 of this document, indicates that the achievable tailings dry density at full saturated self-weight consolidation can range from 1.36 to 1.73 t/m^3 at depth, averaging 1.65 t/m^3 for a total deposited tailings depth in excess of 15 m, refer Figure 4.5 in Appendix 2. This figure illustrates the interpreted dry density trend versus tailings depth. Furthermore, the oedometer test result also indicates that with the tailings deposited at an annual rate of rise (RoR) of no greater than 2 m/year, they will fully-consolidate under their own self-weight, just as fast as they are being deposited into TSF3. These results are reasonable, given the settling characteristics of the tailings. As the tailings settle and consolidate, additional water, when available, should be removed. The decant water removal system (pumps and pipes) from the operating TSFs must have a capacity of not less than 70% of the slurry water volume. That is, 70% of the water pumped out with the slurry must be returned to the process plant.

1.11.2 Geochemical Characteristics

Geochemical characterisation of the tailings was completed as part of previous studies and the relevant documents are presented in Appendix 3. The Andy Well tailings samples were classified as Non-Acid Forming (NAF). The results from the multi-elemental analysis of both tailings samples indicate that the following elements may become enriched in Silver (Ag), Arsenic (As), Tellurium (Te) and Titanium (Ti). Silver (Ag) occurs as a native metal or an alloy and is stable in air and water. Titanium (Ti) readily reacts with oxygen to form TiO2, a stable compound. Tellurium (Te) has a strong affinity to Au and Ag and is often present as gold tellurides. Te exists in the earth's crust as a rare stable element. Arsenic (As) concentration levels are well below Health Investigation Levels (HIL) classification F – Commercial/industrial sites, and meet HIL classification A – Standard residential, although exceed Ecological Investigation Levels as published by Department of Environment and Conservation (DEC) soil contamination criteria (2010).

2 TSF DESIGN

2.1 General

The design objectives for TSF3 are:

i) Optimising water recovery from this facility for return to the plant for re-use in processing, which will assist in maximising the in-situ dry density of the deposited tailings.

ii) Optimising tailings storage capacity by maximising the deposited tailings density (i.e. undertaking cyclic tailings deposition between groups of spigots) by maximising tailings drying time.

iii) Reducing environmental impact by maximising water recovery and minimising the potential for seepage losses.

The Scope of Works, Drawings, Schedule of Materials and Earthworks Specification for the Construction of TSF3 are presented in Appendix 4. The drawings comprise the general arrangements, sections relevant to TSF3 embankments and sections and details as listed in Table 3.1.

The Operations Manual is presented in Appendix 5 and the Water Balance is presented in Appendix 6.

Table 3.1 - Drawings

Drawing Title	Drawing No.
General Arrangement Plan	200
TSF3 Stage 1 Plan	201
TSF3 Stage 2 Plan	202
Embankment Sections	203
Sections and Details Sheet 1	204
Sections and Details Sheet 2	205

2.2 Risk-Based Design Assessment

It should be noted from the outset that TSF3 is a robust structure, which is constructed by downstream construction techniques with factors of safety (FOS) well above the minimum acceptance requirements, refer to Section 4.7.6 in the Geotechnical Assessment, Appendix 2 of this document.

This assessment considered the various natural features of the site, in addition to public and mine infrastructure based on data supplied by the client and a review of publicly available, satellite imagery (Google Earth Pro):

i) The natural topography of the site downstream of TSF3 falls to the west, towards the diversion and bunding around the decline to the underground workings, which would effectively deflect any flow to the south and ultimate to the northwest across the Great Northern Highway located 600 m west of TSF3. The main process plant infrastructure and administration building (existing infrastructure) and proposed camp further to the north are all located hydraulically *'up gradient'* of decline to the underground workings so there is little likelihood that any flow from a dam break event could move in that direction.

ii) Munarra Homestead is located ~6 km south of TSF3, with homestead on higher ground (~13 m higher) so there is little likelihood that any flow from a dam break event could move in that direction.

iii) This leaves the Great Northern Highway located 600 m west of TSF3 as possibly being impacted by a dam break, assuming such an event could occur.

It should be noted that:

i) The style of construction proposed for TSF3 is downstream raising for Stage 1, which has a mass earthen embankment, with Factors of Safety (FoS) against embankment failure which meet and exceed the recommended minimum.

ii) The Stage 2 embankment is a 2.5 m upstream raise, which also has FoS which meets and exceeds the recommended minimum; refer Section 4.7.6 in the Geotechnical Assessment, Appendix 2 of this document.

iii) Embankment overtopping could occur during an extreme a storm event, if TSF3 was poorly managed during Stage 2 such that the mandatory freeboard was compromised. However, the runout distance from a dam break in this scenario is a function of the volume of water on the TSF at the time of the break and the shear strength of the tailings, which are not susceptible to liquefaction based on the recent testing. Such a scenario is unlikely to develop if the water recovery system, pumps and pipes are sized for an operating capacity of not less than 70% of the slurry water volume at the maximum static head, refer to Figure 2.2.

iv) The Rourke and Luppnow[5] analysis of past tailings storage facility (TSF) failures, indicates that the release volume varies between 9 % and 67 % of stored volume. The 67% volume scenario for TSF3 plus a PMP event, or approximately 3.0 Mm^3 represents a likely maximum release from a relatively low embankment height TSF in a semi-arid region of WA, where the water pond should not be large if the recommended minimum capacity of the water recovery system is adopted and excess water should not accumulate on TSF3. The Rourke and Luppnow Method demonstrates that in order to mitigate the consequence of a dam-break, the pond volume and its spatial extent should be minimised by the adoption of good water recovery practices as outlined in this document.

v) A sensitivity analysis was previously undertaken for this project by Coffey Mining in 2012 for their Dam Break Analysis using *'The energy-based linear method'* proposed by Seddon (2010)[6] and methodology developed by Lucia (1981)[7] to assess potential downstream impacts in the event of TSF failure. A copy of that document, which has been reviewed by Soil & Rock Engineering Pty Ltd (SRE) is included in Appendix 2. We concur with the use of the Seddon Method and Lucia Methods to estimate runout distances.

vi) We have estimated runout distances in the order of 60 m to 110 m for Stage 2 of TSF3 assuming the liquefied tailings strength, $S_{u(LIQ)}$ range between 3.5 kPa and 4.5 kPa.

Based on the above infrastructure consideration, the triggering of a dam break event in the proposed TSF3 development is anticipated to result in the following limited operational consequences:

i) Population at Risk (PAR) is likely limited to mine personnel undertaking maintenance/inspection works in or around TSF3. However, ANCOLD '*Guidelines on the Consequence Categories for Dams*'[4] defines the *"PAR includes all people who would be directly exposed to flood waters assuming they took no action to evacuate"*. It is likely that mine personnel would be aware of the risks of working around TSF3 and would be trained in the evacuation procedures. It is also likely that these same personnel would be aware of the need to remove supernatant water from TSF3 to prevent embankment failure and on the basis of the foregoing and is therefore anticipated that the PAR would be less than 1.

ii) Potentially minimal disruption to the Andy Well mining operation as tailings storage can potentially be diverted into Suzie Pit if this facility is not already full.

2.2.1 DEMIRS Hazard Rating

This TSF3 has been assigned a hazard rating of Medium, Category 1, based on classification criteria outlined in accordance with the DEMIRS Code of Practice (2013) which are presented as Table 3.2 and 3.3.

Table 3.2 – Hazard rating system applicable to TSFs in Western Australia (source DEMIRS Code of Practice 2013)

a) embankment or structural failure, and
b) controlled or uncontrolled release of tailings/water, or seepage.

Type of impact or damage	Hazard rating		
	High	Medium	Low
	Extent or severity of impact or damage		
Loss of human life or personal injury	Loss of life or injury is possible	Loss of life or injury is possible although not expected	No potential for loss of life or injury
Adverse human health due to direct physical impact or contamination of the environment (e.g. chemical or radiation denigration of water, soil, air)	Long-term human exposure is possible, and permanent or prolonged adverse health effects are expected	The potential for human exposure is limited, and temporary adverse health effects are possible	No potential for human exposure
Loss of assets due to direct physical impact or contamination of the environment (e.g. chemical or radioactive pollution of water, soil or air)	Loss of numerous livestock is possible	Loss of some livestock is possible	Limited or no potential for loss of livestock
	Permanent loss of assets (e.g. commercial, industrial, agricultural and pastoral assets, public utilities and infrastructure, mine infrastructure) is possible and no economic repairs can be made	Temporary loss of assets is possible and economic repairs can be made	Limited or no potential for destruction or loss of assets
	Loss of TSF storage capacity is possible and repair is not practicable	Loss of TSF storage capacity is possible and repair is practicable	Insignificant loss of TSF storage capacity is possible
Damage to items of environmental, heritage or historical value due to direct physical impact or contamination of the environment (e.g. chemical or radioactive pollution of water, soil or air)	Permanent or prolonged damage to the natural environment (including soil, and surface and ground water resources) is possible	Temporary damage to the natural environment is possible	Limited or no potential for damage to the natural environment
	Permanent or prolonged adverse effects on flora and fauna are possible	Temporary adverse effects on flora and fauna are possible	Limited or no potential for adverse effects on flora and fauna
	Permanent damage or loss of items of heritage or historical value is possible	Temporary damage of items of heritage or historical value is possible	Limited or no potential for damage of items of heritage or historical value

Table 3.3 - Matrix of hazard ratings and heights used to derive TSF categories in Western Australia

Maximum embankment or structure height	Hazard rating		
	High	Medium	Low
> 15 m	Category 1	Category 1	Category 1
5 - 15 m	Category 1	Category 2	Category 2
< 5 m	Category 1	Category 2	Category 3

Notes:

i) Cross-valley TSFs or those that block or significantly impede flow in natural drainage paths should be treated as Category 1 TSFs, regardless of the embankment height.

ii) In-pit TSFs are categorised assuming an embankment height of less than 5 m. In-pit TSFs extended by constructing a perimeter embankment are categorised based on the embankment height.

iii) For thickened discharge facilities and "dry" stacked tailings, the maximum stack height is used in lieu of embankment height.

iv) Integrated landforms should be classified according to the height of the retained tailings.

2.2.2 Dam Break Assessment and ANCOLD Hazard Category Assessment

A hazard category assessment has also been undertaken for the proposed TSF3 development using the criteria provided in Tables 1 and 2 of ANCOLD (2019) *Guidelines on Tailings Dams - Planning, Design, Construction, Operation and Closure* (reproduced in this report as Table 3.4 and Table 3.5 below.

Table 3.4 – ANCOLD Severity Level Impacts

Damage Type	Minor	Medium	Major	Catastrophic
Infrastructure (dam, houses, commerce, farms, community)	<$10M	$10M-$100M	$100M-$1B	>$1B
Business importance	Some restrictions	Significant impacts	Severe to crippling	Business dissolution, bankruptcy
Public health	<100 people affected	100-1000 people affected	<1000 people affected for more than one month	>10,000 people affected for over one year
Social dislocation	<100 person or <20 business months	100-1000 person months or 20-200 business months	>1000 person months or >200 business months	>10,000 person months or numerous business failures
Impact Area	<1 km2	< 5km^2	< 20km^2	> 20km^2
Impact Duration	< 1 (wet) year	< 5 years	< 20 years	> 20 years
Impact on natural environment	Damage limited to items of low conservation value (e.g., degraded or cleared land, ephemeral streams, non-endangered flora and fauna). Remediation possible.	Significant effects on rural land and local flora & fauna. Limited effects on: A. Item(s) of local & state natural heritage. B. Native flora and fauna within forestry, aquatic and conservation reserves, or recognised habitat corridors, wetlands, or fish breeding areas.	Extensive rural effects. Significant effects on river system and areas A & B. Limited effects on: C. Item(s) of National or World natural heritage. D. Native flora and fauna within national parks, recognised wilderness areas, RAMSAR wetlands and nationally protected aquatic reserves. Remediation difficult	Extensively affects areas A & B. Significantly affects areas C & D. Remediation involves significantly altered ecosystems.

Table 3.5 – ANCOLD Recommended Consequence Category

Population At Risk (PAR)	Severity of Damage or Loss			
	Minor	Medium	Major	Catastrophic
<1	Very Low	Low	Significant	High C
>1 to 10	Significant	Significant	High C	High B
>10 to 100	High C	High C	High B	High A
>100 to 1000		High B	High A	Extreme
>1000			Extreme	Extreme

This TSF3 has been assigned a hazard rating of *'Low'*, based on classification criteria outlined in accordance with the ANCOLD (2019), which are presented as Table 3.4 and 3.5.

Given the hazard ratings assigned to the TSF3, this facility must be:

i) Constructed in accordance with the intent of this Design Report, where the construction must be in Scope of Work, Drawings, and Earthworks Specification.

ii) Operated in accordance with the intent of this Design Report, where the Operations Manual for the Process Plant Management and Plant staff must execute frequent inspections (once per shift, twice daily) must be made of the spigot, tailings lines, water return lines, pumps and related facilities, the position of the pond in relation to the water recovery pump and the pit walls. The return lines should be checked regularly for quantity and quality of water return. Full engineering inspections must be executed on an annual basis.

iii) Operated to meet the design objectives of the TSF3 which are to:

   a) Maximise the in-situ dry density of the tailings, which in turn maximises the storage capacity of the tailings facility.
   b) Maximise the water return to the process plant. The water recovery system, pumps and pipes must be sized for an operating capacity of not less than 70% of the slurry water volume at the maximum static head, refer to Figure 2.2.

2.3 Storage Characteristics

The storage capacity for Stages 1 and 2 will be 6.75 Mt of tailings (4.5 Mm^3) over a 10.39-year life assuming an ore processing rate of 0.65 Mtpa, a tailings insitu dry density of 1.5 t/m^3 and a beach slope of 0.1 %.

2.4 Embankment Design

TSF3 will be a single cell, constructed by downstream raising using mine waste sourced from existing mine waste dumps. The maximum height of TSF3 will be 17.5 m after the construction of the Stage 2 embankment.

The embankment of TSF3 will be a zoned embankment comprising an upstream zone of low permeability roller-compacted tailings with a downstream zone of traffic-compacted mine waste material. The low permeability materials in the upstream zone will be sourced from the in-situ tailings in TSF 1 and TSF 2.

The embankment incorporates a cut-off trench founded on the hardpan below the surficial soils, approximately 0.5 m below ground level in order to reduce seepage losses. The embankments will be keyed into the existing TSF2 embankment.

The embankments for TSF3 have design slopes of 1(V):2(H) upstream and 1(V):3(H) downstream, with a crest width of 4 m on the upstream zone and 4 m on the downstream zone. The upstream embankment crest will have a 2% cross-fall towards the upstream side, with a 0.5 m (min height) windrow at the downstream crest, and above-ground tailings pipeline at the upstream crest. The decant causeway has design slopes of 1:1.5 (V: H) and a nominal 6 m crest width. The crest of the decant causeway will have 0.5 m minimum height windrows on both sides of the accessway. Breaks in the windrow on the low side will allow surface water to run off. There is an upstream toe drain in Stage 1 on the northern, western and southern embankment to assist with the captures and removal of any potential leachate from TSF3.

2.5 Water Recovery

Surface water will be removed from TSF3 by a pontoon-mounted decant pump located in a rock-ring-type central decant structure. The water recovered by the decant will be pumped directly to the process plant for reuse. The water recovery system, pumps and pipes must be sized for an operating capacity of not less than 70% of the slurry water volume at the maximum static head, refer to Figure 2.2.

2.6 Drainage Diversion

TSF3 is a partially side-hill paddock style of TSF. The existing drainage diversion to the east is to be modified and with a new drainage diversion (windrow) constructed adjacent to and along the eastern, southeastern and southern embankment toe of TSF3, to divert runoff away from the embankment.

2.7 Geotechnical Assessment

The geotechnical evaluation for this project comprised a site visit, executed on 8 to 10 May 2024, to visually assess the current conditions at the site proposed for TSF3. The details from the geotechnical assessment are presented in Appendix 2 of this document.

The design concept adopted for TSF3 has been formulated to meet both the general requirements of the mine and the general parameters discussed in the previous sections.

The design is based on the available reports, testing and the experience of the author who has been involved in the development, operation and annual reviews of existing similar, above-ground tailings storage facilities for various gold projects throughout Western Australia.

The key features from the geotechnical assessment of the site and the design of the downstream-raised TSF3 are:

i) The TSF is a robust design with significant structural stability.

ii) Incorporation of an upstream toe drain to mitigate potential seepage losses and enhance stability.

iii) The rock-ring filter is designed to clarify the supernatant water to enhance the potential for high water recovery and significantly limit the spatial extend of the decant pond, which should ideally not exceed a distance of 12.5 m from the outer side of the decant rock ring. This means the total radius of the decant pond is limited to approximately 40 m from the centre of the decant rock ring.

2.8 Operational Considerations

The following environmental considerations have been incorporated into the tailings storage design.

Tailings in the form of slurry will be discharged sub-aerially from multipoint spigotting from the western end of TSF3. Other similar single-point discharge pipes will need to be deployed from the northern and southern sides to force the supernatant water to pond around the rock filter decant which will contain a pontoon-mounted pump. As the level of tailings rises, the spigotting will extend around the entire perimeter of the facility.

Keeping the supernatant pond (surface water) to a small size will have the effect of reducing seepage and evaporation from the surface of the pond and hence will assist in optimising the water recovery and tailings density.

Towards the end of the life of TSF3, an adequate freeboard of 0.7 m (minimum) must be maintained. This includes the 0.2 m to store the design storm event of a 1% annual exceedance probability (AEP), 72-hour storm event, plus 0.2 m, during the operation of the facility. Operational freeboard for tailings deposition is 0.3 m (minimum). Total freeboard is 0.7 m.

Pipelines to and from the pits will have bunding to prevent spillage of tailings or return water into the surrounding area in the event of pipeline failure.

Monitoring/recovery bores will need to be constructed along strike in the known faults/shear zones. Water recovered will be pumped to the process plant. Water samples will be taken every three (3) months from monitoring bores adjacent to the pit, to check water quality, with water levels in the monitoring bores being read on a monthly basis.

On decommissioning, the tailings will consolidate to an increasingly stable mass. Settlement of the upper surface will occur as the tailings consolidate. The consolidation process will be relatively quick, taking place over a short period as details in Section 2.5.1. Consequently, as the supernatant pond develops and is removed, routine cyclic topping-up of TSF3 with tailings can be executed. Section 3.12 details the expected consolidation of the tailings.

Section 5 contains details of the proposed rehabilitation and closure plans and tailings deposition must be cognisant of the closure requirements as deposition is executed towards the end of the life of TSF3.

Based on the details presented in the report located in Appendix 4 of this document, together with the supporting documents and considering the past performance of the majority of in-pit TSFs, together with the relatively short life of the TSF3, the existing and future pit walls are likely to be stable during the operation of the TSF, provided that the:

i) Design concept presented in this document, which provides the details for the TSF Design, is fully understood.

ii) Construction work for pipeline corridors, bunding etc., is executed in accordance with the intent of the design.

iii) Management of tailings deposition and water recovery is in accordance with the intent of the design as presented in Section 4.1 of this document and the Operations Manual, presented in Appendix 5.

From a review of the test results above and the performance of similar in-pit storage facilities where oxide ore is discharged, final in-situ dry densities in the order of 1.50 t/m^3 could be reasonably achieved where consolidation of tailings and water recovery is maximised. It is recommended that the water recovery system (pumps and pipes) be sized for an operating capacity of not less than 70% of the slurry water volume at the maximum static head, refer to Figure 2.2.

Upstream erosion protection measures have been incorporated into the design and care will have to be taken during tailings deposition to ensure that the spigotting does not erode the embankments and water recovery will have to be efficient to avoid creation of large ponds and long-term ponding of supernatant water over a large area of the tailings surface.

The geotechnical assessment of the TSF3 indicates the storage can be operated safely, provided the details in the OM are followed. Given the past performance of the majority of TSFs and relatively short life of the TSF3, it is unlikely that any minor slumping of the materials from the internal embankments would affect the operation of the decant system.

A major deep-seated wall failure of the perimeter embankments of TSF3 is not anticipated, given the presence of the *'hardpan'* close to the natural ground surface.

2.9 Water Balance

A preliminary water balance analysis was prepared using an excel spreadsheet, which uses the inflows and outflows from the TSF and estimates the balance after water return has been optimised. Water shortfall or water in excess of requirements is indicated on a monthly and annual basis. This water balance is presented in Appendix 6.

Water inflows to the TSFs consist of rainfall (incident-rainfall on the impoundment area only as the perimeter bunds exclude external runoff) and slurry water from the plant. Water outflows consist of evaporation from the supernatant pond and running beaches, evapo-transpiration from drying beaches, seepage, retention of water within tailings and water returned to the plant.

The following information was used for the water balance:

i) Average monthly rainfall figures for Meekatharra (recording period: 1944 to 2023), annual average 232 mmpa.
ii) Average annual evaporation is estimated at approximately 3504 mm/year.

The following assumptions were made for the water balance:

i) Operational hours 7,900 pa.
ii) Runoff co-efficient of 1.0 from the surface of the tailings.
iii) In-situ dry density of tailings 1.50 t/m^3 and the tailings stack is assumed to be saturated.
iv) Maximum decant pond area is assumed to be 2,000 m^2, pond radius maximum 12.5 m outside the 25 m diameter rock ring filter.
v) Wet beach areas are assumed to be 20,200 m^2, 4 opened spigots at 25 m spacing with wet beach area 200 m^2.
vi) Seepage is assumed to be 1.0 x 10^{-9} m/sec/m^2.

Water recovery was set at approximately 70% (approximate 62.18 tph) based on the performance of other similar TSFs for gold projects, which have operated in Western Australia.

Using the assumptions above, together with average rainfall and evaporation, the preliminary water balance results for this TSF3 indicate a slight surplus, averaging around 1/m^3/annum. Water recovery **must** be maintained at not less than 70% of the inflow slurry water volume to avoid the build-up of excess water on the TSF which would otherwise consume tailings solids storage capacity, significantly reducing the storage life of the facility. If the density of the deposited tailings increases additional water must be recovered.

It is recommended that the water recovery system (decant pumps and piping) has a minimum capacity of not less than 70% of the inflow slurry water volume for the project to ensure adequate water removal, particularly during high rainfall periods.

2.10 Erosion Control

The risk of erosion of the embankments from external sources is negligible, given that TSF3 is inside the existing diversion bund.

Erosion of internal embankments during spigotting operations is possible, however the correct deployment of spigots, conductor pipes and erosion protection beneath the spigots, combined with regular inspections during operation, should minimise the risk of erosion during tailings discharge.

2.11 Freeboard

The facilities must have an adequate freeboard of 0.7 m (minimum) at all times. The total freeboard of 0.7 m comprises the following components:

i) 0.182 m to store the design storm event of a 1% annual exceedance probability (AEP), 72-hour storm event, plus 0.2 m, during the operation of the facility.
ii) Operational freeboard for tailings deposition is 0.3 m (minimum).

2.12 Tailings Consolidation

Interpretation of the tailings consolidation behaviour utilising oedometer consolidation test results in Appendix 2, Table 4.3, is conservatively based on classical Terzaghi's one-dimensional consolidation theory, which indicates that tailings deposited at an annual rate of rise (RoR) not higher than 2 m/year anticipated to fully-consolidate under their own self-weight just as fast as they are being deposited into TSF3.

Considering the proposed TSF3 lifespan is approximately 9 years for an embankment height of between 15 and 16 m, full consolidation of the deposited tailings under its own saturated self-weight is anticipated to be achievable at the same time/before TSF3 lifespan is reached. As such, the contribution of tailings surface settlement response due to saturated self-weight consolidation can be disregarded for rehabilitation and closure design.

At closure, impounded TSF3 tailings are anticipated to gradually desaturate (due to supernatant recovery, evaporation, and/or seepage through underdrain) and will result in gradual increase in effective self-weight overburden pressure within the in-situ tailings mass over time. The gradual increase in effective self-weight overburden pressure of the in-situ tailings mass is anticipated to also result in on-going primary self-weight consolidation of in-situ tailings, corresponding to tailings surface settlement over time.

Estimation of the total capping surface settlement at complete tailings desaturation has been undertaken, based on conventional one-dimensional consolidation theory, in conjunction with the measured tailings void ratio – effective vertical stress (e – σv') response estimated from the laboratory oedometer consolidation test results as per Table 4.3 (Appendix 2), which is described by the following statistical trendline power function (where σv' is in kPa):

$$e = A(\sigma_v^{'})^B$$

Using the above equation in conjunction with laboratory oedometer consolidation test results in Table 4.3, with A = 1.17 and B = -0.1 the tailings surface settlement is estimated to be up to 500 mm upon complete desaturation of the entire impounded TSF3 tailings with a total deposited height of between 15 m and 16 m. The actual settlement being a function of the timing and volume of tailings placed, and water removal during operation and post operation prior to closure. The underdrainage can reasonably be expected to continue operation, for possibly several months after tailings deposition has ceased.

If a mine waste cover with vegetation is selected, the area will be monitored to ensure vegetation is establishing and the site is tracking towards closure. At closure, the objective is to provide a safe stable non-polluting structure, which, with the passage of time, would blend in with the surrounding topography.

In the unlikely event that the tailings surface is not able to support the placement mine waste cover, temporary bunding may need to be constructed and maintained to limit vehicular access to the surface of TSF3.

2.13 Construction Details

The construction work comprises earthworks for the perimeter embankments and decant and placement of the tailings and water recovery pipes from the existing bunding, as required, to TSF3 along existing access roads.

A Scope of Works, the Drawings, Schedule of Materials and Earthworks Specification, which includes the earthworks testing requirements for the embankment construction activities, is presented in Appendix 4.

3 OPERATIONAL REQUIREMENTS

3.1 Management of Tailings Deposition and Water Recovery

An OM for Plant Management has been prepared and is presented in Appendix 5 of this document.

A separate OM for Plant Staff, who are responsible for the day-to-day operation of the TSF3 has been prepared and the document provides a description of the operating procedures for TSF3 to achieve the design objectives.

This section provides a summary of the operating methodology of the tailings storage. For full details of the operation of the TSF, the reader is referred to the OM in Appendix 5 of this document.

To optimise tailings storage capacity and reduce the risks associated with embankment stability and seepage, tailings will be deposited from the embankment and along the perimeter of the storage as depicted in the drawings. Tailings deposition and beaching will be controlled, such that the supernatant solution is ponding around the decant pump. Tailings will be deposited such that the insitu densities within the stored tailings and the solution return for reuse in the process plant, is maximised.

The following considerations have been incorporated into the design of the TSF3:

i) The tailings discharge into the TSF3 will be from a multiple spigots starting on the western side such that the supernatant pond is maintained near the decant with the water recovery pump. The discharge points will be moved from the western side around to southern and northern sides as the level of tailings rises. The formation of the tailings beach against the pit wall will minimise the potential for seepage.

iv) Supernatant water will be recovered by a pontoon-mounted decant pump in the rock filter.

v) Keeping the supernatant pond (surface water) to a small size will have the effect of reducing seepage and evaporation from the surface of the pond and hence will assist in optimising the water recovery and tailings density.

Depending on the decommissioning plan adopted for the storage, it may be necessary to alter the deposition philosophy near the end of the mine life. Appropriate procedures shall be developed if changes to deposition or freeboard criteria are required. If necessary, appropriate government authorities shall be advised of any changes, especially to freeboard criteria.

Towards the end of the life of the pit, the facility should have an adequate freeboard of 0.7 m (minimum) available which includes approximately 0.182 m to store the design storm event of a 1% annual exceedance probability (AEP), 72-hour storm event, plus 0.2 m, during the operation of the facility. Operational freeboard for tailings deposition is 0.3 m (minimum). Total freeboard is say, 0.7 m.

Frequent inspections (once per shift, twice daily) should be made of the spigot, tailings lines, water return lines, pumps and related facilities, the position of the pond in relation to the water-recovery pump and the containment embankments. The return lines should be checked regularly for quantity and quality of water return. Only by regular inspection and appropriate remedial action, can the performance of the water return system be optimised and additional operational problems avoided. Monthly inspections by the Process Plant Manager must be undertaken.

Monitoring bores adjacent to the pits will be utilised as monitoring/recovery bores. Water samples will be taken every three (3) months from the monitoring bores to check water quality, with water levels in the monitoring bores being read on a monthly basis.

Operation, safety and environmental aspects should be periodically reviewed during an inspection by a suitably experienced and qualified engineer. This inspection should be done at least annually.

3.2 Storm Events

The TSF3 can accommodate storm events based on the IFD obtained from the BOM, which indicates the 1% AEP 72-hour storm is approximately 182 mm. Assuming the TSF is to be operated such that the supernatant pond is maintained away from the perimeter containment at the lowest pit rim, then the minimum freeboard requirements comprise the total of the following:

i) Operational Freeboard (lowest embankment crest RL to the tailings beach) 300 mm.
ii) Beach Freeboard (tailings beach to the supernatant pond after the 1% AEP 72-hour storm) 200 mm.
iii) The 1 in 100 AEP 72-hour storm 182 mm on top of the normal operating supernatant pond.

The total minimum freeboard, on top of the normal operating supernatant pond is therefore 682 mm, say 0.7 m.

The supernatant pond level within the TSF should be as low as practicable to ensure volume is available within the TSF storage to accommodate storm events without breaching or otherwise impacting on the minimum freeboard requirements.

3.3 Seepage Management

In the unlikely event of significant rises in ground water levels which might potentially impact on vegetation, the monitoring bores would be fitted with solar pumps to maintain water levels at least 6 m below ground level, which is typically well below the plant root zone.

3.4 Erosion Control

The risk of erosion of embankments, from external sources, is negligible, given that TSF3 is located within the diversion.

3.5 Performance Monitoring and Instrumentation

For this project, monitoring/recovery bores are to be located within the potential flow paths which are controlled structurally and lithologically by fractured rock. The locations of the monitoring bores will be checked prior to installation by the project hydrogeologist. These monitoring bores would be utilised as recovery bores, if required.

The standing water levels in the bores will be monitored on a monthly basis. Water samples will be taken every three (3) months from the monitoring bores located around the facilities to check water quality.

4 CLOSURE CONSIDERATIONS

4.1 Overview

Once the tailings surface in the TSF3 has reached the maximum design tailings level, the facility will be rehabilitated according to the details presented in the following Sections. 5.2 and 5.3.

As previously indicated, the tailings consolidation process will be relatively quick taking place over a short period. Consequently, as the supernatant pond develops and is removed, periodic opportunistic topping up of the TSF3 with tailings can be executed with the freeboard requirements being observed at all times.

4.2 Decommissioning

At the completion of tailings deposition, including the topping-out process, the tailings lines will be flushed and removed. The decant water-recovery pump and the water-return lines will also be removed.

Interpretation of the laboratory oedometer consolidation test results in Appendix 2, Table 4.3 indicates the achievable tailings dry density at fully saturated self-weight consolidation can range from 1.36 to 1.73 t/m^3 at depth, average 1.65 t/m^3 for a total deposited tailings depth in excess of 15 m. Furthermore, this oedometer test result also indicates that tailings deposited into TSF3 at an annual rate of rise (RoR) not faster than 2 m/year are anticipated to fully consolidate under their own self-weight just as fast as they are being deposited into TSF3. In other words, no post-closure settlement is anticipated.

4.3 Rehabilitation

Environmental management and rehabilitation plans to be implemented at the completion of filling include:

i) Monitoring of the level of the tailings surface following the completion of the last tailings deposition cycle.

ii) Monitoring the formation of the crust following the completion of the last tailings cycle, prior to the deposition of new tailings as part of the 'topping-up' process. This monitoring may comprise moisture and density monitoring as well as shear-strength testing, as appropriate.

iii) The top surface of the storage may be capped with a layer of mine waste (0.3 m nominal thickness) in order to minimise the ingress of rainfall into the tailings, dust generation from the dried tailings surface and provide support for topsoil/growth medium for revegetation of the top surface.

iv) Approximately 10-20 cm topsoil cover will be applied, dependant on availability.

v) The area will be ripped along the contour and seeded with native salt-tolerant species.

The source of the capping materials will comprise either mine waste from the dumps or the batters of the pit above the tailings surface which will be 'caved'. The volume of materials available from the nearby waste dump is significantly greater than the volume of materials required for capping.

Rehabilitation will likely be undertaken in stages as the tailings consolidate. Cover construction can be commenced once the tailings surface has sufficiently consolidated to permit access to earthmoving equipment. Rehabilitation/decommissioning (closure) plans will be continually updated by MML to incorporate successful procedures identified in site-specific trials throughout the life of the project.

4.4 Performance Monitoring Against Closure Criteria

Settlement monitors will be installed and checked on an annual basis to track surface settlement against predictions.

Rehabilitated areas will be monitored to ensure vegetation is establishing and the area is tracking towards closure.

5 IMPORTANT INFORMATION ABOUT YOUR REPORT

The reader's attention is drawn to the following important information about this report. The design of the TSF3 is based on the following:

i) Data provided by the client.
ii) The results of the tailings testwork and geotechnical testwork on samples of the materials proposed for the containment embankment construction works.
iii) The expectation that the design, implementation and operating procedures provided as part of this document will be followed.

6 REFERENCES

1. DEMIRS, formerly DMP (2015) *'Guide to the preparation of a design report for tailings storage facilities (TSFs)'*.

2. DEMIRS, formerly DMP (2013) *'Code of Practice, Tailings Storage Facilities in Western Australia'*.

3. ANCOLD (2019) *'Guidelines on Tailings Dams - Planning, Design, Construction, Operation and Closure'*.

4. ANCOLD (2012) *'Guidelines on the Consequence Categories for Dams'*.

5. Rourke, H., Luppnow, D., *'The Risks of Excess Water on Tailings Facilities and Its Application to Dam-break Studies',* in the proceedings of AusIMM, Tailings and Mine Waste Management for the 21st Century, Sydney 2015.

6. K D Sneddon (2010), *'Approaches to estimation of run-out distances for liquified tailings'*, Mine Waste 2010, Perth Australia.

7. Lucia, P. C., Duncan J. M., and Seed, H.B. *'Summary of Research on Case Histories of Flow Failures of Mine Tailings Impoundments'.*

8. Luke, G.J., Burke K.L., and O'Brien T. M., (1988) *'Evaporation Data for Western Australia, Technical Report No. 65, Second Edition'*.

Appendix 1

Certification

Tailings Storage Data Sheets and Explanatory Notes

ANDY WELL PROJECT

Tailings Storage Facility 3 Design Report

Soil & Rock Engineering Pty Ltd (SRE)

ABN 98 675 219 020

CERTIFICATION OF COMPLIANCE

For and on behalf of Soil & Rock Engineering Pty Ltd (SREPL) I, James Christopher Lane, being a duly authorised officer of the above company and a qualified engineering/environmental geologist with over 38 years relevant experience in the field of tailings management and holding professional registration through the following organisations:

- Chartered Fellow of the Geological Society London, Registration No: 14006. (1990 – 2023)
- Registered Professional Geoscientist, The Australian Institute of Geoscientists, Registration No: 10009.
- Chartered Member of the Australasian Institute of Mining and Metallurgy, Member No: 109219.
- Registered Professional Engineer Queensland Geotechnical (Mining), Registration No: 14006.

do hereby certify and confirm that the Tailings Storage Facility 3 (TSF3) located on ML 51/870, at the Meeka Metals Limited (MML) Andy Well Project (AWP) has been designed in accordance with the current edition of the Code of Practice - Tailings Storage Facilities in Western Australia, issued by the Department of Mines and Petroleum, Western Australia. The design is referenced as *'Tailings Storage Facility 3 - Design Report'* dated 20 June, 2024.

Signature of above person: [redacted]

Signature of witness: ______________________________________

Name of witness: ____

Date: 20 June, 2024

TAILINGS STORAGE DATA SHEET							
Project Operator: Meeka Metals Limited							
Project Name: Andy Well						Date: 20 June, 2024	
TSF name: TSF3				Commodity: Gold			
Name of data provider: * Chris Davidson						Phone:* +61 401535652	
TSF centre co-ordinates (MGA50)				668200 m E,		7097760 m N	
Lease numbers: M51/870							
TSF data							
TSF Status: Proposed ☒ Active ☐ Disused ☐ Rehabilitated ☐							
Type of TSF:[1]			Paddock	Number of cells:[2]			1
Hazard rating:[3]			Medium	TSF category:[4]			1
Catchment area:[5]			40 ha	Nearest watercourse:			None nearby
Date deposition started (mm/yy):				Date deposition completed (mm/yy):			NA
Tailings discharge method:[6]			mulit-point spigots	Water recovery method:[7]			Floating pump
Bottom of facility sealed or lined?			No	Type of seal or liner:[8]			N/A
Depth to original groundwater level:			27 m	Original groundwater TDS:			<1,000 mg/L
Current groundwater depth			27 m	Original groundwater pH:			7.8
Ore process:[9]			CIL/CIP	Material storage rate:[10]			0.65×10^6 tpa
Impoundment volume (present):			0×10^6 m^3	Expected maximum:			4.5×10^6 m^3
Mass of solids stored (present):			0 Mt	Expected maximum:			6.75 Mt
Above ground facilities							
Foundation soils:			colluvium over hardpan	Foundation rocks:			hardpan over saprolite
Starter bund construction materials:[11]				Wall lifting by:[12] Downstream Stages 1, 2, 3, 4 (15 m), Upstream lift Stage 5 (2.5 m).			
Wall construction by: mechanically ☐ hydraulically ☐				Wall lifting material:[13]			
Present maximum wall height agl:[14]			N/A	Expected maximum:			17.5 (Stage 5)
Crest length (present):			N/A	Expected maximum:			2,435 m
Impoundment area (present):			N/A	Expected maximum:			35.8 ha
Below ground (in-pit) facilities							
Initial pit depth (maximum):			0 m	Area of pit base:			ha
Thickness of tailings (present):			(estimated) 0 m	Expected maximum:			m
Current surface area of tailings:			0 ha	Final surface area of tailings:			ha
Properties of tailings and return water							
TDS:	<1,000 mg/L	pH:	7.8	Solids content:	45 %	Deposited density:	1.50 t/m^3
Potentially hazardous substances:[15]			None	WAD CN:	N/A mg/L	Total CN:	N/A mg/L
				Any other NPI listed substances in the TSF?[16]			N

* **Not to be recorded in the database; for 1, 2, 3 etc See Explanatory Notes.**

EXPLANATORY NOTES FOR COMPLETING TAILINGS STORAGE DATA SHEET

The following notes are provided to assist the proponent to complete the tailings storage data sheet.

1. Paddock (ring-dyke), cross-valley, side-hill, in-pit, depression, waste fill etc.
2. Number of cells operated using the same decant arrangement.
3. See Table 1 in the Guidelines.
4. See Figure 1 in the Guidelines
5. Internal for paddock (ring-dyke) type, internal plus external catchment for other facilities.
6. End of pipe (fixed), end of pipe (movable), single spigot, multi-spigots, cyclone, CTD (Central Thickened Discharge) etc.
7. Gravity feed decant, pumped decant, floating pump etc.
8. Clay, synthetic etc.
9. See list below for ore process method.
10. Tonnes of solids per year
11. Record only the main material(s) used for construction eg: clay, sand, silt, gravel, laterite, fresh rock, weathered rock, tailings, clayey sand, clayey gravel, sandy clay, silty clay, gravelly clay, etc or any combination of these materials.
12. Wall lifting method during the reporting period, if raised.
13. If the wall has been raised during the reporting period, the wall lifting material used. Is it tailings or any other (or combination of) material(s) listed under item 11 above.
14. Maximum wall height above the ground level (not AHD or RL).
15. Arsenic, Asbestos, Caustic soda, Copper sulphide, Cyanide, Iron sulphide, Lead, Mercury, Nickel sulphide, Sulphuric acid, Xanthates etc.
16. NPI – National Pollution Inventory. Contact Dept of Environmental Protection for information on NPI listed substances.

ORE PROCESS METHODS

The ore process methods may be recorded as follows:

Atmospheric Acid Leaching	Atmospheric Alkali Leaching
Bayer process	Becher process
BIOX CIL/CIP	
Crushing and screening	Flotation
Gravity separation	Heap Leaching
Magnetic separation	Ore sorters
Pressure Acid leaching	Pressure Alkali leaching
Pyromets	SX/EW (Solvent Extraction/Electro Wining)
Vat leaching	Washing and screening

Appendix 2

Geotechnical Assessment and Coffey 2012 Dam Break Assessment

ANDY WELL PROJECT

Tailings Storage Facility 3 Design Report

Soil & Rock Engineering Pty Ltd (SRE)

ABN 98 675 219 020

ANDY WELL PROJECT

Tailings Storage Facility 3

Geotechnical Assessment Report

Ref: **Geotechnical Assessment TSF3 Rev 1**

Date: **19 June, 2024**

Prepared by: **SRE P/L**
PO BOX 777
COWARAMUP WA 6284

Prepared for: **Meeka Metals Limited**
Level 2, 46 Ventnor Street
WEST PERTH WA 6005

Soil & Rock Engineering Pty Ltd (SRE)

Disclaimer

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Document Control

Date	Revision	Purpose	Authors
20/05/2024	A	Internal Review	[redacted]
11/06/2024	B	Issued for Client Review	
14/06/2024	0	Issued for Use	
19/06/2024	1	Issued for Use	

Abbreviations and Terminology

The following abbreviations have been used in this document.

AEP	Annual Exceedance Probability
AL	Atterberg Limit (test)
ANCOLD	Australian National Committee on Large Dams
BOM	Bureau of Meteorology
CUTX	Consolidated Undrained Triaxial compression shear test
DEMIRS	Department of Energy, Mines, Industry, Regulation and Safety (from 1 July 2017), previously referred to as Department of Mines and Petroleum (DMP)
DEMIRSWA	Department of Energy, Mines, Industry, Regulation and Safety Western Australia, previously referred to as DMPWA
DWER	Department of Water and Environmental Regulation (from 1 July 2017), previously referred to as Department of Environment Regulation (DoER)
DST	Drained Settling Test
ECN	Emerson Class Number
FoS	Factor of Safety
GSI	Geotechnical Site Investigation
ha	hectare
H:V	Horizontal : Vertical
IPTSF	In-Pit Tailings Storage Facility
IPTSFs	In-Pit Tailings Storage Facilities
LoM	Life of Mine
m/a	metres per annum
MMDD	Maximum Modified Dry Density
mmpa	millimetres per annum
MB	Monitoring Bore
m^3/d	cubic metres per day
Mm^3	Million cubic metres
MML	Meeka Metals Limited
Mt	Million tonnes
Mt/a	Million tonnes per annum
Mtpa	Million tonnes per annum
ML	Mine Lease
oh/a	operating hours per annum, assumed as 8,000
OM	Operations Manual(s)
OMC	Optimum Moisture Content
pa	per annum
PSD	Particle Size Distribution
P_{80}	80% passing, and refers to a particular particle size as stated, i.e., a P_{80} of 75 microns means 80% of the total weight of materials is finer than 75 microns
RL	Reduced Level relative to a fixe datum
SMDD	Standard Maximum Dry Density
SPD	Soil Particle Density
SPTSF	Suzie Pit Tailings Storage Facility
tpa	tonnes per annum
tpd	tonnes per day

tph	tonnes per hour
t/m^3	tonnes per cubic metre
TDS	total dissolved solids
UST	Undrained Settling Test

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1 INTRODUCTION

This report presents the results of the geotechnical assessment undertaken of the proposed Tailings Storage Facility 3 (TSF3) at the Andy Well Project, approximately 45 km north of Meekatharra, in the Murchison Region of Western Australia.

The mine commenced operation on 27 November 2013 and was placed on care and maintenance in September 2017 due to the low gold price. The mine is proposing to restart in Q3 of 2024 with no modifications to the existing process plant. Initial tailings deposition from the re-start will be into the Suzie Pit Tailings Storage Facility (SPTSF), whilst the new paddock-style of TSF, TSF3, is developed to the south of the existing TSF2. Figure 1.1 shows the Andy Well Project and Figure 1.2 shows the TSF3 Location.

Figure 1.1 – Andy Well Project (source Google Earth)

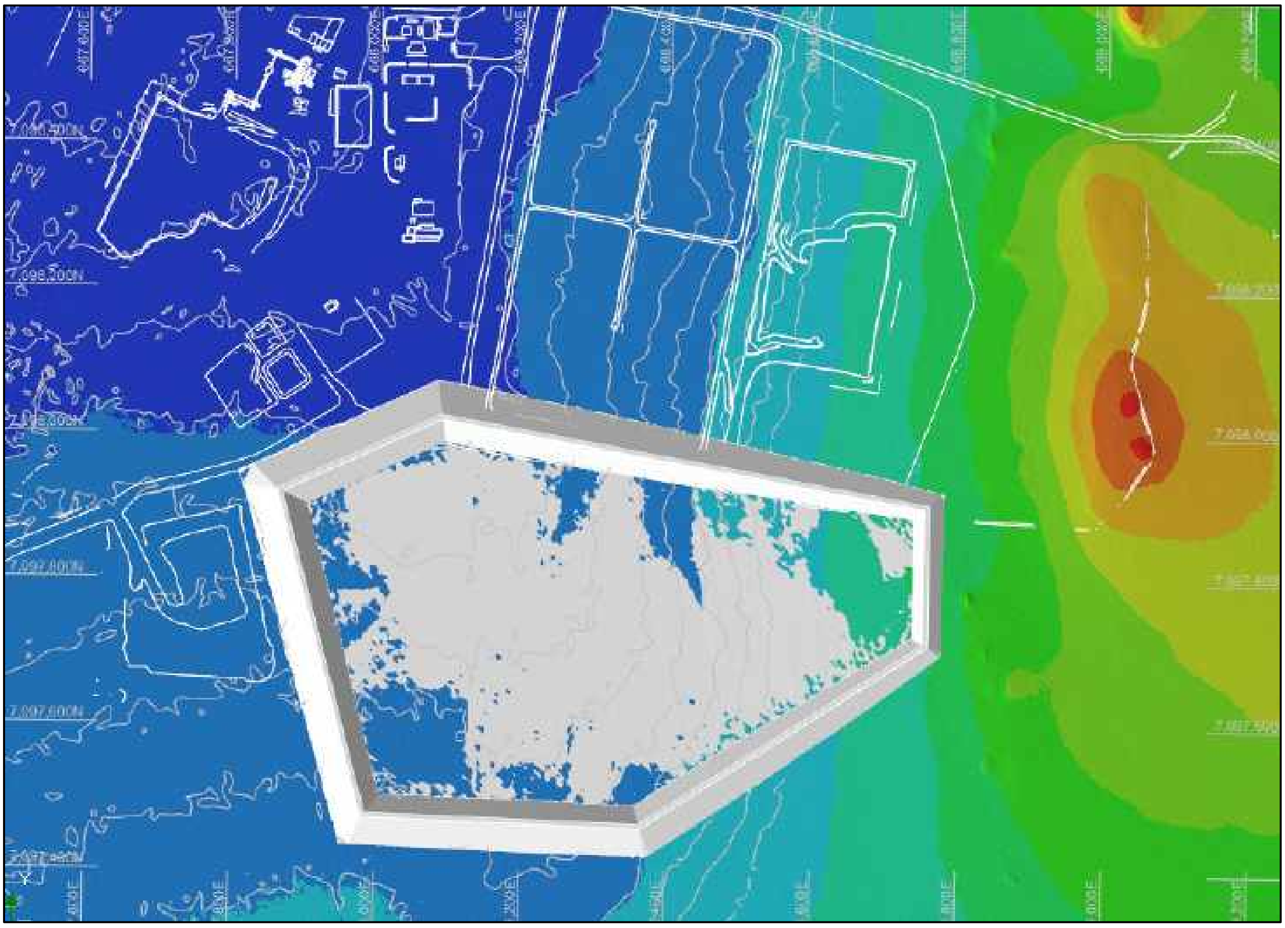

Figure 1.2 – Proposed location of TSF3

2 BACKGROUND INFORMATION

The use of the SPTSF for tailings storage, as detailed in a separate report, will utilise an abandoned pit for tailings storage whilst the new southern paddock-style of TSF, TSF3, is constructed.

A pipeline corridor from the process plant to the existing surface TSFs already exists and an extension of the existing pipeline corridor will be established along existing tracks to the SPTSF. No major clearing is required, although some minor clearing of degraded land may be required where the tailings pipeline deviates from any existing track alignment. The land around the site is degraded as a result of previous pastoral and mining activities.

A geotechnical site investigation (GSI) was carried out between 8 and 10 May 2024 and photographs taken at the time of this GSI are presented in Appendix A of this document. Tailings testing carried out in 2012 and 2024 to assess the geotechnical properties of the tailings proposed to be produced and the implications for the construction and operation of the TSFs. The results of the tailings testing are presented in Appendix B and Appendix C, respectively of this document.

A discussion of various aspects of TSF3 is presented in Section 4.5 of this document and the following sections of the Design Report (DR):

i) DR - Section 2.5.1 presents a summary of the mineralogy of the tailings.

ii) DR – Section 2.5.2 presents the geotechnical characteristics of the tailings.

A hydrogeological assessment was executed prior to the previous mining operation. Monitoring/recovery bores are to be located by the project hydrogeologist within the potential flow paths which are controlled structurally and lithologically by fractured rock with a northeast/southwest trend.

3 SCOPE OF GEOTECHNICAL ASSESSMENT

The scope of the geotechnical work comprised the following:

i) Review of available historical geotechnical data.

ii) Visual assessment of the southern wall of TSF2 which will partially form the northern wall of TSF3.

iii) Execution of geotechnical site investigations which included field assessment of the mine waste materials proposed to form the downstream section of the containment embankments of TSF3.

iv) Laboratory testing of tailings which will form the upstream zone of the containment embankments of TSF3.

v) Assessment of the implications for the construction and management TSF3.

4 GEOTECHNICAL ASSESSMENT OF TSF3

4.1 Site Geology

The regional geology of the area takes in the northern margin of the Yilgarn Craton. The Yilgarn Craton is composed of Archaean rocks, predominantly granitoids, which are crossed by north-northwest-trending belts of greenstone. Archaean and the overlaying Proterozoic strata of the Yilgarn Craton have been extensively oxidised to depths of up to 120 m, possibly since the pre-Cretaceous, during the formation of the Western Australian Plateau. The Yilgarn Craton comprises elongate, NNW-SSE-striking belts of sedimentary and volcanic rock (i.e., greenstone) that are enclosed by large areas of granite and granitic gneiss. These rocks formed principally between c. 3.05 and 2.62 Ga, with a minor older component (> 3.7 Ga). The Yilgarn is divided into four broad tectonic units: the Narryer Terrane, Youanmi Terrane, South West Terrane and Eastern Goldfields Superterrane.

Superficial cover includes degraded laterite profiles and ferruginised rubble and colluvium over areas of subdued relief. Watercourses are related to northwesterly-flowing tributaries to the Yalgar drainage system.

4.2 Sub-soil stratigraphy

Foundation soils (encountered at the time of the 2024 SRE GSI fieldwork described in Section 4.5.4) within the proposed TSF3 development footprint, can generally be characterised as a surficial soil cover (thickness varying between 0.1 m and 1.2 m, averaging 0.5 m) overlying the Wiluna (i.e. Red Brown) Hardpan.

The soil cover is composed of a mixture of loose to medium-dense sandy SILT, clayey SAND, sandy CLAY, silty GRAVEL material, where the coarse-grained gravel component is fine to medium grained and fine-grained silt clay and components are of low to nil plasticity, as per classification in general accordance with AS1726:2017.

The underlying Wiluna Hardpan is composed of FERRICRETE and CALCRETE material as per AS1726:2017, however, quartz induration has also been observed in some of the testpits.

It should also be noted that topsoil and exposed rubbish (including putrescible landfill) was identified during the GSI and noted to be present in the northern half of the proposed TSF3 footprint, as per satellite imagery illustration in Figure 4.3 and photographs in Appendix A, Figure A.15 and Figure A.16.

4.3 Hydrological Condition

The proposed TSF3 is located on relatively flat ground which slopes up to the east within Mining Tenements ML51/870. The southern embankment of the proposed TSF3 will divert runoff from the east into the natural drainage systems to the southwest.

4.4 Hydrogeological Condition

The Suzie Pit sits in what is known as the Upper Transition Zone Aquifer, which extends from the base of saprolite to around 35 to 40 m below ground (445 to 440 mAHD) in a highly weathered and fractured zone. This zone is also highly oxidised with abundant iron staining on fracture surfaces. At the time of the site visit, the water table in the Suzie Pit was approximately 27 m below ground level.

4.5 Groundwater Condition

The client, Meeka Metals Limited (MML) has provided the 2023 Annual Environmental Report dated 31st March 2024, prepared for DWER with respect to Andy Well Mining Centre's (Andy Well) Licence L8698/2012/01. This document contained discussions on observation of groundwater monitoring bores surrounding the existing TSF. The information in this document indicates that the existing monitoring bores have been consistently dry over several years of monitoring and the indicated depth to natural groundwater table is 25 m.

Documents provided by MML which contained relevant (GSI) data are summarised below, in Sections 4.5.1 to 4.5.3 where a brief description of the data contained within each document is provided. All GSI fieldwork and bulk soil sample locations from the historical investigations as described in Sections 4.5.1 to 4.5.3 are illustrated in *'plan view'* on the satellite imagery refer to Figure 4.1, with the following symbol colour coding: blue for Coffey Mining (2012); green for Coffey Mining (2015), and yellow for CMW Geosciences (2016).

4.5.1 Coffey Mining (2012)

Coffey Mining (2012) document titled *'Andy Well Gold Project – Tailings Storage Facility, Water Storage Facility and Settling Discharge Pond'*, dated 14th June 2012 (Coffey doc. no.: MWP00921AB-AB Design Report Rev0). Data presented within this document include fieldwork comprising the excavation of 24 testpits (utilising a 5 t Samsung SE 50-3 excavator) within the existing TSF1 and TSF2 footprint prior to its construction. 22 of 24 testpits refused on natural hardpan material at depths varying between 0.25 and 1.8 m (average 0.5 m). Bulk soil samples collected from five (5) of the testpits were sent to a geotechnical soil testing laboratory for soil particle size distribution grading and Atterberg Limits testing, with the test results and certificates provided within this document. Certificates for geotechnical and geochemical laboratory tests on tailings slurry samples were provided to Coffey Mining by the client (Doray Minerals), with geotechnical testwork involving PSD grading with hydrometer measurement, Atterberg Limits test, soil particle density measurement, air-drying test, drained and undrained settling test and modified triaxial consolidation test.

4.5.2 Coffey Mining (2015)

Coffey Mining (2015) document titled *'Settling Pond Design, Andy Well Gold Project'*, dated 17th December 2015 (Coffey doc. no.: MINEWPER00921AG-AB). Data presented within this document included results (and certificates) for laboratory geotechnical testing on bulk soil samples collected from mine waste and topsoil stockpiles surrounding the existing TSF1 and TSF2. Test results for this work include particle size distribution grading with hydrometer measurement, Atterberg Limits test, moisture content measurement, standard Proctor compaction test and falling head permeability testing.

4.5.3 CMW Geosciences (2016)

CMW Geosciences (2016) document titled *'Andy Well Gold Mine – TSF Stage 2 Upstream Raise to RL491m Design Report'*, dated 27th September 2016 (CMW doc. no.: PER2016-0691AB, Rev1). Data presented within this document comprise fieldwork consisting of a single 4 m deep hand-augured borehole within the existing TSF tailings surface, including hand shear vane, dynamic cone penetrometer and push tube sampling at four (4) other locations spread across the existing TSF tailings surface. Bulk soil samples were collected from a mine-waste stockpile located south-west of the existing TSF. The collected push tube tailings samples and mine-waste samples were sent to a geotechnical soil testing laboratory for soil particle size distribution grading with hydrometer measurement, Atterberg Limits tests, moisture content and density measurement, modified Proctor compaction tests and multi-stage consolidated undrained triaxial compression shear testing (samples reconstituted to 95% of Maximum Modified Dry Density determined from the modified Proctor compaction test results), with the test results and certificates provided within this document.

4.5.4 SRE (2024)

The GSI fieldwork was executed by SRE Principal Geotechnical Engineer Dr. David Yong between 8th and 10th May 2024, in which the following fieldwork activities, relevant to the TSFs were undertaken:

i) Visual assessment of Suzie Pit, which is proposed as an In-pit TSF and is the subject of a separate geotechnical assessment and Design Report.

ii) Visual assessment of the existing mine waste stockpiles and the existing TSFs (TSF1 and TSF2) and the proposed TSF3 footprint. Photographs taken during the assessment and are presented as Figures A.1 to A.34 and the details of the infrastructure location and corresponding photographs are summarized as in Table 4.1

Table 4.1 – Photograph Details

Infrastructure	Photographs
Mine waste stockpiles	Figures A.2 to A.6, Figures A.10 to A.11, Figures A.15 and A.16.
Existing TSFs	Figures A.8 to A.9, and Figures A.12 and Figure A.14
Proposed TSF3 footprint	Figure A.7, Figure A.17 to Figure A.28

iii) Excavation of 13 testpits within the proposed TSF3 footprint, with excavation works undertaken utilising a 17 t SDLG LG958L wheel loader with ripper attachment. All testpits were excavated and ripped until ripper refusal was encountered. The test pit details are summarised in Table 4.1 below.

iv) Collection of bulk tailings samples from the existing TSF tailings surface and delivery to a Perth-based NATA-accredited geotechnical soil testing laboratory (E-Precision) for evaluation. Two (2) samples were collected from each TSF cell (total four sample bags), with one scooped near the cell embankment and another close to the decant tower located in the middle of the cell. Sampling location details are provided in Table 4.1 below.

The 2024 GSI locations (testpits in green square symbols, tailings sampling locations in blue triangle symbols), including visual inspection tracking path (purple line) and where photographs were taken (green camera symbol), are illustrated on a plan satellite imagery as per Figure 4.2.

Figure 4.1 – Historical GSI locations

SRE

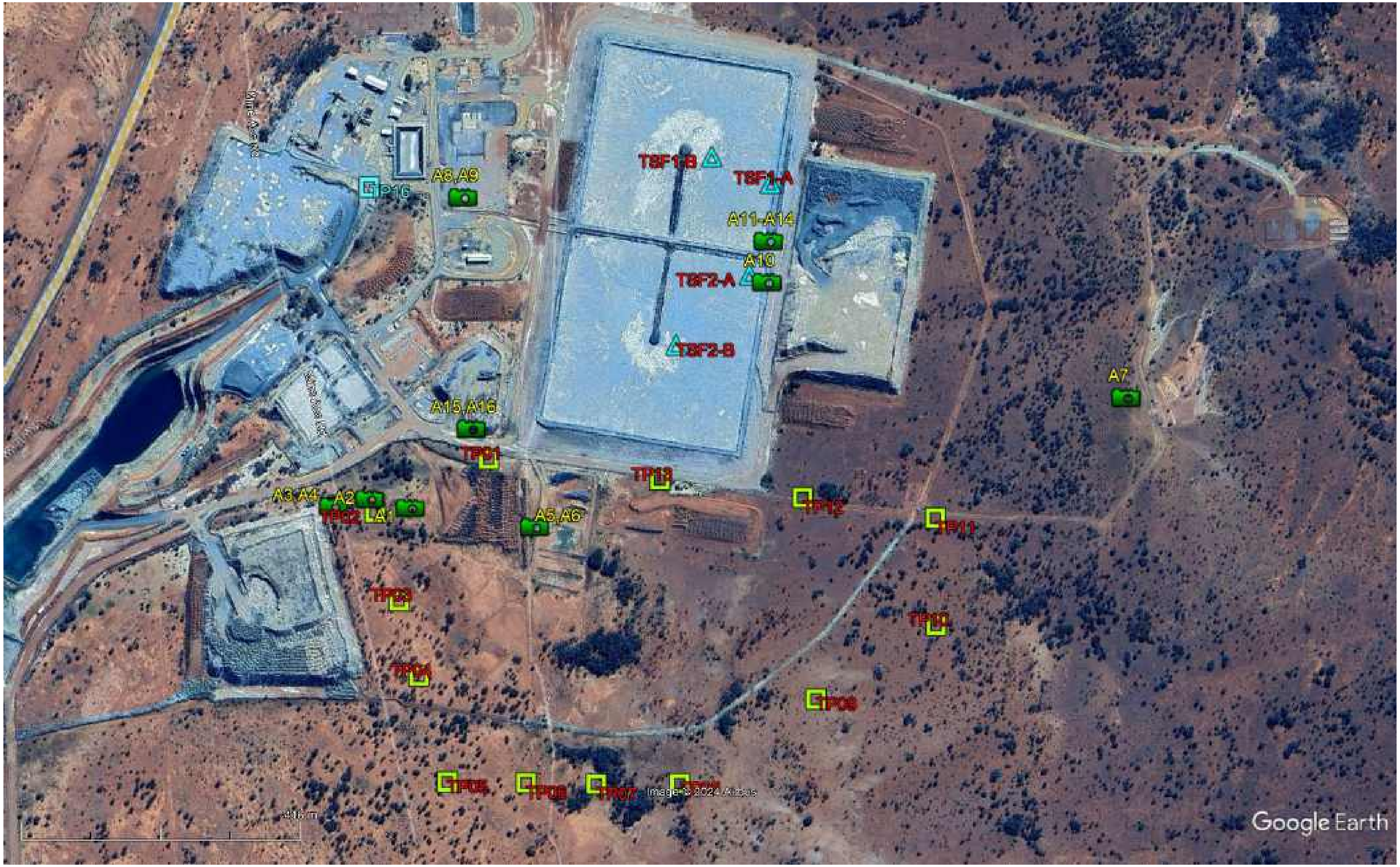

Figure 4.2 - 2024 GSI location – Proposed TSF3 location

Figure 4.3 - Presence of topsoil stockpile, exposed rubbish stockpile, and putrescible landfill area

Table 4.2 - 2024 GIS locations

SRE Testpit ID	MML Testpit ID	Northing (m)	Easting (m)	Relevant photo in Appendix A	Excavated depth to refusal (m)
TSF2-A	-	7098248	668466	Figure A.12	1.2
TSF2-B	-	7098146	668355	Figure A.12	0.5
TSF1-A	-	7098383	668499	Figure A.13	0.5
TSF1-B	-	7098424	668412	Figure A.13	0.5
TP01	TSF-TP-01	7097981	668074	-	1.2
TP02	TSF-TP-02	7097904	667904	Figure A.17	0.5
TP03	TSF-TP-04	7097773	667938	Figure A.18	0.5
TP04	TSF-TP-05	7097661	667966	Figure A.19	0.6
TP05	TSF-TP-03	7097504	668006	Figure A.20	0.5
TP06	TSF-TP-06	7097501	668123	Figure A.21	0.8
TP07	TSF-TP-07	7097498	668228	Figure A.22	1
TP08	TSF-TP-08	7097497	668352	Figure A.23	0.2
TP09	TSF-TP-09	7097620	668556	Figure A.24	0.2
TP10	TSF-TP-10	7097727	668735	Figure A.25	0.4
TP11	TSF-TP-11	7097885	668736	Figure A.26	0.7
TP12	TSF-TP-12	7097918	668540	Figure A.27	0.8
TP13	TSF-TP-13	7097947	668328	Figure A.28	0.6

4.5.5 2024 Laboratory Tailings Testing

The collected tailings samples from the existing TSF underwent the following testwork:

i) PSD grading with hydrometer measurement was undertaken for all sample bags separately.

ii) Triaxial permeability and Standard Proctor compaction testing was undertaken on two (2) of the sample bags collected from the existing southern TSF cell separately (TSF2-A and TSF2-B).

iii) Atterberg Limits testing was undertaken on two (2) of the sample bags collected from the existing northern TSF cell separately (TSF1-A and TSF1-B), and this test was then subsequently repeated by mixing samples from both bags together (referred to as TSF1-A/B composite mix) to form a composite slurry with 45% solids content (to simulate tailings slurry material expected to be deposited into the proposed TSF3) that matches the PSD specification as per data contained in the referenced 2012 Coffey Mining document (refer Section 1.6).

iv) The TSF1-A/B mixed composite tailings sample underwent further testing involving one-dimensional (1D) consolidation test, air-drying test, drained and undrained settling test, and extended height consolidometer testing.

A summary of the laboratory tailings test results is provided in Table 4.2 to Table 4.4 below.

Table 4.3 - 2024 laboratory tailings test results – material index and compaction properties

Sample bag ID	% soil content smaller than following particle size (mm):					Particle density (t/m^3)	Liquid Limit (%)	Plasticity Index, I_p (%)	Standard Maximum Dry Density (t/m^3)	Optimum moisture content (%)
	2.36	0.60	0.425	0.075	0.002					
TSF1-A_1	99.8	99	94.4	35	3.1	3.043	27.29	10.47	-	-
TSF1-B_1	100.0	100.0	100.0	97.5	24.2	2.843	45.61	17.48	-	-
TSF2-A	99.0	98.3	97.3	51.7	2.8	2.817	20.77	10.24	1.700	15.50
TSF2-B	98.8	97.6	97.1	86.9	6.9	3.142	46.92	18.69	1.800	18.00
TSF1-A/B composite mix	100	100	100	58	8	-	-	-	-	-

Table 4.4 - 2024 laboratory tailings test results – consolidation and hydraulic properties

Sample bag ID	Consolidation properties (extended height test)					
	Effective vertical stress (kPa)	Void ratio, e	Vertical strain, ε_v (%)	Consolidation coefficient, c_v (m2/year)	Volume compressibility coefficient, m_v (MPa^{-1})	Hydraulic conductivity coefficient, k (m/s)
TSF2-A#	100	0.841	-	-	-	1.26×10^{-7}
TSF2-B#	100	0.94	-	-	-	0.8×10^{-7}
TSF1-A/B composite mix	12.5	0.896	10.39	15.33	8.31×10^{-3}	4.0×10^{-8}
	25	0.843	12.89	14.20	2.24×10^{-3}	9.9×10^{-9}
	50	0.797	15.10	13.39	1.02×10^{-3}	4.2×10^{-9}
	100	0.734	18.08	12.49	7.02×10^{-4}	2.7×10^{-9}
	200	0.680	20.62	11.73	3.09×10^{-4}	1.1×10^{-9}
NOTE: # Compacted to 90% SMDD						

Table 4.5 - 2024 laboratory tailings test results – slurry settling properties

Sample ID – TSF1-A/B composite mix	Settling properties (air-dry test, drained test value and undrained test value)					
	Initial dry density (t/m^3)	Final dry density (t/m^3)	Test duration	Slurry water available for return at end of test (%)	Drained slurry water return at end of test (%)	
					Surface decant	Underdrain
Air-drying	0.64	1.30	10.4 (days)	N/A	TBC	TBC
Undrained Settling test	0.64	1.08	6.6 (hours)	53%	53%	N/A
Top and Bottom Drained Settling Test	0.64	1.43	5 (hrs)	68.28%	24%	44.28%

4.6 Tailings Slurry Characterisation

Tailings testwork was executed by E-Precision Pty Ltd in May 2024. The results are presented in Appendix 3 of this document together with the results of the testing executed in 2012. The results of this testing and the implications for the operation of the TSFs are presented below.

4.6.1 Particle Size Distribution and Atterberg Limits

The results of the Particle Size Distribution (PSD) and Atterberg Limits (AL) **executed in the 2012** testing indicate that the tailings can be classified as a non-plasticity, sandy silt, according to Table 10, Classification of Fine-Grained Soils in AS 1726:2017, Geotechnical site investigations. Based on the results of the PSD and AL tests, the hydraulic conductivity for the settled, consolidated tailings is estimated to be in the range of 10^{-8} m/s to 10^{-9} m/s. The relevant geotechnical test results (PSD and AL testing) on which the screening for liquefaction is based, include moisture content, particle size distribution, clay content (defined as % passing the 0.005 mm sieve) and Atterberg limits. The screening implies that there is an overall tendency for the tailings materials which are non-plastic, to be susceptible to liquefaction under sufficiently adverse conditions of saturation, in-situ stress and cyclic loading.

The results of the Particle Size Distribution (PSD) and Atterberg Limits (AL) **executed in the 2024** testing indicate that the tailings can be classified as a low to medium plasticity, sandy silt, according to Table 10, Classification of Fine-Grained Soils in AS 1726:2017, Geotechnical site investigations. Based on the results of the PSD and AL tests, the hydraulic conductivity for the settled, consolidated tailings is estimated to be in the range of 10^{-8} m/s to 10^{-9} m/s. The relevant geotechnical test results (PSD and AL testing) on which the screening for liquefaction is based, include moisture content, particle size distribution, clay content (defined as % passing the 0.005 mm sieve) and Atterberg limits. The screening implies that there is an overall tendency for the tailings materials tested, which have medium plasticity, **not to be susceptible** to liquefaction under sufficiently adverse conditions of saturation, in-situ stress and cyclic loading. However, given that the tailings are stored in a downstream constructed TSF there is no potential for tailings to be released should they liquefy.

4.6.2 Soil Particle Density

The tailings **tested in 2012** have a Soil Particle Density (SPD) of 2.68 t/m^3. The tailings **tested in 2024** have a Soil Particle Density (SPD) in the range of 2.817 to 3.142 t/m^3.

4.6.3 Air-Drying Tests

The objective of the air-drying test is to look at the period of drying, corresponding density and moisture content. The maximum dry density of 1.108 t/m^3 was reached after 51 hours with an initial moisture content of 147.29% in the **2012 Testing**. The maximum dry density of 1.30 t/m^3 was reached after 10.4 days (250 hours) with an initial moisture content of 122.18% in the 2024 Testing.

4.6.4 Undrained Settling Test

The objective of the Undrained Settling Test (UST) is to monitor the tailings settlement and the development of clear supernatant water in undrained conditions. By monitoring the percentage of supernatant with respect to the initial water volume, an indication of how much water will be available for recovery and the speed at which this water is released can be assessed. The laboratory results in Appendix 1 show the available supernatant water with respect to the total water discharged to the tailings storage.

The points to note from the 2012 laboratory results are:

i) Water available for recovery (approximately 36%) takes 2 hours under laboratory conditions.

ii) The dry density of the tailings in the 2012 test after 2 hours is 0.675 t/m^3 in the undrained settling test, which does not include the effects of consolidation.

The points to note from the 2024 laboratory results are:

i) Water available for recovery (approximately 53%) takes 6.75 hours under laboratory conditions.

ii) The dry density of the tailings in the 2024 test after 6 hours is 1.08 t/m^3 in the undrained settling test, which does not include the effects of consolidation.

4.6.5 Top and Bottom Drained Settling Tests

The objective of the Drained Settling Test (DST), which was top and bottom drained, is to monitor the tailings settlement and the development of clear supernatant water and underdrainage in drained conditions. By monitoring the percentage of supernatant and underdrainage with respect to the initial water volume, an indication of how much water will be available for recovery and the speed at which this water is released can be assessed. The result of this drained settling test is presented in Appendix 1.

The points to note from the laboratory 2012 results are:

i) The total recovery of water is approximately 68.9% of water available with approximately 21.75 hours after tailings placement.

ii) The dry density of the tailings is 1.156 t/m^3 in the drained settling test, which does not include the effects of consolidation which would occur within the TSF3.

The points to note from the laboratory 2024 results are:

i) The total recovery of water is approximately 68.3% of water available with approximately 4.87 hours after tailings placement.

ii) The dry density of the tailings is 1.408 t/m^3, which does not include the effects of consolidation which would occur within the TSF3.

4.6.6 Design Tailings Properties

The tailings properties adopted for the TSF3 design, based on the testwork executed, are detailed as follows:

- Average slurry density ex-plant 45% solids.
- Final tailings density (average) 1.50 t/m^3 (average in-situ dry density).
- Hydraulic Conductivity (estimated) 10^{-8} to 10^{-10} m/s.

Figure 4.4 shows the generic moisture density curve and the residual water at 1.50 t/m^3 for the proposed ores to be processed. Interpretation of the laboratory oedometer consolidation test results in

Table 4.3 indicates the achievable tailings dry density at fully saturated self-weight consolidation can range from 1.36 t/m^3 to 1.73 t/m^3 at depth, averaging 1.65 t/m^3 for a total deposited tailings depth in excess of 15 m; refer graph in Figure 4.5 illustrating interpreted dry density trend versus tailings depth. Furthermore, this oedometer test result also indicates that tailings deposited at an annual rate of rise (RoR) not faster than 2 m/year is anticipated to fully consolidate under their own self-weight just as fast as they are being deposited into TSF3. These results are reasonable, given the settling characteristics of the tailings. As the tailings settle and consolidate, additional water, when available, should be removed. The decant water removal system (pumps and pipes) from the operating TSFs should have a capacity of not less than 70% of the slurry water.

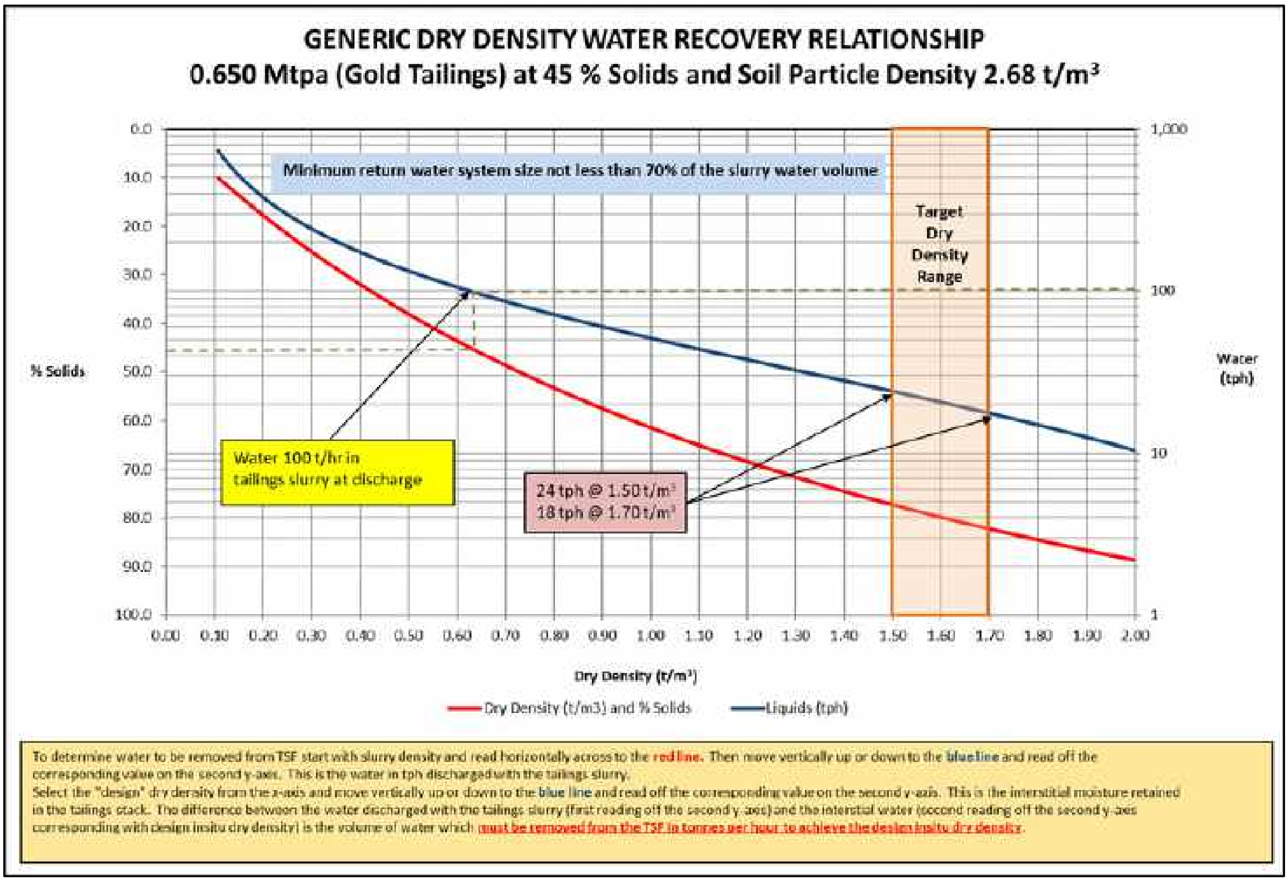

Figure 4.4 - Generic % Solids Dry Density Water Recovery

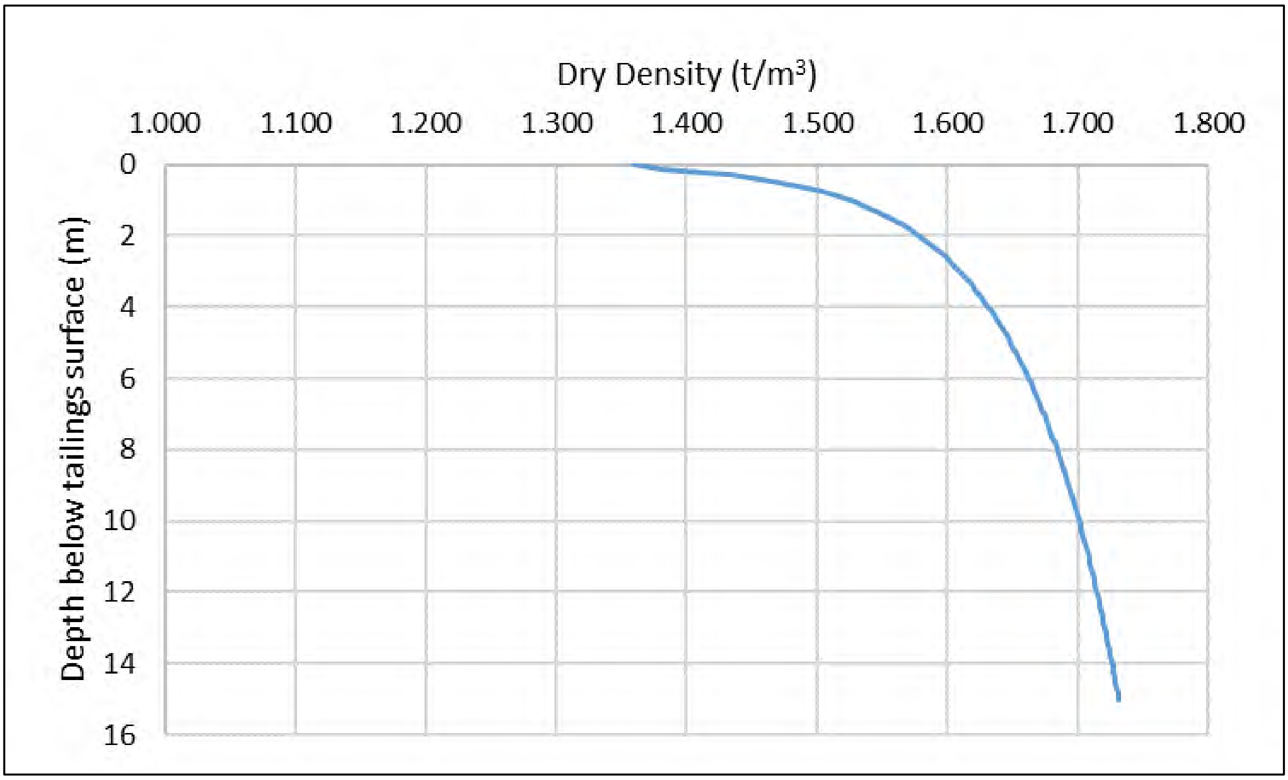

Figure 4.5 – Tailings dry density profile with depth, refer to laboratory oedometer test data in Table 4.3.

4.7 Geotechnical Engineering Analysis

4.7.1 Geotechnical Foundation Characterisation

Foundation soils are not anticipated to affect the geotechnical stability of the proposed earthfill embankment to be constructed to form the TSF3 impoundment on the following basis:

i) Vegetation and topsoil (to a nominal depth of 250 mm) must be removed from the entire proposed TSF3 footprint and stockpiled for later reuse during closure rehabilitation; this includes topsoil stockpiles present within the footprint as per stockpile location illustration in Figure 4.3.

ii) Exposed rubbish within the TSF3 footprint must be removed from the TSF3 footprint disposed in an appropriate location, refer stockpile location illustration in Figure 4.3, including photographs in Figures A.15 and A.16.

iii) Surficial soil cover overlying the Wiluna Hardpan is to be stripped to allow embankment fill to be placed directly onto the hardpan surface.

iv) Upstream embankment low-permeability soil liner layer will be keyed into a trench that is formed on the exposed Wiluna Hardpan layer.

v) The Wiluna Hardpan possesses sufficient geotechnical shear strength, attributed to its ferruginous/calcareous/siliceous induration, such that the hardpan layer is anticipated to constrain any geotechnical shear failure plane forming within the embankment.

Given the excavation refusal of all testpits on the Wiluna Hardpan the geotechnical shear strength of the foundation has been assumed to be rigid for geotechnical TSF engineering purposes.

4.7.2 Hydraulic characterisation

The 2016 CMW Geosciences document (as described in Section 4.6.3; Section 6.5 of that CMW document) indicated that vibrating wire piezometer (VWP) readings within the existing TSF were approximately 0.5 m above the foundation surface, inferring that the formation of any phreatic surface within the deposited tailings is likely to be deep and constrained close to the TSF basin, and attributed it to seepage loss through the basin itself. Considering the near-identical/similar founding condition between the existing TSF and that of the adjacent proposed TSF3 development site, the above phreatic surface response can be anticipated to be applicable to TSF3, on which basis a hydraulic conductivity coefficient $k = 1 \times 10^{-5}$ m/s is deemed appropriate for the natural foundation soils where the TSF3 embankment is to be keyed into the Wiluna Hardpan (and has been adopted as such for design), with the above k value specified based on past project experience to simulate fractures that may be present through the Wiluna Hardpan and/or presences of unsealed sterilisation boreholes drilled by previous project owners.

4.7.3 Seismic Condition

Seismic parameters relevant for engineering assessments are generally the bedrock peak ground acceleration (PGA) and moment wave magnitude (M_w). The bedrock PGA and M_w values have been interpreted based on the Geoscience Australia *2018 National Seismic Hazard Assessment (NSHA) for Australia* document including complementary record catalogue, and considering the proposed TSF3 development shall consider a 1,000-year Annual Exceedance Probability (AEP) earthquake event, based on ANCOLD (2019) *Guidelines for design of dams and appurtenant structures for earthquake* requirements for a TSF with an ANCOLD *'Low'* consequence category classification, the adopted design earthquake parameter values are as follows:

- PGA = 0.03 g
- M_w = 7.0

A seismic site classification of 'B_e' in accordance with AS1170.4-2007 is deemed appropriate to reflect the natural foundation conditions.

4.7.4 Liquefaction risk

<u>Future TSF3 impounded tailings</u>

Considering the proposed TSF3 development will only comprise construction of a starter embankment followed by only a single 2.5 m upstream raise, liquefaction of the impounded tailings is anticipated to have limited to negligible influence on the geotechnical stability of the TSF3 embankments.

Disregarding the above comments, liquefaction of the impounded TSF3 tailings can however potentially be mitigated if desired, provided the following TSF3 operating practices are adopted:

i) The Rate of Rise (RoR) of the tailings is limited to being no faster than 2.5 m per annum, to ensure that deposited tailings can normally-consolidate under their own self-weight, and therefore less likely to be susceptible to geotechnical shear strength transition/degradation from drained to undrained state (undrained strength behaviour is a prerequisite for static liquefaction triggering) under transient loading (i.e. mine blasting activity, high intensity rainfall resulting in rapid TSF3 inundation) during static operating conditions. The expected RoR for the proposed TSF3 development is ~2 m per annum and is therefore within this limit.

ii) Sufficient effective confining soil stress is induced on the impounded tailings to ensure adequate cyclic shear resistance against shearing generated by earthquake shaking motion. Effective confining soil stresses can be developed by maximising dry tailings overburden over saturated tailings present below the phreatic surface (i.e. phreatic surface management). Effective confining soil stresses acting on the tailings are deemed to be adequate, provided the phreatic surface is no closer than 1 m below the deposited tailings surface. This is likely achievable on the basis that the phreatic surface response within the proposed TSF3 development is similar/identical to that of the existing TSF when it was operational (refer Section 4.5). The above tailings phreatic surface specification is based on seismically-induced tailings liquefaction triggering assessment undertaken utilising empirical relationships by Youd and Idriss (2001), applying seismic input parameters as per Section 4.7.3.

TSF3 embankment fill

The differential in hydraulic conductivity between the different fill materials is anticipated to result in the bulk embankment body built out of mine waste material remaining dry during TSF3 operations (refer numerical seepage assessment findings in Section 4.7.5). It is on this basis that the mine-waste fill material is not anticipated to be susceptible to liquefaction.

The liquefaction potential of the low-permeability soil liner is anticipated to have limited to negligible influence on the geotechnical stability of the TSF3 embankments, however it should be noted that compaction of such tailings fill material to achieve a dry density of ≥ 1.85 t/m^3 is anticipated to result in it being sufficiently dense enough to geotechnically shear in a drained, dilatant and liquefaction-resistant manner.

TSF2 tailings

The southern portion of the in-situ TSF2 tailings is proposed to act as the foundation for the TSF3 north wall embankment. Considering the phreatic surface within TSF2 was originally already constrained to near the basin surface even under operating conditions, as per VWP reading discussions in the 2016 CMW Geosciences document (as described in Section 4.6.3; Section 6.5 of that CMW document), these tailings are anticipated to be sufficiently desaturated, such that they are not susceptible to liquefaction.

4.7.5 Seepage response

Seepage assessment has been undertaken to evaluate the seepage response of TSF3 during operational conditions. It was undertaken based on the two-dimensional Finite Element (2D FE) numerical approach utilising the commercial seepage analysis software Geostudio SEEP/W 2012, assuming steady-state seepage flow. The assessment has been undertaken based on the following assumptions and considerations:

i) TSF3 will have an upstream toe drain connected to an external sump at the toe of the northern, western and southern embankments.

ii) TSF3 west, south and east embankments comprise 4 downstream constructed raises from the natural ground level to an embankment height of up to 15 m (RL 481 m to RL 496 m), followed by a single 2.5 m high upstream raise to RL 498.5 m, Stage 5. Please note that the existing ground level for the eastern embankment is approximately RL 490 m, and an initial 1 m high embankment (crest RL 491 m) will be constructed to prevent runoff entering TSF3 from the higher ground to the east. The Stage 4 crest of the these embankments have a minimum width of 6 m.

iii) TSF3 north embankment, southern embankment of TSF2 will, after any loose surface materials have been removed, have a low-permeability soil liner placed on the existing TSF2 embankment, which will be at least 4 m thick (measured along horizontal plane), with this thickness specified based on constructability considerations (layer width is dictated by compaction and earth haulage machinery width) and will be keyed into the southern extremities of the eastern and western embankments of TSF2. This embankment will be raised in stages up to the existing TSF2 embankment crest at RL 489 m. Above this elevation the northern embankment of TSF3 will be founded onto the existing TSF2 crest as well as onto the in-situ tailings within TSF 2 to RL 496 m, followed by the Stage 5 raise, a single 2.5 m high upstream raise to RL 498.5 m.

iv) TSF3 tailings are to be deposited up to no closer than 1 m below the embankment crest. They is assumed to be fully inundated up to maximum tailings beach surface (i.e. 1 m freeboard below crest).

v) In-situ TSF2 tailings are sufficiently desaturated, such that a phreatic surface is not present.

vi) Natural groundwater table within TSF3 footprint is RL 457 m, refer to Section 4.4.

vii) Soil hydraulic conductivity coefficients based on geotechnical interpretive findings presented above and summarised in Table 4.5 below.

viii) All soil material (except the tailings impounded within TSF3, which are considered to be fully-saturated) is modelled considering saturated/unsaturated potential, defined by a Van Genuchten hydraulic conductivity function, combined with preset volumetric water content functions contained within SEEP/W.

