

**Design
for a better
*future /***

Brightstar Resources

**Brightstar Gold Project:
Beta Tailings Storage
Facilities**

Detailed Feasibility Study
Report



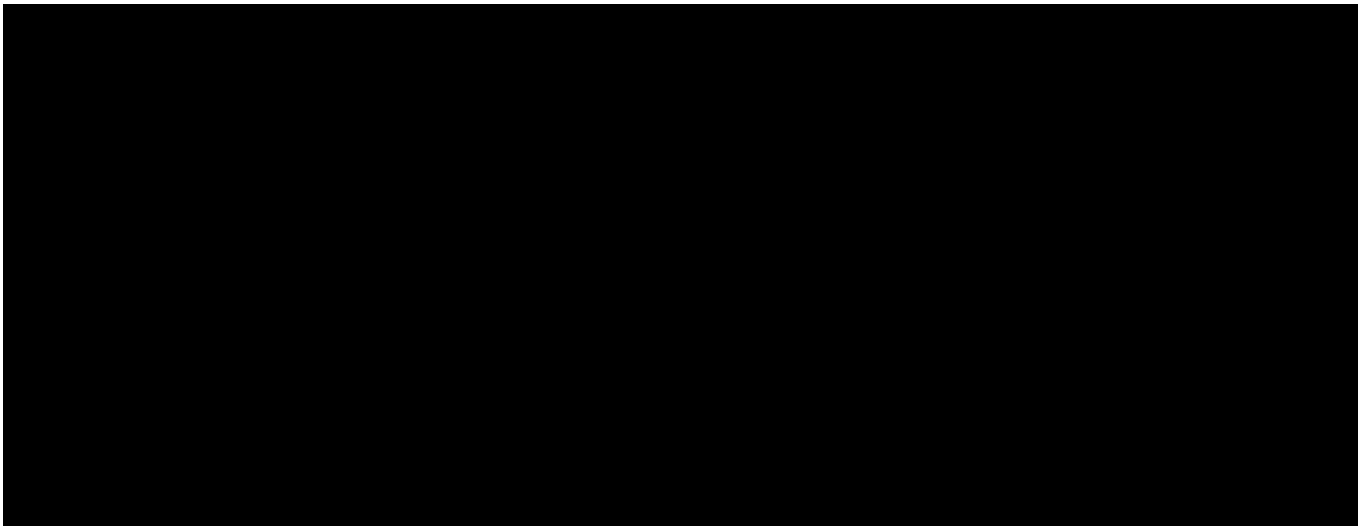
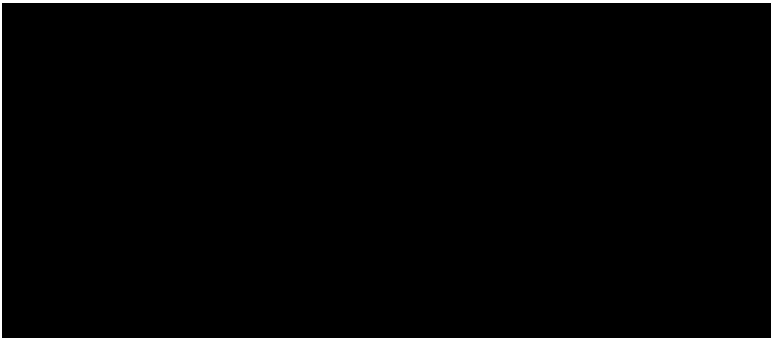
May 2025

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Brightstar Gold Project: Beta Tailings Storage Facilities
Detailed Feasibility Study Report

Brightstar Resources



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Abbreviations

AEP	Annual Exceedance Probability
ANCOLD	Australian National Committee on Large Dams
BGL	Below Ground Level
BTR	Brightstar Resources Limited
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety (WA)
FoS	Factor of Safety
GISTM	Global Industry Standard on Tailings Management
IPTSF	In-Pit Tailings Storage Facility
LOD	Life of Design
RL	Reduced Level
Su	Undrained Shear Strength
TSF	Tailings Storage Facility
WSP	WSP Pty Ltd

1 Introduction

1.1 Scope

Brightstar Resources Limited (BTR) has engaged WSP to conduct a Feasibility Study level design for tailings storage in the Beta open pits at the Brightstar Gold mine under contract BTR_PFS_01.

1.2 Project background

The Brightstar Gold Mine is located approximately 35 km southeast of Laverton, Western Australia, as shown in Figure 1.1.

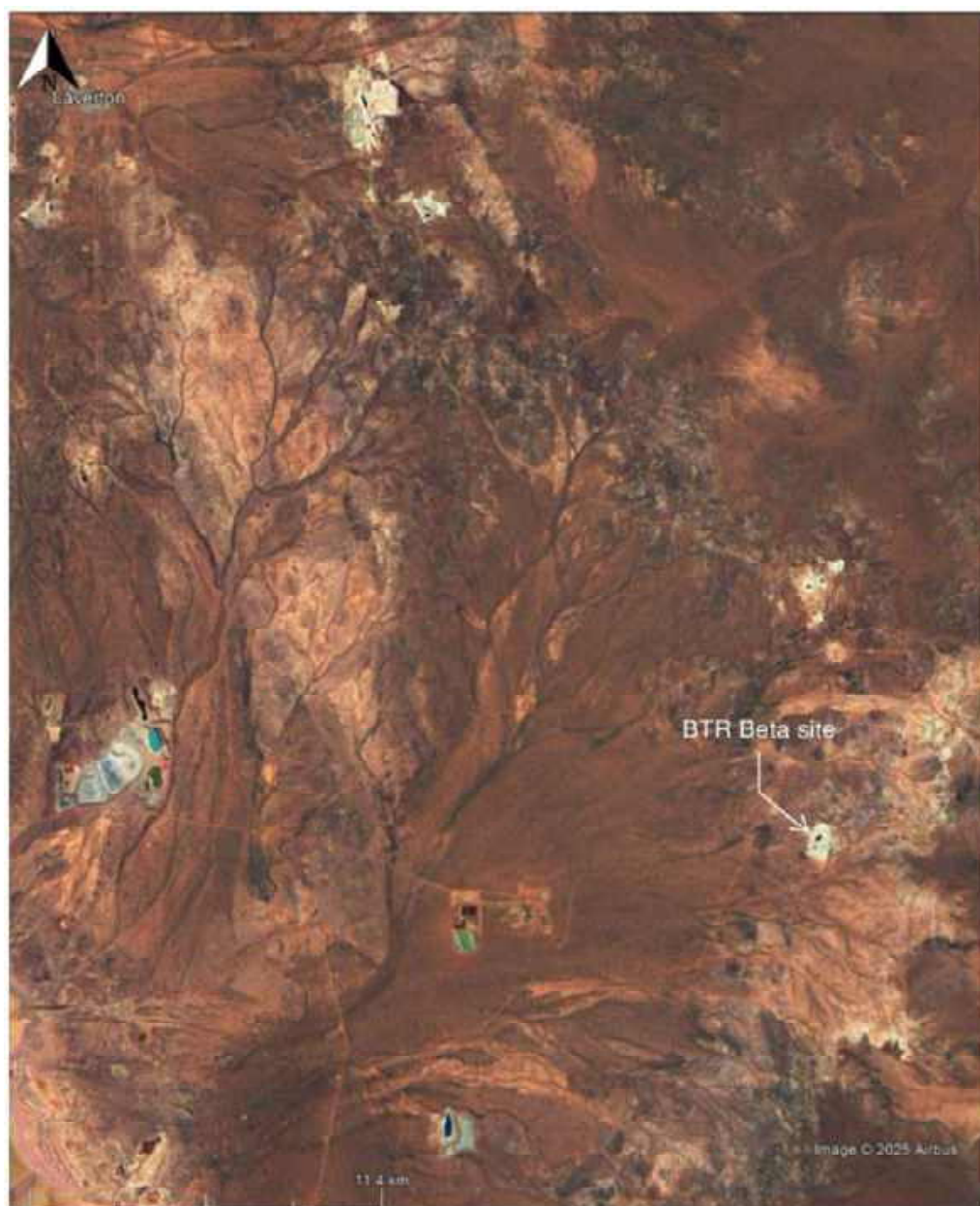


Figure 1.1 BTR Beta site location

The site was previously operated from December 2009 to September 2012 by Stone Resources, prior to being placed in care and maintenance.

The proposed refurbishment of the Brightstar Beta processing plant is currently in the feasibility study phase, necessitating the development of tailings storage solutions. The tailings storage options evaluated in this study include:

- In-Pit Tailings Storage Facilities: Utilizing the Central and South Beta pits.
- Donut Beta Tailings Storage Facility: Constructing a perimeter embankment around the Central and South Beta pits.

A scoping study conducted for the BTR Menzies and Laverton Gold projects (Brightstar Resources, 2023) indicated that toll treatment of the Lady Shenton and Yunndaga ore from the BTR Menzies project will initially occur at third-party processing facilities. Tailings generated during this period will be stored at the third-party facilities.

Following completion of the Beta plant refurbishment, ore from various deposits within the Laverton area are intended to be processed at the Beta plant, and the associated tailings storage requirements are addressed in this study.

1.3 Site layout

The BTR Beta site project boundary (mining lease M38/009) includes three existing open pits (North, Central, and South), two waste dumps, a ROM pad, a Carbon-in-leach (CIP) processing plant, a tailings storage facility (TSF), a process water dam, a laydown area, topsoil stockpiles, an accommodation camp, site offices, access roads, and associated infrastructure.

The site infrastructure is constrained within the M38/9 tenement boundaries with little to no extra space. The M38/9 tenement boundary is surrounded by the E38/2032 tenement boundary, currently held by Focus Minerals. BTR also hold a general-purpose lease on tenement G38/39 approximately 500 m west of the Beta site, shown in Figure 1.2.

The site layout is shown in Figure 1.3.



Figure 1.2 Location of the M38/009 and G38/039 tenements held by BTR



Figure 1.3 BTR Beta site layout

2 Site characteristics

2.1 Topography

The BTR Beta site is in a low relief, sparsely vegetated area with a south-westerly slope of approximately 0.5%. The North Beta pit covers approximately 17.7 ha and is approximately 30 m deep with elevations ranging from approximately 470 m RL to 440 m RL. The Central Beta pit covers approximately 76.5 ha and is approximately 50 m deep with elevations ranging from 473 m RL to 423 m RL. The South Beta pit covers approximately 32.6 ha and is approximately 37 m deep with elevations ranging from 460 m RL to 423 m RL. The base depth of the pits is inferred from 2010 “as-mined” survey details, but the detailed current base topography of the pits is unknown due to ponds being present in the pits during the time of recent survey (March 2024).

2.2 Climate

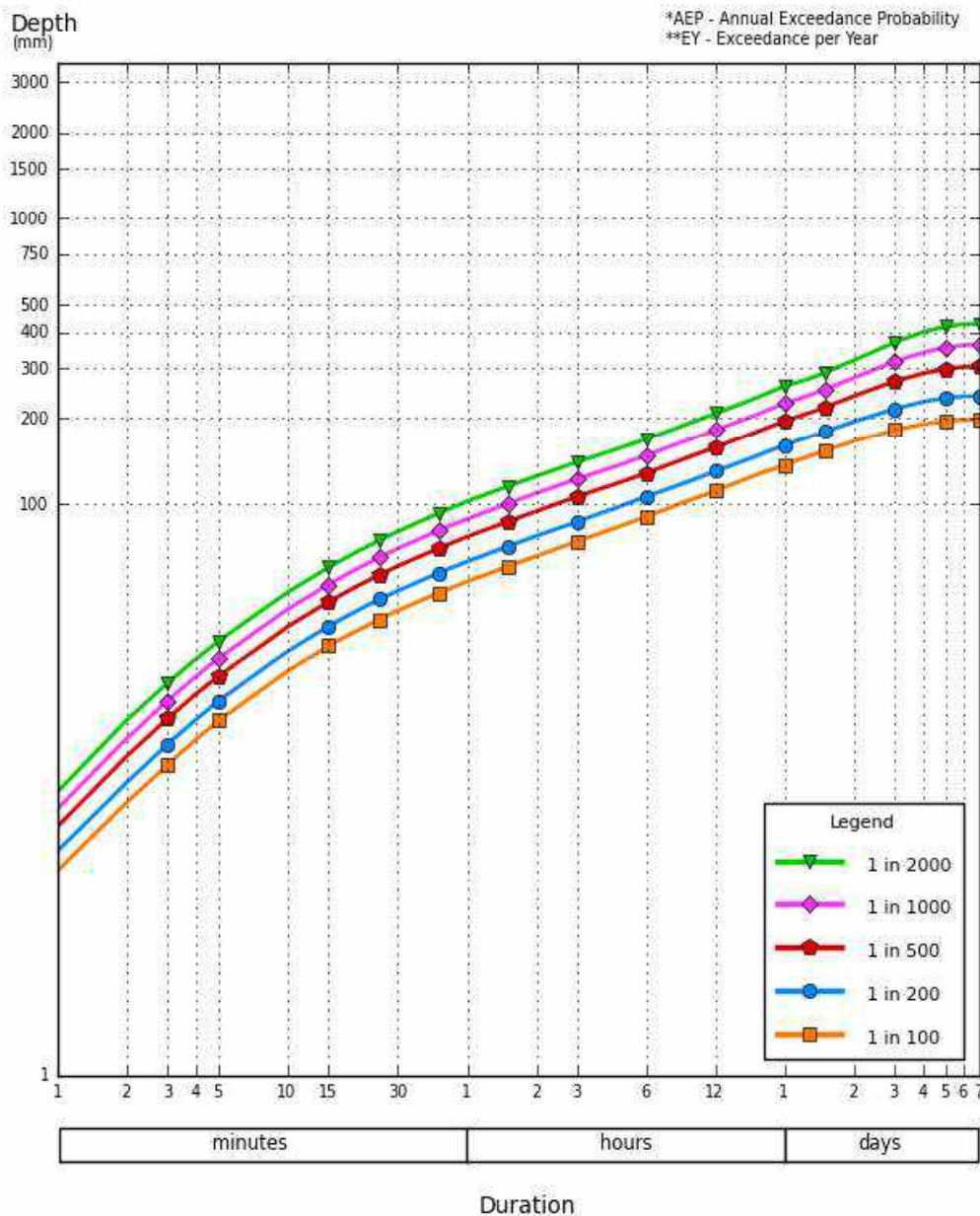
2.2.1 *Rainfall and evaporation*

The Eastern Goldfields experiences a semi-arid climate, characterised by hot summers and cool winters.

The nearest BoM weather stations to the site, from which data was adopted for this study, are Laverton and Laverton Aerodrome.

Rainfall data from the Laverton Aerodrome station (located approximately 25 km from the site) indicates an annual mean rainfall of 276 mm calculated from 31 years of data. Monthly mean rainfall ranges from 7.6 mm in September to 50.6 mm in February, rainfall is evenly spread throughout the year with majority of the rain falling between November to March.

Rainfall intensity-frequency-duration (IFD) data for the BTR Beta site is presented in Figure 2.1, which has been sourced from the Bureau of Meteorology.



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Figure 2.1 IFD data for the BTR Beta site

Evaporation data indicates a mean evaporation rate of approximately 2,500 mm per year. Based on monthly data, the potential evaporation rates are significantly higher than potential rainfall depths for the entirety of the year as shown in Figure 2.2.

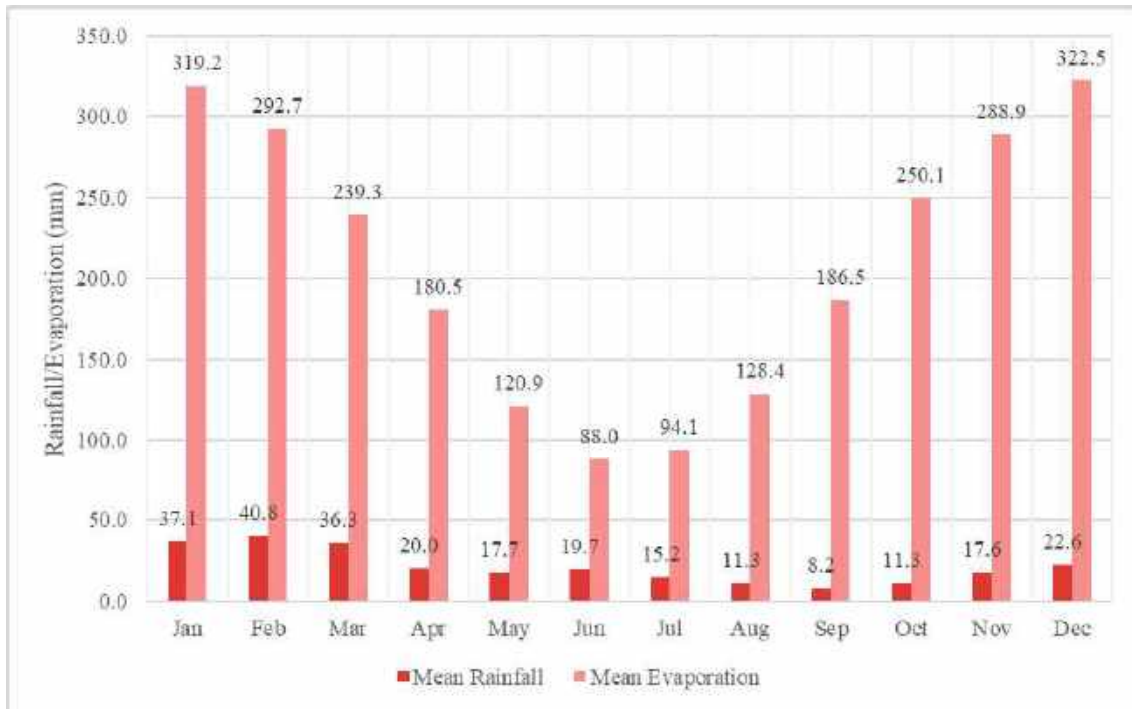


Figure 2.2 Mean climate data at weather stations closest to the BTR Beta site

2.2.2 Temperature

The average monthly daytime temperature at Laverton exceeds 30°C from November to March (inclusive). Mean monthly maximum and minimum temperatures are presented in Figure 2.3.

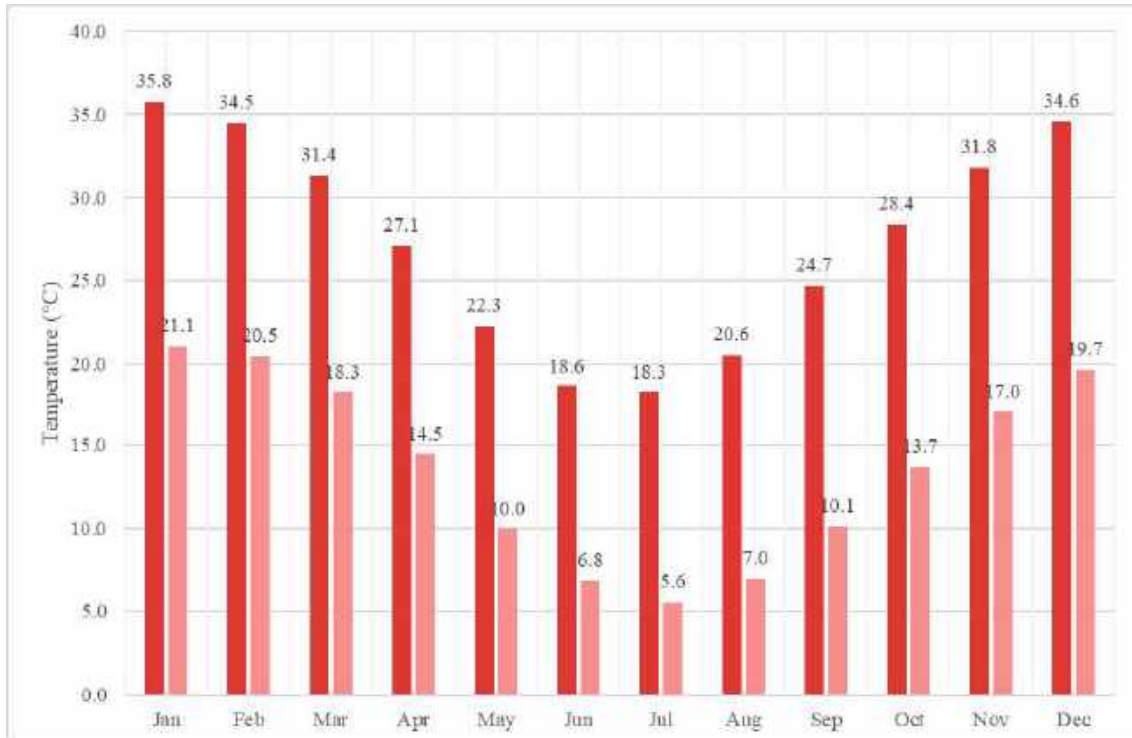


Figure 2.3 Mean monthly temperatures

2.2.3 Wind

Wind data from the Laverton Aerodrome weather station indicates that winds are typically variable in spatial distribution. Morning (9 am) winds are predominantly from the east, whilst afternoon (3 pm) winds typically come from the west and northwest.

The annual wind roses for the Laverton Aerodrome are presented in Figure 2.4.

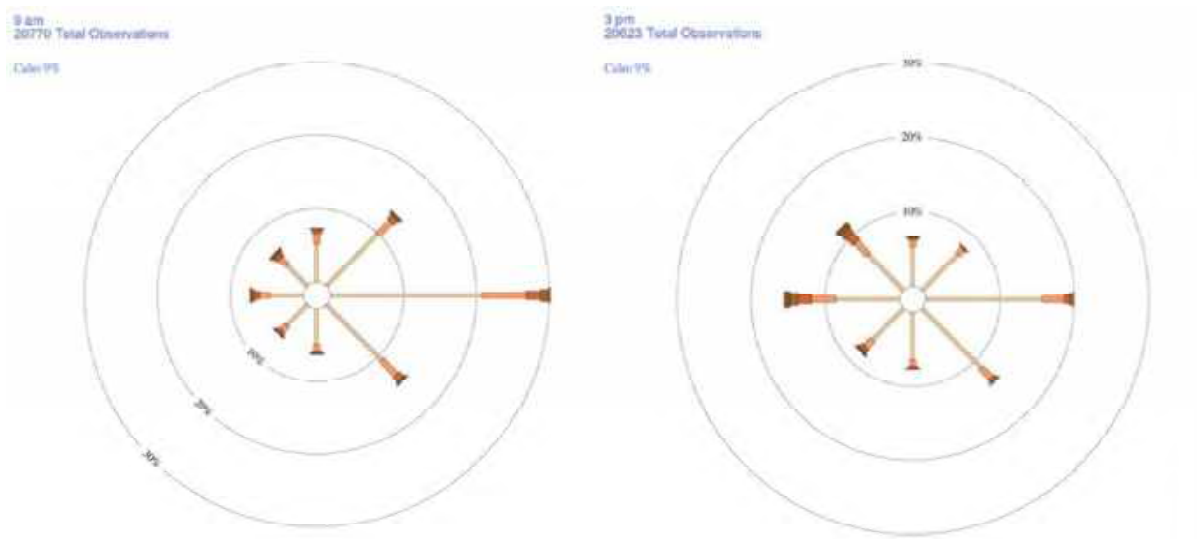


Figure 2.4 Laverton aerodrome annual wind roses

2.3 Geology

The site is situated at the transition between the Archaean Eastern Goldfields Greenstones Superterrane to the east and the Archaean Yilgarn Craton Granites to the west. The boundary between these geological regions, known as the Mikado Shear, is located approximately 500 m east of the open pits. There is no evidence of disturbance along this shear zone.

The geology at the BTR Beta site is illustrated on Figure 2.5 and comprises:

- Metamorphosed basalt (green), which is locally porphyritic. It includes zones with a dolerite texture and areas of feldspar-hornblende or chlorite schist.
- Metamorphosed ultramafic rock (purple), including talc-chlorite (carbonate) and tremolite-chlorite schist. It also contains layered metamafic rocks, amphibolite, and graphitic schist.
- Monzogranite (orange), with common biotite and occasional hornblende. It also contains minor amounts of granodiorite and syenogranite. The texture varies from fine- to coarse-grained and ranges from uniform (equigranular) to containing larger crystals in a finer matrix (porphyritic). The rock structure is mostly massive but can show weak foliation, and it has undergone metamorphism.

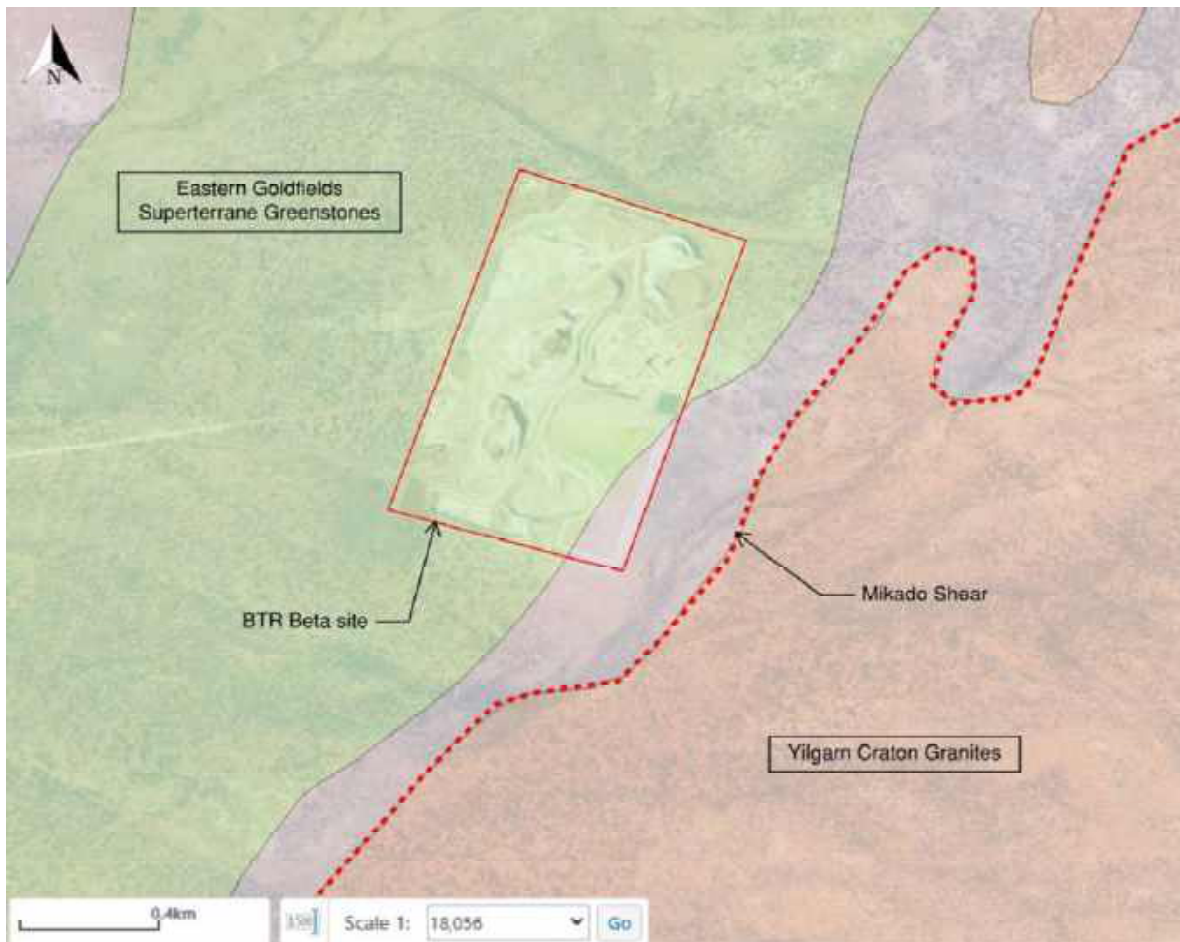


Figure 2.5 Geological map for the BTR Beta site (WA GeoView)

A site inspection undertaken on 21 – 23 October 2024 indicated that the pit walls primarily consist of weathered schists, extending to the observable depths. These are overlain by dense or cemented clayey gravel, ferricrete, or calcrete duricrust. (WSP Pty Ltd, 2024).

Geotechnical investigation at the existing Tailings Storage Facility (TSF) site was conducted in March 2013 (STATS, 2013a). The investigation involved the drilling of eight boreholes to a depth of 12m (except BH5, which reached 15m) around the TSF Embankments. Field Standard Penetration Tests (SPT) were conducted at every 3m depth.

The bore logs revealed that the materials used for the TSF construction comprised variable amounts of weathered Claystone and Schist gravel within a silty/sandy clay matrix, overlying a highly becoming slightly weathered Claystone and Schist bedrock foundation.

A geotechnical walk-around inspection was conducted for the south pit and waste rock dump area on March 18 and 19, 2013 (STATS, 2013b). The inspection involved detailed photographs, slope measurements, and mapping of ground surface cracks and locations. It was observed that the entire south portion of the south pit and specific areas of the waste dump exhibited slip circle failures and localized low-height slope failures due to weathered conditions. Other regions showed signs of plane failure and potential weak toe regions, including settlement and cracks. It was recommended that machinery operation was avoided within 10 m of sections susceptible to slope failures and cracks.

2.4 Hydrology and hydrogeology

The BTR Beta site is characterized by low outcrop, low elevation colluvial and/or sheetwash slopes. Surface drainage flows westward toward Lake Carey, approximately 20 km west of the project's southern boundary.

The Beta site is located in the Minigwal sub-area of the Goldfields Groundwater Management Area (Rockwater, 2010). Groundwater in the region is primarily sourced from paleochannel sediments or weathered and fractured bedrock, often overlain by alluvium. While major aquifers remain inactive beneath alluvial and colluvial cover, localised calcrete deposits often provide shallow groundwater.

Groundwater was abstracted from a fractured mafic rock aquifer from two bores during previous mine operation which had a licensed allocation of 400,000 kL/annum.

At tenement M38/009, groundwater depths recorded in 2007 ranged from 17 m below ground level (mBGL) in the southern section to 21.6 mBGL in the central area (Aquaterra, 2007). Salinity increased with depth, varying from approximately 1,000 mg/L near the surface to 7,000 mg/L at greater depths. Test pumping of an old bore (Mikado Bore) indicated a yield of about 200 m³/day.

Three of the boreholes drilled in 2013 were installed with vibrating wire piezometers at the bottom, two had inclinometer casings installed, and two had Casagrande type PVC standpipes. The standpipes inside the embankment did not record any water.

Pit Lake elevations recorded in 2024 ranged from 440 mBGL at the North Beta pit and 432 mBGL at the Central and South Beta pit (corresponding to approximate depths below pit rim level of 31 m and 35 m respectively). The inferred hydraulic gradient of 1.5% follows the surface drainage slope towards Lake Carey (southwest).

The regional groundwater is brackish to saline with between 1,000 and 7,000 mg/L total dissolved solids (TDS), although salinities in excess of 100,000 mg/l have been recorded from fractured rock aquifers closer to Lake Carey.

2.5 Seismicity

Earthquakes in Australia are classified as shallow intraplate events, occurring within the stable continental interior, away from plate boundaries. These earthquakes are infrequent and distributed across numerous small faults.

Seismic activity is driven by horizontal compression, characterized by high stress levels and short-duration motion.

Crustal activity in the past 5 ma – 10 ma is termed Neotectonic. Western Australia has two primary Neotectonic domains, illustrated on Figure 2.6 and described as:

- Archaean and unreactivated Palaeoproterozoic crust (Orange)
- Reactivated Proterozoic crust (Red).

Within these domains, major crustal boundaries, interpreted to be relict sutures between different crustal blocks have been inferred by seismic reflection profiling.

The BTR site is located in the Archaean and unreactivated Palaeoproterozoic crust domain, approximately 15 km east of a north to south trending major crustal boundary (locally represented by the Hootanui fault) on the eastern side of Lake Carey.