Table 4.6 - Input soil hydraulic conductivity coefficients

Material	Input Hydraulic conductivity coefficient, k (m/s)
Natural foundation (fractured Wiluna Hardpan)	1×10^{-5}
Mine-waste fill	1×10^{-6}
Low-permeability soil liner (tailings fill)	5×10^{-7}
Impounded TSF3 tailings	5×10^{-7}

SEEP/W analysis output based on the above assumptions and considerations is presented as an illustration in Figures 4.6 and 4.9 (blue dotted line represents the predicted phreatic surface profile). From these figures, the following comments can be made:

i) Seepage out of TSF3 is anticipated to preferentially drain to the upstream toe drain, although some vertical drainage down into the groundwater table may occur and is not expected to saturate in-situ TSF2 tailings underlying the proposed TSF3 north wall alignment.

ii) Seepage drainage through the Wiluna Hardpan, on the basis it is similarly fractured (or contains unsealed sterilisation boreholes), as inferred from the existing TSF VWP response when it was operating (refer findings in Section 4.7.2), is anticipated to be sufficiently fast such that natural foundation soils underlying the TSF3 base are likely to remain relatively dry without a phreatic surface development down to the natural groundwater table.

iii) Mine-waste fill forming the bulk of the TSF3 embankment body is anticipated to remain dry due to (i) the relative impermeability of the low-permeability tailings soil liner placed on the upstream embankment batter, and (ii) fast seepage drainage through the TSF basin and into the Wiluna Hardpan as discussed above.

4.7.6 Slope stability

Geotechnical slope stability assessment has been undertaken, based on a deterministic Factor of Safety (FoS_{slope}) approach, to derive a design TSF3 embankment batter geometry that is geotechnically stable and in compliance with the ANCOLD (2019) guideline FoS_{slope} requirement. The assessment considers the predicted phreatic surface response as per Section 4.7.5 and under the following soil stress state:

i) Long-term static operating condition in which minimum required ANCOLD $FoS_{slope} \geq 1.5$. All soils are treated to geotechnically shear in a drained manner.

ii) 1,000-year AEP earthquake event, simulated with a pseudo-static horizontal acceleration coefficient = 0.5 x PGA value in Section 4.7.1 = 0.015 g, in which minimum required ANCOLD $FoS_{slope} \geq 1.2$. Impounded TSF3 tailings are treated to geotechnically shear in an undrained manner, whereas all other soil material still retains a drained geotechnical shear response.

iii) Input soil strength parameters are as per geotechnical interpretive findings presented above and are summarised in Table 4.6, below.

FoS_{slope} is estimated based on the Limit Equilibrium Morgenstern-Price method of slices, utilising the commercial analysis software Geostudio SLOPE/W 2012.

The executed geotechnical slope stability assessment indicates that the embankment batter must be specified to be (i) no steeper than 2.5:1.0 (H:V) (≤ 21.8°) and constructed according to earthwork specifications in Section 4.8, to ensure compliance with ANCOLD FoS_{slope} requirements. SLOPE/W analysis output illustration supporting this specification is Figure 4.7 and Figure 4.8 for the proposed TSF3 west, south and east wall configuration, and Figure 4.10 and Figure 4.11 for the proposed TSF3 north wall configuration.

Table 4.7 - Input geotechnical soil strength parameters

Geological Unit	Bulk unit weight, γ_b (kN/m³)	Characteristic static geotechnical shear strength parameters		
		Effective stress state (drained)		Total stress state (undrained)
		ϕ' (°)	C' (kPa)	Undrained shear strength, S_u (kPa)
Mine waste	18	32	0	N/A
Low-permeability soil liner	23	39	0	N/A
Impounded TSF3 tailings	16	30[A]	0	$S_u/\sigma_v' = 0.25^A, 0.05^B$
Natural foundation	N/A	Rigid		

NOTE:

A Assumed based on past project experience for static undrained condition.

B Assumed based on past project experience for seismically-liquefied condition.

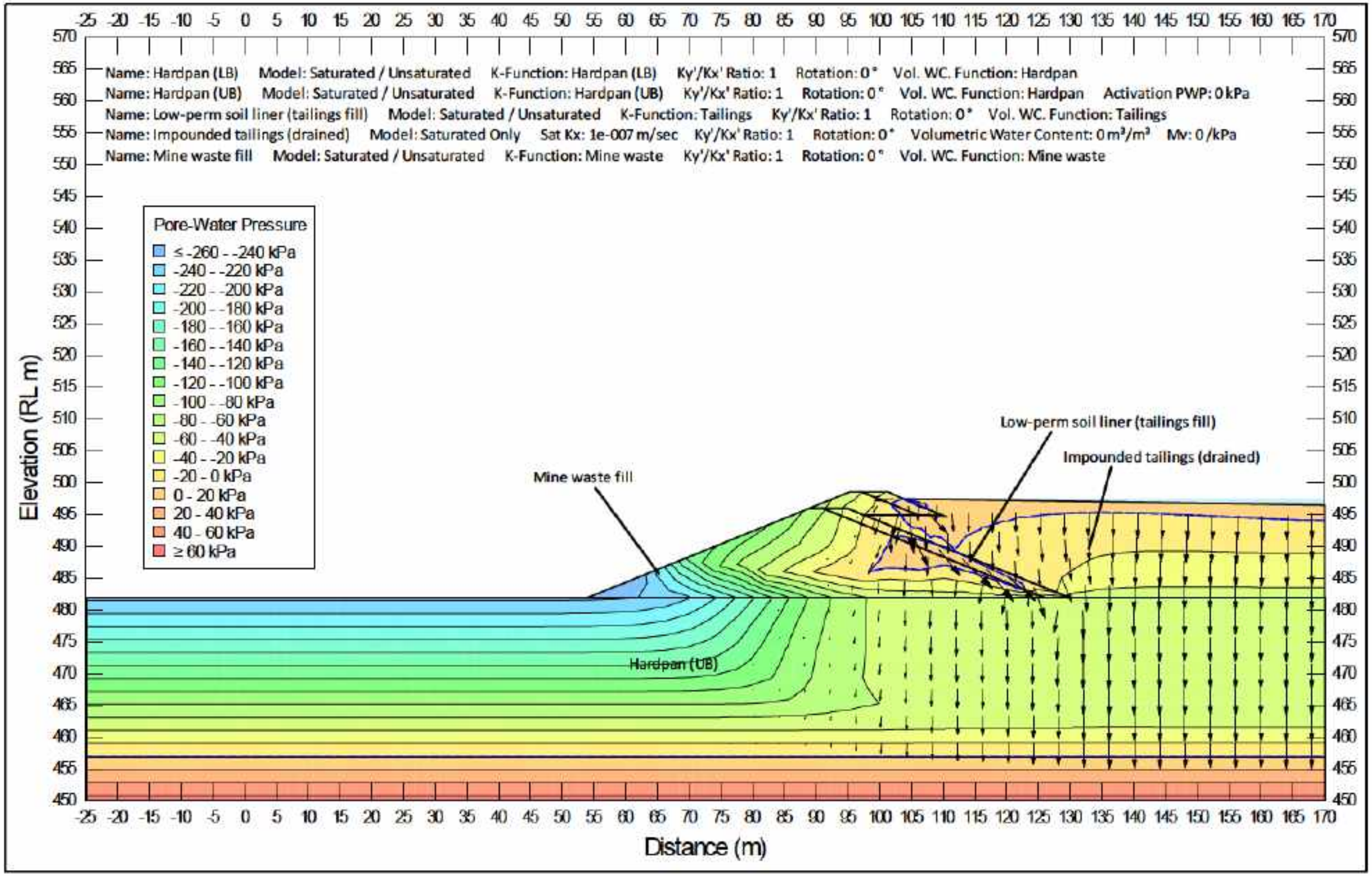

Figure 4.6 - SEEP/W output – Steady-state seepage out of TSF3 west, south, and east wall under operating conditions

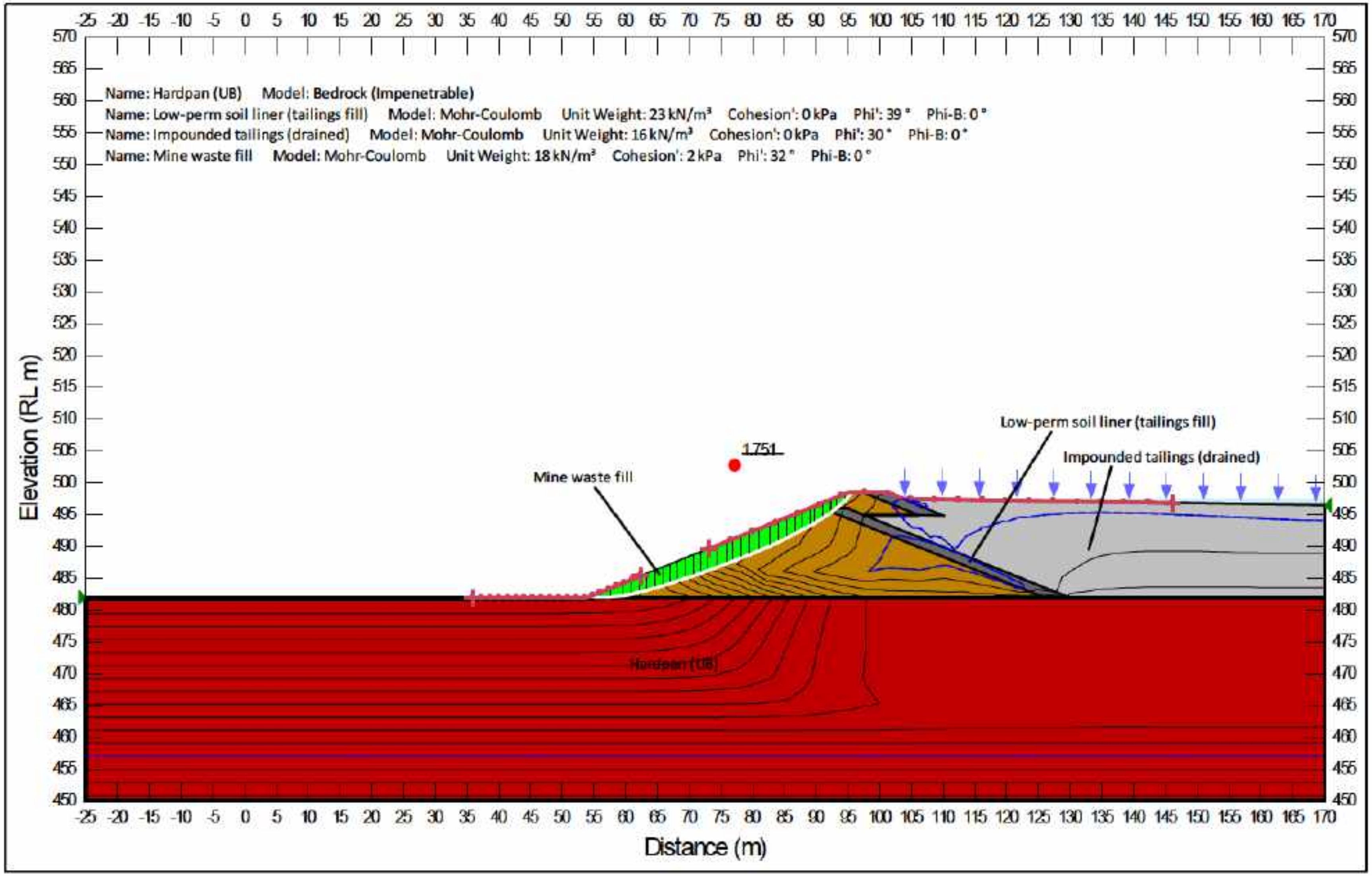

Figure 4.7 - SLOPE/W output geotechnical slope stability under static soil stress conditions: TSF3 west, south, and east wall

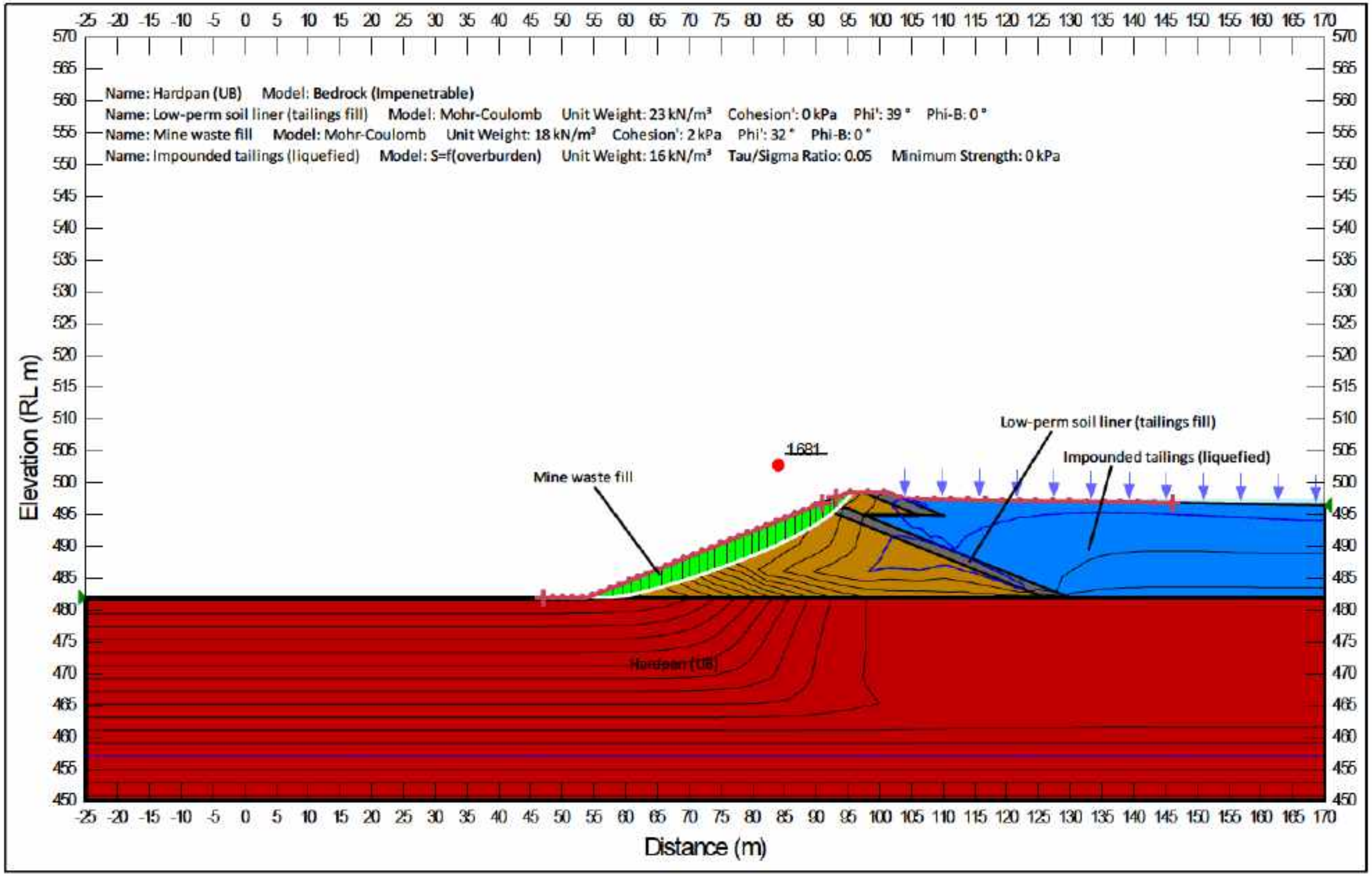

Figure 4.8 - SLOPE/W output geotechnical slope stability under 1000-year AEP earthquake event conditions: TSF3 west, south, and east wall

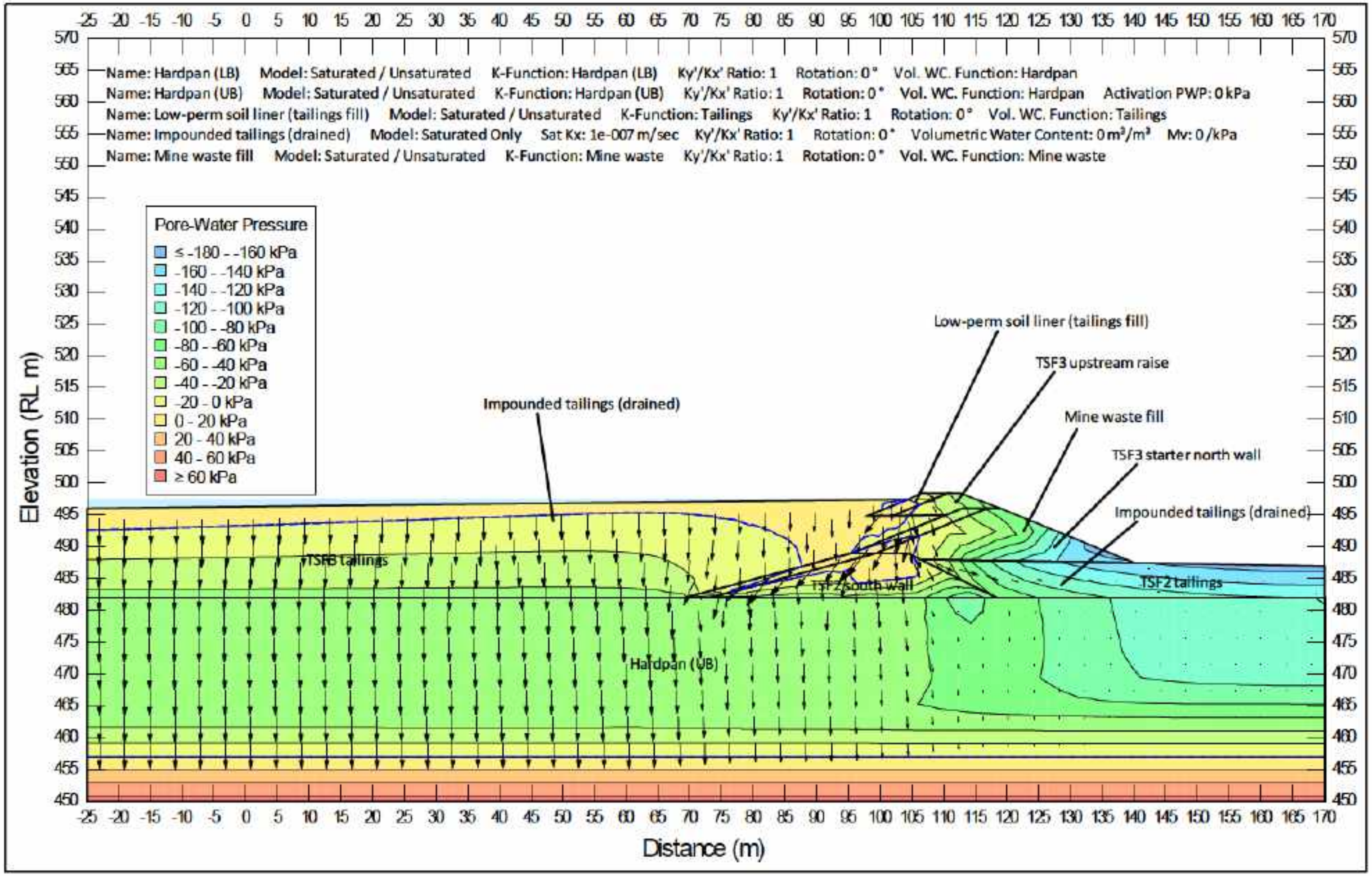

Figure 4.9 - SEEP/W output – Steady-state seepage out of TSF3 north wall under operating conditions

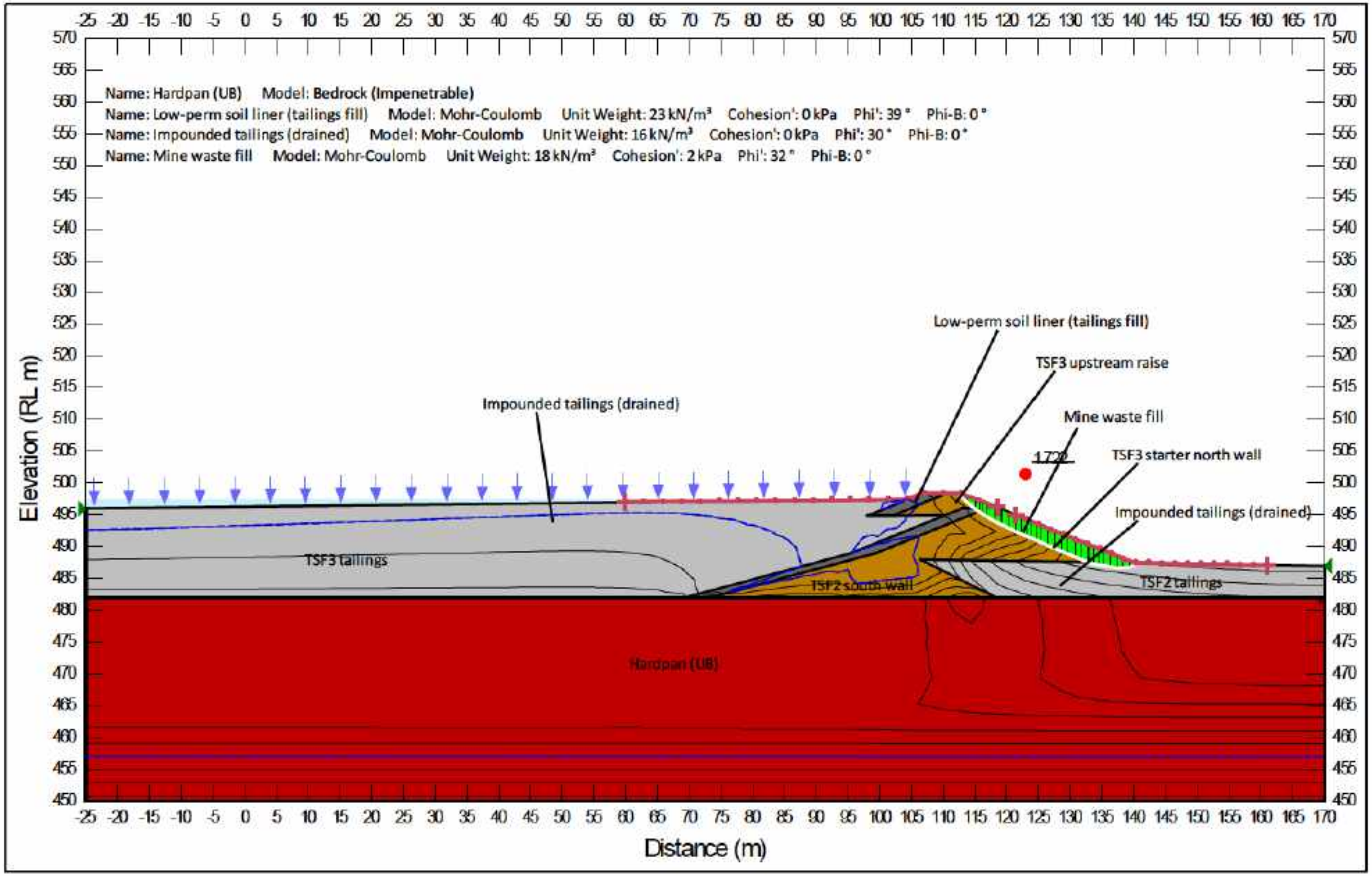

Figure 4.10 - SLOPE/W output geotechnical slope stability under static soil stress conditions: TSF3 north wall

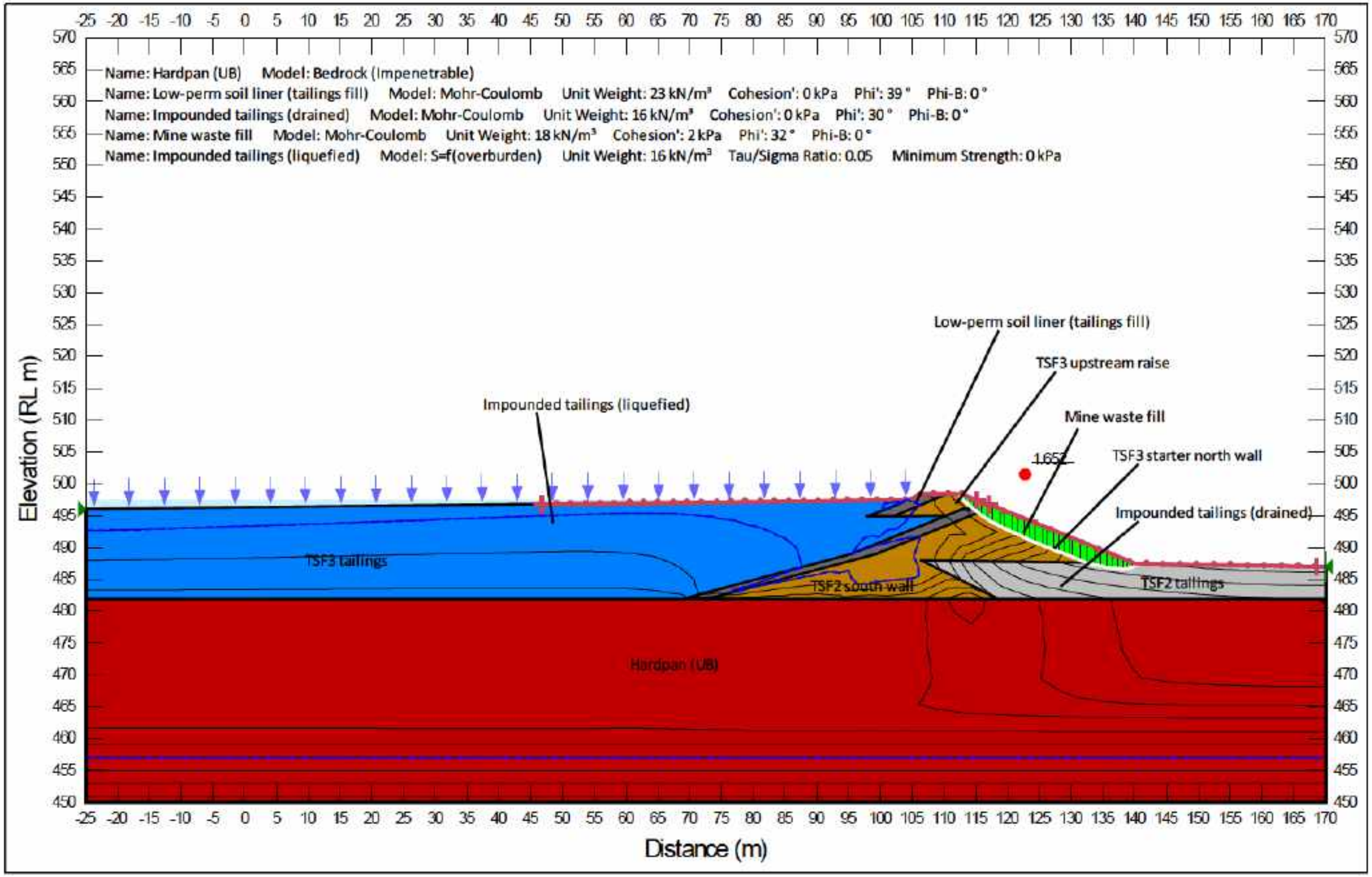

Figure 4.11 - SLOPE/W output geotechnical slope stability under 1000-year AEP earthquake event conditions: TSF3 north wall

4.8 TSF Embankment Fill

4.8.1 General

TSF3 embankment construction is proposed to comprise placement of oxide mine waste to form the bulk of the downstream embankment, with the upstream embankment formed by placement and compaction of tailings sourced from TSF1/TSF2 to form a low-permeability soil layer against the compacted oxide mine waste.

Geotechnical characterisation of both fill material has been undertaken based on historical GSI data, as per referenced documents listed in Section 1.6. Details relevant to the construction proposed TSF3 construction work are presented below. It should be noted that the Scope of Work, Drawings, Materials Schedule and Earthworks Specification are presented in Appendix 4 of the TSF3 Design Report.

4.8.2 Mine waste

The composition of mine-waste fill material stockpiled near the proposed location of TSF3 can be variably classified as mix of GRAVEL, COBBLE, silty GRAVEL with sand, and clayey SILT material, with its fine-grained component (silt and clay) possessing low plasticity (plasticity index averaging 10%, liquid limit between 35% and 40%), in general accordance with Australian Standard AS1726:2017 *Geotechnical site investigations*. The total cumulative clay, silt and sand content in the waste material is generally in excess of 40%.

Based on site observations, the geotechnical engineering properties of the mine-waste material are anticipated to be dictated by the sand-sized soil content or finer, as past project experience indicated gravels and cobbles to likely *'float'* where the finer soil content is in excess of 15% (i.e. gravels/cobbles are not in contact with each other, instead are separated by sand-sized soils or finer).

Laboratory consolidated undrained triaxial compression shear (CUTX) test results provided in the CMW (2016) document indicated the geotechnical shear strength of the fine soil content within the mine waste (defined via the Mohr-Coulomb failure criterion through the effective friction angle ϕ' and apparent cohesion c' parameters) to be represented by $\phi' = 32°$ with $c' \approx 0$ kPa and have been adopted as such for design.

Based on the above material composition and from past project experience, the hydraulic conductivity of the mine waste is anticipated to be represented by a hydraulic conductivity *'k'* coefficient of approximately 1×10^{-7} m/s under traffic-compacted state and has been adopted as such for the design.

4.8.3 Tailings

Tailings located close to the existing TSF1 and TSF2 embankments can be classified as low-plasticity sandy SILT material in general accordance with AS1726:2017, with the sand content decreasing from approximately 50% for tailings deposited close to the TSF embankments, to around ~10% or less near the decant tower (and transitioning into CLAY of intermediate plasticity near the decant).

Laboratory compaction test data contained within the CMW (2016) document indicates that tailings sourced from close to the TSF embankment can be compacted to achieve a Maximum Modified Dry Density (MMDD) of 1.85 t/m^3 based on Optimum Moisture Content (OMC) of 12.5%. SRE laboratory Standard Proctor compaction test results indicate that the same density quoted above can be achieved with an OMC of ~15%. Conventional compaction equipment (i.e. vibrating pad foot roller) will be suitable at this OMC.

Laboratory CUTX test results provided in the CMW (2016) document indicated that for tailings fill compacted to the above density, it is anticipated to geotechnically shear in a dilatant manner and as such, can be reasonably deemed to always shear in a drained manner under both static and transient (i.e. seismic) soil stress conditions. On this basis, the geotechnical shear strength of the tailings fill material (if compacted to the density value quoted above) can be represented by the Mohr-Coulomb failure criterion via the effective friction angle (ϕ') and apparent cohesion (c') parameters. The CUTX test result measured $\phi' = 39°$, with $c' \approx 0$ kPa, and have been adopted as such for design.

Hydraulic conductivity measurements have been made as part of the CMW CUTX testing, with measured hydraulic conductivity k coefficients ranging between 3×10^{-7} and 8×10^{-7} m/s (average 5×10^{-7} m/s). SRE laboratory falling head permeability testing also measured marginally lower, but a similar order of magnitude '*k*' (refer to Table 4.3).

5 CLOSURE SETTLEMENT RESPONSE

At the end of the TSF3 lifespan, no additional tailings settlement is anticipated prior to rehabilitation and closure, since self-weight consolidation of the tailings, under saturated conditions, will occur during deposition. This is referred to as primary saturated self-weight consolidation. In addition, time-dependent primary consolidation of tailings under increasing self-weight as the tailings body gradually desaturates due to drainage of tailings fluid via the underdrainage system, referred to as primary desaturated self-weight consolidation.

5.1 Primary saturated tailings self-weight consolidation

Interpretation of the tailings consolidation behaviour utilising oedometer consolidation test results in Table 4.3, conservatively based on classical Terzaghi's one-dimensional consolidation theory, indicate that tailings deposited at an annual rate of rise (RoR) not higher than 2 m/year, are anticipated to fully-consolidate under their own self-weight just as fast as they are being deposited into TSF3.

Considering the proposed TSF3 lifespan is approximately 9 years for an embankment height of between 15 and 16 m, full consolidation of the deposited tailings under its own saturated self-weight is anticipated to be achievable at the same time/before the TSF3 lifespan is reached. As such, the contribution of tailings surface settlement response due to saturated self-weight consolidation can be disregarded for rehabilitation and closure design.

5.2 Primary desaturated tailings self-weight consolidation

At closure, impounded TSF3 tailings are anticipated to gradually desaturate (due to supernatant recovery, evaporation, and/or seepage through underdrain) which will result in gradual increase in effective self-weight overburden pressure within the in-situ tailings mass over time. The gradual increase in effective self-weight overburden pressure of the in-situ tailings mass is anticipated to also result in on-going primary self-weight consolidation of the in-situ tailings, corresponding to tailings surface settlement over time.

Estimation of the total capping surface settlement at complete tailings desaturation has been undertaken based on conventional one-dimensional consolidation theory in conjunction with the measured tailings void ratio – effective vertical stress ($e - \sigma_v'$) response estimated from the laboratory oedometer consolidation test results as per Table 4.3, which is described by the following statistical trendline power function (where σ_v' is in kPa):

$$e = A(\sigma_v')^B$$

Using the above equation in conjunction with laboratory oedometer consolidation test results in Table 4.3 with A = 1.17 and B = -0.1 has been estimated, with tailings surface settlement estimated to be up to 500 mm upon complete desaturation of the entire impounded TSF3 tailings, with a total deposited height of between 15 m and 16 m.

6 CONSTRUCTION CONSIDERATIONS

Earthworks to construct the proposed TSF3 embankment must be undertaken by an experienced earthworks contractor in compliance with Australian Standard AS3798:2007 '*Guidelines on earthworks for commercial and residential developments*'. It should be noted that the Scope of Work, Drawings, Materials Schedule and Earthworks Specification are presented in Appendix 4 of the TSF3 Design Report.

A summary of required earthwork activities is given below:

1. Vegetation and topsoil (to a nominal depth of 250 mm or as directed) must be removed from the entire proposed TSF3 footprint and stockpiled for later reuse during closure rehabilitation. This includes topsoil stockpiles present within the footprint as per stockpile location illustration in Figure 4.3.
2. All loose surface materials within the TSF3 footprint will be removed, refer stockpile locations marked on Figure 4.3, and photographs, Figures A.15 and A.16 of Appendix A. Materials which have previously been buried within the TSF3 footprint including putrescible rubbish shall be covered with not less than a 300 mm thick layer of low permeability materials, Zone 1, refer to Table 2.1 of the Earthworks Specification, Appendix 4 of the Design Report. This material must be placed and compacted to not less than 95% SMDD in accordance with the requirements of Section 3.3.3 of the Earthworks Specification.
3. Surficial foundation soils within the proposed TSF3 embankment footprint must be stripped down to the Wiluna Hardpan surface, with the stripped material to be stockpiled for later reuse during closure rehabilitation.
4. Upon completion of surficial foundation soil stripping, a cut-off trench must be excavated to refusal into the Wiluna Hardpan formation to key in the low-permeability soil liner (constructed from compacted tailings fill sourced from the existing TSF), which forms the low permeability upstream zone covering the downstream zone of the TSF3 embankment.
5. The downstream zone of the TSF3 embankment will be constructed from mine waste in the available stockpiles. The mine waste material must be free of organic matter and other deleterious material, with fines (silt and clay, materials finer than 75 micron) in excess of 20%. The mine waste fill material must be placed and traffic-compacted in horizontally continuous lifts, with each lift to be limited to a lift thickness not exceeding 500 mm.
6. A low-permeability soil liner is to be placed on the upstream face of the TSF3 embankment batter, with liner material to comprise tailings sourced from the existing TSF. The tailings material must be placed to conform with the details in the Scope of Work and Earthworks Specification. Each tailings layer will be tested to confirm its compliance to the specification. Where the tests indicate the specified density ratio has not been achieved the Contractor will be instructed to rework the layer to achieve compliance.

7 CONCLUSIONS

Based on the details presented in this report, the supporting documents in the Appendices and considering the past performance of the existing TSFs, and the proposed engineered containment embankments, TSF3 is likely to be stable during its operation, provided that the:

i) Design concept is fully understood, constructed and operated in accordance with the details in the Design Report (DR) and Operations Manuals (OMs).

ii) Management of tailings deposition and water recovery is in accordance with the intent of the design as presented in the OMs presented in the DR for TSF3.

It is recommended that the water-recovery system (pumps and pipes) be sized for an operating capacity of not less than 70% of the volume of water in the tailings slurry discharged into TSF3 and have sufficient capacity to remove water from storm events in less than 5 days. This may require reduction of draw or shutting down external mark-up water sources for short periods.

Care will have to be taken during tailings deposition to ensure that the spigotting does not erode the containment embankments with deposition from the designated locations in the sequence required.

8 RECOMMENDATIONS

The following recommendations are made for the proposed TSF3:

i) Construction of TSF3 must be supervised by suitability qualified staff experienced in TSF construction.

ii) Annual geotechnical inspection of the embankments of TSF3 is recommended during the operation of this facility.

iii) The recommended spigotting operation must be implemented to ensure the water does not pond against the embankments.

iv) Water recovery must be executed to minimise the spatial area of the decant pond, which must be confined to the area adjacent to the decant.

v) Water ponding against the perimeter embankments must be avoided to ensure embankment stability is not compromised.

vi) Monitoring/recovery bores will be used to monitor standing water levels and sample water quality around TSF3.

vii) MML reviews operating procedures for the TSFs (TSF1, TSF2, TSF3 and the SPTSF) as detailed in the Oms, to ensure that the tailings deposition, water recovery and inspection requirements are understood and implemented.

9 REFERENCES

1. Youd, T.L., and Idriss, I.M (2001), " Liquefaction resistance of soils: summary report from the 1996 NCEER and 1998 NCEER/NSF workshops on evaluation of liquefaction resistance of soils", *J. Geotech. & Geoenv. Eng.*, Vol. 127, No. 4, pp 297-313

Appendix A

Photographs

ANDY WELL PROJECT

Tailings Storage Facility 3

Figure A.1 – Photograph A1: Groundwater monitoring bore no. 7

Figure A.2 – Photograph A2: Mine waste stockpile

Figure A.3 – Photograph A3: Mine waste stockpile (close-up)

Figure A.4 – Photograph A4: Mine waste stockpile (close-up)

SRE

Figure A.5 – Photograph A5: Rubbish landfill area

Figure A.6 – Photograph A6: Topsoil stockpile

Figure A.7 – Photograph A7: Hill overlooking project site (near mine dewatering runoff area)

Figure A.8– Photograph A8: Pipelines leading to TSF1-TSF2 dividing wall

Figure A.9 – Photograph A9: Pipelines leading to TSF1-TSF2 dividing wall

Figure A.10 – Photograph A10: Mine waste stockpile (east of South TSF)

Figure A.11 – Photograph A11: Mine waste stockpile (east of North TSF)

Figure A.12 – Photograph A12: South TSF – TSF2

Figure A.13 – Photograph A13: North TSF, TSF1

Figure A.14 – Photograph A14: Dividing wall between TSF1 (North) and TSF2 (South)

Figure A.15 – Photograph A15: Topsoil stockpile (elevated view from the top of a mine waste stockpile)

Figure A.16 – Photograph A16: Mine waste stockpile (exposed rubbish stockpile in background to the right, adjacent rubbish landfill and topsoil stockpile area)

Figure A.17 – Photograph A17: TP02

Figure A.18 – Photograph A18: TP03

Figure A.19 – Photograph A19: TP04

Figure A.20 – Photograph A20: TP05

Figure A.21 – Photograph A21: TP06

Figure A.22 – Photograph A22: TP07

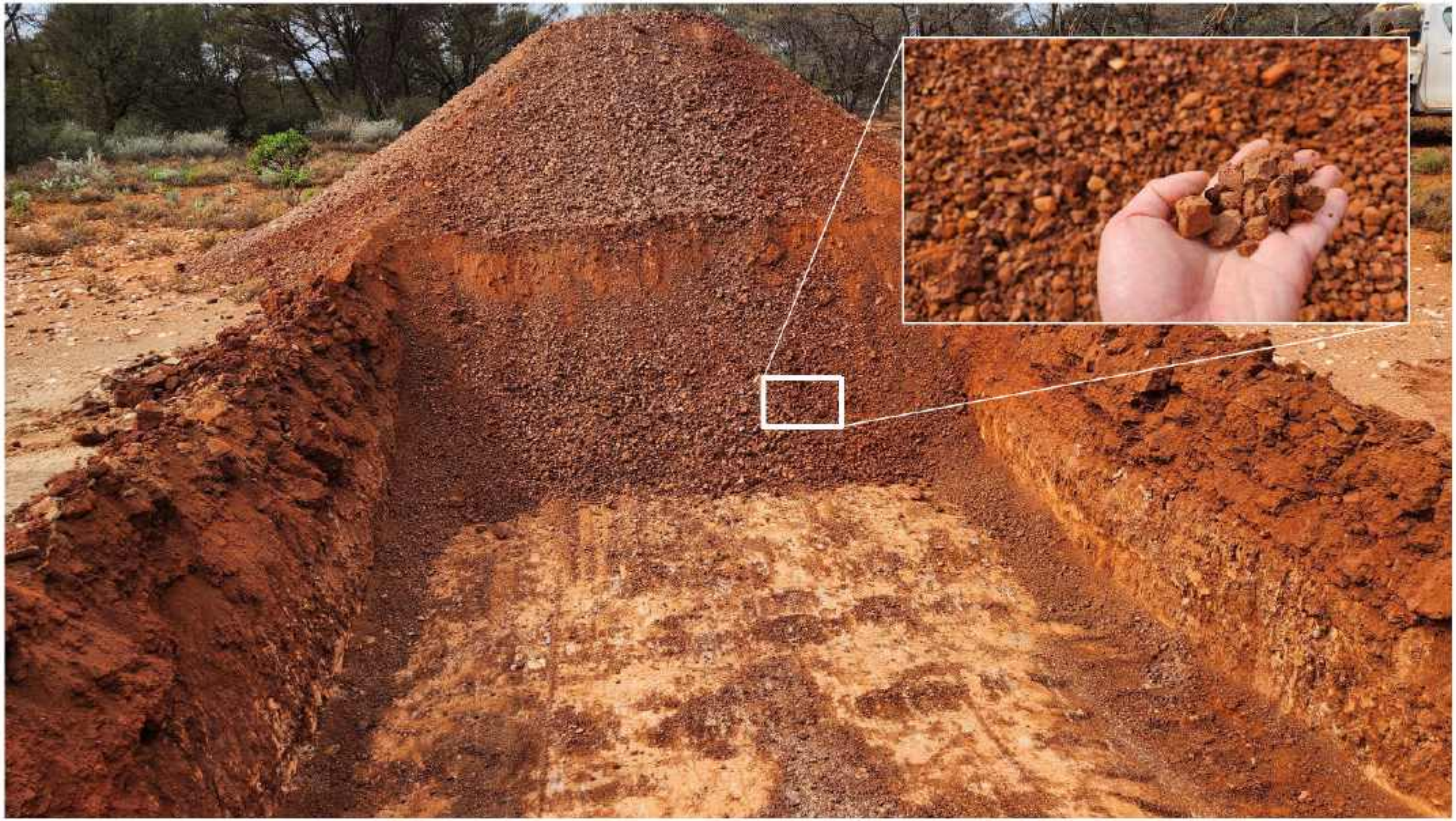

Figure A.23 – Photograph A23: TP08

Figure A.24 – Photograph A24: TP09

Figure A.25 – Photograph A25: TP10 (ripper refusal)

Figure A.26 – Photograph A26: TP11

Figure A.27 – Photograph A27: TP12

Figure A.28 – Photograph A28: TP13

Figure A.29 – Photograph A29: TP18

Figure A.30 – Photograph A30: TP16

Figure A.31 – Photograph A31: TP14

Figure A.32 – Photograph A32: TP15

Figure A.33 – Photograph A33: TP17

Figure A.34 – Photograph A34: TP19

Appendix B

Construction Materials Test Results

ANDY WELL PROJECT

Tailings Storage Facility 3

Welshpool, Perth Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
269A Treasure Road (Cnr Poole St)
Welshpool WA 6106

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Material Test Report

Report No: WELS14S-05823-1
Issue No: 1

Client:	Coffey Mining Pty Ltd (West Perth) 53 Burswood Road Burswood WA 6100
Principal:	Doray Mineral Limited
Project No.:	INFOWELS01708AA
Project Name:	MINEWPER00921AG - Settling Ponds Design
Lot No.: NA	**TRN:** NA

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

[redacted]

(Laboratory Manager)
NATA Accredited Laboratory Number: 431
Date of Issue: 23/09/2014

NATA WORLD RECOGNISED ACCREDITATION

Sample Details

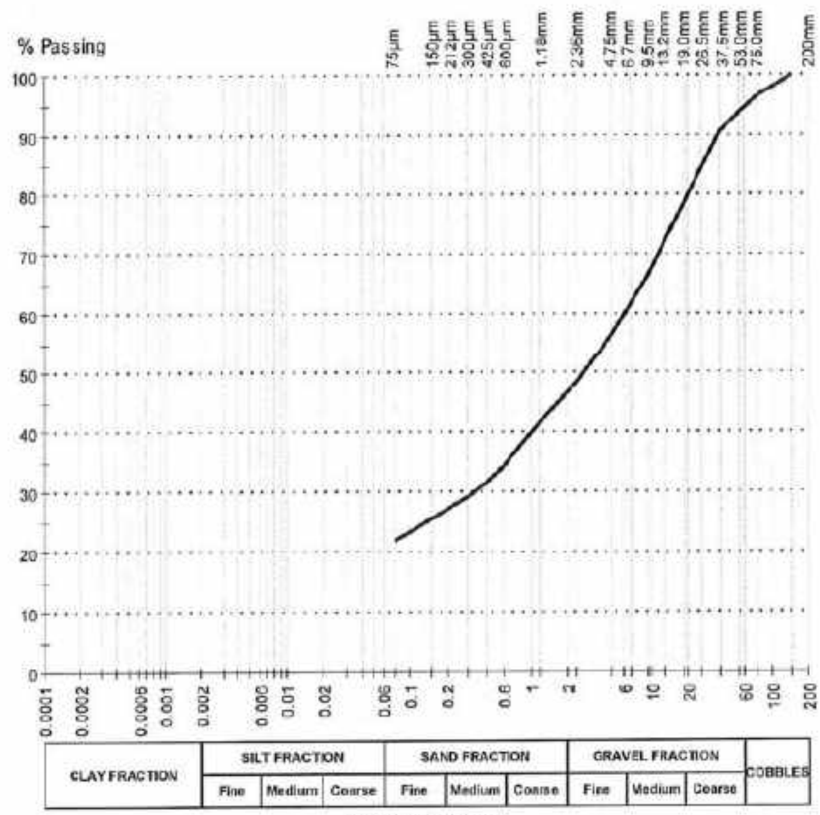
Sample ID:	WELS14S-05823
Client Sample:	PAF 1
Date Sampled:	01/07/2014
Source:	Unknown
Material:	Gravel
Specification:	Determined by client
Sampling Method:	Submitted by client
Project Location:	Andy Well Gold Project
Sample Location:	PAF 1

Atterberg Limit:

Liquid Limit: 38
Plastic Limit: 27
Plasticity Index: 11
Linear Shrinkage (%): 4.5

Sample Description:

Particle Size Distribution



Grading: AS 1289.3.6.1

Drying by: Oven
Date Tested: 4/09/2014
Note: Sample Washed

Sieve Size	% Passing	Limits
150mm	100	
75.0mm	97	
37.5mm	91	
19.0mm	78	
9.5mm	66	
4.75mm	56	
2.36mm	48	
1.18mm	41	
600µm	34	
425µm	32	
300µm	29	
150µm	25	
75µm	22	

Welshpool, Perth Laboratory

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coffey

Material Test Report

Report No: WELS14S-05823-1
Issue No: 1

Client:	Coffey Mining Pty Ltd (West Perth) 53 Burswood Road Burswood WA 6100
Principal:	Doray Mineral Limited
Project No.:	INFOWELS01708AA
Project Name:	MINEWPER00921AG - Settling Ponds Design
Lot No.: NA	**TRN:** NA

Accredited for compliance with ISO/IEC 17025.

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NATA
WORLD RECOGNISED ACCREDITATION

[redacted]

(Laboratory Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 23/09/2014

Sample Details

Sample ID:	WELS14S-05823
Client Sample:	PAF 1
Date Sampled:	01/07/2014
Source:	Unknown
Material:	Gravel
Specification:	Determined by client
Sampling Method:	Submitted by client
Project Location:	Andy Well Gold Project
Sample Location:	PAF 1

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	2.4	
Date Tested		2/09/2014	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	4.5	
Mould Length (mm)		251	
Crumbling		No	
Curling		No	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	38	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	27	
Plasticity Index (%)	AS 1289.3.3.1	11	
Date Tested		10/09/2014	

Comments

N/A

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Report No: WELS14S-05824-1
Issue No: 1

Material Test Report

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[redacted]
(Laboratory Manager)
NATA Accredited Laboratory Number: 431
Date of Issue: 23/09/2014

Client: Coffey Mining Pty Ltd (West Perth)
53 Burswood Road
Burswood WA 6100

Principal: Doray Mineral Limited
Project No.: INFOWELS01708AA
Project Name: MINEWPER00921AG - Settling Ponds Design
Lot No.: NA **TRN:** NA

Sample Details

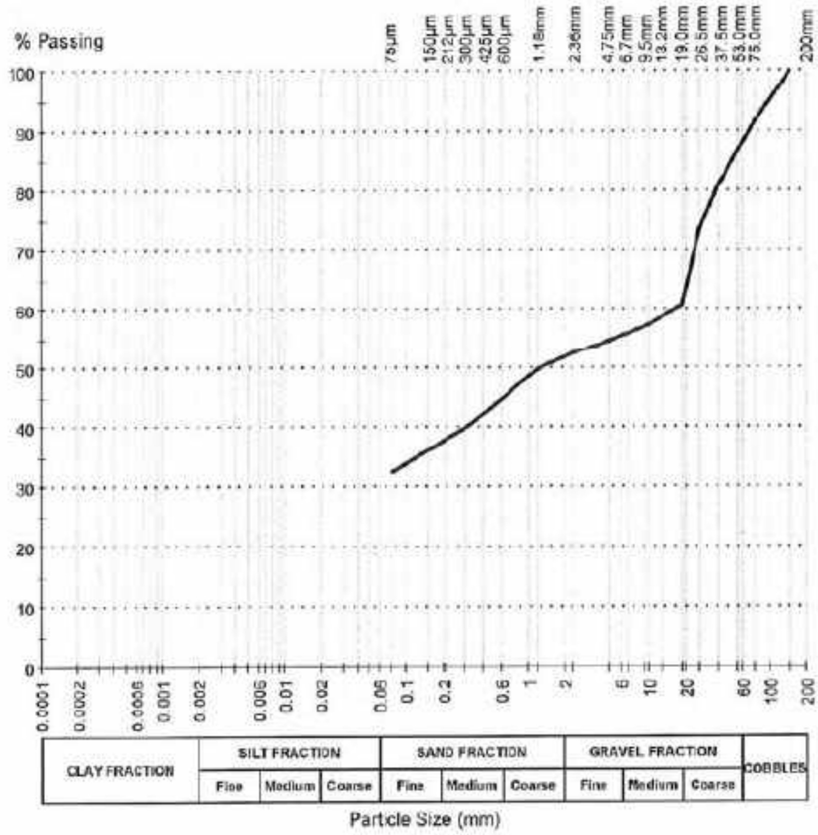
Sample ID:	WELS14S-05824
Client Sample:	PAF 2
Date Sampled:	01/07/2014
Source:	Unknown
Material:	Gravel
Specification:	Determined by client
Sampling Method:	Submitted by client
Project Location:	Andy Well Gold Project
Sample Location:	PAF 2

Atterberg Limit:

Liquid Limit:	39
Plastic Limit:	27
Plasticity Index:	12
Linear Shrinkage (%):	4.5

Sample Description:

Particle Size Distribution



Grading: AS 1289.3.6.1

Drying by: Oven
Date Tested: 10/09/2014
Note: Sample Washed

Sieve Size	% Passing	Limits
150mm	100	
75.0mm	92	
37.5mm	81	
26.5mm	73	
19.0mm	61	
9.5mm	57	
4.75mm	54	
2.36mm	52	
1.18mm	50	
600µm	44	
425µm	42	
300µm	40	
150µm	36	
75µm	32	

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Report No: WELS14S-05824-1
Issue No: 1

Material Test Report

Client:	Coffey Mining Pty Ltd (West Perth) 53 Burswood Road Burswood WA 6100
Principal:	Doray Mineral Limited
Project No.:	INFOWELS01708AA
Project Name:	MINEWPER00921AG - Settling Ponds Design
Lot No.: NA	**TRN:** NA

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA
WORLD RECOGNISED ACCREDITATION

[redacted]

(Laboratory Manager)
NATA Accredited Laboratory Number: 431
Date of Issue: 23/09/2014

Sample Details

Sample ID:	WELS14S-05824
Client Sample:	PAF 2
Date Sampled:	01/07/2014
Source:	Unknown
Material:	Gravel
Specification:	Determined by client
Sampling Method:	Submitted by client
Project Location:	Andy Well Gold Project
Sample Location:	PAF 2

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	2.5	
Date Tested		2/09/2014	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	4.5	
Mould Length (mm)		251	
Crumbling		No	
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.1	39	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	27	
Plasticity Index (%)	AS 1289.3.3.1	12	
Date Tested		10/09/2014	

Comments

N/A

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Material Test Report

Report No: WELS14S-05828-1
Issue No: 1

Client:	Coffey Mining Pty Ltd (West Perth) 53 Burswood Road Burswood WA 6100
Principal:	Doray Mineral Limited
Project No.:	INFOWELS01708AA
Project Name:	MINEWPER00921AG - Settling Ponds Design
Lot No.:	NA
TRN:	NA

NATA WORLD RECOGNISED ACCREDITATION

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[redacted]

(Laboratory Manager)
NATA Accredited Laboratory Number: 431
Date of Issue: 23/09/2014

Sample Details

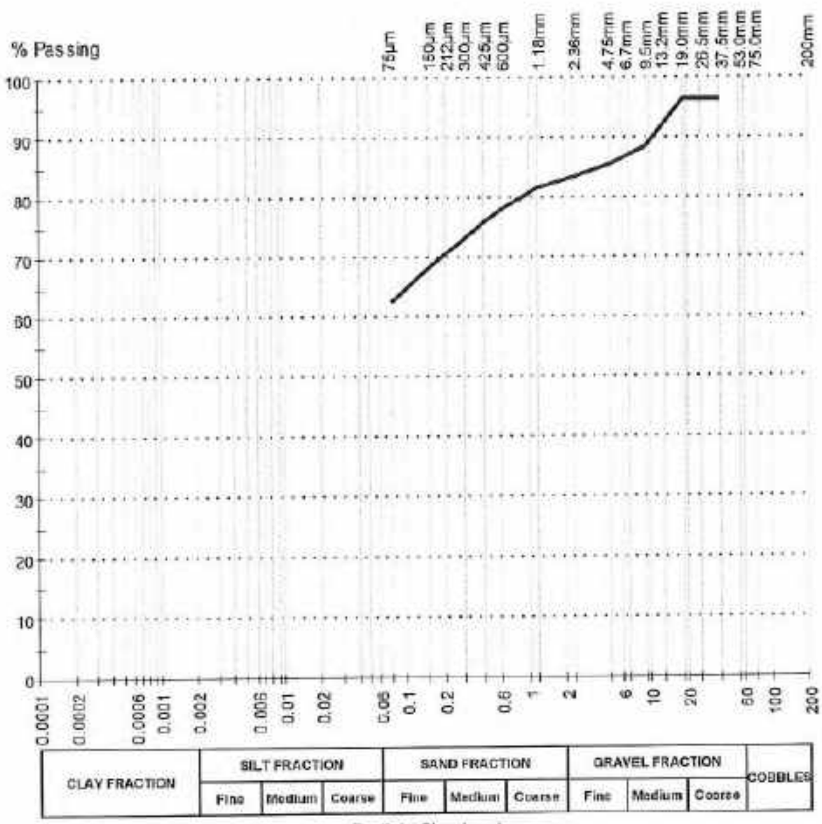
Sample ID:	WELS14S-05828
Client Sample:	ROM 1
Date Sampled:	01/07/2014
Source:	Unknown
Material:	Gravel
Specification:	Determined by client
Sampling Method:	Submitted by client
Project Location:	Andy Well Gold Project
Sample Location:	ROM 1

Atterberg Limit:

Liquid Limit:	43
Plastic Limit:	29
Plasticity Index:	14
Linear Shrinkage (%):	3.0

Sample Description:

Particle Size Distribution



Grading: AS 1289.3.6.1

Drying by:	Oven
Date Tested:	5/09/2014
Note:	Sample Washed

Sieve Size	% Passing	Limits
37.5mm	96	
19.0mm	96	
9.5mm	89	
4.75mm	85	
2.36mm	83	
1.18mm	81	
600µm	78	
425µm	76	
300µm	73	
150µm	68	
75µm	62	

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Material Test Report

Report No: WELS14S-05828-1

Issue No: 1

Client:	Coffey Mining Pty Ltd (West Perth) 53 Burswood Road Burswood WA 6100
Principal:	Doray Mineral Limited
Project No.:	INFOWELS01708AA
Project Name:	MINEWPER00921AG - Settling Ponds Design
Lot No.: NA	**TRN:** NA

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

[redacted]

(Laboratory Manager)
NATA Accredited Laboratory Number: 431
Date of Issue: 23/09/2014

Sample Details

Sample ID:	WELS14S-05828
Client Sample:	ROM 1 [redacted]
Date Sampled:	01/07/2014
Source:	Unknown
Material:	Gravel
Specification:	Determined by client
Sampling Method:	Submitted by client
Project Location:	Andy Well Gold Project
Sample Location:	ROM 1

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	7.0	
Date Tested		3/09/2014	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	3.0	
Mould Length (mm)		251	
Crumbling		No	
Curling		No	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	43	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	29	
Plasticity Index (%)	AS 1289.3.3.1	14	
Date Tested		10/09/2014	

Comments

N/A

coffey

Material Test Report

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Report No: WELS14S-05829-1
Issue No: 1

Client: Coffey Mining Pty Ltd (West Perth)
53 Burswood Road
Burswood WA 6100

Principal: Doray Mineral Limited
Project No.: INFOWELS01708AA
Project Name: MINEWPER00921AG - Settling Ponds Design
Lot No.: NA **TRN:** NA

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

[redacted]

(Laboratory Manager)
NATA Accredited Laboratory Number: 431
Date of Issue: 23/09/2014

Sample Details

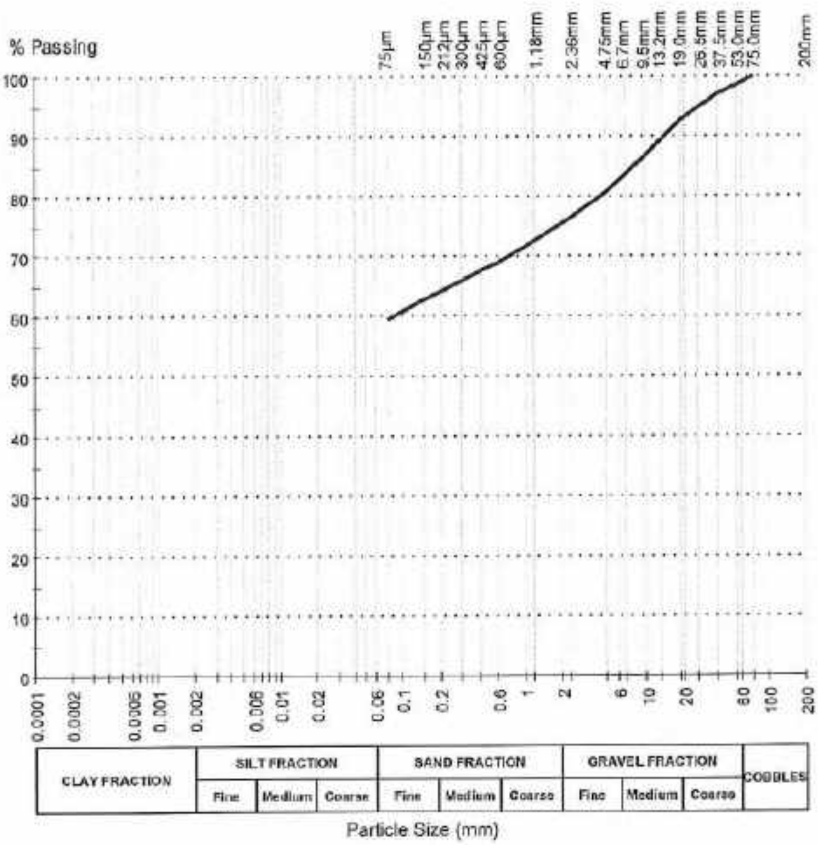
Sample ID:	WELS14S-05829
Client Sample:	ROM 2
Date Sampled:	01/07/2014
Source:	Unknown
Material:	Gravel
Specification:	Determined by client
Sampling Method:	Submitted by client
Project Location:	Andy Well Gold Project
Sample Location:	ROM 2

Atterberg Limit:

Liquid Limit: 39
Plastic Limit: 30
Plasticity Index: 9
Linear Shrinkage (%): 3.5

Sample Description:

Particle Size Distribution



Grading: AS 1289.3.6.1

Drying by: Oven
Date Tested: 5/09/2014
Note: Sample Washed

Sieve Size	% Passing	Limits
75.0mm	100	
53.0mm	98	
37.5mm	97	
19.0mm	93	
9.5mm	86	
4.75mm	81	
2.36mm	76	
1.18mm	73	
600µm	69	
425µm	67	
300µm	66	
150µm	63	
75µm	59	

Welshpool, Perth Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
269A Treasure Road (Cnr Poole St)
Welshpool WA 6106

Phone: +61 8 6466 2400
Fax: +61 8 6466 2450

coffey

Report No: WELS14S-05829-1
Issue No: 1

Material Test Report

Client:	Coffey Mining Pty Ltd (West Perth) 53 Burswood Road Burswood WA 6100
Principal:	Doray Mineral Limited
Project No.:	INFOWELS01708AA
Project Name:	MINEWPER00921AG - Settling Ponds Design
Lot No.: NA	**TRN:** NA

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA WORLD RECOGNISED ACCREDITATION

[redacted]

(Laboratory Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 23/09/2014

Sample Details

Sample ID:	WELS14S-05829
Client Sample:	ROM 2
Date Sampled:	01/07/2014
Source:	Unknown
Material:	Gravel
Specification:	Determined by client
Sampling Method:	Submitted by client
Project Location:	Andy Well Gold Project
Sample Location:	ROM 2

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	4.6	
Date Tested		2/09/2014	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	3.5	
Mould Length (mm)		250	
Crumbling		No	
Curling		No	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	39	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	30	
Plasticity Index (%)	AS 1289.3.3.1	9	
Date Tested		10/09/2014	

Comments

N/A

Cardno Geotech Pty Ltd
ABN: 48 137 480 034
Address:
72 McCombe Road,
Davenport WA 6230

Laboratory: Geotech Bunbury
Phone: 08 9726 2187 Fax: 08 9721 2348
Email: [redacted]

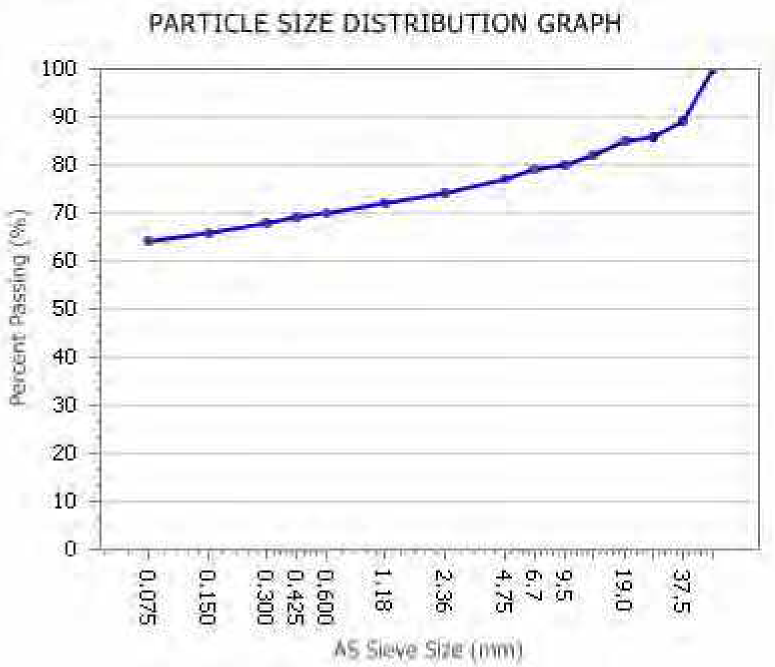
QUALITY OF MATERIALS REPORT

Client:	CMW Geosciences	Report Number:	5029/R/7567-1
Client Address:	19/127 Herdsman Parade, WEMBLEY	Project Number:	5029/P/570
Project:	Doray Minerals Limited - Andy Well	Lot Number:	Open Pit Waste Pad
Location:	Meekatharra WA	Internal Test Request:	5029/T/2706
Component:		Client Reference/s:	PER2016-0691
Area Description:		Report Date / Page:	4/08/2016 Page 1 of 1

Test Procedures AS1289.3.6.1, AS1289.3.1.2, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1, AS 1289.3.3.1

Sample Number	5029/S/14916	Test Request	
Sampling Method	Tested As Received	Area	
Date Sampled	29/07/2016		
Sampled By	Client Sampled		
Date Tested	2/08/2016	Material Source	Client
Att. Drying Method	Oven Dried	Material Type	-
Atterberg Preparation	Dry Sieved	Material Description	Light Brown Grey Silty CLAY

AS Sieve (mm)	Specification Minimum	Percent Passing (%)	Specification Maximum
53.0		**100**	
37.5		**89**	
26.5		**86**	
19.0		**85**	
13.2		**82**	
9.5		**80**	
6.7		**79**	
4.75		**77**	
2.36		**74**	
1.18		**72**	
0.600		**70**	
0.425		**69**	
0.300		**68**	
0.150		**66**	
0.075		**64**	



Test Result	Specification Minimum	Result	Specification Maximum	Test Result	Specification Minimum	Result	Specification Maximum
Liquid Limit (%)		**38**		0.075/0.425 Fines Ratio		**0.93**	
Plastic Limit (%)		**26**		PI x 0.425 Ratio (%)		**823.2**	
Plastic Index (%)		**12**		LS x 0.425 Ratio (%)		**308.7**	
Linear Shrinkage (%)		**4.5**		Linear Shrinkage Defects	-		

Remarks

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

Accreditation Number: 5029

Approved Sign [redacted]

Form ID: W85Rep Rev 1

Cardno Geotech
Shaping the Future

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72 McCombe Road,
Davenport WA 6230

Laboratory: Geotech Bunbury
Phone: 08 9726 2187 Fax: 08 9721 2348
Email: [redacted]

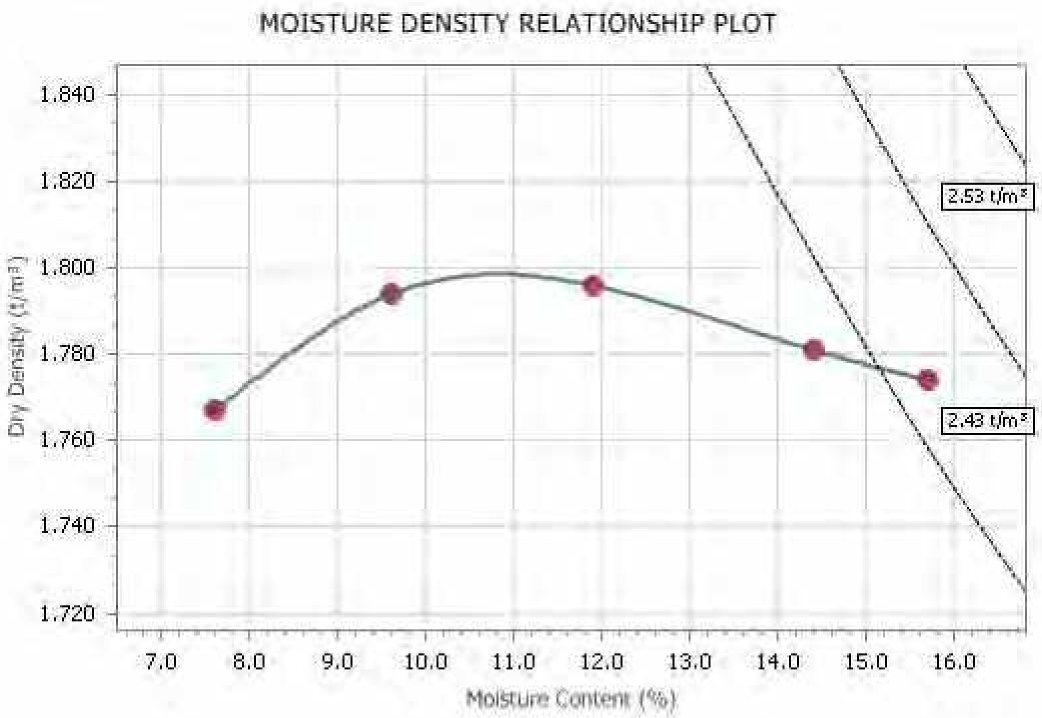
MOISTURE DENSITY RELATIONSHIP REPORT

Client:	CMW Geosciences	Report Number:	5029/R/7568-1
Client Address:	19/127 Herdsman Parade, WEMBLEY	Project Number:	5029/P/570
Project:	Doray Minerals Limited - Andy Well	Lot Number:	Open Pit Waste Pad
Location:	Meekatharra WA	Internal Test Request:	5029/T/2706
Component:		Client Reference/s:	PER2016-0691
Area Description:		Report Date / Page:	4/08/2016 Page 1 of 1

Test Procedures	AS1289.5.2.1, AS1289.2.1.1	Sample Location	
Sample Number	5029/S/14916	Test Request	
Sampling Method	Tested As Received	Area	
Date Sampled	29/07/2016		
Sampled By	Client Sampled		
Date Tested	1/08/2016	Compactive Effort	Modified
Material Source	Client	Fraction Tested (mm)	< 19.0mm
Material Type		Percent Oversize (%)	4.9
Material Description	Light Brown Grey Silty CLAY		

Moisture / Density Relationship Data

Moisture Content (%)	Dry Density (t/m³)
7.6	1.767
9.6	1.794
11.9	1.796
14.4	1.781
15.7	1.774



Maximum Dry Density (t/m³):	**1.80**	**Optimum Moisture Content (%):**	**11.0**

Remarks

NATA

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

Accreditation Number: 5029

Approved Signat [redacted]

Form ID: W4Rep Rev 1

CMW Geosciences
Doray Minerals Limited - Andy Well

Cardno Geotech
Bunbury Base Laboratory #5029
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NATA

VISUAL DESCRIPTION	
Pinkish brown very silty CLAY / clayey SILT	
Date Sampled	29/07/2016

GENERAL	
Date test started	2/08/16
Type of sample	Recompacted
Specimen orientation	Vertical
Type of drains fitted	One end

INITIAL		
Diameter	(mm)	102.2
Length	(mm)	211.1
Moisture content	(%)	11
Bulk density	(t/m^3)	1.90
Dry density	(t/m^3)	1.71
Voids ratio		0.591
Degree of saturation	(%)	50

SATURATION		
Pressure increments applied	(kPa)	10
Differential pressure used	(kPa)	10
Pore pressure on completion	(kPa)	355
Cell pressure on completion	(kPa)	360
B value achieved		0.00

TESTING PROCEDURES USED	
Specimen Set-up	AS1289.6.4.2 - 1998 Clause 4/5
Saturation	AS1289.6.4.2 - 1998 Clause 6
Consolidation - Isotropic	AS1289.6.4.2 - 1998 Clause 7
Shearing	AS1289.6.4.2 - 1998 Clause 9

Borehole	Open Pit
Sample	Waste Pad
Depth (m)	-
Cardno Geotech Sample Number	5029/S/14916

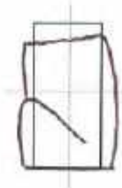
SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE

Date: 12/08/2016 [redacted]
Template Issue: 1
Filename: 5029/S/14916 / EFFECTIV /
Date: 12.8.16
Approved Signatory: [redacted]

CMW Geosciences
Doray Minerals Limited - Andy Well

CONSOLIDATION : ISOTROPIC		Stage 1	Stage 2	Stage 3
Cell pressure	(kPa)	370	380	400
Back pressure	(kPa)	360	360	360
Effective cell pressure	(kPa)	10	20	40
Pore pressure on completion	(kPa)	360	360	360
Pore pressure dissipation	(%)	100	100	100
Moisture content	(%)	23	23	22
Bulk density	(t/m^3)	2.06	2.07	2.08
Dry density	(t/m^3)	1.68	1.69	1.71
Voids ratio		0.624	0.614	0.587
Degree of saturation	(%)	100	100	100
Cvi	(m^2/year)	227.45	264.28	363.10
Mvi	(m^2/MN)	1.41	0.80	0.76
Permeability	(m/s)	9.93E-08	6.53E-08	8.54E-08

Mode of failure:



Borehole	Open Pit
Sample	Waste Pad
Depth (m)	-
Cardno Geotech Sample Number	5029/S/14916

SUMMARY OF
ISOTROPICALLY CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION TEST : MULTISTAGE

Template Issue: 1 [redacted] Date: 12/08/2016

Approved Signatory: [redacted] Date: 12-8-16 Filename: 5029/S/14916 / EFFECTIV /

CMW Geosciences
Doray Minerals Limited - Andy Well

SHEARING		Stage 1	Stage 2	Stage 3
Initial pore pressure	(kPa)	360	360	360
Initial effective cell pressure	(kPa)	10	20	40
Rate of strain	(%/hour)	1.00	1.00	1.00
At peak deviator stress				
Corrected deviator stress	(kPa)	34	52	80
Membrane correction applied	(kPa)	0.4	0.4	0.4
Drain correction applied	(kPa)	0	0	0
Axial strain	(%)	8.06	9.63	7.71
Excess pore pressure	(kPa)	-5	-6	3
Major principal effective stress	(kPa)	48	78	117
Minor principal effective stress	(kPa)	15	26	37
Principal effective stress ratio		3.28	2.99	3.17
ε 50	(%)	1.64	0.83	0.94
Secant modulus at ε 50	(kPa)	1027	3124	4235
At peak principal effective stress ratio				
Corrected deviator stress	(kPa)	22	44	71
Membrane correction applied	(kPa)	0.1	0.1	0.1
Drain correction applied	(kPa)	0	0	0
Axial strain	(%)	2.70	2.72	2.30
Excess pore pressure	(kPa)	1	2	12
Major principal effective stress	(kPa)	31	62	99
Minor principal effective stress	(kPa)	9	18	28
Principal effective stress ratio		3.53	3.45	3.50
ε 50	(%)	0.45	0.64	0.81
Secant modulus at ε 50	(kPa)	2438	3397	4337

FINAL CONDITIONS		Computed	Computed	Measured
Moisture content	(%)	23	23	22
Bulk density	(t/m³)	2.06	2.07	2.08
Dry density	(t/m³)	1.68	1.69	1.71

Borehole	Open Pit
Sample	Waste Pad
Depth (m)	-
Cardno Geotech Sample Number	5029/S/14916

SUMMARY OF
ISOTROPICALLY CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION TEST : MULTISTAGE

Date: 12/08/2016

[redacted]

Template Issue: 1

Filename: 5029/S/14916 / EFFECTIV /

Date: 12-8-16

[redacted]

Approved Signatory:

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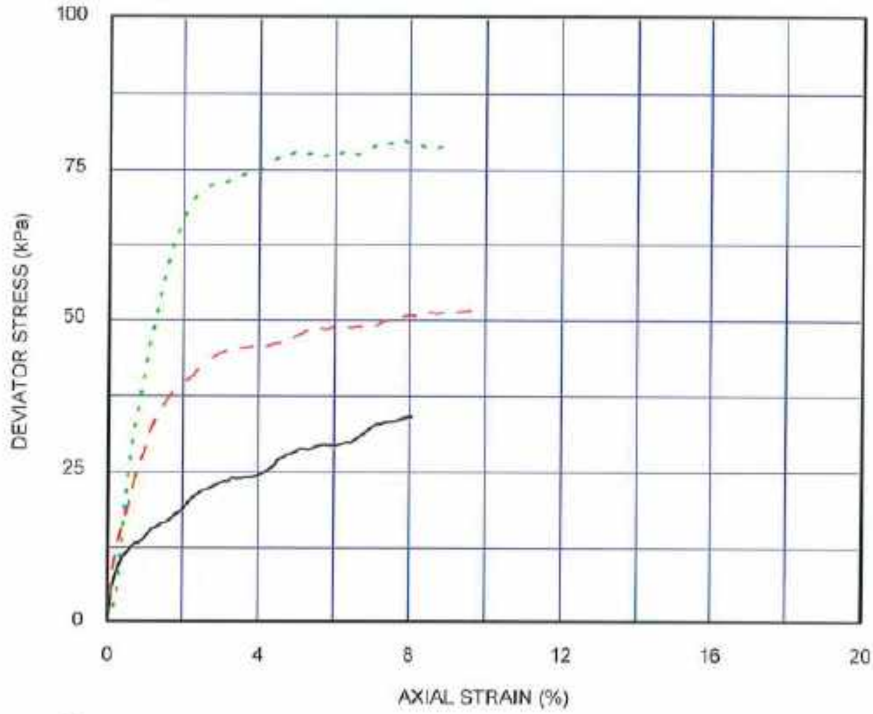
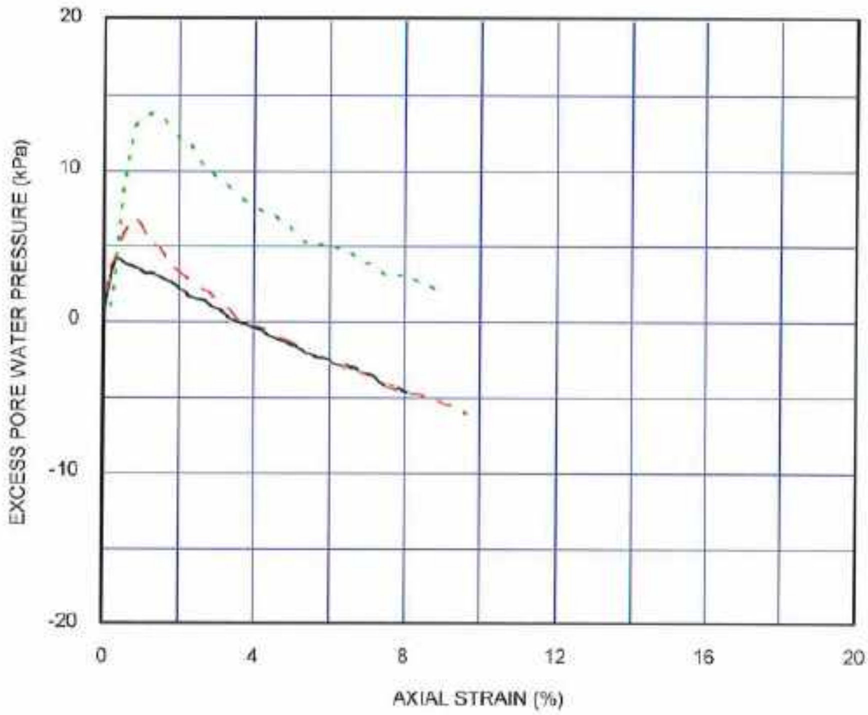
paul.kent@cardno.com.au

NATA

Date: 12/08/2016
Drawn by: [redacted]
Template Issue: 2
Filename: 5029/S/14916 \ EFFECTIVE \ 14916_CUMulti.OPJ
Date: 12.8.16
Approved Signatory: [redacted]





Curve	Stage(M)	s_{rc}' (kPa)	s_{vc}' (kPa)	Borehole	Depth	Sample ID
——	1	10	10	Open Pit	Waste Pad	-
– – –	2	20	20			
· · · ·	3	40	40			

ISOTROPIC CONSOLIDATED UNDRAINED COMPRESSION TEST:MULTISTAGE

CMW Geosciences
Doray Minerals Limited - Andy Well

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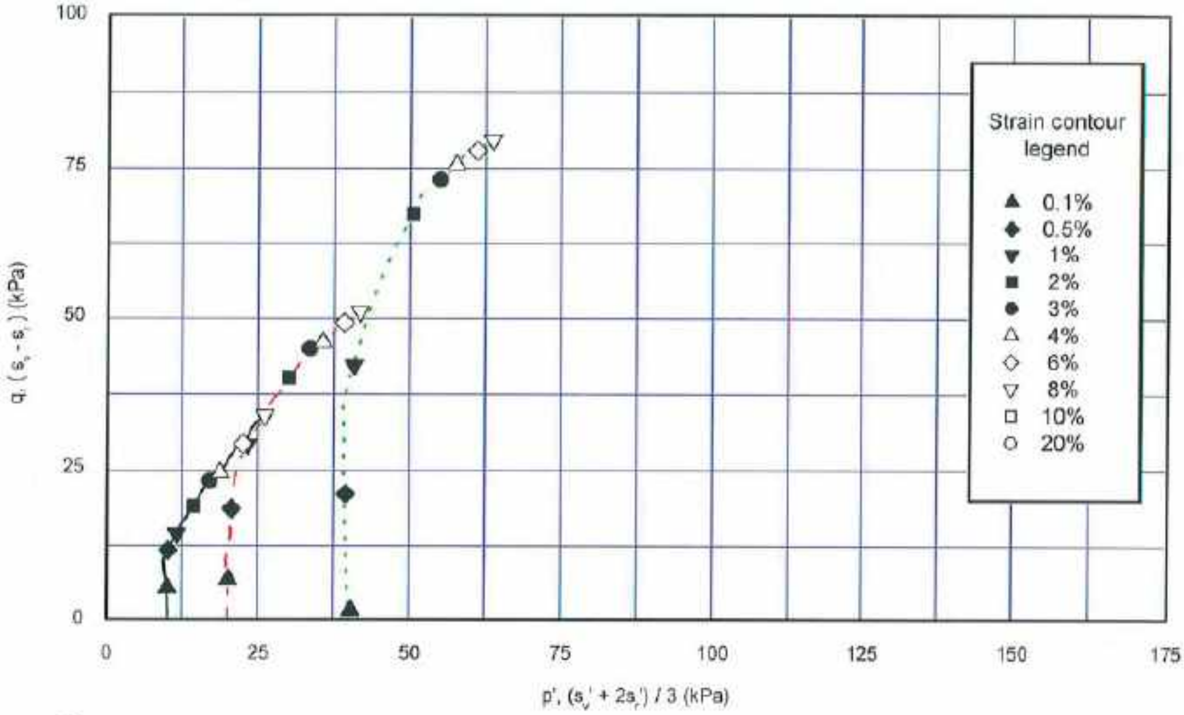
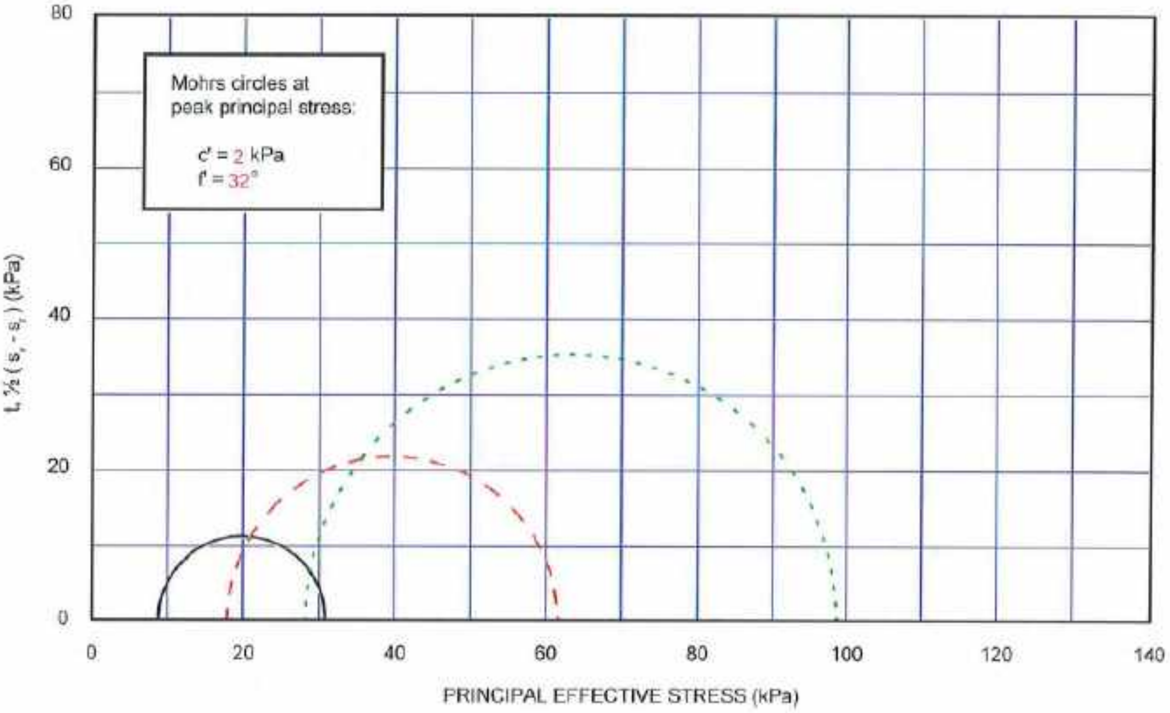
Date: 12/08/2016
Drawn by: [redacted]
Template Issue: 2
Filename: 5029/S/14916\EFFECTIVE\14916_CUMulti.OPJ
Date: 12-9-16
Approved Signatory: [redacted]





Curve	Stage(M)	s_{rc}' (kPa)	s_{vc}' (kPa)	Borehole	Depth	Sample ID
———	1	10	10	Open Pit	Waste Pad	-
— — —	2	20	20			
· · · ·	3	40	40			

ISOTROPIC CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST:MULTISTAGE

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Date: 12/08/2016
Drawn by: [redacted]
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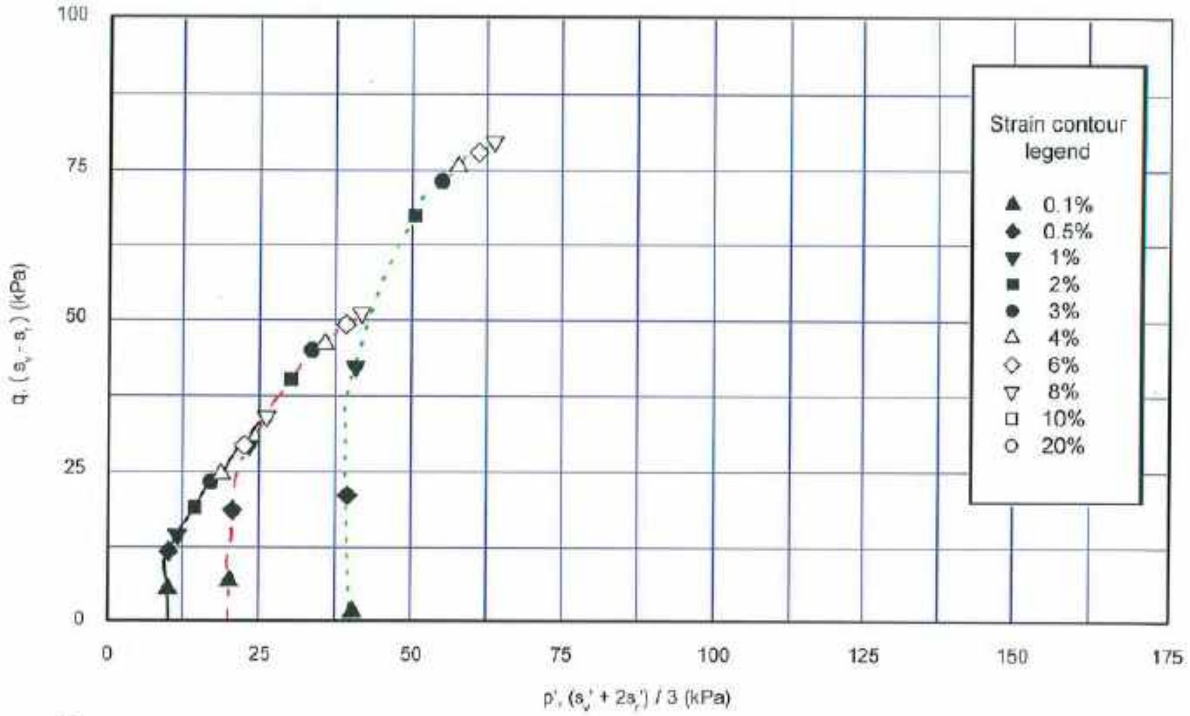
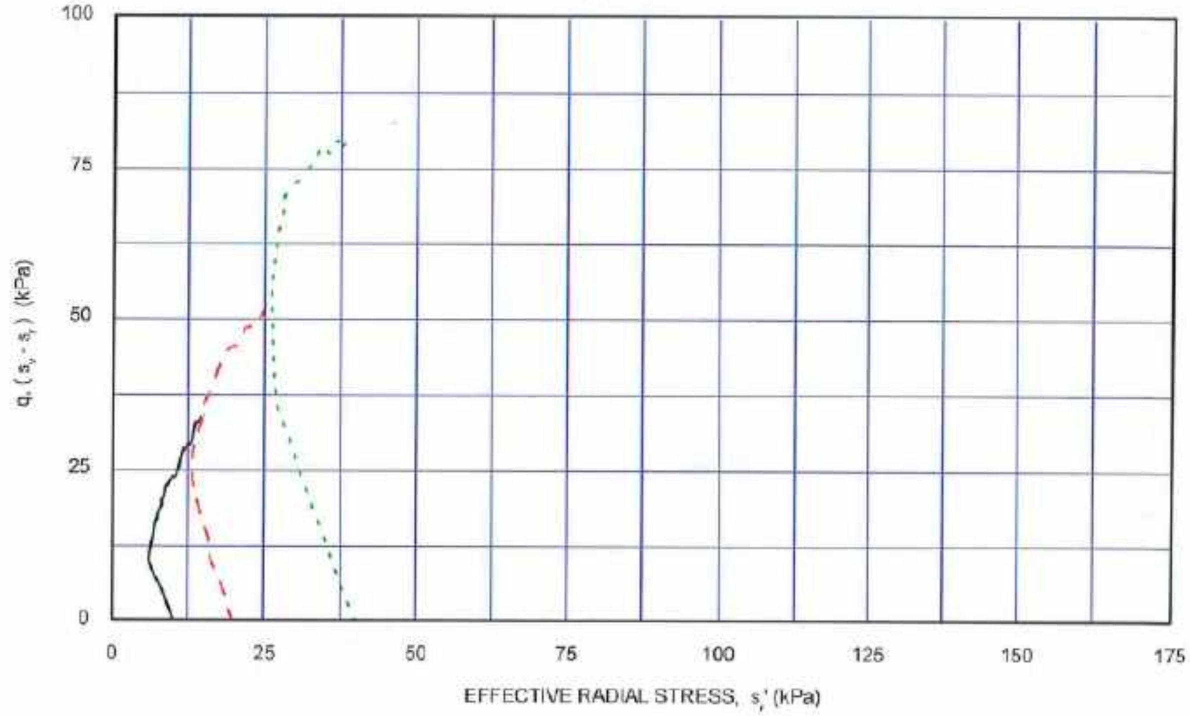
Filename: 5029/S/14916\EFFECTIVE\14916_CUMulti.OPJ
Date: 12-8-16
Approved by: [redacted]





Curve	Stage(M)	s_{rc}' (kPa)	s_{vc}' (kPa)	Borehole	Depth	Sample ID
——— (solid)	1	10	10	Open Pit	Waste Pad	-
– – – (dashed)	2	20	20			
· · · (dotted)	3	40	40			

ISOTROPIC CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST: MULTISTAGE

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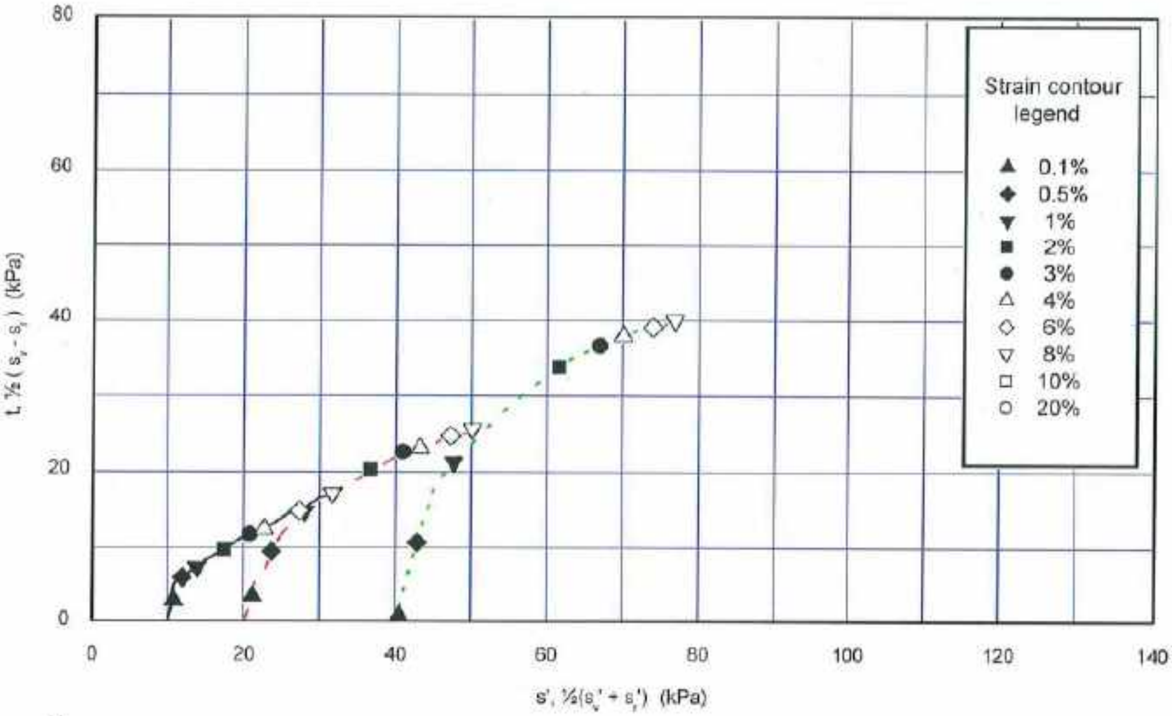
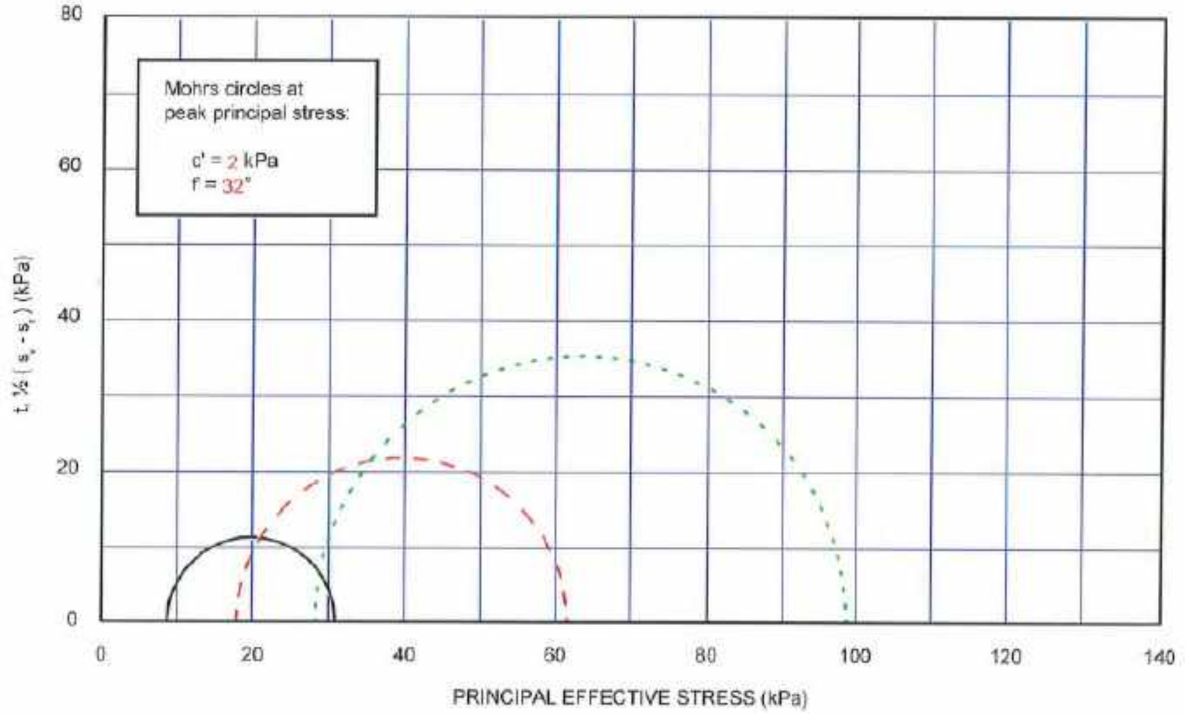
Date: 12/08/2016
Drawn by: [redacted]
Template Issue: 2
Filename: 5029/S/14916 \ EFFECTIVE \ 14916_CUMulti.OPJ
Date: 12 - 8 - 16
Approved by: [redacted]





Curve	Stage(M)	s_{rc}' (kPa)	s_{vc}' (kPa)	Borehole	Depth	Sample ID
———	1	10	10	Open Pit	Waste Pad	-
— — —	2	20	20			
· · · ·	3	40	40			

ISOTROPIC CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST: MULTISTAGE

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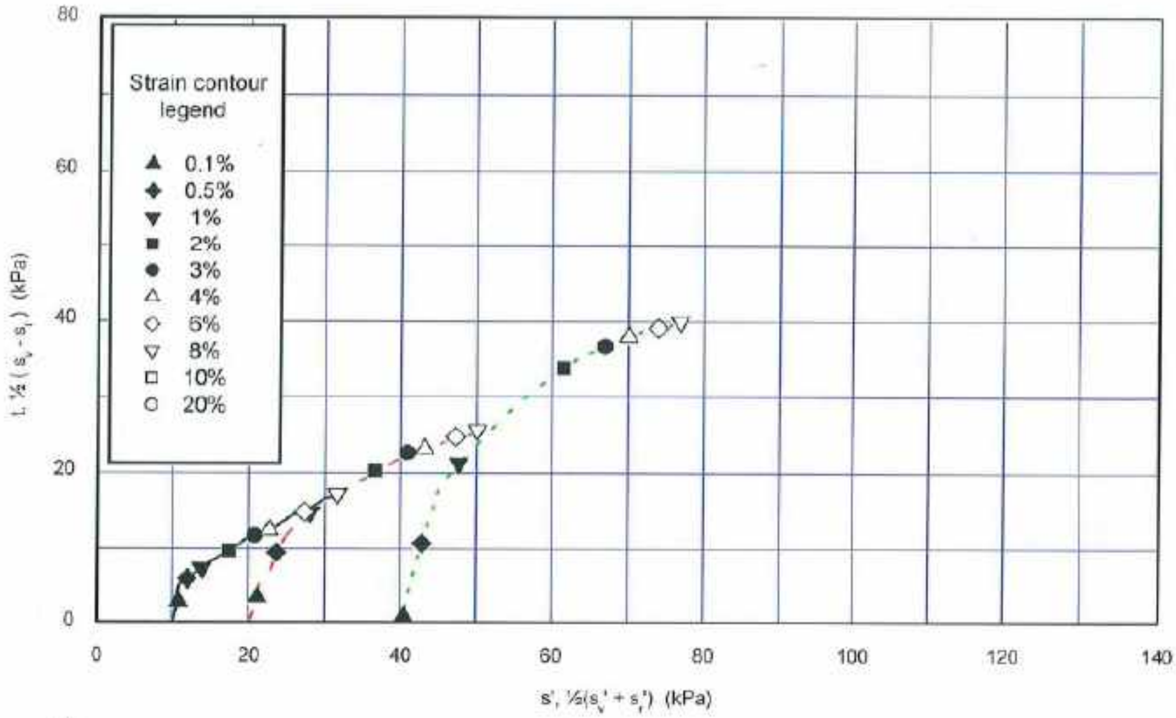
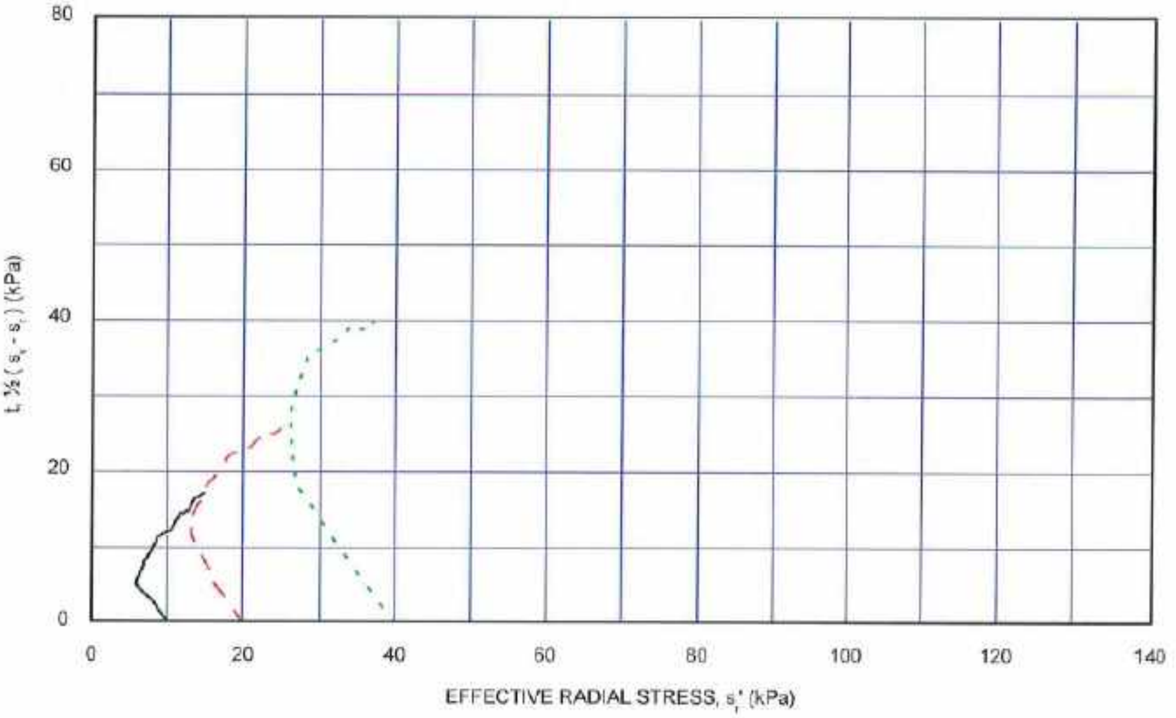
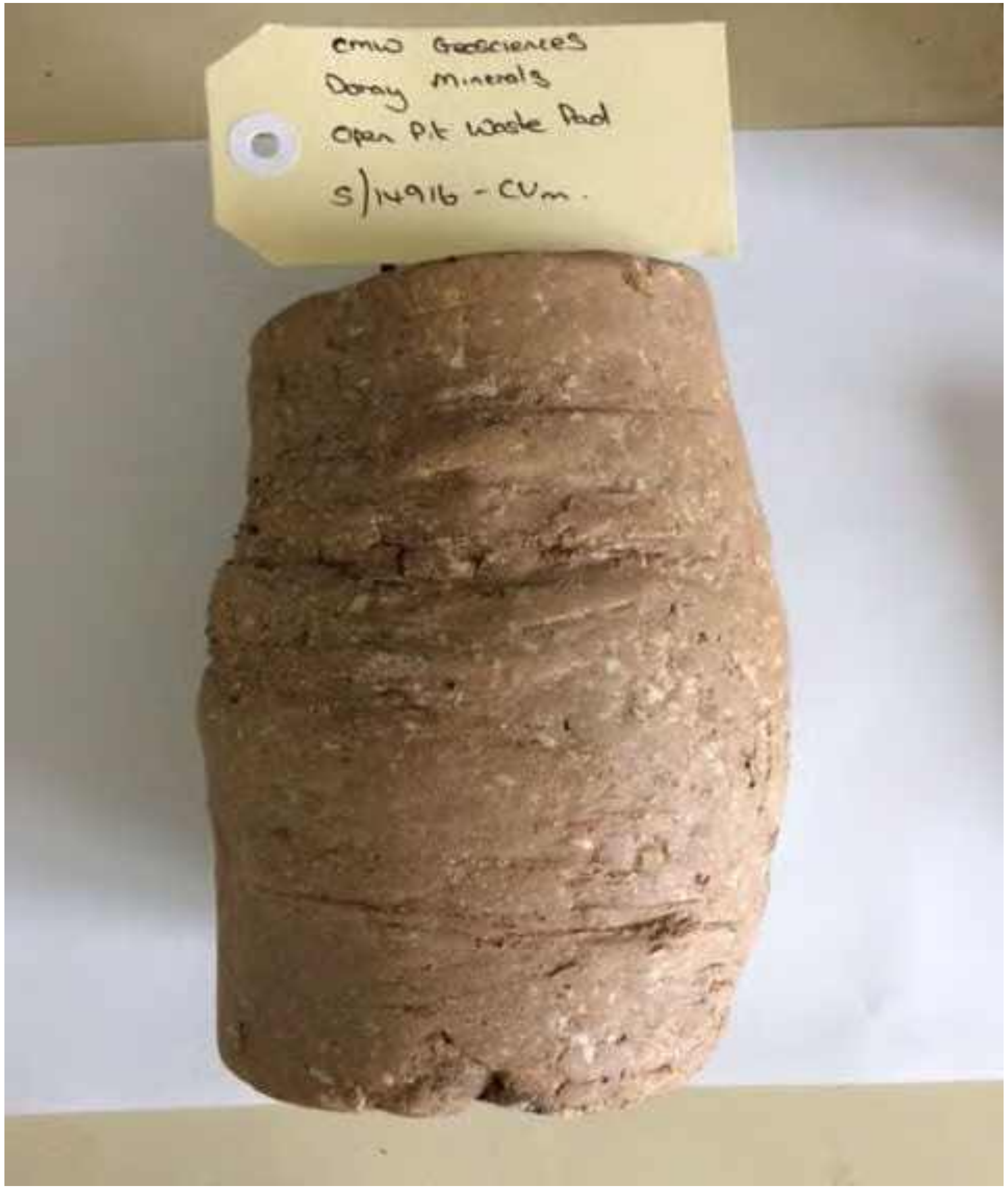
Date: 12/08/2016
Drawn by: [redacted]
Template Issue: 2
Filename: 5029/S/14916\EFFECTIVE\14916_CUMulti.OPJ
Date: 12-8-16
Approved by: [redacted]





Curve	Stage(M)	s_{rc}' (kPa)	s_{vc}' (kPa)	Borehole	Depth	Sample ID
	1	10	10	Open Pit	Waste Pad	-
	2	20	20			
	3	40	40			

ISOTROPIC CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION TEST: MULTISTAGE


CMW Geosciences
Doray Minerals
Open Pit Waste Pad
S/14916 - CUm.


CMW Geosciences
Doray Minerals
Open Pit Waste Pad
S/14916 - CUm.

Appendix C

Geotechnical Tailings Testwork

ANDY WELL PROJECT

Tailings Storage Facility 3

Appendix B

Physical Tailings Testing Results

Welshpool Laboratory
Coffey Information Pty Ltd
ABN 92 114 364 046
289a Treasure Road
Welshpool Western Australia 6106
Telephone: +61 8 6406 2400
Facsimile: +61 8 6406 2480

coffey information
SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

Test Report

Report No.: WELS12S- 00221PI

Issue No.: 1

This report replaces all previous issues of report no. WELS12S- 00221PI

Client:	Coffey Mining - MINEWPER00921AB
Client Address:	1162 Hay Street West Perth WA 6005
Principal:	Doray Minerals Limited
Project:	Andy Well Gold Project
Project No.:	INFOWELS00989AA
Work Order No.:	WELS12W 30033
Location:	45 km North of Meekatharra

NATA
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[redacted]

NATA Accredited Laboratory Number: 431
Date of Issue: 06-02-12

Sample Details

Sample No.: WELS12S- 00221
Sample ID: Tailings

Other Sample Details:

Test Results

Atterberg Limits in accordance with AS1289.3.1.1, 3.2.1, 3.3.1, 3.4.1

Date tested	3-02-2012
Liquid Limit (%)	Unobtainable
Plastic Limit (%)	Non - Plastic
Plasticity Index (%)	Non - Plastic
Linear Shrinkage (%)	0.0
Length of mould (mm)	250
Nature Of Shrinkage	flat
Sample History	oven dried
Preparation Method	dry sieved

Comments:
Sample supplied by client
Non standard linear shrinkage due to liquid limit being unobtainable. Linear shrinkage taken at moisture content of 26.4%

Welshpool Laboratory
Coffey Information Pty Ltd
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coffey information
SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

Test Report

Report No.: WELS12S- 00221SPD

Issue No.: 1

This report replaces all previous issues of report no. WELS12S- 00221SPD

Client:	Coffey Mining - MINEWPER00921AB
Client Address:	1162 Hay Street West Perth WA 6005
Principal:	Doray Minerals Limited
Project:	Andy Well Gold Project
Project No.:	INFOWELS00989AA
Work Order No.:	WELS12W 30033
Location:	45 km North of Meekatharra

NATA
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[redacted]

NATA Accredited Laboratory Number: 431
Date of Issue: 7/02/2012

Sample Details

Sample No.: WELS12S- 00221
Sample ID: Tailings

Other Sample Details:

Test Results

Soil Particle Density tested in accordance with AS1289.3.5.1

Date tested	2/02/2012	
Average Apparent Particle Density for material passing 2.36mm	2.68	g/cm^3
Water temperature for material passing 2.36mm	23.0	°C
Average Apparent Particle Density for material retained 2.36mm	N/A	g/cm^3
Soil Particle Density	2.68	g/cm^3

Comments:
Sample supplied by client

coffey information
SPECIALISTS IN SCIENTIFIC TESTING SOLUTIONS

Welshpool Laboratory
Coffey Information Pty Ltd
ABN 92 114 364 046
269A Treasure Road
Welshpool Western Australia 6106
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Facsimile: +61 8 6466 2450

Test Report

Report No.: WELS12S-00221HYDRO
Issue No.: 1

Client:	Coffey Mining - MINEWPER00921AB
Client Address:	1162 Hay Street West Perth WA 6005
Principal:	Doray Minerals Limited
Project:	Andy Well Gold Project
Project No.:	INFOWELS00989AA
Work Order No.:	WELS12W30033
Location:	45 km North of Meekatharra

NATA
WORLD RECOGNISED ACCREDITATION

This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025.

[redacted] in full.)

NATA Accredited Laboratory Number: 431
Date of Issue: 7/02/2012

Sample Details

Sample No.: WELS12S-00221
Sample ID: Tailings

Other Sample Details:
Method of dispersion: Omitted pretreatment
Hydrometer type: zeal

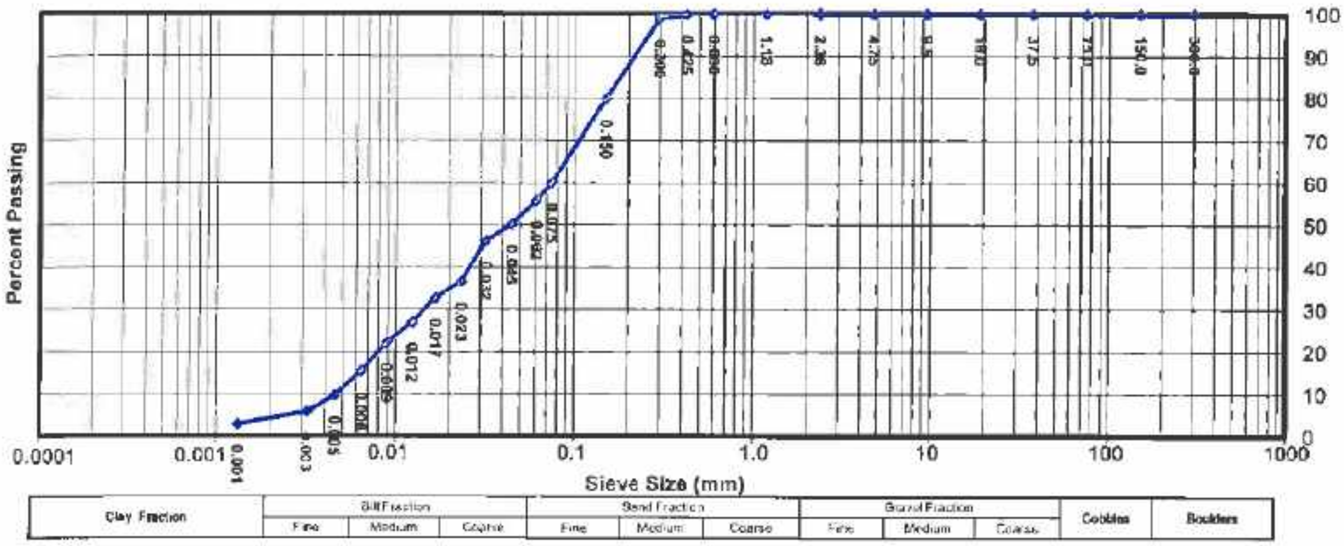
Test Results

Particle Size Distribution in accordance with AS1289.3.6.1 & AS1289.3.6.3

Date tested : 2/02/2012

Sieve Size (mm)	% Passing
300.0	100
150.0	100
75.0	100
37.5	100
19.0	100
9.5	100
4.75	100
2.36	100
1.18	100
0.600	100
0.425	100
0.300	99
0.150	80
0.075	60

Particle Size (mm)	% Passing
0.062	56
0.045	50
0.032	46
0.023	37
0.017	33
0.012	27
0.009	22
0.006	15
0.005	10
0.003	6
0.001	3



Comments:
Sample supplied by client

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test certificate - air drying test

job no : INFOWELS00989AA
report no : WELS12S-00221ADT

client :	Coffey Mining - MINEWPER00921AB	date :	31/01/2012
principal :	Doray Minerals Limited	laboratory :	Welshpool
project :	Andy Well Gold Project	tested by :	MJ
location :	45 km North of Meekatharra	checked by :	MJ

Sample ID:

PERCENT SOLIDS: 30.2 %

TEST CYLINDER

Diameter of Beaker	100	mm
Area of Beaker	7853.98	mm2
Mass of Beaker	258.8	g
Mass Beaker & Tailings	1181.84	g
Mass of Tailings Wet	923.04	g
Mass of Tailings Dry	278.53	g

MOISTURE CONTENT AT TEST

Container No.	19	
Mass Cont. & Tailings Wet	487.1	g
Mass Cont. & Tailings Dry	242.45	g
Mass Container	136.72	g
Moisture Content	231.39	%

AFTER TEST

Mass Tailings Dry:	281.40	g
Mass Tailings Dry: *check*	281.40	g

Date & Time Test Commenced

Elapsed Time (hours)	Height of Tailings (mm)	Height of Water (mm)		Mass Beaker & Tailings (g)	Wet Mass (g)	Volume of Tailings (cm3)	Dry Density (t/m3)	Moisture Content of Slurry (%)
0	88.0	0		1181.84	923.04	691.15	0.403	231.39
23	35.0	48		1050.55	791.75	274.89	1.013	184.26
51	32.0	38		947.58	688.78	251.33	1.108	147.29
70	32.0	28		879.77	620.97	251.33	1.108	122.94
140	32.0	0		575.88	317.08	251.33	1.108	13.84
164	32.0	0		540.20	281.40	251.33	1.108	1.03

Remarks: Sampling Method/s - Submitted by client. Test sample placed in Air drying oven with temperatures
Test sampl ranging between approximately 45^0 - 50^0C.Refer to picture attached for sample characteristics .

Approved: [redacted]
Date:

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test certificate - drained settling test

job no : INFOWELS00989AA
report no : WELS12S-00221DST

client : Coffey Mining - MINEWPER00921AB
Address: 1162 Hay Street West Perth WA 6005
principal : Doray Minerals Limited
project : Andy Well Gold Project
location : 45 km North of Meekatharra

date : 31/01/2012
laboratory : Welshpool
tested by : MJ
checked by : MJ

% Solids: 30.2

Sample ID: Tailings

TEST CYLINDER

Diameter of Cylinder	60.0	mm
Area of Cylinder	2827.4	mm2
Mass of Cylinder	707.4	g
Mass Cylinder & Tailings	1725.4	g
Mass of Tailings Wet	1018.0	g
Mass of Tailings Dry	307.2	g

AFTER TEST

Mass Cylinder & Tailings	1564.8	g	
Mass of Tailings Wet	857.4	g	
Mass of Tailings Dry	307.2	g	
Amount of Liquor in Sample	251.4	mm	
Amount of Liquor Drained	56.8	mm	160.6 (g)
Amount of Liquor Removed	0.0	mm	
Remaining Liquor in Sample	194.60	mm	

MOISTURE CONTENT CHECK

Container No.	19	
Mass Cont. & Tailings Wet	487.1	g
Mass Cont. & Tailings Dry	242.45	g
Mass Container	136.72	g
Moisture Content	231.39	%

AFTER TEST

Final Moisture Content	83.55	%

Date & Time Test Commenced: 31/01/2012 10:20

Density of Liquor: 1.0 g/cm3

					With respect to Initial Volume of Liquor					
Elapsed Time (minutes)	Height of Liquor mm	Liquor Drained (g)	Liquor Drained (mm)	Height of Tailings (mm)	Supernatant (%)	Drainage (%)	Cumulative Underdrain (%)	Total Recovery (%)	Dry Density (t/m3)	Moisture Content of Slurry (%)
0	0	0.0	0.0	248	0.00	0.00	0.00	0.00	0.438	231.39
2	4	24.5	8.7	243	1.59	3.44	3.44	5.03	0.447	223.42
4	9	40.4	14.3	230	3.58	2.24	5.69	9.27	0.472	218.23
8	16	58.5	20.7	214	6.36	2.55	8.23	14.60	0.508	212.34
30	57	105.9	37.5	168	22.67	6.66	14.90	37.57	0.647	196.92
90	103	166.8	59.0	95	40.97	8.56	23.46	64.43	1.144	177.11
120	100	174.9	61.9	95	39.78	1.15	24.61	64.38	1.144	174.45
1305	0	454.2	160.6	94	0.00	39.28	63.89	63.89	1.156	83.55

Remarks: Sampling Method/s - Submitted by client.

Approved: [redacted]

Date: 8/02/2012

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test certificate - undrained settling test

job no : INFOWELS00989AA
report no : WELS12S-00221UST

client : Coffey Mining - MINEWPER00921AB
Address: 1162 Hay Street West Perth WA 6005
principal : Doray Minerals Limited
project : Andy Well Gold Project
location : 45 km North of Meekatharra

date : 31/02/12
laboratory : Welshpool
tested by : MJ
checked by : MJ

% Solids:	30.2	%
TEST CYLINDER		
Diameter of Cylinder	60.00	mm
Area of Cylinder	2827.43	mm2
Mass of Cylinder	441.21	g
Mass Cylinder & Tailings	2167.21	g
Mass of Tailings Wet	1726	g
Mass of Tailings Dry	520.83	g
Density of Liquor	1.0	g/cm3
Amount of Liquor in Sample	426.24	mm

Sample ID:	Tailings	
MOISTURE CONTENT AT TEST		
Container No.	19	
Mass Cont. & Tailings Wet	487.1	g
Mass Cont. & Tailings Dry	242.45	g
Mass Container	136.72	g
Moisture Content	231.39	%

Date & Time Test Commenced

Elapsed Time (minutes)	Height of Water (mm)			Height of Tailings (mm)	*With respect to Initial Volume of Liquor* Cumulative Supernatant (%)			Dry Density (t/m3)
0	0.0			425.0	0.00			0.433
1	5.0			420.0	1.17			0.439
2	8.0			417.0	1.88			0.442
4	10.0			415.0	2.35			0.444
8	15.0			410.0	3.52			0.449
15	26.0			399.0	6.10			0.462
30	46.0			379.0	10.79			0.486
60	86.0			339.0	20.18			0.543
120	152.0			273.0	35.66			0.675
1440	246.0			179.0	57.71			1.029

Remarks: Sampling Method/s - Submitted by client.

Approved: [redacted]
Date:

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TEST CERTIFICATE

Client: Coffey Mining - MINEWPER00921AB
Principal: Doray Minerals Ltd
Project: Andy Well Gold Project
Location: 45 km North of Meekatharra
Sample ID: Tailings

Report No.: WELS12S-00221MTT
Project No. INFOWELS00989AA
Date Tested: 13/02/2012

Modified Triaxial Test

Specimen Preparation: The material was poured into a Triaxial membrane placed within a triaxial cell. The specimen was confined and nett volume change measurements were recorded at a range of confining stresses. Drainage of the specimen was allowed via a porous disc through the top of the specimen which was connected to atmospheric conditions.

Soil Particle Density: 2.7 t/m^3

Dry Mass of Test Specimen: 464.46 g

Confining Stress (kPa)	0	50	100	200
Change in Volume (cm^3)	N/A	3.51	0.06	8.70
Volume (cm^3)	231.13	227.62	227.56	218.86
Mass of Water in Specimen (g)	133.64	130.13	130.07	130.07
Moisture Content (%)	28.8	28.0	28.0	121.4
Dry Density (t/m^3)	2.010	2.041	2.041	2.122
Void Ratio	0.344	0.323	0.323	0.272

Remarks: Sampling Method/s - Submitted by client.
All values in the table above are average values for one test specimer[redacted]
Soil Particle Density value assumed.

Approved[redacted]
Date: 23/02/2012

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Test Report

Report No.: WELS12S- 01853PI

Issue No.: 1

This report replaces all previous issues of report no. WELS12S- 01853PI

Client:	Coffey Mining - MINEWPER00921AB
Client Address:	1162 Hay Street West Perth WA 6005
Principal:	Doray Minerals Limited
Project:	Andy Well Gold Project
Project No.:	INFOWELS00989AB
Work Order No.:	WELS12W 30362
Location:	45 km North of Meekatharra

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[redacted]

NATA Accredited Laboratory Number: 431
Date of Issue: 18/04/2012

Sample Details

Sample No.:	WELS12S- 01853
Sample ID:	3 Samples of tailings (from ALS Ammetec Metallurgy)

Other Sample Details:

Test Results

Atterberg Limits in accordance with AS1289.3.1.1, 3.2.1, 3.3.1, 3.4.1

Date tested	12/04/2012
Liquid Limit (%)	22
Plastic Limit (%)	Non Plastic
Plasticity Index (%)	Non Plastic
Linear Shrinkage (%)	1.0
Length of mould (mm)	250
Nature Of Shrinkage	flat
Sample History	air dried
Preparation Method	dry sieved

Comments:

Sample supplied by client

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Report No.: WELS12S-01853HYDRO

Issue No.: 1

Test Report

Client:	Coffey Mining - MINEWPER00921AB
Client Address:	1162 Hay Street West Perth WA 6005
Principal:	Doray Minerals Limited
Project:	Andy Well Gold Project
Project No.:	INFOWELS00989AB
Work Order No.:	WELS12W30362
Location:	45 km North of Meekatharra

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[redacted]

NATA Accredited Laboratory Number: 431

Date of Issue: 20/04/12

Sample Details

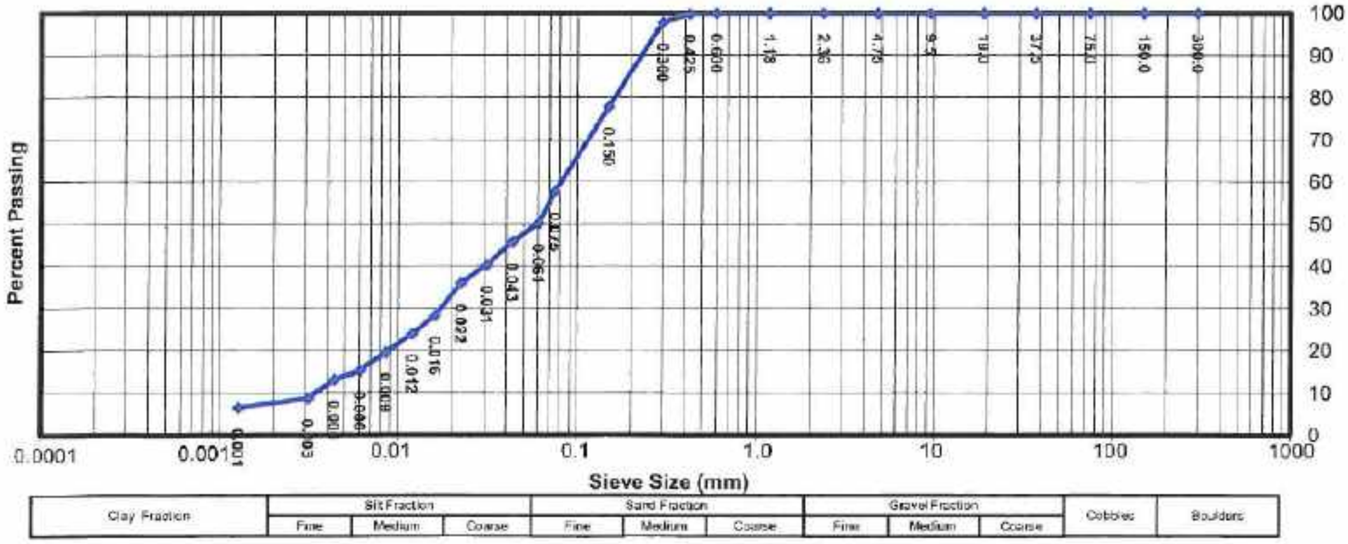
Sample No.:	WELS12S-01853	**Other Sample Details:**	
Sample ID:	3 Samples of tailings (from ALS Ammtec Metallurgy)	**Method of dispersion:**	Omitted pretreatment
		Hydrometer type:	real

Test Results

Particle Size Distribution in accordance with AS1289.3.6.1 & AS1289.3.6.3

Date tested : 12/4/2012

Sieve Size (mm)	% Passing	Particle Size (mm)	% Passing
300.0	100	0.061	50
150.0	100	0.043	46
75.0	100	0.031	40
37.5	100	0.022	36
19.0	100	0.016	28
9.5	100	0.012	24
4.75	100	0.009	20
2.36	100	0.006	15
1.18	100	0.004	13
0.600	100	0.003	9
0.425	100	0.001	7
0.300	98		
0.150	78		
0.075	58		



Comments:

Sampled in accordance with AS1289.1.2.1

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Test certificate - air drying test

job no : INFOWELS00989AA
report no : WELS12S-01853ADT

client :	Coffey Mining - MINEWPER00921AB	date :	12/4/2012
principal :	Doray Minerals Limited	laboratory :	Welshpool
project :	Andy Well Gold Project	tested by :	MJ
location :	45 km North of Meekatharra	checked by :	MJ

Sample ID:

PERCENT SOLIDS: 33.3 %

TEST CYLINDER

Diameter of Beaker	100	mm
Area of Beaker	7853.98	mm2
Mass of Beaker	257.6	g
Mass Beaker & Tailings	1247.3	g
Mass of Tailings Wet	989.70	g
Mass of Tailings Dry	329.51	g

MOISTURE CONTENT AT TEST

Container No.	2	
Mass Cont. & Tailings Wet	683.2	g
Mass Cont. & Tailings Dry	343.2	g
Mass Container	173.5	g
Moisture Content	200.35	%

AFTER TEST

Mass of Tailings Dry	329.51	g
Mass Tailings Dry: *check*	329.51	g

Date & Time Test Commenced 12/4/2012 10:00

Elapsed Time (hours)	Height of Tailings (mm)	Height of Water (mm)		Mass Beaker & Tailings (g)	Wet Mass (g)	Volume of Tailings (cm3)	Dry Density (t/m3)	Moisture Content of Slurry (%)
0	99.0	0		1247.3	989.70	777.54	0.424	200.35
288	50.0	9		913.57	655.97	392.70	0.839	99.07
309	49.0	3		848.21	590.61	384.84	0.856	79.24
333	44.0	0		779.74	522.14	345.57	0.954	58.46
360	35.0	0		697.84	440.24	274.89	1.199	33.60
364	35.0	0		688.53	430.93	274.89	1.199	30.78
383	35	0		592.10	334.50	274.89	1.199	1.51

Remarks: Sampling Method/s - Submitted by client. Test sample placed in Air drying oven with temperatures Test sampl ranging between approximately 45^0 - 50^0C.Refer to picture attached for sample characteristics .

Approved [redacted]

Date: 20/04/12

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test certificate - drained settling test

job no : INFOWELS00989AA
report no : WELS12S-01853DST

client : Coffey Mining - MINEWPER00921AB
Address: 1162 Hay Street West Perth WA 6005
principal : Doray Minerals Limited
project : Andy Well Gold Project
location : 45 km North of Meekatharra

date : 12/4/2012
laboratory : Welshpool
tested by : MJ
checked by : MJ

% Solids: 33.3 %

Sample ID:

TEST CYLINDER			**MOISTURE CONTENT CHECK**		
Diameter of Cylinder	61.0	mm	Container No.	2	
Area of Cylinder	2922.5	mm2	Mass Cont. & Tailings Wet	683.2	g
Mass of Cylinder	730.1	g	Mass Cont. & Tailings Dry	343.2	g
Mass Cylinder & Tailings	1790.4	g	Mass Container	173.6	g
Mass of Tailings Wet	1060.3	g	**Moisture Content**	200.47	%
Mass of Tailings Dry	352.9	g			
AFTER TEST			**AFTER TEST**		
Mass Cylinder & Tailings	1780.5	g	Final Moisture Content	197.65	%
Mass of Tailings Wet	1050.4	g			
Mass of Tailings Dry	352.9	g			
Amount of Liquor in Sample	242.1	mm			
Amount of Liquor Drained	3.4	mm 10.0 (g)	Date & Time Test Commenced		
Amount of Liquor Removed	0.0	mm			
Remaining Liquor in Sample	238.66	mm	Density of Liquor:	1.0	g/cm3

					With respect to Initial Volume of Liquor					
Elapsed Time (minutes)	Height of Liquor mm	Liquor Drained (g)	Liquor Drained (mm)	Height of Tailings (mm)	Supernatant (%)	Drainage (%)	Cumulative Underdrain (%)	Total Recovery (%)	Dry Density (t/m3)	Moisture Content of Slurry (%)
	0	0	0.0	261	0.00	0.00	0.00	0.00	0.463	200.47
	0	3.62	1.2	261	0.00	0.51	0.51	0.51	0.463	199.45
	0	4.28	1.5	261	0.00	0.09	0.61	0.61	0.463	199.26
	0	4.91	1.7	260	0.00	0.09	0.69	0.69	0.464	199.08
	0	5.74	2.0	260	0.00	0.12	0.81	0.81	0.464	198.85
	5	5.89	2.0	255	2.07	0.02	0.83	2.90	0.474	198.80
	18	6.16	2.1	242	7.44	0.04	0.87	8.31	0.499	198.73
	126	6.89	2.4	117	52.05	0.10	0.97	53.03	1.032	198.52
	126	7.20	2.5	114	52.05	0.04	1.02	53.07	1.059	198.43
	127	7.91	2.7	110	52.47	0.10	1.12	53.58	1.098	198.23
	125	8.07	2.8	109	51.64	0.02	1.14	52.78	1.108	198.18
	123	8.65	3.0	109	50.81	0.08	1.22	52.04	1.108	198.02
	117	8.96	3.1	114	48.33	0.04	1.27	49.60	1.059	197.93
	116	9.31	3.2	114	47.92	0.05	1.32	49.24	1.059	197.83
	110	9.95	3.4	114	45.44	0.09	1.41	46.85	1.059	197.65

Remarks: Sampling Method/s - Submitted by client.

Approved: [redacted] Date: 30/04/12

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test certificate - undrained settling test

job no : INFOWELS00989AA
report no : WELS12S-01853UD

client : Coffey Mining - MINEWPER00921AB
date : 12/4/2012
Address: 1162 Hay Street West Perth WA 6005
principal : Doray Minerals Limited
laboratory : Welshpool
project : Andy Well Gold Project
tested by : MJ
location : 45 km North of Meekatharra
checked by : MJ

% Solids: 33.3 %

Sample ID:

TEST CYLINDER			**MOISTURE CONTENT AT TEST**		
Diameter of Cylinder	60.00	mm	Container No.	2	
Area of Cylinder	2827.43	mm2	Mass Cont. & Tailings Wet	683.2	g
Mass of Cylinder	442	g	Mass Cont. & Tailings Dry	343.2	g
Mass Cylinder & Tailings	1697.4	g	Mass Container	173.5	g
Mass of Tailings Wet	1255.4	g	Moisture Content	200.35	%
Mass of Tailings Dry	417.97	g			
Density of Liquor	1.0	g/cm3			
Amount of Liquor in Sample	296.18	mm	Date & Time Test Commenced		11/4/2012 10:00

					With respect to Initial Volume of Liquor			
Elapsed Time (minutes)	Height of Water (mm)			Height of Tailings (mm)	Cumulative Supernatant (%)			Dry Density (t/m3)
0	0.0			310.0	0.00			0.477
1	3.0			307.0	1.01			0.482
2	8.0			302.0	2.70			0.489
4	8.0			302.0	2.70			0.489
8	8.0			302.0	2.70			0.489
15	10.0			300.0	3.38			0.493
30	10.0			300.0	3.38			0.493
60	11.0			299.0	3.71			0.494
120	11.0			299.0	3.71			0.494
240	11.0			299.0	3.71			0.494
1440	17.0			293.0	5.74			0.505
5760	158.0			152.0	53.35			0.973
7260	161.0			149.0	54.36			0.992
8640	163.0			147	55.03			1.006
10080	164.0			146	55.37			1.013
11520	164.0			146	55.37			1.013

Remarks: Sampling Method/s - Submitted by client.

Approved: [redacted]

Date: 20/04/12

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www.coffey.com.au

TEST CERTIFICATE

Client: Coffey Mining - MINEWPER00921AB
Principal: Doray Minerals Limited
Project: Andy Well Gold Project
Location: 45 km North of Meekatharra
Sample ID: WELS12S-01853

Report No.: WELS12S-01853MODTXL
Project No.: INFOWELS00989AB
Date Tested: 10/05/2012

Modified Triaxial Test

Specimen Preparation: The material was poured into a Triaxial membrane placed within a triaxial cell. The specimen was confined and nett volume change measurements were recorded at a range of confining stresses. Drainage of the specimen was allowed via a porous disc through the top of the specimen which was connected to atmospheric conditions.

Soil Particle Density: 3 t/m^3

Dry Mass of Test Specimen: 479.28 g

Confining Stress	(kPa)	0	50	100	200
Change in Volume	(cm3)	N/A	79.28	20.85	9.55
Volume	(cm3)	331.35	252.07	231.22	221.67
Mass of Water in Specimen	(g)	144.84	113.57	99.54	96.16
Moisture Content	(%)	30.2	23.7	20.8	20.1
Dry Density	(t/m3)	1.446	1.901	2.073	2.162
Void Ratio		1.074	0.578	0.447	0.387

Remarks: Sampling Method/s - Submitted by client.
All values in the table above are average values for one test specimen .
Soil Particle Density value assumed.

Approved: [redacted]
Date: 18/05/2012

Perth
16 Gympie Way, Willetton
WA 6155
Ph: (08) 9418 8742
[redacted]

E-Precision Laboratory

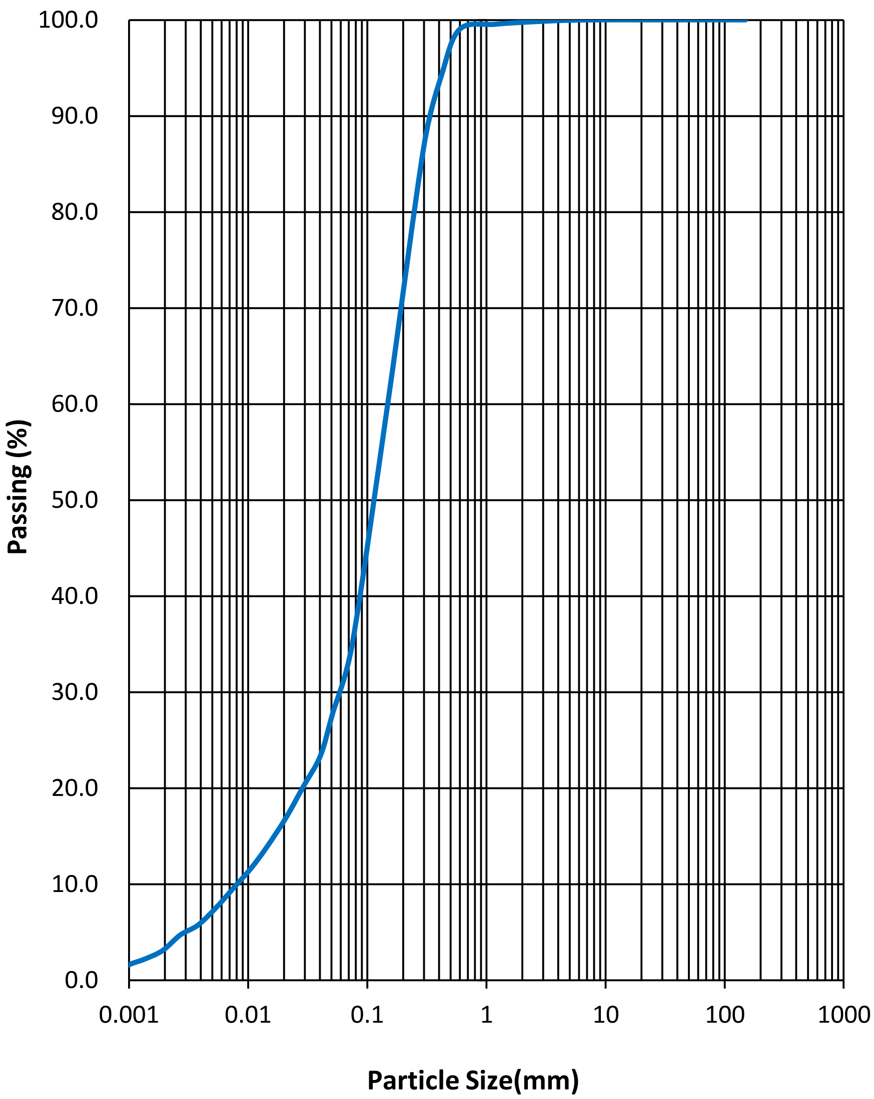
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.3 3.5.1

Client:	Geoanalytica	Date Tested:	26/05/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	MEEKA
Sample No:	TSF1-A	Depth (m):	-
Lab ID:	TSF1-A_1_PSD	Room Temperature at Test:	19°C
Tested by:	[redacted]	2.36mm Particle Density (t/m³):	3.043
Checked by:		Moisture Content (%):	-

Sieve Size (mm)	Passing %
150	100.0
75	100.0
53	100.0
37.5	100.0
26.5	100.0
19	100.0
9.5	100.0
4.75	100.0
2.36	99.8
1.18	99.5
0.6	99.0
0.425	94.4
0.3	86.9
0.15	60.3
0.075	35.0
0.05131	27.8
0.04051	23.4
0.02903	20.1
0.02080	16.9
0.01430	13.8
0.01054	11.6
0.00751	9.6
0.00535	7.5
0.00380	5.7
0.00270	4.7
0.00192	3.1
0.00136	2.2
0.00108	1.8
0.00094	1.5
0.00079	1.3

PSD Graph



Notes: *Oven dried @ 60deg*
Stored and Tested the Sample as received
Samples supplied by the Client

Authorized Signature: [redacted]

Integrity Precision Innovation

Perth
16 Gympie Way, Willetton
WA 6155
Ph: (08) 9418 8742
[redacted]

E-Precision Laboratory

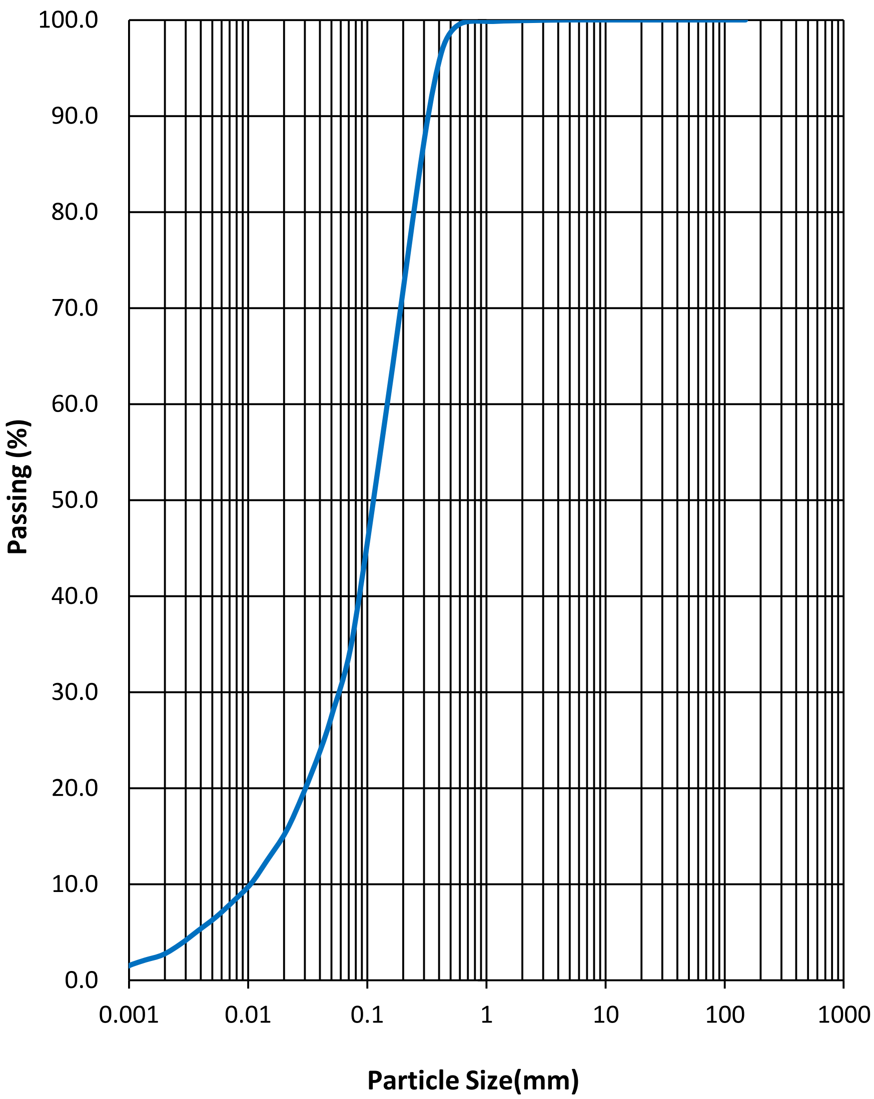
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.3 3.5.1

Client:	Geoanalytica	Date Tested:	26/05/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	MEEKA
Sample No:	TSF1-A	Depth (m):	-
Lab ID:	TSF1-A_2_PSD	Room Temperature at Test:	19°C
Tested by:	[redacted]	2.36mm Particle Density (t/m³):	3.036
Checked by:		Moisture Content (%):	-

Sieve Size (mm)	Passing %
150	100.0
75	100.0
53	100.0
37.5	100.0
26.5	100.0
19	100.0
9.5	100.0
4.75	100.0
2.36	99.9
1.18	99.9
0.6	99.6
0.425	96.8
0.3	87.4
0.15	60.7
0.075	35.6
0.05106	27.8
0.04027	23.9
0.02905	19.4
0.02089	15.5
0.01437	12.5
0.01060	10.1
0.00754	8.3
0.00537	6.6
0.00381	5.2
0.00271	3.8
0.00193	2.7
0.00137	2.1
0.00108	1.7
0.00094	1.4
0.00079	1.3

PSD Graph



Notes: *Oven dried @ 60deg*
Stored and Tested the Sample as received
Samples supplied by the Client

Authorized Signature: [redacted]

Perth
16 Gympie Way, Willetton
WA 6155
Ph: (08) 9418 8742
[redacted]

E-Precision Laboratory

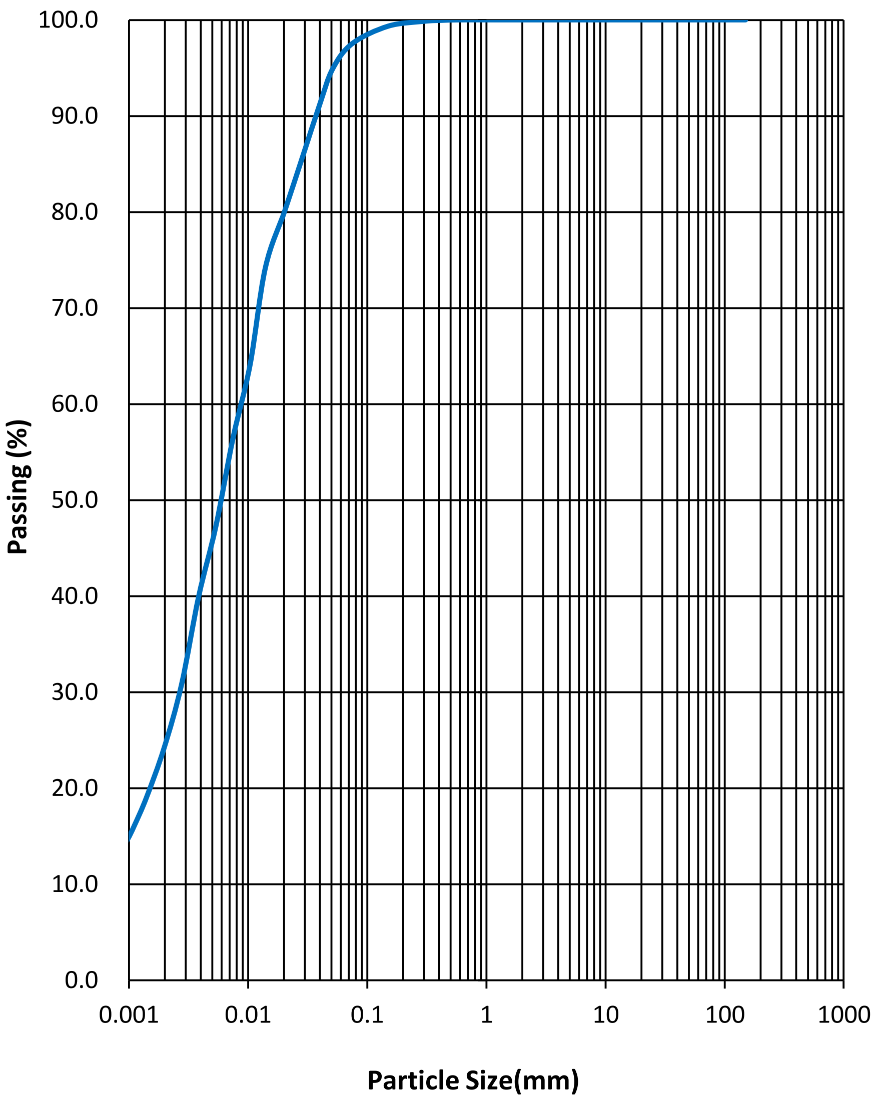
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.3 3.5.1

Client:	Geoanalytica	Date Tested:	26/05/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	MEEKA
Sample No:	TSF1-B	Depth (m):	-
Lab ID:	TSF1-B_1_PSD	Room Temperature at Test:	19°C
Tested by:	[redacted]	2.36mm Particle Density (t/m³):	2.843
Checked by:		Moisture Content (%):	-

Sieve Size (mm)	Passing %
150	100.0
75	100.0
53	100.0
37.5	100.0
26.5	100.0
19	100.0
9.5	100.0
4.75	100.0
2.36	100.0
1.18	100.0
0.6	100.0
0.425	100.0
0.3	99.9
0.15	99.3
0.075	97.5
0.05133	94.9
0.04008	91.2
0.02869	85.7
0.02051	80.2
0.01398	74.2
0.01041	64.1
0.00747	56.4
0.00537	47.3
0.00385	39.9
0.00277	30.8
0.00198	24.2
0.00141	19.1
0.00111	16.1
0.00097	14.7
0.00082	13.2

PSD Graph



Notes: *Oven dried @ 60deg*
Stored and Tested the Sample as received
Samples supplied by the Client

Authorized Signature: [redacted]

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Perth
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WA 6155
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[redacted]

E-Precision Laboratory

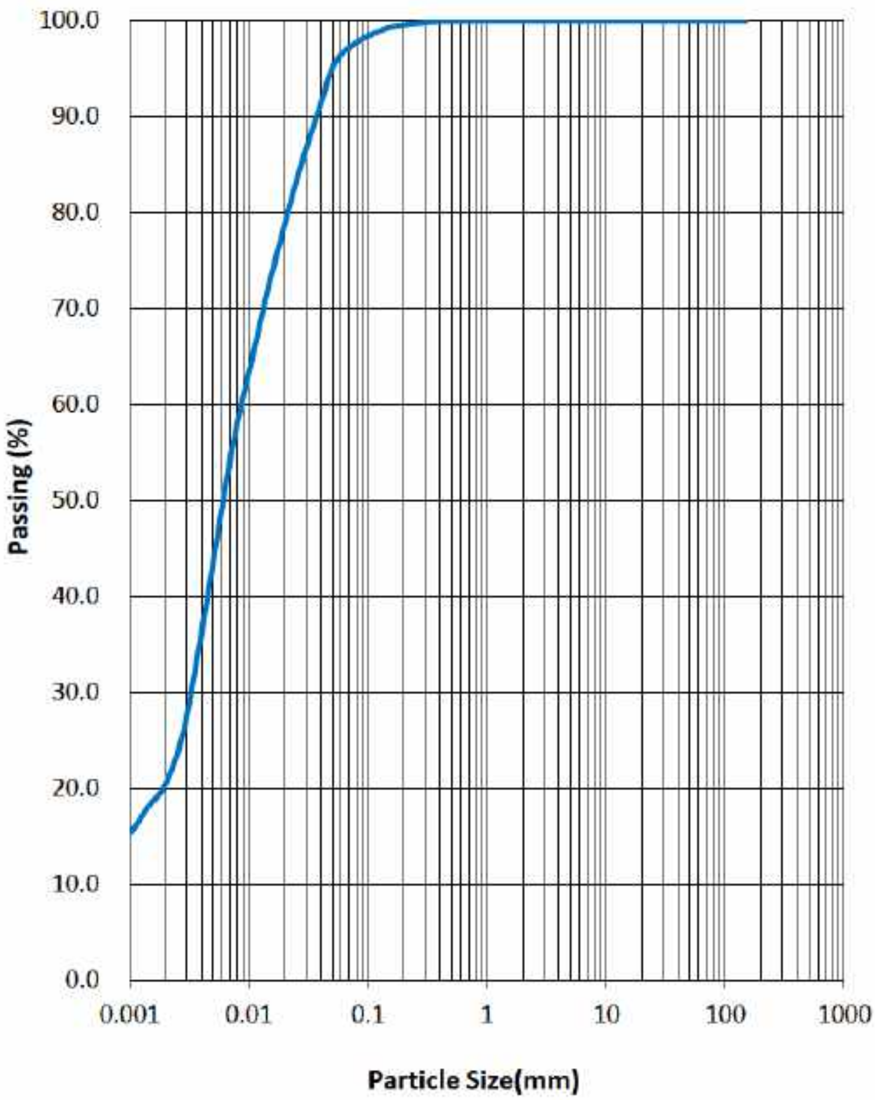
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.3 3.5.1

Client:	Geoanalytica	Date Tested:	26/05/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	MEEKA
Sample No:	TSF1-B	Depth (m):	-
Lab ID:	TSF1-B_2_PSD	Room Temperature at Test:	19°C
Tested by:	[redacted]	2.36mm Particle Density (t/m³):	2.867
Checked by:	[redacted]	Moisture Content (%):	-

Sieve Size (mm)	Passing %
150	100.0
75	100.0
53	100.0
37.5	100.0
26.5	100.0
19	100.0
9.5	100.0
4.75	100.0
2.36	100.0
1.18	100.0
0.6	100.0
0.425	100.0
0.3	99.8
0.15	99.3
0.075	97.5
0.05184	95.4
0.04047	91.4
0.02889	85.8
0.02065	79.4
0.01413	71.4
0.01045	64.2
0.00749	56.3
0.00539	45.9
0.00388	35.1
0.00278	25.5
0.00198	20.4
0.00140	18.0
0.00111	16.0
0.00097	15.2
0.00082	14.4

PSD Graph



Notes: *Oven dried @ 60deg*
Stored and Tested the Sample as received
Samples supplied by the Client

Authorized Signature: [redacted]

Perth
16 Gympie Way, Willetton
WA 6155
Ph: (08) 9418 8742
[redacted]

E-Precision Laboratory

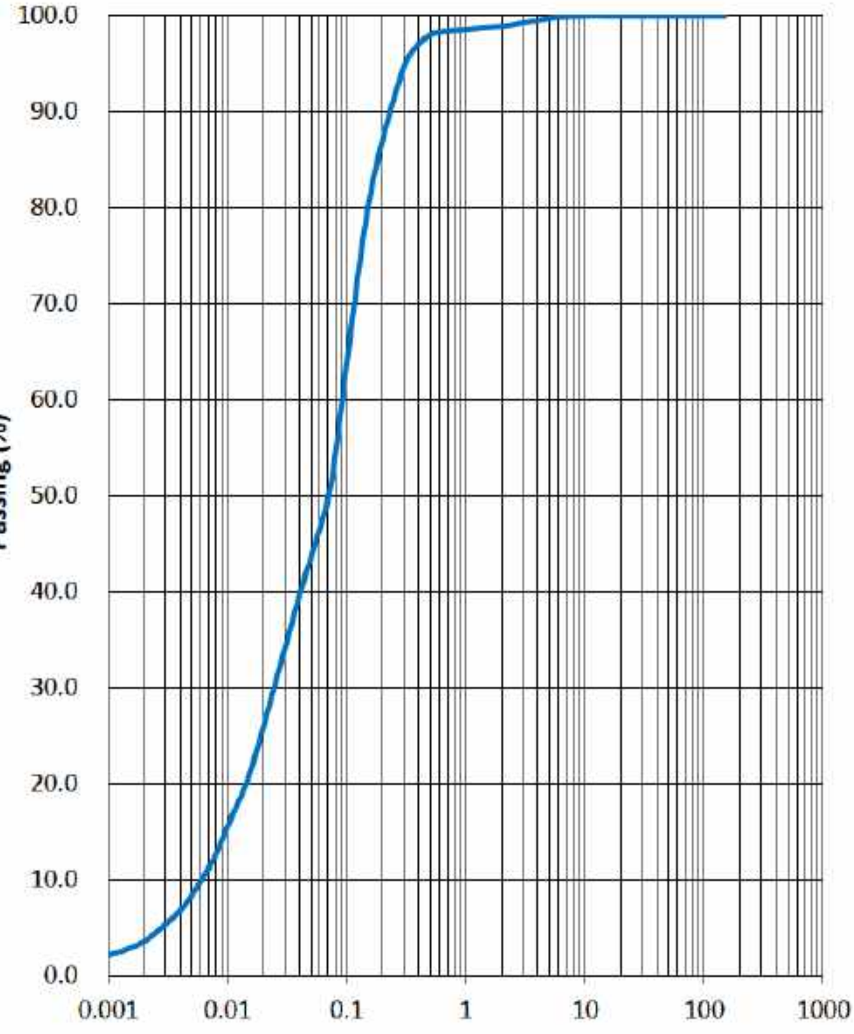
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.3 3.5.1

Client:	Geoanalytica	Date Tested:	26/05/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	MEEKA
Sample No:	TSF2-A	Depth (m):	-
Lab ID:	TSF2-A_PSD	Room Temperature at Test:	19°C
Tested by:	[redacted]	2.36mm Particle Density (t/m^3):	2.817
Checked by:		Moisture Content (%):	-

Sieve Size (mm)	Passing %
150	100.0
75	100.0
53	100.0
37.5	100.0
26.5	100.0
19	100.0
9.5	100.0
4.75	99.7
2.36	99.0
1.18	98.6
0.6	98.3
0.425	97.3
0.3	94.5
0.15	79.7
0.075	51.7
0.05369	44.8
0.04214	40.5
0.03037	34.1
0.02187	27.6
0.01513	20.8
0.01118	16.9
0.00799	12.6
0.00569	9.4
0.00405	6.9
0.00288	5.1
0.00204	3.6
0.00145	2.8
0.00114	2.4
0.00100	2.1
0.00084	1.9

PSD Graph



Notes: *Oven dried @ 60deg*
Stored and Tested the Sample as received
Samples supplied by the Client

Authorized Signature: [redacted]

Perth
16 Gympie Way, Willetton
WA 6155
Ph: (08) 9418 8742
[redacted]

E-Precision Laboratory

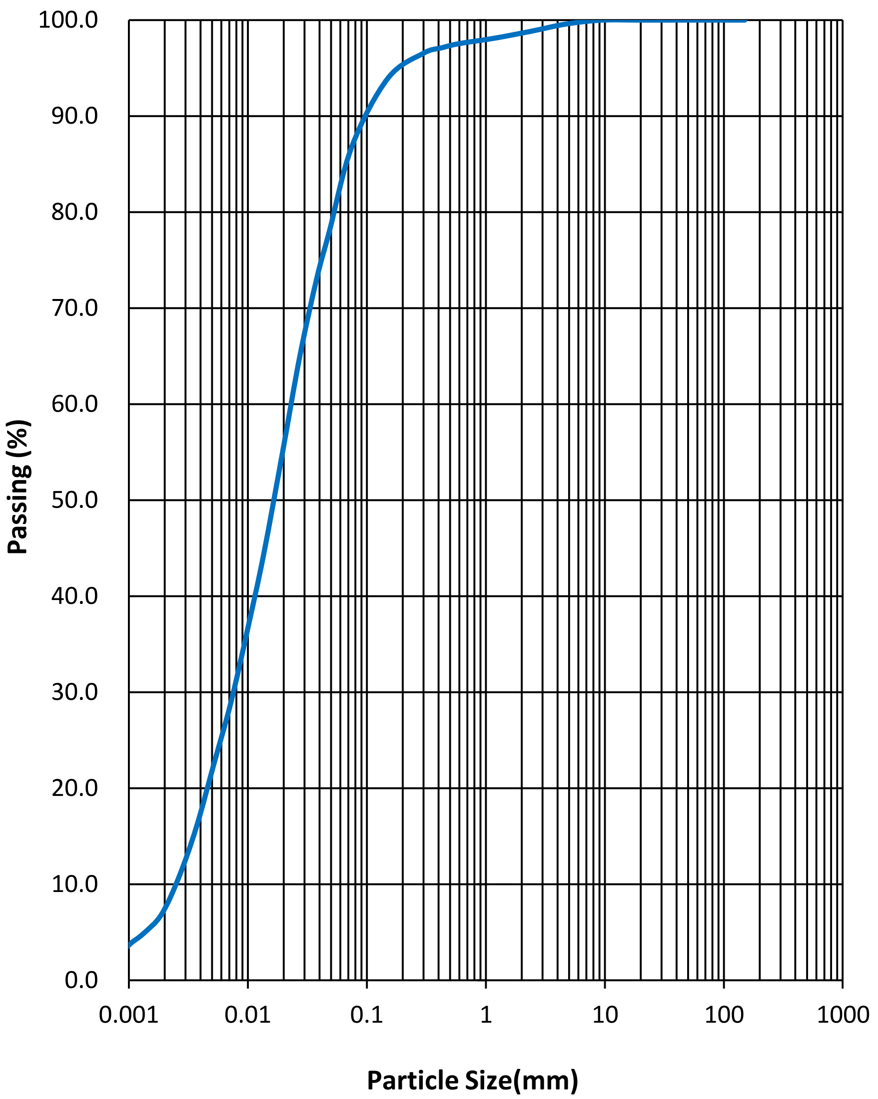
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.3 3.5.1

Client:	Geoanalytica	Date Tested:	26/05/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	MEEKA
Sample No:	TSF2-B	Depth (m):	-
Lab ID:	TSF2-B_PSD	Room Temperature at Test:	19°C
Tested by:	[redacted]	2.36mm Particle Density (t/m³):	3.142
Checked by:		Moisture Content (%):	-

Sieve Size (mm)	Passing %
150	100.0
75	100.0
53	100.0
37.5	100.0
26.5	100.0
19	100.0
9.5	100.0
4.75	99.6
2.36	98.8
1.18	98.1
0.6	97.6
0.425	97.1
0.3	96.6
0.15	93.9
0.075	86.9
0.04840	78.0
0.03792	73.1
0.02727	65.0
0.01966	55.2
0.01358	44.4
0.01007	36.9
0.00723	29.0
0.00517	22.5
0.00370	16.0
0.00264	10.8
0.00188	6.9
0.00133	4.9
0.00105	3.9
0.00092	3.3
0.00077	2.9

PSD Graph



Notes: *Oven dried @ 60deg*
Stored and Tested the Sample as received
Samples supplied by the Client

Authorized Signature: [redacted]

Integrity Precision Innovation

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WA 6155
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[redacted]

E-PRECISION LABORATORY

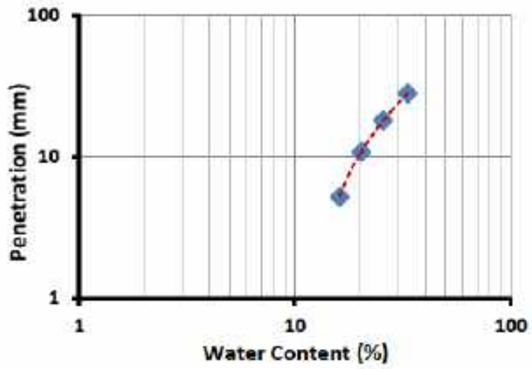
ATTERBERG LIMITS TEST REPORT

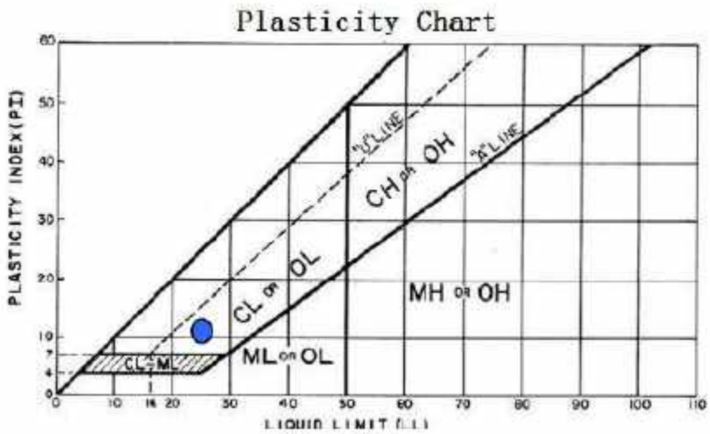
Test Method: AS1289.2.1.1 3.1.1 3.2.1 3.4.1

Client:	Geoanalytica	Date Tested:	26/05/2024
Project:	Meeka Testing 2024	Lab:	EPLAB
Sample No:	TSF1-A_2	Job Number:	MEEKA
Lab ID:	TSF1-A_2_ATT		
Depth (m):	-	Room Temperature at Test:	20°C
Tested by:	[redacted]	**Sample Description:**	-
Moisture Content (%):	-	Wet Density (t/m³):	-
		Dry Density (t/m³):	-

Liquid Limit (%):	24.96
Plastic Limit (%):	13.68
Plasticity Index (%):	11.28
Liquidity Index (%):	-
Shrinkage Limit (%):	11.60
Linear Shrinkage(%):	5.83

Results Chart





Notes: The sample/s were tested oven dried, dry sieved and in a 125-250mm mould.

Stored and Tested the Sample as received

Samples supplied by the Client

Authorised Signature: [redacted]

Integrity Precision Innovation

Perth
16 Gympie Way, Willetton
WA 6155
Ph: (08) 9418 8742
[redacted]

E-PRECISION LABORATORY

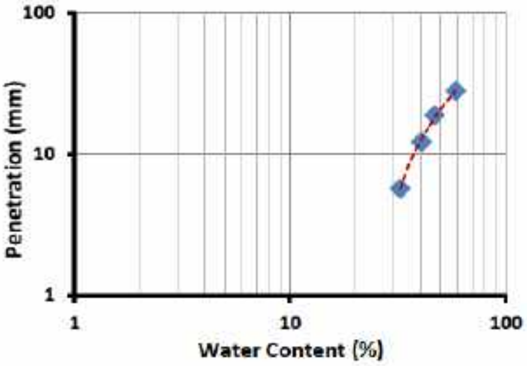
ATTERBERG LIMITS TEST REPORT

Test Method: AS1289.2.1.1 3.1.1 3.2.1 3.4.1

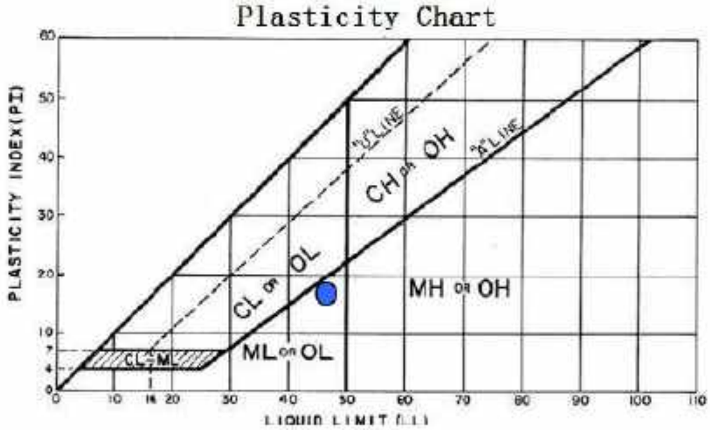
Client:	Geoanalytica	Date Tested:	26/05/2024
Project:	Meeka Testing 2024	Lab:	EPLAB
Sample No:	TSF1-B_1	Job Number:	MEEKA
Lab ID:	TSF1-B_1_ATT		
Depth (m):	-	Room Temperature at Test:	20°C
Tested by:	[redacted]	Sample Description:	-
Moisture Content (%):	-	Wet Density (t/m³):	-
		Dry Density (t/m³):	-

Liquid Limit (%):	45.61
Plastic Limit (%):	28.13
Plasticity Index (%):	17.48
Liquidity Index (%):	-
Shrinkage Limit (%):	21.26
Linear Shrinkage(%):	8.47

Results Chart



Plasticity Chart



Notes: The sample/s were tested oven dried, dry sieved and in a 125-250mm mould.

Stored and Tested the Sample as received

Samples supplied by the Client

Authorised Signature: [redacted]

Integrity Precision Innovation

Perth
16 Gympie Way, Willetton
WA 6155
Ph: (08) 9418 8742
[redacted]

E-PRECISION LABORATORY

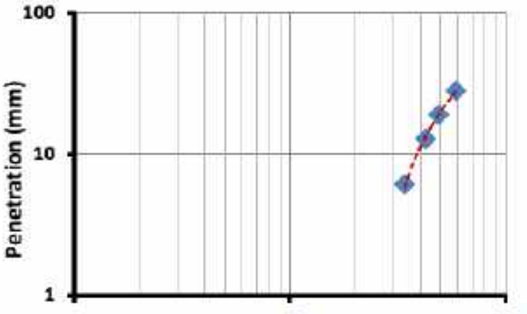
ATTERBERG LIMITS TEST REPORT

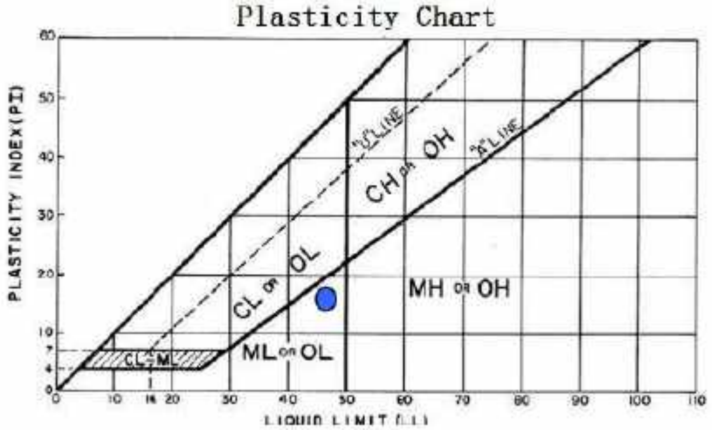
Test Method: AS1289.2.1.1 3.1.1 3.2.1 3.4.1

Client:	Geoanalytica	Date Tested:	26/05/2024
Project:	Meeka Testing 2024	Lab:	EPLAB
Sample No:	TSF1-B_2	Job Number:	MEEKA
Lab ID:	TSF1-B_2_ATT		
Depth (m):	-	Room Temperature at Test:	20°C
Tested by:	[redacted]	Sample Description:	-
Moisture Content (%):	-	Wet Density (t/m³):	-
		Dry Density (t/m³):	-

Liquid Limit (%):	46.61
Plastic Limit (%):	29.79
Plasticity Index (%):	16.82
Liquidity Index (%):	-
Shrinkage Limit (%):	22.68
Linear Shrinkage(%):	8.26

Results Chart





Notes: The sample/s were tested oven dried, dry sieved and in a 125-250mm mould.

Stored and Tested the Sample as received

Samples supplied by the Client

Authorised Signature: [redacted]

Integrity Precision Innovation

Perth
16 Gympie Way, Willetton
WA 6155
Ph: (08) 9418 8742
[redacted]

E-PRECISION LABORATORY

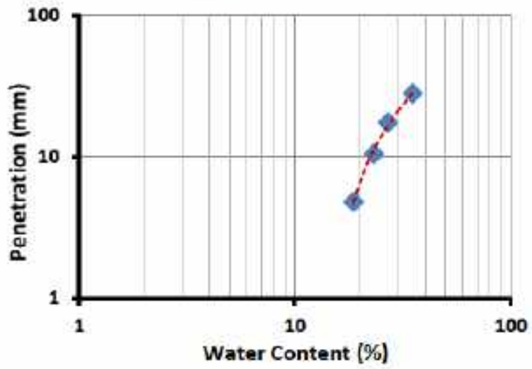
ATTERBERG LIMITS TEST REPORT

Test Method: AS1289.2.1.1 3.1.1 3.2.1 3.4.1

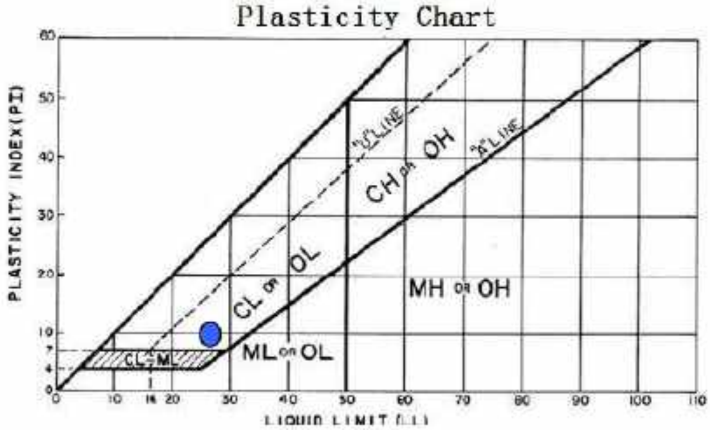
Client:	Geoanalytica	Date Tested:	26/05/2024
Project:	Meeka Testing 2024	Lab:	EPLAB
Sample No:	TSF1-A_1	Job Number:	MEEKA
Lab ID:	TSF2-A_1_ATT		
Depth (m):	-	Room Temperature at Test:	20°C
Tested by:	[redacted]	Sample Description:	-
Moisture Content (%):	-	Wet Density (t/m³):	-
		Dry Density (t/m³):	-

Liquid Limit (%):	27.29
Plastic Limit (%):	16.82
Plasticity Index (%):	10.47
Liquidity Index (%):	-
Shrinkage Limit (%):	14.28
Linear Shrinkage(%):	5.15

Results Chart



Plasticity Chart



Notes: The sample/s were tested oven dried, dry sieved and in a 125-250mm mould.

Stored and Tested the Sample as received

Samples supplied by the Client

Authorised Signature: [redacted]

Integrity Precision Innovation

Perth
16 Gympie Way, Willetton
WA 6155
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[redacted]

E-PRECISION LABORATORY

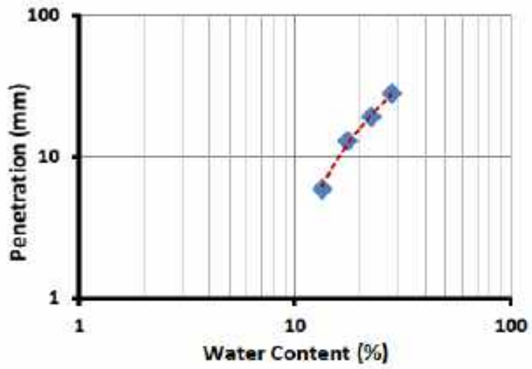
ATTERBERG LIMITS TEST REPORT

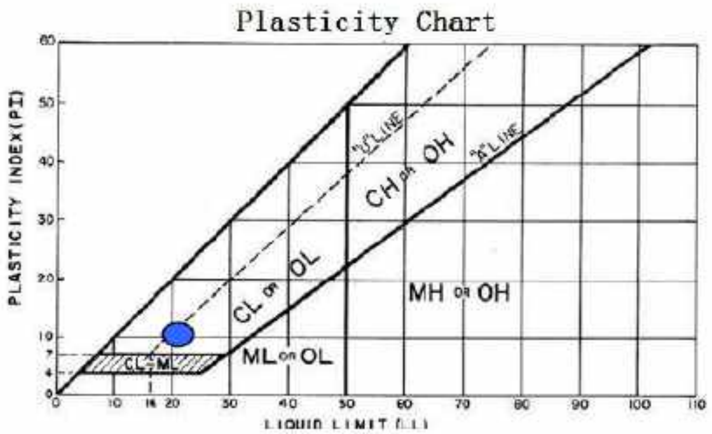
Test Method: AS1289.2.1.1 3.1.1 3.2.1 3.4.1

Client:	Geoanalytica	Date Tested:	26/05/2024
Project:	Meeka Testing 2024	Lab:	EPLAB
Sample No:	TSF2-A	Job Number:	MEEKA
Lab ID:	TSF2-A_ATT		
Depth (m):	-	Room Temperature at Test:	20°C
Tested by:	[redacted]	Sample Description:	-
Moisture Content (%):	-	Wet Density (t/m³):	-
		Dry Density (t/m³):	-

Liquid Limit (%):	20.77
Plastic Limit (%):	10.54
Plasticity Index (%):	10.24
Liquidity Index (%):	-
Shrinkage Limit (%):	9.18
Linear Shrinkage(%):	5.14

Results Chart





Notes: The sample/s were tested oven dried, dry sieved and in a 125-250mm mould.