Figure 2.6 Western Australia Neotectonic Domains and Major Crustal Boundaries

Historical records indicate that earthquakes with a magnitude greater than 4.0 have not occurred within 100 km of the BTR site over the past century (Geoscience Australia, 2025) (as illustrated on Figure 2.7). A 4.1 magnitude event occurred 104 km to the northeast of the site in October 1965, a magnitude 4.2 event occurred approximately 110 km to the south east in August 1980 and a series of events between magnitude 2.7 and 5.4 occurred 25 km further to the south east in March 1989.

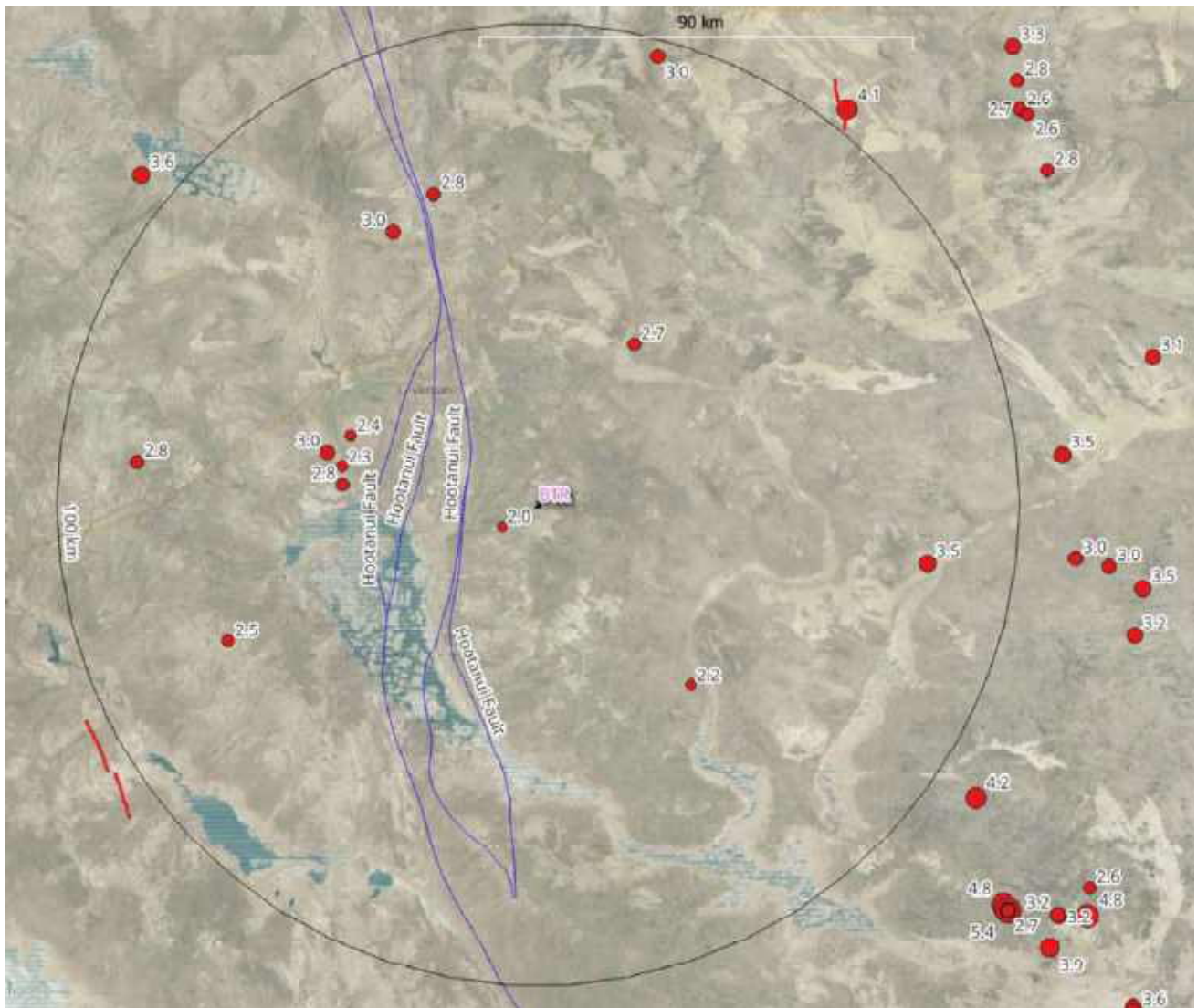


Figure 2.7 Earthquakes within 100 km of BTR Site since 1925

3 Tailings management plan

The current BTR mining and processing plan involves treatment of ore at a nominal rate of 0.6 Mtpa, which is effectively equivalent to the rate of tailings generation. Tailings storage at the Beta site will be optimised by in-pit deposition.

The BTR Beta site proposed tailings management plan involves storage of the tailings in the following spaces:

- Central Beta pit as an In-Pit Tailings Storage Facility.
- South Beta pit as an In-Pit Tailings Storage Facility.
- Building a perimeter embankment around the Central and South pits to continue tailings deposition when the pit voids are filled.

The existing pits have an estimated void volume of 2.86 Mm³ available for storage of tailings and stormwater and provision of contingency freeboard to prevent overtopping of the pit rims.

Figure 3.1 illustrates an overview of the tailings management scheme presented in this document.

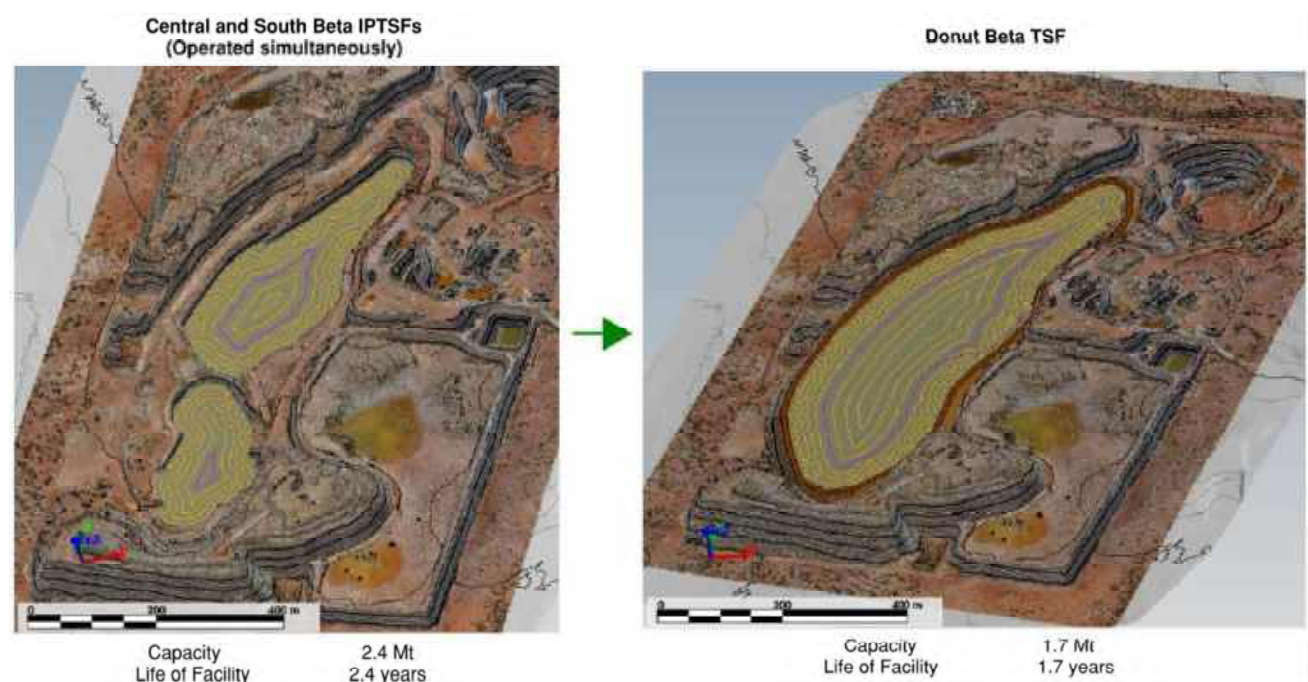


Figure 3.1 BTR Beta site tailings storage plan

There is also potential to store additional tailings in the existing above ground TSF if a perimeter embankment raise (to a previously approved maximum embankment height of 10 m) is constructed; however, storage space is limited to approximately 0.43 Mm³ and this option is currently not under consideration.

4 Basis of design

4.1 Design codes and guidelines

The engineering design of the proposed TSFs follows applicable industry guidelines and regulatory requirements. Relevant requirements, codes, and guidelines comprise:

4.1.1 *Industry guidelines*

- The Code of Practice for Tailings Storage Facilities administered by DEMIRS (DMP, 2013).
- The Australian National Commission on Large Dam's Guidelines on Tailings Dams; Planning Design, Construction, Operation and Closure (ANCOLD, 2019a).
- The Guide to the preparation of a design report for tailings storage facilities (DMP, 2015a)
- Mine Closure Plan Guidance (DEMIRS, 2020).
- The Global Industry Standard on Tailings management (Global Tailings Review, 2020)
- International Cyanide Management Institute – The Cyanide Code (International Cyanide Management Institute, 2021).

4.1.2 *Environmental legislation*

- Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth).
- Environmental Protection Act 1986:
 - Environment Impact Assessment (Part IV)
 - Clearing of Native Vegetation (Part V, Division 2)
 - Prescribed premises, works approvals and licences (Part V, Division 3)
- Mining Act 1978.
- Biodiversity Conservation Act 2016.
- Contaminated Sites Act 2003.
- Rights in Water and Irrigation Act 1914 (RIWI Act).

4.1.3 *Social guidelines*

- Western Australia Environmental Factor Guidelines: Social (EPA).
- Western Australia Environmental Factor Guidelines: Human Health (EPA).
- Aboriginal Heritage Act 1972.

4.1.4 *Safety legislation*

- Work Health and Safety Act 2020.
- Mines Safety and Inspection Regulations, 1995.

4.2 Design criteria

4.2.1 Operational design criteria

The project operational design criteria are summarised in Table 4.1.

Table 4.1 Operational Design Criteria

Design Element	Design Input	Source
Tailings production		
Tailings production rate	~1.0 Mtpa	BTR
Tailings / processed ore ratio	100%	
TSF design life	~ 4 years	
Storage capacity requirement	4.0 Mt	
Embankment geometry		
Safety windrow height	0.5 m (Light Vehicles) 1.8 m (Heavy Vehicles)	WSP

4.2.2 Risk-based design criteria

Risk-based design criteria are established based on TSF consequence classification in accordance with DMIRS (DMP, 2013), ANCOLD (ANCOLD, 2019a) and GISTM (Global Tailings Review, 2020) guidelines.

Whilst the intent of properly executed design and operation of a TSF is to minimise the likelihood of uncontrolled release of tailings or water to as low as reasonably practical, the various guidelines require assessment of a “dam failure” consequence category or classification based on the potential consequences of such an event occurring. The classification serves as a framework for establishing the required level of technical input and assessments for the TSF's design, operation and closure.

4.2.2.1 DEMIRS

The DEMIRS guidelines assign a hazard rating to a TSF and the facility's size (height) is taken into account to determine the facility classification.

The hazard rating is determined by assessing the potential impacts of an uncontrolled release of tailings or water, including:

- safety risks to nearby community infrastructure and/or mining developments
- environmental impacts
- economic impacts, including the operational consequences of temporarily losing the TSF.

The hazard rating and resultant facility category for the Central and South Beta IPTSFs have been established based on qualitative assessment as illustrated in Table 4.2 and Table 4.3. Based on the assessment, the TSF is considered a **Category 2** facility.

Table 4.2 DEMIRS hazard rating for the Central and South Beta IPTSFs

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 4.3 DEMIRS TSF consequence category for the Central and South Beta IPTSFs

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

The proposed raising of a perimeter embankment around the combined pits will result in an embankment height of less than 15m but greater than 5 m, consequently the facility category will remain Category 2.

4.2.2.2 ANCOLD

The ANCOLD guidelines require assessment of a “dam failure” consequence category and an “environmental spill” consequence category. The former is used to inform the earthquake design criteria and spillway discharge flood requirements, and the latter is used to assess stormwater storage freeboard requirements.

The potential damages and losses from dam failure are evaluated based on the anticipated severity level of impact and the predicted number of persons at risk (PAR), which together determine the dam failure consequence category. This methodology is also applied to derive an environmental spill consequence category for the scenario where only water is released to the environment.

The severity level impact assessment considers total infrastructure costs, impacts on the dam owner’s business, health and social impacts, and environmental effects. Based on this assessment, a "Medium" severity level was assigned to the Central and South Beta IPTSFs, as detailed in Table 4.5.

Table 4.4 Severity level impact assessment (ANCOLD)

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	100-10 00 people affected	<1 000 people are affected for more than 1 month	>10 000 people affected for over 1 year
Social dislocation	<100 person or <20 business months	100-1 000 person months or 20-2 000 business months	>1 000 person months or >200 business months	
Impact area	<1 km ²	<5 km ²	<20 km ²	>20 km ²
Impact duration	<1 (wet) year	<5 years	<20 years	>20 years

Damage type	Minor	Medium	Major	Catastrophic
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 and fauna. Limited effects on: a Item(s) of local and 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) and (b) Limited effects on: a Item(s) of National or World natural heritage. b Native flora and fauna within national parks, recognised wilderness areas, Ramsar wetlands and nationally protected aquatic reserves. Remediation difficult.	Extensive effects on areas (a) and (b). Significant effects on areas (c) and (d) Remediation involves significantly altered ecosystems.

The ANCOLD Guidelines define PAR (Population at Risk) as "all those who would be directly exposed to tailings or water release, assuming they took no action to evacuate." This includes individuals in dwellings and workplaces, as well as itinerants traveling through the dam breach-affected zone. The PAR may vary depending on temporal-spatial probability, which reflects the likelihood of buildings being occupied or itinerant travellers being in the hazard zone at the time of failure.

For both the Central and South Beta IPTSFs (and the donut Beta raise), a PAR in the range of 1-10 was adopted due to the TSF proximity to the process plant, administration and camp buildings, and active personnel conducting daily inspections of the facility.

As shown in Table 4.5, this results in a “**Significant**” dam failure consequence category.

Table 4.5 Dam failure consequence category (PAR based)

Population at Risk (PAR)	Severity of damages and losses			
	Minor	Medium	Major	Catastrophic
<1	Very low	Low	Significant	High C
≥1 to <10	Significant (Note 2)	Significant (Note 2)	High C	High B
≥10 to <100	High C	High C	High B	High A
≥100 to <1 000	(Note 1)	High B	High A	Extreme
≥1 000		(Note 1)	Extreme	Extreme

Notes:

- 1) With a PAR in excess of 100, it is unlikely Damage will be minor. Similarly with a PAR in excess of 1000 it is unlikely Damage will be classified as Medium.
- 2) Change to ‘High C’ where there is potential of one or more lives being lost. The potential for loss of life is determined by the characteristics of the flood area, particularly the depth and velocity of flow.

Following a similar process for the scenario where only water is released, an environmental spill category of **Low** has been inferred on the basis that water can only reach the pit rim if an extreme storm is superimposed on a poorly managed decant pond and any chemicals in the decant water that could lead to adverse environmental impact will be significantly diluted. For the Donut Beta embankment, excessive surface water due to an extreme storm will report to the North Beta pit via flow through the designed spillway and such, the environmental spill category of **Low** has also been inferred.

4.2.2.3 GISTM

The risk-based classifications established using the ANCOLD guidelines are considered consistent within the context of the Global industry standard on tailings management (GISTM). The GISTM provides similar tables to ANCOLD for consequence classification, flood design criteria and seismic design criteria.

The GISTM severity levels are based on 'Incremental Loss' in the event of failure, which does not account for economic losses associated with lost production or repairing the TSF. GISTM requires preliminary designs (i.e., to a level provided in this study) to be undertaken either through adoption of 'Extreme' criteria, or that proof of concept to upgrade the design based on current conditions to cater for Extreme criteria is demonstrated. The latter is the approach that has been adopted for the IWL TSF and results in a consequence classification of **Significant** as illustrated in Table 4.6.