Stored and Tested the Sample as received

Samples supplied by the Client

Authorised Signature: [redacted]

Perth
16 Gympie Way, Willetton
WA 6155
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[redacted]

E-PRECISION LABORATORY

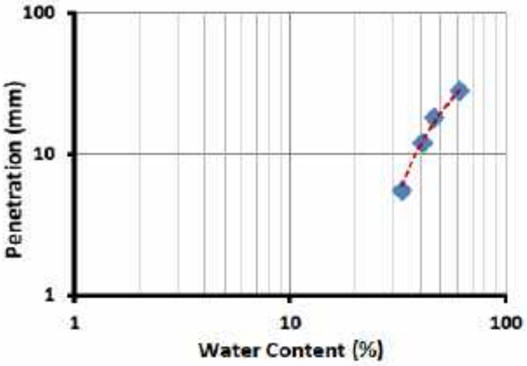
ATTERBERG LIMITS TEST REPORT

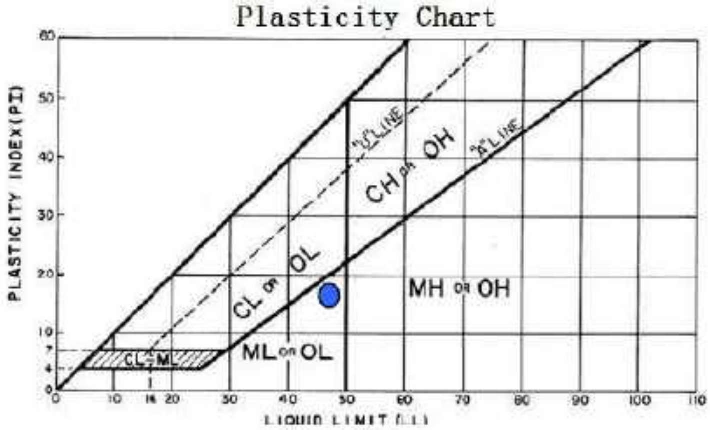
Test Method: AS1289.2.1.1 3.1.1 3.2.1 3.4.1

Client:	Geoanalytica	Date Tested:	26/05/2024
Project:	Meeka Testing 2024	Lab:	EPLAB
Sample No:	TSF2-B	Job Number:	MEEKA
Lab ID:	TSF2-B_ATT		
Depth (m):	-	Room Temperature at Test:	20°C
Tested by:	[redacted]	Sample Description:	-
Moisture Content (%):	-	Wet Density (t/m³):	-
		Dry Density (t/m³):	-

Liquid Limit (%):	46.92
Plastic Limit (%):	28.23
Plasticity Index (%):	18.69
Liquidity Index (%):	-
Shrinkage Limit (%):	21.00
Linear Shrinkage(%):	9.16

Results Chart





Notes: The sample/s were tested oven dried, dry sieved and in a 125-250mm mould.

Stored and Tested the Sample as received

Samples supplied by the Client

Authorised Signature: [redacted]

Integrity Precision Innovation

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WA 6155
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[redacted]

E-Precision Laboratory

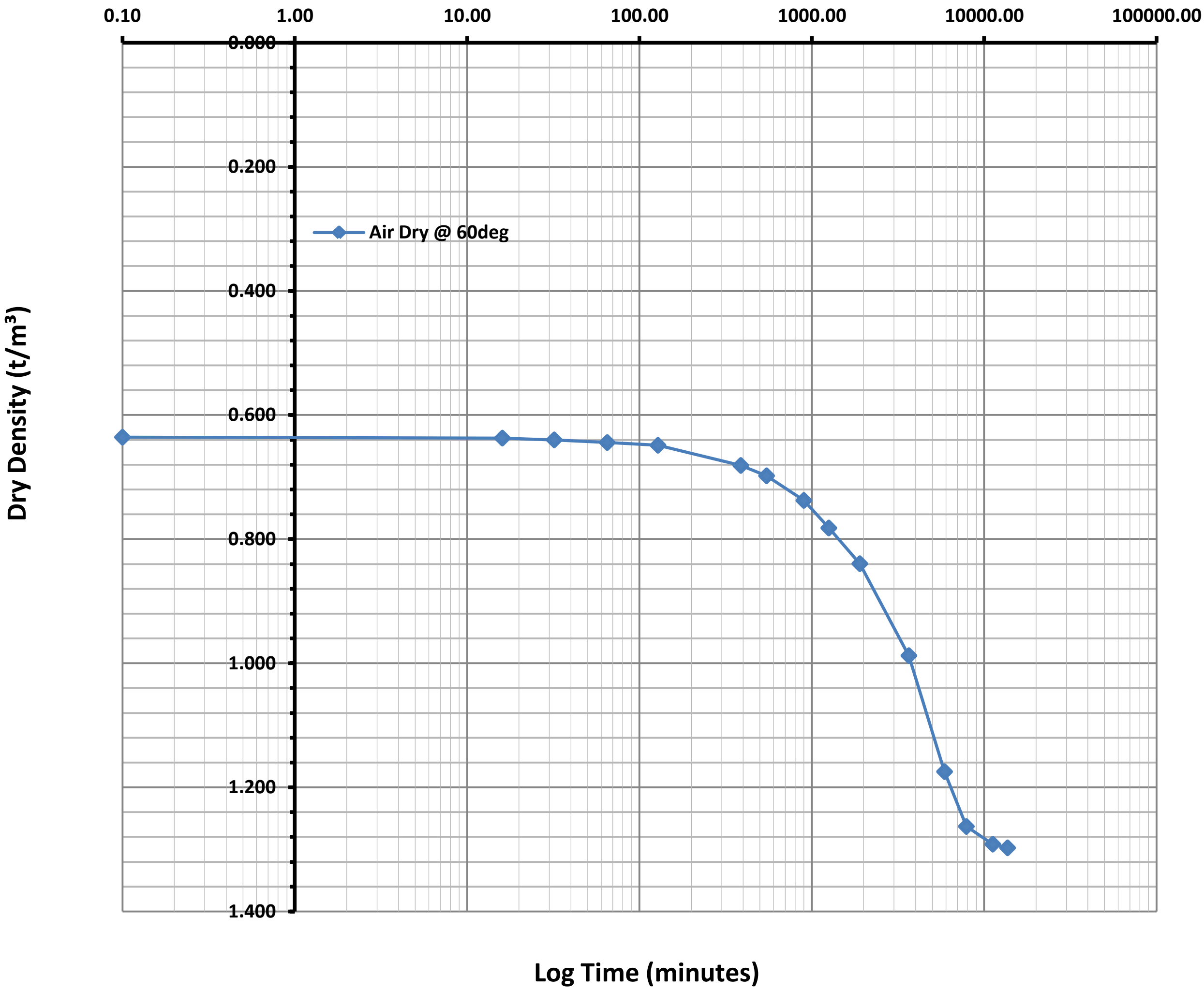
AIR DRYING SETTLING TEST

METHOD: Supplied by Client SRC-WF-100 / SRC-RF-100

Client:	Geoanalytica	Date Tested:	28/03/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	REC
Sample No:	TSF1 A / B Combined as instructed		
Lab ID:	MEEKA_AIR_DRY	Room Temperature at Test:	19°

Tested by:	[redacted]	**Initial Bulk Density (t/m³):**	1.412
Type of Test:	Air Dry Testing	**Particle Density (t/m³):**	2.867
Sample Preparation:	45% Solids	**Moisture Content Initial (%):**	122.180

Dry Density (t/m³) Vs Time (minutes)



Comments:

Authorised Signature (Geotechnical Engineer): [redacted]

The results of tests performed apply only to the specific sample at time of test unless otherwise clearly stated. Reference should be made to E-Precision Laboratory's "Standard Terms and Conditions" E-Precision Laboratory ABN 431 559 578 87

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WA 6155
Ph: (08) 9418 8742
[redacted]

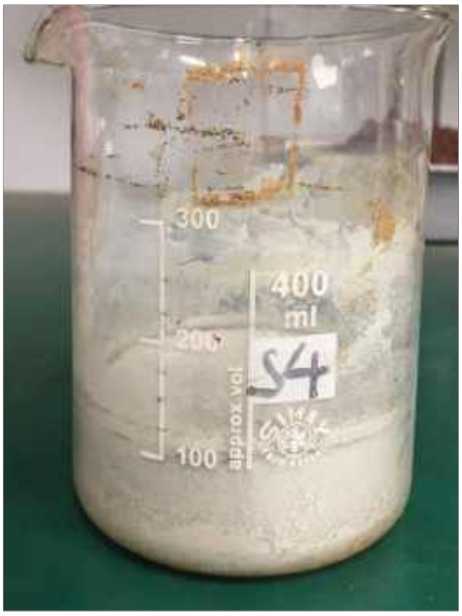
E-Precision Laboratory

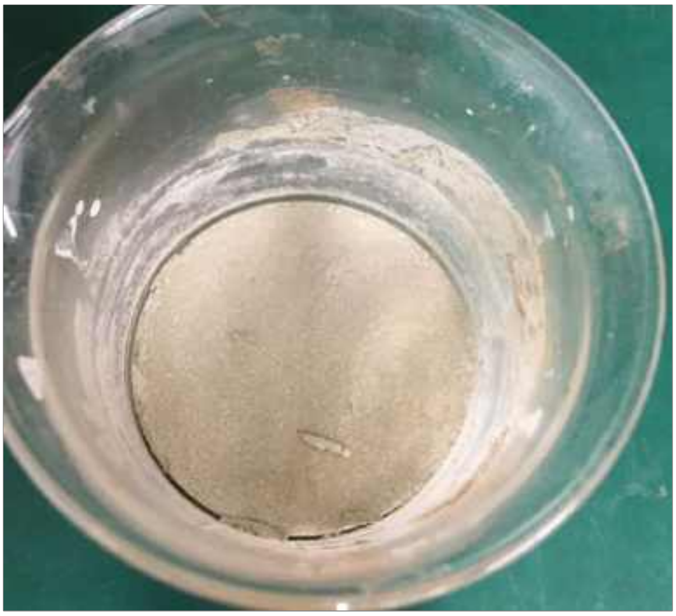
AIR DRYING SETTLING TEST

METHOD: Supplied by Client SRC-WF-100 / SRC-RF-100

Client:	Geoanalytica	Date Tested:	28/03/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	REC
Sample No:	TSF1 A / B Combined as instructed		
Lab ID:	MEEKA_AIR_DRY	Room Temperature at Test:	19°

Photo of Samples after Testing





Oven dried @ 60deg

Comments:

Authorised Signature (Geotechnical Engineer): [redacted]

Integrity Precision Innovation

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WA 6155
Ph: (08) 9418 8742
[redacted]

E-Precision Laboratory

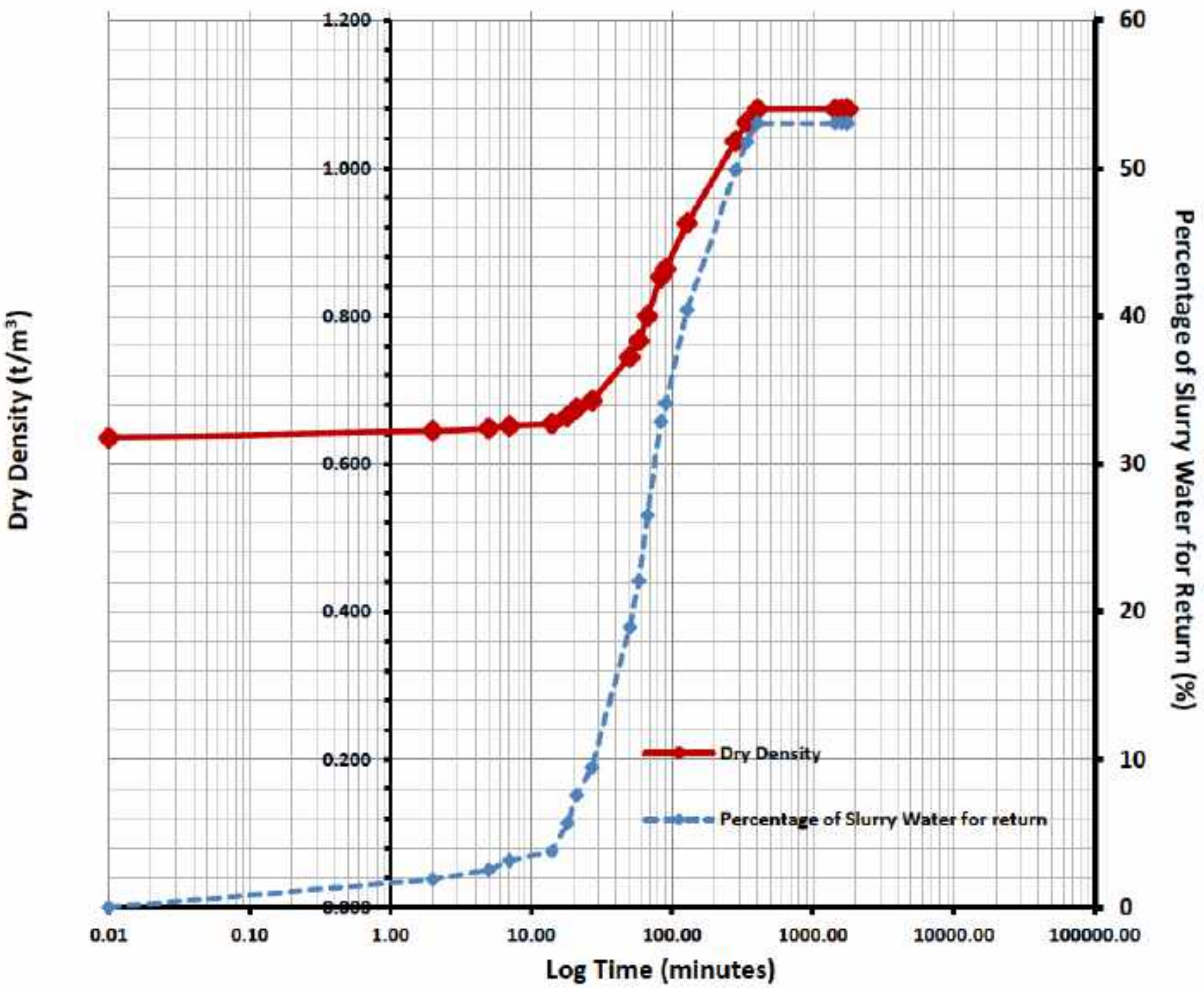
SETTLEMENT TESTING TAILINGS

METHOD: IN-HOUSE METHOD

Client:	Geoanalytica	Date Tested:	18/05/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	MEEKA
Sample No:	TSF1 A / B Combined as instructed		
Lab ID:	MEEKA_2024_SETTLEMENT	Room Temperature at Test:	19°

Tested by: [redacted]	**Initial Dry Density (t/m^3):** 0.635
Type of Test: Settlement Testing	**Particle Density (t/m^3):** 2.867
Sample Preparation: 45% Solids	**Initial Bulk Density (t/m^3):** 1.411

Undrained Dry Density (t/m^3) Vs Log Time (minutes)



Comments:

Authorised Signature (Geotechnical Engineer): [redacted]

Integrity Precision Innovation

Perth
16 Gympie Way, Willetton
WA 6155
Ph: (08) 9418 8742
[redacted]

E-PRECISION LABORATORY

SETTLEMENT TESTING TAILINGS

METHOD: IN-HOUSE METHOD

Client:	Geoanalytica	Date Tested:	18/05/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	MEEKA
Sample No:	TSF1 A / B Combined as instructed		
Lab ID:	MEEKA_2024_SETTLEMENT	Room Temperature at Test:	19°

Tested by: [redacted]

Type of Test: Settlement Testing

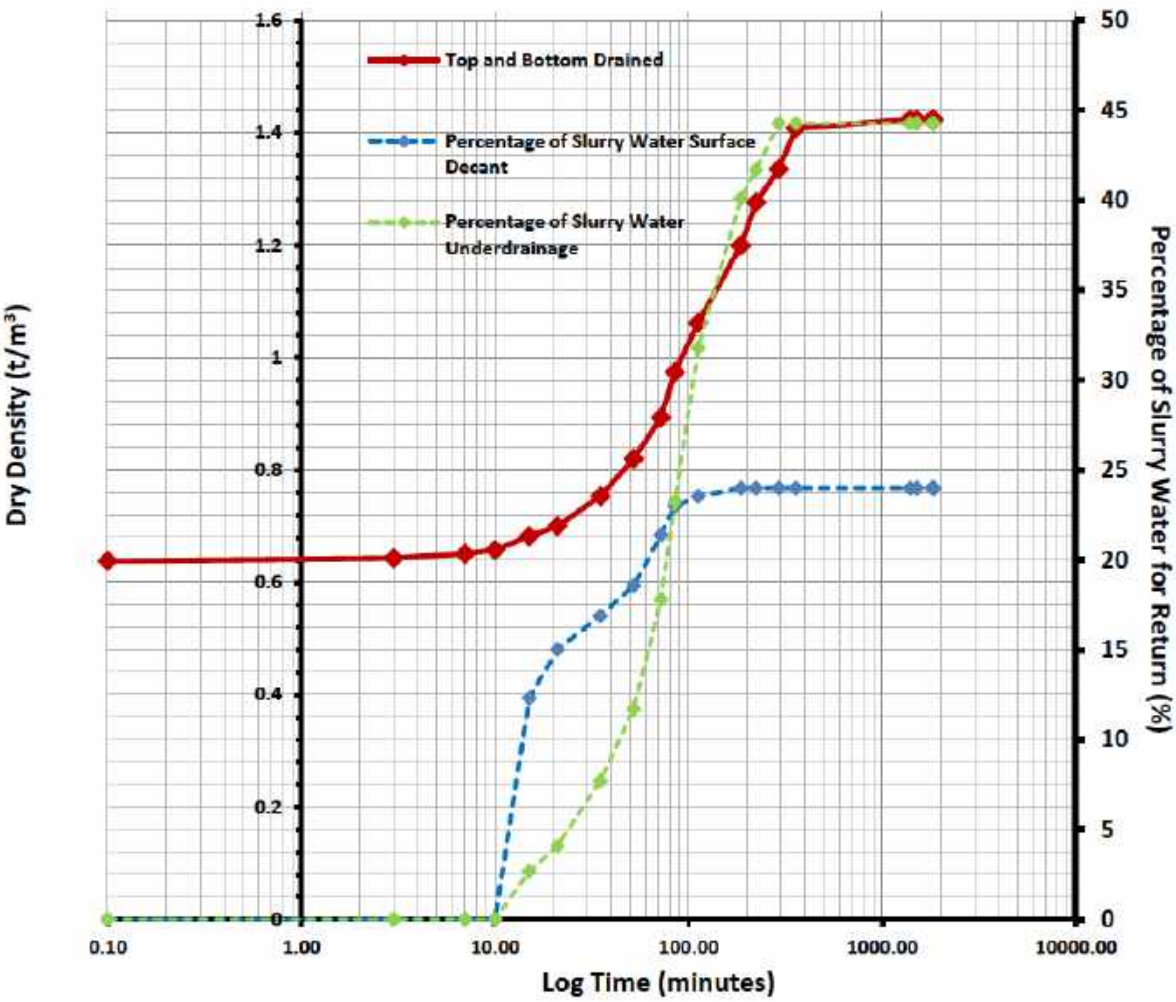
Sample Preparation: 45% Solids

Initial Dry Density (t/m^3): 0.638

Particle Density (t/m^3): 2.867

Initial Bulk Density (t/m^3): 1.414

Top and Bottom Drained Dry Density (t/m^3) Vs Log Time (minutes)



Comments: [redacted]

Authorised Signature (Geotechnical Engineer):

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E-Precision Laboratory

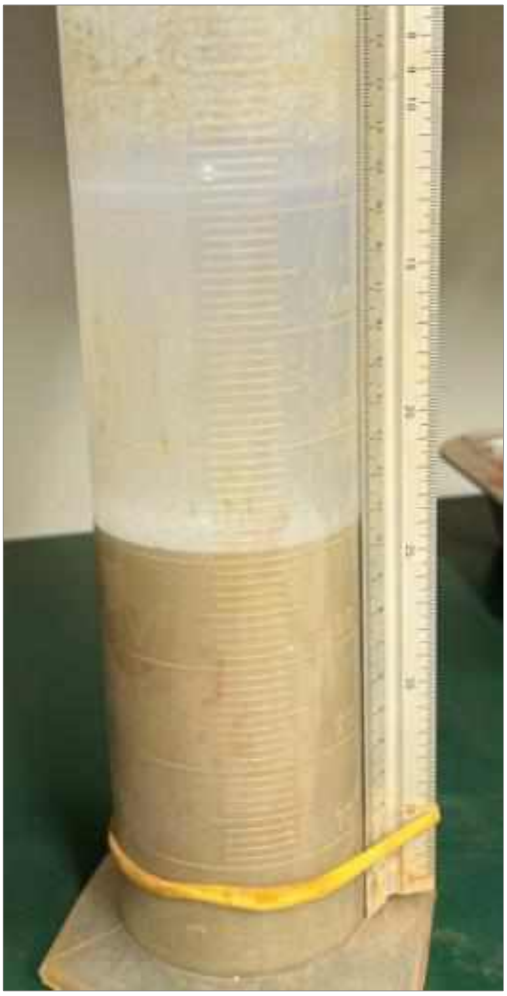
SETTLEMENT TESTING TAILINGS

METHOD: IN-HOUSE METHOD

Client:	Geoanalytica	Date Tested:	18/05/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	MEEKA
Sample No:	TSF1 A / B Combined as instructed		
Lab ID:	MEEKA_2024_SETTLEMENT	Room Temperature at Test:	19°

Tested by:	[redacted]	**Initial Dry Density (t/m³):**	-
Type of Test:	Settlement Testing	**Particle Density (t/m³):**	-
Sample Preparation:	45% Solids	**Initial Bulk Density (t/m3):**	-

Photo of Test Setup



Comments:

Authorised Signature (Geotechnical Engineer): [redacted]

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[redacted]

E-Precision Laboratory

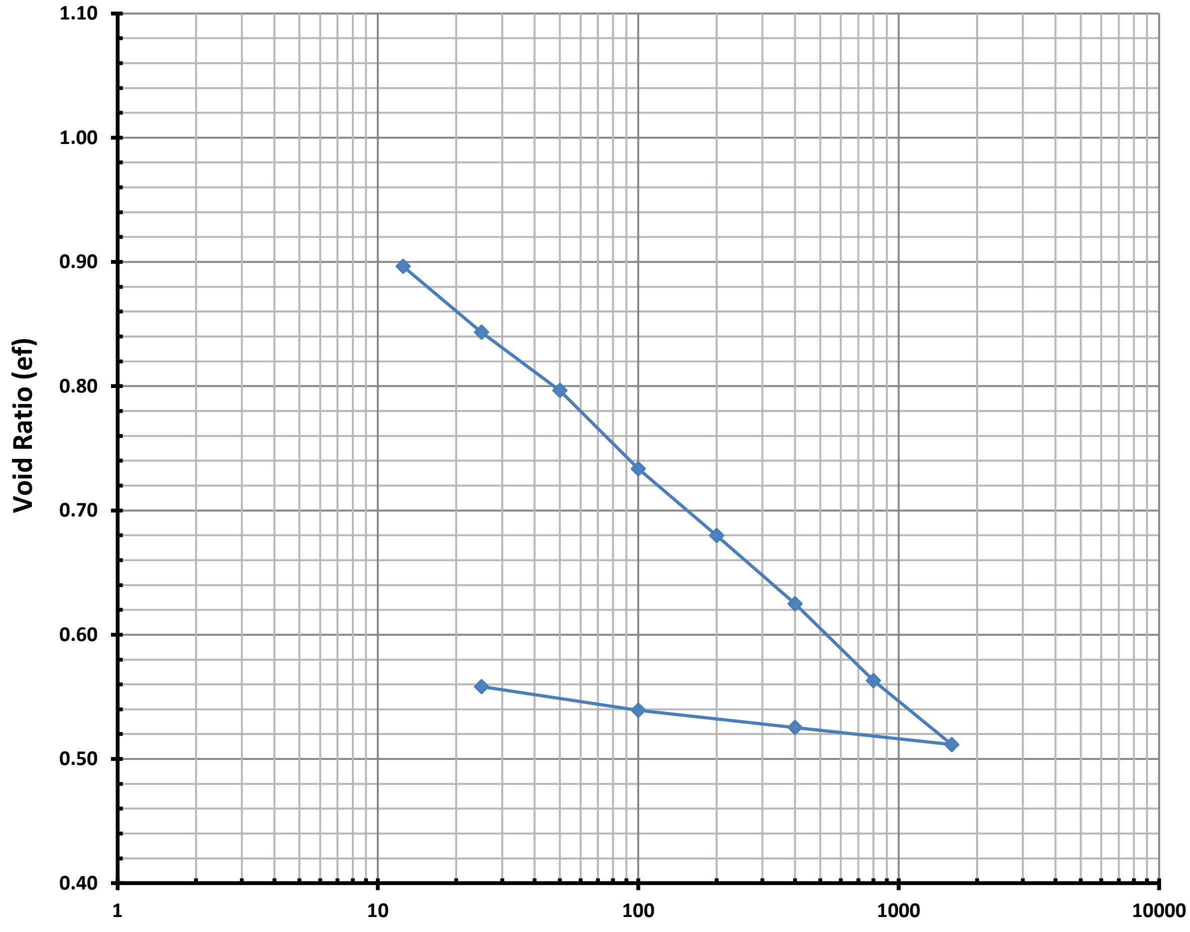
CONSOLIDATION - ONE DIMENSION

Method: AS1289 6.6.1 / Inhouse Method

Client:	Geoanalytica	Date Tested:	06/04/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	RENASCOR
Sample ID:	TSF1-A-B Combined		
Lab ID:	TSF1_A_B_MEEKA_OED	Lab:	EPLab
Depth (m):	-	Room Temperature at Test:	~ 19°c

Tested by:	[redacted]	Initial Moisture (%):	38.03	Test Condition:	Undrained
Height (mm):	37.65	Final Moisture Content (%):	41.18	Sample Condition:	Saturated
Diameter (mm):	61.80	Bulk Density (t/m³):	1.97	Particle Density (t/m³):	2.867
Direction:	Vertical	Dry Density (t/m³):	1.42	Initial Void Ratio (e_i):	1.013

Void Ratio (e_f) Vs Log of Vertical Pressure (kPa)



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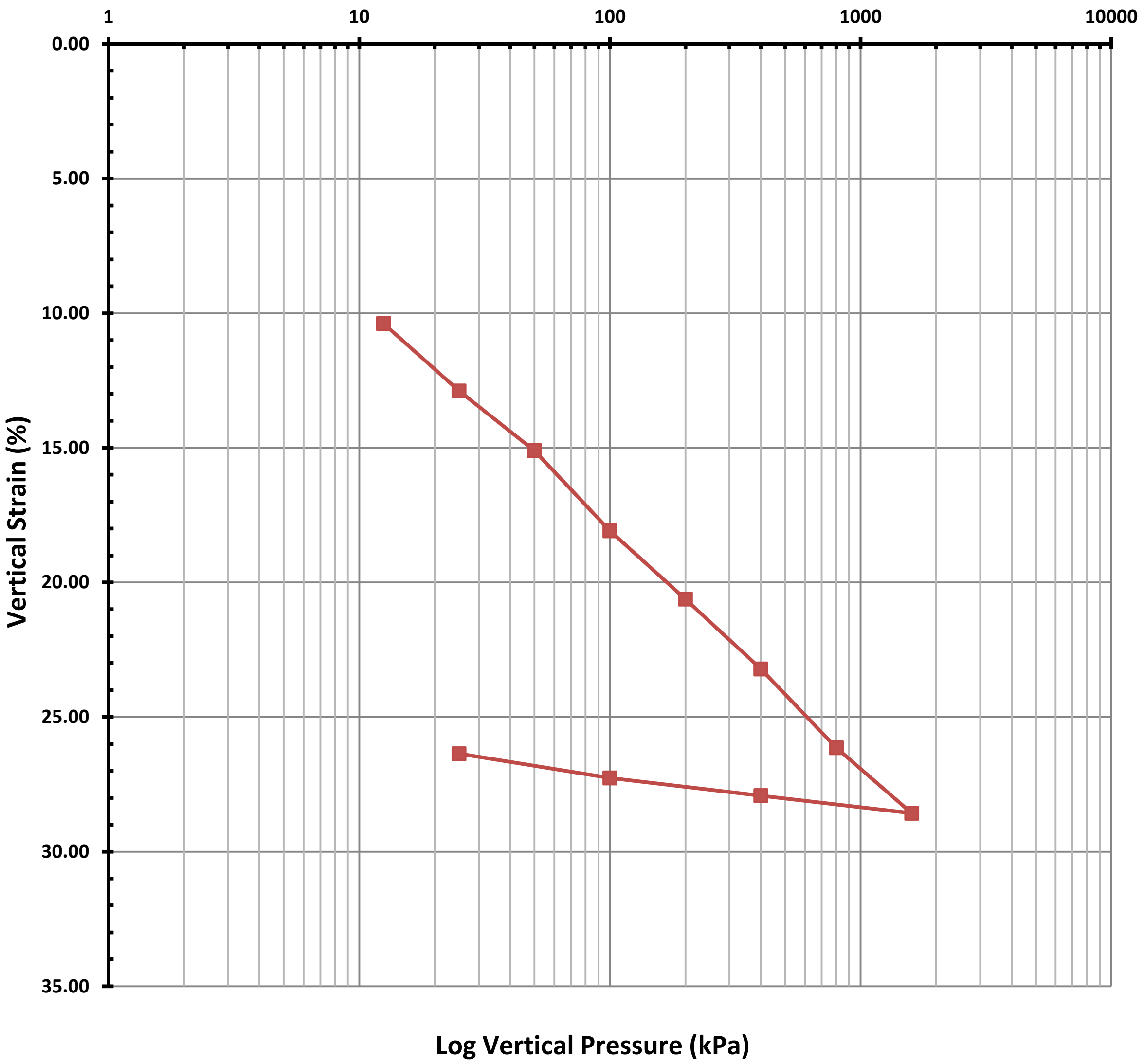
CONSOLIDATION - ONE DIMENSION

Method: AS1289 6.6.1 / Inhouse Method

Client:	Geoanalytica	Date Tested:	06/04/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	RENASCOR
Sample ID:	TSF1-A-B Combined		
Lab ID:	TSF1_A_B_MEEKA_OED	Lab:	EPLab
Depth (m):	-	Room Temperature at Test:	~ 19°C

Vertical Strain (%) Vs Log of Vertical Pressure (kPa)



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CONSOLIDATION - ONE DIMENSION

Method: AS1289 6.6.1 / Inhouse Method

Client:	Geoanalytica	Date Tested:	06/04/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	RENASCOR
Sample ID:	TSF1-A-B Combined		
Lab ID:	TSF1_A_B_MEEKA_OED	Lab:	EPLab
Depth (m):	-	Room Temperature at Test:	~ 19°C

Test Results

*

Stages	Vert Disp (mm)	Cv (m^2/yr)		Compressibility Mv (m^2/kN)	K (m/s)		Void Ratio (e_f)	Vertical Strain (%)
		*t_{50}	t_{90}					
Stage 1 @ 12.5kPa	3.910	15.330	-	8.31E-03	4.0E-08		0.896	10.39
Stage 2 @ 25kPa	4.853	14.200	-	2.24E-03	9.9E-09		0.843	12.89
Stage 3 @ 50kPa	5.687	13.388	-	1.02E-03	4.2E-09		0.797	15.10
Stage 4 @ 100kPa	6.809	12.489	-	7.02E-04	2.7E-09		0.734	18.08
Stage 5 @ 200kPa	7.763	11.733	-	3.09E-04	1.1E-09		0.680	20.62
Stage 6 @ 400kPa	8.741	11.005	-	1.64E-04	5.6E-10		0.625	23.22
Stage 7 @ 800kPa	9.842	6.765	-	9.52E-05	2.0E-10		0.563	26.14
Stage 8 @ 1600kPa	10.758	4.781	-	4.12E-05	6.1E-11		0.512	28.57
Unload @ 400kPa	10.512							
Unload @ 100kPa	10.265							
Unload @ 25kPa	9.927							

** Values interpreted via lab only*

Comments: **Samples collected from Drained Settlement Testing**
Cv values to be interpreted via Engineer

Samples supplied by the Client

Authorised Signatory (Geotechnical Engineer): [redacted]

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[redacted]

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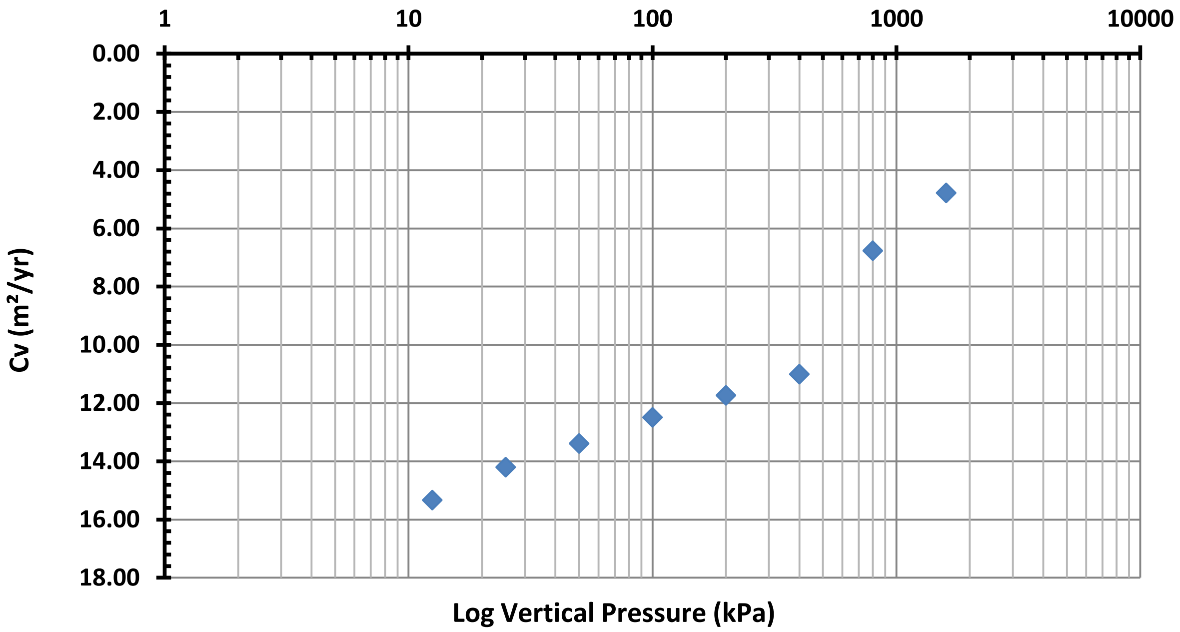
CONSOLIDATION - ONE DIMENSION

Method: AS1289 6.6.1 / Inhouse Method

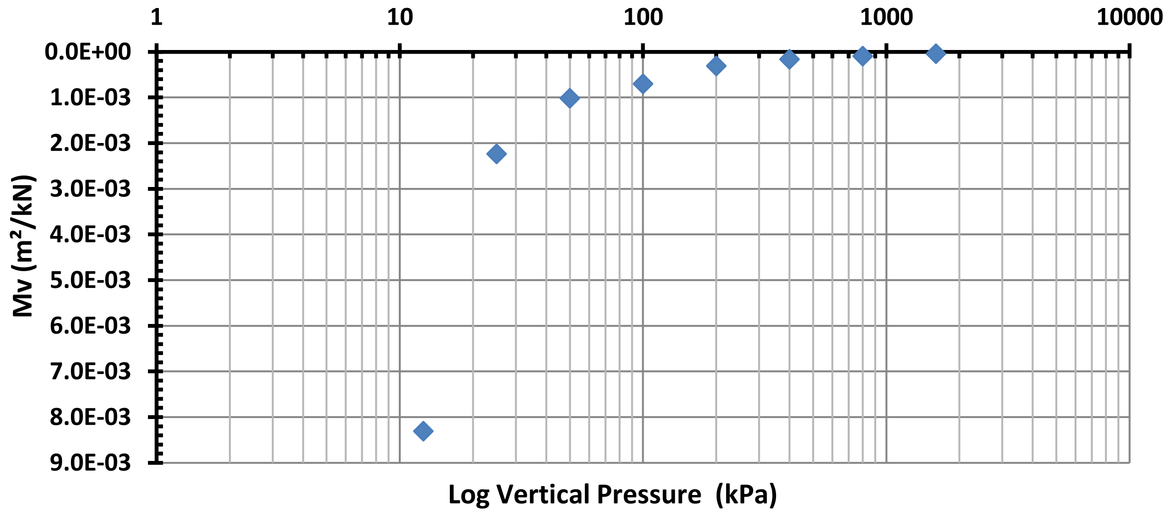
Client:	Geoanalytica	Date Tested:	06/04/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	RENASCOR
Sample ID:	TSF1-A-B Combined		
Lab ID:	TSF1_A_B_MEEKA_OED	Lab:	EPLab
Depth (m):	-	Room Temperature at Test:	~ 19°C

Cv (m²/yr) Vs Log of Vertical Pressure (kPa)



* Plot based on Log (time) data

Mv (m²/kN) Vs Log of Vertical Pressure (kPa)



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CONSOLIDATION - ONE DIMENSION

Method: AS1289 6.6.1 / Inhouse Method

Client:	Geoanalytica	Date Tested:	06/04/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	RENASCOR
Sample ID:	TSF1-A-B Combined		
Lab ID:	TSF1_A_B_MEEKA_OED	Lab:	EPLab
Depth (m):	-	Room Temperature at Test:	~ 19°C

TEST RESULTS PLEASE SEE PAGES BELOW

Perth
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[redacted]

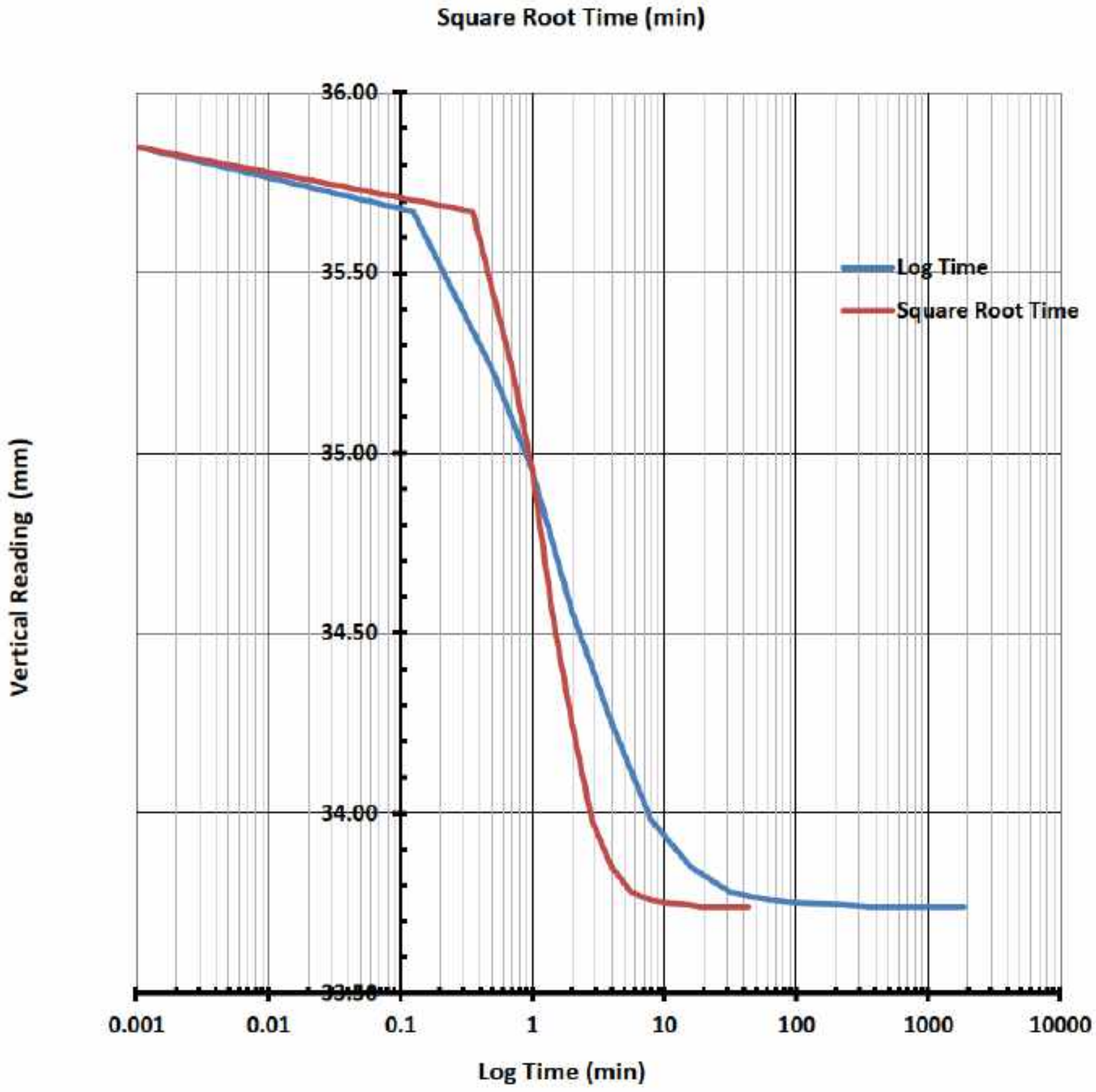
E-PRECISION LABORATORY

CONSOLIDATION - ONE DIMENSION

Method: AS1289 6.6.1 / Inhouse Method

Client:	Geoanalytica	Date Tested:	06/04/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	RENASCOR
Sample ID:	TSF1-A-B Combined		
Lab ID:	TSF1_A_B_MEEKA_OED	Lab:	EPLab
Depth (m):	-	Room Temperature at Test:	~ 19°C

Stage 1 @ 12.5kPa



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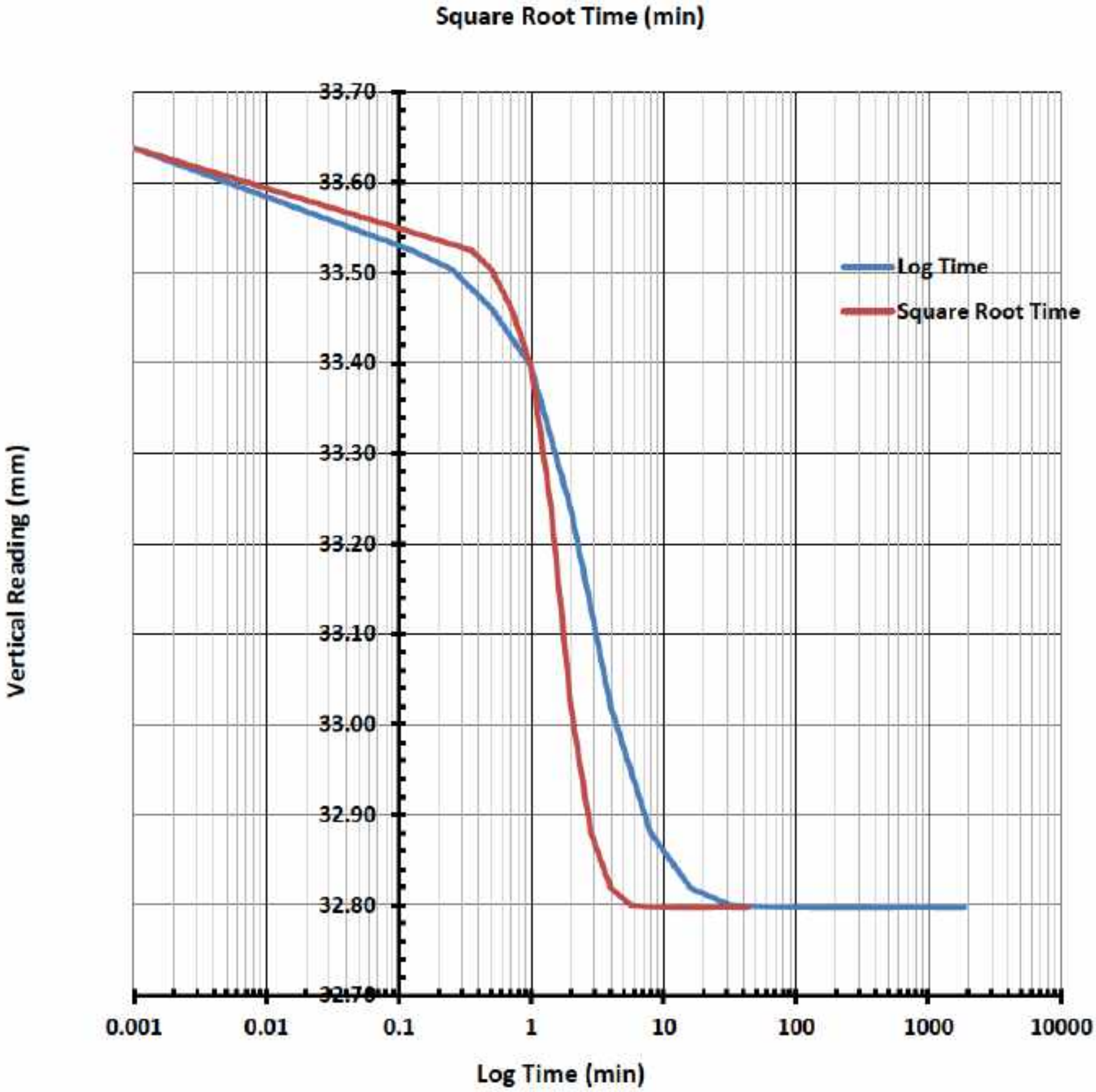
CONSOLIDATION - ONE DIMENSION

Method: AS1289 6.6.1 / Inhouse Method

Client:	Geoanalytica	Date Tested:	06/04/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	RENASCOR
Sample ID:	TSF1-A-B Combined		
Lab ID:	TSF1_A_B_MEEKA_OED	Lab:	EPLab
Depth (m):	-	Room Temperature at Test:	~ 19°C

Stage 2 @ 25kPa



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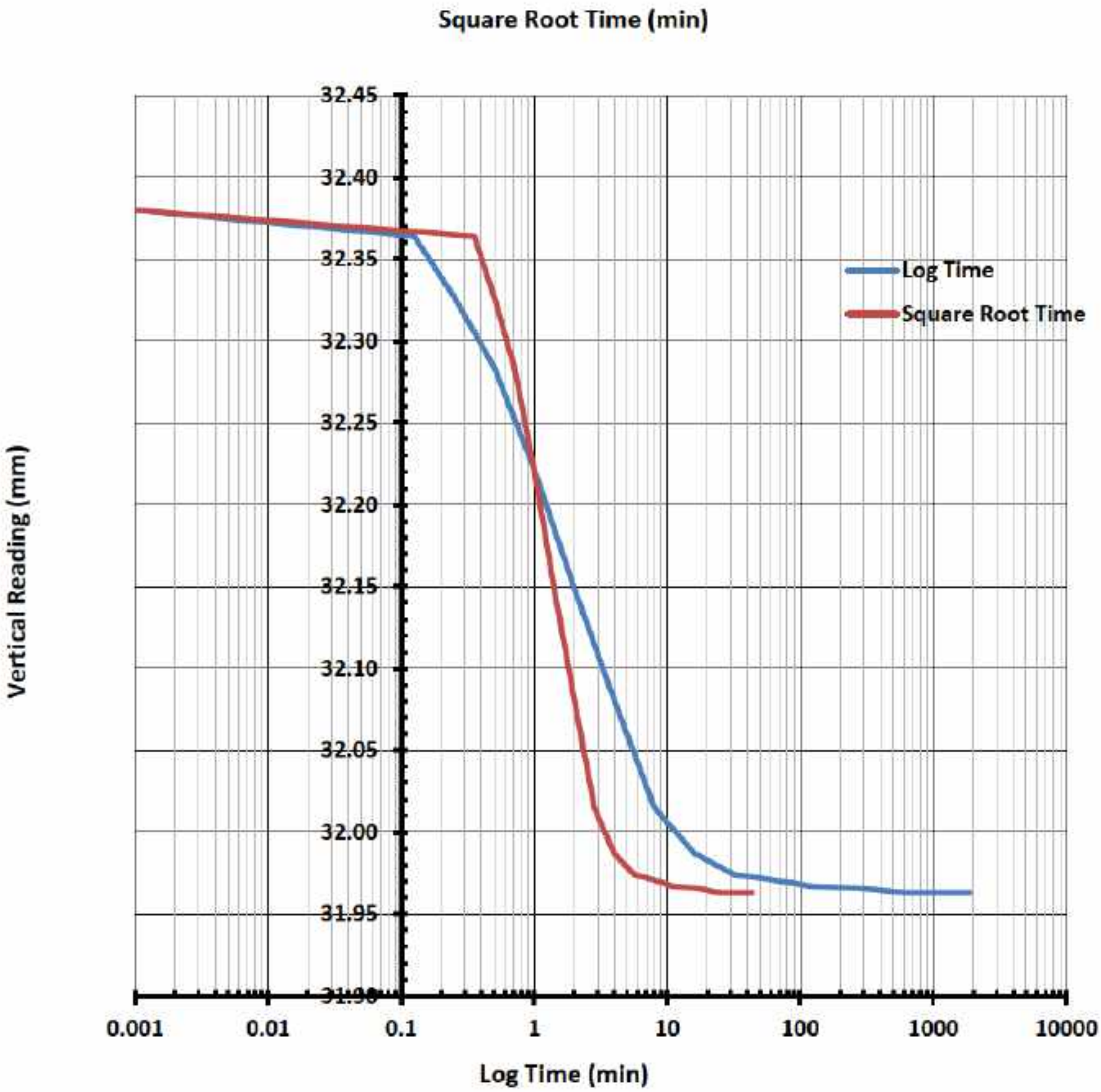
CONSOLIDATION - ONE DIMENSION

Method: AS1289 6.6.1 / Inhouse Method

Client:	Geoanalytica	Date Tested:	06/04/2024
	Meeka Testing 2024	EP Lab Job Number:	RENASCOR
Sample ID:	TSF1-A-B Combined		
Lab ID:	TSF1_A_B_MEEKA_OED	Lab:	EPLab
Depth (m):	-	Room Temperature at Test:	~ 19°C

Stage 3 @ 50kPa



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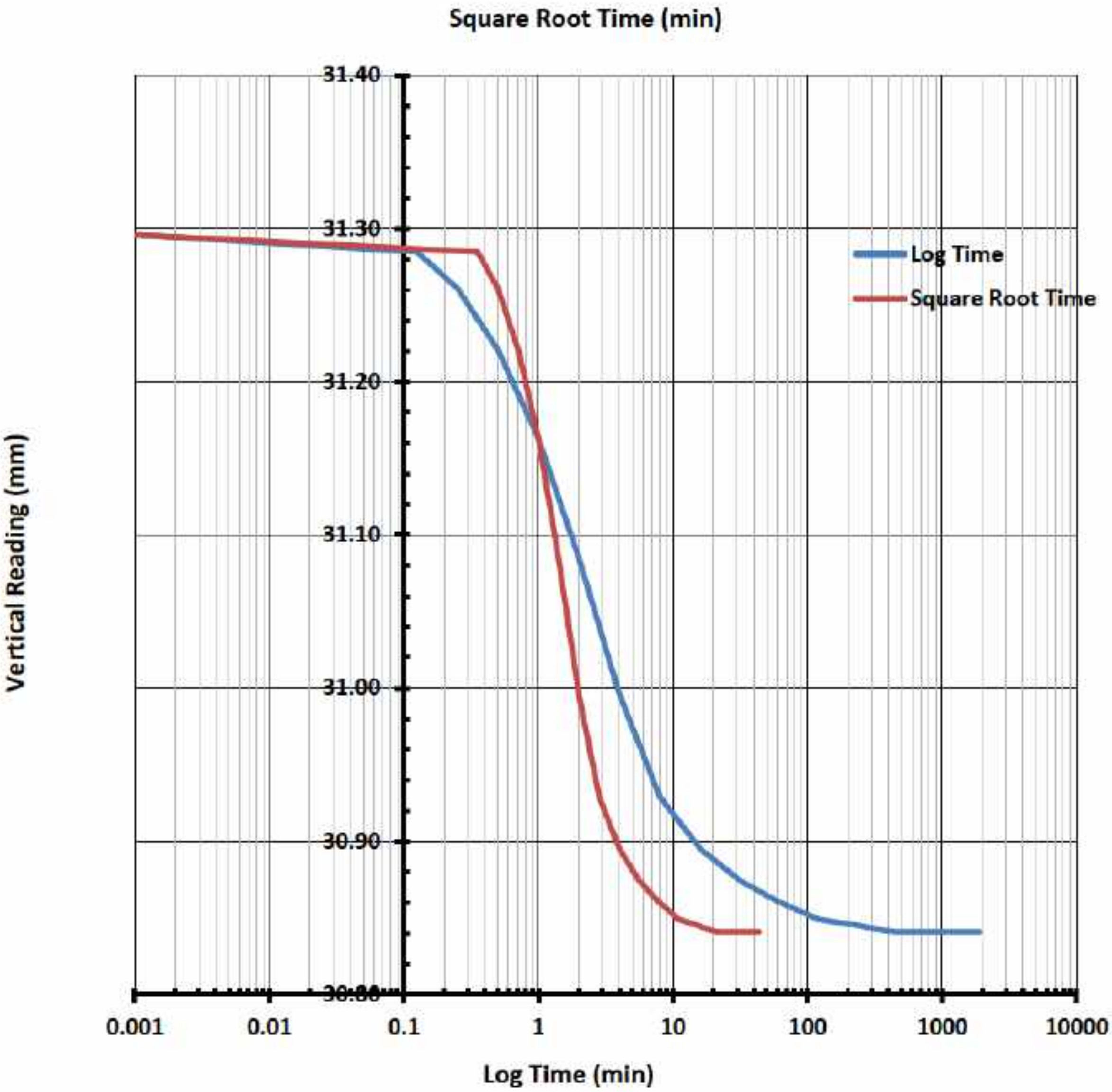
CONSOLIDATION - ONE DIMENSION

Method: AS1289 6.6.1 / Inhouse Method

Client:	Geoanalytica	Date Tested:	06/04/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	RENASCOR
Sample ID:	TSF1-A-B Combined		
Lab ID:	TSF1_A_B_MEEKA_OED	Lab:	EPLab
Depth (m):	-	Room Temperature at Test:	~ 19°C

Stage 4 @ 100kPa



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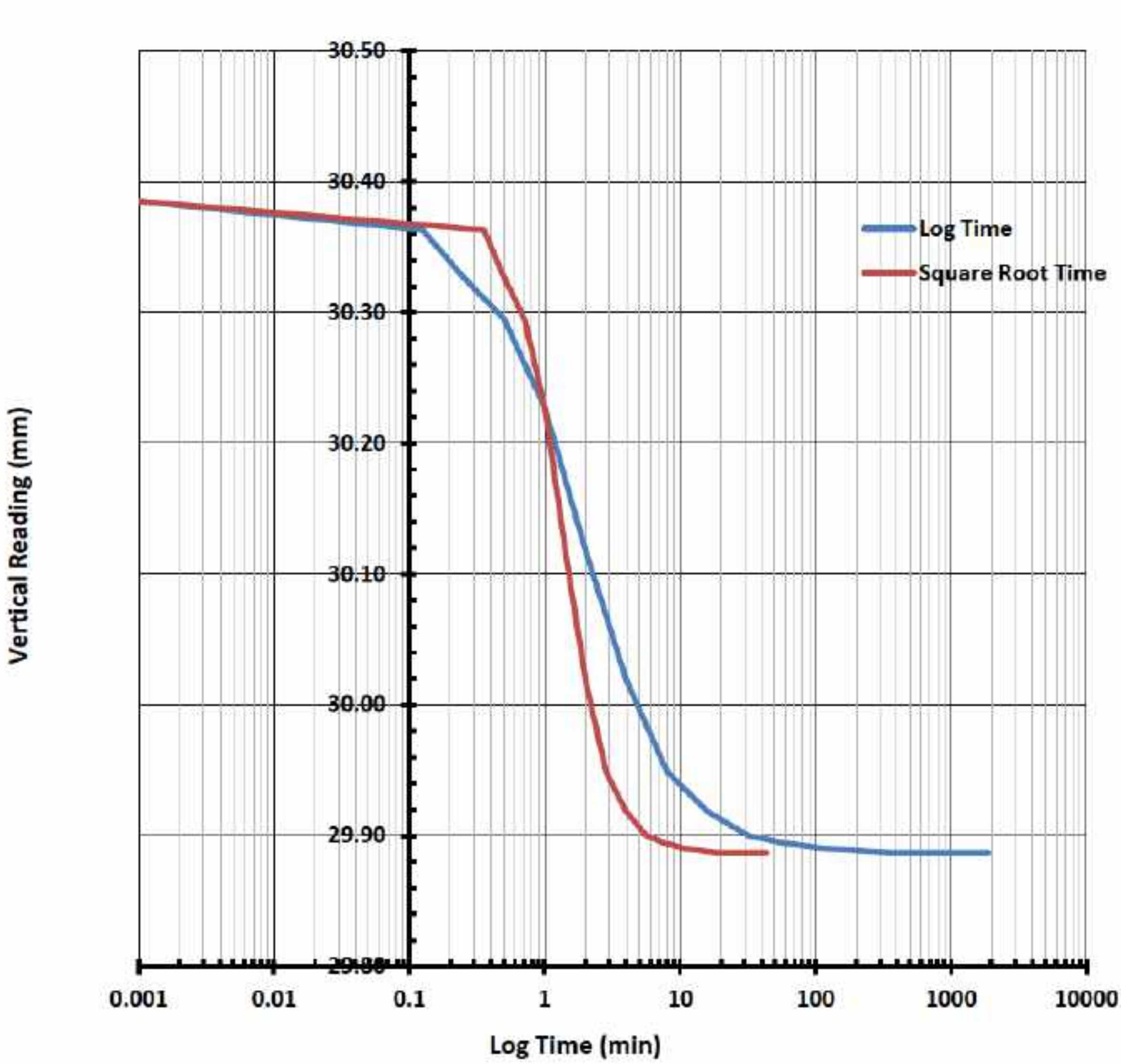
CONSOLIDATION - ONE DIMENSION

Method: AS1289 6.6.1 / Inhouse Method

Client:	Geoanalytica	Date Tested:	06/04/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	RENASCOR
Sample ID:	TSF1-A-B Combined		
Lab ID:	TSF1_A_B_MEEKA_OED	Lab:	EPLab
Depth (m):	-	Room Temperature at Test:	~ 19°C

Stage 5 @ 200kPa



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Ph: (08) 9418 8742
[redacted]

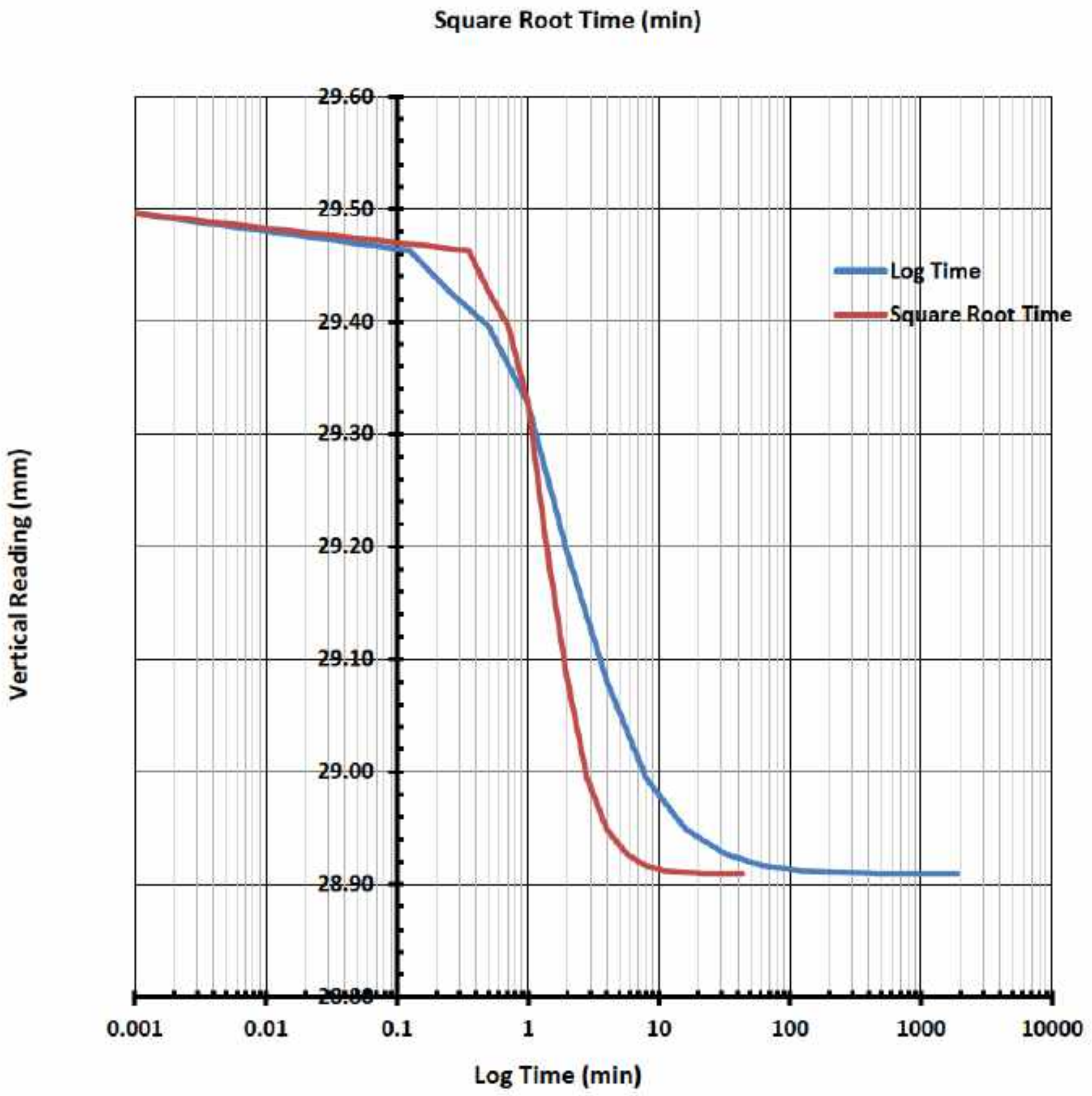
E-Precision Laboratory

CONSOLIDATION - ONE DIMENSION

Method: AS1289 6.6.1 / Inhouse Method

Client:	Geoanalytica	Date Tested:	06/04/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	RENASCOR
Sample ID:	TSF1-A-B Combined		
Lab ID:	TSF1_A_B_MEEKA_OED	Lab:	EPLab
Depth (m):	-	Room Temperature at Test:	~ 19°C

Stage 6 @ 400kPa



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[redacted]

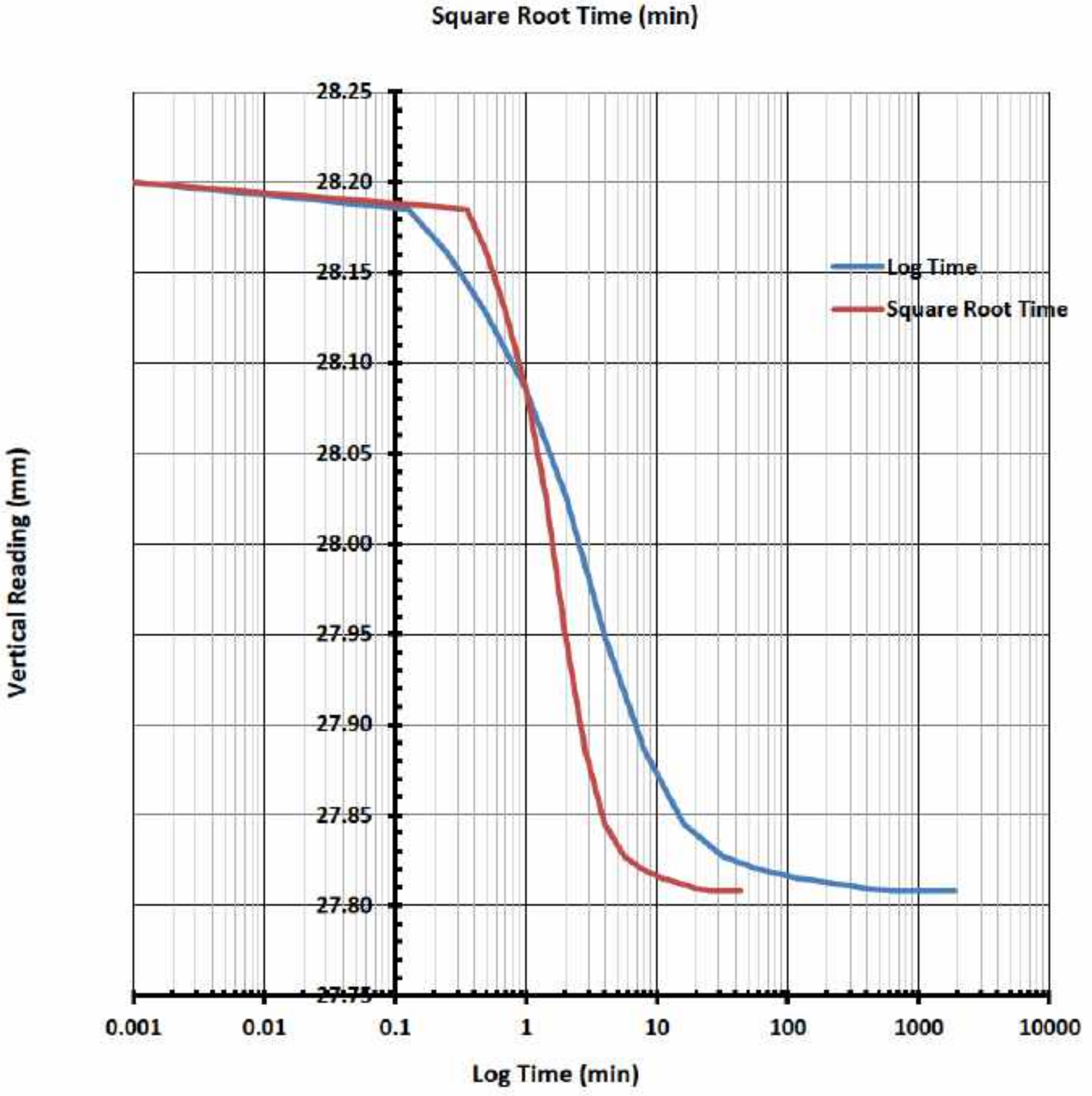
E-PRECISION LABORATORY

CONSOLIDATION - ONE DIMENSION

Method: AS1289 6.6.1 / Inhouse Method

Client:	Geoanalytica	Date Tested:	06/04/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	RENASCOR
Sample ID:	TSF1-A-B Combined		
Lab ID:	TSF1_A_B_MEEKA_OED	Lab:	EPLab
Depth (m):	-	Room Temperature at Test:	~ 19°C

Stage 7 @ 800kPa



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[redacted]

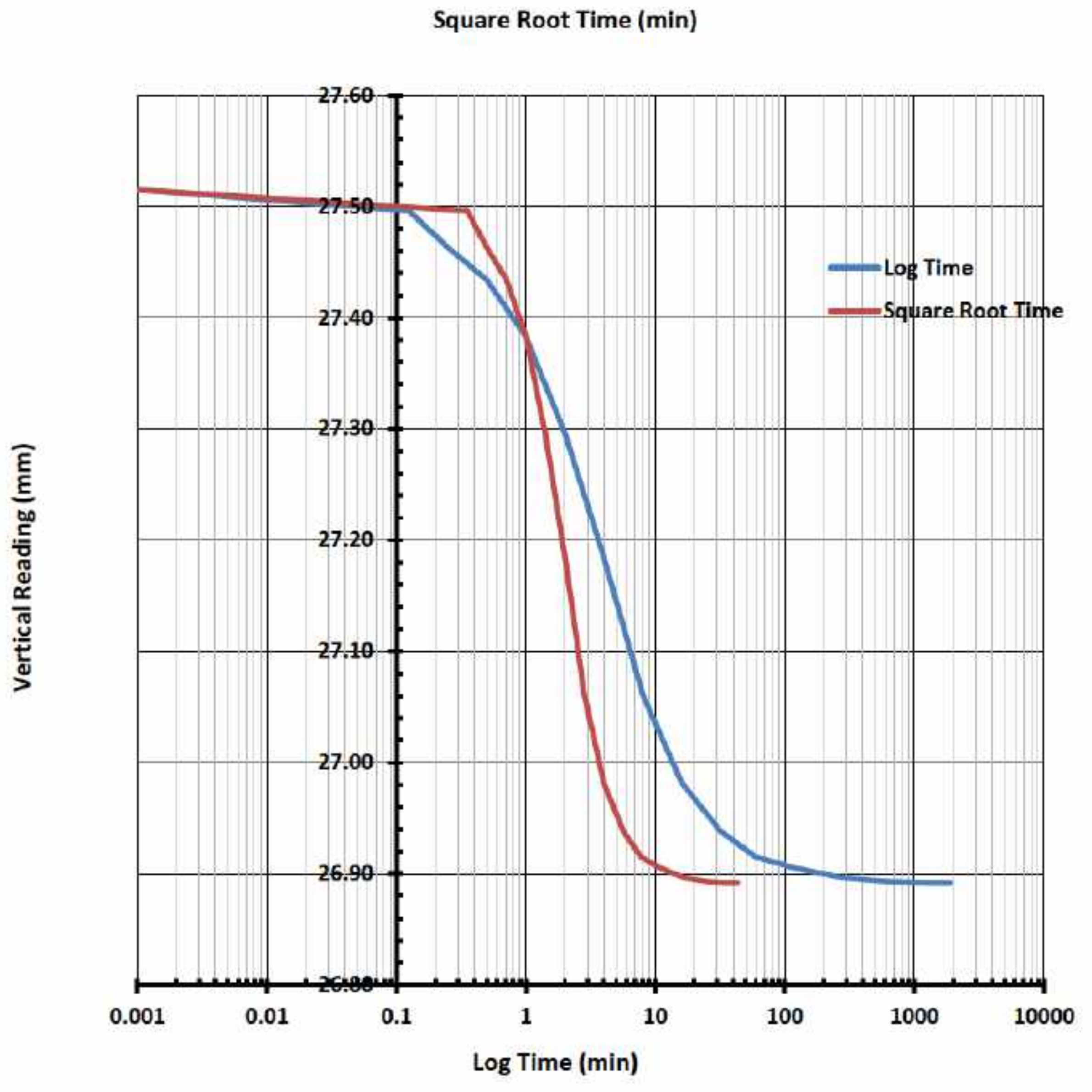
E-Precision Laboratory

CONSOLIDATION - ONE DIMENSION

Method: AS1289 6.6.1 / Inhouse Method

Client:	Geoanalytica	Date Tested:	06/04/2024
Project:	Meeka Testing 2024	EP Lab Job Number:	RENASCOR
Sample ID:	TSF1-A-B Combined		
Lab ID:	TSF1_A_B_MEEKA_OED	Lab:	EPLab
Depth (m):	-	Room Temperature at Test:	~ 19°C

Stage 8 @ 1600kPa



Integrity Precision Innovation

4 October 2012

Doray Minerals Limited
Level 3,
41-43 Ord Street.
WEST PERTH, WA 6005

Attention: [redacted]

Dear Sirs,

RE: ANDY WELL TSF - REVISED DAM BREAK ASSESSMENT

1 INTRODUCTION

This letter describes the results of a revised dam break assessment carried out by Coffey Mining for the proposed Andy Well Tailings Storage Facility (TSF) at the Andy Well Gold Project, near Meekatharra, WA. The assessment was carried out to determine the potential extent of tailings flow towards the underground mine and the Great Northern Highway and is to be included in revised Mining Proposal documentation. An initial letter was prepared at the request of Doray Minerals, to satisfy the Department of Mines and Petroleum (DMP) regarding adequacy of the TSF design and support approval to construct the facility. Based on DMP feedback, a sensitivity analysis has now also been carried out and is included in this revised assessment. Doray Minerals proposes to commence construction of the TSF in October 2012 in accordance with the design outlined in the Mining Proposal.

2 DAM BREAK ANALYSIS

2.1 General

A dam break analysis was conducted for a perimeter embankment breach of the Andy Well TSF. Two separate methods of analysis were used. The energy-based linear method proposed by Seddon (2010)[1] and methodology developed by Lucia (1981)[2] were utilised to assess potential downstream impacts in the event of TSF failure. Tailings released from the facility were assumed to be liquefied and failure was assumed to proceed to the full height of the embankment at a time when the facility is full. It should be noted that dam break analyses have been performed to assess the consequence of an embankment breach and do not indicate the likelihood of the event.

2.2 Failure Volume

The volume of tailings likely to be released from the TSF in the event of embankment failure was determined to be in the order of 80,000m^3 (approximately 35% of the impounded volume). This value is based on correlations between tailings impoundment and release volumes, as derived by Rico et al. (2007)[3] from data related to a collection of historic dam failures.

2.3 Seddon Methodology

Utilising the methodology proposed by Seddon (2010)[1], estimated tailings run-out distances corresponding to various values of tailings liquefied strength were determined and are summarised in Table 1. The pre-slide configuration adopted for the calculations comprised tailings masses corresponding to the maximum TSF starter embankment height. The failure volume was idealised as a rectangular mass accounting for the proportion of tailings likely to be released and the geometry of the total tailings mass.

A liquefied strength ratio of approximately 5% was determined for the tailings, based on Olsen and Stark (2002) as presented in Fell (2005)[4]:

$$S_{u(LIQ)}/\sigma'_{vo} = 0.03 + 0.0143\,(q_t) \pm 0.03$$

A (q_t) value of 2MPa was assumed in the above equation based on typical cone resistance values for soft silt given in Lunne et al (1997)[5].

For the modelled tailings at the starter embankment height, a liquefied tailings strength, $S_{u(LIQ)}$, of 2.5 kPa to 3.5 kPa was determined to be applicable. As a result, the tailings run-out distance is estimated to be in the order of 35 m to 70 m, based on Table 1.

Table 1
Potential Tailings Run-Out Distance Based on Liquefied Strength (Starter Embankment)

Liquefied Tailings Strength (kPa)	Tailings Run-Out Distance (m)
1	154
2	72
3	36
4	15
5	0

For modelled tailings at Stage 1 embankment height, a liquefied tailings strength, $S_{u(LIQ)}$, of 3.5kPa to 4.5kPa is applicable. As a result, the tailings run-out distance is estimated to be in the order of 60 m to 110 m, based on Table 2.

Table 2 Potential Tailings Run-Out Distance Based on Liquefied Strength (Stage 1 Embankment)	
Liquefied Tailings Strength (kPa)	**Tailings Run-Out Distance (m)**
1	263
2	157
3	110
4	82
5	63

2.4 Lucia Methodology

The Lucia (1981)[2] methodology assumes that the critical failure mode is shear along the base of the tailings with active pressure at the back of the liquefied wedge. Use of the method requires approximation of the run-out path as a plane of constant gradient. For critical run-out paths from the Andy Well TSF (westward), an assumption of no gradient was most appropriate. A representative liquefied strength of 2.5 kPa to 3.5 kPa was selected for the starter embankment and 3.5kPa to 4.5kPa for the Stage 1 embankment tailings mass, determined from the liquefied strength ratio calculated based on Olsen and Stark (2002) as presented in Fell (2005)[4] and the overburden stress at the centroid of the liquefied wedge.

With the pre-failure height of the tailings mass maintained at the start of the liquefied wedge, the flow distance for the starter embankment height was determined to be in the order of 327 m. This is measured from the wall furthest from the breach, resulting in a run-out of some 67 m from the facility for an east-west oriented starter embankment failure.

The flow distance for the Stage 1 embankment height was determined to be in the order of 369 m. Measuring from the wall furthest from the breach results in a run-out distance of approximately 110 m from the facility for an east-west orientated Stage 1 embankment failure.

Figure 1 shows the estimated extent of tailings flow in the event of embankment failure. The flow distances shown are an envelope of solutions obtained using both the Seddon and Lucia methodologies. The distances shown neglect the effects of topographical confinement (valleys) and are considered to be conservative.

3 SENSITIVITY ANALYSIS

As the facility is currently at the design stage, there is limited information regarding material properties. This has necessitated the assumption of certain parameters in the dam break assessment. A sensitivity analysis has been carried out to assess the effects of potential variability in the assumed parameters. The parameters considered in the sensitivity analysis were:

- Density (ρ) - values of $11 kN/m^3$, $15 kN/m^3$ and $16.5 kN/m^3$ were adopted (lower bound, expected value, and upper bound),

- Cone resistance (q_t) - values of 1MPa and 2MPa were adopted (lower bound and expected value).

Both parameters impact upon the liquefied strength, $S_{u(LIQ)}$, of the tailings material and therefore the estimated run-out distance (R_0).

Results of the sensitivity analysis can be found attached to this letter. In summary:

- Varying density had little effect on R_0 results for the values investigated. A variation in density of approximately 35%, from 11kN/m^3 to 15kN/m^3, had an impact on $S_{u(LIQ)}$ for the tailings of approximately 35%. Varying the tailings density thus cancelled out in the calculation of R_0.

- Varying cone resistance values affects the liquefied strength to effective stress ratio ($S_{u(LIQ)}/\sigma'_{vo}$). Based on the values investigated, a reduction of the liquefied strength of up to 50% was obtained. This reduced the liquefied strength from 2.86% of the original shear strength (τ) to 1.43% of τ. The calculated R_0 is therefore deemed to be sensitive to cone resistance values.

4 DISCUSSION

The calculated R_0 values for the TSF reported in Section 2 are based on expected values of cone resistance (q_t) and liquefied shear strength ($S_{u(LIQ)}$). The R_0 values are less than the distances to the proposed underground mine (~ 300m) and existing Great Northern Highway (~ 500m). This is illustrated in Figure 1.

Sensitivity analyses carried out on assumed density (ρ) and cone resistance (q_t) values indicate that changes in density have little effect on R_0. Changes in the cone resistance, however, impact on R_0. Adopting a lower bound average cone resistance value of 1MPa could put the underground mine within reach of tailings run-out from a potential dam breach at starter embankment height, according to the Lucia method of R_0 evaluation (R_0 = 440m). It is noted, however, that the Seddon method (R_0 = 272m) negates this assessment, i.e. the underground mine is not at risk. There is thus discordance in the results at lower bound values of cone resistance.

The conditions for TSF failure will be largely driven by the size and extent of the decant pond on the facility. Effective management of the decant pond to ensure that excess water is continually removed and the location of the pond is maintained around the central decant tower will minimise the risk of a perimeter embankment breach.

TSF failure is not expected when the facility is operated in accordance with the design.

5 CONCLUSIONS

A dam break analysis has been carried out for the proposed Andy Well TSF. The results of the analysis given in Section 2 show that critical infrastructure such as the underground mine and Great Northern Highway will not be at risk in the event of dam failure at expected values CPT cone resistance and corresponding tailings liquefied shear strength.

Sensitivity analyses have indicated there is a potential for the run-out distance to increase should the deposited tailings not achieve the expected strength. Investigation of the deposited tailings is recommended prior to raising the TSF, to validate expected cone resistance values adopted in the current dam break assessment. Confirmation that there is no risk to infrastructure such as the underground mine or Great Northern Highway will be required prior to TSF raising construction.

6 CLOSURE

We trust this information meets your immediate requirements. Should you require further information or clarification of any details, please do not hesitate to contact the undersigned.

For and on behalf of Coffey Mining Pty Ltd

[redacted]

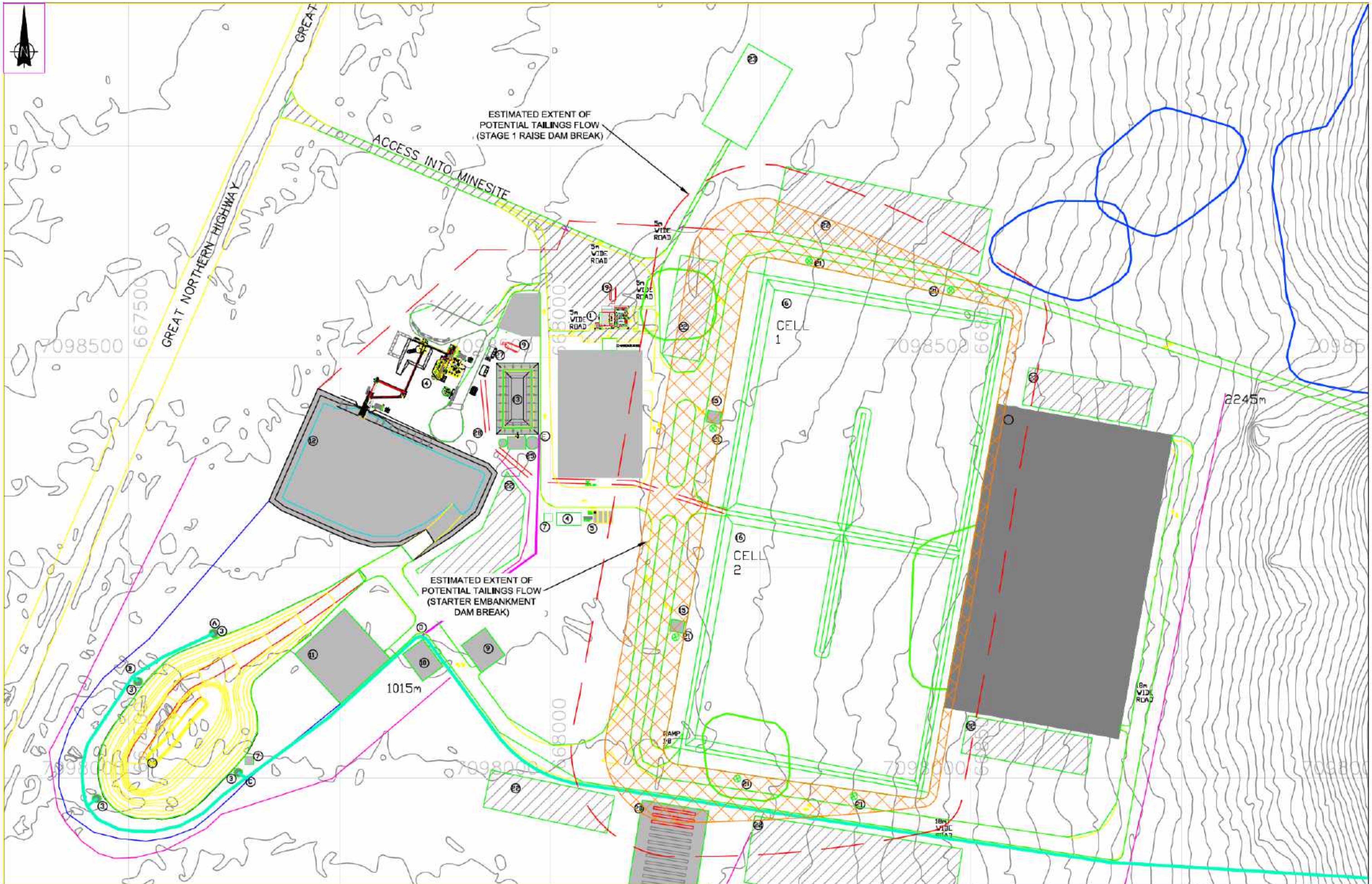
Associate Civil / Geotechnical Engineer

Attachments:

- Figure 1 – Dam Break – Potential Impact
- Supporting Calculations
- Sensitivity Analysis Results

7 REFERENCES

1. Seddon (2010), *Approaches to run-out distances for liquefied tailings*, Mine Waste 2010, pp 63-70.
2. Lucia, Duncan & Seed (1982), *Summary of research on case histories of flow failures of mine tailings impoundments*, Mine Waste Disposal Technology 1982, pp 46-53.
3. Rico, Benito & Diez-Herrero (2007), *Floods from tailings dam failures*, Journal of Hazardous Materials 2007, pp 79-87.
4. Fell, MacGregor, Stapledon & Graeme (2005). *Geotechnical Engineering of Dams.* London: Taylor & Francis Group plc.
5. Lunne, Robertson & Powell (1997), *Cone Penetration Testing in Geotechnical Practice.*



				drawn	BT	client:	DORAY MINERALS LTD
				approved	GR	project:	ANDY WELL TSF AND WSF DESIGN NEAR MEEKATHARRA, WA
				date	25/09/2012		
A	ISSUED FOR CLIENT REVIEW	25/09/2012	GR	scale	1:4000	title:	DAM BREAK - POTENTIAL IMPACT
rev no	revision note	date	approved	original size	A3	project no: MWP00021AB	fig no: 1 rev: A

coffey mining

coffey

Client: Doray Minerals
Project: Andy Well TSF Starter Embankment
Project No: MINEWPER00921AB
Calculations: Dam Break Analysis (Seddon, 2010)
Design: BT
Date: 21/09/2012

4.2 **Linear method**

The simplest solution can be obtained if it is assumed that the runout tongue is of uniform thickness. From the geometry,

$$H_o x_o = h\, x_f$$

$$\therefore h = (x_o / x_f) H_o$$

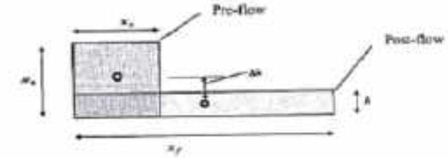


Figure 2 **Simplified flow slide geometry**

$$x_f^2 + x_o x_f - 2\gamma x_o H_o^2 / s_u = 0$$

in which X_f is the only unknown, and the required runout distance (Ro) is:

$$Ro = x_f - x_o$$

ENERGY BASED APPROXIMATIONS

Linear Method

(K.d. Seddon) Approaches to estimation of run-out distances for liquefied tailings (MINE WASTE 2010)

Inputs

Assumed Tailings Bulk Density (ρ):	1.5 t/m^3
TSF Breach Height (H_0):	5.5 m
**Equivalent Tailings Failed Length (x_o):	90 m

Outputs

Parameter	Case									
	1	2	3	4	5	6	7	8	9	10
Undrained Shear Strength (s_u) (kPa)	1	2	3	4	5	6	7	8	9	10
Density (γ) (kN/m^3)	15	15	15	15	15	15	15	15	15	15
Pre-flow Length (x_o) (m)	90	90	90	90	90	90	90	90	90	90
Pre-flow Height (H_o) (m)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
A = 1	1	1	1	1	1	1	1	1	1	1
B = x_o (m)	90	90	90	90	90	90	90	90	90	90
C = -2*g*x_o*H_o*H_o/s_u	-81,675	-40,838	-27,225	-20,419	-16,335	-13,613	-11,668	-10,209	-9,075	-8,168
Solution x_f (m)	244	162	126	105	90	80	72	66	60	56

Run-out Distance R_o (m)	154	72	36	15	0	-10	-18	-24	-30	-34
Run-out Height h = (x_o/x_f) H_0	2.03	3.05	3.93	4.72	5.47	6.18	6.87	7.54	8.20	8.85

coffey

Client: Doray Minerals
Project: Andy Well TSF Starter Embankment
Project No: MINEWPER00921AB
Calculations: Dam Break Analysis (Lucia, 1981)
Design: BT
Date: 21/09/2012

ASSUMPTIONS

β from 1m drop over 260m horizontal distance (westwards)

Triangular breach geometry, with side slopes 1:2 (H:V) (MacDonald & Langridge-Monopolis, 1984. Breaching characteristics of dam failures. Journal of Hydraulic Engineering, vol 110, no 5, May 1984, pp567-585.)

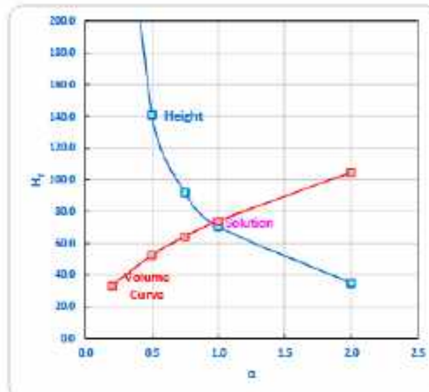
N_0 derived using Beta = 0 curve

VALUE FOR 1 CELL

Parameter	Value	Unit	Description
V_T	0.23	Mm^3	Total volume of tailings
V_F	0.08	Mm^3	Volume of released tailings (M. Rico et. al, 2007. Floods from tailings dam failures. Journal of Hazardous Materials, vol 154, no 1–3, 15 June 2008, Pages 79–87.)
V_F	2,833,374	ft^3	Converted by Google
V_F	157,020	ft^3/ft	Volume of released tailings per cross-sectional width, cross-section of breach is equal to height of wall (MacDonald & Langridge-Monopolis, 1984)
β	0.00	°	Slope of ground, rounded to nearest degree (P. C. Lucia, 1981. Review of Experiences with Flow Failures of Tailings Dams and Waste Impoundments.)
tan(β)	0		
Density	1.3	t/m^3	Tailings density, denoted γ in Lucia (1981)
Density	2,866	p/m^3	Converted by Google
Density	81	p/ft^3	Converted by Google
Wall Height	5.5	m	Height of confining embankment
Wall Height	18.0	ft	Converted by Google
S_u ratio	5%		**ASSUMED**
S_u	2.4	kPa	Tailings liquefied strength, **ASSUMED**
S_u	50	p/ft^2	Converted by online.unitconverterpro.com, www.unitconversion.org, www.digitaldutch.com/unitconverter

CALCULATIONS

α [°]	tan(α)	Strength Curve (H_f) [m]	N_0 [kPa/kPa]	A_1	A_2	A_3	H_C	Volume Curve (H_f) [m]
0.2	0.00	392.6	640	1.000	0.007	0.000	2.453	33.2
0.5	0.01	141.1	230.0	1.000	0.017	0.000	2.453	52.4
0.8	0.01	92.0	150.0	1.000	0.026	0.000	2.453	64.2
1.0	0.02	70.5	115.0	1.000	0.035	0.000	2.453	74.1
2.0	0.03	35.0	57.0	1.000	0.070	0.000	2.453	104.8



RESULTS

Solution

α 1.0 °

H_f 73 ft

Interpretation

Considering the height of the wall is 18 ft, H_f should be capped at 18 ft (5.5m)

L 1,074 ft **Subtracting 260m gives**

L 327 m m

α is low relative to case studies, answer should be conservative.

L is relative to the back of the "pond".

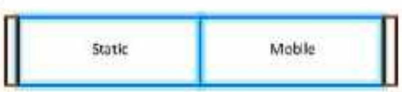
Each cell of the Facility is essentially square, so, failure in any direction, 260m needs to be subtracted.

It is therefore assumed that the further tailings from the breach point will remain static.

A portion of the tailings closest to the breach point will flow.

This flow wedge will be at full height at the origin and will support the static tailings.

Pre-failure



Post-failure

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Client: Doray Minerals
Project: Andy Well TSF Stage 1 Embankment
Project No: MINEWPER00921AB
Calculations: Dam Break Analysis (Seddon, 2010)
Design: BT
Date: 21/09/2012

4.2 Linear method

The simplest solution can be obtained if it is assumed that the runout tongue is of uniform thickness.

From the geometry,

$$H_o x_o = h\, x_f$$

$$\therefore h = (x_o / x_f) H_o$$

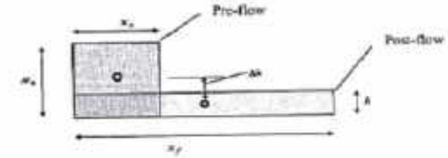


Figure 2 Simplified flow slide geometry

$$x_f^2 + x_o x_f - 2\gamma x_o H_o^2 / s_u = 0$$

in which x_f is the only unknown, and the required runout distance (Ro) is:

$$Ro = x_f - x_o$$

ENERGY BASED APPROXIMATIONS

Linear Method

(K.d. Seddon) Approaches to estimation of run-out distances for liquefied tailings (MINE WASTE 2010)

Inputs

Assumed Tailings Bulk Density (ρ):	1.5 t/m^3
TSF Breach Height (H_0):	8 m
**Equivalent Tailings Failed Length (x_o):	70 m

Outputs

Parameter	Case									
	1	2	3	4	5	6	7	8	9	10
Undrained Shear Strength (s_u) (kPa)	1	2	3	4	5	6	7	8	9	10
Density (γ) (kN/m^3)	15	15	15	15	15	15	15	15	15	15
Pre-flow Length (x_o) (m)	70	70	70	70	70	70	70	70	70	70
Pre-flow Height (H_o) (m)	8	8	8	8	8	8	8	8	8	8
A = 1	1	1	1	1	1	1	1	1	1	1
B = x_o (m)	70	70	70	70	70	70	70	70	70	70
C = $-2*g*x_o*H_o*H_o/s_u$	-134,400	-67,200	-44,800	-33,600	-26,880	-22,400	-19,200	-16,800	-14,933	-13,440
Solution x_f (m)	333	227	180	152	133	119	108	99	92	86

Run-out Distance R_o (m)	263	157	110	82	63	49	38	29	22	16
Run-out Height h = $(x_o/x_f)\ H_0$	1.68	2.47	3.12	3.69	4.22	4.72	5.19	5.64	6.08	6.50

Client: Doray Minerals
Project: Andy Well TSF Stage 1 Embankment
Project No: MINEWPER00921AB
Calculations: Dam Break Analysis (Lucia, 1981)
Design: BT
Date: 21/09/2012

ASSUMPTIONS

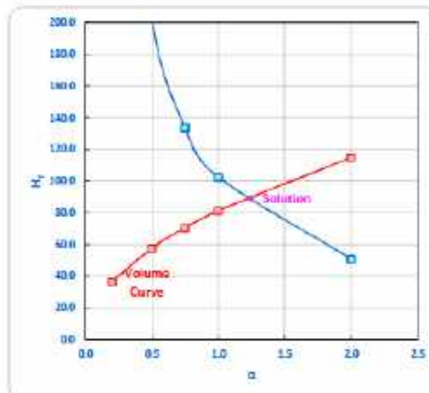
β from 1m drop over 260m horizontal distance (westwards)
Triangular breach geometry, with side slopes 1:2 (H:V) (MacDonald & Langridge-Monopolis, 1984. Breaching characteristics of dam failures. Journal of Hydraulic Engineering, vol 110, no 5, May 1984, pp567-585.)
N_0 derived using Beta = 0 curve

VALUE FOR 1 CELL

Parameter	Value	Unit	Description
V_T	0.40	Mm^3	Total volume of tailings
V_F	0.14	Mm^3	Volume of released tailings (M. Rico et. al, 2007. Floods from tailings dam failures. Journal of Hazardous Materials, vol 154, no 1–3, 15 June 2008, Pages 79–87.)
V_F	4,954,951	ft^3	Converted by Google
V_F	188,784	ft^3/ft	Volume of released tailings per cross-sectional width, cross-section of breach is equal to height of wall (MacDonald & Langridge-Monopolis, 1984)
β	0.00	°	Slope of ground, rounded to nearest degree (P. C. Lucia, 1981. Review of Experiences with Flow Failures of Tailings Dams and Waste Impoundments.)
tan(β)	0		
Density	1.3	t/m^3	Tailings density, denoted γ in Lucia (1981)
Density	2,866	p/m^3	Converted by Google
Density	81	p/ft^3	Converted by Google
Wall Height	8.0	m	Height of confining embankment
Wall Height	26.2	ft	Converted by Google
S_u ratio	5%		**ASSUMED**
S_u	3.5	kPa	Tailings liquefied strength, **ASSUMED**
S_u	72	p/ft^2	Converted by online.unitconverterpro.com, www.unitconversion.org, www.digitaldutch.com/unitconverter

CALCULATIONS

α [°]	tan(α)	Strength Curve (H_t) [m]	N_0 [kPa/kPa]	A_1	A_2	A_3	H_C	Volume Curve (H_t) [m]
0.2	0.00	571.0	640	1.000	0.007	0.000	3.569	36.5
0.5	0.01	205.2	230.0	1.000	0.017	0.000	3.569	57.5
0.8	0.01	133.8	150.0	1.000	0.026	0.000	3.569	70.4
1.0	0.02	102.6	115.0	1.000	0.035	0.000	3.569	81.3
2.0	0.03	50.9	57.0	1.000	0.070	0.000	3.569	114.9



RESULTS

Solution

α	1.2	°
H_t	89	ft

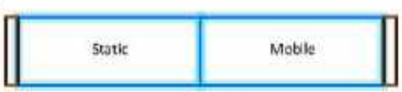
Interpretation

Considering the height of the wall is 26.2 ft, H_t should be capped at 26.2 ft (8m)

			Subtracting 260m gives
L	1,210	ft	
L	369	m	109 m

α is low relative to case studies, answer should be conservative.
L is relative to the back of the "pond".
Each cell of the Facility is essentially square, so, failure in any direction, 260m needs to be subtracted.
It is therefore assumed that the further tailings from the breach point will remain static.
A portion of the tailings closest to the breach point will flow.
This flow wedge will be at full height at the origin and will support the static tailings.

Pre-failure



Post-failure

Client: Doray Minerals
Project: Andy Well TSF
Project No: MINEWPER00921AB
Calculations: Sensitivity Summary Dam Break Analysis
Design: BT
Date: 4/10/2012

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ρ = 11kN/m^3

qt = 2MPa

$S_{u(LIQ)}/\sigma'_{vo}$

MIN	2.86%
MEAN	5.86%
MAX	8.86%

$S_{u(LIQ)}/\sigma'_{vo} = 0.03+0.0143(q_t)\pm0.03$

τ = Shear Strength

S_u = Residual Shear Strength

R_0 = Run-out Distance

Dam Heights = 5.5 & 8.0 (m)

Residual Shear Strength

	$S_{u5.5}$ (kPa)	$S_{u8.0}$ (kPa)	$R_{05.5}$ (m)	$R_{08.0}$ (m)
MIN Seddon	0.87	1.26	127	187
MIN Lucia	1.15	1.68	224	327
MEAN Seddon	1.77	2.58	55	90
MEAN Lucia	2.36	3.44	26	69
MAX Seddon	2.68	3.90	21	51
MAX Lucia	3.57	5.20	-55	-4

$\tau_{average}$

	$\tau_{5.5}$ (kPa)	$\tau_{8.0}$ (kPa)
Seddon (ρ=11kN/m^2)	30.25	44.00
Lucia (ρ=11kN/m^2)	40.33	58.67

coffey

Client: Doray Minerals
Project: Andy Well TSF
Project No: MINEWPER00921AB
Calculations: Sensitivity Summary Dam Break Analysis
Design: BT
Date: 4/10/2012

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ρ = 15kN/m^3

qt = 2MPa

$S_{u(LIQ)}/\sigma'_{vo}$

MIN	2.86%
MEAN	5.86%
MAX	8.86%

τ = Shear Strength

S_u = Residual Shear Strength

R_0 = Run-out Distance

Dam Heights = 5.5 & 8.0 (m)

$S_{u(LIQ)}/\sigma'_{vo} = 0.03+0.0143(q_t)\pm0.03$

Residual Shear Strength

	$S_{u5.5}$ (kPa)	$S_{u8.0}$ (kPa)	$R_{05.5}$ (m)	$R_{08.0}$ (m)
MIN Seddon	1.18	1.72	130	187
MIN Lucia	1.57	2.29	224	327
MEAN Seddon	2.42	3.52	55	92
MEAN Lucia	3.22	4.69	26	67
MAX Seddon	3.65	5.32	21	51
MAX Lucia	4.87	7.09	-55	-4

$\tau_{average}$

	$\tau_{5.5}$ (kPa)	$\tau_{8.0}$ (kPa)
Seddon (ρ=15kN/m^2)	41.25	60.00
Lucia (ρ=15kN/m^2)	55.00	80.00

coffey

Client: Doray Minerals
Project: Andy Well TSF
Project No: MINEWPER00921AB
Calculations: Sensitivity Summary Dam Break Analysis
Design: BT
Date: 4/10/2012

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ρ = 15kN/m^3

qt = 1MPa

$S_{u(LIQ)}/\sigma'_{vo} = 0.03+0.0143(q_t)\pm0.03$

$S_{u(LIQ)}/\sigma'_{vo}$

MIN	1.43%
MEAN	4.43%
MAX	7.43%

τ = Shear Strength
S_u = Residual Shear Strength
R_0 = Run-out Distance
Dam Heights = 5.5 & 8.0 (m)

Residual Shear Strength

	$S_{u5.5}$ (kPa)	$S_{u8.0}$ (kPa)	$R_{05.5}$ (m)	$R_{08.0}$ (m)
MIN Seddon	0.59	0.86	237	305
MIN Lucia	0.79	1.14	440	655
MEAN Seddon	1.83	2.66	83	124
MEAN Lucia	2.44	3.54	101	156
MAX Seddon	3.06	4.46	36	66
MAX Lucia	4.09	5.94	-27	19

$\tau_{average}$

	$\tau_{5.5}$ (kPa)	$\tau_{8.0}$ (kPa)
Seddon (ρ=15kN/m^2)	41.25	60.00
Lucia (ρ=15kN/m^2)	55.00	80.00

Client: Doray Minerals
Project: Andy Well TSF
Project No: MINEWPER00921AB
Calculations: Sensitivity Summary Dam Break Analysis
Design: BT
Date: 4/10/2012
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ρ = 16.5kN/m^3

qt = 2MPa

$S_{u(LIQ)}/\sigma'_{vo}$

MIN	2.86%
MEAN	5.86%
MAX	8.86%

$S_{u(LIQ)}/\sigma'_{vo} = 0.03+0.0143(q_t)\pm0.03$

τ = Shear Strength
S_u = Residual Shear Strength
R_0 = Run-out Distance
Dam Heights = 5.5 & 8.0 (m)

Residual Shear Strength

	$S_{u5.5}$ (kPa)	$S_{u8.0}$ (kPa)	$R_{05.5}$ (m)	$R_{08.0}$ (m)
MIN Seddon	1.30	1.89	132	184
MIN Lucia	1.73	2.52	224	327
MEAN Seddon	2.66	3.87	53	90
MEAN Lucia	3.55	5.16	26	67
MAX Seddon	4.02	5.85	21	51
MAX Lucia	5.36	7.80	-55	-4

$\tau_{average}$

	$\tau_{5.5}$ (kPa)	$\tau_{8.0}$ (kPa)
Seddon (ρ=16.5kN/m^2)	45.38	66.00
Lucia (ρ=16.5kN/m^2)	60.50	88.00

Appendix 3

Geochemical Assessment

ANDY WELL PROJECT

Tailings Storage Facility 3 Design Report

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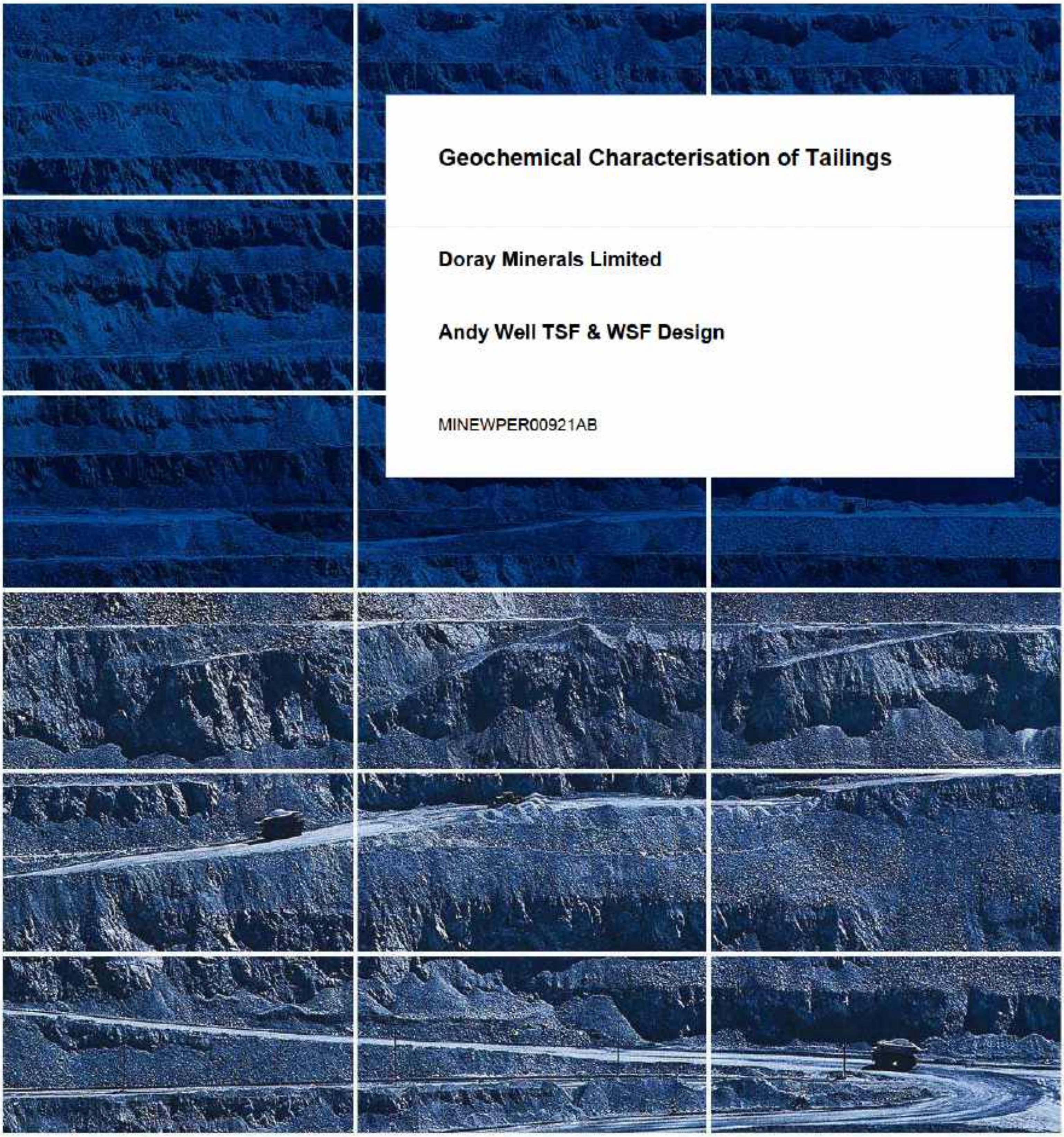
SPECIALISTS FROM BOARDROOM TO MINE FACE



Geochemical Characterisation of Tailings

Doray Minerals Limited

Andy Well TSF & WSF Design

MINEWPER00921AB

coffey mining
SPECIALISTS FROM BOARDROOM TO MINE FACE

14 June 2012

Doray Minerals Limited
Level 3
41-43 Ord Street
West Perth, Western Australia 6005

Attention: [redacted]

Dear [redacted]

RE: Geochemical Characterisation of Tailings

Please find enclosed our final report on the geochemical testwork completed on the Andy Well Gold Project tailings samples.

We trust this meets your immediate requirements. Should you have any queries please contact the undersigned.

For and on behalf of Coffey Mining Pty Ltd

[redacted]

Senior Consultant - Metallurgist

MINEWPER00921AB

DOCUMENT INFORMATION

Author(s): Melinda Robertson Senior Consultant - Metallurgy MAusIMM(CP)

Date: 14 June 2012

Project Number: MINEWPER00921AB

Version / Status: v.04 / Final

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Print Date: Thursday, 14 June 2012

Copies:

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Coffey Mining – Perth archive	(1) electronic

Document Change Control

Version	Description (section(s) amended)	Author(s)	Date
01	Draft issued for client review	M Robertson	24/01/2012
02	Short term leach testwork included	M Robertson	01/05/2012
03	Summary amended	M Robertson	07/06/2012
04	Executive summary and short-term leach content amended	M Robertson	14/06/2012

Document Review and Sign Off

[redacted]

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EXECUTIVE SUMMARY

Doray Minerals Ltd is currently undertaking feasibility studies for the Andy Well Gold Project (Project). The ore from the mine will be subjected to metallurgical processing prior to being sent to the tailings storage facility.

Coffey Mining (Coffey Mining) was requested by Doray Minerals to carry out geochemical static analysis on tailings samples derived from metallurgical testwork simulating the proposed processing plant final tailing. The geochemical testwork was completed by ALS Ammtec (Ammtec) with samples also sent to the Coffey Information Pty Ltd (Coffey Information) laboratory for geotechnical testwork.

The Ammtec testwork programme focussed on:

- Acid formation potential through ANC, NAG, NAPP testing;
- Multi-element composition of the tailings solids; and
- Water extraction tests.

The testwork procedures employed for this study are based on standard geochemical characterisation methods. A summary of the acid base testwork results is presented in Table 1.

Table 1
Andy Well Gold Project
Acid Base Results Summary

Parameter	Units	WH 4397	WH 4398
Sulphide Sulphur Content	% Sulphide Sulphur	0.42	0.36
MPA	kg H2SO4 per tonne of ore	12.9	11.0
ANC	kg H2SO4 per tonne of ore	193	196
NAPP	kg H2SO4 per tonne of ore	-180	-185
NAG	kg H2SO4 per tonne of ore	-9.0	-9.0
ANC/MPA ratio		15.0	16.9

The potential for Acid Mine Drainage (AMD) production is very low for waste material with ANC/MPA ratios greater than 2.0. The Andy Well tailings samples showed ratios of 15.0 and 16.9. As such, the Acid Forming Potential (AFP) of the tailings samples was classified as Non-Acid Forming (NAF).

The results from the multi-elemental analysis of both tailings samples indicate that the following elements may become enriched:

- Silver (Ag), Arsenic (As), Tellurium (Te) and Titanium (Ti).

Silver (Ag) occurs as a native metal or an alloy and is stable in air and water. Titanium (Ti) readily reacts with oxygen to form TiO_2, a stable compound. Tellurium (Te) has a strong affinity to Au and Ag and is often present as gold tellurides. Te exists in the earth's crust as a rare stable element.

Arsenic (As) concentration levels are well below Health Investigation Levels (HIL) classification F – Commercial/industrial sites, and meet HIL classification A – Standard residential, although exceed Ecological Investigation Levels as published by Department of Environment and Conservation (DEC) soil contamination criteria (2010).

Further investigation to assess the degree of mobility and the potential for impacting the receiving environment was undertaken by short-term leach testing following the Australian Standard Leach Procedure (ASLP) AS4439.3 – 1997 on sample WH 4397. Table 2 shows the results.

Table 2
Andy Well Gold Project
ASLP Analysis

Element	ANZECC & ARMCANZ (2000)[1]		Leachable Concentration	Leachable Concentration	Concentration Tailings
	Short-term irrigation water	Long-term irrigation water	De-ionised pH = 5.68	pH = 2.9	
	mg/L	mg/L	mg/L	mg/L	mg/kg
Ag			0.0026	0.0017	1.4
Al	20	5	0.6216	0.6215	47200
As	2	0.1	0.1092	0.0502	80
Ba			2.8848	0.8779	135
Be	0.5	0.1	0.0010	0.0010	
Bo		0.5			
Cd	0.05	0.01	0.0010	0.0030	5
Cr	1	0.1	0.0500	0.0500	840
Co	0.1	0.05	0.0119	0.0188	30
Cu	5	0.2	0.3256	0.2320	58
Fe	10	0.2	0.8000	0.7997	43600
Hg	0.02	0.02	0.0100	0.0100	0.1
Li	2.5	2.5	0.0127	0.0147	30
Mn	10	0.2	0.0221	8.7287	700
Mo	0.05	0.01	0.0041	0.0041	15
Ni	2	0.2	0.0411	0.3215	265
Pb	5	2	0.2049	0.1065	15
Se	0.05	0.02	0.0500	0.0500	
U	0.1	0.01	0.0022	0.0179	
V	0.5	0.1			110
Zn	5	2	0.1494	0.1248	70
F	2	1	0.1227	0.1227	1.4

Note: 1. ANZECC & ARMCANZ (2000) Australian Water Quality Guidelines for Fresh and Marine Water Quality

Comparison of the leachable concentration and guideline values for assessment levels for water as published by Department of Environment and Conservation (DEC) (2010) indicated concentrations meeting the Department of Health (DoH) (2006) Contaminated Sites Reporting Guideline for Chemicals in Groundwater guideline (domestic non-potable groundwater use).

Mercury (Hg) does exceed the long and short term irrigation use guideline however it assayed at less than the detection limit of 20 parts per billion (ppb). Further result analysis for mercury shows the contained mercury in the tailings solid is well below Ecological Investigation Levels (EIL) as published by Department of Environment and Conservation (DEC) soil contamination criteria (2010). The copper and selenium results were the only two values at the higher pH leachate solution that exceeded the long term irrigation water guidelines. Selenium is below the detection limit for the sample analysis at 100 parts per billion (ppb) and therefore can range from 0 to 0.05 mg/L. The copper concentration of 58 mg/kg in the tailings solid sample does not exceed the Ecological Investigation Level (DEC, 2010) of 100 mg/kg therefore the potential overall loading of mobile metal is low. During the operational phase of the Project, routine monitoring of the process tailings, monitoring bores and associated return water quality is recommended to actively assess and mitigate any potential impact to the receiving environment.

1 INTRODUCTION

The Andy Well gold project (Project) is located approximately 45km north of Meekatharra, in the Murchison region of Western Australia.

The Project is a greenfield development with feasibility studies initiated in November 2010. Doray Minerals Limited (Doray Minerals) is anticipating delivery of a Bankable Feasibility Study in 2012.

Coffey Mining Pty Ltd (Coffey Mining) were requested by Terry Weston on behalf of Doray Minerals to carry out geochemical static testwork and analysis on tailings samples derived from testwork carried out by ALS Ammtec (Ammtec) in Perth. The sample was provided by the client to approximate the slurry expected to be delivered to a process tailings storage facility.

The geochemical analysis focused on the tailings produced from metallurgical testwork and did not take into account the mine waste material produced during the mining life. Included in the geochemical testwork were the following analyses:

- Acid forming potential through ANC, NAG, NAPP testing;
- Multi-element composition of the tailings solids;
- Water extraction testwork; and
- Short term leach testing following the methodology of the Australian Standard Leach Procedure (ASLP) AS4439.3 – 1997.

2 GEOLOGY AND MINERALISATION

Roger Townend and Associates Consulting Mineralogists presented a mineralogy report on two Reverse Circulation (RC) samples: Sample MNRC 035 45-48m transitional quartz vein ore and sample MNRC 041 97-101 m fresh quartz vein ore.

Table 2_1
Andy Well Gold Project
Mineralogy Summary - Transitional

Ore Mineral	Size Fraction			
	+1 mm	-1 mm +300 µm	+300 µm -75 µm	-75 µm
Pyrite	Dominant	Dominant	Dominant	Major
Goethite	Accessory	Accessory	Minor	Major
Chalcocite	Trace		Trace	Trace
Covellite	Trace			Trace
Leucoxene	Trace	Trace	Accessory	
Chalcopyrite		Trace		Trace
Titanium Oxides				Accessory
Magnetite				Accessory

Table 2_2
Andy Well Gold Project
Mineralogy Summary - Fresh

Ore Mineral	**Size Fraction**			
	+1mm	**-1mm +300µm**	**+300µm -75µm**	**-75µm**
Pyrite	Dominant	Dominant	Dominant	Dominant
Goethite		Accessory		
Chalcopyrite	Trace	Trace	Accessory	Trace
Titanium Oxides		Accessory	Trace	
Magnetite			Accessory	
Galena	Trace		Trace	
Gold	Trace		Trace	
Sphalerite			Trace	
Pyrrhotite			Trace	
Hematite				Trace

All size fractions contained approximately 5% or less of ore minerals. Ore mineral classification approximates the following categories:

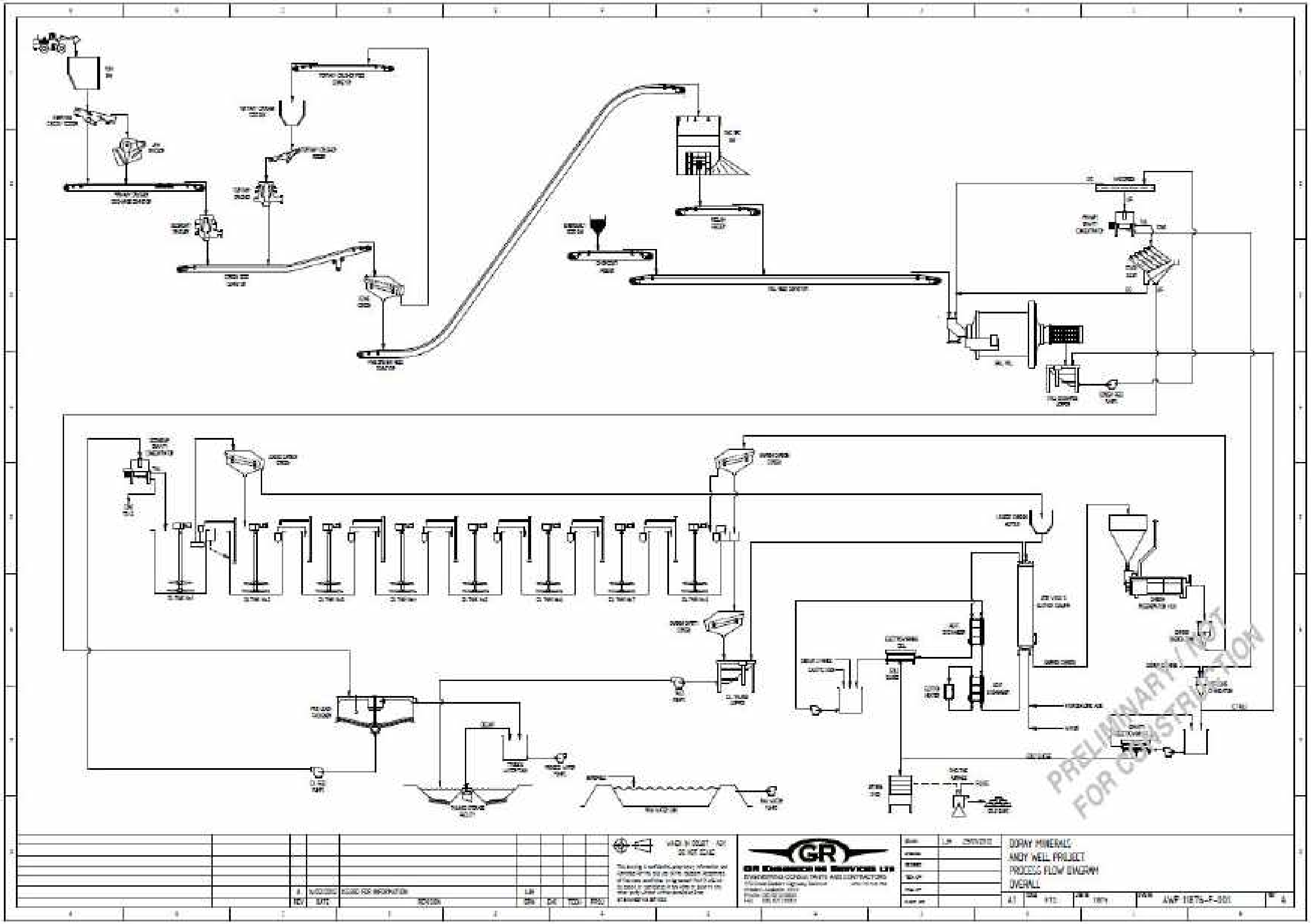
- Dominant >50%
- Major 20-50%
- Minor 10-20%
- Accessory 2-10%
- Trace <2%

The Wilber lode mineralisation consists of a thin (1-2m wide) zone of steeply dipping quartz-carbonate vein(s) within moderately altered and sheared high-Mg basalts. Mineralisation is associated with disseminated pyrite within the vein and selvedge, with minor amounts of chalcopyrite, galena and sphalerite present. Typical alteration within the host rocks consists of moderate degrees of silicifcation, carbonate alteration, and chlorite/biotite alteration. Trace amounts of fuchsite have been observed in the lode itself.

3 PROCESS DESCRIPTION

The proposed flowsheet comprises of three stage crushing, gravity gold recovery, milling, intensive cyanidation and Carbon in Leach/Carbon in Pulp (CIL/CIP) unit processes. Gold will be recovered to dore following elution and electrowinning. Tailings will be pumped from the CIL/CIP circuit to the tailings storage facility. Water will be returned from the tailings decant for reuse in the process.

Figure 3_1
Process Flowsheet



4 TESTWORK

The testwork procedures employed for this study were based on standard geochemical characterisation methods. The static testwork programme was completed by Ammtec. The Ammtec testwork programme flowsheets for the two samples provided for the geochemical characterisation are shown in Figure 4_1 and 4_2.

Figure 4_1
Static Test Programmes Flowsheet – Sample WH4397

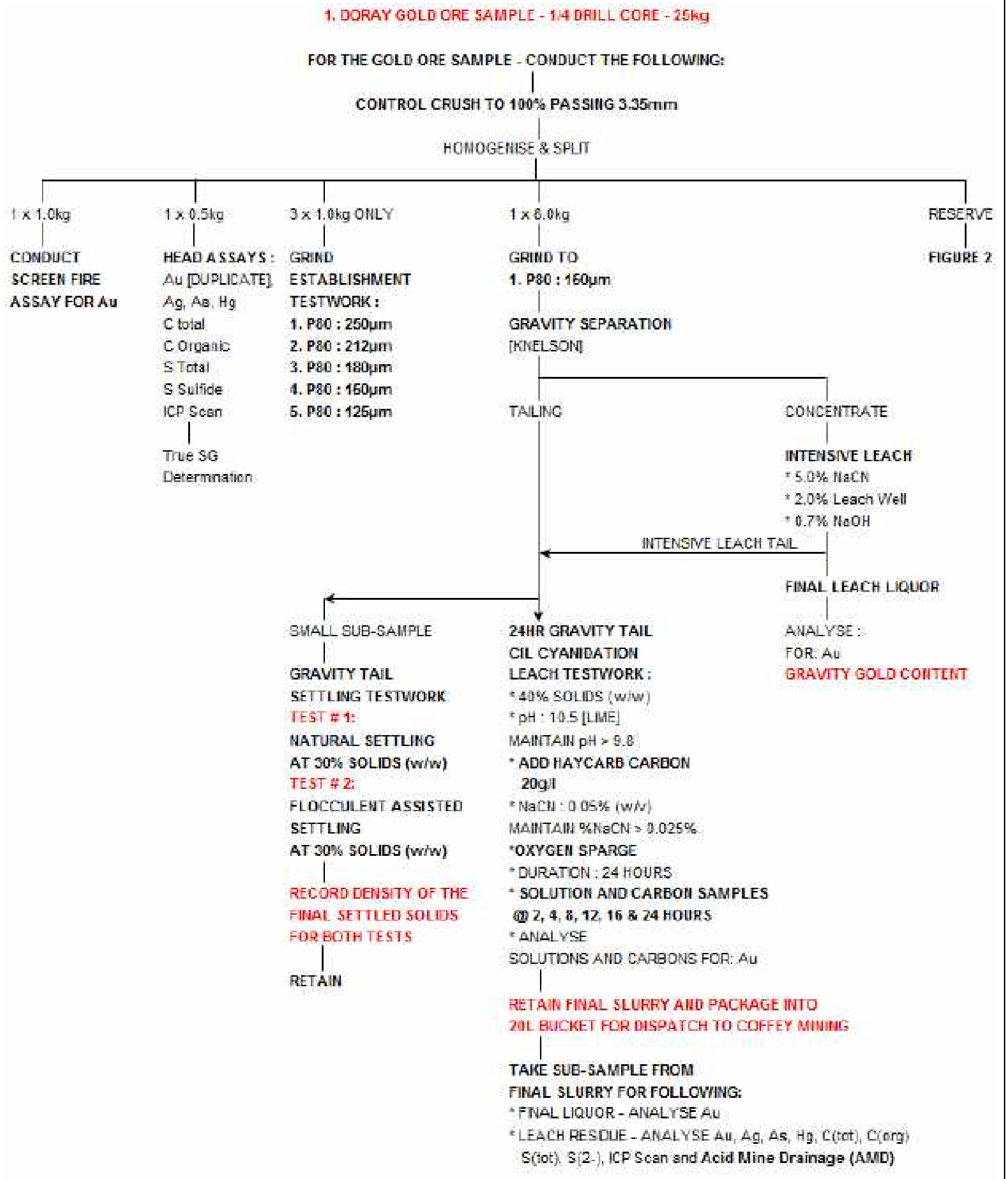
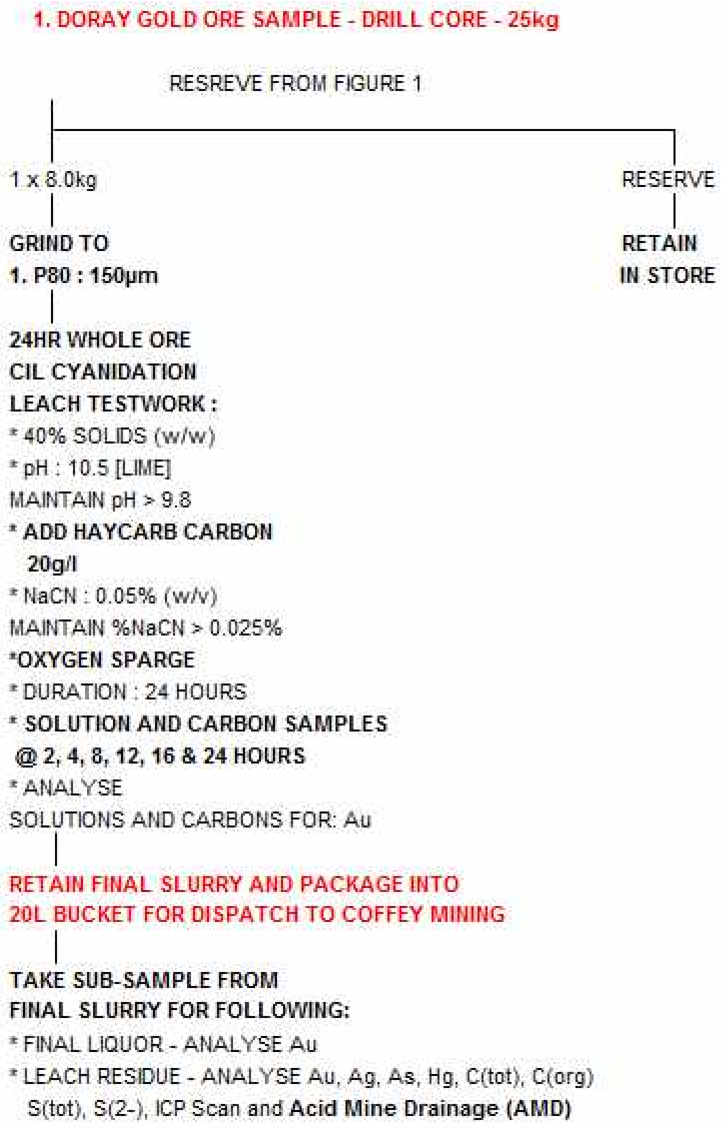


Figure 4_2
Static Test Programme Flowsheet – Sample WH 4398



Subsequent short term leach testwork was completed on tailings sample WH 4397 by SGS Lakefield Oretest. The kinetic test was completed using the established methodology, the Australian Standard Leach Procedure (ASLP) AS4439.3 – 1997.

Copies of the laboratory reports are provided in the Appendix A, B and C.

4.1 Sample Selection

Two tailings samples were generated by Ammtec, WH 4397 and WH 4398. Doray Minerals provided 25kg of quarter drill core sample which was homogenised and split. The tailings samples were collected after undergoing two different processing flowsheet options as outlined in Section 4.

A 20 litre sample of tailings slurry was collected and sent to Coffey Information for additional tailings geotechnical laboratory testwork. A subsample from each tailings produced was extracted and tested by Ammtec for Acid Mine Drainage (AMD) and multi elemental analysis. Some of the analysis on sample WH 4397 was completed in duplicate as part of Ammtec's quality assurance practices.

Doray Minerals provided the sample used for production of the tailings samples. Coffey Mining did not verify the sample representivity.

The remaining tailings slurry sample from WH 4397 was dispatched from Coffey Information to SGS Lakefield Oretest for the short term leach testwork programme. WH 4397 is most representative of the process flow, having undergone gravity concentration and intensive cyanide leach prior to standard cyanide leaching and disposal to tailings. Results of both samples, WH 4397 and WH 4398, indicated no significant difference being attributed to process flow.

4.2 Acid Base Chemistry

4.2.1 Maximum Potential Acidity (MPA)

The MPA reflects the maximum amount of acid that is generated if all the sulphide sulphur in the sample is completely oxidised according to the following reaction:

- $FeS_2 + {}^{15}/_4 O_2 + {}^{7}/_2 H_2O = Fe(OH)_3 + 2\ H_2SO_4$

From the elemental analysis, the sulphide sulphur grades and resultant MPA's of the Project tailings are shown in Table 4.2.1_1.

Table 4.2.1_1
Andy Well Gold Project
Maximum Potential Acidity Results

Parameter	Units	WH 4397	WH 4398
Sulphide Sulphur	%	0.42	0.36
MPA	kg H_2SO_4 per tonne of ore	12.9	11.0

4.2.2 Acid Neutralisation Capacity (ANC)

In this test, the sample is acidified with a known amount of hydrochloric acid which is then heated to ensure reaction completion. The calcium carbonate equivalent of the sample is obtained by determining the amount of unconsumed acid by titration with standardised sodium hydroxide.

The Project tailings ANC is shown in Table 4.2.2_1.

Table 4.2.2_1
Andy Well Gold Project
Acid Neutralisation Capacity Results

Parameter	Units	WH 4397	WH 4398
ANC	kg H_2SO_4 per tonne of ore	193	196

4.2.3 Net Acid Producing Potential (NAPP)

The NAPP is calculated from the corresponding MPA and ANC values using the following equation:

- NAPP = MPA - ANC

For tailings sample WH 4397:

- NAPP = 12.9 - 193 = -180.1 kg H_2SO_4 per tonne of ore.

For the tailings sample WH 4398:

- NAPP = 11.0 – 196 = -185.0 kg H_2SO_4 per tonne of ore.

4.2.4 Net Acid Generating (NAG)

In this test, the sample is placed under oxidising conditions to accelerate the sulphide oxidation. The resulting solution is then back titrated to measure the amount of acid that was produced.

Both tailings results show the Project tailings NAG = -9.0 kg H_2SO_4 per tonne of ore.

4.2.5 Results Discussion

A summary of the acid base testwork results is presented in Table 4.2.5_1.

Table 4.2.5_1
Andy Well Gold Project
Acid Base Results Summary

Parameter	Units	WH 4397	WH 4398
Sulphide Sulphur Content	% Sulphide Sulphur	0.42	0.36
MPA	kg H2SO4 per tonne of ore	12.9	11.0
ANC	kg H2SO4 per tonne of ore	193	196
NAPP	kg H2SO4 per tonne of ore	-180	-185
NAG	kg H2SO4 per tonne of ore	-9.0	-9.0
ANC/MPA ratio		15.0	16.9

There are no standards for classifying Acid Forming Potential (AFP) in mine waste material, rather a range of tests are applied to determine deposit specific geochemistry and mineralogy. Research and mining operational experience (especially estimation of reaction-rates for diverse sulphide/gangue-mineral assemblages) have shown that the potential for Acid Rock Drainage (ARD) production is very low for mine waste materials with ANC/MPA ratios greater than 2.0 (AMIRA 2002).

The AFP of a sample can be classified into either:

- Non-Acid forming (NAF)
- Potentially acid forming (PAF)

The classification criteria often used in mining operations worldwide are:

- NAF: Sulphide Sulphur <0.3%, both a negative NAPP and an ANC/MPA ratio of ≥2.0
- PAF: Sulphide Sulphur ≥0.3%, any positive NAPP and a negative NAPP value with an ANC/MPA ratio of <2.0

From the above criteria, both of the Project tailings samples can be considered Non-Acid Forming (NAF).

Modified Acid Base Accounting (ABA) methods use the sulphide sulphur content in the sample (as above). It calculates Acid Production Potential (APP) on the sulphide sulphur content (Lawrence 1990). This is different from the total sulphur calculation used in the ABA test in that the sulphur contribution from non-sulphide sources is not included.

Both the sulphide sulphur and total sulphur have been analysed with a reported difference of 0.04% and 0.02% in samples WH 4397 and WH 4398 respectively. This result indicates almost all of the sulphur is present as sulphides, and from the mineralogy, likely to be dominated by pyrite.

4.3 Multi Elemental Analysis

The multi elemental analysis of the tailings sample is presented in Table 4.3_1 and Table 4.3_2, along with a comparison with the average crustal abundance of the earth and the Geochemical Abundance Index (GAI). The GAI is calculated from the ratio of the sample element content and the average element crustal abundance. A GAI greater than 3 usually signifies enrichment to a level that warrants further investigation. Element enrichments serve as a starting point in the assessment of potential concerns for element leaching, and the production of toxic dust from dry exposed tailings in the storage facility.

Table 4.3_1
Andy Well Gold Project
Multi Elemental Analysis – WH 4397

Element	Units	Element Content	Average Crustal Abundance (ACA)	Geochemical Abundance Index (GAI)
Al	%	4.72	8.20	0
Ca	%	4.60	4.10	0
Fe	%	4.36	4.10	0
K	%	0.40	2.10	0
Mg	%	4.92	2.30	0
Na	%	0.54	2.30	0
Ag	ppm	1.40	0.07	3
As	ppm	80.00	1.5	5
Ba	ppm	135	500	0
Bi	ppm	<10	0.048	0
Cd	ppm	<5	0.11	0
Co	ppm	30.00	20	0
Cr	ppm	840.00	100	2
Cu	ppm	58.00	50	0
Hg	ppm	0.10	0.05	0
Li	ppm	30.00	20	0
Mn	ppm	700.00	950	0
Mo	ppm	15.00	1.5	2
Ni	ppm	265.00	80	1
P	ppm	500.00	1000	0
Pb	ppm	15.00	14	0
Sn	ppm	<50	2.2	0
Sr	ppm	58	370	0
Te	ppm	0.8	0.001	6
Th	ppm	62.00	12	1
Ti	ppm	1800.00	0.6	6
V	ppm	110.00	160	0
Y	ppm	12.00	30	0
Zn	ppm	70.00	75	0
Zr	ppm	35.00	165	0

The following comments can be made from Table 4.3_1 and Table 4.3_2:

- Silver (Ag), Arsenic (As), Tellurium (Te) and Titanium (Ti) are considered to be enriched.
- Silver (Ag) occurs as a native metal or an alloy and is stable in air and water. Amounts of Ag in the tailings may vary depending upon metallurgical recoveries prior to tailings deposition.
- Titanium (Ti) readily reacts with oxygen to form TiO_2, a stable compound.
- Tellurium (Te) has a strong affinity to Au and Ag and is often present as gold tellurides. Te exists in the earth's crust as a rare stable element.

- Arsenic (As) concentration levels are well below Health Investigation Levels (HIL) classification F – Commercial/industrial sites, and meet HIL classification A – Standard residential, although exceed Ecological Investigation Levels as published by Department of Environment and Conservation (DEC) soil contamination criteria (2010).

Table 4.3_2
Andy Well Gold Project
Multi Elemental Analysis – WH 4398

Element	Units	Element Content	Average Crustal Abundance (ACA)	Geochemical Abundance Index (GAI)
Al	%	4.64	8.20	0
Ca	%	4.60	4.10	0
Fe	%	4.28	4.10	0
K	%	0.40	2.10	0
Mg	%	4.84	2.30	0
Na	%	0.51	2.30	0
Ag	ppm	0.9	0.07	3
As	ppm	70	1.5	4
Ba	ppm	125	500	0
Bi	ppm	<10	0.048	0
Cd	ppm	<5	0.11	0
Co	ppm	30	20	0
Cr	ppm	830	100	2
Cu	ppm	52	50	0
Hg	ppm	0.2	0.05	1
Li	ppm	25	20	0
Mn	ppm	700	950	0
Mo	ppm	15	1.5	2
Ni	ppm	270	80	1
P	ppm	500	1000	0
Pb	ppm	20	14	0
Sn	ppm	<50	2.2	0
Sr	ppm	64	370	0
Te	ppm	1	0.001	6
Th	ppm	58	12	1
Ti	ppm	1800	0.6	6
V	ppm	116	160	0
Y	ppm	12	30	0
Zn	ppm	64	75	0
Zr	ppm	35	165	0

4.4 Water Extraction Testwork

To assess the stability of major and minor-elements, a subsample from the drill core was ground to a P80 of 150µm. Using deionised water and a solid to water ratio of 1:1.5 (w/w) the slurry was bottle rolled for 24 hours. The resulting solid and solution was analysed using ICPMS. The extraction results are shown in Table 4.4_1.

The water extraction tests were undertaken to identify any weakly-bound forms of solutes susceptible to release to solution upon contact with rainfall/precipitation. The results show extraction rates of <5%, except for Selenium (Se) indicating an elevated extraction result of 13.04%, from leaching over the time period of 24 hours. Of the enriched elements, neither silver nor arsenic were readily leachable under the neutral pH test conditions.

Further investigation to assess the degree of mobility and potential for impacting the receiving environment was undertaken by short term leach testing on sample WH 4397 following the Australian Standard Leach Procedure (ASLP) AS4439.3 – 1997.

Table 4.4_1
Andy Well Gold Project
Water Extraction Analysis

Element	**Solution Data (ppm)**	**Extraction Data (%)**
pH	7.5	
Oxygen	8.6	
Ag	0.015	1.11
Al	0.1	0.00
As	0.3	0.50
B	0.05	0.74
Ba	0.025	0.03
Bi	0.05	1.48
Cd	0.025	1.48
Co	0.025	0.12
Cr	0.05	0.01
Cu	0.01	0.02
Fe	0.05	0.00
Hg	0.001	0.37
Mn	0.025	0.01
Mo	0.025	0.74
Ni	0.025	0.01
Pb	0.025	0.08
Sb	0.008	2.91
Se	0.25	13.04
Sn	0.01	0.03
Sr	0.05	0.14
Th	0.0025	0.05
U	0.0025	0.74
V	0.01	0.01
Zn	0.01	0.02

Note: Solution data units are ppm, except for pH.

4.5 Short-Term Leach Testwork

The Australian Standard Leach Procedure (ASLP) AS 4439.3-1997 provides a method for the preparation of leachates from liquid and solid wastes, sediments, sludges and soils for assessing the potential of inorganic and semivolatile organic contamination of groundwater, in a variety of disposal-to-land scenarios.

The solids are leached at a 20:1 liquid to solid ratio on an end-over-end rotary agitator for 18 hours. Two tests were undertaken on the tailings sample WH 4397. One had a leaching fluid of de-ionised water, pH of 5.68, and the second test, a leaching fluid with a pH of 2.88. The leachate and tailings results are presented in Table 4.5_1.

Table 4.5_1
Andy Well Gold Project
ASLP Analysis

Element	ANZECC & ARMCANZ (2000)[1]		Leachable Concentration	Leachable Concentration	Concentration Tailings
	Short-term irrigation water	Long-term irrigation water	De-ionised pH = 5.68	pH = 2.9	
	mg/L	mg/L	mg/L	mg/L	mg/kg
Ag			0.0026	0.0017	1.4
Al	20	5	0.6216	0.6215	47200
As	2	0.1	0.1092	0.0502	80
Ba			2.8848	0.8779	135
Be	0.5	0.1	0.0010	0.0010	
Bo		0.5			
Cd	0.05	0.01	0.0010	0.0030	5
Cr	1	0.1	0.0500	0.0500	840
Co	0.1	0.05	0.0119	0.0188	30
Cu	5	0.2	0.3256	0.2320	58
Fe	10	0.2	0.8000	0.7997	43600
Hg	0.002	0.002	0.0100	0.0100	0.1
Li	2.5	2.5	0.0127	0.0147	30
Mn	10	0.2	0.0221	8.7287	700
Mo	0.05	0.01	0.0041	0.0041	15
Ni	2	0.2	0.0411	0.3215	265
Pb	5	2	0.2049	0.1065	15
Se	0.05	0.02	0.0500	0.0500	
U	0.1	0.01	0.0022	0.0179	
V	0.5	0.1			110
Zn	5	2	0.1494	0.1248	70
F	2	1	0.1227	0.1227	1.4

Note: 1. ANZECC & ARMCANZ (2000) Australian Water Quality Guidelines for Fresh and Marine Water Quality

Concentration calculations assumed assay values reported at the detection limit of testing methodology accuracy were taken as being mid range. Therefore, if the detection limit was 0.1mg/L with a reported assay of <0.1mg/L, for calculation a value of 0.05mg/L was used.

The tailings analysis used was from original assay conducted by Ammtec on the 24hr gravity tail CIL cyanidation leach tailings.

The ANZECC & ARMCANZ (2000) irrigation guidelines apply to commercial and agricultural applications. These guideline levels are trigger values below which there should be minimal risk of adverse effects. The assessment of groundwater quality depends upon the beneficial use of the groundwater resource. It is assumed the site is located in an area where groundwater is abstracted for irrigation purposes. Long-term irrigation refers to the application of irrigation water in agricultural settings for periods up to 100 years. If irrigation is unlikely to be used for any significant periods of time the short-term irrigation guidelines may be more appropriate.

Mercury (Hg) does exceed the short term irrigation use guideline however it assayed at less than the detection limit of 20 parts per billion (ppb). Further result analysis for mercury shows the contained mercury in the tailings solid is well below Ecological Investigation Levels (EIL) as published by Department of Environment and Conservation (DEC) soil contamination criteria (2010). Mercury also meets the DoH (2006) Contaminated Sites Reporting Guideline for Chemicals in Groundwater guideline (domestic non-potable groundwater use) of 0.01 mg/L which may be applied for chemical substances as the guideline is consistent with the National Health and Medical Research Council (NHMRC) recommended screening approach.

The ASLP method uses a soil to solution ratio of 1:20 which enables an accelerated assessment of potential metal bioavailability. In operation the solid to solution ratio is significantly lower, with values approaching 1:1 after consolidation and water reclamation. Copper (Cu) and Selenium (Se) are the only mobile metals that are elevated at the higher pH which do not meet the long-term irrigation guidelines. Selenium is below the detection limit for the sample analysis at 100 ppb and therefore can range from 0 to 0.05 mg/L. The copper concentration of 58 mg/kg in the tailings solid sample does not exceed the Ecological Investigation Level (DEC, 2010) of 100 mg/kg. The potential overall loading of mobile metal is therefore low.

The process tailings samples provided indicate a pH of approximately 8.5 to 9.5. The metal absorption (CEC) property of clays increases with increasing pH. The contact of metal cations and surrounding clay soils and processing streams is likely to result in cationic exchange with the metals absorbing onto the clay surface. Manganese and iron oxides are strong cationic exchangers.

5 SUMMARY

Based on the testwork results obtained in this study, it is concluded that the process tailings streams of Andy Well Gold Project are not acid generating with a low Net Acid Producing Potential (NAPP) for each of the samples WH4397 and WH4398 of -180.1 kg and -185.0 kg of H_2SO_4 per tonne of ore respectively.

The results from the multi-elemental analysis of the tailings sample indicate that As, Ag, Te and Ti elements may have enrichment.

Further consideration of the degree of mobility was investigated by undertaking a short-term leach test on sample WH 4397 following Australian Standard Leach Procedure (ASLP) AS 4439.3-1997. Comparison of the leachable concentration and guideline values for assessment levels for water as published by Department of Environment and Conservation (DEC) (2010) indicated concentrations meeting the short term irrigation water guidelines.

The copper and selenium results were the only two values at the higher pH leachate solution that exceeded the long-term irrigation water guidelines. Selenium is below the detection limit for the sample analysis at 100 ppb and therefore can range from 0 to 0.05 mg/L. The copper concentration of 58 mg/kg in the tailings solid sample does not exceed the Ecological Investigation Level (DEC, 2010) of 100 mg/kg. The potential overall loading of mobile metal is therefore low. During the operational phase of the Project, routine monitoring of the process tailings, monitoring bores and associated return water quality is recommended to actively assess and mitigate any potential impact to the receiving environment.

6 GLOSSARY

Table 6_1
Glossary of Technical Terms

Term	Description
AMD	Acid Mine Drainage
ANC	Acid neutralisation Capacity – Measures the amount of material in the ore that can neutralise acid
Bulk density	The density of a rock which takes into account voids.
kg	Kilogram, a standard metric unit for weight.
kg/t	Kilograms per tonne, a standard mass unit for demonstrating the concentration.
L	Litre, a standard metric unit measure of liquid volume.
m^2	Square metre, a standard metric unit measure of area.
Metallurgical testwork	The testing of representative ore samples in order to define the physical properties and metallurgical characteristics of the ore.
MPA	Maximum Potential Acidity
NAF	Non-Acid Forming
NAG	Net Acid generation
NAPP	Net Acid Producing Potential
PAF	Potential Acid Forming
Pyrite	An iron sulphide mineral, FeS2.
Specific gravity	The weight of a substance compared with the weight of an equal volume of pure water at 4°C.
Sulphide Sulphur	Acid Mine Drainage
t/m^3	Acid neutralisation Capacity – Measures the amount of material in the ore that can neutralise acid

7 REFERENCES

ANZECC & ARMCANZ, 2000, *Australian Water Quality Guidelines for Fresh and Marine Water Quality.*

AMIRA International Ltd, 2002, "ARD Test Handbook", Prepared by Ian Wark Research Institute, and Environmental Geochemistry International Pty Ltd.

Australian Standard, AS 4439.3-1997, *Waste, sediments and contaminated soils, Part 3: Preparation of leachates – Bottle leaching procedure.*

Department of Environment and Conservation (DEC), February 2010, *Assessment Levels for Soil, Sediment and Water.*

Department of Health, 2006, *Contaminated Sites Reporting Guideline for Chemicals in Groundwater.*

Soil Water Group, 2012, *Wilber Lode Deposit Pre-Mine Soil Characterisation.*

Appendix A

Water Leach Testwork Results

PROJECT	**A14043: DORAY GOLD ORE SAMPLE - DRILL CORE**
CLIENT	**DOREY MINERALS LIMITED**
TEST No	**WH4506**
SAMPLE IDENTITY	**DORAY GOLD ORE SAMPLE - DRILL CORE**
GRIND	**P 80 : 150 MICRON**
WATER	Distilled w ater
DATE	JANUARY 2012

24HR WHOLE ORE STANDARD BOTTLE ROLL DI WATER LEACH TESTWORK

TIME	**ADDITIONS**		**SOLUTION DATA**								**EXTRACTION DATA**					
(Hours)	**Solids** (g)	**DI water** (g)	**Oxygen** (ppm)	**pH** -	**Ag** (ppm)	**Al** (ppm)	**As** (ppm)	**B** (ppm)	**Ba** (ppm)	**Bi** (ppm)	**Ag** (%)	**Al** (%)	**As** (%)	**B** (%)	**Ba** (%)	**Bi** (%)
	1000.00	1500.0														
0			9.5	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00
24			8.6	7.5	0.015	0.10	0.30	0.05	0.025	0.05	1.11	0.00	0.50	0.74	0.03	1.48

GOLD EXTRACTION CALCULATIONS

Product	**Quantity**	**Ag**			**Al**			**As**			**B**			**Ba**			**Bi**		
		Assay (ppm)	**Total** (μg)	**Dist'n** (%)	**Assay** (ppm)	**Total** (μg)	**Dist'n** (%)	**Assay** (ppm)	**Total** (μg)	**Dist'n** (%)	**Assay** (ppm)	**Total** (μg)	**Dist'n** (%)	**Assay** (ppm)	**Total** (μg)	**Dist'n** (%)	**Assay** (ppm)	**Total** (μg)	**Dist'n** (%)
Solids (g)	1000.0	2.0	2000	98.89	45200	45200000	100.00	90	90000	99.50	10.0	10000	99.26	130	130000	99.97	5	5000.0	98.52
Solution (mls)	1500.0	0.015	22.5	1.11	0.10	150.0	0.00	0.30	450.0	0.50	0.05	75.0	0.74	0.025	37.5	0.03	0.05	75.0	1.48
Extraction				**1.11**			**0.00**			**0.50**			**0.74**			**0.03**			**1.48**
Total			2023	100.00		45200150	100.00		90450	100.00		10075	100.00		130038	100.00		5075	100.00
CALC'D HEAD (ppm)			2.0			45200			90			10			130			5.1	
HEAD ASSAY (ppm)			2.8			N/A			90			< 20			135			< 10	
HEAD ASSAY - VIA ICPMS			2.2			26000			40			< 20			110			< 10	

COMMENTS

1. Grind Size P 80: 150.0 (µm)
2. Leach test conducted in leach bottles w ith roll agitation.
3. 24 analytes via ICPMS.
4. Evaporation losses made up prior to sampling at termination (24 hours).

PROJECT	A14043: DORAY GOLD ORE SAMPLE - DRILL CORE
CLIENT	DOREY MINERALS LIMITED
TEST No	WH4506
SAMPLE IDENTITY	DORAY GOLD ORE SAMPLE - DRILL CORE
GRIND	P 80 : 150 MICRON
WATER	Distilled w ater
DATE	JANUARY 2012

24HR WHOLE ORE STANDARD BOTTLE ROLL DI WATER LEACH TESTWORK

TIME	ADDITIONS		SOLUTION DATA								EXTRACTION DATA					
(Hours)	Solids (g)	DI water (g)	Oxygen (ppm)	pH -	Cd (ppm)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe (ppm)	Hg (ppm)	Cd (%)	Co (%)	Cr (%)	Cu (%)	Fe (%)	Hg (%)
	1000.00	1500.0														
0			9.5	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00
24			8.6	7.5	0.025	0.025	0.05	0.01	0.05	0.001	1.48	0.12	0.01	0.02	0.00	0.37

GOLD EXTRACTION CALCULATIONS

Product	Quantity	Cd			Co			Cr			Cu			Fe			Hg		
		Assay (ppm)	Total (μg)	Dist'n (%)	Assay (ppm)	Total (μg)	Dist'n (%)	Assay (ppm)	Total (μg)	Dist'n (%)	Assay (ppm)	Total (μg)	Dist'n (%)	Assay (ppm)	Total (μg)	Dist'n (%)	Assay (ppm)	Total (μg)	Dist'n (%)
Solids (g)	1000.0	2.5	2500	98.52	30	30000	99.88	600	600000	99.99	68	68000	99.98	47000	47000000	100.00	0.4	400	99.63
Solution (mls)	1500.0	0.025	38	1.48	0.025	38	0.12	0.05	75	0.01	0.01	15	0.02	0.05	75	0.00	0.001	2	0.37
Extraction				**1.48**			**0.12**			**0.01**			**0.02**			**0.00**			**0.37**
Total			2538	100.00		30038	100.00		600075	100.00		68015	100.00		47000075	100.00		402	100.00
CALC'D HEAD (ppm)		2.5			30			600			68			47000			0.4		
HEAD ASSAY (ppm)		< 5			30			600			66			44000			0.9		
HEAD ASSAY - VIA ICPMS		< 5			20			400			46			26000			0.4		

COMMENTS

1. Grind Size P 80: 150 (μm)
2. Leach test conducted in leach bottles w ith roll agitation.
3. 24 analytes via ICPMS.
4. Evaporation losses made up prior to sampling at termination (24 hours).

PROJECT	A14043: DORAY GOLD ORE SAMPLE - DRILL CORE
CLIENT	DOREY MINERALS LIMITED
TEST No	WH4506
SAMPLE IDENTITY	DORAY GOLD ORE SAMPLE - DRILL CORE
GRIND	P 80 : 150 MICRON
WATER	Distilled w ater
DATE	JANUARY 2012

24HR WHOLE ORE STANDARD BOTTLE ROLL DI WATER LEACH TESTWORK

TIME	ADDITIONS		SOLUTION DATA								EXTRACTION DATA					
(Hours)	Solids (g)	DI water (g)	Oxygen (ppm)	pH -	Mn (ppm)	Mo (ppm)	Ni (ppm)	Pb (ppm)	Sb (ppm)	Se (ppm)	Mn (%)	Mo (%)	Ni (%)	Pb (%)	Sb (%)	Se (%)
	1000.00	1500.0														
0			9.5	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00
24			8.6	7.5	0.025	0.025	0.025	0.025	0.008	0.25	0.01	0.74	0.01	0.08	2.91	13.04

GOLD EXTRACTION CALCULATIONS

Product	Quantity	Mn			Mo			Ni			Pb			Sb			Se		
		Assay (ppm)	Total (µg)	Dist'n (%)	Assay (ppm)	Total (µg)	Dist'n (%)	Assay (ppm)	Total (µg)	Dist'n (%)	Assay (ppm)	Total (µg)	Dist'n (%)	Assay (ppm)	Total (µg)	Dist'n (%)	Assay (ppm)	Total (µg)	Dist'n (%)
Solids (g)	1000.0	630	630000	99.99	5	5000	99.26	275	275000	99.99	45	45000	99.92	0.4	400	97.09	2.5	2500	86.96
Solution (mls)	1500.0	0.025	38	0.01	0.025	38	0.74	0.025	38	0.01	0.025	38	0.08	0.008	12	2.91	0.25	375	13.04
Extraction				**0.01**			**0.74**			**0.01**			**0.08**			**2.91**			**13.04**
Total			630038	100.00		5038	100.00		275038	100.00		45038	100.00		412	100.00		2875	100.00
CALC'D HEAD (ppm)		630			5			275			45			0.4			2.9		
HEAD ASSAY (ppm)		615			< 5			180			35			N/A			N/A		
HEAD ASSAY - VIA ICPMS		400			< 5			130			30			0.3			< 5		

COMMENTS

1. Grind Size P 80: 150 (µm)
2. Leach test conducted in leach bottles w ith roll agitation.
3. 24 analytes via ICPMS.
4. Evaporation losses made up prior to sampling at termination (24 hours).

PROJECT	A14043: DORAY GOLD ORE SAMPLE - DRILL CORE
CLIENT	DOREY MINERALS LIMITED
TEST No	WH4506
SAMPLE IDENTITY	DORAY GOLD ORE SAMPLE - DRILL CORE
GRIND	P 80 : 150 MICRON
WATER	Distilled w ater
DATE	JANUARY 2012

24HR WHOLE ORE STANDARD BOTTLE ROLL DI WATER LEACH TESTWORK

TIME	ADDITIONS		SOLUTION DATA								EXTRACTION DATA					
(Hours)	Solids (g)	DI water (g)	Oxygen (ppm)	pH -	Sn (ppm)	Sr (ppm)	Th (ppm)	U (ppm)	V (ppm)	Zn (ppm)	Sn (%)	Sr (%)	Th (%)	U (%)	V (%)	Zn (%)
	1000.00	1500.0														
0			9.5	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00
24			8.6	7.5	0.01	0.05	0.0025	0.0025	0.01	0.01	0.03	0.14	0.05	0.74	0.01	0.02

GOLD EXTRACTION CALCULATIONS

Product	Quantity	Sn			Sr			Th			U			V			Zn		
		Assay (ppm)	Total (µg)	Dist'n (%)	Assay (ppm)	Total (µg)	Dist'n (%)	Assay (ppm)	Total (µg)	Dist'n (%)	Assay (ppm)	Total (µg)	Dist'n (%)	Assay (ppm)	Total (µg)	Dist'n (%)	Assay (ppm)	Total (µg)	Dist'n (%)
Solids (g)	1000.0	50	50000	99.97	54	54000	99.86	8	8000	99.95	0.5	500	99.26	124	124000	99.99	64	64000	99.98
Solution (mls)	1500.0	0.01	15	0.03	0.05	75	0.14	0.0025	4	0.05	0.0025	4	0.74	0.01	15	0.01	0.01	15	0.02
Extraction				**0.03**			**0.14**			**0.05**			**0.74**			**0.01**			**0.02**
Total			50015	100.00		54075	100.00		8004	100.00		504	100.00		124015	100.00		64015	100.00
CALC'D HEAD (ppm)			50			54			8.0			0.5			124			64	
HEAD ASSAY (ppm)			50			54			8.0			0.6			124			68	
HEAD ASSAY - VIA ICPMS			100			62			8.0			4.5			72			40	

COMMENTS

1. Grind Size P 80: 150 (µm)
2. Leach test conducted in leach bottles w ith roll agitation.
3. 24 analytes via ICPMS.
4. Evaporation losses made up prior to sampling at termination (24 hours).

Appendix B

24HR Gravity Tail CIL Cyanidation Leach Tailings Assay

A14043 DORAY MINERALS LIMITED

DORAY GOLD ORE SAMPLE

24HR GRAVITY TAIL CIL CYANIDATION LEACH RESIDUE ASSAY

ANALYTE	UNIT	WH 4397 RESIDUE	WH 4398 RESIDUE
Au_1	g/t	0.61	0.88
Au_2	g/t	0.60	n/a
Ag	g/t	1.40	0.9
As	ppm	80	70
Al	%	4.72	4.64
Ba	ppm	135	125
Bi	ppm	< 10	< 10
C_{total}	%	1.35	1.41
$C_{organic}$	%	0.12	0.21
CO_3^{2-}	%	6.15	6.00
Ca	%	4.60	4.60
Cd	ppm	< 5	< 5
Co	ppm	30	30
Cr	ppm	840	830
Cu	ppm	58	52
Fe	ppm	4.36	4.28
Hg	ppm	0.1	0.2
K	ppm	4000	4000
Li	ppm	30	25
Mg	%	4.92	4.84
Mn	ppm	700	700
Mo	ppm	15	15
Na	ppm	5380	5080
Ni	ppm	265	270
P	ppm	500	500
Pb	ppm	15.00	20
S_{total}	%	0.46	0.38
$S_{sulfide}$	%	0.42	0.36
SiO_2	%	60.2	59.0
Sn	ppm	< 50	< 50
Sr	ppm	58	64
Te	ppm	0.80	1.00
Th	ppm	62	58
Ti	ppm	1800	1800
V	ppm	110	116
Y	ppm	12	12
Zn	ppm	70	64
Zr	ppm	35	35

ALS Ammtec

Appendix C

Acid Mine Drainage Testwork

A14043 DORAY MINERALS LIMITED

DORAY GOLD ORE SAMPLE

ACID MINE DRAINAGE (AMD) TESTWORK

ANALYTE	UNIT	WH 4397 RESIDUE	WH 4398 RESIDUE
S total	%	0.46/0.46	0.38
ANC	(kg H_2SO_4 /t)	193/174	196
NAG	(kg H_2SO_4 /t)	-9.0/-9.0	-9.0
TAPP	(kg H_2SO_4 /t)	14/14	12
NAPP	(kg H_2SO_4 /t)	-179/-160	-184
pH	-	8.73/8.80	8.65
Conductivity	ms/cm	0.453/0.494	0.401

Appendix D

Australian Standard Leach Procedure Testwork

SGS

ASSAY LABORATORY REPORT SHEET: ASLP – Method AS4439.3 - 1997

Client Name:	**Coffey Mining**	**Extraction Fluid:**	**Reagent Water (De-Ionised Water)**
Job Number:	**10975**	**Date:**	**28/03/2012**
Sample Description:	**WH4397**	**Test:**	**34072**

Sample (units)	Init pH	Final pH	Ag	As	Be	Cd	Cr	Hg	Mo	Ni	Pb	Se	F	CN (amenable)	CNTotal
ASLP Leachate (mg/L)	5.68	8.34	0.002	0.07	<0.002	<0.002	<0.1	<0.02	0.002	<0.05	0.2	<0.1	0.1	-	-
Class III Waste DEC (mg/L)	-	-	10	5	1	1	5 as Cr(VI)	0.1	5	2	1	5	150	4	8

Test Parameters

Sample Identity	:	34072
Date of Receipt	:	17/03/2012
Sample Storage Conditions	:	Sample stored under ambient conditions in sealed container
Date of Leachate Preparation	:	17/03/2012
Mass of Test Sample	:	100.1 g
Mass of Dry Solids	:	67.1 g
Leaching Fluid Used	:	Reagent Water
Mass of Leaching Fluid	:	2002 g
Method of Agitation:	:	End over end rolling for 18 hrs
Test Temperature:	:	Ambient
pH of Sample Liquid	:	8.34
Relevant Obseravations	:	L:S ratio = 20.0

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Member of the SGS Group (Société Générale de Surveillance)

ASSAY LABORATORY REPORT SHEET: ASLP – Method AS4439.3 - 1997

Client Name: Coffey Mining
Job Number: 10975
Sample Description: WH4397
Extraction Fluid: pH 2.9 (Acetate Buffer)
Date: 28/03/2012
Test: 34073

Sample (units)	Init pH	Final pH	Ag	As	Be	Cd	Cr	Hg	Mo	Ni	Pb	Se	F	CN (amenable)	CNTotal
ASLP Leachate (mg/L)	2.88	5.17	<0.002	<0.02	<0.002	0.003	<0.1	<0.02	0.002	0.31	<0.2	<0.1	0.1	-	-
Class III Waste DEC (mg/L)	-	-	10	5	1	1	5 as Cr(VI)	0.1	5	2	1	5	150	4	8

Test Parameters

Sample Identity	:	34073
Date of Receipt	:	17/03/2012
Sample Storage Conditions	:	Sample stored under ambient conditions in sealed container
Date of Leachate Preparation	:	17/03/2012
Mass of Test Sample	:	99.9 g
Mass of Dry Solids	:	67.0 g
Leaching Fluid Used	:	pH 2.0 (prepared by adding 5.7 mL of CH3CH2OOH and 900 mL D.I. then diluting to 1L)
Mass of Leaching Fluid	:	1998 g
Method of Agitation:	:	End over end rolling for 18 hrs
Test Temperature:	:	Ambient
pH of Sample Liquid	:	5.17
Relevant Obseravations	:	L:S ratio = 20.0

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Coffey Mining - Chemical Analysis of Filtrate and ASLP Leachates Derived from Sample WH4397

Product Description	Solution	Sample Origin	Ag PPB	Al MG/L	As PPB	B MG/L	Ba PPB	Be PPB	Bi PPB	Ca MG/L	Cd PPB	Ce PPB	Cl MG/L	Co PPB	Cr MG/L	Cs PPB	Cu PPB	Dy PPB
	% (w/w)	(Method) Detection Limit	IMS84V 2	ICP84V 1	IMS84V 20	ICP84V 0.1	IMS84V 50	IMS84V 2	IMS84V 2	ICP84V 0.5	IMS84V 2	IMS84V 1	CLA27V 5	IMS84V 5	ICP84V 0.1	IMS84V 1	IMS84V 50	IMS84V 2
Interstitial Solution	90.9	As-Received Pulp	42	8	2490	<0.1	750	<2	<2	3.3	3	4	<5	308	0	<1	12800	<2
ASLP Leach Solution	96.8	ASLP with De-ionised Water	2	<1	70	<0.1	2920	<2	<2	5.2	<2	<1	<5	7	<0.1	<1	120	<2
ASLP Leach Solution	96.8	ASLP with pH 2.9 Buffer	<2	<1	<20	<0.1	880	<2	<2	1610	3	16	<5	14	<0.1	<1	<50	<2

Product Description	Solution	Sample Origin	Er PPB	Eu PPB	F MG/L	Fe MG/L	Ga PPB	Gd PPB	Hf PPB	Hg PPB	Ho PPB	In PPB	K MG/L	La PPB	Li PPB	Lu PPB	Mg MG/L	Mn PPB
	% (w/w)	(Method) Detection Limit	IMS84V 2	IMS84V 1	ISE07W 0.1	ICP84V 1	IMS84V 10	IMS84V 2	IMS84V 2	IMS84V 20	IMS84V 1	IMS84V 1	ICP84V 5	IMS84V 1	IMS84V 2	IMS84V 2	ICP84V 0.2	IMS84V 10
Interstitial Solution	90.9	As-Received Pulp	<2	<1	1.5	19	<10	<2	<2	<20	<1	849	63	2	724	<2	9.4	150
ASLP Leach Solution	96.8	ASLP with De-ionised Water	<2	<1	0.1	<1	<10	<2	<2	<20	<1	849	<5	<1	<2	<2	0.4	20
ASLP Leach Solution	96.8	ASLP with pH 2.9 Buffer	<2	<1	0.1	<1	<10	<2	<2	<20	<1	837	8	14	3	<2	7.7	8870

Product Description	Solution	Sample Origin	Mo PPB	Na MG/L	Nb PPB	Nd PPB	Ni PPB	P MG/L	Pb MG/L	Pr PPB	Rb PPB	Re PPB	S MG/L	Sb PPB	Sc PPB	Se PPB	Si MG/L	Sm PPB
	% (w/w)	(Method) Detection Limit	IMS84V 2	ICP84V 0.5	IMS84V 5	IMS84V 2	IMS84V 50	ICP84V 0.3	ICP84V 0.2	IMS84V 1	IMS84V 1	IMS84V 20	ICP84V 0.1	IMS84V 2	IMS84V 20	IMS84V 100	ICP84V 5	IMS84V 2
Interstitial Solution	90.9	As-Received Pulp	133	420	<5	<2	1020	0.8	0.5	<1	104	<20	38	37	<20	<100	34	<2
ASLP Leach Solution	96.8	ASLP with De-ionised Water	2	7	<5	<2	<50	<0.3	0.2	<1	6	<20	0	<2	<20	<100	<5	<2
ASLP Leach Solution	96.8	ASLP with pH 2.9 Buffer	2	7.3	<5	5	310	<0.3	<0.2	2	32	<20	1.2	<2	<20	<100	7	<2

Product Description	Solution	Sample Origin	Sn PPB	Sr PPB	Ta PPB	Tb PPB	Te PPB	Th PPB	Ti PPB	Tl PPB	Tm PPB	U PPB	W PPB	Y PPB	Yb PPB	Zn PPB	Zr PPB	SG
	% (w/w)	(Method) Detection Limit	IMS84V 10	IMS84V 2	IMS84V 2	IMS84V 1	IMS84V 10	IMS84V 1	IMS84V 200	IMS84V 10	IMS84V 1	IMS84V 1	IMS84V 2	IMS84V 1	IMS84V 2	IMS84V 50	IMS84V 10	PHY11V 0.01
Interstitial Solution	90.9	As-Received Pulp	<10	27	<2	<1	10	3	<200	<10	<1	72	485	<1	<2	1630	20	1.00
ASLP Leach Solution	96.8	ASLP with De-ionised Water	<10	20	<2	<1	<10	<1	<200	<10	<1	1	3	<1	<2	125	<10	1.00
ASLP Leach Solution	96.8	ASLP with pH 2.9 Buffer	<10	1710	<2	<1	<10	<1	<200	<10	<1	17	<2	17	4	100	<10	1.00

Coffey Mining - Chemical Analysis of Feed Solids and ASLP Leach Residues Derived from Sample WH4397

Product Description	Solids	Sample Origin	Ag	Al	As	B	Ba	Bi	CTotal	CO3	Corg	Ca	Cd	Ce	Cl	Co	Cs	Dy
			PPM	PPM	PPM	PPM	PPM	PPM	%	%	%	PPM	PPM	PPM	PPM	PPM	PPM	PPM
	% (w/w)	(Method) Detection Limit	IMS41Q 0.5	ICP41Q 500	IMS41Q 5	ICP90Q 20	IMS41Q 10	IMS41Q 0.5	CSA06V 0.005	CSA04V 0.05	CSA04V 0.01	ICP41Q 200	IMS41Q 0.5	IMS41Q 0.25	CLA04E 50	IMS41Q 0.5	IMS41Q 0.25	IMS41Q 0.5
Feed Solids	9.1	As-Received Pulp	<0.5	50300	51	70	158	0.6	1.34	<0.05	<0.01	49400	<0.5	9.1	<50	28	0.5	1.4
ASLP Leach Residue	3.2	ASLP with De-ionised Water	<0.5	46900	72	53	136	0.6	1.31	2.25	0.87	47150	<0.5	9.9	<50	32	0.5	1.4
ASLP Leach Residue	3.2	ASLP with pH 2.9 Buffer	<0.5	53200	78	49	159	0.7	0.09	0.25	0.04	7450	<0.5	9.6	<50	36	0.5	1.7

Product Description	Solids	Sample Origin	Er	Eu	F	Fe	Ga	Gd	Hf	Hg	Ho	In	K	La	Li	Lu	Mg	Mn
			PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM
	% (w/w)	(Method) Detection Limit	IMS41Q 0.5	IMS41Q 0.25	ISE07A 25	ICP41Q 100	IMS41Q 1	IMS41Q 0.5	IMS41Q 0.25	IMS12S 0.1	IMS41Q 0.25	IMS41Q 0.1	ICP41Q 100	IMS41Q 0.25	IMS41Q 0.5	IMS41Q 0.05	ICP41Q 100	IMS41Q 2.5
Interstitial Solution	9.1	As-Received Pulp	0.9	0.40	145	53100	11	1.2	1.3	1.7	0 3	871	4450	4.4	36	0.15	57600	856
ASLP Leach Solution	3.2	ASLP with De-ionised Water	1.0	0.40	94	51450	11	1.2	1.2	2.2	0 3	820	4505	4.9	33	0.15	53450	832
ASLP Leach Solution	3.2	ASLP with pH 2.9 Buffer	1.1	0.40	161	59900	12	1.4	1.5	2.3	0 3	914	4940	4.6	38	0.14	62400	644

Product Description	Solids	Sample Origin	Mo	Na	Nb	Nd	P	Pb	Pr	Rb	Re	STotal	S2-	SO4	Sb	Sc	Se	Sm
			PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	%	%	%	PPM	PPM	PPM	PPM
	% (w/w)	(Method) Detection Limit	IMS41Q 0.5	ICP41Q 500	IMS41Q 0.5	IMS41Q 0.5	ICP41Q 100	IMS41Q 5	IMS41Q 0.25	IMS41Q 0.25	IMS12S 0.05	CSA06V 0.005	CSA16V 0.01	CSA16V 0.03	IMS41Q 0.5	IMS41Q 1	IMS41Q 10	IMS41Q 0.5
Interstitial Solution	9.1	As-Received Pulp	19	3990	4.6	3.9	240	25	1.1	17	<0.05	0.28	0.08	0.57	<0.5	24	<10	0.9
ASLP Leach Solution	3.2	ASLP with De-ionised Water	18	4390	3.4	4.3	235	27	1.1	18	<0.05	0.49	0.13	1.08	0.5	22	<10	1.0
ASLP Leach Solution	3.2	ASLP with pH 2.9 Buffer	19	4780	3.1	4.4	270	27	1.1	19	<0.05	0.54	0.15	1.17	0.5	26	<10	1.1

Product Description	Solids	Sample Origin	Sn	Sr	Ta	Tb	Te	Th	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Zr
			PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM
	% (w/w)	(Method) Detection Limit	IMS41Q 1.5	IMS41Q 0.5	IMS41Q 0.25	IMS41Q 0.25	IMS41Q 0.5	IMS41Q 0.25	IMS41Q 0.25	IMS41Q 0.5	IMS41Q 0.25	IMS41Q 0.25	ICP41Q 5	IMS41Q 0.5	IMS41Q 0.25	IMS41Q 0.5	ICP41Q 25	IMS41Q 2.5
Interstitial Solution	9.1	As-Received Pulp	<1.5	66	0.6	<0.25	0.8	1.8	1744	<0.5	<0.25	9.8	144	45	8.2	1.1	135	36
ASLP Leach Solution	3.2	ASLP with De-ionised Water	<1.5	69	0.4	<0.25	0.8	1.3	1851	<0.5	<0.25	0.9	134	41	8.8	1.0	128	36
ASLP Leach Solution	3.2	ASLP with pH 2.9 Buffer	<1.5	18	0.5	<0.25	1.0	1.7	2016	<0.5	<0.25	0.7	157	56	9.0	1.1	142	40

Appendix 4

Scope of Works/Drawings/Schedule of Materials/Earthworks Specification

ANDY WELL PROJECT

Tailings Storage Facility 3 Design Report

Soil & Rock Engineering Pty Ltd (SRE)

ABN 98 675 219 020

ANDY WELL PROJECT

Tailings Storage Facility 3 – Scope of Works

Ref: **Scope of Works Rev 0 202406**

Date: **19 June, 2024**

Prepared by: **SRE P/L**
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Abbreviations and Terminology

The following abbreviations have been used in this document

AWP	Andy Well Project
AS	Australian Standard
CMW	CMW Geosciences Pty Ltd
DEMIRS	Department of Energy, Mines, Industry, Regulation and Safety (from 1 July 2017), previously referred to as Department of Mines and Petroleum (DMP)
DEMIRSWA	Department of Energy, Mines, Industry, Regulation and Safety Western Australia, previously referred to as DMPWA
DWER	Department of Water and Environmental Regulation (from 1 July 2017), previously referred to as Department of Environment Regulation (DoER)
ha	hectare
H:V	Horizontal : Vertical
MB	Monitoring Bore
m^3/d	cubic metres per day
Mm^3	Million cubic metres
ML	Mine Lease
NATA	National Association of Testing Authorities
OMC	Optimum Moisture Content
PSD	Particle Size Distribution
P_{80}	80% passing, and refers to a particular particle size as stated, i.e. a P_{80} of 75 microns means 80% of the total weight of materials is finer than 75 microns
QA/QC	Quality Assurance and Quality Control
RL	Reduced Level relative to a fixed datum
SMDD	Standard Maximum Dry Density
SoW	Scope of Works
SP	Standpipe Piezometers
TSF3	Tailings Storage Facility 3
t/m^3	tonnes per cubic metre
TDS	total dissolved solids
UCS	Unified Soil Classification System

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LIST OF APPENDICES (behind text)

Soil & Rock Engineering Pty Ltd (SRE)

Project: **Andy Well Project**

Subject: **Tailings Storage Facility 3 – Scope of Works**

1.0 GENERAL

1.1 Introduction

This Scope of Work (SoW) covers the construction of the tailings storage embankments, decant access and decant and associated infrastructure, and is to be read in conjunction with the drawings.

The work mainly involves bulk earthworks to construct/raise the starter embankments for TSF3 and the placement of tailings delivery pipework and return water pipework.

The Scope of Work shall comprise the provision of all material, construction plant, equipment, labour, supervision, tools, services, warehousing if required, testing equipment, and each and every item of expense necessary for the construction, acceptance testing and preparing of *'as built'* drawings and documents for work shown in the drawings schedules and Specifications forming part of the Contract for the Construction of the tailings storage embankments of Tailings Storage 3 at the at Meeka Metals Limited (MML) Andy Well Project (AWP).

All works shall be constructed complete and operational, except as specifically excluded and shall include all necessary auxiliary works, accessories and the incorporation of all miscellaneous material, minor parts and other such items, whether or not the items are specified, where it is clearly the intent of the Contract that they should be supplied or where they are obviously required and necessary to complete and commission the work.

Tailings will not be discharged into the storage during construction. Pipework is controlled and operated by the Principal's.

The contractor is reminded that the AWP may be an operational mine at the time of construction of TSF3. As such, it may be necessary to discharge tailings into TSF3 which may be under construction and the Principal's reserves the right to continue deposition during the construction period of the contract. Ideally, the tailings deposition to the Susie Pit will be executed during the construction of TSF3, with tailings discharged into TSF3 after construction is completed.

The contractor should fully co-operate with the pipe handling/operating crew and shall work in with their activities at all times. The contractor shall protect all active and non-active pipework which is in place. The Principal's shall be immediately notified of any damage to pipework no matter how minor. This Specification prescribes the requirements for the embankment construction works to achieve the site-finished grades indicated on the Design Drawings for TSF3 at Meeka Metals Limited (MML) Andy Well Project (AWP). Also prescribed, are the requirements for clearing and grubbing; the removal, replacement and disposal of unsuitable materials; the disposal of surplus materials and the furnishing, placement and compaction of embankment fill material.

The Appendices referred to in this document comprise the following and are to be attached to this document by the Owner.