Table 4.6 GISTM consequence classification

Dam failure consequence classification	Incremental losses			Health, social, and cultural	Infrastructure and economics
	Potential PAR	Potential loss of life	Environmental		
Low	None	None Expected	Minimal short-term loss or deterioration of habitat or rare and endangered species	Minimal effects and disruption of business and livelihoods. No measurable effect on human health. No disruption of heritage, recreation, community, or cultural assets.	Low economic losses: area contains limited infrastructure or services. <US\$1M
Significant	1-10	Unspecified	No significant loss or deterioration of habitat. Potential contamination of livestock/fauna water supply with no health effects. Process water low potential toxicity. Tailings not potentially acid generating and have low neutral leaching potential. Restoration possible within 1 to 5 years.	Significant disruption of business, service, or social dislocation. Low likelihood of loss of regional heritage, recreation, community, or cultural assets. Low likelihood of health effects.	Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes. <\$US10M.
High	10-100	Possible (1-10)	Significant loss or deterioration of critical habitat or rare and endangered species. Potential contamination of livestock/fauna water supply with no health effects. Process water moderately toxic. Low potential for acid rock drainage or metal leaching effects of released tailings. Potential area of impact 10-20 km ² . Restoration possible but difficult and could take > 5 years.	500-1,000 people affected by disruption of business, services, or social dislocation. Disruption of regional heritage, recreation, community, or cultural assets. Potential for short term human health effects.	High economic losses affecting infrastructure, public transportation and commercial facilities, or employment. Moderate relocation/compensation to communities <US\$100M.

Dam failure consequence classification	Incremental losses			Environmental	Health, social, and cultural	Infrastructure and economics
	Potential PAR	Potential loss of life				
Very High	100-1000	Likely (10-100)	Major loss or deterioration of critical habitat or rare and endangered species. Process water highly toxic. High potential for acid rock drainage or metal leaching effects from released tailings. Potential area of impact >20 km². Restoration or compensation possible but very difficult and requires a long time (5 years to 20 years)	1,000 people affected by disruption of business, services or social dislocation for more than one year. Significant loss of national heritage, community, or cultural assets. Potential for significant long-term human health effects.	Very high economic losses affecting important infrastructure or services (e.g., highway, industrial facility, storage facilities, for dangerous substances), or employment. High relocation /compensation to communities <US\$1B.	
Extreme^	>1000	Many (>100)	Catastrophic loss of critical habitat or rare and endangered species. Process water highly toxic. Very high potential for acid rock drainage or metal leaching effects from released tailings. Potential area of impact >20 km². Restoration or compensation impossible or requires a very long time (>20 years).	5,000 people affected by disruption of business, services, or social dislocation for years. Significant National heritage or community facilities or cultural assets destroyed. Potential to severe and/or long-term human health effects.	Extreme economic losses affecting critical infrastructure or services, (e.g., hospital, major industrial complex, major storage facilities for dangerous substances) or employment. Very high relocation/compensation to communities and very high social readjustment costs >US\$1B	

^ – GISTM recommends design of new facilities to an extreme classification

4.2.2.4 Applicable risk – based design criteria

The risk – based design criteria applicable to the derived consequence categories are summarized in Table 4.7.

Table 4.7 Design criteria for the BTR Beta TSFs project

Criteria Application	Design input	Reference
TSF Water Storage Provisions		
Minimum water storage freeboard	1:100 AEP, 72-hr rainfall + 0.3 m	(DMP, 2013)
	notional wet season (excess) run-off, 1:100 AEP 72-hr rainfall + 1:10 AEP wave run up + 0.3 m	(ANCOLD, 2019a)*
Spillway design storm	1:1,000 AEP and wave run up for 1:10 AEP wind	(ANCOLD, 2019a)
Flood criteria	1:1,000 AEP	GISTM (Global Tailings Review, 2020)
Geotechnical Stability of TSF		
Minimum Factor of Safety (FoS)		
— Peak (static)	>1.5	(ANCOLD, 2019a)
— Undrained	>1.3	
— Post peak (post seismic)	>1.1	
Earthquake loading and PGAs		
— Operating Basis Earthquake (OBE)	1: 475 AEP	(ANCOLD, 2019a)
— Safety Evaluation Earthquake (SEE)	1:1,000 AEP	(ANCOLD, 2019a)
— Seismic Criteria	1:1,000 AEP	GISTM (Global Tailings Review, 2020)
Closure considerations		
Flood Criteria	1:10,000 AEP	GISTM (Global Tailings Review, 2020)
Post closure earthquake		
— MCE	1:10,000 AEP	(ANCOLD, 2019a)
— Seismic Criteria	1:10,000 AEP	GISTM (Global Tailings Review, 2020)

* For Low environmental spill category, extreme storm storage allowance can be determined by risk assessment. Allowances for a “Significant” consequence category have been conservatively adopted.

4.3 Design parameters

Design parameters selected to satisfy the design criteria described in Section 4.2 are provided in Table 4.8 to Table 4.13.

Material hydraulic conductivity parameters were calculated from the hydrogeological study conducted in 2024 (EMM, 2024). Soil strength parameters are adopted from previous geotechnical investigations, local databases and observations on site.

Table 4.8 Tailings deposition design parameters

Parameter	Value	Source/Derivation
Slurry Solids concentration	55%	Processing Target
Particle Density	2.85 t/m ³	WSP Salt corrected laboratory test results (average)
Initial Settled Density (ISD)	0.80 t/m ³	30% reduction from WSP laboratory test average
Air Dried Density	1.70 t/m ³	WSP laboratory test result
Deposited Dry Density (DDD)	1.20 t/m ³	Estimate based on range between initial settled density and air-dried density.
Supernatant (Bleed) at ISD	0%	Calculated for initial settled density and particle density parameters adopted
Supernatant (Bleed) at DDD	43%	Calculated for deposited dry density and particle density parameters adopted

Table 4.9 Geometric design parameters

Parameter	Design Input	
Embankment design	<u>Crest width</u> 10.0 m Crest slope = 1% towards upstream crest margin Upstream batter = 1V:2H Downstream batter = 1V:3H	
Adopted beach slope	Incremental Distance (m)	Slope (%)
	Upper third of flow distance	1.0
	Middle third of flow distance	0.75
	Lower third of flow distance	0.5
	(Pirouz, 2006)	
Windrow geometry	0.5 m high minimum, 1V:1.3H side slopes	

Table 4.10 Flood assessment parameters (operations)

Parameter	Design Input	Source/Derivation
Stormwater Management		
1 in 100-year, 72-hour Rainfall depth	182 mm	BOM
1 in 1,000-year rainfall depths	Duration (hrs)	BOM
	Rainfall depth (mm)	
	12	
	18	
	24	
	30	
	36	
	48	
	72	
	96	
	120	
	144	
	168	
Wave run-up (combined pits)	0.2 m	WSP Calculation

Table 4.11 Seepage assessment parameters

Geological Unit	Hydraulic Conductivity, k_x (m/s)
Surficial Soils	1.0×10^{-6}
Weathered Schist	4.5×10^{-7}
Extremely Altered Schist	1.0×10^{-6}
Tailings	1.0×10^{-8}
Embankment Material	1.0×10^{-8}

Table 4.12 Seismic design parameters

Parameter	Design Input	Source
Seismicity		
Operating Basis Earthquake (OBE)	0.0185 g	NSHA 2023 (1:475 AEP)
Safety Evaluation Earthquake (SEE)	0.06 g	NSHA 2023 (1:2,475 AEP) (Refer Section 7.2)
MCE Earthquake magnitude	M = 6.5	Assumed

Table 4.13 Soil strength parameters

Material (Mohr-Coulomb)	Unit Weight (kN/m ³)	Undrained (Total stress)			Drained (Effective stress)		Residual strength (Post seismic) ^{Note 1}		
		c' (kPa)	Φ' (°)	Su/σ'v	c' (kPa)	Φ' (°)	c' (kPa)	Φ' (°)	Su/σ'v
Surficial Soils	20	-	-	0.35	0	33	0	29	-
Weathered Schist	22	-	-	0.41	0	38	0	34	-
Extremely Altered Schist	18	-	-	0.36	0	35	0	31	-
Tailings	19	-	-	0.34	-	-			0.07
Embankment	17	-	-	0.33	5	32	4	28	-

Note 1: Drained parameters reduced by 15% for post-seismic residual strength. Inferred liquefied shear strength ratio adopted for undrained material (tailings).

5 Design description

5.1 Central and South Beta IPTSFs

5.1.1 Overview

The Central and South Beta IPTSFs will utilize the existing pits for tailings storage.

A 0.5 m high bund will be constructed at the upstream toe set out line for the next-stage (Donut Beta) TSF's embankment. This bund will:

- prevent incidental stormwater runoff from entering the pits
- provide an exclusion marker for vehicular access to the pit rim
- anchor the tailings delivery pipeline spigots in place.

Design drawings are provided in Appendix A.

5.1.2 Storage capacity

Allowing for stormwater storage provision (section 7.1), the Central Beta pit will provide approximately 1.55 Mm³ of tailings storage capacity, whereas the South Beta pit will provide approximately 0.42 Mm³ of tailings storage capacity. The available volumes will provide storage for approximately 1.86 Mt and 0.5 Mt of tailings respectively (assuming an achieved density of 1.2 t/m³). More details of the storage capacity of both pits are provided in Table 5.1. Storage curves are provided in Figure 5.1 and Figure 5.2.

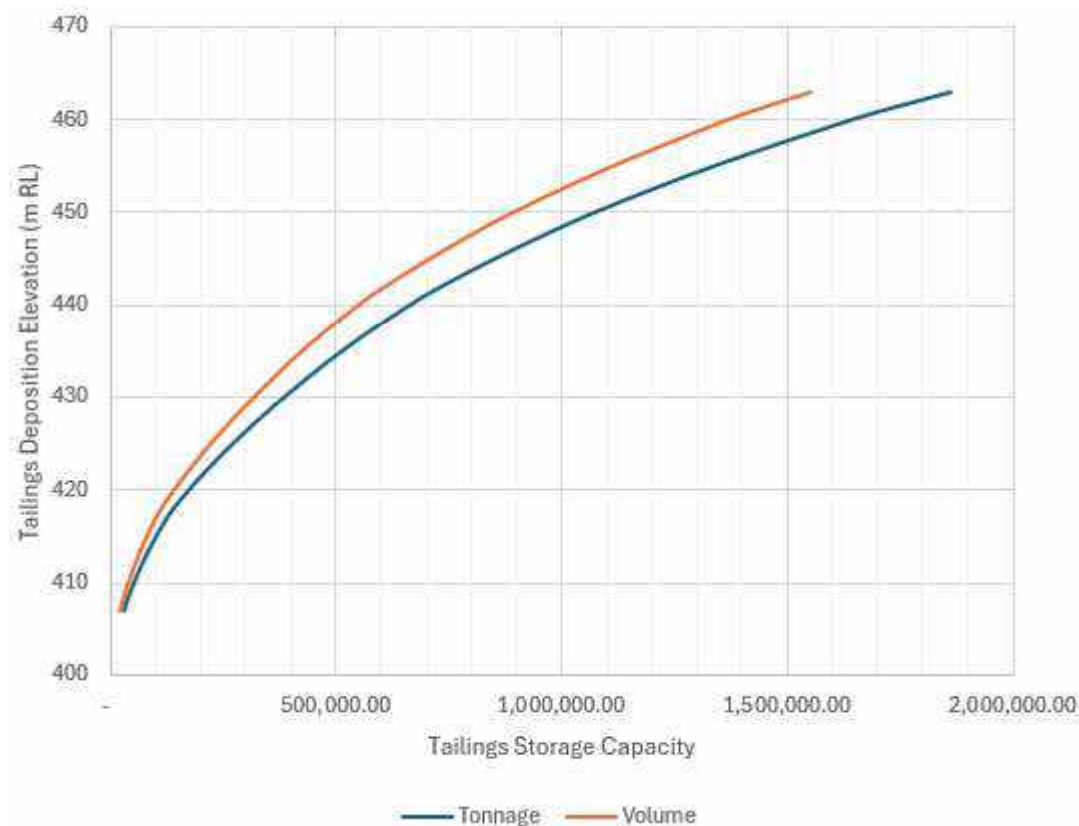


Figure 5.1 Central Beta IPTSF storage curve

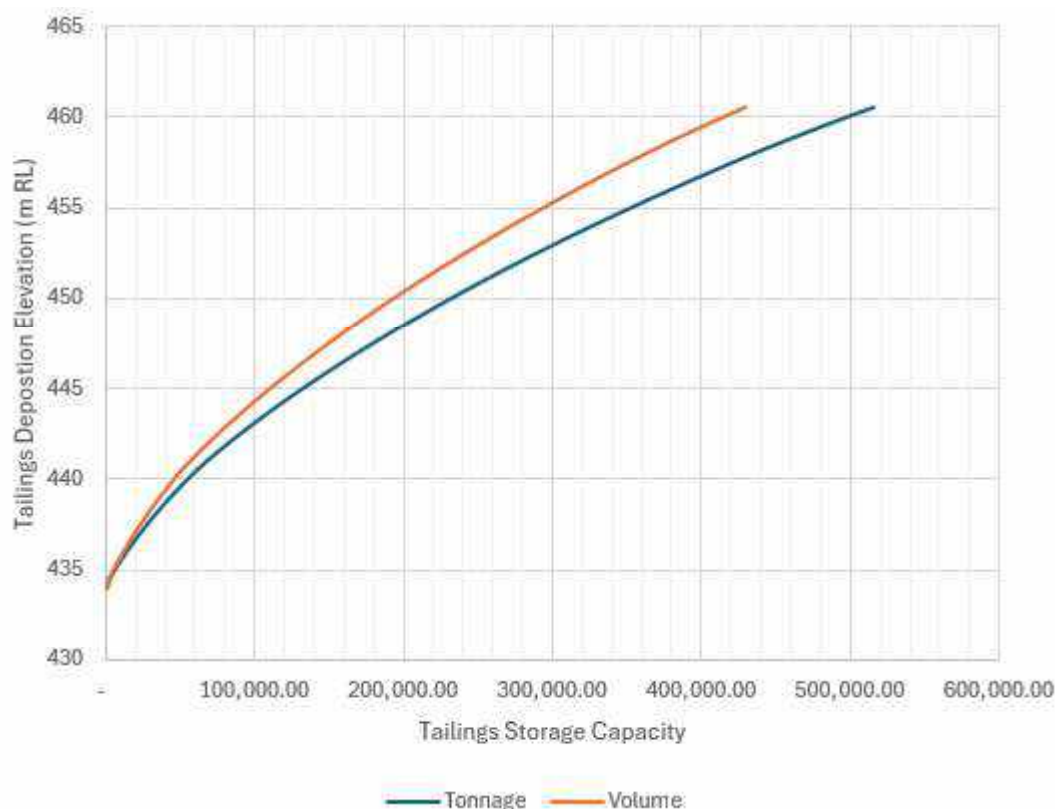


Figure 5.2 South Beta IPTSF storage curve

Table 5.1 Central and South Beta IPTSFs storage capacities summary

Item	Central Beta	South Beta
Tailings storage volume (m ³)	1,550,080	429,316
Tailings surface area (m ²)	62,666	28,113
Earthworks volume of starter donut bund (m ³)	1,240	
Expected Life of Design (assuming 1.0 Mtpa)	1.8 years (22 months)	0.5 years (6 months)
Expected tailings density (t/m ³)	1.2	1.2

The tailings density of 1.2 t/m³ was selected due to the high rate of rise for deposition into a pit void which narrows with depth, which limits consolidation time and results in lower in-situ densities. Additionally, the presence of a pit lake causes initial tailings deposition to occur sub-aqueously, preventing evaporative drying and slowing dewatering and consolidation, further sustaining a lower tailings density. As deposition progresses, the tailings beach will emerge above the water level, forming beaches that although exposed to evaporative drying, may retain high moisture content, particularly if the rate of rise exceeds natural drying mechanisms, thereby maintaining a reduced density over time.

5.1.3 Decant system

A pontoon decant system is proposed for both the Central and South Beta IPTSFs. Since both pits will operate simultaneously, a separate pontoon decant system should be installed for each pit.

The stochastic water balance results for outflow from the IPTSF ponds (see Section 7.6) indicate that water recovery from the tailings facilities may be limited once the tailings surfaces emerge above the pit lakes. While dewatering during active deposition into the pit lakes is possible, continuous monitoring is essential to ensure the pump does not intake suspended tailings solids.

Active dewatering will be required following storm events, particularly as this water is expected to be among the highest quality available for process plant use. To support effective operational water management, an average dewatering rate of 60 m³/hr is estimated for both IPTSFs. The maximum dewatering rate should be aligned with the process plant's water demand, which may approximate to the proposed slurry water throughput of 93 m³/hr (for 1 MtPa solids throughput and slurry solids content of 55% w/w).



Figure 5.3 Photo of a typical pontoon decant system

5.2 Donut Beta TSF

5.2.1 Overview

The Donut Beta TSF concept involves constructing a perimeter embankment to a maximum height of 10 m around the Central and South IPTSFs, effectively joining them and increasing their storage capacity. The embankment alignment follows existing access roads around the two pits.

Design drawings are provided in Appendix A.

As the embankment is less than 15 m high, the facility maintains a Category 2 DEMIRS classification and a 'Significant' ANCOLD dam failure consequence category.



Figure 5.4 Donut Beta TSF layout

5.2.2 Storage capacity

The Donut Beta TSF will provide approximately 1.4 Mm³ of additional tailings storage capacity, once In-pit deposition is completed (equivalent to 1.7 Mt of tailings, assuming an achieved density of 1.2 t/m³). Details of the additional storage capacity are provided in Table 5.2.

Table 5.2 Donut Beta TSF storage capacity summary

Item	Donut Beta
Tailings storage volume (m ³)	1,413,882
Tailings surface area (m ²)	169,118.76
Earthworks volume (m ³)	282,673.49
Expected Life of Design (assuming 1.0 Mtpa)	Approximately 1.7 years (20 months)
Expected tailings density (t/m ³)	1.2

5.2.3 Decant system

The pontoon decant system proposed for both the Central and South Beta IPTSFs will be maintained for the Donut Beta TSF.

6 Tailings characterisation

6.1 Geotechnical properties

Tailings testing was completed on pilot samples from the Cork Tree Well metallurgical process testing and was undertaken at the WSP laboratory. Testing included classification tests (particle density, particle size and plasticity), settlement testing and consolidation testing.

The laboratory test results are provided in Appendix B-1.

6.1.1 Classification tests

Table 6.1 summarizes the results of the tailings classification testing. Particle size distribution curves and plasticity characteristics are plotted on Figure 6.1 and Figure 6.2, respectively.

Table 6.1 Cork Tree Well tailings – classification tests

Sample	P ₈₀ (µm)	Fines content (< 75 µm)	Liquid limit (%)	Plasticity Index (%)	Particle density Note 1 (t/m ³)	Soil classification
CTW Oxide 1 (CTWOM WSP LT-01_1)	80	78	42	16	2.89 (2.87)	Low plasticity SILT with sand
CTW Oxide 2 (CTWOM WSP LT-01_2)	80	77	42	16		Low plasticity SILT with sand
CTW Transition 1 (CTWTM WSP LT-02_01)	100	71	31	7	2.85 (2.35)	Low plasticity SILT with sand
CTW Transition 2 (CTWTM WSP LT-02_02)	100	68	32	9		Low plasticity sandy CLAY/SILT
CTW Fresh 1 (CTWFM WSP LT-03_1)	100	59	26	Non-plastic	2.87 (2.84)	Non-plastic sandy SILT
CTW Fresh 2 (CTWFM WSP LT-03_2)	90	77	27	Non-plastic		Non-plastic SILT with sand

() Salt Corrected

Note 1: Results taken from salt corrected test procedure where liquor was used to dissolve the salts. Lower results are given on the standard soil classification certificates (no salt correction). Soluble salts can reduce apparent particle density by occupying internal voids or forming surface coating on particles, trapping water and artificially increasing apparent volume of solids.

Figure 6.1 presents the particle size distribution of the Cork Tree Well tailings samples by their weathering profiles.

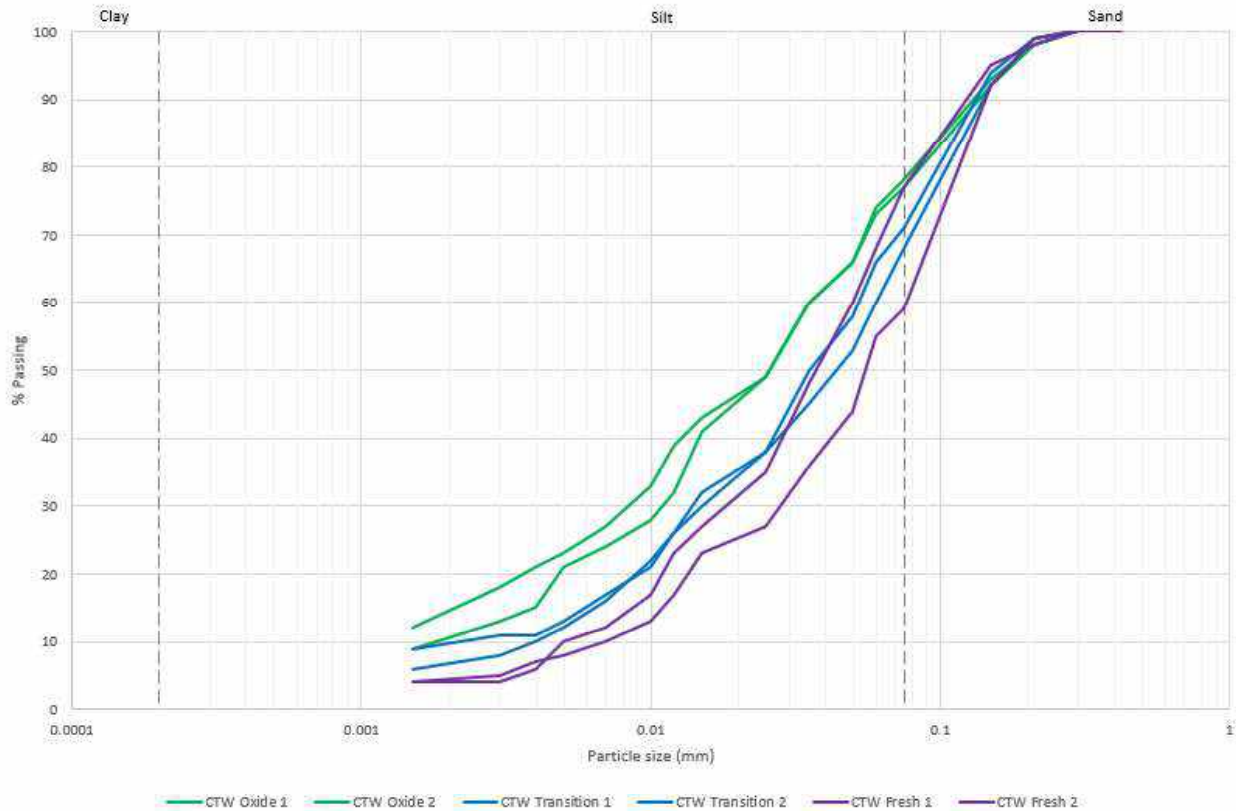


Figure 6.1 Cork Tree Well representative tailings samples particle size distribution

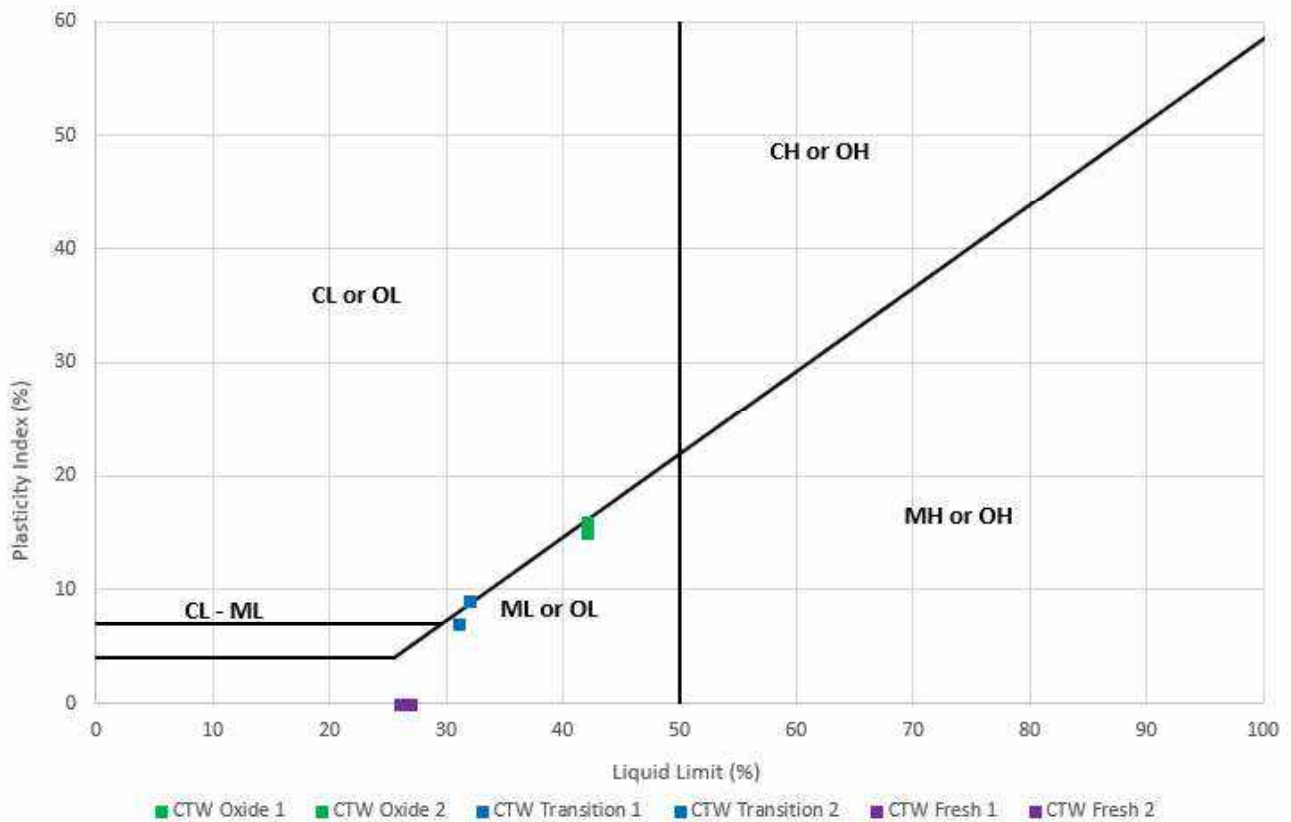


Figure 6.2 Cork Tree Well tailings samples plasticity chart

The results indicate that the metallurgical tailings samples are generally similar. However, the oxide and transition tailings samples indicated low plasticity while the fresh tailings samples were non-plastic.

6.1.2 Tailings settled density and bleed rates

Laboratory testing conducted by WSP determined tailings settlement characteristics. Three samples (oxide, transition and fresh) were prepared to a 55% solids concentration (the proposed thickener underflow density), poured into glass settling columns and allowed to settle. Supernatant water was decanted, and the wet density and moisture content of the tailings determined. The settled dry density was calculated, and estimates were made for supernatant water and underdrainage water loss during initial settling.

The fresh ore tailings sample was then air-dried until achieving constant volume and mass.

The certificates of the settling tests are presented in Appendix B-1. The results are summarised in Table 6.2.

Table 6.2 Tailings density test results

Sample	Poured dry Density (t/m ³) (e0 test)	Settled dry Density (t/m ³)	Air dried density (t/m ³)	Average Particle density (t/m ³)	Estimated Bleed (% of initial slurry water)
CTW Oxide 1 (CTWOM WSP LT-01)	0.94	1.015	-	2.87	22%
CTW Transition 1 (CTWTM WSP LT-02)	0.93	1.086	-	2.83	31%
CTW Fresh 1 (CTWFM WSP LT-03)	1.15	1.377	1.69	2.84	54%

The undrained settling tests allowed tailings slurry to settle in measuring cylinders, simulating deposition of tailings under water. These results indicate expected rates and quantities of supernatant release and determine the minimum expected dry density. Due to the in-pit nature of the first stage of the tailings management plan, drained settlement tests were not conducted.

Tailings deposit density typically increases over time through three processes:

- sedimentation (initial settling)
- desiccation (air-drying), expected to be restricted in an in-pit setting
- consolidation.

In an in-pit deposition scenario, the combination of rapid rate of rise, high energy deposition from height and a subaqueous deposition environment tends to generate excess pore water pressures in the settling tailings, effectively pushing particles apart and reducing the initial settled density to less than that observed in laboratory settling tests (and potentially lower than observed in e0 tests).

6.1.3 Consolidation properties

Consolidation begins after initial sedimentation completes. During this time-dependent process, water is forced from the tailings pore spaces due to self-weight settlement. While tailings density increases with depth during consolidation, initial pore water pressures, permeability and discharge rates affect the rate of density increase. Finer tailings, which may segregate from the initial slurry mix consolidate more slowly than sandy tailings. As deposition continues, adding more tailings leads to further consolidation and density increases.

Results of a slurry consolidometer test indicated that tailings dry density is likely to be approximately 1.32 t/m³ at a vertical effective pressure of 10 kPa and 1.75 t/m³ at an effective vertical pressure of 1600 kPa.

The increase in density with effective vertical pressure is coupled with a decrease in permeability from 2.3×10^{-8} m/s to 3.0×10^{-9} m/s.

Assuming initial excess pore pressures have dissipated, and the tailings deposit behaves as a normally consolidated soil, 10 kPa effective vertical pressure represents an approximate overlying tailings thickness of 0.5 m and 1600 kPa represents a thickness of approximately 80 m.

The maximum thickness of tailings deposited in the central Beta pit will be approximately 75 m, so it is reasonable to assume that when fully consolidated, the average dry density of the tailings deposit in the central part of the pit would be approximately 1.5 t/m^3 .

6.2 Geochemical properties

Geochemical testing was conducted on metallurgical tailings samples by ALS Global as part of this study. The samples represent tailings generated from processing underground ore sourced from the various weathering zones of Cork Tree Well.

The laboratory test results are provided in Appendix C.

Static Acid Base Accounting tests (summarised in Table 6.3) indicated the tailings samples from all ore weathering zones to be non-acid forming (NAF). Measured acid neutralising capacity (between 26.3 kg $\text{H}_2\text{SO}_4/\text{t}$ and 227.0 kg $\text{H}_2\text{SO}_4/\text{t}$) was greater than three times maximum acid producing potential (3.06 kg $\text{H}_2\text{SO}_4/\text{t}$ to 21.11 kg $\text{H}_2\text{SO}_4/\text{t}$).

Acid Metalliferous Drainage (AMD) screening classification plots is given on Figure 6.3 and Figure 6.4.

Chromium reduceable sulfur (sulfidic sulfur) concentrations were less than total sulfur concentration for the oxide and transition samples (Figure 6.5), suggesting some of the contained sulfur is sulfate sulfur in these weathering zones. Chromium reducible sulfur and total sulfur concentrations were similar for the fresh tailings sample, indicating a greater likelihood of Pyrite mineralisation in the fresh ore. Total sulfur concentrations ranged from 0.10% to 0.69%.