- Appendix A - Drawings

- Appendix B - Schedule of Materials
- Appendix C – Earthworks Specification

The Contractor shall coordinate work prescribed by this Specification with other related works to be performed, such as relocation of tailings pipework. The Specification(s) relevant for these works are listed below:

Client to add pipework specifications if appropriate.

This Specification shall be read in conjunction with the latest revisions of the following Design Drawings:

Drawing Title	Drawing No.
General Arrangement Plan	200
TSF3 Stage 1 Plan	201
TSF3 Stage 2 Plan	202
Embankment Sections	203
Sections and Details Sheet 1	204
Sections and Details Sheet 2	205

1.2 Terminology

The following terms are defined as stated, unless otherwise indicated:

Contractor	Appropriate individual, partnership, company or corporation contractually obligated to perform the work prescribed in this Specification and associated Specifications (Appendix C) and becomes contractually obligated to the Owner.
Design Drawings	Detailed Design Drawings issued by the Owner to the Contractor.
Engineer	The engineer (or designated representative) appointed by the Owner who is responsible for evaluating the suitability of the materials involved in the work and for verifying the compliance of the work to the requirements of the Specifications.
Independent Testing and Inspection Firm	The company, partnership, or corporation retained to perform the inspections and tests required determining and verifying compliance of the work with the requirements of this Specification.
Optimum Moisture Content	The moisture content at which the Maximum Modified Dry Density is achieved.
Owner	Meeka Metals Limited (MML) Andy Well Project (AWP)
Project Superintendent	The designated representative of the Contractor appointed by the Contractor who is responsible for the work by the Contractor.
Standard Maximum Dry Density	The maximum dry density achieved as per AS 1289.5.1.1 when testing a sample of material representative of that to be compacted in the field.

Work/works	The activities specified within this document as the responsibility for the Contractor.

1.3 Code of Practice

Unless otherwise specified, or shown on the drawings, the Contractor is to provide all materials and carry out all the work in accordance with the latest revisions of the relevant Australian Standard Codes.

All work under this Contract shall be performed strictly in accordance with the following Specifications, Drawings and other documents, which by this reference forms part of this Contract, unless expressly noted otherwise.

i) AS 1289 Methods of testing soils for engineering purposes.

ii) AS 1726 Geotechnical site investigations.

iii) AS 3798 Guidelines on earthworks for commercial and residential developments.

The Works shall be carried out to comply with the latest revision of the Drawings, Codes and Standards specified, or where no standards are specified, to Australian Standards, or to the appropriate British or other recognised Standards.

Before making any change in any work under the Contract to comply with any revisions to the relevant codes and standards, the Contractor shall give to the Principal's written notice specifying the reason therefore and requesting his direction thereon. The Principal's shall decide whether a change is necessary and issue an order accordingly under the provisions of the General Conditions of Contract.

1.4 Specifications

The publications listed above form part of this Specification. Each publication shall be the latest revision and addendum in effect on the date this Specification is issued for construction, unless noted otherwise. Except as modified by the requirements specified herein or the details of the Design Drawings, work included in this Specification shall conform to the applicable provisions of these publications.

1.4.1 Applicable Documents

The works shall be carried out to comply with the latest revision of the Earthworks Specification, Design Drawings, Codes and Standards specified.

1.5 Site Inspection

The Contractor shall inspect the site and must allow for the following factors in their price:

i) The nature and requirements of the work to be done.

ii) All conditions on and adjacent to the site.

iii) Access to the site.

iv) The types of soil and vegetation present on the site.

v) The expected or known water table.

vi) The nearest sources of suitable fill material which complies with this Specification.

vii) The source of water for construction purposes.

1.6 Safety

The Contractor shall:

i) Carry out the works in a safe manner.

ii) Conform to all relevant Acts or Statutes of Parliament, Regulations, By-Laws or Orders relating to the safety of persons and property on or about the site.

1.7 Site Location and Description

The AWP is owned by MML and is located approximately 40 km north of Meekatharra. The TSF3 is located approximately 1.7 km southwest of the processing plant at AWP.

2.0 DESCRIPTION OF WORK – SPECIFIC

The Scope of Work shall include, but is not necessarily limited to the following.

2.1 General

The Contractor shall:

i) Attend a Site Induction of approximately four (4) hours' duration before the commencement of works if they have not already attended one in the last six (6) months.

ii) Carry out all works indicated or implied in the Drawings or in the Specification.

iii) Supply all labour, plant and materials (except those indicated as being supplied by the Principal) necessary for completion of the works.

iv) Maintain all works as required by the Contract documents and for the period stated therein.

All construction shall be to the minimum lines and grades shown on the drawings or as required by the Owner's Representative as work progresses.'

During the progress of the works, the Owner's Representative may find it necessary to revise the lines, levels and grades of any part of the works because of the conditions revealed by the works.

The Contractor shall accept reasonable delays due to inspection and checking of any part of the works to determine grades and levels.

2.2 Survey

The Contractor must:

i) Perform all ground surveys using conventional and agreed surveying techniques.

ii) Survey and setting out the works based on the datum points provided by the Owner's Representative.

iii) Be responsible for the protection of all permanent and temporary beacons or benchmarks.

iv) Be wholly responsible for the setting out of his works in accordance with the terms of the specification. Although the Owner's Representative will cause such setting out to be checked from time to time, such checking will not relieve the Contractor of full responsibility for the accuracy of such setting out.

v) Carry out surveys prior to the commencement of the item of work and at the completion of the item of work.

vi) Carry out a post construction survey by licensed surveyor of the works to verify that the works were constructed within the specified tolerances and submit to the Owner's Representative.

vii) Submit his survey data and calculations to the Owner's Representative.

viii) Ensure initial and/or final surveys are undertaken and approved by the Owner's Representative prior to the removal or placement of any material, especially where such action will destroy or cover the surface just surveyed. All survey checks or quantity measurements must be supplied to the Owner's Representative, suitable time must be given to the Owner's Representative to allow such calculations to be checked and approved prior to the works being covered or removed.

The Owner's Representative may undertake his own survey of any item, either in conjunction with the Contractor, or separately. The Contractor and Owner's Representative shall agree on the results of measurement surveys that are carried out prior to any works being covered up or within seven (7) days of a survey being undertaken. Should agreement not be reached, the difference shall be documented such that the matter can be later decided without disruption to the Contractor's program.

The maximum permissible horizontal deviation from the finished lines or zone boundaries shall be -0 m to +0.5 m.

Vertical deviation shall be -0 m to +0.2 m, provided no abrupt changes in slope or level are present on any finished surface.

The Contractor's attention is drawn to the possibility of very low shear strength materials being encountered on the existing tailings beaches on TSF1 and TSF2.

Measurement for payment of all embankment fill material shall be made for the compacted material, measured in place and only to the lines and grades required.

2.3 Clearing and Establishment Works

The Contractor shall, as appropriate:

i) Remove all vegetable matter and scrub from the area of the proposed tailings storage. The area to be cleared shall extend approximately 10 m past the downstream toe of the embankment, to the downstream toe drains and the water return sump. All stripped vegetation should be pushed into heaps in locations as indicated by the Owner's Representative.

ii) Remove all solid obstructions, tree stumps, roots and logs from beneath the footprint of the perimeter embankments and within all borrow areas.

iii) Clear the agreed routes of all haul roads of all vegetation-standing and fallen. Push this vegetation into heaps as approved by the Owner's Representative.

iv) Form up and lay base course as necessary and do all things necessary to form and maintain haul roads linking the mine waste dumps/borrow areas to the site and other haul roads necessary for the works and which are approved by the Owner's Representative.

v) Keep all haul roads sprayed and wet to totally prevent the generation of airborne dust during the course of road construction and usage.

i) Seal all investigation boreholes, groundwater and sterilisation holes drilled in the area of the proposed tailings storage facility (reference Drg. No.200) and keep an accurate record of all holes filled.

ii) Prepare a quality assurance and quality control program to cover all aspects of work included within this Construction Specification for the Principal's approval.

iii) Provide all things necessary to implement the approved QA/QC program.

2.4 Foundation Preparation

The Contractor must, as appropriate:

i) Strip topsoil from within the tailings storage area and from the embankment footprint to a nominal depth below the natural ground surface of 0.1 m. Stockpiling of topsoil shall be in areas nominated by the Owner's Representative. Stockpiles shall have a maximum height of 2.0 m and side slopes of 1 (vertical) to 1.5 (horizontal).

ii) Tyne, water and compact any areas of loose material on the prepared surface of the embankment footprint identified by the Owner's Representative.

iii) Prepare the foundation for the cutoff trench under the embankment by excavating to refusal on the *'hardpan'* a nominal average depth of 0.6 m or as directed by the Owner's Representative. Side batters shall have a minimum slope of 1:1.

iv) Rip if necessary to construct the cutoff excavation. Blasting in the tailings storage area is not anticipated. No blasting or excavation into or through any competent rock shall be undertaken unless approval has been received from the Owner's Representative.

v) Leave all areas to receive fill in a clean and suitable condition to allow an uninterrupted placement of fill. No fill shall be placed in the cutoff until the base of all excavations has been inspected and approved by the Owner's Representative.

vi) Grade smooth all areas to receive pipework, which must be free of any rock, cobbles and other deleterious materials that could damage the pipework.

vii) Allow for keeping water from excavations by pumping, dewatering or other suitable means and adequately dispose of it clear of the works.

viii) Tyne and moisture condition the surface of the existing embankments prior to the placement of the fill as directed by the Owner's Representative.

2.5 Earthworks

The Contractor must:

i) Prepare a method statement for the construction of initial lift(s) on the tailings beach. The Contractor's attention is drawn to the possibility of very low shear strength materials being encountered on the tailings beach. The method statement prepared by the Contractor shall not only include details on the proposed method of construction on the tailings beach but also the safety measures to be adopted to ensure the work is carried out with minimal risk to personnel and equipment. The Contractor shall submit details of the proposed method of on the tailings beach to the Owner's Representative prior to the commencement of construction.

ii) Take the tailings for the upstream zone of TSF3 from the designated borrow areas within the existing tailings storage facilities TSF1/TSF2. Suitable material must comply with the requirements as detailed in Section 2.2 of the Earthworks Specification. All borrow excavations in these TSFs must not commence closer than 15 m from the upstream toe of the existing embankment and must be extended as far as possible away from the embankments to prevent the excavation of deep trenches immediately adjacent to the embankments. Under no circumstances shall the depth of excavation exceed 1.5 m below the existing tailings beach level. The materials borrowed from within the upper 1.5 m of the soil profile in the storage area shall be well mixed to ensure uniform distribution of fines (material less than 75 microns). The Contractor shall leave raised bunds in the borrow area at centres of not less than 75 m along the embankment perimeter. The bunds shall be of sufficient dimensions to prevent the flow of tailings into the adjacent excavation by collapse of the bund or overtopping if the tailings deposition into TSF2 is recommenced. Finger trenches shall be excavated from the borrow down the tailings beach towards the decant midway between each bund.

iii) Construct the downstream zone of the tailings storage embankments using selected approved mine waste material sourced from the waste dumps located adjacent to the site. Suitable material must comprise waste rock free of organic matter and other deleterious material, with a fines content in excess of 25% to comply with the requirements as detailed in Section 2.3 of the Earthworks Specification.

iv) Ensure all materials shall be stockpiled, transported and placed in such a manner as to minimise segregation.

v) Construct the internal decant accessways using selected mine waste material sourced from the waste dump located west of storage.

vi) Construct access roads and/or ramp(s), as appropriate, to the designated borrow or waste dump(s) as appropriate to enable the fill materials to be recovered. The Contractor shall submit details of the proposed ramps to the Owner's Representative prior to the commencement of construction.

vii) Construct and maintain haul road(s) between the ramp at the waste dump/borrow area and the works at the Tailings Storage.

viii) Construct and maintain access ramps as required to enable the construction equipment to access the existing embankment crests. The location of these ramps shall be approved by the Owner's Representative prior to commencement of these works. The ramps may be left in place at the discretion of the Principal.

ix) Raise the internal decant accessway using traffic compacted mine waste sourced from the waste dump(s) located adjacent to the storage. Suitable material must comply with the requirements as detailed in Sections 2.3 and 2.4 of the Earthworks Specification.

x) Place and select rock around the decant(s) structure. Selected rock shall comprise clean mine waste material, free of fines, sourced from a location nominated by the Owner's Representative. Suitable material must comply with the requirements as detailed in Section 2.4 of the Earthworks Specification.

xi) Adjust the moisture content of the borrow material, approved for use in the upstream zone of the perimeter embankment. Moisture condition the borrow to within the range of -2%, +2% of the optimum moisture content as determined from laboratory test 5.1.1 of AS1289 (1993). The borrow materials shall be cured to ensure the moisture is thoroughly mixed and evenly spread through all materials proposed for embankment construction.

xii) Place all fill material comprising the upstream zone of the perimeter embankment in homogeneous horizontal layers not exceeding 300mm loose lift thickness. Each lift shall be compacted by a minimum of 6 passes of a Caterpillar 825 or Dynapac CA301PD Vibratory Roller or approved equivalent. Placement should be continuous. If a break in fill placement allows the exposed surface to dry, it should be lightly tyned, watered and compacted prior to fill placement recommencing. Drawing no. 203 outlines the grades and lines to which the embankments are to be constructed.

xiii) Each layer shall be compacted to achieve an average density ratio greater than 98% of the maximum dry density - standard compaction as determined from laboratory test AS 1289.5.1.1. The actual number of passes of a Caterpillar 825 or Dynapac CA301PD or an approved equivalent to achieve a density greater than 98% standard compaction (AS 1289.5.1.1) shall be determined on site using roller trials.

xiv) Carry out testing of Zone 1 to comply with the Specification and QA/QC procedures.

xv) In the event of wet tailings being encountered on the tailings beach, place, spread and traffic compact the fill in the initial lift with construction plant. Subsequent lifts shall be compacted to achieve a density greater than 98% standard compaction (AS 1289.5.1.1).

xvi) The crests of the completed external embankments shall be graded to the inside (upstream) of the storage at a 2% crossfall. A windrow of not less than 400 mm height shall be left on the outside of the crest of all external embankments.

xvii) Place all Zone 2 Rock Fill material comprising the downstream zone of the perimeter embankment in homogeneous horizontal layers not exceeding 500 mm loose lift thickness. Each lift must be compacted using vibrating rollers of not less than 11 tonnes front module mass in layers of loose lift thickness not exceeding 500 mm. Where the front module mass is less than 11 tonnes, the loose lift thickness of the Rock Fill must be reduced. Placement should be continuous. If a break in fill placement allows the exposed surface to dry, it should be lightly tyned, watered and compacted prior to fill placement recommencing. Any oversize rock is to be pushed to the downstream face of the embankment. Largest size should not exceed 350 mm. Drawing no 203 outlines the grades and lines to which the embankments are to be constructed.

xviii) The downstream face of the completed external embankments shall be covered with minimum thickness of 500 mm of selected NAF mine waste material sourced from the waste dump(s) located adjacent to the storage. All loose fill material which is on the southern face of the existing TSF2 embankment shall be removed and incorporated into the construction of the downstream zone of TSF3 as directed by the supervising Engineer/Principal.

xix) Place all Zone 3 Rock Fill materials in the designated locations. There will be some fresh rock potentially acid forming materials (PAF) which can be used judiciously in the construction of the decant accessway or rock ring and as agreed with the Engineer.

xx) Place the basecourse materials on the crest of TSF3.

xxi) Allow for keeping water from the works during construction by shaping finished surfaces with a fall to the centre of the storage.

xxii) Allow for maintaining the borrow areas free of large accumulations of water.

2.6 Decant Structure

The decant structure is a rock ring filter constructed from Zone 3 Rock Fill Material which is to be constructed as shown on the drawings.

2.7 Completion

The Contractor must:

i) Batter down the sides of the borrow pits, as appropriate, for stability on completion of the work. Materials not considered suitable for use in the works shall be evenly spread over the borrow pit surface. The finished surface profile of the borrow shall comply with Department of Energy, Mines, Industry, Regulation and Safety (DEMIRS) Guidelines for Rehabilitation of Waste Dumps.

ii) Clean up all rubbish, remove all plant and supply materials, trim all banks neatly, spread all excavated material not specified to be removed from the site and leave the site in a clean and tidy condition.

iii) Topsoil and vegetable matter removed from the embankment footprint prior to embankment construction shall be respread on the downstream face of the dam. Topsoil shall be redeployed in a thickness similar to that removed from the embankment footprint.

2.8 Construction Sequence

TSF3 may be used during the period of the Contract. The Contractor shall liaise with the Principal to agree a sequence for the works. The Contractor shall endeavour to complete the external embankments in the sequence agreed.

2.9 Limits of the Contract

The limits of the Contract are as shown on the Drawings.

3.0 EXCLUSIONS

The following works will be performed by others simultaneously to the Works in this Contract:

i) All pipework removal and replacement including the tailings discharge mainline and the return water line.

ii) At the completion of the construction of the embankments, the Principal shall re-connect the tailings distribution pipework.

The Contractor shall:

i) Fully co-operate with the pipe handling and operating crew and shall work in with their activities at all times.

ii) Avoid damaging the tailings distribution pipework which is either operational or has been removed from the crest of the storage by the Principal. Any pipework damaged by the Contractor through carelessness shall be replaced at no additional cost to the Principal.

4.0 PRINCIPAL-SUPPLIED ITEMS

4.1 Survey

The Principal's will provide co-ordinates and levels of four (4) survey marks within the vicinity of the storage. The Contractor shall set out all lines and levels using the survey marks provided.

4.2 Materials

The Principal's will supply mine waste for construction of the perimeter embankment, decant access and decant filter rock from the designated source. The items listed below, will be provided as Principal-Supplied items to the Contractor. The items will be supplied from the Principal's store during normal store hours.

4.3 Water

Water will be made available to the Contractor at no charge. Supply will be from a standpipe located near the plant site. Access to the standpipe will not be exclusive to the Contractor. The Contractor shall determine the type and suitability of the water supplies for use in this Contract.

The Contractor shall make his own arrangements for loading and hauling.

Note: Potable water supplies are limited and the Principal may, from time to time, direct the Contractor to use alternative sources.

5.0 QUALITY CONTROL AND QUALITY ASSURANCE

The required quality standards for implementation of this Scope of Work are the AS/NZS ISO 9001:1994 Standard Series and the Contractor shall comply with the requirements of these standards.

The Contractor shall provide not later than thirty (30) days after Award of Contract, fully documented details of the Quality systems and procedures to be utilised together with reference details for implementation of the stated system and procedures on previous similar projects.

6.0 INSPECTION AND TESTING

6.1 Inspection Requirements

The Owner's Representative will be entitled, at all times to inspect, examine and test the materials and workmanship being provided under the Contract. Such inspection, examination or testing, if made, shall not release the Contractor from any obligation under the Contract.

The Contractor shall co-operate with and provide full opportunity to the Owner's Representative to regularly monitor the progress of the Works of the Contractor and his subcontractor's to the detailed extent necessary to satisfy progress relative to the Construction Program.

All pertinent information to enable the Owner's Representative to determine the adequacy of the advance planning for material procurement, machine and manpower resources to meet the Construction Program shall be made freely available to the Owner's Representative.

These requirements shall be incorporated in orders placed with Subcontractor's.

6.2 Testing Plans

The Contractor shall provide not later than fourteen (14) days after Award of Contract a certified Testing Program.

The Testing Program shall include details of Procedures, Standards and acceptance levels and conform to the requirements of Specifications forming part of the Contract documentation.

Compliance tests shall be carried out by a qualified technician from a NATA registered laboratory employed by the Contractor.

Compliance tests shall be carried out to such a degree as to satisfy the Owner's Representative that the criteria on moisture content and compaction are met.

Compliance testing of compaction shall be at the rate of not less than 1 test per layer per material type per 2,500 m^2.

The Contractor shall, at his own expense, rework or replace materials which do not meet the compaction requirements.

7.0 PERMITS, LICENCES AND APPROVALS

Further to the General Conditions of Contract, the Principal will obtain permits, licences and approval from DEMIRS and Department of Water and Environmental Regulation (DWER).

All other necessary permits, licenses and approvals shall be obtained by the Contractor.

8.0 CAD DRAWINGS

Computer Aided Drafting (CAD) drawings shall be supplied on files compatible with the current version of Microstation, and in accordance with specifications SE43 CAD Drawing Procedure.

9.0 SUBSTITUTIONS

The Contractor must:

i) Not substitute any alternative to the equipment and materials included in the Works without the prior written consent of the Principal.

ii) Make diligent efforts to utilise the specified Materials to be incorporated into the Works but where the Contractor considers there are commercial or other advantages to be derived by the Principal, the Contractor may submit a proposal for a substitute material for approval by the Principal's prior to commencement of the work. Such proposal for substitution shall be in writing and state reasons for and (if applicable) advantages of the substitute material. The Principal shall determine whether the substitute material will be permitted and such a determination shall be binding and conclusive upon the Contractor. Approval of a substitution will be given as a variation under the General Conditions of Contract incorporating any adjustment to the Contract Sum.

10.0 SHIPMENT (GENERAL)

The Contractor is responsible for transporting the Plant and Equipment to the site and must maintain full responsibility for loading, unloading, handling, site storage and insurance of the Plant and Equipment during transportation.

Notice of dispatch must be sent by the Contractor to the Principal at the time of dispatch of all consignments of Plant. Such notice must contain the method and date of dispatch and date of arrival on site.

11.0 CO-OPERATION WITH OTHER CONTRACTOR'S AND OPERATIONS

It is inevitable that at times other Contractor's or Operations personnel may be working in very close proximity to the Contractor during the execution of the Works. The Contractor shall at times, co-operate to the fullest extent with other Contractors and Operations and shall be deemed to have made full allowance in the Contract Sum for any costs which could be incurred as a result of such co-operation up to a maximum of two (2) hours for each incident. The Contractor must make allowances for the following:

i) Inconvenience of working around other Contractor's and operations.

ii) Need to relocate to another work area if the area is considered unsafe by the Principal's due to activities of other Contractor's and Operations.

iii) Restrictions on access due to activities of others.

iv) The need to use temporary and incomplete access ways and platforms.

No claims will be accepted by the Principal's for costs or extension of time resulting from the activities of operations or other Contractor's or Operations personnel working in the same area as the Contractor for this two (2) hour delay.

12.0 TEMPORARY SERVICES AND FACILITIES

12.1 Furnished by Contractor

Except as expressly set forth in Clause 12.2 of this document, the Contractor shall, as part of the Scope of Work, supply, install, properly maintain, and remove all temporary construction facilities and utilities necessary for full and complete performance of the works. Such items shall include, but not necessarily be limited to, those listed below. The type of facilities, mobilisation and demobilisation dates, and locations of job site shall be subject to, and in accordance with, the review and approval of the Principal's.

i) Access roads around and within the site to the approval of the Principal's.

ii) All temporary office, crib room and buildings required for use during the execution of the works.

iii) All sanitary consumables (toilet paper and hand cleaner).

iv) First-line first aid facilities at work site, including a First Aid Officer.

v) Fuels and lubricants.

vi) Compressed air and gases.

vii) Construction of electric power distribution at the work Site to the approval of the Principal's from existing supply points.

viii) Transportation facilities on Site.

ix) Communications activities, including telephone and facsimile. (Contractor shall liaise with telecommunications suppliers direct).

x) Maintenance of Contractor's laydown, storage and work areas and roads within such areas.

xi) All cranes and other necessary equipment for lifting and moving equipment.

xii) All small tools and testing equipment.

xiii) Temporary lighting.

xiv) Road and traffic signs

xv) Any items specified or implied in other sections of the Contract documents.

xvi) Site clean-up and removal of rubbish to tip at an interval not exceeding one week.

12.2 Furnished by Principal

This section provides a list of Principal-furnished Services other than those items listed in Sections 1.2 and 4.0.

Any services or materials not specifically identified as being provided by the Principal's shall be provided by the Contractor.

12.2.1 Utility Services

Where the Contract work is at an existing Plant, the Principal's is able to provide from existing outlets, electric power, water and plant air free of charge to the Contractor. These utility services are not guaranteed and may be withdrawn or terminated by the Principal's at any time and for any duration without notice.

Should the Contractor be required to extend water, electric power or plant air from the existing outlets, such as extensions shall only be carried out with the written approval of the Principal and shall be at the Contractor's cost.

All installations are to be built and maintained in accordance with relevant regulations and to the Principal's requirements.

The Contractor shall not be entitled to any monetary compensation by reason of interruptions to utility service, whether such services are provided by the Principal or not.

The Contractor shall not be entitled to any extension of time by reason of interruption unless each such interruption exceeds two days, in which case any extension of time which may be granted by the Principal in pursuance of claims made by the Contractor will not be greater than the period of interruption.

The Contractor shall take all necessary steps to prevent waste of utility services, and the Principal reserves the right to deduct from amounts payable under the Contract, the value of any utility which, in the opinion of the Principal, is wasted or unnecessarily used.

12.2.2 Accommodation

Unless otherwise specified, the Contractor shall be responsible for arranging and providing accommodation for all his employees and the cost of such accommodation shall be deemed to be included in the rates and lump sum prices applicable to the Contract.

The Contractor's employees may, by application of the Contractor, be accepted for single status accommodation and messing where this is available. The Contractor shall be charged for the cost of accommodation and messing for each of his employees accommodated on a single basis at the prevailing rate per manday, Sundays and Public Holidays included, such rate of this Clause, manday shall be measured from noon to noon.

or/Accommodation and messing for the Contractor will be provided by the Principal.

12.2.3 Materials

Where the Principal's agrees to supply Materials to the Contractor in the performance of the Contract then the following conditions will apply:

i) The items shall be included in the Contractor's materials procurement schedules. The Contractor shall, upon arrival at site and prior to commencing work, check and ensure that Principal-Supplied Materials are available.

ii) Items stored by the Principal's, shall be removed from the Principal's store or storage area by the Contractor when required by him or when directed by the Superintendent (whichever is the sooner). However, no items shall be removed from the Principal's store or storage area by the Contractor without first obtaining authority from the Owner's Representative and the Contractor shall sign receipts or other documentation required acknowledging receipt of the Free Issue Materials.

iii) From the time the Principal-Supplied Materials are removed from the Principal's store or storage area or are delivered to the site the Contractor shall be responsible for and shall keep safely and in good order all those Principal's Supplied Materials including any returnable packing or containers.

iv) The Contractor shall account for all Principal's Supplied Materials used and shall return to the Principal's in good order and condition any Principal's Supplied Materials remaining unused on completion of the work. Subject to any insurance cover the Contractor shall be responsible for the cost of replacement or repair of any Principal's Supplied Materials lost or damaged while he is responsible, therefore.

v) The Contractor shall immediately notify the Owner's Representative of any damaged to or loss of any of those Principal-Supplied Materials at any time and shall as soon as possible specify the extent and circumstances of the damage or loss.

vi) Principal's Supplied Materials used by the Contractor are used at the sole risk of the Contractor. Any failure to perform the Contract by the Contractor shall not be excused by any matter or thing arising from or incidental to the use of Principal-Supplied Materials.

13.0 DATA REQUIREMENTS

The Contractor shall submit the following data in addition to the data requirements detailed elsewhere in this Specification to the Principal's as part of the Work.

The Contractor shall show the reference Contract Number and identifying item numbers, if applicable, on all data submitted.

13.1 As-built Drawings

Further to the General Conditions of Contract, the Contractor shall supply as built drawings within 14 days of the issue of a Certificate of Practical Completion.

14.0 CONSTRUCTION PROGRAM

The Contractor must provide a construction program and indicate the following milestone dates.

i) Contract Award.

ii) Notice to Proceed with the Fieldwork.

iii) Principal's Completion Date.

iv) Final Completion Date.

15.0 ESTIMATE OF QUANTITIES

A preliminary estimate of quantities has been provided to allow material requirements to be gauged for Stage 1 Construction.

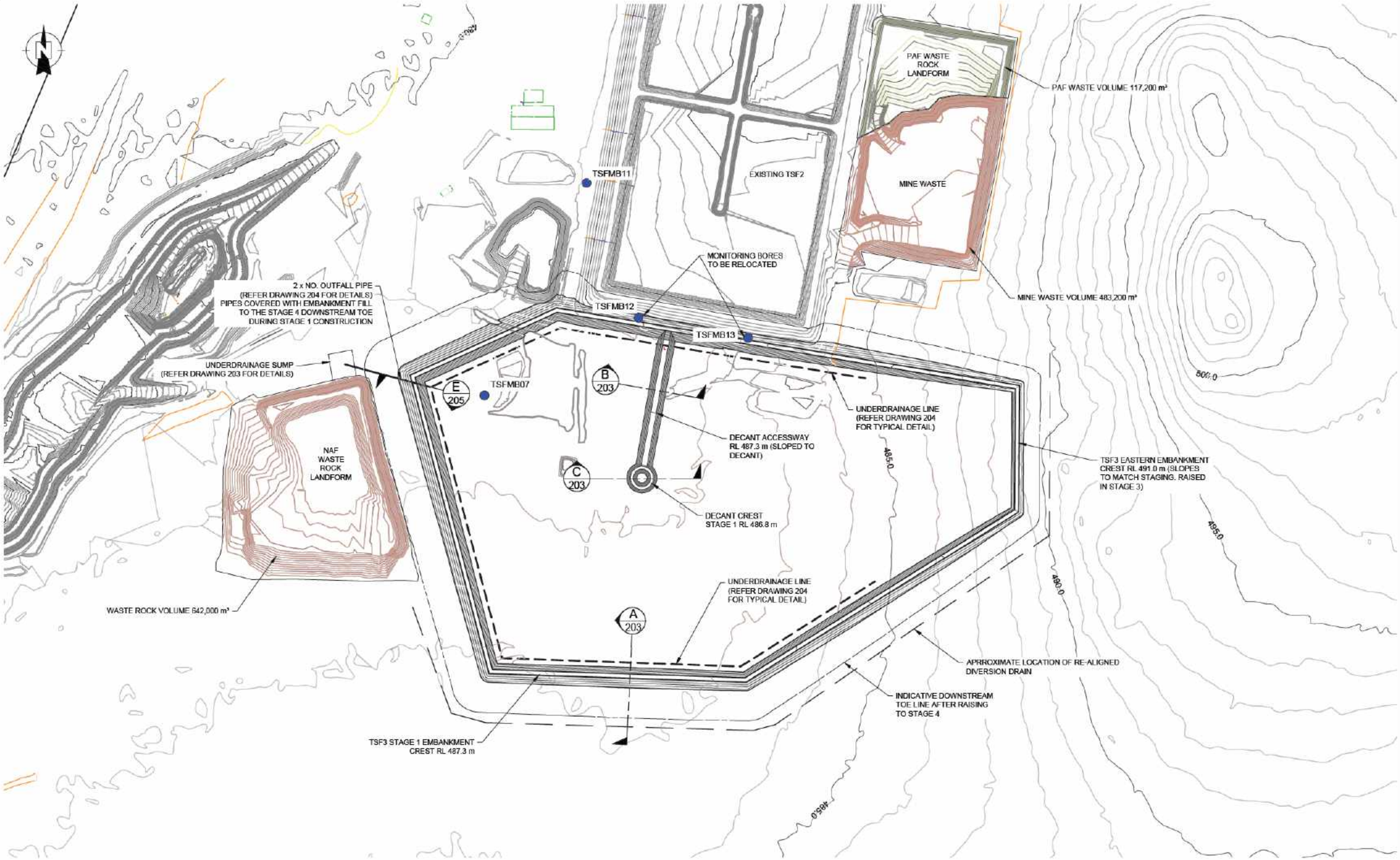
The figures have not been calculated by a Quantity Surveyor and are provided for convenience only.

Appendix A

Drawings

Meeka Metals Limited

Tailings Storage Facility 3 Scope of Works



NOTES:

1. COORDINATE SYSTEM: MGA ZONE 50, GDA94

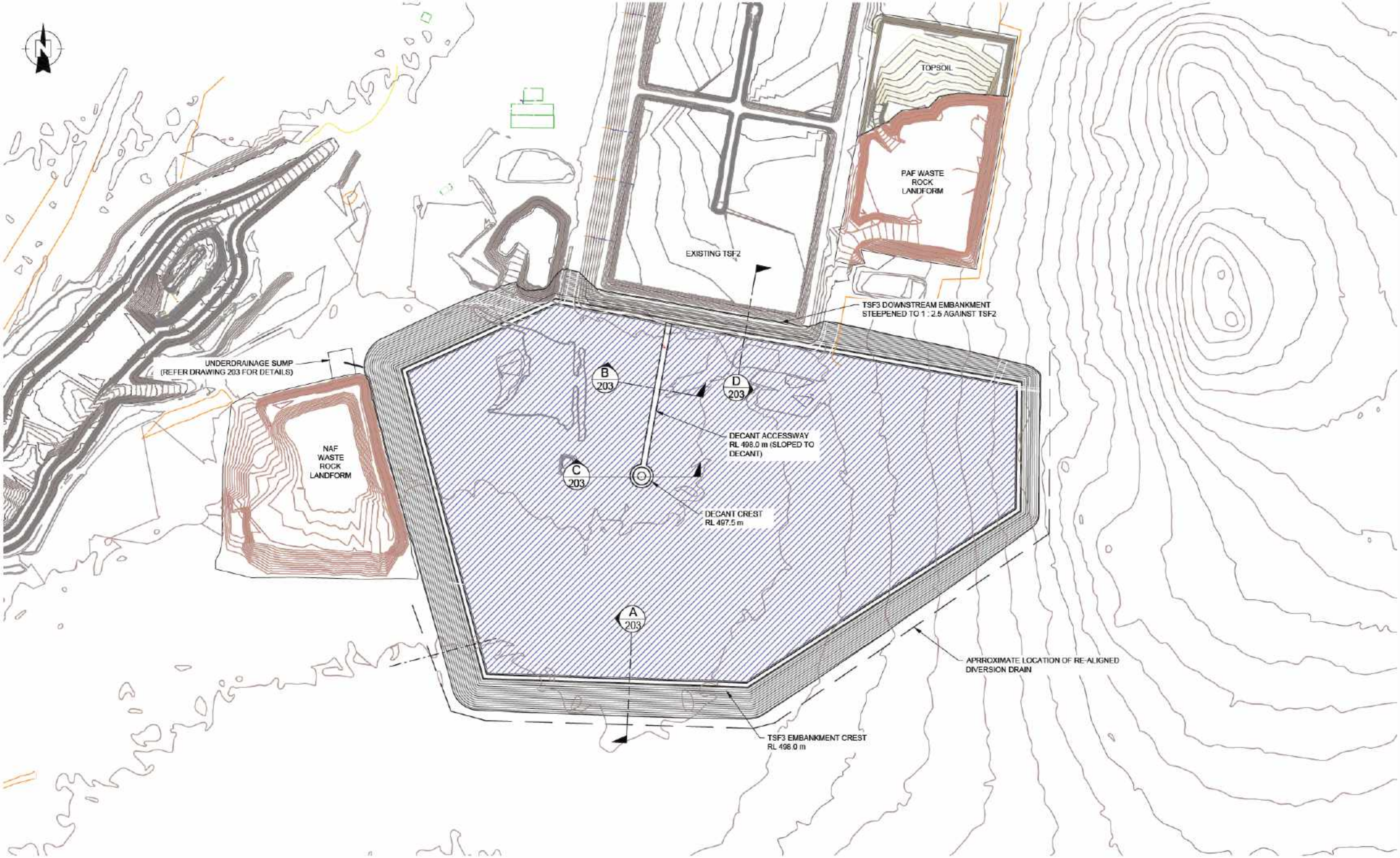
LEGEND:

● TSFMB EXISTING MONITORING BORE

Soil & Rock Engineering
ABN 98 675 219 020

CMW Geosciences
Great People | Practical Solutions

CLIENT:	DORAY MINERALS LIMITED	DRAWN:	DE	PROJECT:	PER2017-0152
PROJECT:	ANDY WELL GOLD MINE TSF3	CHECKED:	CL	DRAWING:	201
		REVISION:	B	SCALE:	1:5 000
TITLE:	TSF3 STAGE 1 PLAN	DATE:	20.06.24	SHEET:	A3 L



NOTES:

1. COORDINATE SYSTEM: MGA ZONE 50, GDA94

1:5 000 — 0 50 100 150 200 250 m

Soil & Rock Engineering
ABN 98 675 219 020

CMW Geosciences
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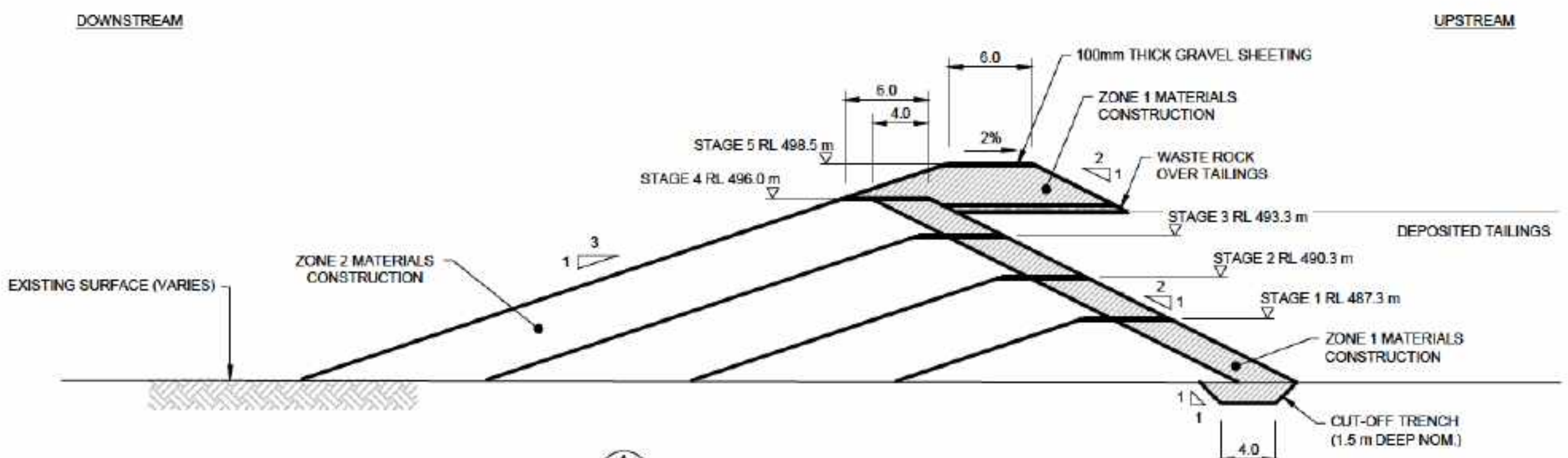
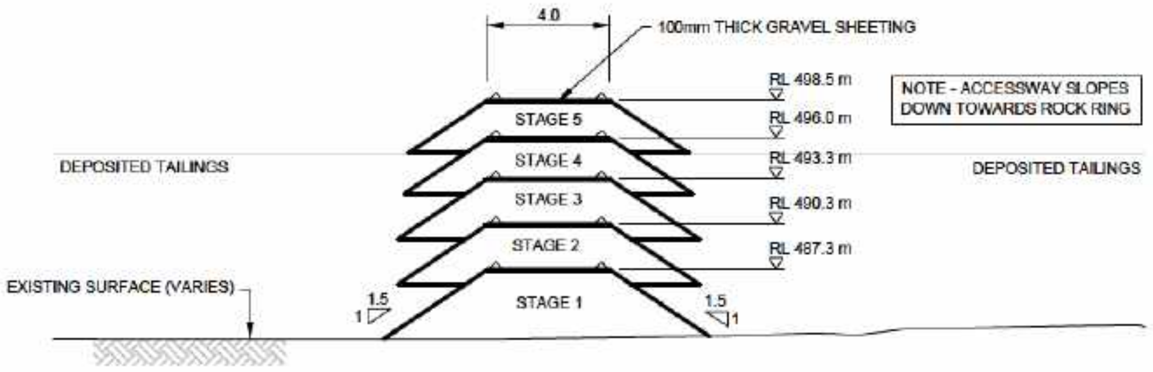
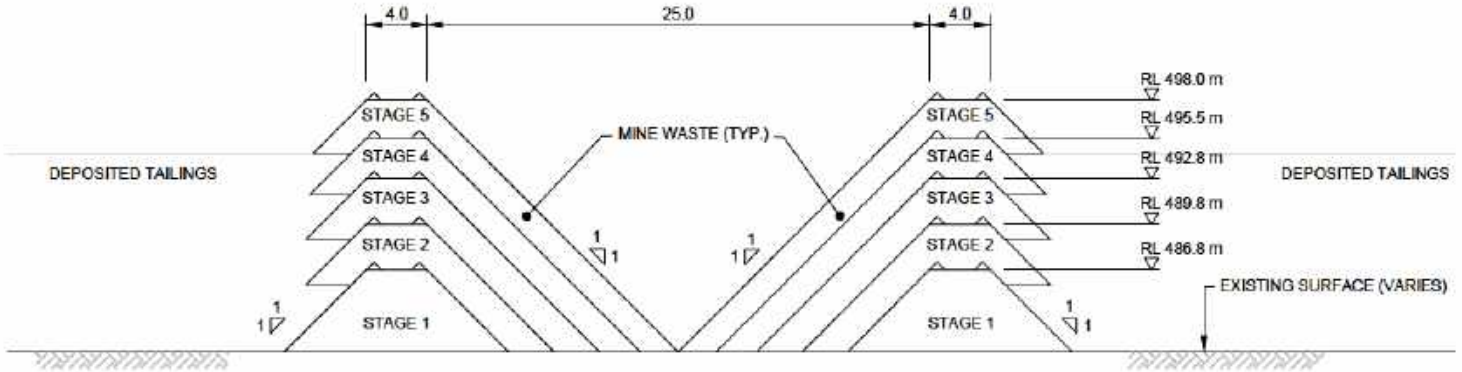
CLIENT: DORAY MINERALS LIMITED		DRAWN: DE	PROJECT: PER2017-0152
PROJECT: ANDY WELL GOLD MINE TSF3		CHECKED: CL	DRAWING: 202
		REVISION: B	SCALE: 1:5 000
TITLE: TSF3 FINAL STAGE PLAN		DATE: 20.06.24	SHEET: A3 L



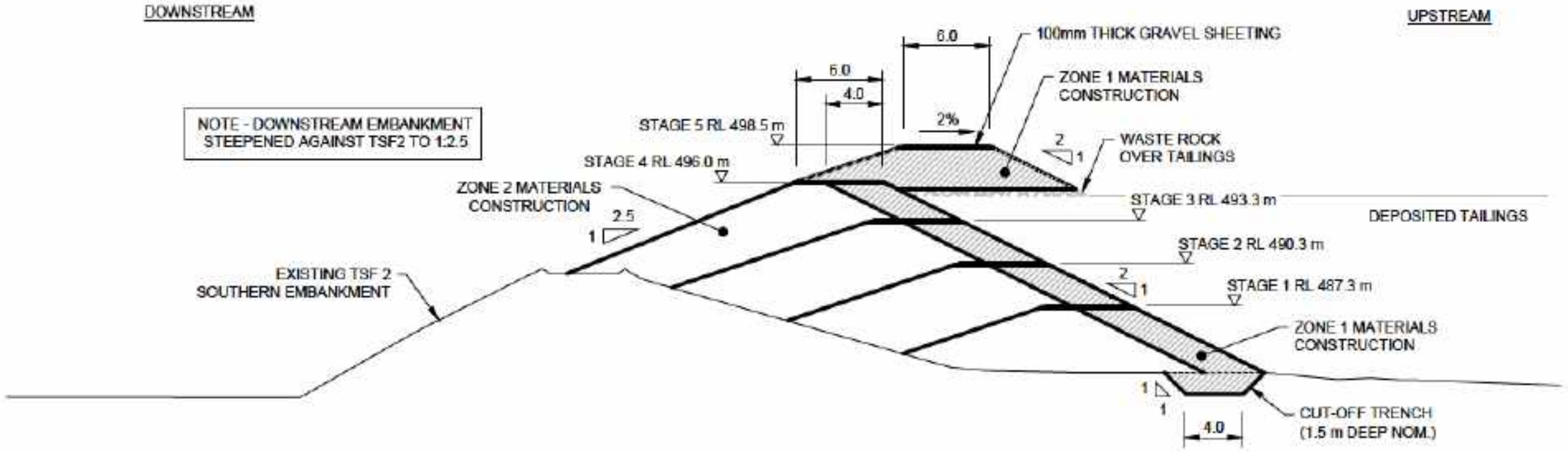
A 201/202 PERIMETER EMBANKMENT - TYPICAL SECTION
1:500



B 201/202 DECANT ACCESSWAY - TYPICAL SECTION
1:500



C 201/202 DECANT ROCK RING - TYPICAL SECTION
1:500



D 202 PERIMETER EMBANKMENT AGAINST EXISTING TSF2 - TYPICAL SECTION
1:500

NOTES:

1. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

1:500 0 5 10 15 20 25 m

Soil & Rock Engineering
ABN 98 675 219 020

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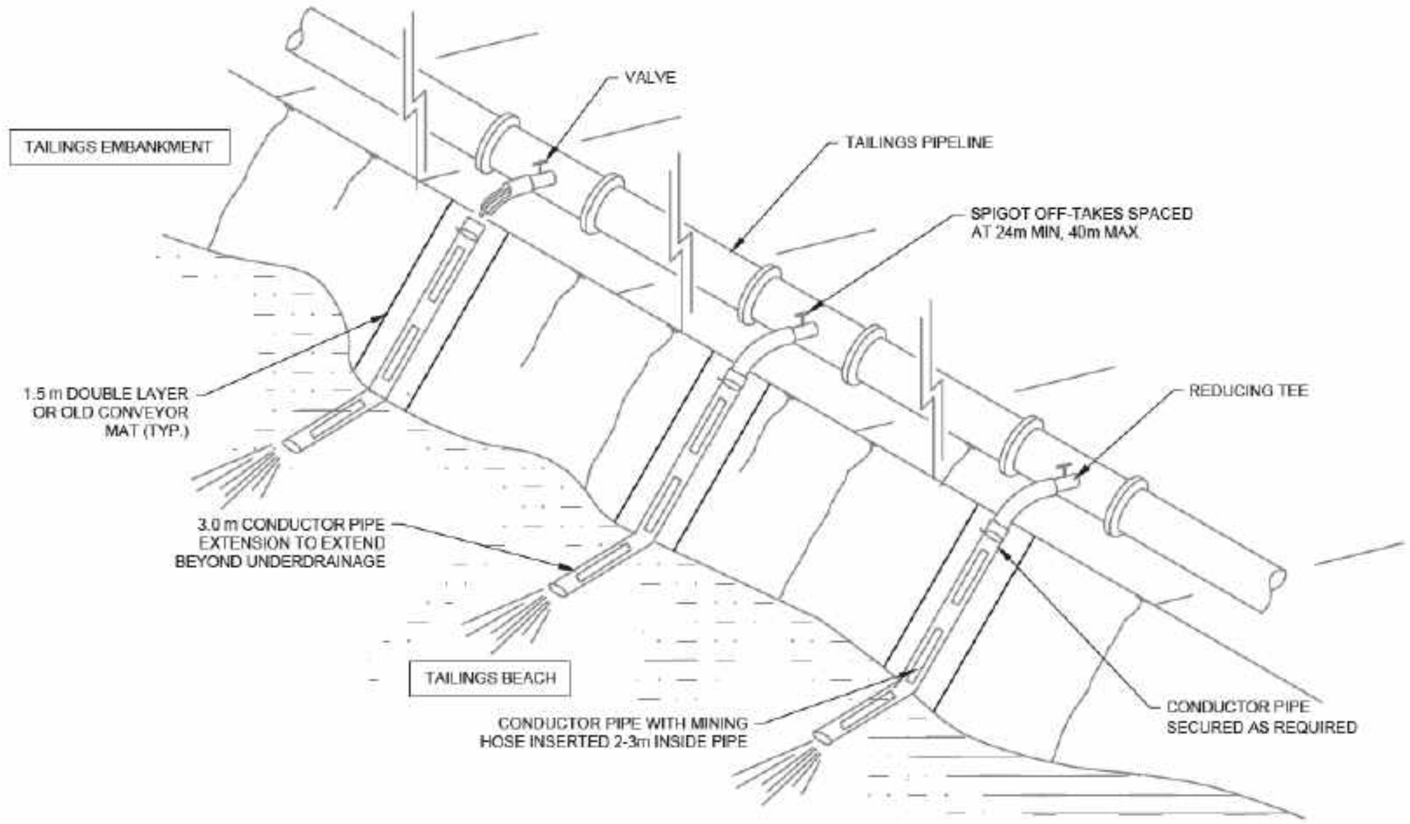
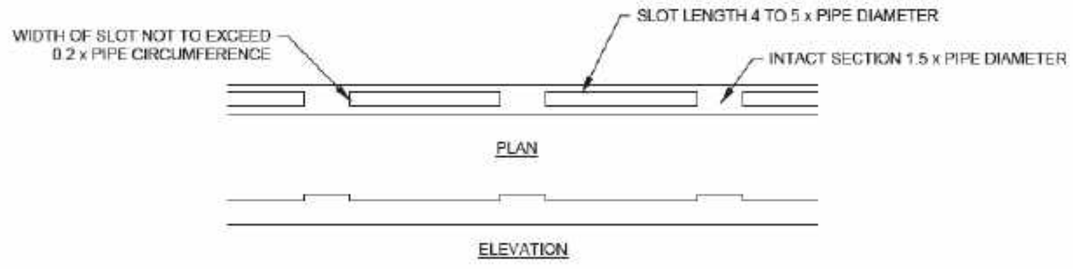
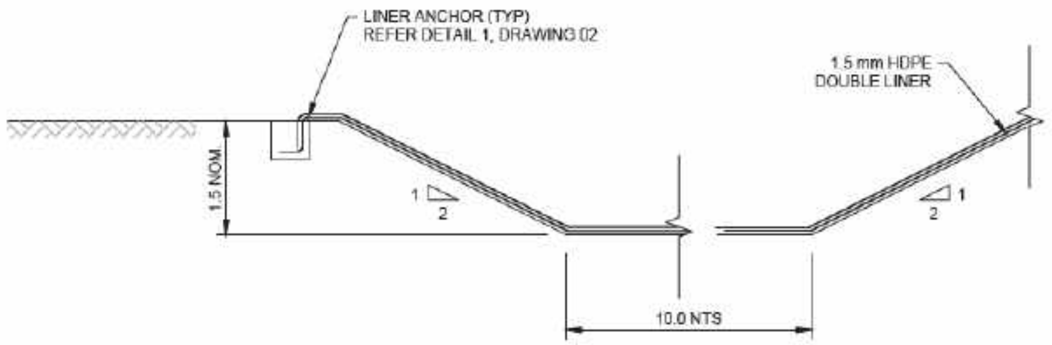
CLIENT: DORAY MINERALS LIMITED		DRAWN: DE	PROJECT: PER2017-0152
PROJECT: ANDY WELLS GOLDMINE TSF3		CHECKED: CH	DRAWING: 203
		REVISION: B	SCALE: 1:500
TITLE: TYPICAL EMBANKMENT SECTIONS		DATE: 20.06.24	SHEET: A3 L



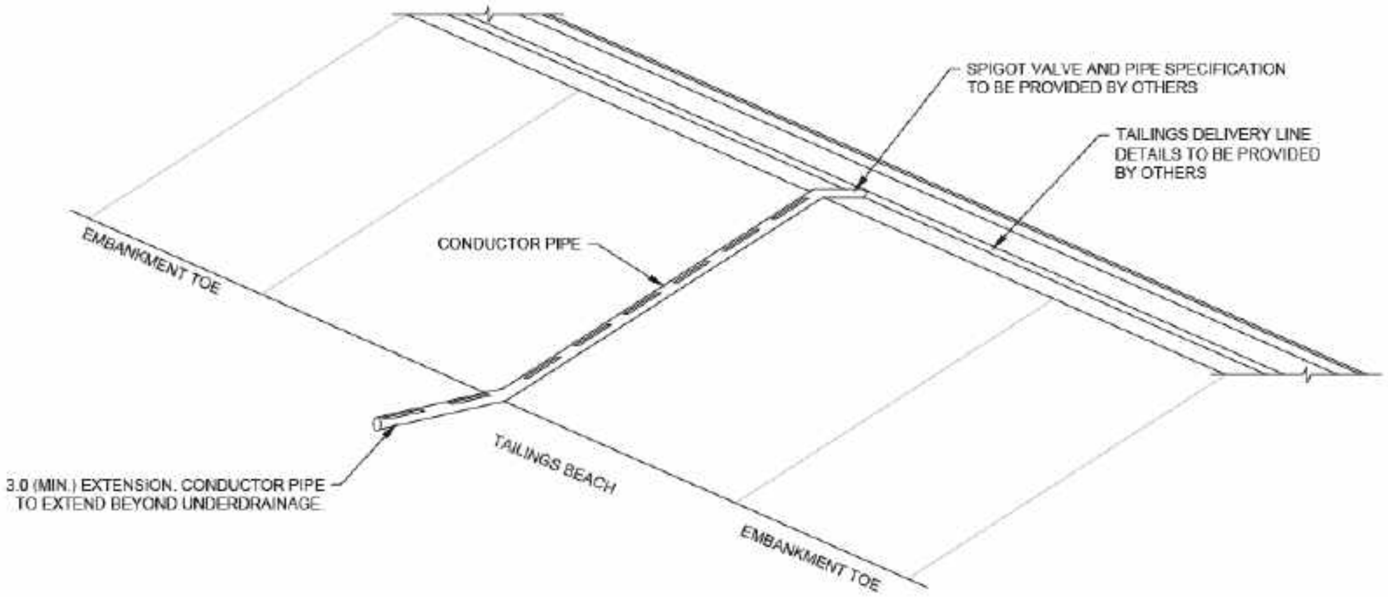
PROPOSED SPIGOT ARRANGEMENT
ISOMETRIC VIEW (NTS)



CONDUCTOR PIPE (SLOTTED PVC) - TYPICAL DETAIL
1:50



UNDERDRAINAGE SUMP - TYPICAL DETAIL
1:100



DRAINAGE / DEPOSITION EMBANKMENT
PERSPECTIVE VIEW (NTS)

NOTES:

1. ALL DIMENSIONS IN METRES UNO

1:100 — 0 1 2 3 4 5 m

1:50 — 0 0.5 1.0 1.5 2.0 2.5 m

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ABN 98 675 219 020

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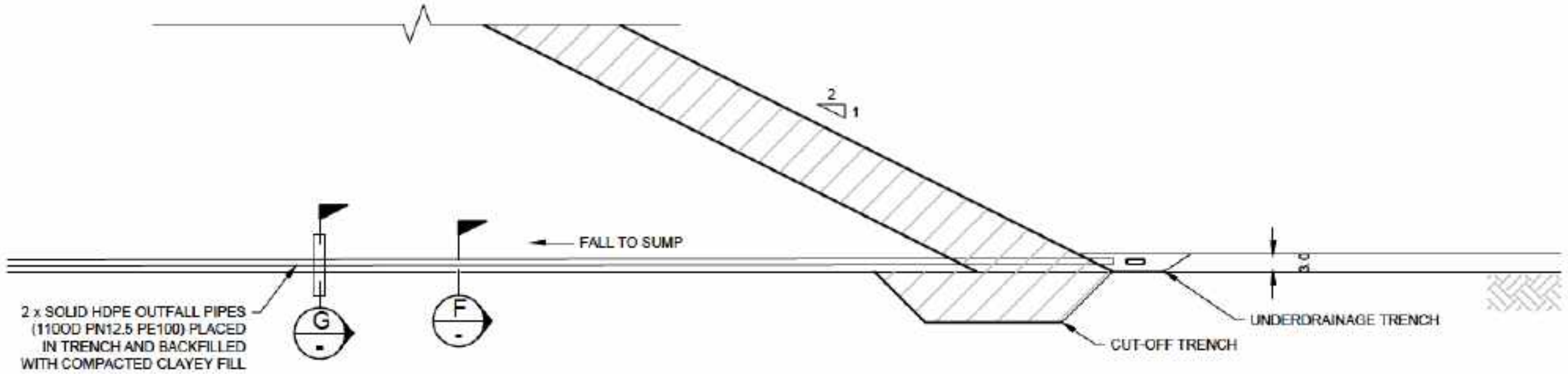
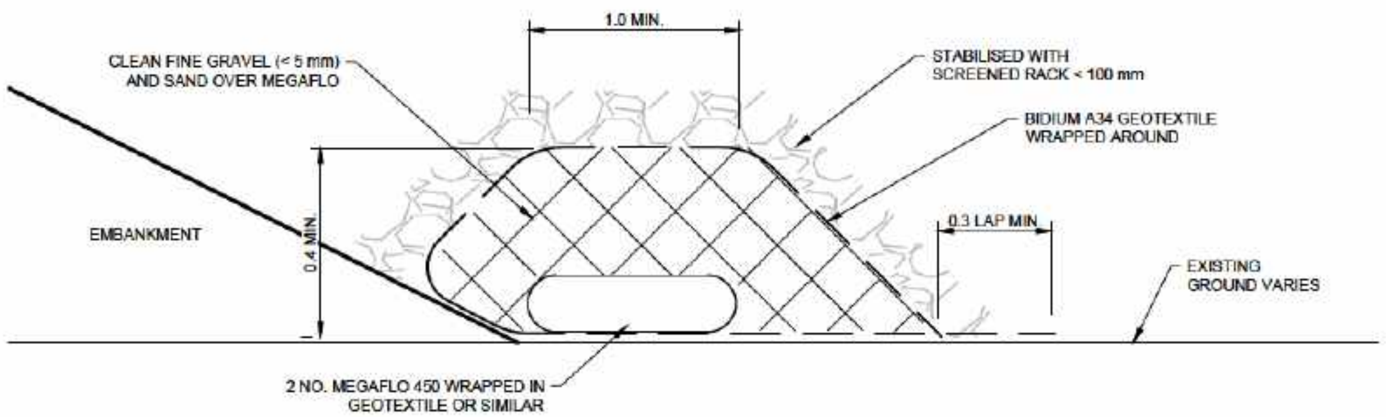
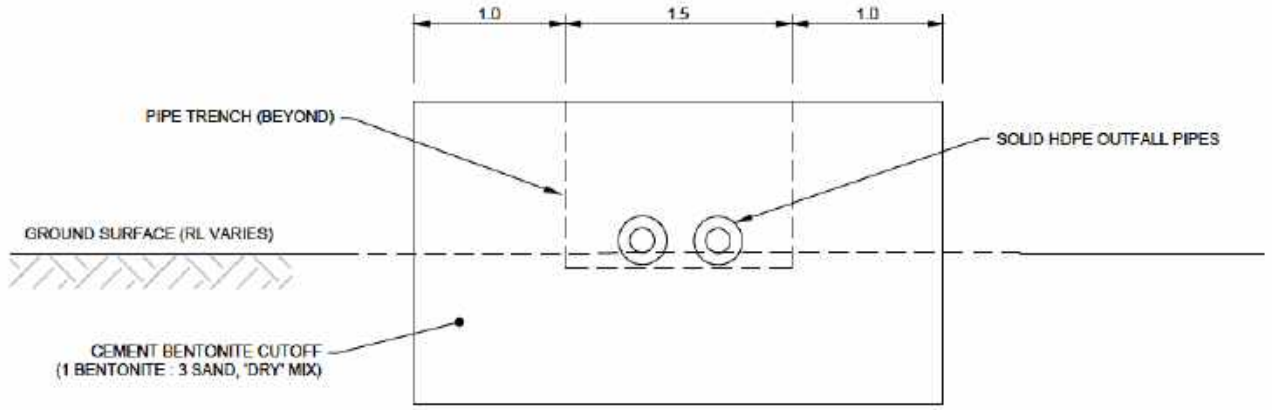
CLIENT: DORAY MINERALS LIMITED	DRAWN: DE	PROJECT: PER2017-0152
PROJECT: ANDY WELLS GOLDMINE TSF3	CHECKED: CL	DRAWING: 204
	REVISION: B	SCALE: AS SHOWN
TITLE: SECTIONS AND DETAILS - PIPEWORK AND UNDERDRAINAGE SUMP	DATE: 20.06.24	SHEET: A3 L



E / 201 UNDERDRAINAGE OUTFALL PIPE THROUGH EMBANKMENT - TYPICAL SECTION
1:200

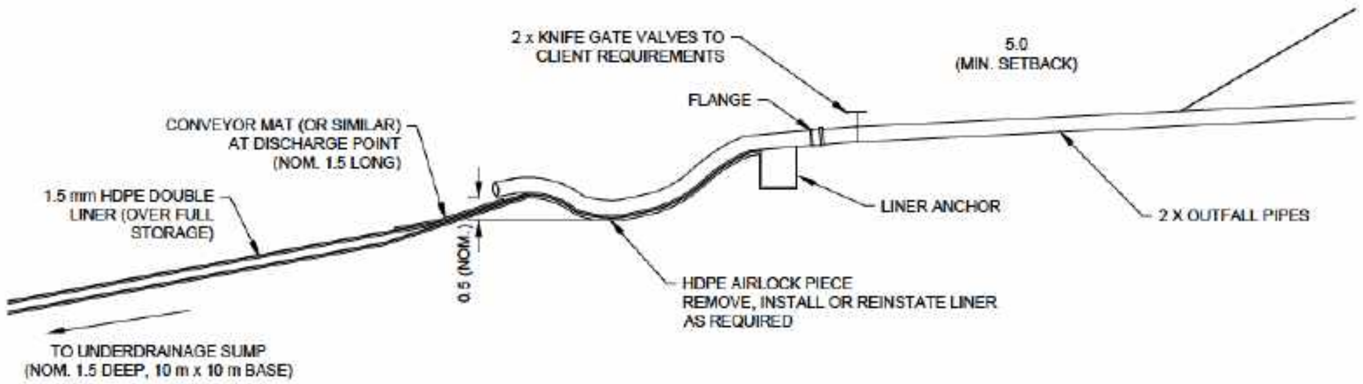


UNDERDRAINAGE - TYPICAL SECTION
NTS

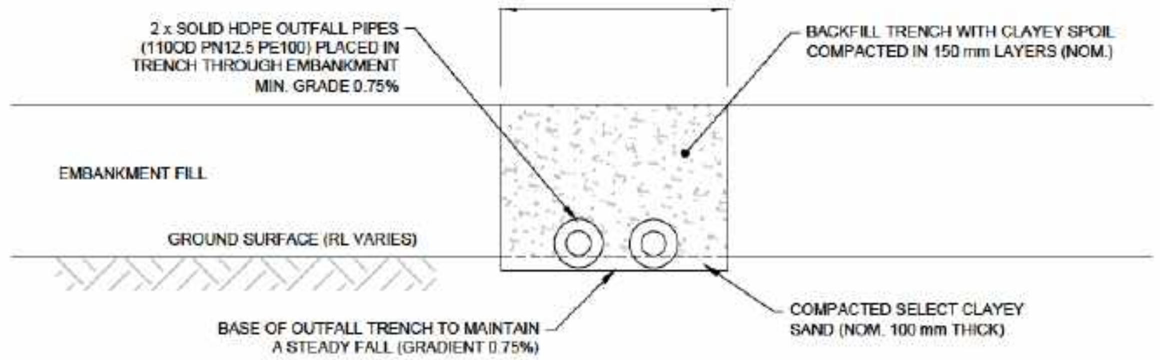


G / - CEMENT BENTONITE CUTOFF - TYPICAL SECTION
1:50

NOTE - PIPES COVERED WITH EMBANKMENT FILL TO THE STAGE 4 DOWNSTREAM TOE DURING STAGE 1 CONSTRUCTION



OUTFALL PIPEWORK OUTLET - TYPICAL SECTION
NTS



F / - OUTFALL PIPE TRENCH (THROUGH EMBANKMENT) - TYPICAL SECTION
1:50

NOTES:

1. ALL DIMENSIONS IN METRES UNO

Soil & Rock Engineering
ABN 98 675 219 020

CMW Geosciences
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CLIENT: DORAY MINERALS LIMITED		DRAWN: DE	PROJECT: PER2017-0152
PROJECT: ANDY WELLS GOLDMINE TSF3		CHECKED: CL	DRAWING: 205
		REVISION: B	SCALE: AS SHOWN
TITLE: SECTIONS AND DETAILS - UNDERDRAINAGE		DATE: 20.06.24	SHEET: A3 L

Appendix B

Schedule of Materials

Meeka Metals Limited

Tailings Storage Facility 3 Scope of Works

				Date	20/06/2024
PROJECT	**: ANDY WELL TSF3**			Subject	materials
CLIENT	**: MEEKA METALS LIMITED**			Revision	A
LOCATION	**: MEEKATHARRA**				
SUBJECT	**: MATERIALS SCHEDULE TSF3 - STAGE 1 TO RL 487.3 m**				

Item	Description	Unit	Quantity	Rate	Amount
1.00	**EARTHWORKS**				
1.01	Clearing tailings storage floor area Stage 1 as per Scope of Works including removal of rubbish etc as directed	m^2	370,000		$ -
1.02	Strip top soil from TSF Stage 1 as per Scope of Works and Earthworks Specification	m^2	370,000		$ -
1.03	Strip top soil from beneath underdrainage return water storage (downstream of TSF)	m^2	100		$ -
1.04	Strip top soil from beneath pipework corridors to underdrainage return water storage (downstream of TSF)	m^2	200		$ -
1.05	Excavate seepage cutoff as directed	m^3	20,250		$ -
1.06	Borrow, moisture condition, transport, place and compact fill to seepage cutoff	m^3	20,250		$ -
1.07	Borrow, transport, and place Zone 2 waste rock to perimeter embankment	m^3	143,100		$ -
1.08	Borrow, moisture condition, transport, place and compact Zone 1 fill to internal embankment	m^3	43,100		$ -
1.09	Borrow, transport, and place cushion layer to decant and accessway	m^3	1,200		$ -
1.10	Borrow, transport, and place rockfill to decant accessway	m^3	13,200		$ -
1.11	Transport and place decant rockfill	m^3	4,400		$ -
1.12	Excavate outfall pipe trench through embankment	m^3	600		$ -
1.13	Form and place cutoff to outfall pipes	m^3	600		$ -
1.14	Backfill over and around pipes through embankment	m^3	600		$ -
1.15	Place gravel sheeting to internal perimeter embankment	m^2	14,400		$ -
1.16	Excavate water diversion drain, including rock armoring	m	1,400		$ -
1.17	Excavate water diversion apron, including mortar stone pitching	item	1		$ -
1.18	Borehole Sealing	item	1		$ -
	ITEM 1.0 TOTAL				**$ -**
2.00	**UNDERDRAINAGE AND LEAK DETECTION**				
2.01	Supply and install solid 110 OD HDPE outfall pipes for underdrainage from TSF to underdrainage return water storage (downstream of TSF)	m	200		$ -
2.02	Supply gotextile and megaflo and construct upstream toe drain as per the design (Drawings 202 and 203)	m	1,600		
2.03	Aggregate to underdrainage	m^3	1,600		$ -
2.04	Underdrainage protection (rock fill)	m^3	1,600		$ -
2.05	Supply and install slotted 110 OD HDPE underdrainage collection pipe (to outfall pipes)	m	3,200		$ -
	ITEM 2.0 TOTAL				**$ -**
	STAGE 1 TOTAL				**$ -**

PROJECT	**: ANDY WELL TSF3**			Date	20/06/2024
CLIENT	**: MEEKA METALS LIMITED**			Subject	materials
LOCATION	**: MEEKATHARRA**			Revision	A
SUBJECT	**: MATERIALS SCHEDULE TSF3 - STAGE 2 TO RL 490.3 m**				

Item	Description	Unit	Quantity	Rate	Amount
1.00	**EARTHWORKS**				
1.01	Strip soil from TSF Stage 1	m^2	23,300		$ -
1.02	Remove gravel sheeting from internal embankment	m^2	14,400		$ -
1.03	Prepare internal embankment foundation	m^2	14,400		$ -
1.04	Borrow, transport, and place waste rock over tailings	m^3	0		$ -
1.05	Borrow, transport, and place Zone 2 waste rock to perimeter embankment	m^3	152,700		$ -
1.06	Borrow, moisture condition, transport, place and compact Zone 1 fill to internal embankment	m^3	19,100		$ -
1.07	Borrow, transport, place, and traffic compact fill to decant accessway	m^3	9,400		$ -
1.08	Transport and place decant rockfill	m^3	3,400		$ -
1.09	Replace gravel sheeting to internal embankment	m^2	14,400		$ -
	ITEM 1.0 TOTAL				$ -
2.00	**TAILINGS PIPELINE**				
2.01	Move tailings pipeline to Stage 1 Crest	sum	1		$ -
	ITEM 2.0 TOTAL				$ -
	STAGE 2 TOTAL				$ -

PROJECT	**: ANDY WELL TSF3**			Date	20/06/2024
				Subject	materials
CLIENT	**: MEEKA METALS LIMITED**			Revision	A
LOCATION	**: MEEKATHARRA**				
SUBJECT	**: MATERIALS SCHEDULE TSF3 - STAGE 3 TO RL 493.3 m**				

Item	Description	Unit	Quantity	Rate	Amount
1.00	**EARTHWORKS**				
1.01	Strip soil from TSF Stage 2	m^2	32,400		$ -
1.02	Remove gravel sheeting from internal embankment	m^2	14,400		$ -
1.03	Prepare internal embankment foundation	m^2	14,400		$ -
1.04	Borrow, transport, and place waste rock over tailings	m^3	0		$ -
1.05	Borrow, transport, and place Zone 2 waste rock to perimeter embankment	m^3	265,400		$ -
1.06	Borrow, moisture condition, transport, place and compact Zone 1 fill to internal embankment	m^3	26,600		$ -
1.07	Borrow, transport, place, and traffic compact fill to decant accessway	m^3	9,600		$ -
1.08	Transport and place decant rockfill	m^3	4,250		$ -
1.09	Replace gravel sheeting to internal embankment	m^2	14,500		$ -
2.00	**TAILINGS PIPELINE**				
2.01	Move tailings pipeline to Stage 4 Crest	sum	1		$ -
	ITEM 2.0 TOTAL				$ -
	STAGE 3 TOTAL				$ -

PROJECT : ANDY WELL TSF3

CLIENT : MEEKA METALS LIMITED

LOCATION : MEEKATHARRA

SUBJECT : MATERIALS SCHEDULE TSF3 - STAGE 4 TO RL 496.0 m

Date	20/06/2024
Subject	materials
Revision	A

Item	Description	Unit	Quantity	Rate	Amount
1.00	**EARTHWORKS**				
1.01	Strip soil from TSF Stage 3	m^2	37,900		$ -
1.02	Remove gravel sheeting from internal embankment	m^2	14,500		$ -
1.03	Prepare internal embankment foundation	m^2	14,500		$ -
1.04	Borrow, transport, and place waste rock over tailings	m^3	0		$ -
1.05	Borrow, transport, and place Zone 2 waste rock to perimeter embankment	m^3	354,700		$ -
1.06	Borrow, moisture condition, transport, place and compact Zone 1 fill to internal embankment	m^3	25,300		$ -
1.07	Borrow, transport, place, and traffic compact fill to decant accessway	m^3	8,000		$ -
1.08	Transport and place decant rockfill	m^3	4,500		$ -
1.09	Replace gravel sheeting to internal embankment	m^2	14,600		$ -
2.00	**TAILINGS PIPELINE**				
2.01	Move tailings pipeline to Stage 4 Crest	sum	1		$ -
	ITEM 2.0 TOTAL				$ -
	STAGE 4 TOTAL				$ -

PROJECT	**: ANDY WELL TSF3**	Date	20/06/2024
CLIENT	**: MEEKA METALS LIMITED**	Subject	costing
LOCATION	**: MEEKATHARRA**	Revision	A
SUBJECT	**: COSTING OF TSF3 - STAGE 5 TO RL 498.5 m**		

Item	Description	Unit	Quantity	Rate	Amount
1.00	**EARTHWORKS**				
1.01	Strip soil from TSF Stage 4	m^2	0		$ -
1.02	Remove gravel sheeting from internal embankment	m^2	14,600		$ -
1.03	Prepare internal embankment foundation	m^2	14,600		$ -
1.04	Borrow, transport, and place waste rock over tailings	m^3	15,000		$ -
1.05	Borrow, moisture condition, transport, place and compact Zone 1 fill to internal embankment	m^3	88,800		$ -
1.06	Borrow, transport, place, and traffic compact fill to decant accessway	m^3	7,400		$ -
1.07	Transport and place decant rockfill	m^3	4,600		$ -
1.08	Replace gravel sheeting to internal embankment	m^2	14,400		$ -
	ITEM 1.0 TOTAL				$ -
2.00	**TAILINGS PIPELINE**				
2.01	Move tailings pipeline to Stage 5 Crest	sum	1		$ -
	ITEM 2.0 TOTAL				$ -
	STAGE 5 TOTAL				$ -

Appendix C

Earthworks Specification

Meeka Metals Limited

Tailings Storage Facility 3 Scope of Works

Soil & Rock Engineering Pty Ltd (SRE)

ABN 98 675 219 020

ANDY WELL PROJECT

Tailings Storage Facility 3 – Earthworks Specification

Ref: **Earthworks Specification Rev 0 202406**

Date: **14 June, 2024**

Prepared by: **SRE P/L**
PO BOX 777
COWARAMUP WA 6284

Prepared for: **MEEKA METALS LIMITED**
Level 2, 46 Ventnor Street
WEST PERTH WA 6005

Soil & Rock Engineering Pty Ltd (SRE)

Disclaimer

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Document Control

Date	Revision	Purpose	Author
27/05/2024	A	Internal Review	[redacted]
12/06/2024	B	Issued for Client Review	
14/6/2024	0	Issued for Use	

Abbreviations and Terminology

The following abbreviations have been used in this document

AWP	Andy Well Project
AS	Australian Standard
CMW	CMW Geosciences Pty Ltd
DEMIRS	Department of Energy, Mines, Industry, Regulation and Safety (from 1 July 2017), previously referred to as Department of Mines and Petroleum (DMP)
DEMIRSWA	Department of Energy, Mines, Industry, Regulation and Safety Western Australia, previously referred to as DMPWA
DWER	Department of Water and Environmental Regulation (from 1 July 2017), previously referred to as Department of Environment Regulation (DoER)
ha	hectare
H:V	Horizontal : Vertical
MB	Monitoring Bore
m^3/d	cubic metres per day
Mm^3	Million cubic metres
ML	Mine Lease
NATA	National Association of Testing Authorities
OMC	Optimum Moisture Content
PSD	Particle Size Distribution
P_{80}	80% passing, and refers to a particular particle size as stated, i.e. a P_{80} of 75 microns means 80% of the total weight of materials is finer than 75 microns
QA/QC	Quality Assurance and Quality Control
RL	Reduced Level relative to a fixed datum
SMDD	Standard Maximum Dry Density
SP	Standpipe Piezometers
TSF3	Tailings Storage Facility 3
t/m^3	tonnes per cubic metre
TDS	total dissolved solids
UCS	Unified Soil Classification System

TABLE OF CONTENTS

LIST OF APPENDICES (behind text)

Soil & Rock Engineering Pty Ltd (SRE)

Project: Andy Well Project

Subject: Tailings Storage Facility 3 – Earthworks Specification

1.0 GENERAL

1.1 Summary

This Specification prescribes the requirements for the embankment construction works to achieve the site-finished grades indicated on the Design Drawings for TSF3 at Meeka Metals Limited (MML) Andy Well Project (AWP). Also prescribed are the requirements for clearing and grubbing; the removal, replacement, and disposal of unsuitable materials; the disposal of surplus materials and the furnishing, placement and compaction of embankment fill material.

The Appendices referred to in this document comprise the following and are to be attached to this document by the Owner.

- Appendix A - Drawings
- Appendix B - Schedule of Materials

The Contractor must coordinate work prescribed by this Specification with other related works to be performed, such as relocation of tailings pipework.

The Specifications relevant for these works are listed below:

Client to add pipework specifications

This Specification must be read in conjunction with the latest revisions of the following Design Drawings as presented in Table 1.1.

Table 1.1 - Drawings

Drawing Title	Drawing No.
General Arrangement Plan	200
TSF3 Stage 1 Plan	201
TSF3 Stage 2 Plan	202
Embankment Sections	203
Sections and Details Sheet 1	204
Sections and Details Sheet 2	205

1.2 Terminology

The following terms are defined as stated, unless otherwise indicated:

Contractor	Appropriate individual, partnership, company or corporation contractually obligated to perform the work prescribed in this Specification and associated Specifications (Section 1.1), and becomes contractually obligated to the Owner.
Design Drawings	Detailed Design Drawings issued by the Owner to the Contractor.
Engineer	The engineer (or designated representative) appointed by the Owner who is responsible for evaluating the suitability of the materials involved in the work and for verifying the compliance of the work to the requirements of the Specifications.
Independent Testing and Inspection Firm	The company, partnership, or corporation retained to perform the inspections and tests required for determining and verifying compliance of the work with the requirements of this Specification.
Optimum Moisture Content	The moisture content at which the Maximum Modified Dry Density is achieved.
Owner	Meeka Metals Limited (MML) Andy Well Project (AWP)
Project Superintendent	The designated representative of the Contractor appointed by the Contractor who is responsible for the work by the Contractor.
Standard Maximum Dry Density	The maximum dry density achieved as per AS 1289.5.1.1 when testing a sample of material representative of that to be compacted in the field.
Work/works	The activities specified within this document are the responsibility of the Contractor.

1.3 References

The publications listed below form part of this Specification. Each publication must be the latest revision and addendum in effect on the date this Specification is issued for construction, unless noted otherwise. Except as modified by the requirements specified herein or the details of the Design Drawings, work included in this Specification must conform to the applicable provisions of these publications.

1.3.1 Applicable Codes / Standards

The works must be carried out to comply with the latest revision of the Design Drawings, Codes and Standards specified or to the appropriate Australian Standards or to other recognised International Standards approved by the Owner or the Engineer where there is no comparable Australian Standard.

The applicable Australian Standards for earthworks are as follows:

i) AS 1289 - Methods of testing soils for engineering purposes.

ii) AS 1726 - Geotechnical site investigations.

iii) AS 3798 - Guidelines on earthworks for commercial and residential developments.

1.4 Submittals

All submittals must be delivered to the Owner. The following information must be submitted by the Contractor one month prior to the start of the work:

i) A description of fill procedures/sequences.

ii) Proposed methods and construction details for any excavation where groundwater is expected to be encountered, to ensure that all excavations are kept dry during construction. Discharge/disposal of the dewatering system effluent must be coordinated with the temporary installations for storm water management and dust control. Certified design calculations are required for all groundwater dewatering systems.

iii) Templates proposed for the daily, weekly and monthly reports.

The following information must be submitted at the completion of the work:

i) As-built drawings in PDF format and DXF files from the as-built survey.

ii) All field and laboratory test results and comments, which must be compiled in date order, for permanent project records.

1.5 Site Conditions

Geotechnical investigations of the site conditions have been conducted and the test pit logs, photographs and laboratory test results from these investigations are, by this reference, made a part of these Specifications.

A copy of the latest data will be included prior to the tender site visit and/or execution of construction works. The information contained in the documents must not be construed as a guarantee of the depth, extent or character of materials, groundwater level or quality actually present.

The Contractor should be aware of existing piezometers and monitoring bores around the existing TSFs and must not damage this existing infrastructure. Any costs to repair or replace the instrumentation due to damage during construction by the Contractor, must be recovered from the Contractor.

2.0 MATERIALS

2.1 General

Satisfactory materials must be free from large lumps or clods, refuse or other material that might prevent proper compaction. All material must be approved for use by the Engineer prior to placement.

The material zones are as follows:

i) Zone 1 Embankment Fill Material – this material must be used to construct the upstream zone of the TSF3 embankment as indicated on the Design Drawings.

ii) Zone 2 Rock Fill Material – this material must comprise the oxide waste which is to be used to construct the downstream zone of the embankment. There will be some fresh rock potentially acid forming materials (PAF) which can be encapsulated within this zone.

iii) Zone 3 Rock Fill Material – this material must comprise the fresh rock which is be used to construct the decant accessway or rock ring as indicated on the Design Drawings. This material may also be used as agreed with the Engineer as the armour protection/rehabilitation layer on the downstream batter of the embankment as indicated on the Design Drawings. There will be some fresh rock potentially acid forming materials (PAF) which can be used judiciously in the construction of the decant accessway or rock ring and as agreed with the Engineer.

2.2 Zone 1 Embankment Fill Material

Zone 1 Embankment Fill Material for the TSF embankments must be sourced from the designated borrow area within TSF2 or TSF1 if insufficient satisfactory material is available within TSF2 and must meet the requirements listed in Table 2.1.

Table 2.1: Properties of Zone 1 Embankment Fill Material

Item	Test Method	Requirement
Soil Classification (USCS)	AS 1726	SM, SC,
Particle Size Distribution	AS 1289	100% passing 75 mm > 45% passing 0.075 mm
Compacted In situ Density	AS 1289	98 % SMDD
Plasticity Index	AS 1289	< 20
Liquid Limit	AS 1289	< 50

Testing frequencies are provided in Section 4.5.

2.3 Zone 2 Rock Fill

This material must predominantly comprise the oxide mine waste rock and transition rock, sourced from the designated borrow and meet the requirements listed in Table 2.2 which is to be used to construct the downstream zone of the embankment.

Table 2.2: Properties of Zone 2 Rock Fill Material

Item	Test Method	Requirement
Soil Classification (USCS)	AS 1726	GM, GC with Cobbles/Boulders
Particle Size Distribution	AS 1289	100 % passing 350 mm $\geq$ 20 % passing 0.075 mm

Testing required for Zone 2 Rock Fill Material must comprise particle size distribution tests as directed by the Engineer.

Where the oxide waste (Zone 2) is to be used in combination with topsoil as a potential a growth medium, soil nutrient determinations are to be executed by the project environmental consultants to confirm the borrow material from the designated borrow is suitable for the intended use. Zone 2 materials may be mixed with organic materials after placement, as required.

2.4 Zone 3 Rock Fill

This material must predominantly comprise the fresh mine waste rock, sourced from the designated borrow and meet the requirements listed in Table 2.3. There will be some fresh rock potentially acid forming materials (PAF) which can be used judiciously in the construction of the decant accessway or rock ring and as agreed with the Engineer.

Table 2.3: Properties of Zone 3 Rock Fill Material

Item	Test Method	Requirement
Soil Classification (USCS)	AS 1726	Gravel, Cobbles, Boulders
Particle Size Distribution	AS 1289	100 % passing 500 mm < 10 % passing 0.075 mm

No testing is required for Zone 3 Rock Fill Material.

2.5 Base Course Material

The base course materials for the TSF3 crest must be well-graded gravel, sourced from the designated borrow and meet the requirements listed in Table 2.4.

Table 2.4: Physical Properties of Base Course Material

Item	Test Method	Requirement
Soil Classification (USCS)	AS1726	GW
Particle Size Distribution	AS1289	100% passing 50 mm 50% or more retained on 4.75 mm <25% fines (0.075 mm)

No testing is required for the Base Course Material.

2.6 Unsuitable Material

Materials that do not meet the requirements listed in the tables above and soil having insufficient strength or stability to carry the loads that will be superimposed on the completed fill or embankment, without excessive settlement or loss of stability, must not be used in the constructed works.

Material containing vegetable matter, muck refuse, large rocks, debris or other materials that could cause the embankment fill not to compact and organic soils with a USCS of Pt, OH, or OL, are considered to be unsuitable material and must not be used in the embankment structural zones.

The Engineer must, in consultation with the project environmental consultants, determine where and how these unsuitable materials are to be placed/stored for future use in rehabilitation works.

3.0 EXECUTION

3.1 Examination

Before starting work, the Contractor must thoroughly examine the site to ascertain conditions under which the work must be performed and the nature of the materials to be used in the construction. The Contractor must obtain all necessary site-specific permits prior to commencing work on site.

3.2 Site Preparation

3.2.1 Construction Layout

The earthworks must be set out in accordance with the Design Drawings. The Contractor must examine the site and verify all existing levels and survey control points and the set-out points shown on the Design Drawings, before commencing the earthworks. The Contractor must be responsible for checking and agreeing the correctness of all values of monuments, datum or benchmarks, prior to the commencement of work. The Engineer may find it necessary to revise the lines, levels and grades of any part of the works during progress, because of conditions revealed during construction. The Contractor must confirm that there are no existing services in the area. If any services are noted, the Contractor must bring them to the notice of the Owner.

3.2.2 Clearing and Grubbing

The Contractor must remove trees, stumps, roots, rubbish and any debris or vegetation resting on or protruding through the ground surface, from the designated areas as shown on the Design Drawings. Trees, stumps, roots and other vegetation must be removed to the bottom of their root zone. The cut materials from the clearing works may, with the permission of the Engineer, be placed on the outer, downstream batter slope of the TSF.

3.2.3 Topsoil Stripping

The Contractor must remove soil only to such depth that the soil meets the definition of topsoil. The Contractor must avoid mixing topsoil with subsoil or other undesirable materials. The Contractor must place the removed topsoil in stockpiles to a maximum height of two metres.

3.2.4 Stockpiling

The Contractor must deposit material resulting from the clearing and grubbing operations in the disposal areas. The Contractor must cover with soil or burn if permitted by applicable regulations.

3.2.5 Haul Roads and Access

The Contractor must clear all vegetation, standing and fallen, from the agreed routes of all haul roads. The Contractor must push this vegetation into heaps.

The Contractor must form up and lay the base course as necessary and do all things necessary to form and maintain the haul roads linking the mine waste dumps / borrow areas to the site and other haul roads necessary for the works. The Contractor must keep all haul roads sprayed and wetted to totally prevent the generation of airborne dust during the course of road construction and usage.

3.2.6 Construction TSF3

During the initial construction works the Contractor must execute the following works as directed by the Engineer:

i) Remove any existing pipework on or within the TSF3 footprint plus a margin of 25 m from the final downstream toe.

ii) Remove the topsoil stockpiles within the footprint of TSF3.

iii) Place a compacted clay cover over the previous landfill.

iv) Prepare the outer southern surface of TSF2 to receive the Zone 1 Materials for TSF3.

v) Construct a new decant accessway and rock-ring decant facility using the scats and other materials which comply with the requirements of Zone 3. There will be some fresh rock potentially acid-forming materials (PAF) which can be used judiciously in the construction of the decant accessway or rock ring and as agreed with the Engineer.

3.2.7 Foundation Preparation

The Contractor must remove unsuitable material as directed by the Engineer. All areas to receive fill must be left in a clean and suitable condition to allow an uninterrupted placement of fill. No fill is to be placed until the base of all excavations has been inspected and approved by the Engineer.

All areas to receive pipework must be graded smooth and be free of any rock, cobbles and other deleterious materials that could damage the pipework.

3.3 Fill and Compaction

3.3.1 General

The Contractor must utilise satisfactory materials resulting from excavation and removal of unsuitable materials, to the fullest extent in the construction.

3.3.2 Surface Preparation

Prior to placing the first layer of fill materials, the Contractor must immediately, scarify the surface of areas on which fill is to be placed to a depth of no less than 150 mm and then proof-compact to not less than 95% of the SMDD.

3.3.3 Placement and Compaction of Zone 1 Embankment Fill Material

The Contractor must construct the TSF perimeter containment embankments using suitable material in accordance with Section 2.2, sourced from within the designated borrow areas approved by the Engineer.

Prior to the compaction, all fill material must be *'moisture conditioned'* (as appropriate), to achieve a moisture content within ±2% of the OMC, as determined by AS 1289.

The moisture must be uniformly distributed throughout the fill and there must be no clods of soil.

Approved water (TSF supernatant water or similar) must be used for moisture control during compaction.

The construction methodology for Zone 1 Embankment Fill Material placement must be as follows:

i) Spread a loose lift of moisture-cured embankment fill material with a loose thickness not exceeding 300 mm.

ii) Apply water with one pass of the water truck.

iii) Grade and mix the fill materials to ensure the moisture is uniformly distributed and trim with a grader.

iv) Compact the material with 6 to 10 passes using either a sheepsfoot roller (Caterpillar 825 or Dynapac CA301PD Vibratory Roller or approved equivalent) or a minimum 10-tonne vibratory padfoot drum roller to 98% of the maximum SMDD, at a moisture content within ±2% of OMC, as determined by AS 1289.

v) Test the material for compaction (refer to Section 4.0 for testing requirements).

vi) After successful compaction testing, add another lift and repeat steps i) to v).

vii) Placement must be continuous. If the material dries out due to inactivity at the site, it should be lightly watered and compacted prior to fill placement recommencing.

viii) The Contractor must verify the above construction methodology prior to execution.

Where the required finished grade has a slope steeper than 1 vertical to 8 horizontal, overbuild the slope by not less than 600 mm (measured horizontally) and trim back to finished grade after compaction.

Where the existing ground surface on which the fill or embankment is to be constructed has a slope steeper than 1 vertical to 4 horizontal, bench the existing slope so that each lift can be placed and compacted horizontally. Benching must be of sufficient width to permit the safe and effective operation of the placing and compacting equipment. Begin each horizontal cut at the intersection of the original ground surface and the vertical sides of the previous cut. Place and compact material cut out for benching in conjunction with the compaction of the fill material. Compaction by water jetting or flooding is not permitted.

3.3.4 Placement of Zone 2 Rock Fill

The Contractor must construct the required parts of the TSF embankments designated as to be constructed of Zone 2 Rock Fill, using suitable material in accordance with Section 2.3, sourced from the designated borrow and designated areas approved by the Engineer.

The construction methodology for Zone 2 Rock Fill placement must be as follows, where this material is placed on existing ground to form part of the TSF embankment:

i) Spread a loose lift of Zone 2 Rock Fill with a maximum thickness not exceeding 500 mm.

ii) The Zone 2 Rock Fill must be compacted using vibrating rollers of not less than 11 tonnes front module mass, in layers of loose lift thickness not exceeding 500 mm. Where the front module mass is less than 11 tonnes, the loose lift thickness of the Rock Fill must be reduced.

iii) The Zone 2 Rock Fill must be watered to lubricate the particles prior to compaction, to facilitate mechanical interlock during compaction with the vibrating roller.

iv) Compaction must comprise not less than 4 passes in vibrating mode and 2 passes in static mode.

3.3.5 Placement of Zone 3 Rock Fill Material

The Contractor must construct the parts of the TSF embankments, decant causeway, rock ring decant and rock armour, designated to be constructed of Zone 3 Rock Fill Material, using suitable material in accordance with Section 2.4, sourced from the designated borrow and designated areas approved by the Engineer. The construction methodology for Zone 3 fill placement must be as follows, where this material is placed on existing ground to form part of the TSF embankment:

i) Spread a loose lift of Rock Fill Material with a maximum thickness not exceeding 500 mm.

ii) Where Zone 3 Rock Fill Material is placed on the structural zone of the perimeter embankment or core of the decant access it must be compacted using smooth drum vibrating rollers of not less than 11 tonnes front module mass, in layers of loose lift thickness not exceeding 500 mm. Where the front module mass is less than 11 tonnes, the loose lift thickness of the Rock Fill must be reduced.

iii) The Rock Fill placed as part of the embankment construction must be watered to lubricate the particles prior to compaction to facilitate mechanical interlock during compaction with the vibrating roller.

iv) Compaction for embankment construction must comprise not less than 4 passes in vibrating mode and 2 passes in static mode.

The construction methodology for Zone 3 fill placement for the decant rock ring must be as follows:

i) Spread a loose lift of Zone 3 Rock Fill Material with a maximum thickness not exceeding 750 mm.

ii) Traffic compaction to spread and provide access. No vibratory compaction is required.

The construction methodology for Zone 3 fill placement must be as follows, where the Rock Fill Material is to be placed on the downstream slope to form the outer protection rehabilitation layer:

i) Spread a loose lift of Zone 3 Rock Fill Material with a maximum thickness normal to the embankment face not exceeding 500 mm.

ii) The rock fill material must be ripped where required, to facilitate mixing of topsoil materials prior to placement of seeds and fertilisers as required.

3.3.6 Placement of Base Course

The Contractor must place the base course material on the crest of the TSF using suitable material in accordance with Section 2.5. The construction methodology for fill placement must be as follows:

i) Spread the base course material with a thickness of 75 mm.

ii) Grade and trim with a grader.

iii) Compact the material to 98% of the SMDD, as determined by AS 1289.

iv) Shape the material to a smooth and even surface, free of voids and to the required lines and grades on the Design Drawings.

The Contractor must verify the above construction methodology prior to execution.

3.4 Surface and Drainage

The Contractor must conduct fill operations in such a manner and sequence that proper drainage is maintained at all times in and around the work area. Promptly remove surface waters that become impounded. Remove and replace with satisfactory fill materials, or stabilise (by drying or approved mechanical or chemical amendment methods) materials that become loosened due to exposure to the elements.

3.5 Maintenance

The Contractor must maintain the final surfaces in a well-drained, dewatered and sufficiently moist condition to prevent shrinkage cracking and minimise dusting. The compacted surface must be smooth and generally free from roller marks, ruts, holes, depressions or protrusions.

3.6 Finishing Tolerances

The Contractor must fine-grade the surfaces and perform all work to a vertical tolerance of ±50 mm from the elevations shown on the Design Drawings. All lines and dimensions must be constructed to within a horizontal tolerance of ±1% and with a maximum tolerance of 100 mm from the dimensions and lines on the Design Drawings. The average slope of batters must not exceed the specified slope.

3.7 Material Suitability

Prior to the placement of embankment fill or rock fill materials, field and laboratory testing must be performed by the independent testing and inspection firm to assess the suitability of the materials for construction. Materials must meet the requirements outlined in Section 2.0 of this Specification.

Compaction criteria for the construction of the TSF embankments must be established by performing compaction testing on representative samples in accordance with AS 1289.1.1 as appropriate to the materials.

3.8 Compaction Testing

Field density testing must be performed by the independent testing and inspection firm on the compacted embankment material to ensure that the compaction criteria meets the requirements of this Specification. The preferred field density testing method is the Nuclear Density test method in accordance with AS 1289.5.8.1. The calibration curves must be checked and adjusted using either the sand cone method as described in AS 1289.5.3.1, or by an approved method by the Engineer.

The calibration checks of both the density and moisture of each gauge must be made at the beginning of the project, on each different type of material encountered and at intervals as directed by the Engineer. The number of tests must be increased if visual inspection indicates non-uniform moisture content or variable compaction effort considered inadequate to achieve the specified dry density.

The Contractor must provide the survey data for the locations and RLs of the test sites.

4.0 TESTING AND INSPECTION

4.1 Testing Firm/Facilities

An independent testing and inspection firm will be retained by the Owner to perform field and laboratory testing and soil evaluations for control of construction activities and/or to verify compliance of the work with the requirements of this Specification. The performance or lack of performance of Quality Control tests and inspections must not be construed as granting relief from the requirements of these Specifications or the other contract documents.

The independent testing and inspection firm must meet the technical criteria of NATA or ASTM for agencies involved in soil and rock inspection and testing.

Any work failing to meet the criteria of the Specification must be rectified at the Contractor's expense.

4.2 Testing Program

The testing must follow the requirements of Table 5 as a minimum.

Table 4.1: Quality Control Tests

Property	Test Method	Minimum Testing Frequency	
		Material Stockpiles	Material Compacted In Place
		Zone 1 Embankment Fill Material	
Moisture-Density	AS 1289	1:5,000 m^3	1:2,500 m^3
Soil Classification	AS 1726	1:5,000 m^3	
Plasticity	AS 1289	1:5,000 m^3	
Particle Size Distribution	AS 1289	1:5,000 m^3	
Field Density	AS 1289	1:2,500 m^3	1:500 m^3 (per layer)

4.3 Additional Inspections

The Contractor must perform a random survey of the top surface of every layer to monitor fill progress.

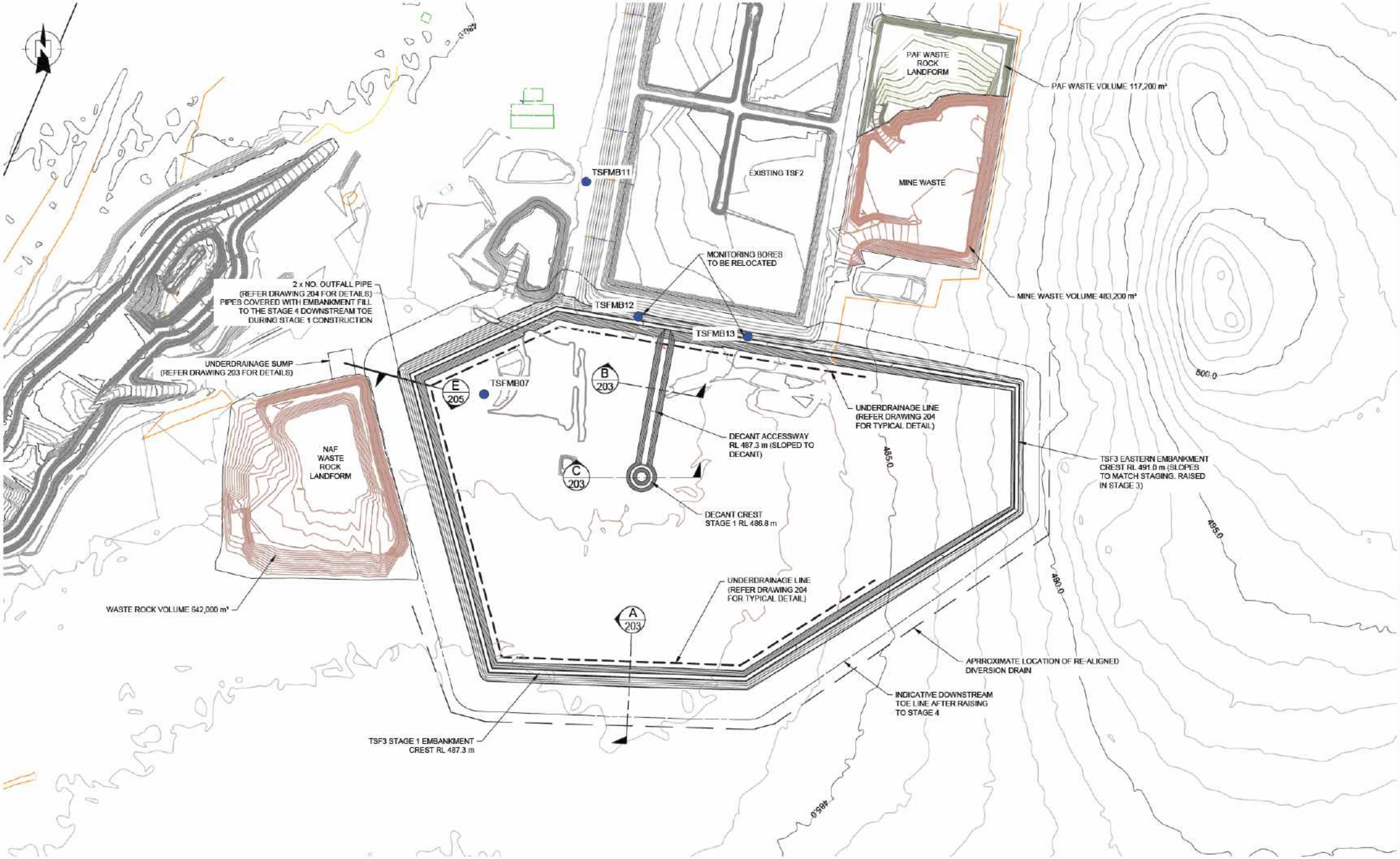
5.0 CLEAN UP

Upon completion of the work, the Contractor must leave the project site clear of debris and surplus material resulting from the construction operations.

Appendix A

Drawings

MEEKA METALS LIMITED

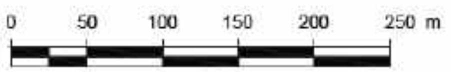


NOTES:

1. COORDINATE SYSTEM: MGA ZONE 50, GDA94

LEGEND:

● TSFMB EXISTING MONITORING BORE



Soil & Rock Engineering
ABN 98 675 219 020

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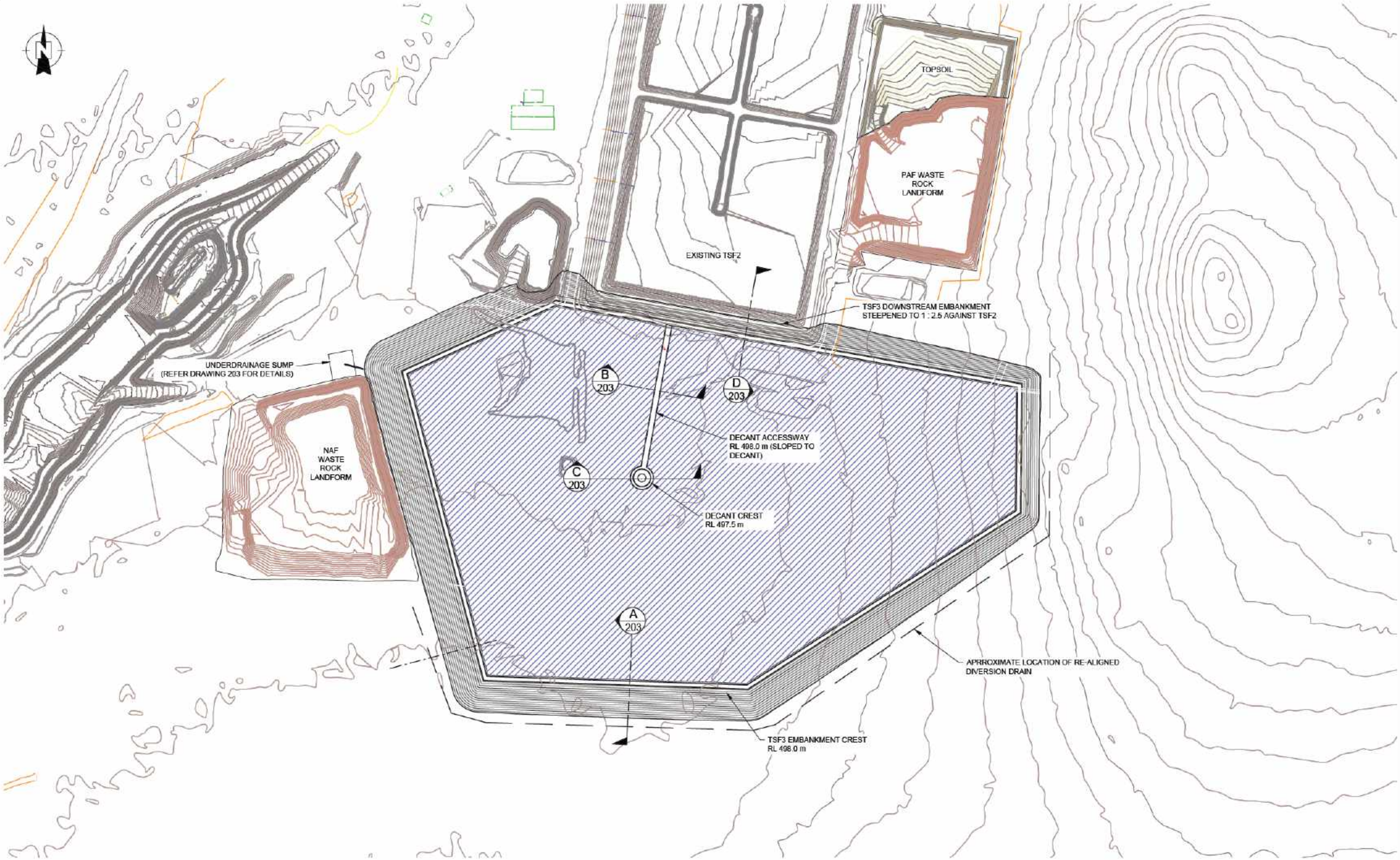
CLIENT: DORAY MINERALS LIMITED	DRAWN: DE	PROJECT: PER2017-0152
PROJECT: ANDY WELL GOLD MINE TSF3	CHECKED: CL	DRAWING: 201
	REVISION: B	SCALE: 1:5 000
TITLE: TSF3 STAGE 1 PLAN	DATE: 20.06.24	SHEET: A3 L



NOTES:

1. COORDINATE SYSTEM: MGA ZONE 50, GDA94

0 50 100 150 200 250 m
1:5 000

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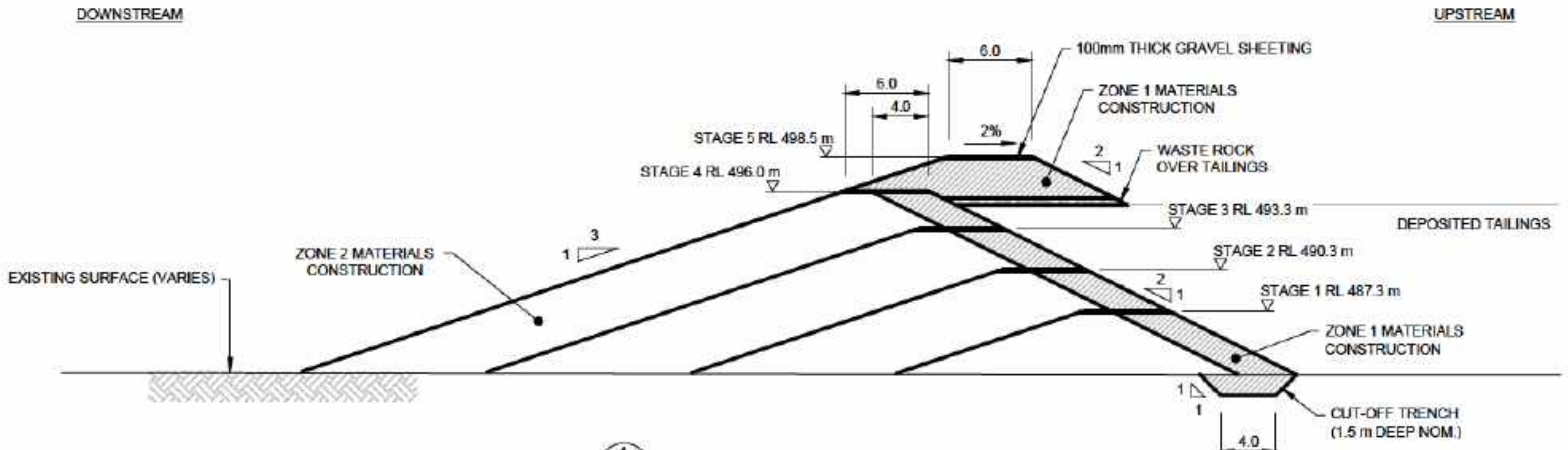
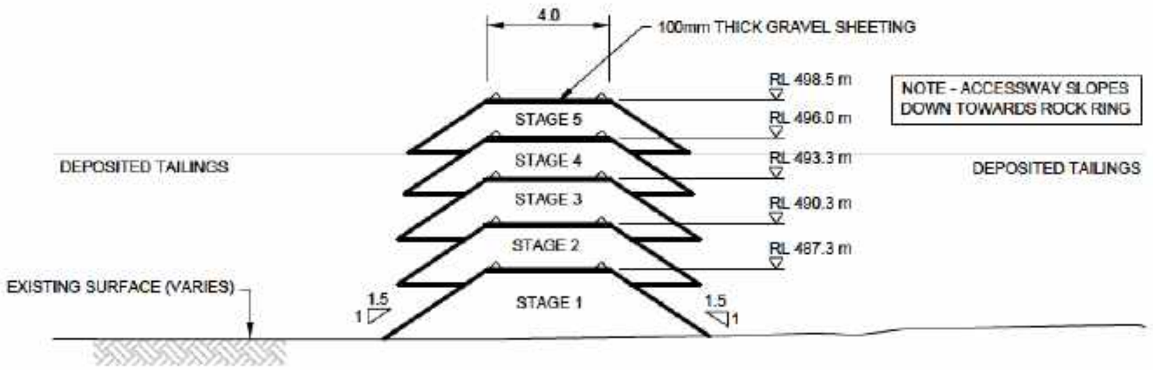
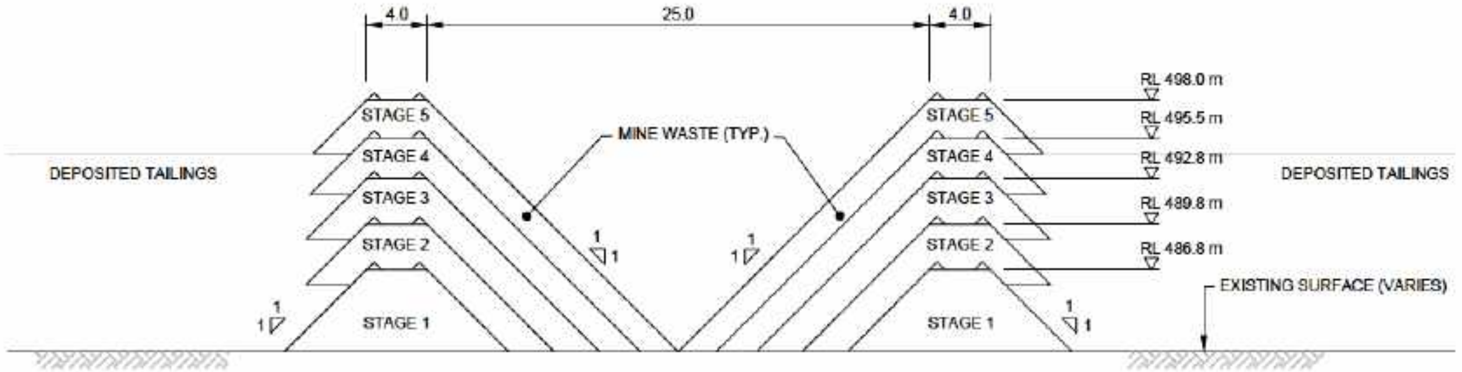
CLIENT:	DORAY MINERALS LIMITED	DRAWN:	DE	PROJECT:	PER2017-0152
PROJECT:	ANDY WELL GOLD MINE TSF3	CHECKED:	CL	DRAWING:	202
		REVISION:	B	SCALE:	1:5 000
TITLE:	TSF3 FINAL STAGE PLAN	DATE:	20.06.24	SHEET:	A3 L



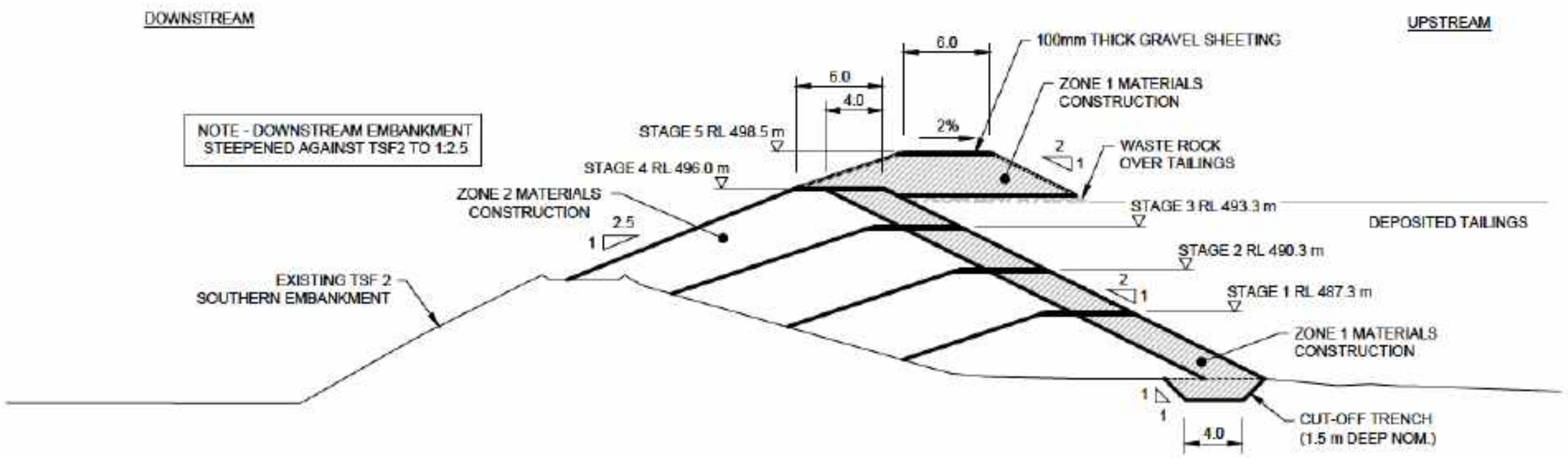
A PERIMETER EMBANKMENT - TYPICAL SECTION
201 /202 1:500



B DECANT ACCESSWAY - TYPICAL SECTION
201 /202 1:500



C DECANT ROCK RING - TYPICAL SECTION
201 /202 1:500



D PERIMETER EMBANKMENT AGAINST EXISTING TSF2 - TYPICAL SECTION
202 1:500

NOTES:

1. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

1:500 0 5 10 15 20 25 m

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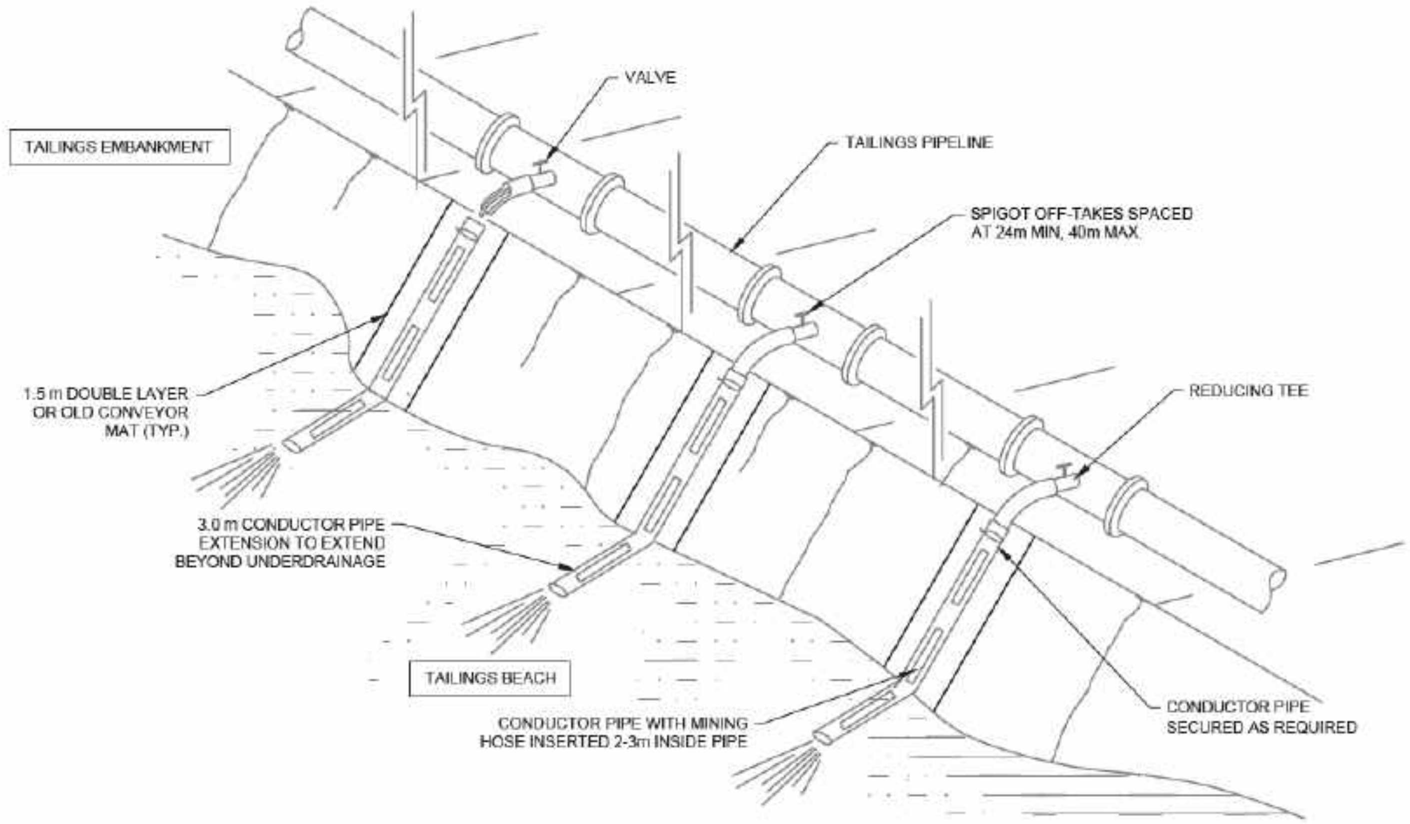
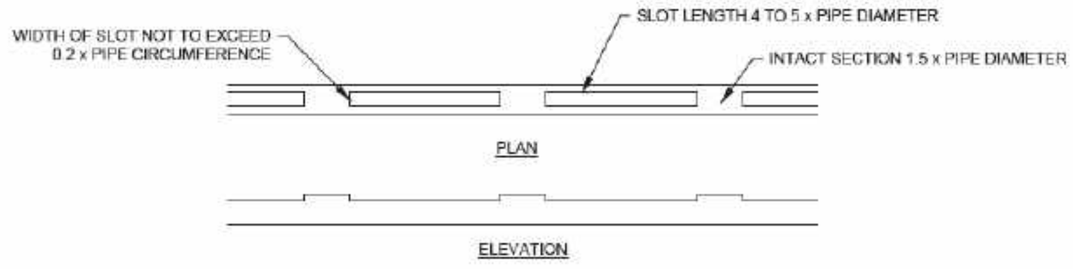
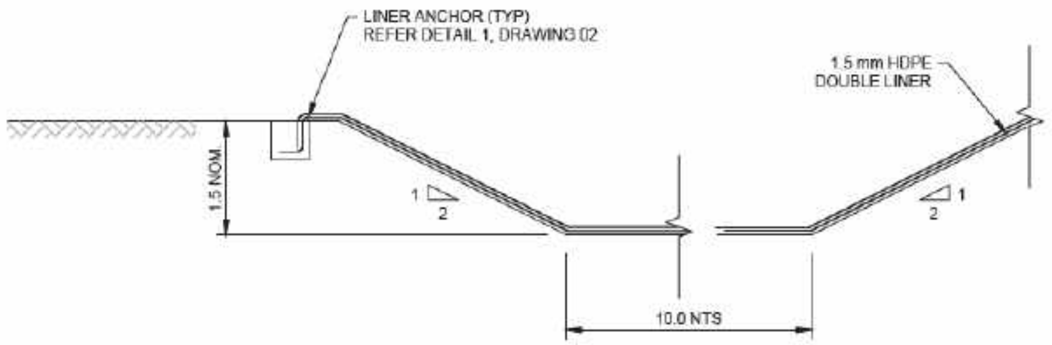
CLIENT: DORAY MINERALS LIMITED	DRAWN: DE	PROJECT: PER2017-0152
PROJECT: ANDY WELLS GOLDMINE TSF3	CHECKED: CH	DRAWING: 203
	REVISION: B	SCALE: 1:500
TITLE: TYPICAL EMBANKMENT SECTIONS	DATE: 20.06.24	SHEET: A3 L



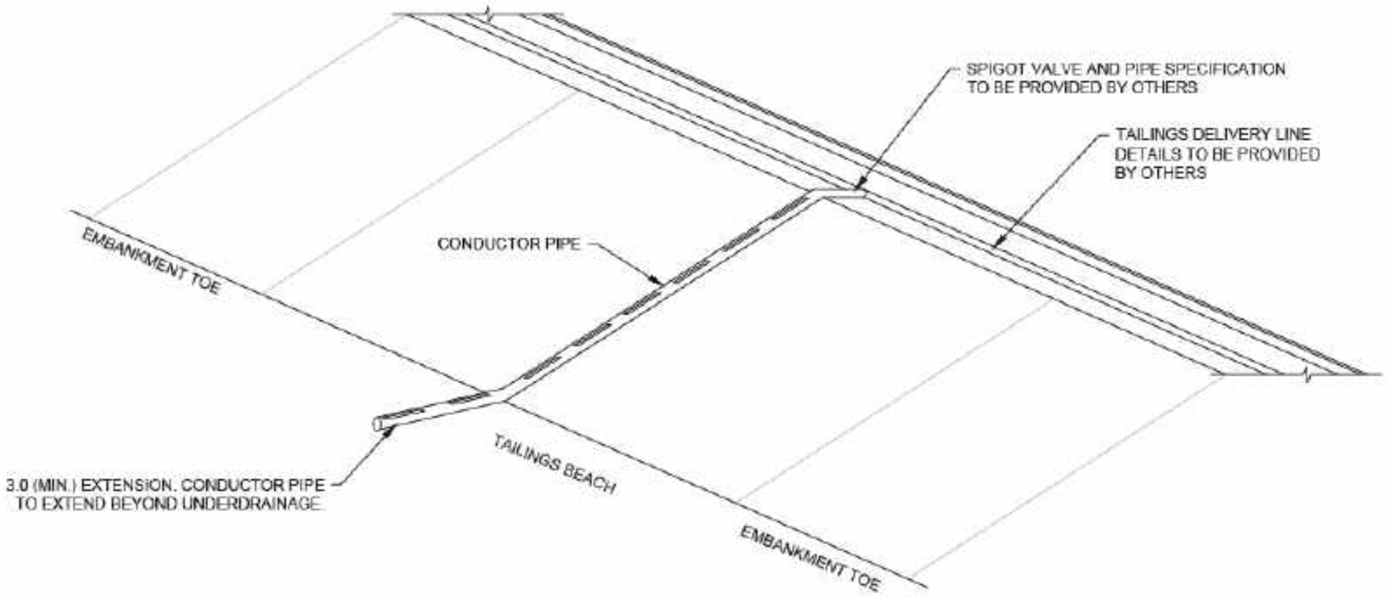
PROPOSED SPIGOT ARRANGEMENT
ISOMETRIC VIEW (NTS)



CONDUCTOR PIPE (SLOTTED PVC) - TYPICAL DETAIL
1:50



UNDERDRAINAGE SUMP - TYPICAL DETAIL
1:100



DRAINAGE / DEPOSITION EMBANKMENT
PERSPECTIVE VIEW (NTS)

NOTES:

1. ALL DIMENSIONS IN METRES UNO

1:100 — 0 1 2 3 4 5 m

1:50 — 0 0.5 1.0 1.5 2.0 2.5 m

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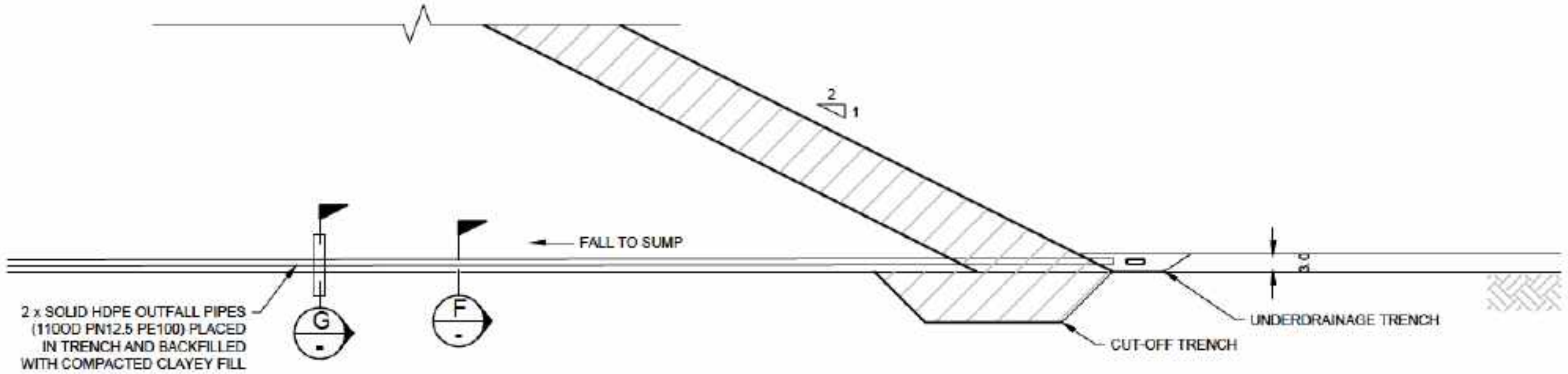
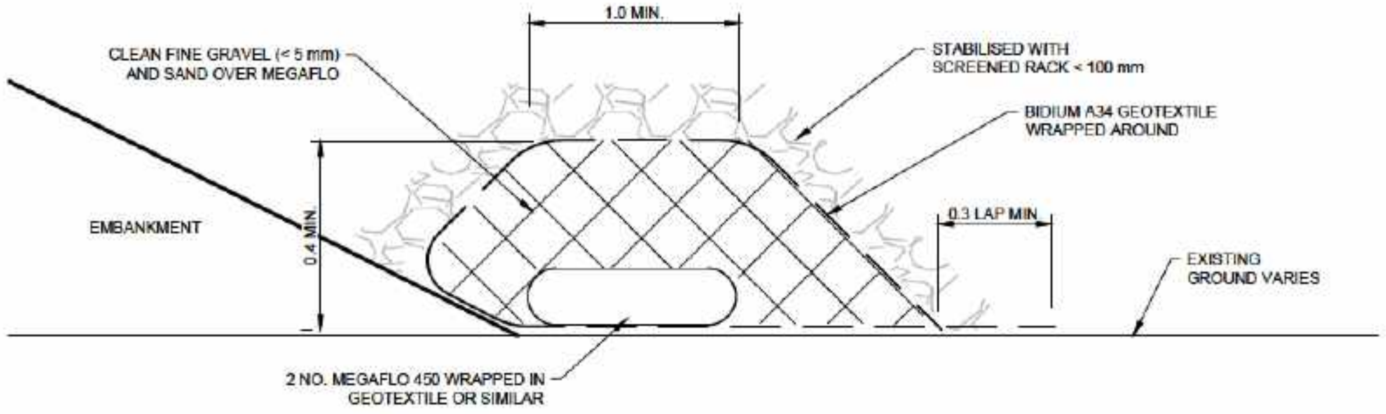
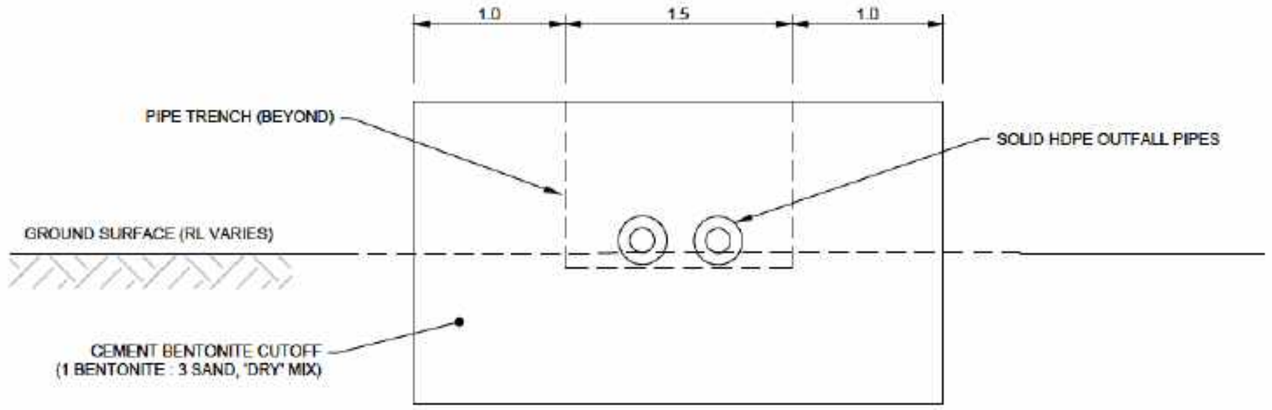
CLIENT:	DORAY MINERALS LIMITED	DRAWN:	DE	PROJECT:	PER2017-0152
PROJECT:	ANDY WELLS GOLDMINE TSF3	CHECKED:	CL	DRAWING:	204
		REVISION:	B	SCALE:	AS SHOWN
TITLE:	SECTIONS AND DETAILS - PIPEWORK AND UNDERDRAINAGE SUMP	DATE:	20.06.24	SHEET:	A3 L



E UNDERDRAINAGE OUTFALL PIPE THROUGH EMBANKMENT - TYPICAL SECTION
201 1:200

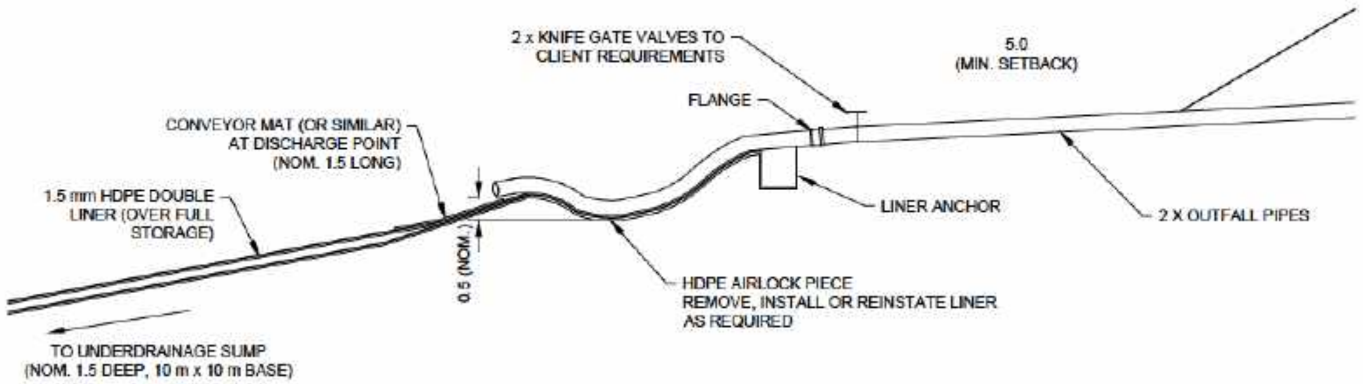


UNDERDRAINAGE - TYPICAL SECTION
NTS

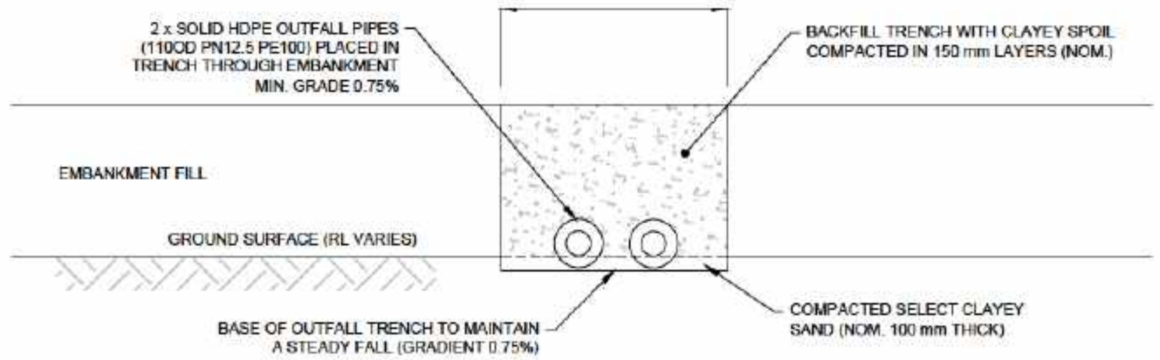


G CEMENT BENTONITE CUTOFF - TYPICAL SECTION
- 1:50

NOTE - PIPES COVERED WITH EMBANKMENT FILL TO THE STAGE 4 DOWNSTREAM TOE DURING STAGE 1 CONSTRUCTION



OUTFALL PIPEWORK OUTLET - TYPICAL SECTION
NTS



F OUTFALL PIPE TRENCH (THROUGH EMBANKMENT) - TYPICAL SECTION
- 1:50

NOTES:

1. ALL DIMENSIONS IN METRES UNO

1:50 — 0, 0.5, 1.0, 1.5, 2.0, 2.5 m
1:500 — 0, 5, 10, 15, 20, 25 m

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CLIENT: DORAY MINERALS LIMITED	DRAWN: DE	CHECKED: CL	PROJECT: PER2017-0152
PROJECT: ANDY WELLS GOLDMINE TSF3	REVISION: B		DRAWING: 205
			SCALE: AS SHOWN
TITLE: SECTIONS AND DETAILS - UNDERDRAINAGE	DATE: 20.06.24		SHEET: A3 L

Appendix B

Schedule of Materials

MEEKA METALS LIMITED

PROJECT	**: ANDY WELL TSF3**	Date	20/06/2024
		Subject	materials
CLIENT	**: MEEKA METALS LIMITED**	Revision	A
LOCATION	**: MEEKATHARRA**		
SUBJECT	**: MATERIALS SCHEDULE TSF3 - STAGE 1 TO RL 487.3 m**		

Item	Description	Unit	Quantity	Rate	Amount
1.00	**EARTHWORKS**				
1.01	Clearing tailings storage floor area Stage 1 as per Scope of Works including removal of rubbish etc as directed	m^2	370,000		$ -
1.02	Strip top soil from TSF Stage 1 as per Scope of Works and Earthworks Specification	m^2	370,000		$ -
1.03	Strip top soil from beneath underdrainage return water storage (downstream of TSF)	m^2	100		$ -
1.04	Strip top soil from beneath pipework corridors to underdrainage return water storage (downstream of TSF)	m^2	200		$ -
1.05	Excavate seepage cutoff as directed	m^3	20,250		$ -
1.06	Borrow, moisture condition, transport, place and compact fill to seepage cutoff	m^3	20,250		$ -
1.07	Borrow, transport, and place Zone 2 waste rock to perimeter embankment	m^3	143,100		$ -
1.08	Borrow, moisture condition, transport, place and compact Zone 1 fill to internal embankment	m^3	43,100		$ -
1.09	Borrow, transport, and place cushion layer to decant and accessway	m^3	1,200		$ -
1.10	Borrow, transport, and place rockfill to decant accessway	m^3	13,200		$ -
1.11	Transport and place decant rockfill	m^3	4,400		$ -
1.12	Excavate outfall pipe trench through embankment	m^3	600		$ -
1.13	Form and place cutoff to outfall pipes	m^3	600		$ -
1.14	Backfill over and around pipes through embankment	m^3	600		$ -
1.15	Place gravel sheeting to internal perimeter embankment	m^2	14,400		$ -
1.16	Excavate water diversion drain, including rock armoring	m	1,400		$ -
1.17	Excavate water diversion apron, including mortar stone pitching	item	1		$ -
1.18	Borehole Sealing	item	1		$ -
	ITEM 1.0 TOTAL				**$ -**
2.00	**UNDERDRAINAGE AND LEAK DETECTION**				
2.01	Supply and install solid 110 OD HDPE outfall pipes for underdrainage from TSF to underdrainage return water storage (downstream of TSF)	m	200		$ -
2.02	Supply gotextile and megaflo and construct upstream toe drain as per the design (Drawings 202 and 203)	m	1,600		
2.03	Aggregate to underdrainage	m^3	1,600		$ -
2.04	Underdrainage protection (rock fill)	m^3	1,600		$ -
2.05	Supply and install slotted 110 OD HDPE underdrainage collection pipe (to outfall pipes)	m	3,200		$ -
	ITEM 2.0 TOTAL				**$ -**
	STAGE 1 TOTAL				**$ -**

		Date	20/06/2024
PROJECT	**: ANDY WELL TSF3**	Subject	materials
CLIENT	**: MEEKA METALS LIMITED**	Revision	A
LOCATION	**: MEEKATHARRA**		
SUBJECT	**: MATERIALS SCHEDULE TSF3 - STAGE 2 TO RL 490.3 m**		

Item	Description	Unit	Quantity	Rate	Amount
1.00	**EARTHWORKS**				
1.01	Strip soil from TSF Stage 1	m^2	23,300		$ -
1.02	Remove gravel sheeting from internal embankment	m^2	14,400		$ -
1.03	Prepare internal embankment foundation	m^2	14,400		$ -
1.04	Borrow, transport, and place waste rock over tailings	m^3	0		$ -
1.05	Borrow, transport, and place Zone 2 waste rock to perimeter embankment	m^3	152,700		$ -
1.06	Borrow, moisture condition, transport, place and compact Zone 1 fill to internal embankment	m^3	19,100		$ -
1.07	Borrow, transport, place, and traffic compact fill to decant accessway	m^3	9,400		$ -
1.08	Transport and place decant rockfill	m^3	3,400		$ -
1.09	Replace gravel sheeting to internal embankment	m^2	14,400		$ -
	ITEM 1.0 TOTAL				$ -
2.00	**TAILINGS PIPELINE**				
2.01	Move tailings pipeline to Stage 1 Crest	sum	1		$ -
	ITEM 2.0 TOTAL				$ -
	STAGE 2 TOTAL				$ -

PROJECT	**: ANDY WELL TSF3**
CLIENT	**: MEEKA METALS LIMITED**
LOCATION	**: MEEKATHARRA**
SUBJECT	**: MATERIALS SCHEDULE TSF3 - STAGE 3 TO RL 493.3 m**

Date	20/06/2024
Subject	materials
Revision	A

Item	Description	Unit	Quantity	Rate	Amount
1.00	**EARTHWORKS**				
1.01	Strip soil from TSF Stage 2	m^2	32,400		$ -
1.02	Remove gravel sheeting from internal embankment	m^2	14,400		$ -
1.03	Prepare internal embankment foundation	m^2	14,400		$ -
1.04	Borrow, transport, and place waste rock over tailings	m^3	0		$ -
1.05	Borrow, transport, and place Zone 2 waste rock to perimeter embankment	m^3	265,400		$ -
1.06	Borrow, moisture condition, transport, place and compact Zone 1 fill to internal embankment	m^3	26,600		$ -
1.07	Borrow, transport, place, and traffic compact fill to decant accessway	m^3	9,600		$ -
1.08	Transport and place decant rockfill	m^3	4,250		$ -
1.09	Replace gravel sheeting to internal embankment	m^2	14,500		$ -
2.00	**TAILINGS PIPELINE**				
2.01	Move tailings pipeline to Stage 4 Crest	sum	1		$ -
	ITEM 2.0 TOTAL				$ -
	STAGE 3 TOTAL				$ -

PROJECT	**: ANDY WELL TSF3**
CLIENT	**: MEEKA METALS LIMITED**
LOCATION	**: MEEKATHARRA**
SUBJECT	**: MATERIALS SCHEDULE TSF3 - STAGE 4 TO RL 496.0 m**

Date	20/06/2024
Subject	materials
Revision	A

Item	Description	Unit	Quantity	Rate	Amount
1.00	**EARTHWORKS**				
1.01	Strip soil from TSF Stage 3	m^2	37,900		$ -
1.02	Remove gravel sheeting from internal embankment	m^2	14,500		$ -
1.03	Prepare internal embankment foundation	m^2	14,500		$ -
1.04	Borrow, transport, and place waste rock over tailings	m^3	0		$ -
1.05	Borrow, transport, and place Zone 2 waste rock to perimeter embankment	m^3	354,700		$ -
1.06	Borrow, moisture condition, transport, place and compact Zone 1 fill to internal embankment	m^3	25,300		$ -
1.07	Borrow, transport, place, and traffic compact fill to decant accessway	m^3	8,000		$ -
1.08	Transport and place decant rockfill	m^3	4,500		$ -
1.09	Replace gravel sheeting to internal embankment	m^2	14,600		$ -
2.00	**TAILINGS PIPELINE**				
2.01	Move tailings pipeline to Stage 4 Crest	sum	1		$ -
	ITEM 2.0 TOTAL				$ -
	STAGE 4 TOTAL				$ -

PROJECT	**: ANDY WELL TSF3**			Date	20/06/2024
				Subject	costing
CLIENT	**: MEEKA METALS LIMITED**			Revision	A
LOCATION	**: MEEKATHARRA**				
SUBJECT	**: COSTING OF TSF3 - STAGE 5 TO RL 498.5 m**				

Item	Description	Unit	Quantity	Rate	Amount
1.00	**EARTHWORKS**				
1.01	Strip soil from TSF Stage 4	m^2	0		$ -
1.02	Remove gravel sheeting from internal embankment	m^2	14,600		$ -
1.03	Prepare internal embankment foundation	m^2	14,600		$ -
1.04	Borrow, transport, and place waste rock over tailings	m^3	15,000		$ -
1.05	Borrow, moisture condition, transport, place and compact Zone 1 fill to internal embankment	m^3	88,800		$ -
1.06	Borrow, transport, place, and traffic compact fill to decant accessway	m^3	7,400		$ -
1.07	Transport and place decant rockfill	m^3	4,600		$ -
1.08	Replace gravel sheeting to internal embankment	m^2	14,400		$ -
	ITEM 1.0 TOTAL				$ -
2.00	**TAILINGS PIPELINE**				
2.01	Move tailings pipeline to Stage 5 Crest	sum	1		$ -
	ITEM 2.0 TOTAL				$ -
	STAGE 5 TOTAL				$ -

Appendix 5

Water Balance

ANDY WELL PROJECT

Tailings Storage Facility 3 Design Report

PROJECT	: ANDY WELL PROJECT
CLIENT	: MEEKA METALS LIMITED
LOCATION	: MEEKATHARRA
SUBJECT	: PRELIMINARY WATER BALANCE - 0.65 Mtpa (average mean month rainfall) TSF3

Date	8-Jun-24
Job No	Andy Well Project
File	SPTSF Water Balance.xls
Subject	TSF Water Balance 0.65 Mtpa
Revision	0

INFLOWS			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
			31	28.25	31	30	31	30	31	31	30	31	30	31	
RAINFALL															
Rainfall (mm) (007045 Meekatharra Airport records from 1944 to 2023)			29.2	36.1	29.6	18.5	21.9	28.8	20.3	10.6	5	6	11.7	14.4	232.1
Average Daily Rainfall (mm)			0.94	1.24	0.95	0.62	0.71	0.96	0.65	0.34	0.17	0.19	0.39	0.46	
TSF Catchment Area (m^2)		**289,200**	289,200	289,200	289,200	289,200	289,200	289,200	289,200	289,200	289,200	289,200	289,200	289,200	
Runoff Coefficient Tailings			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Catchment Area above the tailngs beaches (m^2)		**0**	0	0	0	0	0	0	0	0	0	0	0	0	
Runoff Coefficient from catchment area		**1**	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Tailings Pool Area (m^2) estimated from pond radius 25 m maximum		**2000**	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	
Tailings Running Beaches (m^2) number of active spigots x spacing x length to pond		**20,000**	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	
Rainfall Inflow Total Volume (m^3/day)			272	360	276	178	204	278	189	99	48	56	113	134	66,853
% of total inflow			11%	13%	11%	7%	9%	11%	8%	4%	2%	3%	5%	6%	8%
SLURRY WATER			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Total tonnes per month based on 0.9 Mtpa		**650,000**	54,167	54,167	54,167	54,167	54,167	54,167	54,167	54,167	54,167	54,167	54,167	54,167	650,000
% Solids		**45%**	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45.0%
Tailings Output Solids (tpd)			1,747	1,917	1,747	1,806	1,747	1,806	1,747	1,747	1,806	1,747	1,806	1,747	
Volume of Water (m3/day)			2,136	2,343	2,136	2,207	2,136	2,207	2,136	2,136	2,207	2,136	2,207	2,136	794,444
OTHER WATER INFLOWS															
Dewatering (m3/month)			0	0	0	0	0	0	0	0	0	0	0	0	
Dewatering (m3/month)			0	0	0	0	0	0	0	0	0	0	0	0	
Dewatering (m3/month)			0	0	0	0	0	0	0	0	0	0	0	0	
Other Water Inflow Total (m3/day)			0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL INFLOW (m3/day)			**2,408**	**2,703**	**2,412**	**2,385**	**2,340**	**2,484**	**2,325**	**2,234**	**2,255**	**2,192**	**2,320**	**2,270**	
TOTAL INFLOW (m3/month)			**74,648**	**76,374**	**74,764**	**71,554**	**72,537**	**74,533**	**72,074**	**69,269**	**67,650**	**67,939**	**69,587**	**70,368**	**861,298**

OUTFLOW-LOSSES FROM TAILINGS DAM			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
EVAPORATION (from pond and beaches)															
Monthly Evaporation (007045 Meekatharra Airport records from 1967 to 2017)			490	395	363	246	167	114	121	167	240	341	399	462	3,505
Pan Factor			0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
Adjusted Monthly Dam Evaporation Rate (mm)			367	296	272	185	126	86	91	126	180	256	299	346	
Adjusted Average Daily Evaporation Rate (mm)			12	10	9	6	4	3	3	4	6	8	10	11	
Tailings Pool Area and Running Beaches (m^2)			22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	
Total Evaporation Outflow (m^3/day)			261	231	193	135	89	63	64	89	132	182	219	246	57,831
EVAPO-TRANSPIRATION (from drying tailings)															
Evaporation Rate (mm)			490	395	363	246	167	114	121	167	240	341	399	462	
Evapo-transpiration rate (Pan/6) from recent deposition beach areas which are drying			82	66	60	41	28	19	20	28	40	57	67	77	
Average Daily Evapo-transpiration Rate (mm)			3	2	2	1	1	1	1	1	1	2	2	2	
Area Transpiring (m^2) say previous deposition areas (with 3 maximum)			4,898	3,948	3,627	2,460	1,674	1,140	1,209	1,674	2,400	3,410	3,990	4,619	
Daily transpiration Loss (m^3/day)			13	9	7	3	2	1	1	2	3	6	9	11	2,030
SEEPAGE (collected in the underdrainage)															
Downstream Embankment (m^3/day)			0	0	0	0	0	0	0	0	0	0	0	0	
Upstream Embankment (m^3/day)			0	0	0	0	0	0	0	0	0	0	0	0	
Tailings Stack and Dam Floor (m/day). 1.0 x 10^{-9}m/sec/m^2 (assumed value)		**1.00E-09**	0	0	0	0	0	0	0	0	0	0	0	0	
Total Seepage Outflow (m^3/day) collected by the underdraiange and recorded as "no loss"			0	0	0	0	0	0	0	0	0	0	0	0	
RETENTION															
Tailings Output (tpd)			1,747	1,917	1,747	1,806	1,747	1,806	1,747	1,747	1,806	1,747	1,806	1,747	
Calculated Average Insitu Dry Density of Tailings (t/m^3) and moisture content	1.55	31.0%													
Volume Retained in Tailings (m^3/day)			662	726	662	684	662	684	662	662	684	662	684	662	246,278
WATER RETURNED TO THE PROCESS PLANT															
Volume recycled to the process plant (m^3/day)		62.18	1,492	1,638	1,492	1,542	1,492	1,542	1,492	1,492	1,542	1,492	1,542	1,492	555,158
Volume recycled to the process plant (as a percentage of slurry volume discharge to TSF)			70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	
Make-up water requirements			**643**	**706**	**643**	**665**	**643**	**665**	**643**	**643**	**665**	**643**	**665**	**643**	
TOTAL OUTFLOWS TSF (m^3/day)			2,428	2,604	2,355	2,365	2,245	2,290	2,220	2,245	2,361	2,342	2,455	2,412	861,296
BALANCE INFLOW-OUTFLOW/LOSSES (m3/day)			-20	100	57	20	95	195	105	-11	-106	-151	-135	-142	1
MONTHLY SUMMARY OF WATER BALANCE			**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	
Total water shortfall (-) or excess (+) of requirements (m^3/month) after water return			-620	2,814	1,774	608	2,942	5,844	3,269	-326	-3,193	-4,668	-4,048	-4,395	1
Total water shortfall (-) or excess (+) of requirements (m^3/year) and (% of total) =			**1**	**0.0%**											

Appendix 6

Operations Manual

ANDY WELL PROJECT

Tailings Storage Facility 3 Design Report

Soil & Rock Engineering Pty Ltd (SRE)

ABN 98 675 219 020

ANDY WELL PROJECT

Tailings Storage Facilities

Operations Manual : Process Plant Management

Ref: **Operations Manual Process Plant Management TSF3 and SPTSF Rev 1**

Date: **20 June, 2024**

Prepared by: **SRE P/L**
PO BOX 777
COWARAMUP WA 6284

Prepared for: **Meeka Metals Limited**
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WEST PERTH WA 6005

Soil & Rock Engineering Pty Ltd (SRE)

Disclaimer

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Document Control

Date	Revision	Purpose	Author
10/05/2024	A	Internal Review	[redacted]
10/06/2024	B	Issued for Client Review	
14/06/2024	0	Issued for Use	
20/06/2024	1	Issued for Use	

Terminology and Abbreviations

The following terminology and abbreviations have been used in this document:

AEP	Annual Exceedance Probability
ANCOLD	Australian National Committee on Large Dams
ARI	Average Recurrence Intervals
AS	Australian Standard
BOM	Bureau of Meteorology
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety (from 1 July 2017), previously referred to as Department of Mines and Petroleum (DMP)
DEMIRSWA	Department of Energy, Mines, Industry, Regulation and Safety Western Australia, previously referred to as DMPWA
DWER	Department of Water and Environmental Regulation (from 1 July 2017), previously referred to as Department of Environment Regulation (DoER)
DXF	Drawing eXchange Format
FoS	Factor of Safety
IFD	Intensity Frequency Duration
LOM	Life of Mine
m/a	metres per annum
m^3/d	Cubic meters per day
Mm^3	Million cubic meters
Mt	Million tonnes
Mtpa	Million tons per annum
NAF	Non-Acid Forming
OD	Outside Diameter
oh/a	Operating hours per annum, assumed as 8,059
OHS	Occupational Health and Safety
OM	Operating Manual
OMPPM	Operating Manual Process Plant Management
OMPPS	Operating Manual Process Plant Staff
P_{80}	80% passing, and refers to a particular particle size as stated (i.e. a P_{80} of 105 microns means 80% of the total weight of materials is finer than 105 microns)
pa	Per annum
PPE	Personal Protective Equipment
RL	Relative Level
SG	Specific Gravity
SPD	Soil Particle Density
SPTSF	Suzie Pit Tailings Storage Facility
SWL	Standing Water Level
t/m^3	Tonnes per cubic metre
TMMP	Tailings Management Master Plan

Tpa	Tonnes per annum
tpd	Tonnes per day
TSF	Tailings Storage Facility
TSF3	Tailings Storage Facility 3
TSM	Tailings Storage Management

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Project: **Andy Well Project**

Subject: **Operations Manual : Process Plant Management**

1 GENERAL

1.1 Summary

This document presents the details of the operating procedures for the Suzie Pit Tailings Storage Facility (SPTSF) and Tailings Storage Facility 3 (TSF3) at the Andy Well Project (AWP) owned by Meeka Metals Limited (MML).

The Operating Manuals for the TSFs at AWP, comprise this document and separate documents for the plant staff operating the Suzie Pit Tailings Storage Facility (SPTSF) and Tailings Storage Facility 3 (TSF3). These Operating Manuals (OMs) describe the operating procedures recommended for the safe management and control of the TSF. The provisions of the Operating Manuals must be strictly adhered to by the Owner and the storages must be constructed and operated strictly in accordance with the provisions of the Operations Manuals and in accordance with the Design Reports relevant to each facility. The consultants involved in the design (Soil & Rock Engineering Pty Ltd - SREPL) shall not be liable in any respect whatsoever for any damage to or failure in the operations of the tailings and water storages resulting from failure of the Owner, its servants or agents to comply with the provisions of the relevant Design Reports and Operating Manuals for the tailings storage facilities (TSFs).

1.2 Storage Requirements and Tailings Properties

According to the data provided by MML, the tailings discharge is expected to be non-acid forming (NAF) with a slurry density of 45% solids, at a rate of 0.65 Million tonnes per annum (Mtpa) over a minimum storage life of approximately 9 years, with a minimum total 5.85 Million tonnes (Mt). The minimum design insitu dry density of the deposited tailings with good water management is expected to be not less than 1.50 t/m^3, for the SPTSF and TSF3. The tailings storage design parameters are detailed in Table 1.1.

Table 1.1 – Design Parameters

Storage and Stage	Storage Capacity (Mm^3)	Cumulative Storages Capacity (Mm^3)	Storage Capacity (Mt)	Cumulative Storage Capacity (Mt)	Expected Storage Life (years)
SPTSF	0.300	0.300	0.450	0.450	0.69
TSF3 Stage 1	0.930	1.23	1.396	1.846	2.15
TSF3 Stage 2	0.960	2.19	1.442	3.288	2.22
TSF3 Stage 3	1.022	3.212	1.533	4.821	2.36
TSF3 Stage 4	1.064	4.276	1.596	6.417	2.46
TSF3 Stage 5	0.64	4.916	1.050	7.467	1.5
TSFs Total	**4.916**		**7.467**		**11.38**

1.3 Appendices

The following documents are appended, or are to be appended when available, to this Operations Manual.

i) Appendix A – Regulatory Licence/Lease Conditions.
ii) Appendix B – Design Drawings.
iii) Appendix C – Operations Manual for Process Plant Staff.
iv) Appendix D – Operations Manual for Process Plant Management - Forms.
v) Appendix E – As Built Drawings.

1.4 Regulatory Setting

The SPTSF and TSF3 have been approved for construction and operation by the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) and Department of Water and Environmental Regulation (DWER). Copies of the relevant documents are presented in Appendix A.

2 SCOPE OF THE OPERATIONS MANUAL

The Operations Manual for Process Plant Management (OMPPM) *'this document'* details the requirements for plant management who have the responsibility for:

i) Ensuring the tailings storage facilities and all associated infrastructure are operated, maintained and monitored to achieve the design objectives.
ii) Ensuring the facility is operated in accordance with the parameters that have been provided by the client for use in the design of the tailings storage facilities. Where changes in the parameters are proposed, the process plant management must advise the designers in order that the impact of the changes can be fully assessed.
iii) Ensuring that the Life of Mine (LOM) requirements are committed to a Tailings Management Master Plan (TMMP) and any changes to the TSF and all associated infrastructure are documented in the TMMP.
iv) Ensuring that additional storage requirements are planned, designed, budgeted for and constructed well in advance of the expected availability of the additional capacity.
v) Ensuring that the annual engineering audit is completed.

This document also sets out, in broad terms, the technical details associated with the design of the storages and the technical requirements for operating the storage facility including:

i) Tailings Storage Management
   - Solution recovery
   - Tailings placement/deposition
   - Staging of construction
i) Objectives and requirements of the monitoring program.

3 ROLES AND RESPONSIBILITIES

3.1 Organisational Structure

The organisational structure for the MML is detailed below (Figure 2-1).

Figure 3.1 – Organisational Structure

Client to insert the organisational structure in here

3.2 Roles and Responsibilities

The individual responsibilities for the TSF for this project are detailed in Table 3.1.

Table 3.1 – Individual Responsibilities

Staff Designation	Operation	Maintenance	Surveillance & Reporting	Emergency Response
General Manager	√	√	√	√
Process Plant Manager / Process Plant Superintendent	√	√	√	√
Process Plant Foreman	√	√	√	√
Operators	√	√	√	√
Maintenance Manager / Maintenance Superintendent (electrical, instrumentation, pumping and piping)		√		√
Mine Manager / Mine Superintendent (Earthworks)		√		√
Environmental Manager / Environmental Superintendent			√	√
Security Manager / Security Superintendent				√
Emergency Response Team				√
Design consultant			√	√

3.3 Training and Competency

The Process Plant Manager has the responsibility for ensuring the that training and competency of all the personnel relevant to the day-to-day operation of the TSF is completed.

The Process Plant Manager will also ensure the various departments (Process Plant, Maintenance, Mining, Environmental and Security) are each aware of their respective duties and roles and shall confirm that the training and competency of the relevant personnel within these departments has been completed.

The Process Plant Manager also has the responsibility to ensure the training and competency of contractors is completed prior to work being undertaken on the TSF or the associated infrastructure.

All personnel involved with the TSF must be aware of visual indicators (leaking pipes, high solution levels, embankment cracking, seepage etc.) of the performance of the TSF.

3.4 Document Control

The Process Plant Manager or his appointed designate has the responsibility for all document control for the TSF, including the Operating Manuals. The documents which make up the TMMP comprise the following:

i) Design documents, including drawings and technical specifications.

ii) Operating Manuals.

iii) Construction records.

iv) Managing Change Documents.

3.5 Managing Change Documents

3.5.1 Modifications to Design and/or Operation

No changes shall be made to the design or operation of the TSF without the written approval of the Process Plant Manager, the General Manager and TSF Designers, where the proposed change to the TSF materially affects the design or the operation of the facility.

Where design standards change, the designers shall contact the Process Plant Manager and the General Manager and advise of the changes required to bring either the design or operation of the facilities into line with current standards.

All approved changes to the design and/or operation of the TSF, no matter how minor, must be thoroughly documented and recorded in the master document control sheet for the TSF.

The procedures for making changes to the design and operation of the TSF comprise:

i) Submission of a written Request for Change to the Process Plant Manager. The Request for Change Submission must outline the proposed change, the reason for the change, the expected impact (if any) of the change and the expected benefit (if any) of the change.

ii) Process Plant Manager will decide if the proposed change has any impact, either positive or negative, and determine the value of the benefits of the proposed change.

iii) If the proposed change has no material effect on the design and/or operation of the TSF, the Request for Change Submission can be implemented and the relevant design and operational documents updated as required and the change noted in the master document.

iv) If the proposed change materially affects the design and/or operation of the TSF, the Request for Change Submission will be forwarded to the General Manager and TSF Designers with the comments of the Process Plant Manager, for action as appropriate.

v) Where the Request for Change Submission affects the design of the TSF, the TSF Designers will review the submission and make the necessary changes, ensuring that any impacts not envisaged by the Process Plant Manager are noted on the submission. The revised documents and the submission will be returned to the Process Plant Manager. The revised documents will be appended to the TMMP document and the amendments noted on the document control sheet.

vi) Where the Request for Change Submission affects the operation of the TSF, the TSF Designers will review the submission and note the changes, ensuring that any impacts not envisaged by the Process Plant Manager are noted on the submission. The revised documents and the submission will be returned to the Process Plant Manager. The revised documents will be appended to the TMMP document and the amendments noted on the document control sheet.

vii) Where the Request for Change Submission affects the operation of the TSF, the training and competency procedures will be reviewed to assess whether changes need to be made. Where changes are required, the relevant documents will be amended and the amendments noted on the document control sheets.

3.5.2 Regulatory Changes

Changes in the regulatory requirements will be passed to the Process Plant Manager to be assessed, processed and documented, using the same procedures as outlined in Section 2.5.1 above.

3.5.3 Ownership and Designation Changes

Changes in the ownership or changes to the organisational structure or designation hierarchy (Table 2-1) will be passed to the Process Plant Manager, processed and documented using the same procedures as outlined in Section 3.5.1 above.

4 BACKGROUND

The TSF design for the AWP was prepared based on consideration of the environment, geological settings, site topography, mine development plan and expected tailings characteristics. The TSFs comprise the SPTSF and TSF3.

5 DESIGN

5.1 Design Objectives

The operational design objectives of the AWP TSFs (SPTSF and TSF3) are to:

i) Minimise the environmental footprint.

ii) Provide a high rate of decant water to the plant.

iii) Maximise the in-situ density of the tailings, which in turn maximises the storage capacity of the tailings facility.

The tailings are to be pumped as a slurry to the TSF at approximately 45% solids, deposited sub-aerially, and supernatant solution is to be recovered and reused within the process plant.

5.2 Description of Design

The SPTSF is an in-pit TSF.

TSF3 is a paddock-type TSF which has a common embankment with the southern embankment of the existing TSF2.

5.3 Guidelines, Codes of Practice and Standards

The following Guidelines, Codes of Practice and Standards are relevant to the operation of the TSF:

i) Department of Energy, Mines, Industry Regulation and Safety, previously referred to as the Department of Mines and Petroleum Western Australia (DMP), *'Code of Practice, Tailings Storage Facilities in Western Australia'* (2013).

ii) Australian National Committee on Large Dams (ANCOLD) document: 'Guidelines on Tailings Dams - Planning, Design, Construction, Operation and Closure' (2012).

iii) Department of Mines and Petroleum Western Australia (DMP), 'Code of Practice, Tailings Storage Facilities in Western Australia' (2013).

5.4 Design Parameters

The tailings storage requirements as supplied by MML are 0.65 Mtpa tailings for a total of 9 years for the TSFs, with the details for each storage facility presented in Table 1.1. It is understood that the processing parameters are:

i) Operating hours, 8,000 per annum.

ii) The solids SG/SPD being in the range of 2.817 to 3.142 t/m^3.

iii) The primary milling has a target P_{80} of 150 microns based on the 2012 tailings testwork.

A graph showing gravimetric moisture content in engineering terms (mc_E) and the equivalent metallurgical terms (mc_M) is presented as Figure 5.1.

A decant water return system will recover the supernatant water for reuse and water recovered is pumped back to the process water pond in the plant. Based on the details presented in Figure 5 2, the minimum design capacity for the water recovery is not less than 70% of the slurry water discharged into the TSFs. The water recovery system must be designed to recover the minimum specified water recovery plus have sufficient capacity to remove water from storm events, over a period of several days, to attain the design insitu dry density.

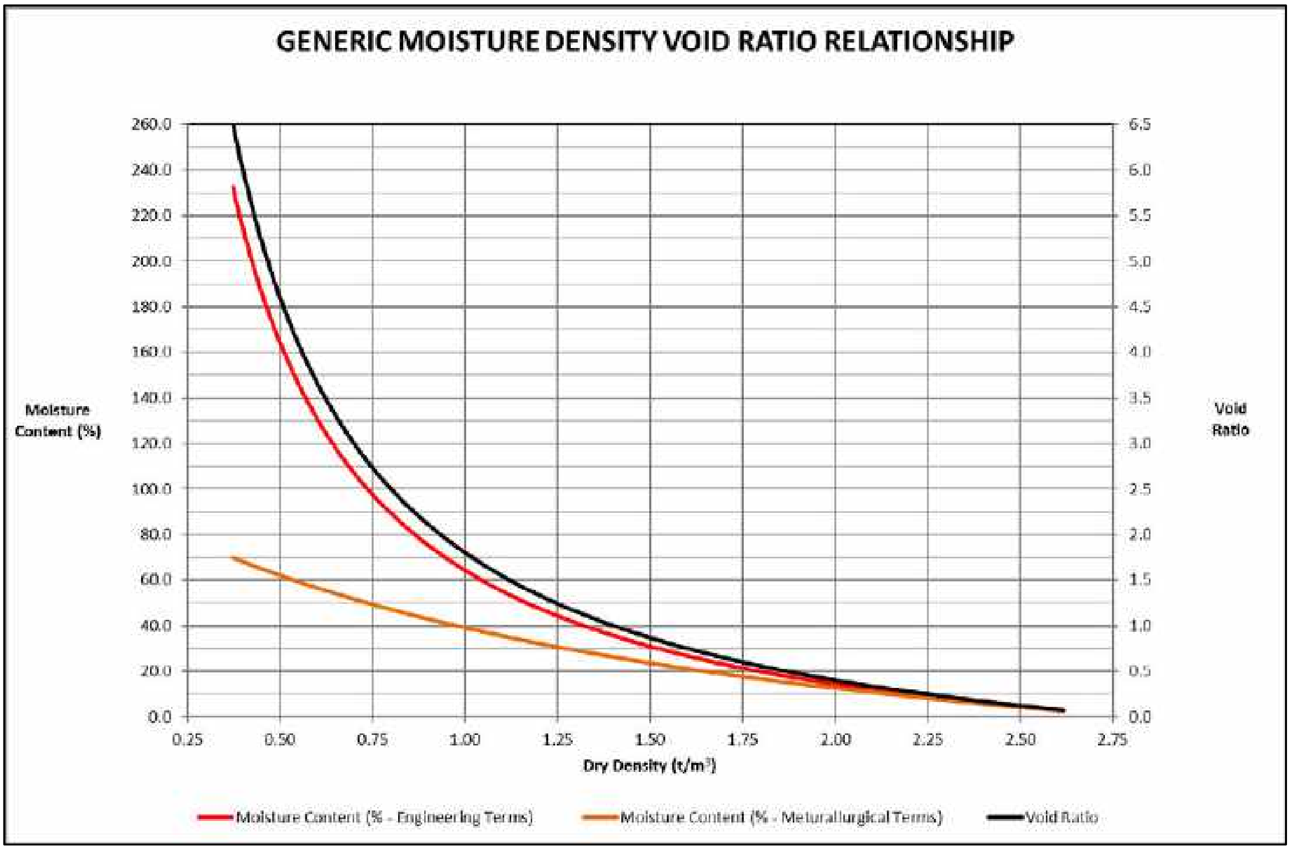


Figure 5.1 – Generic Moisture Density Relationship

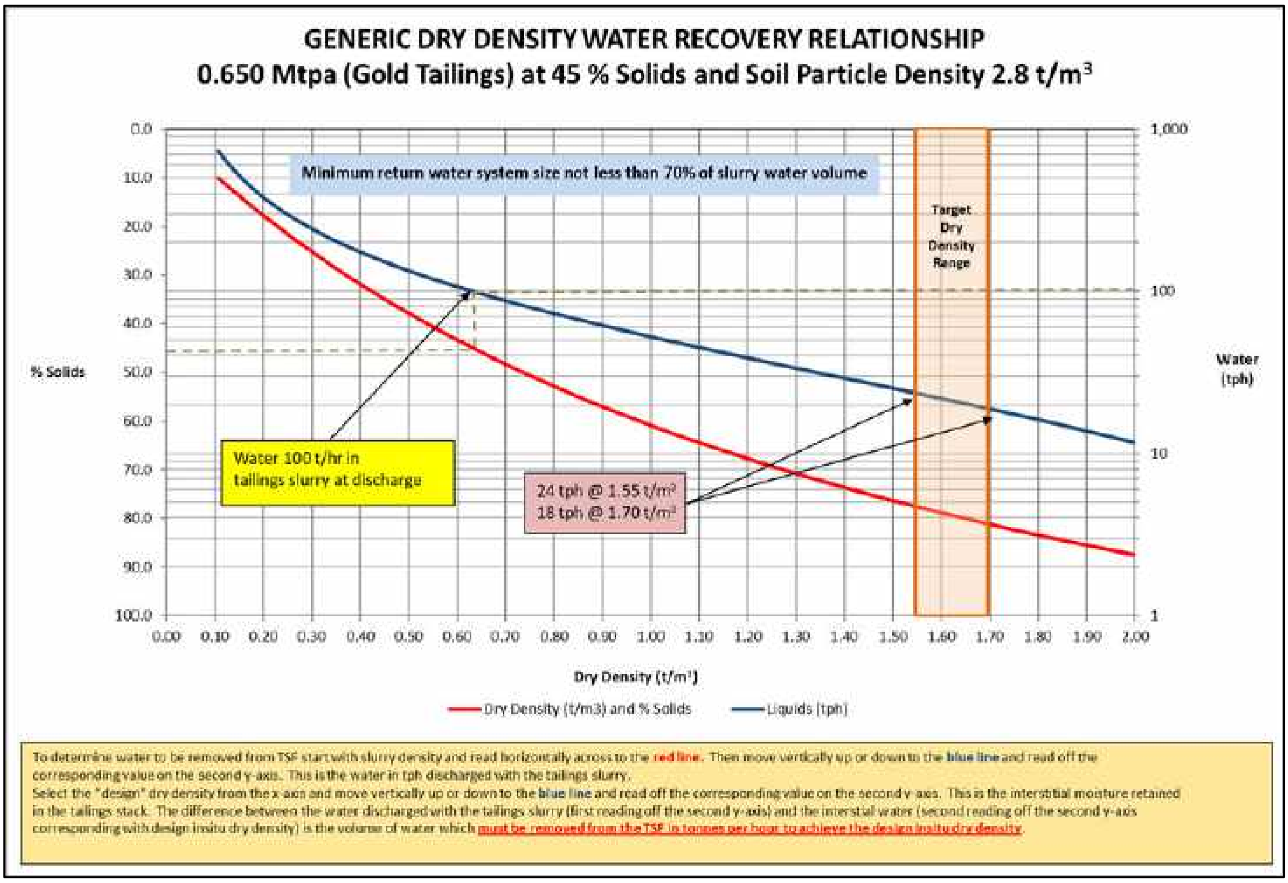


Figure 5.2 – Generic Dry Density Water Recovery Relationship

5.4.1 Hazard Rating

Based on the details presented in ANCOLD (2019) for the design, construction and operation of tailings storage facility, TSF3 has been classified as Low.

Assessment of the consequences associated with embankment failure and uncontrolled tailings or seepage release, resulting in the above classifications comprises:

i) No loss of life expected.

ii) Significant impact on business.

iii) Impact on public health is possible and the number of people affected in the vicinity would be <100.

iv) Social dislocation is possible, classified as minor where the number of people affected could be <100 or <20 business months.

v) Impacted area, less than 5 km².

vi) Duration of impact is less than 5 years.

vii) Effects on rural land and local flora could be significant, particularly if there are any conservation areas in the immediate vicinity of the TSF. Other environmental impacts would be limited.

viii) No significant economic loss is expected, other than limited damage to mine and possibly adjacent public infrastructure.

ix) Repairs to the TSF would be practicable.

5.4.2 Drawings

Details of the TSF design, construction and proposed operation are presented on the drawings included in Appendix B of the Design Report and Appendix B of this document.

The "as built construction drawings" must be appended to this Operating Manual when construction is complete for each stage and inserted into Appendix E. They should, as a minimum, include:

i) General Arrangement and layout plan.
ii) Starter embankment details.
iii) Drainage details.
iv) Decant facility details.
v) Access road and ramp details.

5.4.3 Specifications

The construction specifications are detailed in the Earthworks Specification.

5.4.4 Geochemistry

Geochemical testing has been undertaken as part of previous studies and the tailings are classified as NAF.

5.5 Summary of Operating Procedures

This section provides a summary of the operating methodology of the tailings storage. For details refer to the OMPPS in Appendix C.

To optimise tailings storage capacity and reduce the risks associated with embankment stability and seepage, tailings will be deposited from the embankment and along the perimeter of the storage as depicted in the drawings.

Tailings deposition and beaching will be controlled such that the supernatant solution is ponding away from the engineered embankment. Tailings will be deposited such that the insitu densities within the stored tailings and the solution return for reuse in the process plant, is maximised.

The following considerations have been incorporated into the design of the TSFs:

i) Tailings in the form of a slurry will be discharged subaerially (discharge exposed to air) and/or subaqueously (discharge to slurry/solution), depending on the slurry and solution levels at the point of discharge from the upstream face of the main embankment. Tailings will be deposited in discrete layers from single discharge points for the SPTSF and numerous spigot points for TSF3. The discharge points will be regularly moved to ensure the even development of sloped tailings beaches.

ii) Tailings discharge or spigotting is to be carried out such that a supernatant solution pond is maintained around the decant pump.

iii) Depending on the decommissioning plan adopted for the storage, it may be necessary to alter the deposition philosophy near the end of the mine life. Appropriate procedures shall be developed if changes to deposition or freeboard criteria are required. If necessary, appropriate government authorities shall be advised of any changes, especially to freeboard criteria. As tailings deposition progresses, there may be a requirement for the deposition locations to be moved in order to maximise the utilisation of the tailings storage area.

iv) The MML TSF3 has been sized to accommodate storm events and the minimum total freeboard comprising the operational freeboard and storm freeboard of 0.7 m must be maintained. The vertical distance between the embankment crest and the adjacent deposited tailings beach or supernatant level will have to be determined, post construction, for each embankment crest level.

v) The tailings storage area will assume the form of a truncated prism with a depressed cone in the top surface.

vi) Frequent inspections (a minimum of twice per shift) should be made of the tailings lines, water return lines, discharge points, decant system, the position of the supernatant pond in relation to the decant recovery system and the perimeter containment embankment.

vii) The embankments should be inspected once per day. If seepage has occurred, particular attention should be paid to the embankments in the vicinity of the seepage. Only by regular inspection and appropriate remedial action can the performance of the solution return system be optimised and operational problems be avoided.

viii) Operation, safety and environmental aspects should be periodically reviewed during an inspection by a suitably experienced and qualified engineer. This inspection should be done at least every year.

ix) The operational design objective of the tailings storage facilities located at the MML is to provide return solution to the plant and maximising the insitu density of the tailings which in turn maximises the storage capacity of the tailings facility.

5.6 Storm Events

The TSFs have been sized to accommodate storm events.

The IFD obtained from the BOM indicates the 1 in 100 AEP 72-hour storm is approximately 0.182 m. Assuming each TSF is to be operated such that the supernatant pond is maintained away from the perimeter embankments, then the minimum freeboard requirements comprise the total of the following:

i) Operational Freeboard (lowest embankment crest RL to the tailings beach) 0.3 m.

ii) Beach Freeboard (tailings beach to the supernatant pond after the 1 in 100 AEP 72-hour storm) 0.182 m.

iii) The 1 in 100 AEP 72-hour storm 0.2 m on top of the normal operating supernatant pond.

The total, minimum freeboard, on top of the normal operating supernatant pond is therefore 0.682 m, say 0.70 m.

The supernatant pond level within the TSFs should be as low as practicable to ensure volume is available within each storage to accommodate storm events without breaching or otherwise impacting on the minimum freeboard requirements.

The vertical distance between the embankment crest and the adjacent deposited tailings beach or standing water level which corresponds with this level will have to be determined, after construction, for each embankment crest level.

The SPTSF has a maximum operating level of RL 481.3 m.

At this stage, the maximum operating levels for the proposed TSF3 embankment crest levels are as follows:

i) TSF3 Stage 1 (Embankment Crest Level RL 496.0 m) maximum operating level RL 495.3 m.

ii) Stage 2 (Embankment Crest Level RL 498.5 m) maximum operating level RL 497.8 m.

6 MONITORING AND AUDIT REQUIREMENTS

6.1 General

The following section details the requirements for monitoring and auditing of the TSFs such that the storage is operated and maintained to achieve the design objectives. The Hazard Category of the TSF dictates the monitoring and audit requirements. See Table 5-1 for the required list of documented procedures.

Table 6.1 – Monitoring and Auditing Requirements

Activity	Recommended Frequency
Routine Inspection of SPTSF/TSF3	Twice per shift
Plant Management Inspection of TSF	Once per week
Operational Audit of TSF	Annual
Groundwater Monitoring	Once per Month
Monitoring Instrumentation	Once per month
Environmental Aspects	Once per month

The forms which are relevant to these requirements are provided in the Appendices and comprise the following templates:

OMPPS Forms, which are located in Appendix C of this document.

i) Daily Inspection Log Sheet (OMPPS1)

ii) Operations Personnel Contact Details (OMPPS2)

iii) Training Confirmation Record (OMPPS3)

OMPPM Forms, which are located in Appendix D of this document.

i) Operating Manual Completion Form (OMPPM1)

ii) Operating Manual Update Form (OMPPM2)

iii) Monthly Inspection Log Sheet (OMPPM3)

iv) Outline of Yearly Audit Criteria (OMPPM4)

v) Incident Reporting Sheet (OMPPM5)

All of the forms should be filled in and retained as hard copies on site for the life of the mine. Any issues of concern or unusual occurrences observed at any time should be reported to Process Plant Management for their review, and if required, the TSF designers should be contacted for assistance or advice. Any planned or taken actions must be recorded.

6.2 Daily Inspections

The requirements for daily inspections are detailed in the Operations Manual for Plant Staff (OMPS), Appendix C of this document.

It is expected that the plant staff that have responsibility for the general day-to-day operation and maintenance of the TSF shall perform the daily inspections and complete the daily inspection log. (A Daily Inspection Log template (OMPPS1) is included in Appendix C3 of the OMPPS.)