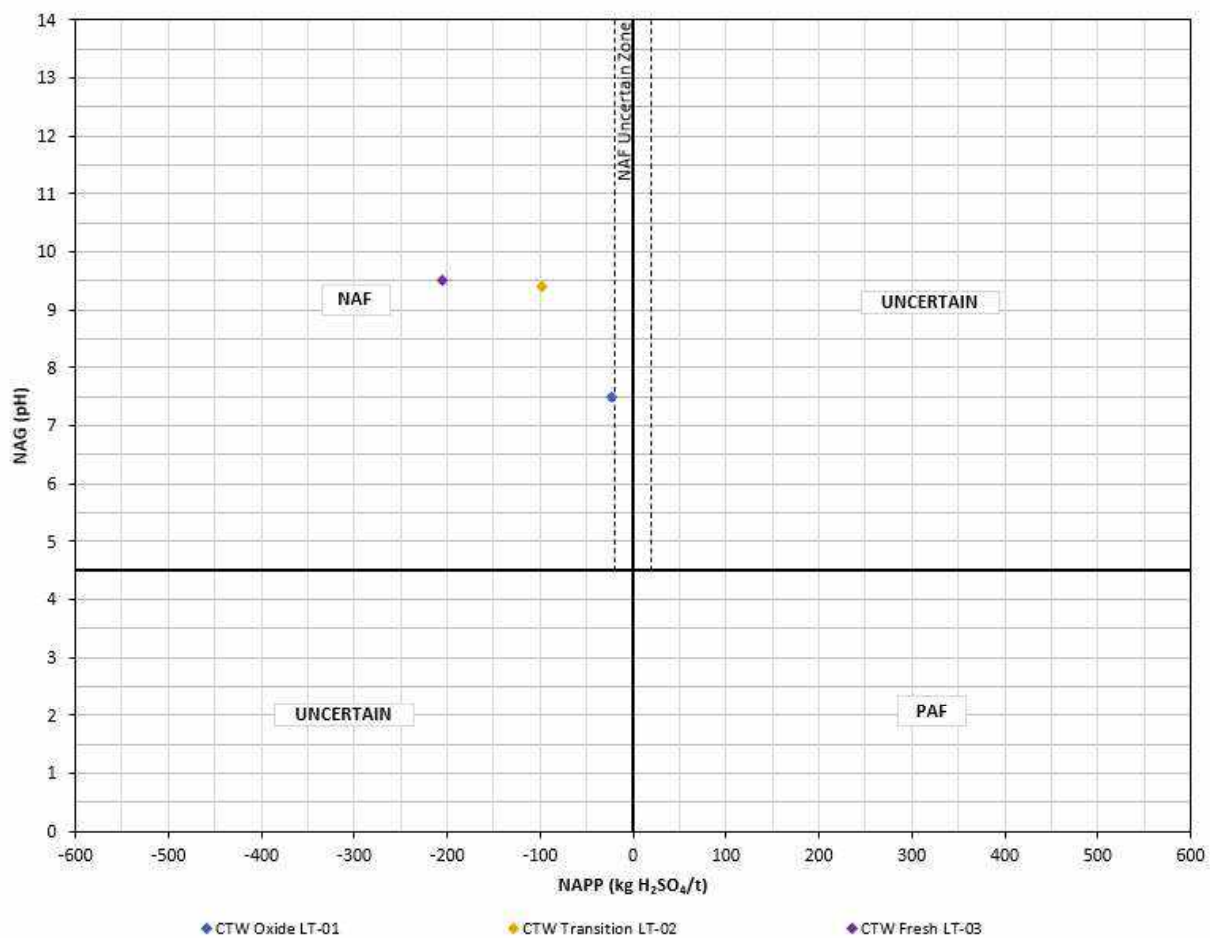


Figure 6.3 AMIRA AMD Classification

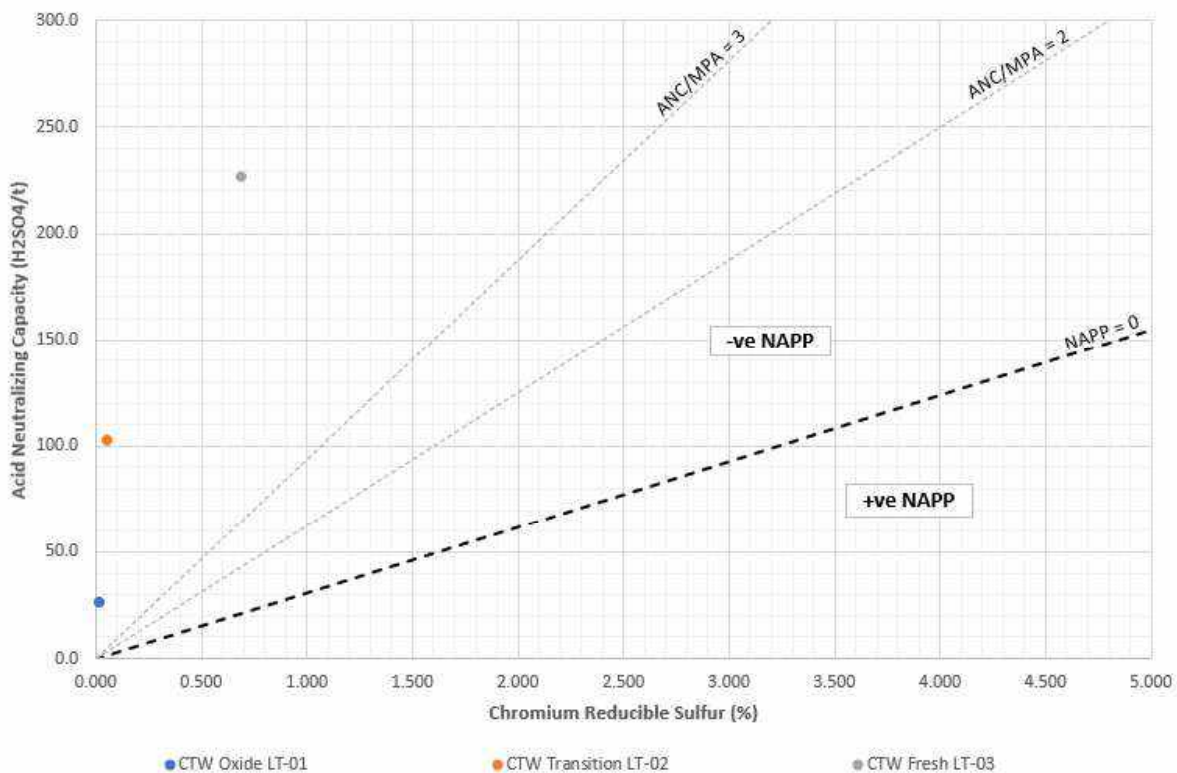


Figure 6.4 ABA (Acid Base Accounting) plot

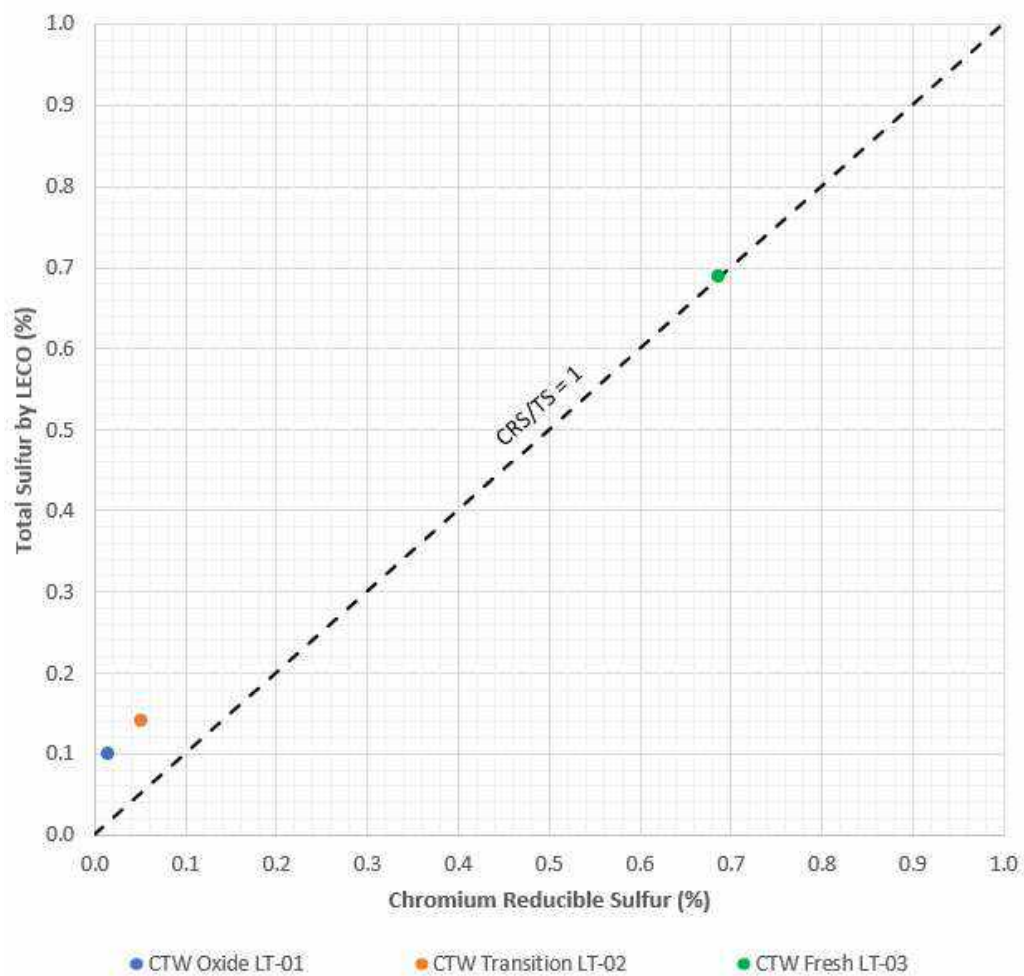


Figure 6.5 Sulphur content plot

Table 6.3 Static acid base accounting – Metallurgical Cork Tree Well tailings samples

Sample	pH	Electrical conductivity	Total sulphur	Total sulphur	Maximum potential acidity	Acid Neutralising Capacity			Net Acid Generation		Chromium Reducible Sulphur	Net Acid Producing Potential
	pH unit	µS/cm	mg/kg)	%	%	CaCO3	kg H ₂ SO ₄ /t	Fizz Unit	kg H ₂ SO ₄ /t	pH Unit	%	kg H ₂ SO ₄ /t
CTW Oxide	9.0	2,480	2,630	0.10	3.06	2.7	26.3	1.0	0	7.5	0.015	-23.2
CTW Transition	9.1	3,040	2,880	0.14	4.28	10.5	103.0	3.0	0	9.4	0.051	-98.7
CTW Fresh	9.5	1,460	880	0.69	21.11	23.2	227.0	3.0	0	9.5	0.686	-205.9

7 Design analyses

7.1 Freeboard assessment

DEMIRS freeboard definitions are illustrated in Figure 7.1. For the in pit TSFs and the subsequent raised embankment the normal operating pond will be positioned in the middle of each pit.

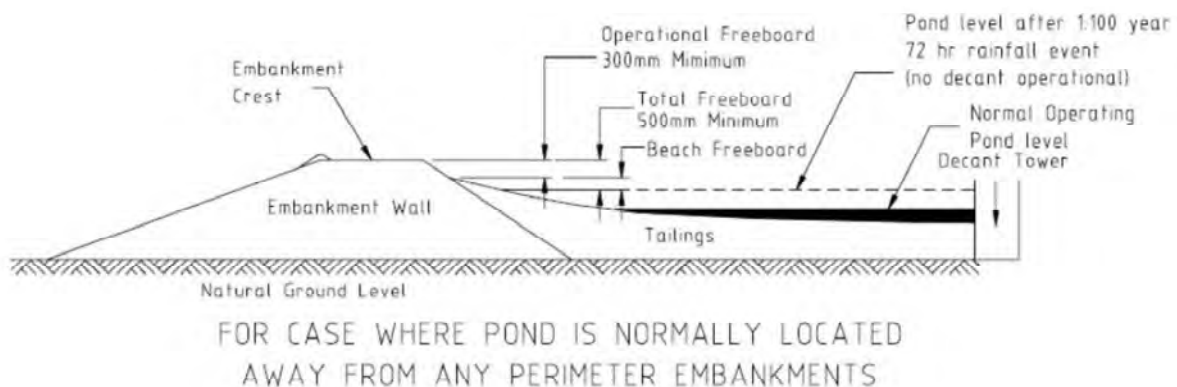


Figure 7.1 DEMIRS freeboard definition

The ANCOLD freeboard definitions are illustrated in Figure 7.2.

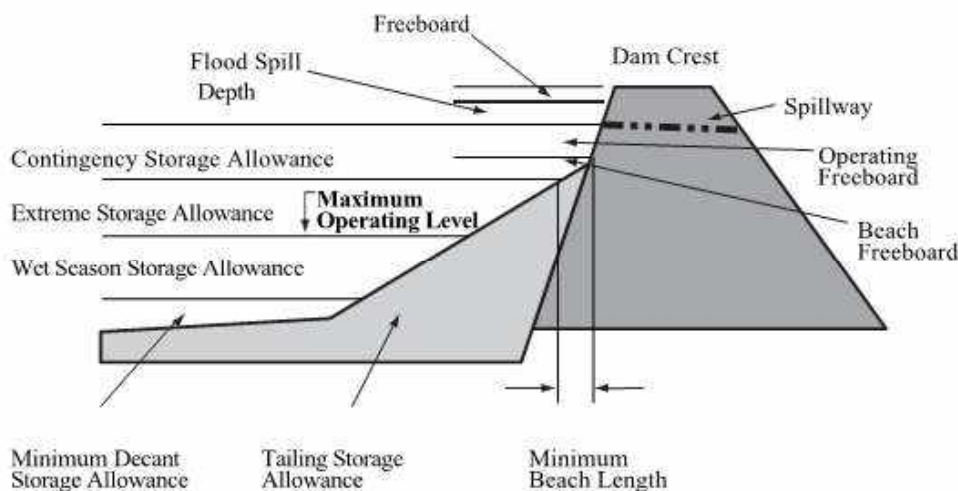


Figure 7.2 ANCOLD freeboard definition

For the purpose of freeboard assessment, the DEMIRS normal pond and the ANCOLD maximum operating pond can be taken as being equivalent as they both represent the design pond elevation upon which the design extreme flood (1:100 AEP, 72-hour storm with rainfall depth of 182 mm) is superimposed.

For the in-pit TSFs, the maximum operating pond elevations for which the required minimum total freeboard (DEMIRS) or contingency storage allowance (ANCOLD) is maintained have been evaluated. Wave run-up from 1:10 AEP wind action was assessed as approximately 0.2 m; consequently, the DEMIRS minimum total freeboard of 0.5 m and the ANCOLD contingency storage allowance of 1:10 AEP wind wave run-up + 0.3 m are equivalent.

Spillways have not been incorporated for the in-pit TSFs, as they are designed as non-release storage facilities; however, potential overflow scenarios were considered based on pit topography. At the Central Beta Pit, the southern rim represents the lowest elevation point, allowing any excess water to naturally flow southward into the adjacent South Beta Pit. Conversely, at the South Beta Pit, the northern rim is the lowest elevation point, facilitating overflow back into the Central Beta Pit. This reciprocal arrangement ensures that in the event of significant inflows or unexpected water accumulation, excess water can be safely transferred between the two pits without impacting the surrounding environment.

The assessment results are summarised in Table 7.1, Figure 7.3 and Figure 7.4.

Table 7.1 Beta pits freeboard assessment results

	Central Beta IPTSF		South Beta IPTSF	
	Volume (m ³)	Depth (m)	Volume (m ³)	Depth (m)
Minimum decant storage allowance	40,072	1.0	23,746	1.0
Wet season storage allowance	64,101	0.9	48,081	1.6
Extreme storage allowance (1:100 AEP, 72 hr flood)	15,224	0.4	7,425	0.3
Contingency storage allowance	19,684	0.3	9,469	0.3
Wave run-up	13,184	0.2	6,379	0.2
Total freeboard	152,265	2.8	95,100	3.4
Pit Rim Low point (mAHD)	465.0		464.0	
Maximum operating pond level (m AHD)	463.6		463.00	

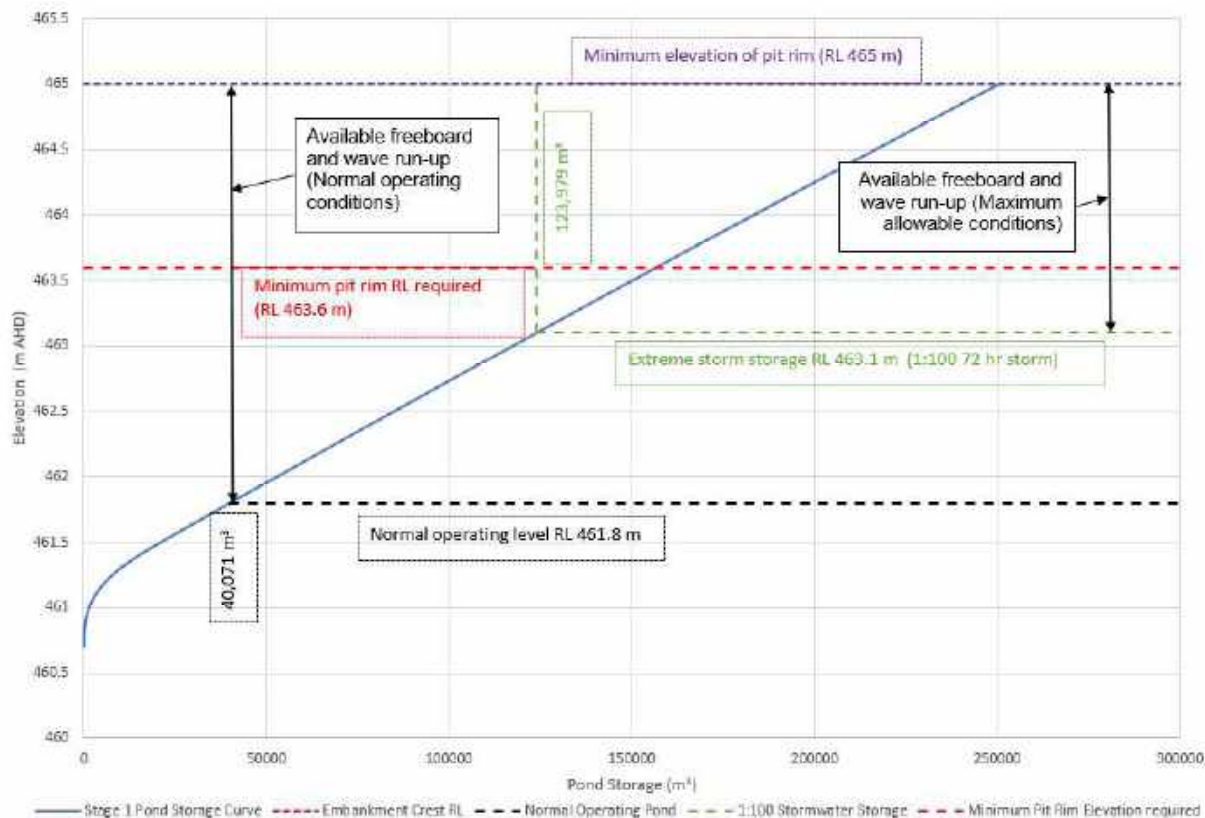


Figure 7.3 Central Beta IPTSF pond storage curve (ANCOLD)

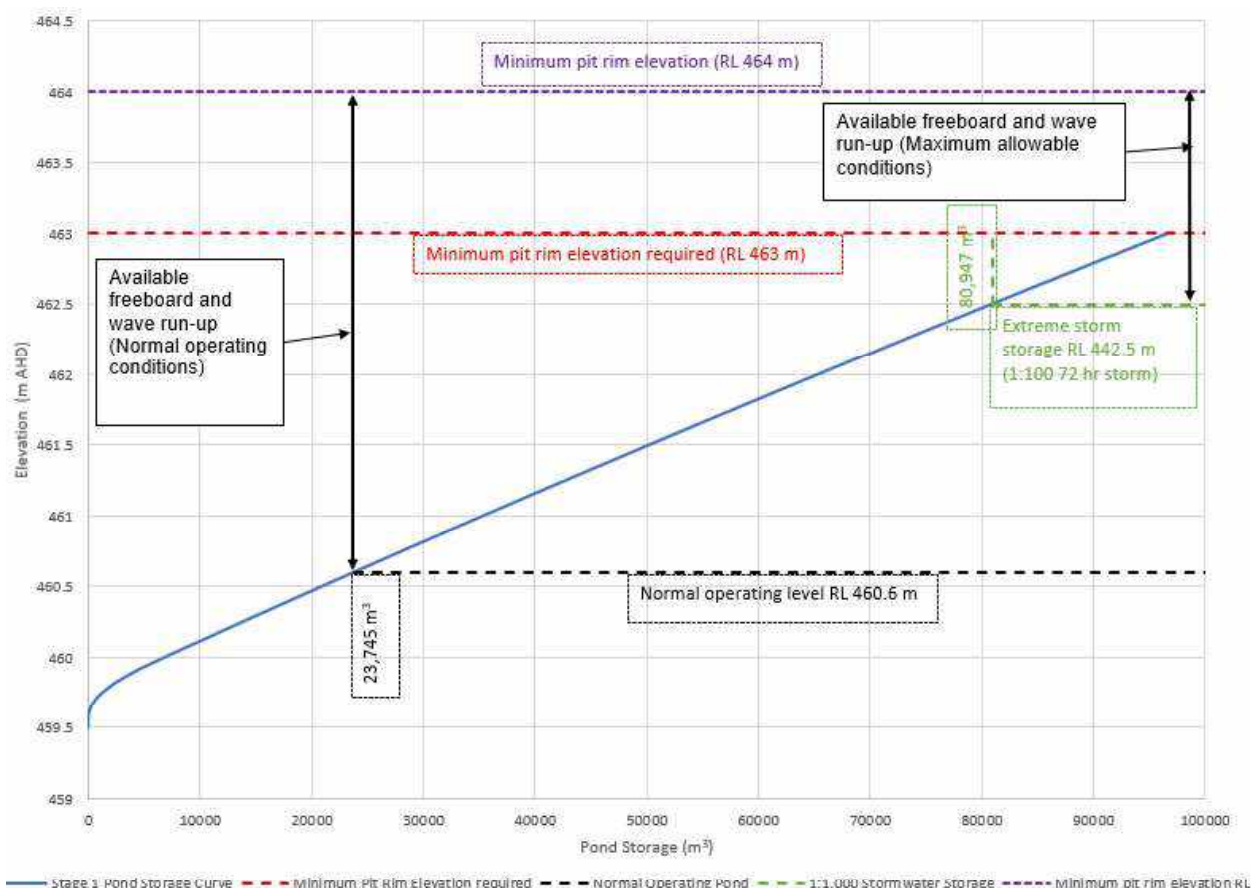


Figure 7.4 South Beta IPTSF pond storage curve (ANCOLD)

Once the perimeter embankment is constructed around the pits, the stormwater and contingency storage allowance below the pit rim will be used to store tailings and revised stormwater storage provisions are applied within the void space between the final tailings surface and the embankment crest elevation.

For the Donut Beta TSF, the pontoon decant will be able to manoeuvre around the pond easier, the tailings beach is expected to be flatter and a minimum pond depth allowance of 0.5 m is considered appropriate. The revised freeboard assessment is summarised in Table 7.2 and the water fill curve is illustrated on Figure 7.5.

Table 7.2 Donut Beta TSF freeboard assessment results

	Central Beta IPTSF	
	Volume required (m³)	Depth required (m)
Minimum decant storage allowance	26,988	0.5
Wet season storage allowance	43,337	0.2
Extreme storage allowance (1:100 AEP, 72 hr flood)	34,580	0.3
Wave run-up	35,673	0.2
Contingency storage allowance	52,503	0.3
Total water storage above tailings beach head	193,082	1.5
Maximum Operating Pond Elevation	473.2	
Minimum embankment elevation required (m RL)	474.7	

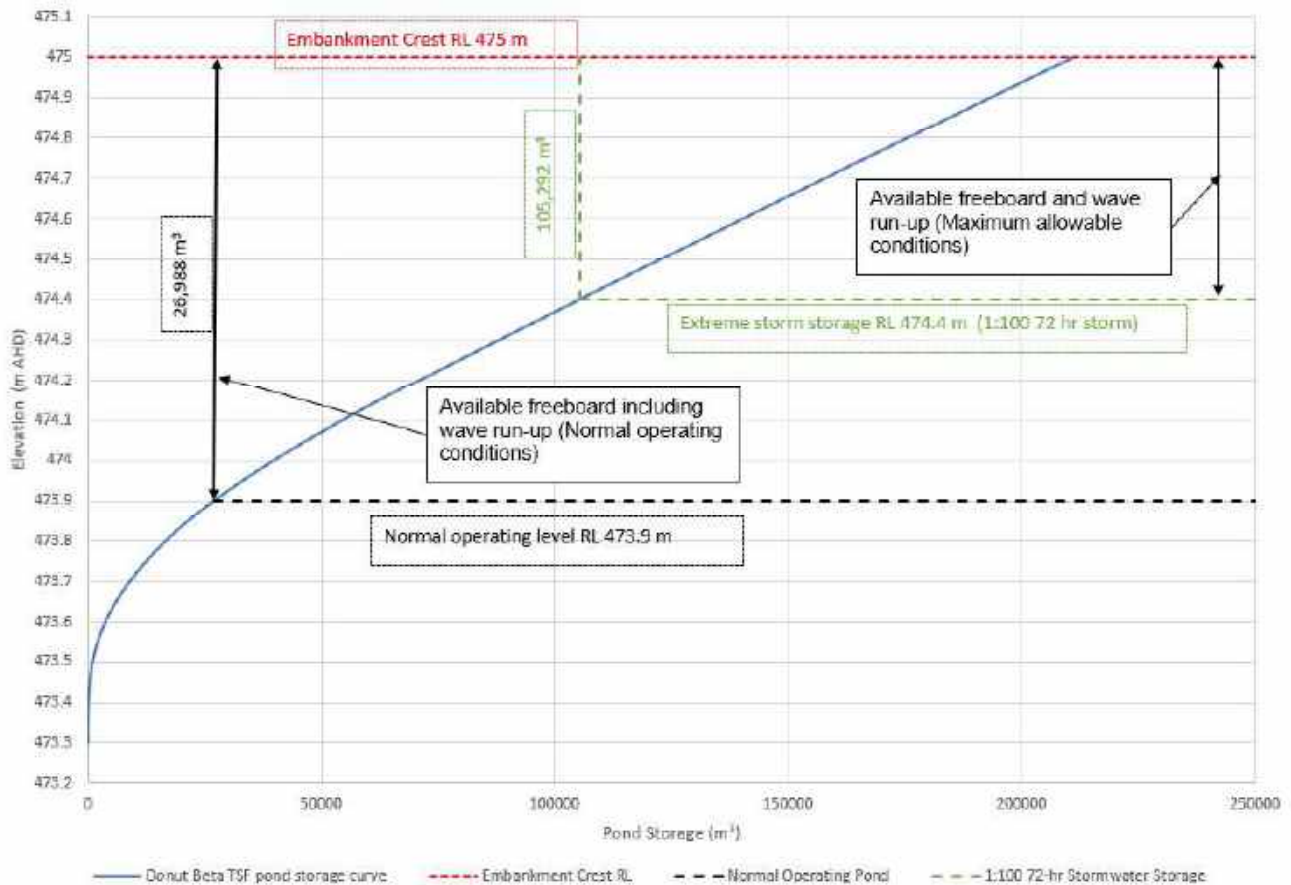


Figure 7.5 Donut Beta TSF pond storage curve (ANCOLD)

Although the freeboard provisions are applied so that the TSF will be a non-release facility, it is considered good practice to mitigate against potential overtopping of the embankment by providing a spillway. Given the intent to utilize North Beta Pit as a water storage area, the spillway was positioned near this pit as illustrated on Figure 7.6.



Figure 7.6 Donut Beta TSF spillway location

An analysis was conducted to assess the flow path of spillway discharge and the terrain it will traverse. In the event of spillway activation, runoff will be directed into North Beta Pit via the western pit wall, which has an existing slope of approximately 1.4H:1V.

Prolonged water flow over this slope is expected to erode the pit wall, potentially affecting the downstream embankment footprint and leading to stability concerns. A stability analysis was performed for this scenario (elaborated in Section 7.5), and the results indicated factors of safety below recommended values. A design spillway width of 14 m was selected.

To mitigate this risk, a buttress for the pit wall, referred to as the North Beta Buttress, has been incorporated into the spillway design. The proposed buttress is shown in Figure 7.7.



Figure 7.7 North Beta buttress location

With the buttress in place, the stability model results confirmed that factors of safety met or exceeded the recommended values, ensuring the structural integrity of the pit wall.

The spillway design follows ANCOLD-recommended flood criteria, corresponding to a Significant dam failure consequence classification, which requires accommodating passage of floodwater from 1:1,000 AEP rainfall events.

The spillway design considerations are as follows:

- Geometry and Hydraulic Capacity:
 - The spillway width was optimized within the available space, ensuring sufficient flow capacity despite the curvature constraints. The optimal spillway width with respect to the limitations was agreed with BTR to be 14.0 m which is applied to the hydrograph calculations.
 - Hydraulic calculations were performed to determine the required spillway depth, ensuring efficient flow conveyance.
- Design Flood and Rainfall Data:
 - Intensity-Frequency-Duration (IFD) rainfall data was obtained from the Bureau of Meteorology (BoM) for storm durations ranging from 12 to 168 hours.
 - Temporal pattern data was applied to assess the most critical rainfall distributions.

For each storm duration, the required spillway depth was designed using the most conservative temporal pattern to ensure robust performance under extreme conditions.

The design storm events were applied to a pond elevation corresponding to the maximum operating pond level. This level is defined as the minimum decant allowance (regulated by the decant operating level) combined with the wet season storage allowance for the TSF.

The results of the spillway assessment are presented in Table 7.3.

Table 7.3 Donut Beta TSF spillway hydrograph summaries

Duration (hrs)	Max inflow into TSF (m ³ /sec)	Max outflow through spillway (m ³ /sec)	Max flow depth (m)
12	5.5	No outflow ⁽¹⁾	-
18	3.2	No outflow ⁽¹⁾	-
24	2.7	No outflow ⁽¹⁾	-
30	1.9	No outflow ⁽¹⁾	-
36	3.3	No outflow ⁽¹⁾	-
48	3.2	No outflow ⁽¹⁾	-
72	2.3	No outflow ⁽¹⁾	-
96	2.5	0.1	0.01
120	2.0	0.3	0.02
144	2.1	0.3	0.09
168	1.2	0.3	0.02

(1) Stormwater event water run-off contained in TSF. Thus, there is no flow from spillway

As shown in Table 7.3, the critical storm event is the 1:1,000 AEP 144-hr duration which results in a maximum outflow through the spillway of 0.3 m³/sec and 0.09 m (rounded up to 0.1 m) critical flow depth.

This effectively results in an additional 0.3 m height being added to the embankment, within which the spillway invert is located. The final embankment crest height is RL 475 m.

7.2 Seismic loading assessment

Under normal operating conditions, peak ground accelerations (PGAs) are assessed for two earthquake loading scenarios in dam deformation analysis:

- Operating Base Earthquake (OBE): Represents a moderate seismic event that may cause minor but acceptable damage to the embankment.
- Safety Evaluation Earthquake (SEE): Represents the maximum level of ground motion for which the embankment must be designed or analysed. While some deformation is tolerable, the embankment must remain structurally functional after the event.

The recommended design earthquake return periods, as per ANCOLD guidelines for a “Significant” dam failure consequence category, are 1:475 AEP and 1:1,000 AEP for OBE and SEE respectively.

In the absence of site-specific shear wave velocity measurements, as the site is underlain by rock at shallow depth, it is inferred that a site sub-soil class of B_e (rock) is appropriate in accordance with AS1170.4 (Standards Australia, 2007).

For Sub-soil class B_e, the National Seismic Hazard Map of Australia (NSHA) (Allen, Griffin, Clark, & King, 2024) indicates a peak ground acceleration (PGA) ranging from 0.0185 g for 1:475 AEP to 0.06 g for 1:2,475 AEP earthquake events as illustrated on Figure 7.8 and Figure 7.9.

The OBE ground acceleration value for a 475-year return period was derived using the NSHA 2023 earthquake hazard map, as shown in Figure 7.8.