The process plant management has the responsibility for verifying that these inspections are occurring, and that these inspections are following the requirements as set out in Section 2.0 of the OMPPS (Appendix C of this document).

6.3 Performance Monitoring

This section outlines the requirements to ensure the TSF is performing in accordance with the parameters and details in the design and will assist in the completion of the yearly audit.

6.4 Process Plant

The following information should be recorded monthly as a minimum, or more frequently if possible:

i) Ore treatment, measured in dry tonnes.

ii) Tailings slurry density, measured as percentage solids.

iii) Solution return from the tailings storage to the process plant, measured in cubic metres.

iv) Make-up water, if any, which is brought into the process plant measured in cubic metres.

6.5 Environmental Monitoring

6.5.1 Climatic Data

If a weather station is located on site, the following information is to be collected daily, or at the end of each month as a minimum:

i) Rainfall.

ii) Evaporation.

6.5.2 Water Quality and Standing Water Level

Water quality sampling and testing is required to be performed on the monitoring bores located in and around the tailings storage, and of any seepage or surface water upstream or downstream from the facility.

Water quality requirements, including frequency and quality limits, are stipulated in the licence conditions by regulatory authorities (Appendix 2). At the time of renewing or updating the licence, all conditions should be reviewed such that any changes to the monitoring regime and criteria are noted and acted upon.

SWL readings should also be taken at the time of water quality sampling. The data obtained from water levels and quality should be plotted as soon as possible and reviewed to allow identification of any changes.

Where newly recorded information deviates significantly from the previously established trend, the reading should be checked, the area inspected, and the information reported to Process Plant Management for consideration and action.

6.5.3 Dust Monitoring

Monitoring of airborne dust will be undertaken through daily visual inspections by the Site Environmental Officer.

Sampling and analysis will be undertaken if required in the licence conditions.

6.6 Storage Monitoring

Detailed surveys of the tailings surface should be performed on an annual basis at minimum, such that the tailings insitu can be reconciled with tonnage of tailings deposited and the storage volume consumed. In addition, an as-built survey should be performed on any construction works.

6.7 Monthly Inspections

It is recommended that monthly inspections of the TSF and associated documentation be carried out by Plant Management to ensure the facility is being operated and maintained to meet the design objectives, and that documentation procedures are being followed. Refer to the Monthly Inspection Log Sheet (OMPPM2) in Appendix D.

6.8 Engineering Inspections

It is a requirement of the DEMIRS/DWER and ANCOLD Guidelines that an inspection and audit by a qualified Geotechnical or Engineering specialist be carried out annually as a minimum. This Audit shall include the aspects outlined on OMPPM3 in Appendix D.

The Audit will also need to include assessment of the environmental conditions of the licence, and report any environmental damage, in particular any seepage or water quality problems.

7 MAINTENANCE

7.1 General

The purpose of the maintenance program for the TSF is to identify the key components of the facility whether they are civil, mechanical, electrical or instrumentation and then detail the predictive and event-driven maintenance requirements.

The responsibility for reporting defects and/or event-driven maintenance requirements rests with the operators of the facility. The maintenance department deals with routine predictive maintenance.

7.2 Maintenance Parameters

[To be completed by the Maintenance Department]

7.3 Routine and Predictive Maintenance

[To be completed by the Maintenance Department]

7.4 Documentation and Reporting

[To be completed by the Maintenance Department]

8 CONSTRUCTION STAGES

The design of the TSF3 is based on construction of all perimeter embankments in a series of stages, with the Stage 1 Crest at RL 496.0 m and the Stage 2 Crest at RL 498.5 m.

For the details of the embankment characteristics and construction stages, reference should be made to the relevant drawings and specifications applicable to construction.

It is anticipated, based on the current production parameters used in the design (refer to Section 1.2) and assuming that the SPTSF and TSF3 are correctly operated, that:

i) The Suzie Pit could provide storage for up to 7 months.

ii) TSF3 Stage 1 embankments could provide storage for up to 8.7 years of operation, and with the construction of the Stage 2 embankments undertaken, providing an additional 1.6 years of storage.

9 OCCUPATIONAL HEALTH AND SAFETY CONSIDERATIONS

Occupational Health and Safety (OHS) requirements for working in the vicinity of the TSF should comprise the following minimum requirements:

i) Appropriate Mandatory Signs (Blue and White), Warning Signs (Black and Yellow), Danger Signs (Black, Red and White) and First Aid Signs (Green and White) to be clearly displayed.
ii) Personal Protective Equipment (PPE) appropriate to the tasks being undertaken to be worn at times by all workers in the area.
iii) Appropriate first aid facilities (Showers and Eye Wash) to be located in the area.
iv) Radio contact to be maintained at all times between personnel working in the area and their respective supervisors.

Warning signs around the facilities are recommended and the integrity of the stock fencing adjacent to the TSF must be checked daily. Any observed damage to fencing must be immediately reported to the relevant personnel or project equivalents, as appropriate, and an incident report completed.

10 EMERGENCY ACTION PLAN

10.1 Response Actions

In the event of an emergency, the site emergency response team must immediately be notified and advised of the nature of the emergency to enable the appropriate emergency action plan to be implemented. The site emergency response plan contains the details presented in the following Sections such that response activities are coordinated with operations personnel.

At the time of the emergency, the Process Plant Foreman or his designated (trained operator) representative is to ensure that:

i) All personnel and Contractors who were or are working in or around the location of the emergency are accounted for. Personnel Contact Details are provided on form (OMPPS2) appended to this document. This form must be reviewed quarterly as a minimum and must be updated immediately in the event of personnel leaving or joining the operation.

ii) All mine based personnel listed in Table 2-1 are immediately contacted and advised of the nature of the emergency and any assistance required is requested.

All personnel who are working in the vicinity of the emergency are expected to be present at the muster points and are expected to be aware of other assembly points around the TSF and the relevant reporting procedures. A drawing showing the emergency assembly points, to be determined by the client is to be added to this document.

10.2 Tailings Storage

The embankments have been designed with an adequate factor of safety against failure under normal operating and seismic load conditions, appropriate for the location of the TSF.

Normal operating conditions refer to the tailings surface and surface of the supernatant water pond being within the freeboard requirements.

The probability of embankment failure during normal operations is very low, given that:

i) The embankment construction has been or should have been carried out in accordance with the design.

ii) The implementation of the tailings operation methodology (Section 0), including the routine inspections and maintenance practices are adhered to as set out in the Operations Manual.

However, in the unlikely event of embankment failure, the flow of tailings from the storage will be controlled by the degree of saturation of the tailings at the time of failure.

Action to control a small-scale embankment failure and limit environmental damage would include:

i) Assessing the requirement to shut down the process plant or reduce process plant throughput.

ii) Diversion of tailings deposition to areas not affected by the small-scale embankment failure.

iii) Construction of bunds by earthmoving equipment to divert and contain the tailings.

iv) Contacting a suitably qualified geotechnical organisation for technical assistance.

v) Deployment of pumps to recover tailings water as appropriate and return it either to the TSF if structurally sound, or to the plant water storage facilities if evaporation and or dilution is impractical.

vi) Undertaking a thorough inspection of the area with or without a specialist, depending on the scale of the failure, prior to the commencement of any repairs.

vii) Undertaking remedial and repair work of the damaged embankment or affected area.

viii) Clean up of tailings as soon as practicable after embankment repairs have been completed and the storage is considered in a safe condition.

ix) Preparing an incident report, detailing all factors prior to the incident and the situation after clean-up. The report should identify the causes of the problem and what actions will be taken to prevent a similar occurrence. This report should detail the on-going monitoring programme to fully assess the impact of the incident.

x) Advising all appropriate government departments as necessary of the incident and reviewing the conditions of operating licence and lease conditions to ensure that the timing of reports and content of reports meets the regulatory requirements.

Action to control a large-scale embankment failure and to limit environmental damage would include:

i) Shut down of the process plant.

ii) Construction of bunds by earthmoving equipment to divert and contain the tailings.

iii) Contacting a suitably qualified geotechnical organisation for technical assistance.

iv) Advising the relevant regulatory authorities.

v) Deployment of pumps to recover tailings water and returning it to the TSF if structurally sound or to the plant water storage facilities if evaporation and or dilution is impractical.

vi) Undertaking a thorough inspection of the area with the assistance of a geotechnical specialist prior to the commencement of any repairs.

vii) Repairing the damaged embankment.

viii) Cleaning up of tailings as soon as practicable after the embankment repairs have been completed.

ix) Preparing an incident report, detailing all factors prior to the incident and the situation after clean-up. The report should identify the causes of the problem and what actions will be taken to prevent a similar occurrence. This report should detail the on-going monitoring programme to fully assess the impact of the incident.

x) Advising all appropriate regulatory authorities as necessary of the incident.

xi) Reviewing conditions of any licence or lease conditions in respect to the timing of advising the regulatory authorities and the contents of that notification (reporting criteria).

It must be stressed however, that the safe operation of the TSF relies upon the implementation of operational procedures which comprise tailings deposition, decant operation and routine inspections and maintenance, as set out in the Operations Manual to minimise the potential for a catastrophic event such as a failed embankment.

10.3 Tailings Lines and Return-Water Lines

The tailings lines from the process plant to the tailings storage and the return-water lines from the decant facilities to the process water dam are to be located inside bunded, open trenches to contain any spillage of materials resulting from leaks or burst pipes during operation. In the event of pipeline failure, the Process Plant Superintendent is to be notified and the affected pipeline is to be shut down until repaired and the spilled materials collected and/or pumped, as appropriate, and deposited in the TSF.

10.4 Process Water Tank

The decant pump is operated manually and runs at all times. The pump is only switched off:

i) During plant shutdowns or maintenance periods

ii) When dirty water is pumped into the process water tank or when embankment construction is scheduled in accordance with the design.

Alternative pumping equipment and pump locations may be required during periods of pump maintenance or when embankment construction work is being undertaken.

11 INCIDENT REPORTING

The objective of regular inspections by the designated process plant staff and monitoring by the environmental staff is to identify any problems prior to them causing a major impact on the operation or integrity of the TSF and associated infrastructure.

The inspections may result in the identification of an event that may require reporting to senior staff and in some cases to relevant regulatory authorities.

12 CLOSURE AND REHABILITATION

The closure and rehabilitation for the TSF will be undertaken in accordance with regulatory guidelines and all applicable ministerial conditions and various commitments made by MML.

At this stage, given the current position with known technology, the method for closing and covering the TSF appears to be:

i) Remove excess supernatant water from the TSF.

ii) Cover the facility with mine waste or similar. The closure process may take some time as the shear strength of the tailings may not be sufficient to support large mining equipment. Smaller equipment is recommended to be deployed.

iii) Establish a vegetative cover.

The final level of the mine waste and soil cover will need to be sufficient to adequately cover the tailings.

Any incident rainfall, either falling directly onto the TSF, or reporting to the TSF from the reduced catchment can be temporarily contained and/or discharged via a spillway, as appropriate.

The practicalities of the option presented above and other options which may arise as a result of changes in technology, as well as the final surface level, embankment and spillway level will need to be determined during the later operational years since the in-situ density of the tailings and volume of the tailings may be greater than or less than the design parameters.

It is expected that the key design criterion for the TSF cover will be resistance to erosion in order to create a stable landform.

For the embankment, benches are generally not recommended at closure as they tend to focus erosion from surface water runoff and mitigating measures such as armoured spillways or drop structures are expensive to construct and difficult to maintain. Deep ripping along the contour of the slopes is effective in mitigating slope erosion provided rock mulch / rock armour is present. The segmentation of the top surface of the final landform by construction of low bunds may be considered as an additional measure to promote infiltration of rain events and mitigate erosion from channelling of surface runoff.

Rehabilitation will likely be undertaken in stages as the tailings consolidate. Cover construction can be commenced once the tailings surface has sufficiently consolidated to permit access to earthmoving equipment. Rehabilitation/decommissioning (closure) plans will be continually updated by MML to incorporate successful procedures identified in site specific trials throughout the life of the project.

Appendix A

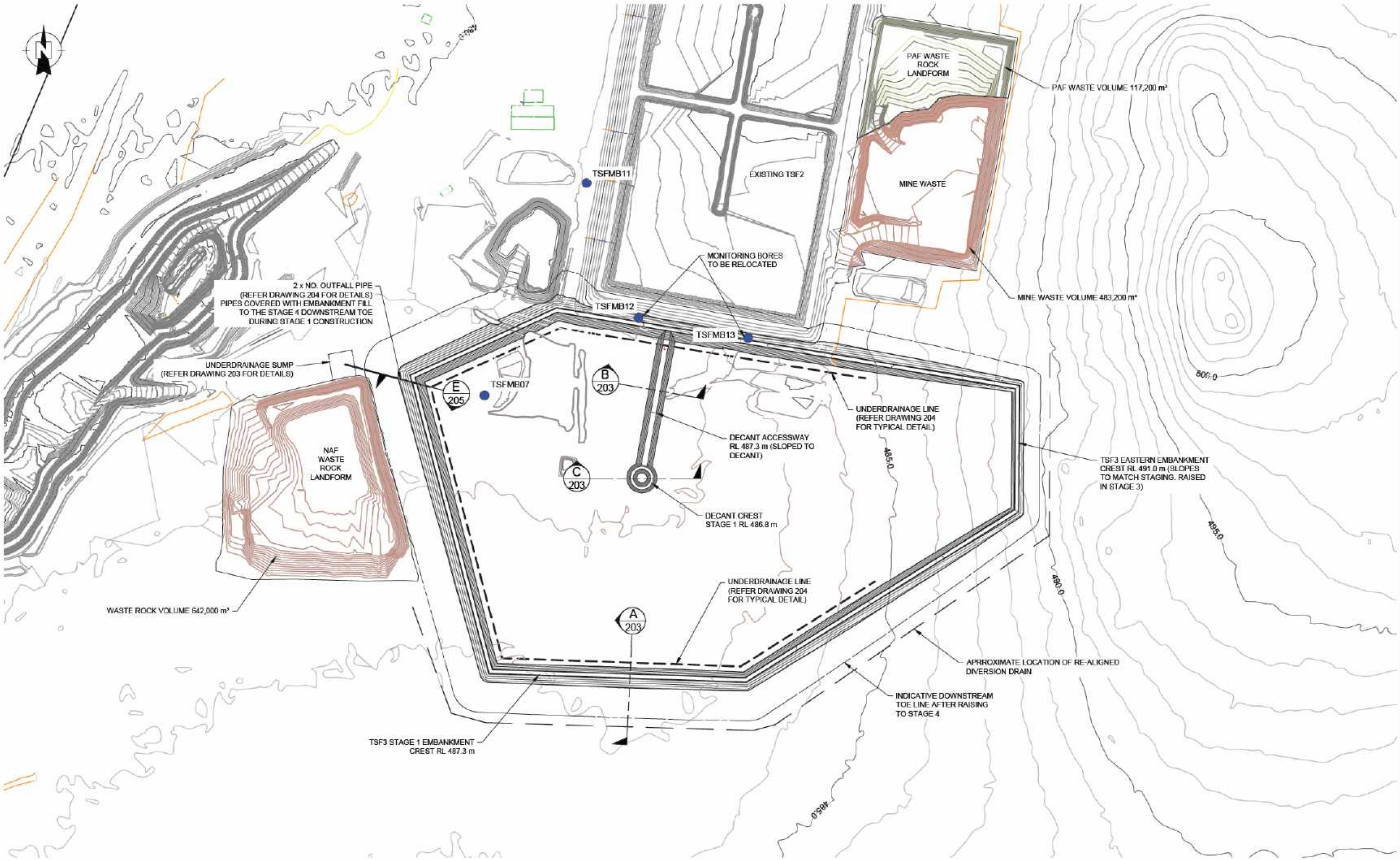
Regulatory Licence / Lease Conditions

Andy Well Project
Tailings Storage Facilities

Appendix B

Design Drawings

Andy Well Project
Tailings Storage Facilities



NOTES:

1. COORDINATE SYSTEM: MGA ZONE 50, GDA94

LEGEND:

● TSFMB EXISTING MONITORING BORE

0 50 100 150 200 250 m

1:5 000

Soil & Rock Engineering
ABN 98 675 219 020

CMW Geosciences
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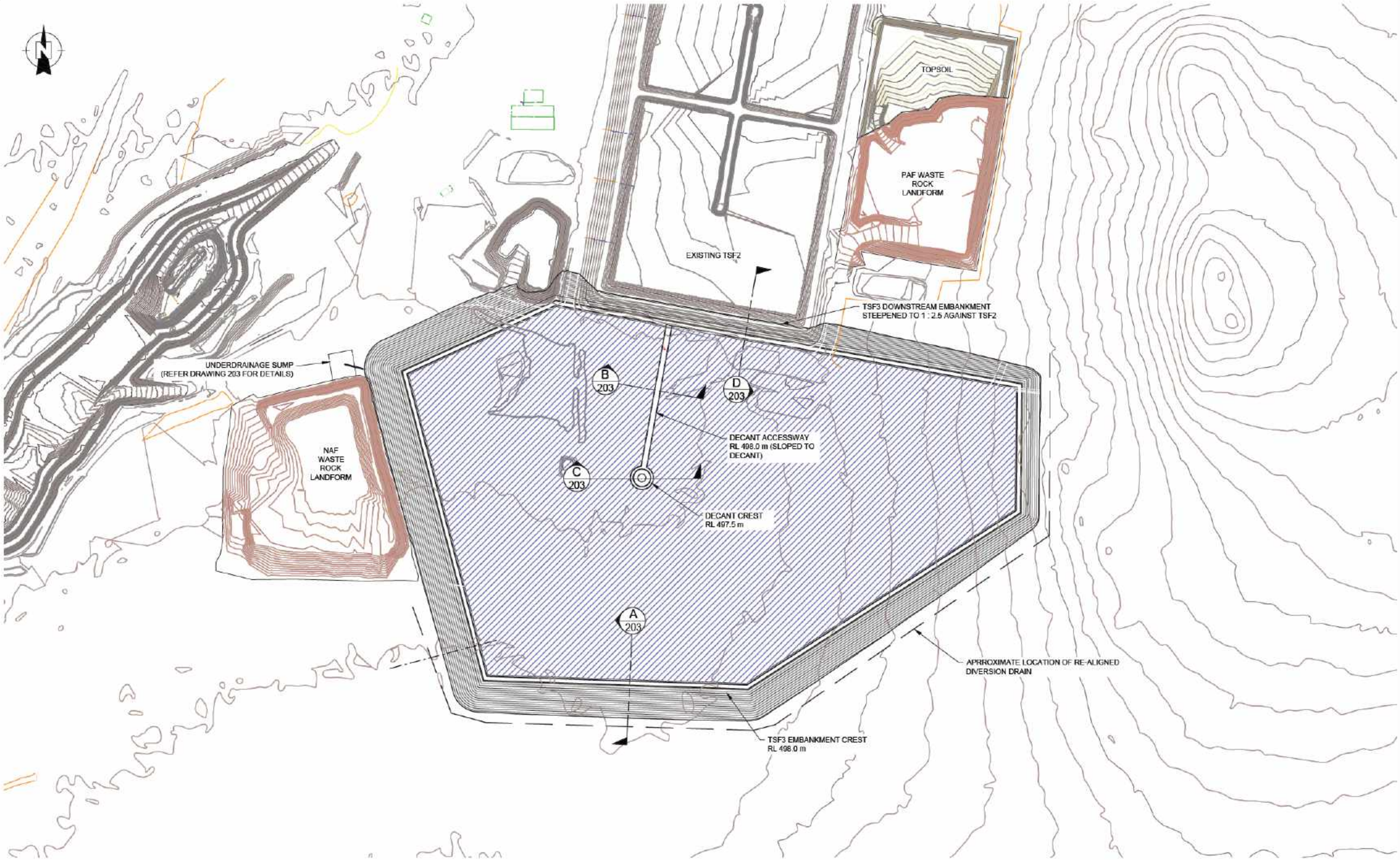
CLIENT: DORAY MINERALS LIMITED	DRAWN: DE	PROJECT: PER2017-0152	
PROJECT: ANDY WELL GOLD MINE TSF3	CHECKED: CL	DRAWING: 201	
	REVISION: B	SCALE: 1:5 000	
TITLE: TSF3 STAGE 1 PLAN	DATE: 20.06.24	SHEET: A3 L	



NOTES:

1. COORDINATE SYSTEM: MGA ZONE 50, GDA94

1:5 000 — 0 50 100 150 200 250 m

Soil & Rock Engineering
ABN 98 675 219 020

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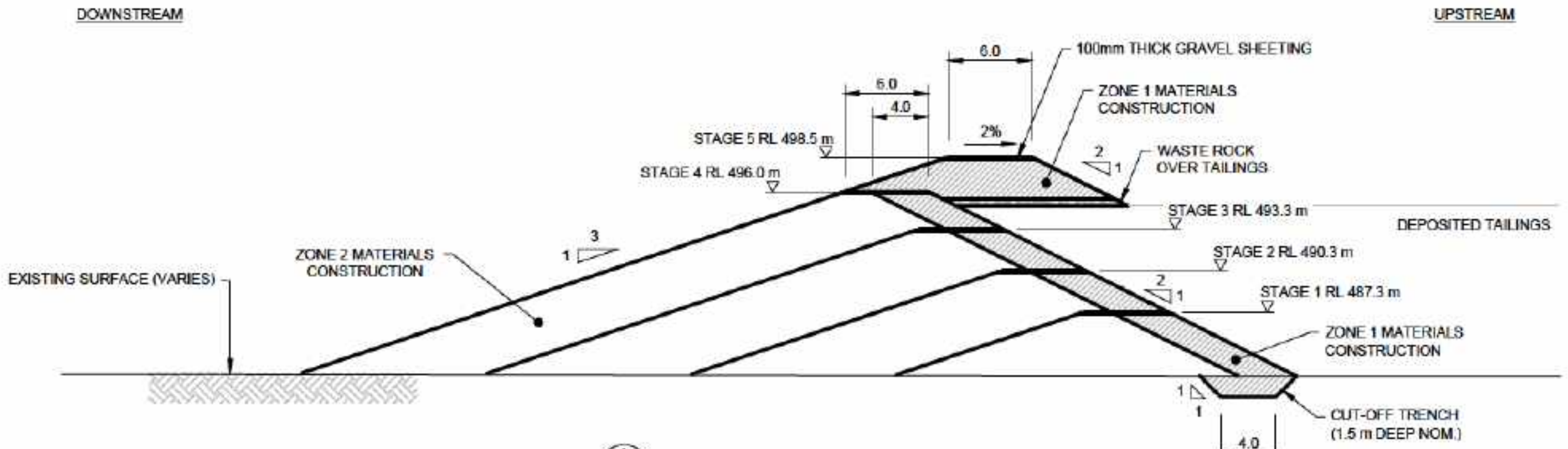
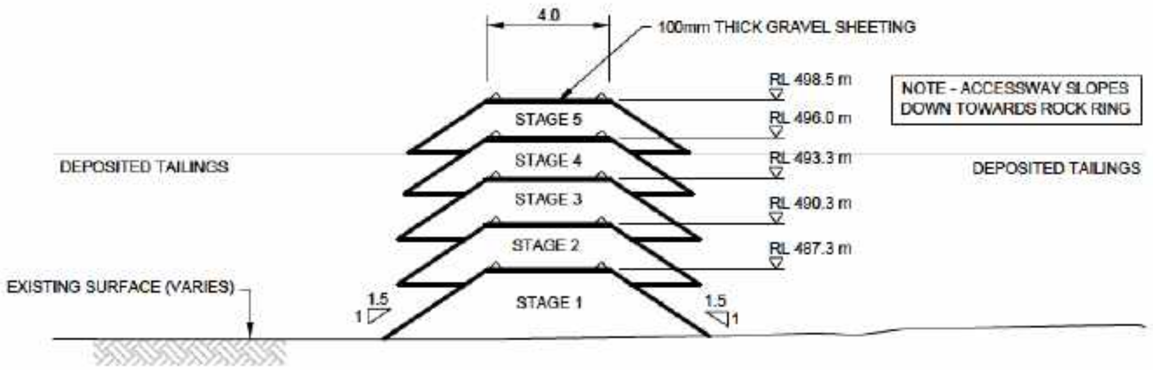
CLIENT: DORAY MINERALS LIMITED		DRAWN: DE	PROJECT: PER2017-0152
PROJECT: ANDY WELL GOLD MINE TSF3		CHECKED: CL	DRAWING: 202
		REVISION: B	SCALE: 1:5 000
TITLE: TSF3 FINAL STAGE PLAN		DATE: 20.06.24	SHEET: A3 L



A 201/202 PERIMETER EMBANKMENT - TYPICAL SECTION
1:500



B 201/202 DECANT ACCESSWAY - TYPICAL SECTION
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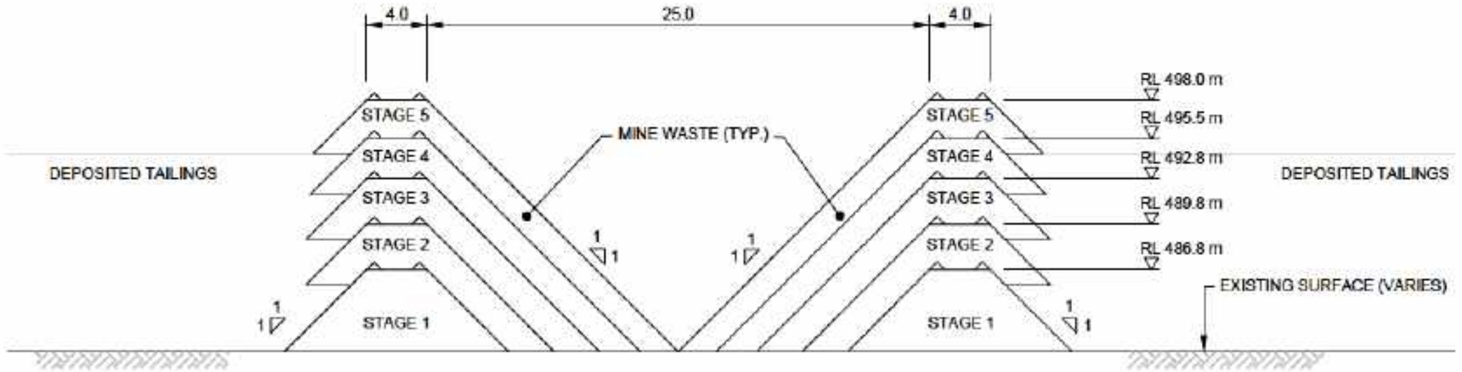

C 201/202 DECANT ROCK RING - TYPICAL SECTION
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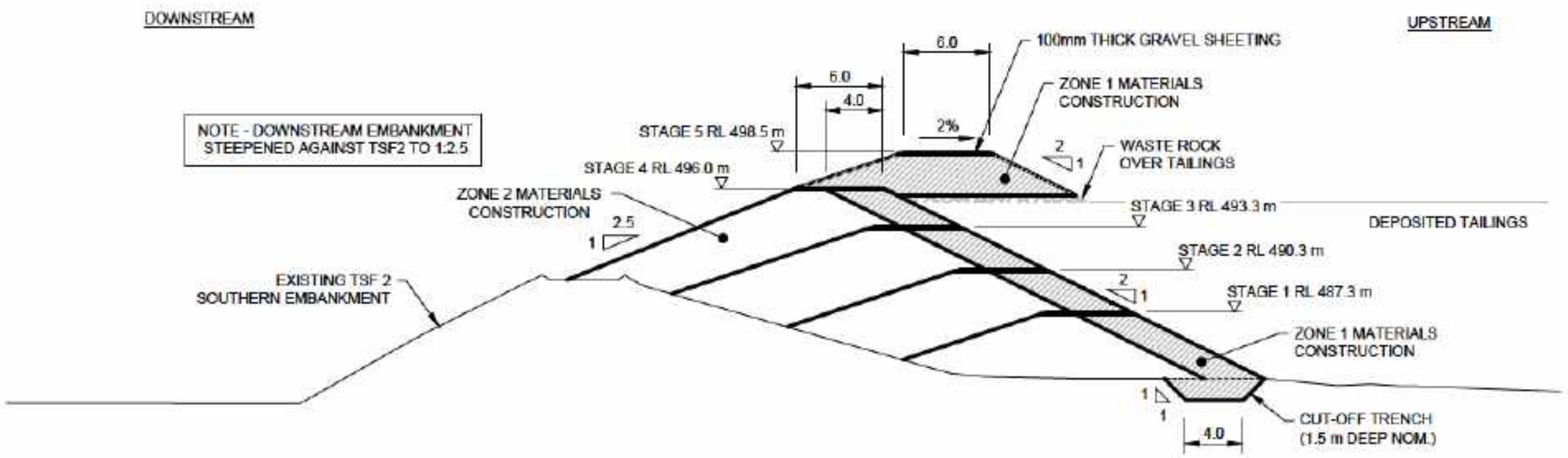

D 202 PERIMETER EMBANKMENT AGAINST EXISTING TSF2 - TYPICAL SECTION
1:500

NOTES:

1. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

0 5 10 15 20 25 m
1:500

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ABN 98 675 219 020

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CLIENT: DORAY MINERALS LIMITED	DRAWN: DE	PROJECT: PER2017-0152
PROJECT: ANDY WELLS GOLDMINE TSF3	CHECKED: CH	DRAWING: 203
	REVISION: B	SCALE: 1:500
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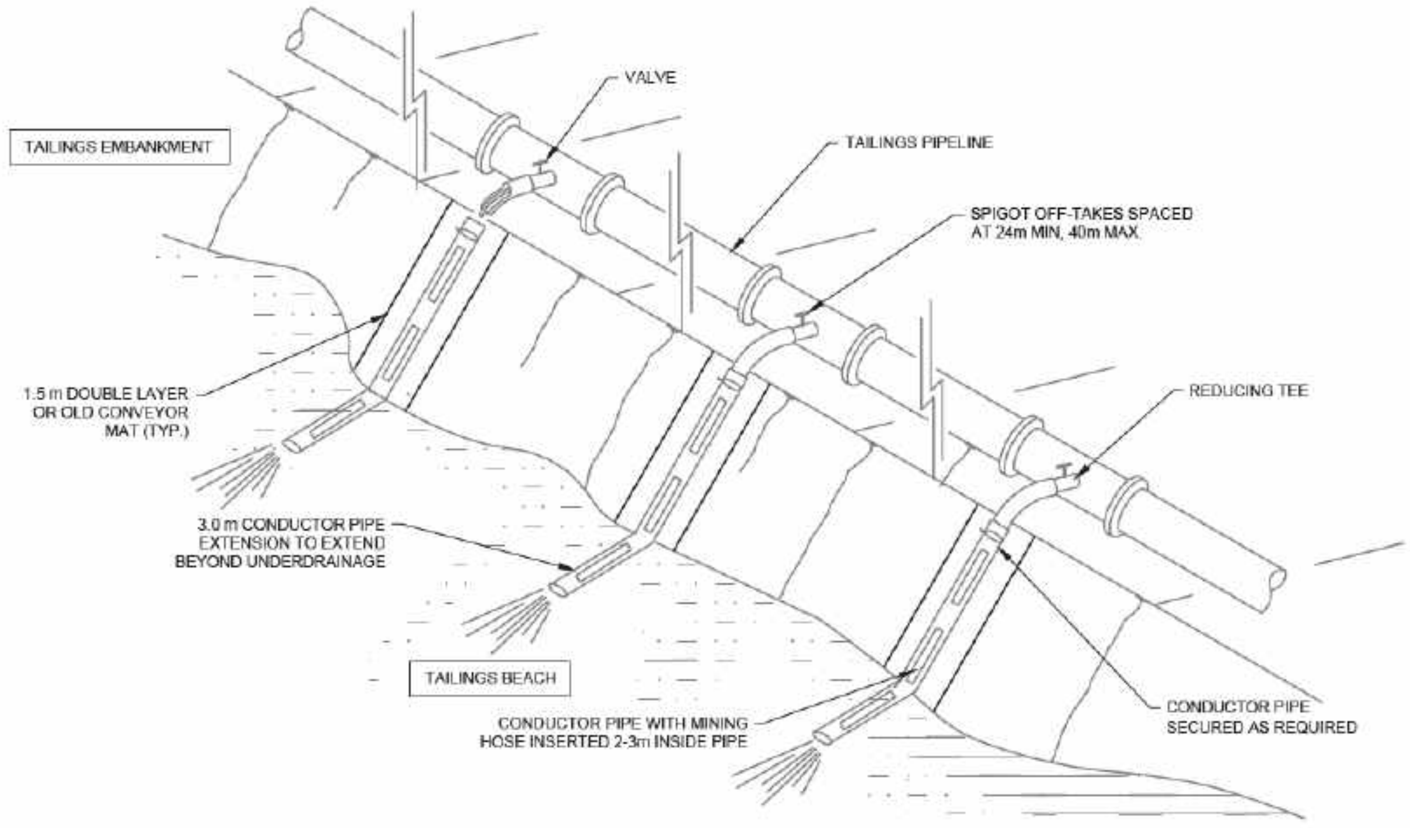
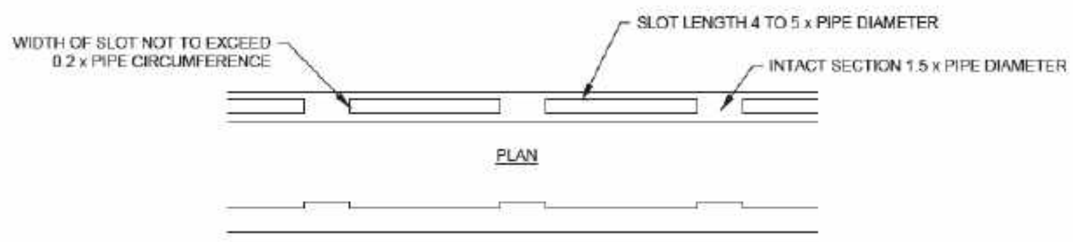
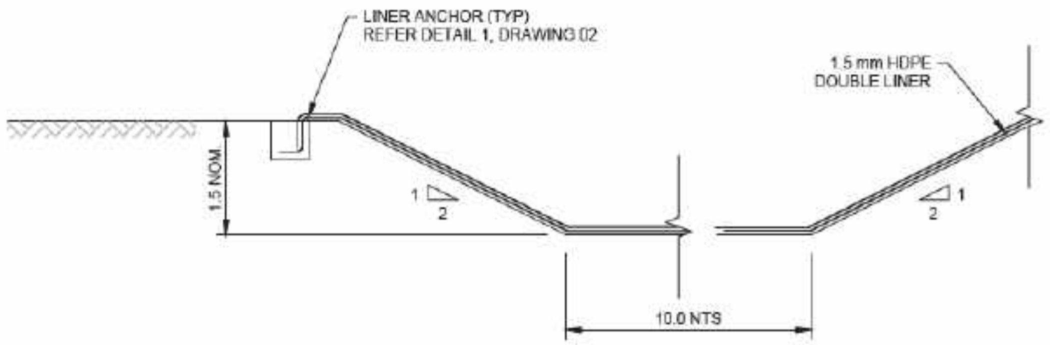


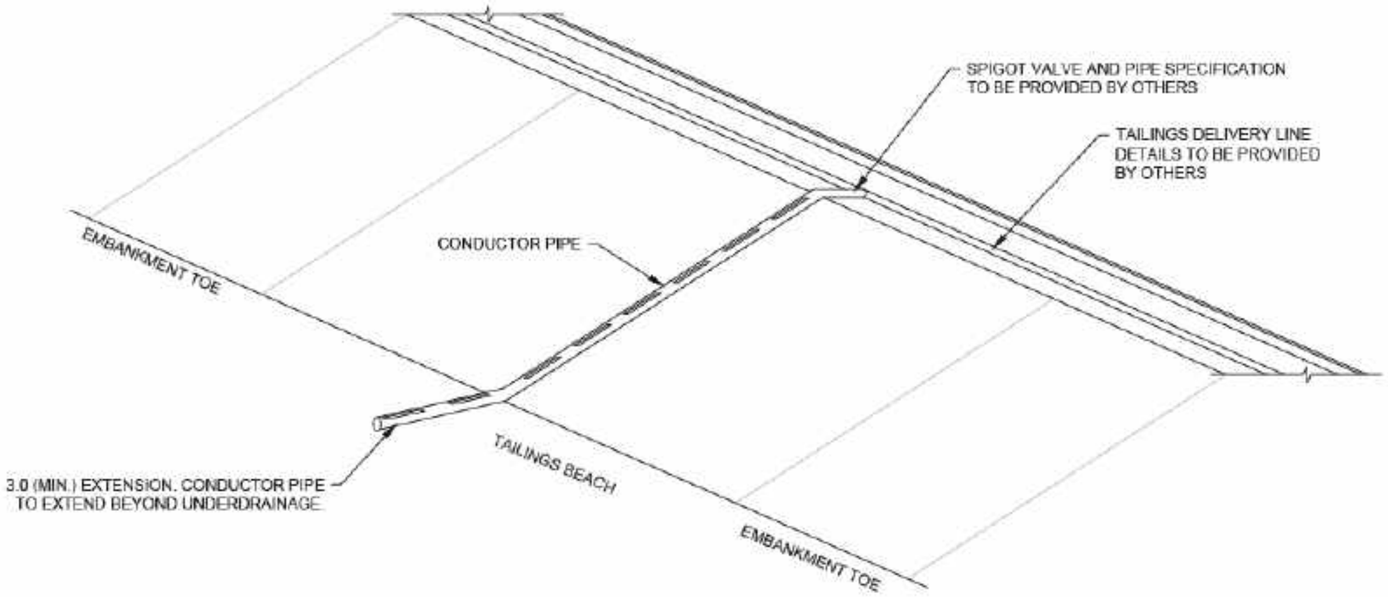
PROPOSED SPIGOT ARRANGEMENT
ISOMETRIC VIEW (NTS)



CONDUCTOR PIPE (SLOTTED PVC) - TYPICAL DETAIL
1:50



UNDERDRAINAGE SUMP - TYPICAL DETAIL
1:100



DRAINAGE / DEPOSITION EMBANKMENT
PERSPECTIVE VIEW (NTS)

NOTES:

1. ALL DIMENSIONS IN METRES UNO

1:100 — 0 1 2 3 4 5 m

1:50 — 0 0.5 1.0 1.5 2.0 2.5 m

Soil & Rock Engineering
ABN 98 675 219 020

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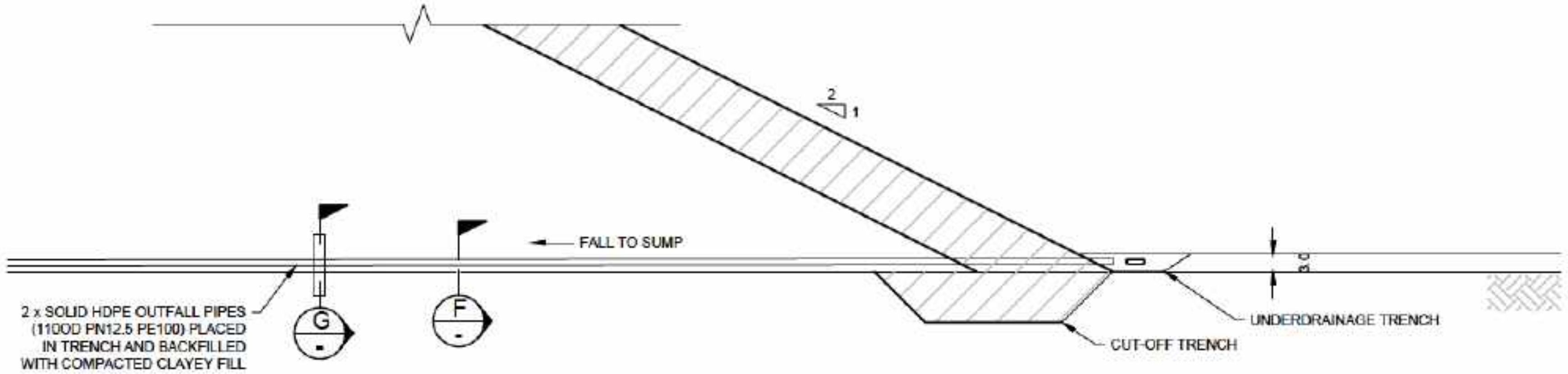
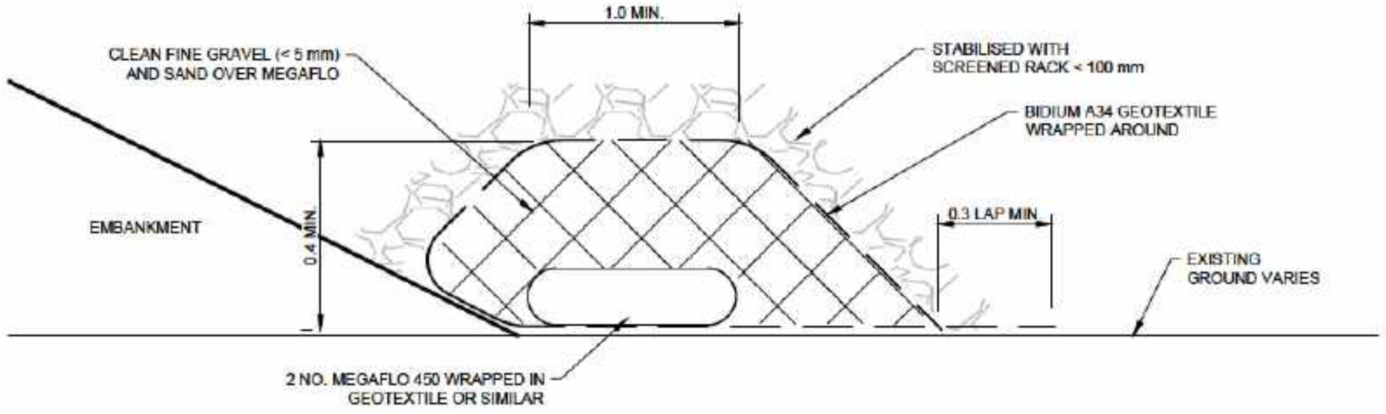
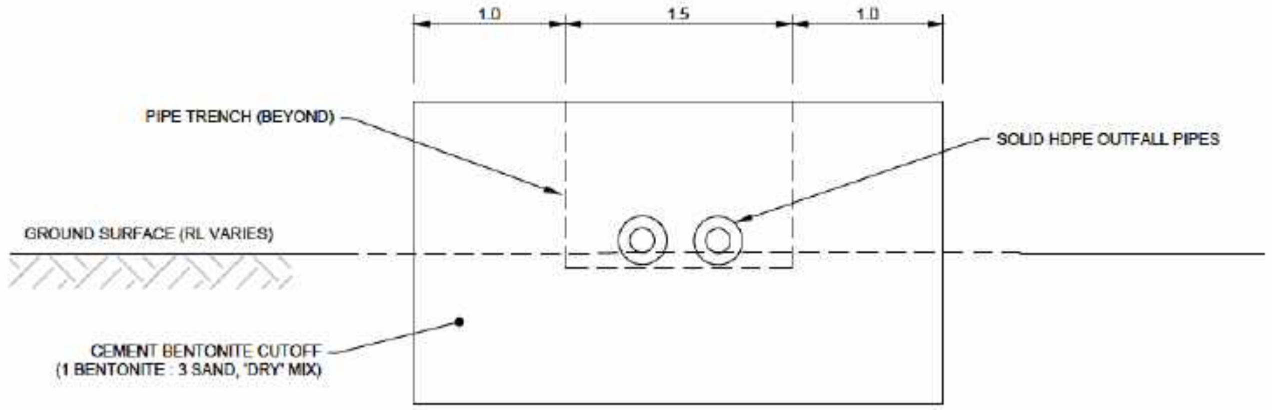
CLIENT: DORAY MINERALS LIMITED	DRAWN: DE	PROJECT: PER2017-0152
PROJECT: ANDY WELLS GOLDMINE TSF3	CHECKED: CL	DRAWING: 204
	REVISION: B	SCALE: AS SHOWN
TITLE: SECTIONS AND DETAILS - PIPEWORK AND UNDERDRAINAGE SUMP	DATE: 20.06.24	SHEET: A3 L



E / 201 UNDERDRAINAGE OUTFALL PIPE THROUGH EMBANKMENT - TYPICAL SECTION
1:200

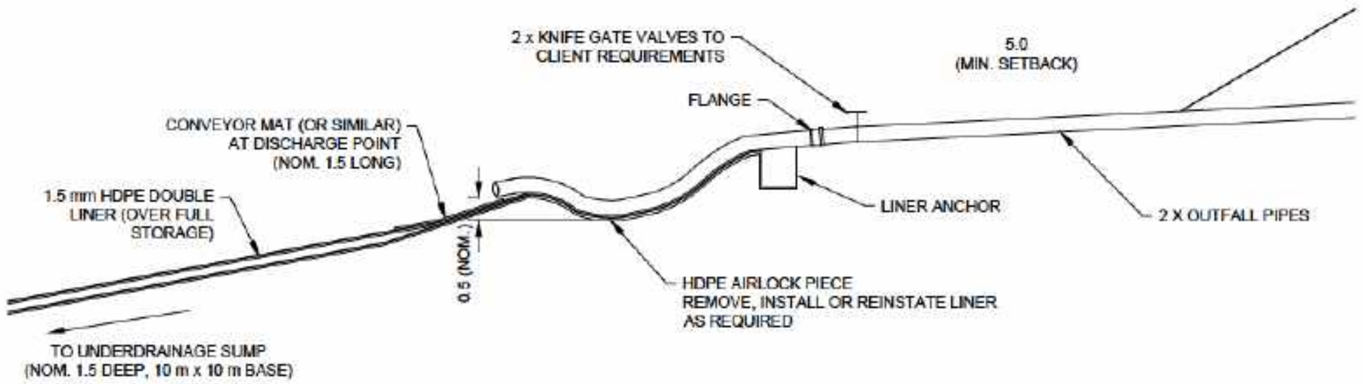


UNDERDRAINAGE - TYPICAL SECTION
NTS

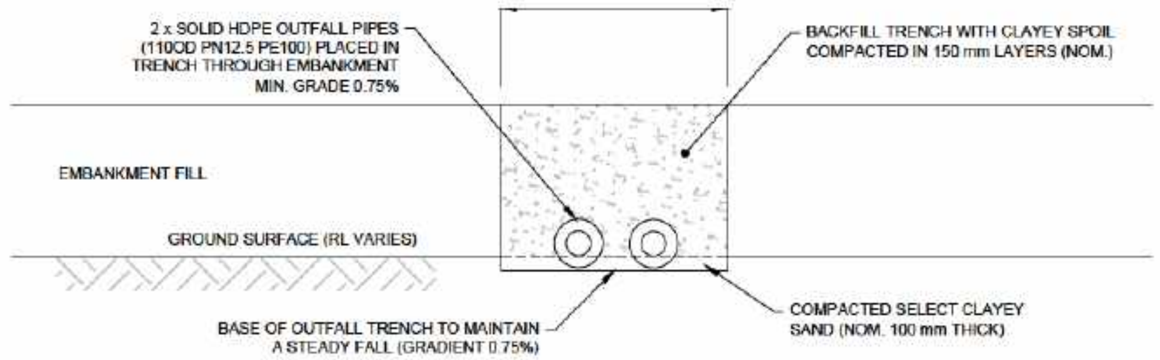


G / - CEMENT BENTONITE CUTOFF - TYPICAL SECTION
1:50

NOTE - PIPES COVERED WITH EMBANKMENT FILL TO THE STAGE 4 DOWNSTREAM TOE DURING STAGE 1 CONSTRUCTION



OUTFALL PIPEWORK OUTLET - TYPICAL SECTION
NTS



F / - OUTFALL PIPE TRENCH (THROUGH EMBANKMENT) - TYPICAL SECTION
1:50

NOTES:

1. ALL DIMENSIONS IN METRES UNO

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PROJECT: ANDY WELLS GOLDMINE TSF3	CHECKED: CL	DRAWING: 205
	REVISION: B	SCALE: AS SHOWN
TITLE: SECTIONS AND DETAILS - UNDERDRAINAGE	DATE: 20.06.24	SHEET: A3 L

Appendix C

Operations Manual Process Plant Staff

Andy Well Project
Tailings Storage Facilities

Soil & Rock Engineering Pty Ltd (SRE)

ABN 98 675 219 020

ANDY WELL PROJECT

Tailings Storage Facility 3

Operations Manual - Staff

Ref: **Staff Operations Manual TSF3 Rev 0**

Date: **14 June, 2024**

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Soil & Rock Engineering Pty Ltd (SRE)

Disclaimer

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Document Control

Date	Revision	Purpose	Author
10/05/2024	A	Internal Review	[redacted]
10/06/2024	B	Issued for Client Review	
14/06/2024	0	Issued for Use	

Terminology and Abbreviations

The following terminology and abbreviations have been used in this document:

AEP	Annual Exceedance Probability
ANCOLD	Australian National Committee on Large Dams
AS	Australian Standard
BOM	Bureau of Meteorology
DC	Design Consultant
DEMIRS	Department of Energy, Mines, Industry, Regulation and Safety (from 1 July 2017), previously referred to as Department of Mines and Petroleum (DMP)
DEMIRSWA	Department of Energy Mines, Industry, Regulation and Safety Western Australia, previously referred to as DMPWA
DR	Design Report
DWER	Department of Water and Environmental Regulation (from 1 July 2017), previously referred to as Department of Environment Regulation (DoER)
ERT	Emergency Response Team
ES	Environmental Superintendent
FoS	Factor of Safety
GIR	Geotechnical Investigation Report
GM	General Manager
ha	hectare
H:V	Horizontal : Vertical
LoM	Life of Mine
MB	Monitoring Bore
m/a	metres per annum
m^3/d	cubic metres per day
Mm^3	Million cubic metres
Mt	Million tonnes
Mt/a	Million tonnes per annum
Mtpa	Million tonnes per annum
ML	Mine Lease
MM	Maintenance Manager
MML	Meeka Metals Limited
MS	Mining Superintendent
oh/a	operating hours per annum, assumed as 8,000
OM	Operations Manual (s)
OTD	Operator Training Documents
pa	per annum
PPF	Process Plant Foreman
PPM	Process Plant Manager
PPO	Process Plant Operator
PSD	Particle Size Distribution
P_{80}	80% passing, and refers to a particular particle size as stated, i.e. a P80 of 75 microns means 80% of the total weight of materials is finer than 75 microns
TSF3	Tailings Storage Facility 3
tpa	tonnes per annum
tpd	tonnes per day
t/m^3	tonnes per cubic metre
TDS	total dissolved solids
WADCN	weak acid dissociable cyanide

TABLE OF CONTENTS

List of Appendices (behind text)

Project: Andy Well Project

Subject: Operations Manual TSF3 - Staff

1 GENERAL

1.1 Summary

This document presents the details of the operating procedures for the Tailings Storage Facility 3 (TSF3) at the Andy Well Project (AWP) owned by Meeka Metals Limited (MML).

This Operating Manual (OM) for the TSF3 describes the operating procedures recommended for the safe management and control of this facility. The provisions of this OM must be strictly adhered to by the Owner and the storage must be constructed and operated strictly in accordance with the provisions of the Operations Manual and the design. Soil & Rock Engineering Pty Ltd (SRE P/L) shall not be liable in any respect whatsoever for any damage to or failure in the operations of the tailings deposition and water recovery systems resulting from failure of the Owner, its servants or agents to comply with the provisions of the design and Operating Manuals for these facilities. The Appendices referred to in this document comprise the following and are to be attached to this document by the Owner:

i) Appendix C1 Emergency Assembly Points

ii) Appendix C2 Regulatory Licence and Lease Conditions

iii) Appendix C3 Operations Manual Forms Process Plant Staff

1.2 Scope of the Operations Manual

The Operations Manual (OM) for Plant Staff *'this document'* details the requirements for the personnel, Process Plant Foreman (PPF) and Process Plant Operators (PPO) who have the responsibility for day to day operation and maintenance of the TSFs. The objectives of the day to day management for the TSFs are to ensure that:

i) The TSFs and all associated infrastructure are operated, maintained and monitored to achieve the design objectives.

ii) The TSFs are operated in accordance with the design parameters that have been provided by the Owner for the design of the TSFs. Where changes in the parameters are proposed, the process plant management must advise the designers in order that the impact of the changes can be fully assessed.

iii) The TSFs are operated and maintained to maximise water removal and minimise water ponding against the containment embankments.

This document also sets out the requirements for operating the TSFs including:

i) Water recovery from the TSFs.

ii) Tailings placement/deposition.

iii) The routine daily inspections and monitoring.

iv) The objectives of the daily inspection and monitoring program.

1.3 Roles and Responsibilities

The individual responsibilities for the TSF for this project are detailed in Table 2.1 of the Operations Manual-Management. The PPF and PPO report to the Process Plant Manager (PPM).

1.4 Operator Training

All operators of the TSF and associated components and contractors working on the TSF must complete the requisite training and competency testing and be aware of the emergency procedures prior to being allowed to work on the TSF and associated components.

The PPM is responsible for ensuring that the training, competency testing and emergency awareness of operators and contractors is completed.

Personnel working around the TSFs must be advised of the regulatory requirements for the facility as part of their induction and training. Copies of the regulatory Licence and/or Lease Conditions relevant to the TSFs are attached to this document in Appendix B. The General Manager (GM) and PPM must insert these documents into Appendix C2 of this Operations Manual and must ensure that each time the regulatory conditions are changed (renewed, amended or updated), the documents are changed and the staff are advised of the changes and the training confirmation records updated accordingly.

2 CODES OF PRACTICE, GUIDELINES AND STANDARDS

The following Codes of Practice, Guidelines and Standards are relevant to the operation of the TSF:

i) DEMIRS documents comprising:
   - *'Code of Practice, Tailings Storage Facilities in Western Australia'* (2013)
   - *'Guide to the preparation of a design report for tailings storage facilities (TSFs)'* (2015)
   - *'Guideline for Mining Proposals in Western Australia'* (2016)

ii) ANCOLD document: *'Guidelines on Tailings Dams - Planning, Design, Construction, Operation and Closure'* (2019).

3 SUMMARY OF OPERATING PROCEDURES

3.1 TSF3

The following considerations have been incorporated into the design of the TSF3:

i) The TSF3 is the new southern paddock-style of TSF developed to the south of the existing TSF1 and TSF2. Water recovery will be from a pontoon-mounted pump located in a rock ring filter on the facility.

ii) Tailings in the form of a slurry will be initially discharged from the western embankment of TSF3 using multiple spigot discharge pipes, with a spacing of approximate 25 m along the perimeter embankment.

iii) The active spigot locations will be moved around the western, northern and southern embankments of TSF3 to develop the tailings beach and maintain the decant pond around the rock ring filter. Deposition from the elevated eastern will be implemented as the level of tailings rises to maintain the decant pond around the rock ring filter.

iv) Throughout the life of the TSF3, the spigot location will progressively be relocated to maintain the supernatant pond around the pontoon-mounted decant pump. This spigotting process will facilitate full utilisation of the storage capacity of the facility.

v) Water recovery would be via the pontoon-mounted decant pump inside the rock ring filter.

vi) Keeping the supernatant pond to a minimum size will have the effect of minimising evaporation from the surface of the pond and hence will assist in optimising the water recovery and tailings density.

vii) The TSF3 incorporates an underdrainage system and external sump. Water recovered by this system is to be returned to the process plant.

viii) Frequent inspections (once per shift, twice daily) should be made of the spigot, tailings lines, pontoon-mounted pump in the decant, water return lines to the process plant, the position of the pond in relation to the decant rock filter and internal water recovery pump, underdrainage sump, pump and float switches in the underdrainage sump and related return water pipelines. The return pipelines should be checked regularly for quantity and quality of water return. **Only by regular inspection and appropriate remedial action, can the performance of the water return system be optimised and additional operational problems avoided.**

ix) Monthly inspections by the PPM must be undertaken.

x) Monitoring bores adjacent to the pits will be utilised as monitoring/recovery bores. Water samples will be taken every three (3) months from the monitoring bores to check water quality, with water levels in the monitoring bores being read on a monthly basis.

xi) Depending on the decommissioning plan adopted for this facility, it may be necessary to alter the deposition philosophy near the end of the mine life. Appropriate procedures shall be developed if changes to deposition or freeboard criteria are required. If necessary, appropriate government authorities shall be advised of any changes, especially to freeboard criteria.

xii) As tailings deposition progresses, there may be a requirement for the deposition locations to be moved out of an orderly sequence in order to maximise the water recovery and utilisation of the tailings storage area.

xiii) Operation, safety and environmental aspects should be periodically reviewed during an inspection by a suitably experienced and qualified engineer. This inspection should be done at least every year.

The TSF is sized to accommodate the design storm events. The IFD obtained from the BOM indicates the 1% AEP 72-hour storm is approximately 0.182 m. Assuming the TSF is to be operated such that the supernatant pond is maintained away from the perimeter containment at the lowest pit rim, then the minimum freeboard requirements comprise the total of the following:

i) Operational Freeboard (lowest embankment crest RL to the tailings beach) 0.30 m.

ii) Beach Freeboard (tailings beach to the supernatant pond after the 1% AEP 72-hour storm) 0.2 m.

iii) The 1 in 100 AEP 72-hour storm 0.182 m on top of the normal operating supernatant pond.

The total minimum freeboard, on top of the normal operating supernatant pond, is therefore 0.682 m, say 0.7 m.

The supernatant pond level within the TSF should be as low as practicable to ensure volume is available within the TSF storage to accommodate storm events without breaching or otherwise impacting on the minimum freeboard requirements. It must be understood that:

i) Water recovery must be maximised at all times.

ii) The minimum freeboard requirement must be maintained at all times.

The tailings storage area will assume the form of a truncated prism with a depressed cone in the top surface. Frequent inspections (a minimum of three times per shift) should be made of the:

i) Tailings lines.

ii) Water return lines.

iii) Discharge points.

iv) Decant system.

v) The position of the supernatant ponds in relation to the water recovery system.

vi) The perimeter containment embankment.

vii) Monitoring and instrumentation.

The embankments should be inspected once per day. If seepage has occurred, particular attention should be paid to the embankments in the vicinity of the seepage. Only by regular inspection and appropriate remedial action can the performance of the water return system be optimised and operational problems avoided.

Operation, safety and environmental aspects should be periodically reviewed during an inspection by a suitably experienced and qualified engineer. This inspection should be done at least every year.

From a design perspective, the objective of the TSF operation is to:

i) Provide a high rate of return water to the plant.

ii) Maximise the insitu density of the tailings, which in turn maximises the storage capacity of the tailings facility.

3.2 Related Documents

This document is part of the TSF management and the related documents are:

i) TSF3 Design Document.

ii) Management Operations Manual which covers both the SPTSF and TSF3.

The forms which are relevant to this Operations Manual are provided in Appendix C and comprise the following templates:

i) Daily Inspection Log Sheet (OMPPS1).

ii) Operations Personnel Contact Details (OMPPS2).

iii) Training Confirmation Record (OMPPS3).

The content of these templates is considered to be the reasonable minimum to be used to monitor the performance of the TSF. The content of the templates can be modified by the site management, if required, to meet any additional site-specific requirements.

A plan showing the location of the Assembly Points in the event of an emergency is to be prepared by the Process Plant Management. This plan is located in Appendix A.

4 OPERATING METHODOLOGY

4.1 Background to Tailings Deposition

The method of deposition of tailings into the TSF is one of the major controlling factors to achieve or exceed the design requirements. The method of tailings deposition influences:

i) Insitu densities within the stored tailings.

ii) Water return for reuse in the process plant.

It is essential that a detailed understanding of the various components of the tailings system is acquired to understand the tailings deposition. The tailings system components include:

i) Tailings pipeline from the process plant to TSF3, including the associated valves in this pipeline which direct tailings to the various distribution points.

ii) Spigot operation and the spigotting (tailings deposition) process.

iii) Flushing procedures for the tailings pipeline(s) and spigots.

4.2 Tailings Pipeline

For this project, tailings are transported from the process plant to the TSF via a large diameter HDPE pipe (OD approximately 225 mm PN 12.5) to the pit rim where the tailings are to be discharged. This pipeline is contained within a system of bunds to enable any spillage or leakage to be contained. An access track is located outside the bunds to facilitate pipeline inspections and maintenance. This track extends from the process plant to the embankments of the TSF and onto the crest of the embankment.

4.2.1 Spigotting Process

Tailings are deposited subaerially/subaqueously, depending on the slurry water level, into TSF3 at the time of discharge. The tailings should be deposited from up to three (3) of the nominated spigot discharge points.

4.2.2 Tailings Line Flushing

At the completion of the deposition and following the changeover to any alternative deposition point, the inoperative tailings line should be flushed with water until it is clean. The flushing operation will be supervised by the PPF.

4.3 Water Management

4.3.1 Decant Operation

The TSF is provided with a decant system which removes supernatant water and discharges that water directly to the process water pond in the process plant. Return water is transported to the process plant from the TSF via an HDPE pipe (OD approximately 110 mm PN 12.5).

There is a tradeoff between the size of the decant pond, the clarity of the supernatant water and evaporation losses. Factors to be considered in the managing of the decant operation are:

i) Little or no pond around the decant facility is likely to produce turbid or dirty water in the water return.

ii) A large pond around the decant will produce clear water, but evaporation and potential seepage losses from the pond will be high.

iii) The water pond should not be so large that the storm freeboard volume is compromised.

The location of the decant pond will be controlled by the tailings discharge sequence. The process of tailings deposition is to ensure that the pond is positioned around the decant facility and that it is maintained in that position. The pond is positioned by altering the location of the deposition point around the perimeter of the storage, as appropriate. During the initial start-up, a temporary pump may be required until water can enter the decant rock ring.

4.3.2 Water Recovery

The pond around the decant facility should be maintained at the smallest practical operational size to maximise water return to the plant and allow the tailings beaches to drain, dry and desiccate.

The size of the pond will be largely governed by the operational requirements for maintaining some water cover and the efficiency of the decant system in removing water from the tailings storage. Other controlling factors will be:

i) Evaporation from the surface of the pond.

ii) Variations to the input of tailings slurry (percent solids).

iii) Rainfall events.

Because the TSF is unlined, there will be some loss of water via seepage.

4.3.3 Storm Events

The TSF has been sized to accommodate storm events and the minimum total freeboard comprising the operational freeboard and storm freeboard for the TSF is 0.7 m. Water recovery must be maximised at all times. The minimum freeboard requirement must be maintained at all times.

4.4 Inspections

A minimum of two (2) inspections must be carried out on each day (1 during the day shift and 1 during the night shift). Inspections must be executed by trained staff, namely the PPF on each shift or by a designated trained operator. The date and time of each inspection is to be entered into the PPF's logbook and is to be signed by the person allocated to undertake the inspection on that shift, to ensure the requirements have been undertaken. The Daily Inspections must cover the following:

i) The pipelines (tailings delivery line and water return line) to and from the tailings storage facility.

ii) Bunding arrangements.

iii) Leak detection.

iv) Pumps.

v) Spigots and valves.

vi) Spigotting and deposition.

vii) Location and size of the supernatant water pond.

viii) The decant and decant pump.

ix) The embankment crest, upstream and downstream face.

x) Seepage from the embankment toe, if any.

xi) The general integrity of the embankment i.e. any new cracking, any new seepage (daily).

xii) Any changes to existing cracking or seepage.

xiii) Process Water Pond.

Any leaks or failures of the tailings pipeline, damage to the bunds or HDPE liner in the process water or abnormally high water levels in the process water pond, must be immediately reported to the PPF or his nominated representative, as appropriate, and an incident report completed and submitted to the:

i) Maintenance Manager (MM)

ii) PPM

iii) Environmental Superintendent

4.4.1 Tailings and Return Water System

All tailings lines and water return lines should be located in bunded corridors. The tailings lines, particularly on the embankment crests of the TSF, are sensitive to temperature and the expansion and contraction of this line can cause leaks and in extreme situations, failure of the pipeline.

The process water pond must also be inspected to ensure that the water from the TSF water return pipes is clear and the level of the water in the pond is at or below the design level. High water levels, above the design water level, must be reported. The HDPE liners to the process water pond are also susceptible to damage from animals. Any damage to HDPE liners noted during the inspection must be reported immediately, to the relevant personnel, and an incident report completed.

4.4.2 Decant System

The position and size of the pond in relation to the decant facility must be inspected at least once per shift. Any abnormalities must be immediately reported to the maintenance and process plant personnel.

4.4.3 Embankments

As part of each inspection of the TSF, the embankments forming the containment of TSF, including berms and batter slopes, must be visually assessed. The presence of any new cracking or other features such as embankment erosion or scour (caused by tailings deposition or rainfall runoff) or any other obvious changes to the physical state of the embankments since the previous inspection, must be entered into the PPF's logbook and immediately reported to the relevant personnel, as per the responsibility hierarchy.

4.4.4 Seepage

Monitoring bores are installed adjacent to TSF3 to monitor ground water levels and quality. The integrity of these bores must be routinely checked to ensure the bores remain intact and are not damaged. It is the responsibility of the Environmental staff to measure ground water levels on a monthly basis and collect water samples for analysis on a quarterly basis. Any damage must be reported, as per the responsibility hierarchy.

4.5 Warning Signs and Fencing

Warning signs around the facilities are recommended and the integrity of any stock fencing adjacent to TSF3 must be checked daily. Any observed damage to fencing must be immediately reported to the relevant personnel or project equivalents, as appropriate, and an incident report completed.

5 EMERGENCY ACTION PLAN

5.1 Response Actions

In the event of an emergency, the site Emergency Response Team (ERT) must immediately be notified and advised of the nature of the emergency to enable the appropriate emergency action plan to be implemented. The site emergency response plan contains the details presented in the following sections, such that response activities are coordinated with operations personnel.

At the time of the emergency, the PPF or his designated (trained operator) representative is to ensure that:

i) All personnel and contractors who were, or are working in or around the location of the emergency, are accounted for.

ii) Personnel Contact Details are provided on form OMPPS2 appended to this document. This form must be reviewed quarterly as a minimum and must be updated immediately in the event of personnel leaving or joining the operation.

iii) All mine-based personnel listed in the responsibility hierarchy are immediately contacted and advised of the nature of the emergency and any assistance required is requested.

All personnel who are working in the vicinity of the emergency are expected to be present at the muster points and are expected to be aware of other assembly points around the TSF and the relevant reporting procedures. Emergency assembly points are shown in Appendix A of this document.

5.2 Tailings Storage

The embankments of TSF3 have an adequate factor of safety against failure under normal operating and seismic load conditions, appropriate for the location.

Normal operating conditions refer to the tailings surface and surface of the supernatant water pond being within the freeboard requirements.

The probability of the containment (pit wall) failing during normal operations is very low, given:

i) It comprises insitu materials with adequate strength to support the proposed operation of the SPTSF.

ii) The implementation of the tailings operation methodology, appropriate to the facility, including the routine inspections and maintenance practices is adhered to as set out in this document.

However, in the unlikely event of pit wall failure, the flow of tailings from the storage will be controlled by the extent of the water pond and degree of saturation of the tailings at the time of failure.

Action to control a small-scale pit wall failure and limit environmental damage would include:

i) Assessing the requirement to shut down the process plant, or reduce process plant throughput.

ii) Diversion of tailings deposition to areas not affected by the small-scale embankment failure.

iii) Construction of bunds by earthmoving equipment to divert and contain the tailings.

iv) Contacting a suitably qualified geotechnical organisation for technical assistance.

v) Deployment of pumps to recover tailings water as appropriate and return it either to the TSF if structurally sound, or to the plant water storage facilities if evaporation and/or dilution is impractical.

vi) Undertaking a thorough inspection of the area with or without a specialist, depending on the scale of the failure, prior to the commencement of any repairs.

vii) Undertaking remedial and repair work of the damaged pit wall area.

viii) Clean-up of tailings as soon as practicable after embankment repairs have been completed and the storage is considered in a safe condition.

ix) Preparing an incident report, detailing all factors prior to the incident and the situation after clean-up. The report should identify causes of the problem and what actions will be taken to prevent a similar occurrence. This report should detail the on-going monitoring programme to fully assess the impact of the incident.

x) Advising all appropriate government departments as necessary of the incident and reviewing the conditions of the operating licence and lease conditions to ensure that the timing of reports and content of reports meets the regulatory requirements.

Action to control a large-scale embankment failure and to limit environmental damage would include:

i) Shut down of the process plant.

ii) Construction of bunds by earthmoving equipment to divert and contain the tailings.

iii) Contacting a suitably qualified geotechnical organisation for technical assistance.

iv) Advising the relevant regulatory authorities.

v) Deployment of pumps to recover tailings water and returning it to the TSF if structurally sound or to the plant water storage facilities if evaporation and or dilution is impractical.

vi) Undertaking a thorough inspection of the area with the assistance of a geotechnical specialist prior to the commencement of any repairs.

vii) Repairing the damaged pit wall.

viii) Cleaning up of tailings as soon as practicable after the repairs have been completed.

ix) Preparing an incident report, detailing all factors prior to the incident and the situation after clean-up. The report should identify causes of the problem and what actions will be taken to prevent a similar occurrence. This report should detail the on-going monitoring programme to fully assess the impact of the incident.

x) Advising all appropriate regulatory authorities as necessary of the incident.

xi) Reviewing conditions of any licence or lease conditions in respect to the timing of advising the regulatory authorities and the contents of that notification (reporting criteria).

It must be stressed however, that the safe operation of the TSFs relies upon the implementation of operational procedures which comprise tailings deposition, decant operation and routine inspections and maintenance, as set out in this document to minimise the potential for a catastrophic event such as a failed embankment.

5.3 Tailings Lines and Return Water Lines

The tailings lines from the process plant to the tailings storage and the return water lines from the decant facilities to the process water dam are to be located inside bunded open trenches to contain any spillage of materials resulting from leaks or burst pipes during operation. In the event of pipeline failure, the PPM is to be notified and the affected pipeline is to be shut down until repaired and the spilled materials collected and/or pumped, as appropriate, and deposited in the TSFs.

5.4 Process Water Tank

The decant pump is operated manually and run at all times. The pump is only switched off:

i) During plant shutdowns or maintenance periods.

ii) When dirty water is pumped into the process water tank.

Alternative pumping equipment and pump locations may be required during periods of pump maintenance or when embankment construction work is being undertaken.

6 INCIDENT REPORTING

The objective of regular inspections by the designated process plant staff and monitoring by the environmental staff is to identify any problems prior to them causing a major impact on the operation or integrity of the TSFs and associated infrastructure.

The inspections may result in the identification of an event that may require reporting to senior staff and in some cases to relevant regulatory authorities.

Appendix C1

Emergency Assembly Points

Andy Well Project
Tailings Storage Facility

Appendix C2

Regulatory Licence and Lease Conditions

Andy Well Project
Tailings Storage Facility

Appendix C3

Operations Manual Forms Process Plant Staff

Andy Well Project

Tailings Storage Facility

This appendix contains the following:

iii) *Daily Inspection Log Sheet (OMPPS1);*

iv) *Operations Personnel Contact Details (OMPPS2); and*

v) *Training Confirmation Record (OMPPS3).*

TSF DAILY INSPECTION LOG SHEET (OMPPS1)					
PROJECT:	**ANDY WELL PROJECT**			**DATE:**	
LOCATION:	**MEEKATHARRA**			**Dayshift**	**Nightshift**
SHIFT SUPERVISOR:			**TIME**		
INSPECTION BY:					
ACTIVE TSF:	**SPTSF**				

ITEM	CRITERIA	COMPLIANCE	NON-COMPLIANCE	COMMENTS
Access Roads	Condition of access road to the TSF			
	Condition of access roads on the TSF embankment / around the perimeter of the TSF			
Tailings/Return Solution Pipeline	Pipeline Integrity			
	Spigot and Valve integrity			
	Satisfactory discharge of tailings			
	Integrity of bunding to TSF			
HDPE Liners	Containment Bunding Integrity			
	Integtrity at Spigot and Valve location			
	TSF Embankment and reservoir liner integrity			
	WSF Embankment liner integrity			
Decant Structure	Satisfactory Operation of Pump			
	Integrity of Decant Structure			
	Solution Clarity			
Decant Pond	Pond Level			
	Pond Size			
	Pond Location			
Tailings Deposition	Active tailings delivery line			
	No. of active discharge spigots/outfalls			
	Available tailings freeboard			
	Spigot discharge even/uneven?			
TSF Embankment	Any new seepage downstream?			
	Any change in existing seepage?			
	Any spillages?			
	Any cracking?			
	Any erosion?			
	Upstream slope erosion or defects?			
	Other defects?			
Fauna	Any deaths?			
Flora	Any new distress?			
Monitoring Equipment	Satisfactory Operation of Instrumentation			

TSF PERSONNEL CONTACT DETAILS (OMPPS2)

NOTE: This sheet must be updated quarterly as a minimum. This sheet must be updated immediately following personnel leaving or starting on site and shall include all personnel listed below, and associated with the TSF.

PROJECT:	**ANDY WELL PROJECT**	**DATE:**	
LOCATION:	**MEEKATHARRA**		

PERSONNEL	POSITION	CONTACT DETAILS (WORK PHONE, MOBILE PHONE, HOME PHONE)
	General Manager	
	Process Plant Manager / Superintendent	
	Mill Foreman	
	Maintenance Manager / Superintendent	
	Mine Manager / Superintendent	
	Environmental Manager / Superintendent	
	Security Manager / Superintendent	
	Emergency Response Team	
	Emergency Response Team	
	Emergency Response Team	
	Emergency Response Team	
	Emergency Response Team	
	Emergency Response Team	
	Emergency Response Team	
	Emergency Response Team	
	Emergency Response Team	
	Emergency Response Team	
	Operator	
	Operator	
	Operator	
	Operator	
	Operator	
	Operator	
	Operator	
	Operator	
	Operator	

TSF PERSONNEL TRAINING REGISTER (OMPPS3)

All Operators of the TSF and associated components and Contractors working on the TSF must complete requisite training, competency testing and be aware of the emergency procedures prior to being allowed to work on the TSF.

PROJECT:	**ANDY WELL PROJECT**	**DATE:**	
LOCATION:	**MEEKATHARRA**		

PERSONNEL	POSITION	TRAINING COMPLETED	COMPETENCY TESTING
	General Manager		
	Process Plant Manager / Superintendent		
	Mill Foreman		
	Maintenance Manager / Superintendent		
	Mine Manager / Superintendent		
	Environmental Manager / Superintendent		
	Security Manager / Superintendent		
	Emergency Response Team		
	Emergency Response Team		
	Emergency Response Team		
	Emergency Response Team		
	Emergency Response Team		
	Emergency Response Team		
	Emergency Response Team		
	Emergency Response Team		
	Emergency Response Team		
	Emergency Response Team		
	Operator		
	Operator		
	Operator		
	Operator		
	Operator		
	Operator		
	Operator		
	Operator		
	Operator		

Appendix D

Operations Manual Process Plant Management - Forms

Andy Well Project
Tailings Storage Facilities

This appendix contains the following:

- *Operating Manual Completion Form (OMPPM1)*
- *Operating Manual Update Form (OMPPM2)*
- *Monthly Inspection Log Sheet (OMPPM3)*
- *Outline of Yearly Audit Criteria (OMPPM4)*
- *Incident Reporting Sheet (OMPPM5)*

TSF EVIDENCE OF COMPLETION - TAILINGS STORAGE OPERATING MANUAL (OMPPM1)

PROJECT:	ANDY WELL PROJECT	DATE:	
LOCATION:	MEEKATHARRA		
ACTIVE TSF:	SPTSF AND TSF3		

For and on behalf of ……,
I, ………(Registered Manager), do hereby confirm that an Operating Manual for the …………………………………………Tailings Storage Facilities at Syama has been prepared in accordance with the current edition of the *Guide to preparation of design report for TSFs (WADMP August 2015) Guide to Departmental requirements for the management and closure of tailings storage facilities (TSFs) (WADMP August 2015) and Code of Practice Tailings Storage Facilities in Western Australia (WADMP 2013*). A copy of the Manual is stored at …….
and is available for inspection by any authorised personnel.

Signature:……… (Registered Manager)

Signature of witness: ……

Name of witness:……
……
Date:…………………………………………………………………………………………………

TSF EVIDENCE OF AMENDMENT OR UPDATE - TAILINGS STORAGE OPERATING MANUAL (OMPPM2)

PROJECT:	**ANDY WELL PROJECT**	**DATE:**	
LOCATION:	**MEEKATHARRA**		
ACTIVE TSF:	**SPTSF AND TSF3**		

For and on behalf of ………,
I, ………(Registered Manager), do hereby confirm
that the Operating Manual for the …………………………………………Tailings Storage Facility has *
- been amended/updated in accordance with the current edition of the Guide to preparation of design report for TSFs (WADMP August 2015) Guide to Departmental requirements for the management and closure of tailings storage facilities (TSFs) (WADMP August 2015) and Code of Practice Tailings Storage Facilities in Western Australia (WADMP 2013). A copy of the Manual is stored at
……
and is available for inspection by any authorised personnel.
- been subjected to a review in accordance with the current edition of the in accordance with the current edition of the Guide to preparation of design report for TSFs (WADMP August 2015) Guide to Departmental requirements for the management and closure of tailings storage facilities (TSFs) (WADMP August 2015) and Code of Practice Tailings Storage Facilities in Western Australia (WADMP 2013) and no amendments were considered necessary. A copy of the Manual is stored at …… and is available for inspection by any authorised personnel.
***delete inapplicable paragraph**

Signature:…… (Registered Manager)

Signature of witness: ……

Name of witness:………
……
Date:…………………………………………………………………………………………………

TSF MONTHLY INSPECTION LOG SHEET (OMPPM3)

PROJECT:	**ANDY WELL PROJECT**	**DATE:**	
LOCATION:	**MEEKATHARRA**		
SHIFT SUPERVISOR:		**TIME**	
INSPECTION BY:			
ACTIVE TSF:	**SPTSF AND TSF3**		

ITEM	CRITERIA	COMPLIANCE	NON-COMPLIANCE	COMMENTS
TSF Embankment	Any new seepage downstream?			
	Any change in existing seepage?			
	Any spillages?			
	Any cracking?			
	Any erosion?			
	Upstream slope erosion or defects?			
	Other defects?			
HDPE Liners	Containment Bunding Integrity			
	Integtrity at Spigot and Valve location			
	TSF Embankment and reservoir liner integrity			
	WSF Embankment liner integrity			
	HDPE liner Defects reported each month			
	Effectiveness of HDPE liner repairs			
Monitoring	Monitoring Bore Data measured and recorded?			
	Water quality from the monitoring bore checked / tested and recorded?			
	Water quality from any seepage checked / tested and recorded?			
	Data from Vibrating Wire Piezometers measured and recorded?			
Process Plant	Ore processed for the month (tonnes)			
	Average tailings density (%solids)			
	Water return from the TSF to the process plant (tonnes and m^3)			
Climatic Data	Rainfall measured and recorded daily and monthly total given to the Metallurgical Department			
	Evaporation measured and recorded daily and monthly total given to the Metallurgical Department			
Documentation	Daily logs complete for each day			
	All proformas up to date and available			
	Emergency Preparedness			

TSF QUARTERLY INSPECTION LOG SHEET (OMPPM4)

PROJECT:	ANDY WELL PROJECT	DATE:	
LOCATION:	MEEKATHARRA		
SHIFT SUPERVISOR:		TIME:	
INSPECTION BY:			
ACTIVE TSF:	SPTSF AND TSF3		

ITEM	CRITERIA	COMPLIANCE	NON-COMPLIANCE	COMMENTS
TSF Embankment	Any new seepage downstream?			
	Any change in existing seepage?			
	Any spillages?			
	Any cracking?			
	Any erosion?			
	Upstream slope erosion or defects?			
	Other defects?			
HDPE Liners	Containment Bunding Integrity			
	Integtrity at Spigot and Valve location			
	TSF Embankment and reservoir liner integrity			
	WSF Embankment liner integrity			
	HDPE liner Defects reported each month			
	Effectiveness of HDPE liner repairs			
Monitoring	Monitoring Bore Data measured and recorded?			
	Water quality from the monitoring bore checked / tested and recorded?			
	Water quality from any seepage checked / tested and recorded?			
	Data from Vibrating Wire Piezometers measured and recorded?			
Process Plant	Ore processed for the month (tonnes)			
	Average tailings density (%solids)			
	Water return from the TSF to the process plant (tonnes and m^3)			
Climatic Data	Rainfall measured and recorded daily and monthly total given to the Metallurgical Department			
	Evaporation measured and recorded daily and monthly total given to the Metallurgical Department			
Documentation	Daily logs complete for each day			
	All proformas up to date and available			
	Emergency Preparedness			

TSF ANNUAL GEOTECHNICAL REVIEW CHECKLIST (OMPPM5)

PROJECT:	**ANDY WELL PROJECT**	**DATE:**	
LOCATION:	**MEEKATHARRA**		
SHIFT SUPERVISOR:		**TIME**	
INSPECTION BY:			
ACTIVE TSF:	**SPTSF AND TSF3**		

ITEM	CRITERIA	COMPLIANCE	NON-COMPLIANCE	COMMENTS
TSF Embankment	Any new seepage downstream?			
	Any change in existing seepage?			
	Any spillages?			
	Any cracking?			
	Any erosion?			
	Upstream slope erosion or defects?			
	Other defects?			
Access Roads	Condition of access road to the TSF			
	Condition of access roads on the TSF embankment / around the perimeter of the TSF			
Tailings/Water Pipeline	Pipeline Integrity			
	Spigot and Valve integrity			
	Satisfactory discharge of tailings			
	Integrity of bunding to TSF			
Decant Structure	Satisfactory Operation of Pump			
	Integrity of Decant Structure			
	Water Clarity			
Decant Pond	Pond Level			
	Pond Size			
	Pond Location			
Tailings Deposition	Active tailings delivery line			
	No. of active discharge spigots/outfalls			
	Available tailings freeboard			
	Spigot discharge even/uneven?			
HDPE Liner Performance	Liner defects recorded?			
	Defects noted during audit process?			
	Results of repairs checked / tested and recorded?			
	Causes of defects?			
Process Plant	Ore processed for the month (tonnes)			
	Average tailings density (%solids)			
	Water return from the TSF to the process plant (tonnes and m^3)			
Climatic Data	Rainfall measured and recorded daily and monthly total given to the Metallurgical Department			
	Evaporation measured and recorded daily and monthly total given to the Metallurgical Department			
Documentation	Daily and monthly logs complete			
	All proformas up to date and available			
	Emergency Preparedness			
	Check existing documentation for design, construction and decommisioning history of facilities.			
Monitoring	Monitoring Bore Data measured and recorded?			
	Water quality from the monitoring bore checked / tested and recorded?			
	Water quality from any seepage checked / tested and recorded?			
	Data from Vibrating Wire Piezometers measured and recorded?			
Regulatory Docs	Check current licence and lease conditions for compliance			
Obtain Data for reporting	Survey Data (3D DXF format) for each TSF			
	Plant throughput for previous year			
	Projected plant through put for present year			
	Projected plant through put for next year			
	Slurry density previous year			
	Slurry density present year			
	Slurry density next year			
	Active TSFs			
	Inactive TSFs			
	Decommissioned TSFs			

TSF INCIDENT REPORT (OMPPM6)

PROJECT:	**ANDY WELL PROJECT**	**DATE:**	
LOCATION:	**MEEKATHARRA**		
SHIFT SUPERVISOR:		**TIME**	
REPORT BY:			
TSF:	**SPTSF AND TSF3**		

	ITEM			
STORAGE DATA	Name of Mine:	Syama Mine Mali		
	Phone Number:	+223 6675 5660		
	Name of Facility:	FTSF ☐ OTSF ☐ CTSF ☐ DTSF ☐		
	Date and Time of Incident:			
	Incident Location:			
	Facility Type:	Paddock		
	Status:	Active		
	Discharge Method:	Multi Spigot		
	Water Recovery:	Pump on Pontoon		
	Type of Tailings Stored:	Gold ☐		
	Annual Production Rate: (Mtpa)			
	Water Quality: (pH, TDS, mg/l)			
	Known Hazardous Chemicals:			
WALL FAILURE INCIDENTS	Embankment Failure Dimensions: (L x W x H in m)			
	Failure Mode	Foundation Sliding ☐ Wall sliding ☐ Wall erosion by rain / pipe failure ☐ Piping ☐ Overtopping ☐ Other ☐		
	Describe the Failure Event: (eg. Initiation point, sequence of events)			
Water Issues in the vicinity before the wall failure occurred	Seepage / leakage through:	Embankment ☐ Foundation ☐ Buried Pipes ☐ Other ☐		
	Estimated Quantity: (L/s)	Moist/Damp ☐ Wet only ☐		
	Control Methods:			
	Rainfall in the previous 72 hours: (mm)			
	Downstream Ponding adjacent to failure?			
	Upstream Pond Location:	Against failure wall ☐ Away from Failure wall (give distance) ☐ Other ☐		
	Freeboard behind crest: (to top of tailings, and water in m)			
Foundation soil/rock types, weathering etc	Describe Foundation Geology in immediate area:			
Construction details of wall that failed	Construction completion date:			
	Overall Embankment Height: (m)			
	Slope angle in failure area:			
	Wall Designed by:	Experience ☐ Geotechnical Methods ☐ None ☐		
	Embankment Construction Material and Methods:			
	Date of most recent Geotechnical Review: (and who by)			
OTHER INCIDENTS	Pipe Failure ☐ Overtopping with no wall failure ☐ Return Water Pond overflow ☐ Other (describe) ☐			
RESULTS OF THE INCIDENT	Type of material released:	Tailings ☐ Water ☐ Other (describe) ☐		
	Duration of Release:	< 1 hour ☐ 1 to 2 hours ☐ 2 to 6 hours ☐6 to 24 hours ☐ >24 hours ☐		
	Amount or volume of materials released: (m^3 / tonnes)			
	Released material contained?			
	Area affected: (m^2/ha)			
	Maximum distances travelled by (a) tailings and (b) water: (km)			
ENVIRONMENTAL DAMAGE (list adverse effects: flora/fauna deaths, water pollution etc)	Describe the environmental impact and downstream facilities that were affected:			
MONITORING DETAILS (eg visual, EDM, piezometers, frequency of monitoring etc)	Signs of failure observed or monitored prior to the failure? Monitoring Methods used: Summarise observations of monitoring results:			

TSF INCIDENT REPORT (OMPPM6)

PROJECT:	**ANDY WELL PROJECT**	**DATE:**	
LOCATION:	**MEEKATHARRA**		
SHIFT SUPERVISOR:		**TIME**	
REPORT BY:			
ACTIVE TSF:	**SPTSF AND TSF3**		

SKETCH	Sketch a plan of the facility showing the extent of the failure area:
	Show the following on the above sketch plans:
	Extent of embankments and tailings material failure as appropriate
	All access ways into underground mines (eg shafts, declines, sink holes, intake and exhaust rises etc)
	All tailings storage facilities
	Evaporation Ponds, water storage facilities (including thickeners)
	Open pits, waste dumps
	Offices, accommodation, etc
	Roads, airfields
	Buildings (eg mill, concentrator, workshops, etc) and fuel storage areas
	Direction of surface drainage flow
	Indicate True North direction and approximate scale

Additional comments:

Route Cause Analysis:

Actions:

By	Description	Date	Completed	Acceptance	Date		

Mitigation Strategies:

REGISTER OF TSF DESIGN OR OPERATION CHANGES (OMPPM7)

All changes to the design and/or operation TSF, no matter how minor, must be thoroughly documented, approved and recorded in this Register.

PROJECT:	**ANDY WELL PROJECT**	**DATE:**	
LOCATION:	**MEEKATHARRA**		

DATE OF CHANGE	**DETAILS OF DOCUMENT WHICH HAS BEEN CHANGED**	**DESCRIPTION OF CHANGE**	**APPROVED BY**

Appendix E

As Built Drawings

Andy Well Project
Tailings Storage Facilities