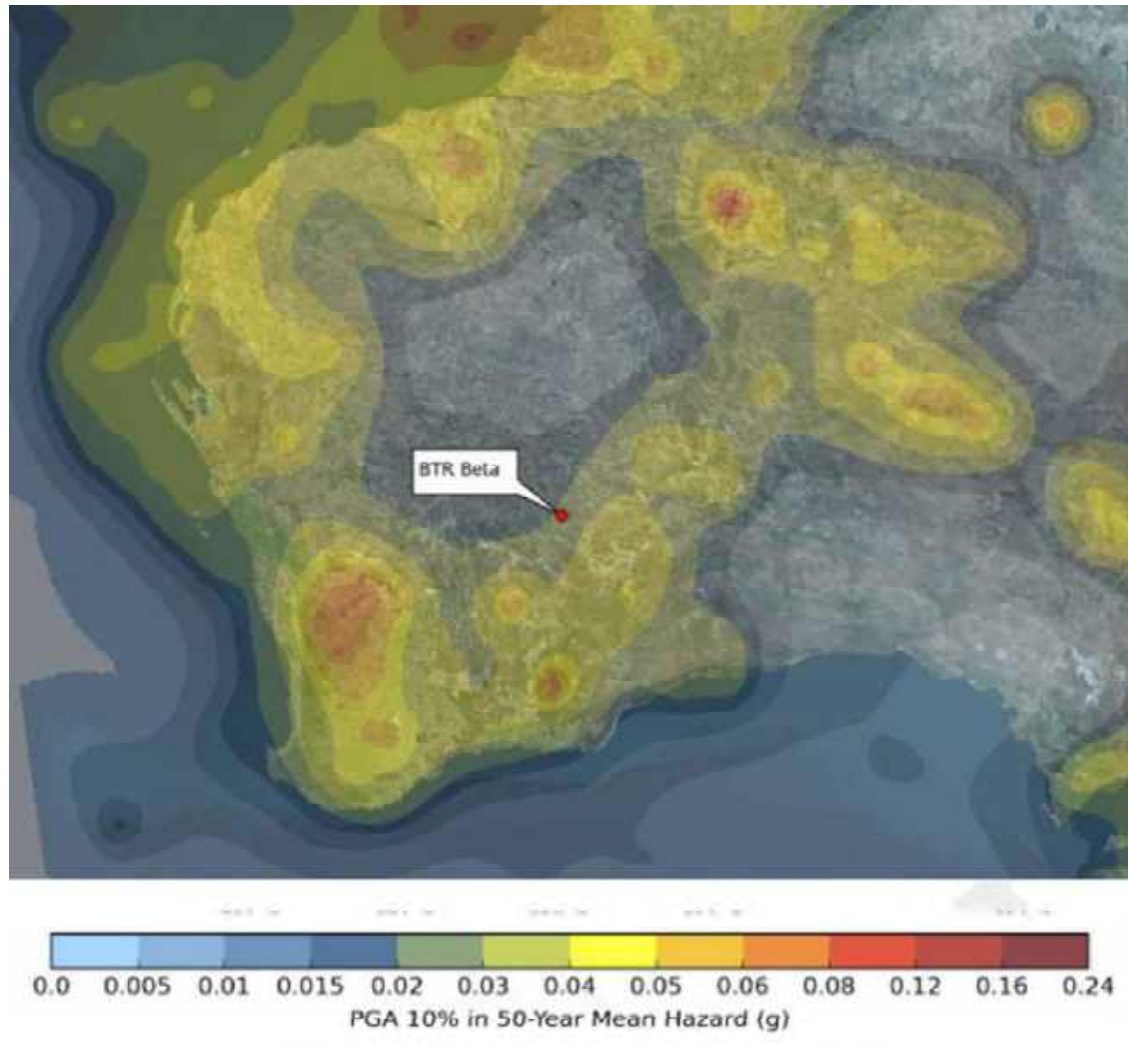


Figure 7.8 NSHA23 Hazard Map – Mean PGA 1:475 AEP = 0.0185g

As hazard maps for 1:1,000 AEP earthquake events are not provided in NHSA 2023, the PGA for a 1:2,475 event has conservatively been adopted for SEE assessment (Figure 7.9).

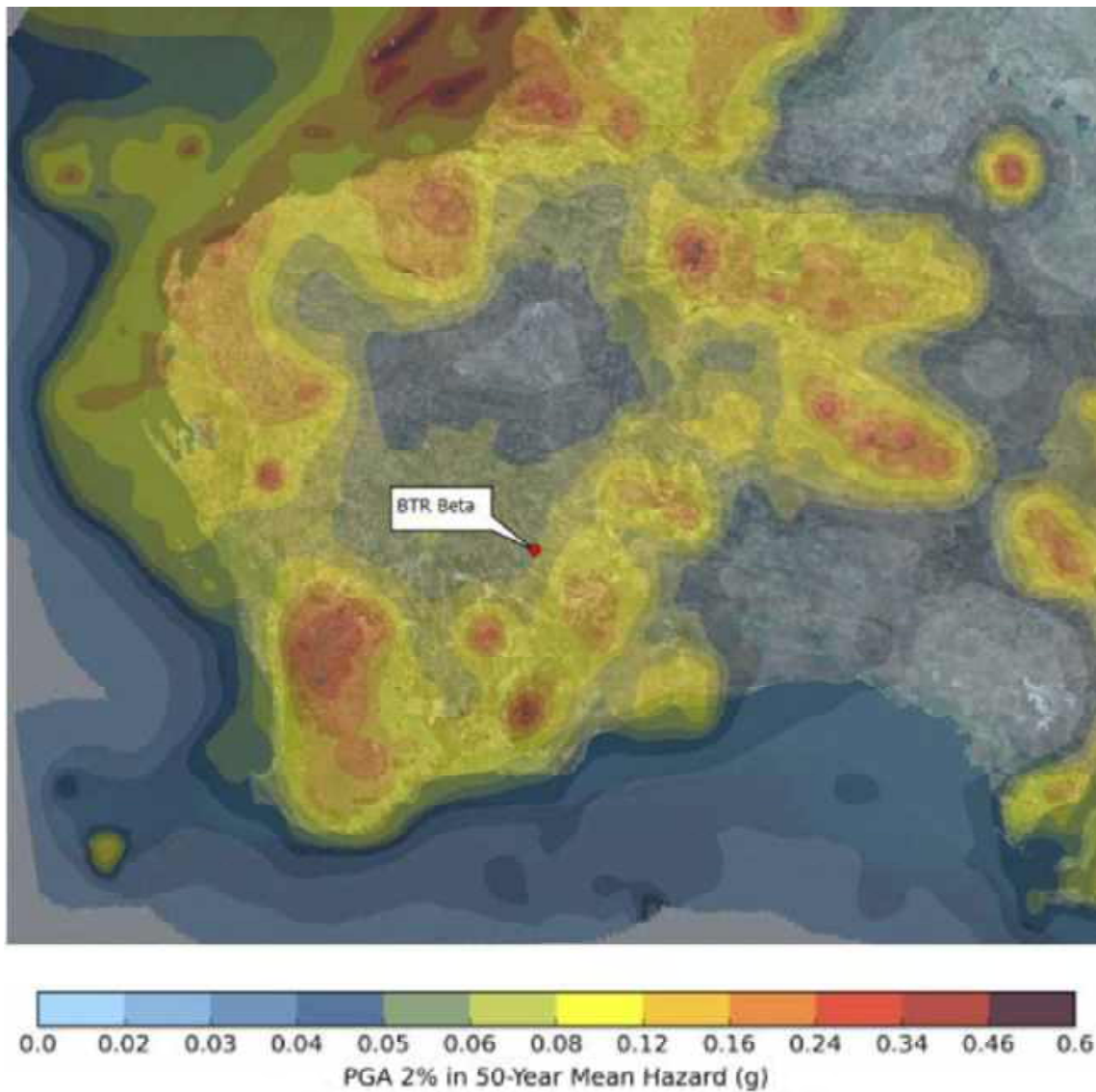


Figure 7.9 NSHA23 Hazard Map – Mean PGA 1:2,475 AEP = 0.06 g

7.3 Dam break analysis

7.3.1 Overview

A dam break of the Central and South Beta In-Pit Tailings Storage Facilities (IPTSFs) is considered non-credible due to the inherent containment provided by the pit walls. However, an empirical dam break analysis has been conducted for the Donut Beta TSF.

The TSF location and surrounding infrastructure are shown in Figure 7.10 (reproduction of Figure 1.3). Key areas of interest surrounding the TSF include:

- the plant site to the east
- the flood plain directly west of the tenement.



Figure 7.10 BTR Beta site layout

Dam break assessments generally consider both Sunny Day Failure (SDF) and Post-Flood Failure (PFF) conditions to determine the worst-case scenario, where:

- Sunny Day Failure (SDF):
 - Represents failure of the dam by mechanisms other than a storm-induced flood event, leading to a sudden loss of tailings containment.
 - Potential causes include foundation failure, excessive seepage and internal erosion (piping) or overtopping due to limited stormwater storage capacity being maintained during operation.
- Post-Flood Failure (PFF):
 - Represents failure during or following a natural flood event. Incremental impacts on the flood affected downstream area are considered.
 - Potential causes include foundation failure, overtopping of the embankment, or internal erosion (piping) facilitated by high hydraulic gradients.

For the Donut Beta TSF, the incremental impact of a flood-induced failure has not been modelled, as the overall catchment is significantly larger than the TSF itself. Thus, in an extreme storm event, downstream flows from the external catchment would exceed those resulting from a TSF failure, meaning the release of mobilised tailings and decant

pond water would have an indiscrete impact on downstream flood flow depths and velocities. It is noted that there would likely still be some tailings residue to clean up after the storm event.

For the purpose of this dam break analysis, the SDF scenario is considered more critical due to the TSF's proximity to the process plant.

7.3.2 Credible Dam break failure modes

The Donut Beta TSF design, as presented in Section 5.2, incorporates the following key elements:

- embankments founded on dense soils, soils cemented with calcrete and ferricrete or an altered/weathered rock mass
- embankments are entirely constructed from low-permeability material.

Considering these design features, along with the site's seismic and hydrological conditions, the credible dam break failure modes have been assessed as follows:

- Sunny Day Failure (SDF): Piping and internal erosion
- Post-Flood Failure (PFF): Overtopping.

In the event of a dam break, the embankment would most likely breach at the southwestern flank, which is the highest point of the embankment (10 m) and is founded on highly altered schist with cemented calcrete veins, as identified during the site inspection.

The embankment crest elevation (RL 475 m) is lower than the Process plant pad level (RL 477 m), consequently direct impact to the processing area is not anticipated.

7.3.3 Population at risk

The primary population at risk consists of personnel involved in mining activities downstream of the breach location or travelling on the Site access road and its continuation to the Mount Weld Mine (approximately 10 km to the WSW at an elevation approximately 35 m lower than BTR) or the section of the unsealed Burtville – Hackwell Road to the south of BTR.

7.3.4 Analysis methodology

Dam break assessments for tailings dams typically estimate the volume of released material based on embankment height, stored tailings volume, and the volume of water on the TSF surface.

The modelling of conventional water outflows following a dam break is well-established, utilising widely accepted methodologies. However, the estimation of tailings run-out volumes is more complex due to multiple influencing variables. This requires a qualitative engineering assessment to determine appropriate input parameters and select suitable modelling techniques.

Common approaches for estimating mobilised tailings volumes include empirical methods and "rule of thumb" techniques, such as assuming a fixed proportion of total stored volume or deriving release volumes based on storage-height relationships.

For this assessment, to estimate the outflow volume (V_F) an empirical expression (Rourke & Luppnow, 2015) was applied to estimate the proportion of released tailings to tailings stored (VR), using the ratio of pond area to tailings surface area (PR) as follows:

$$VR = 0.6533PR + 0.0136$$

Tailings stored below the pit rim elevation beneath the Donut Beta embankment (within the Central and South Beta pits) are unlikely to mobilise beyond the impoundment in the event of a dam break and thus are not included in the proportion of released tailings. The total stored volume above the pit rim is 1.5 Mm³. The maximum embankment height (H) is 10 m.

For the Beta Donut embankment, assuming a pond depth of 0.5 m, the following parameters were applied:

- PR = 62%
- VR = 42%
- $V_F = 0.63 \text{ Mm}^3$
- H = 10 m.

For initial assessment, potential run-out distance was estimated based on statistical analysis of documented tailings dam failures, using the relationships presented in Figure 7.11.

Considering the expected operational conditions—normal operating pond depth of 0.5 m to 1 m and high tailings moisture content—the linear regression curve in Figure 7.11 is considered an appropriate model.

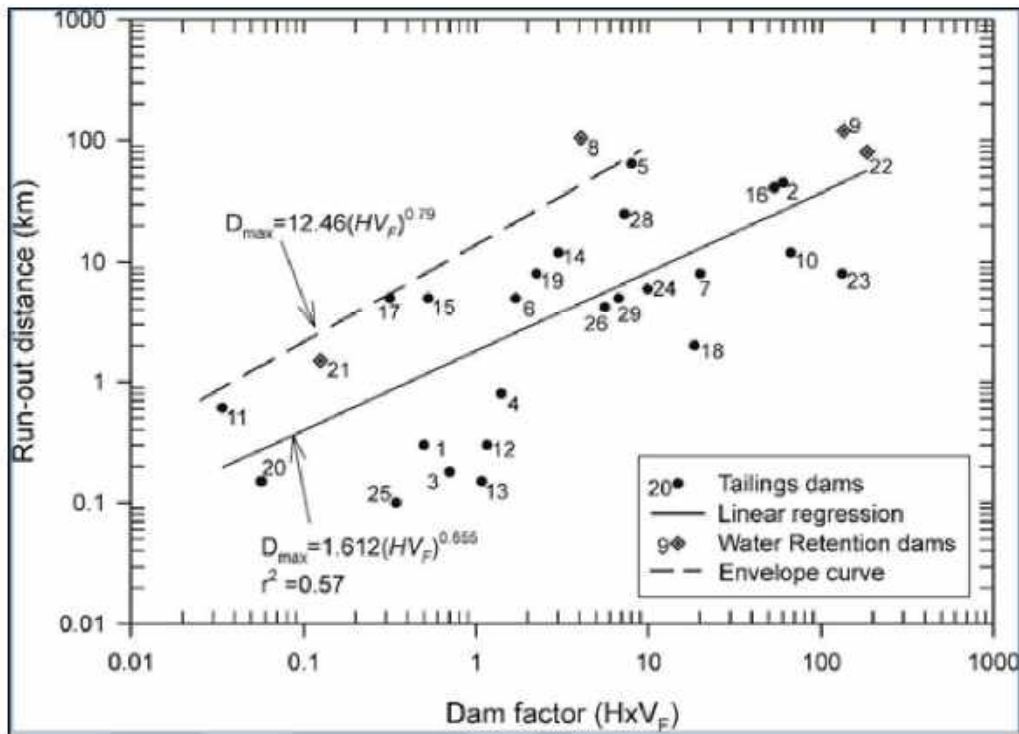


Figure 7.11 Dam break run-out estimation (Rico, Benito, & Diez-Herrero, 2008)

The estimated run-out distance for this scenario is 5.38 km, the extent of which is illustrated on Figure 7.12.



Figure 7.12 Dam break indicative run-out visual map

7.3.5 Results

The critical case, although highly unlikely is considered an SDF from the southwestern flank of the Donut Beta embankment caused by piping of the embankment. Assuming this as the critical case for assessment of the Population at Risk (PAR), mine personnel working within the process plant and administration area of the mine or travelling on the access road have been considered. Based on advice from BTR, the PAR has been assessed as $>1 - 10$.

7.4 Seepage analysis

7.4.1 Overview

Two-dimensional seepage analyses have been carried out using the finite element program SEEP/W developed by GEO-SLOPE International. The software calculates phreatic surfaces, pore pressures and flux (seepage per linear metre of embankment length), given user-defined geometry, hydraulic conductivity and boundary conditions.

The geometry developed for the SEEP/W model is based on the proposed TSF configuration and the existing stratigraphy. Foundation units inferred during assessment of available geotechnical information were idealised by assigning representative hydraulic conductivities (k values), thicknesses, and elevations. Each of the main embankment zones along with the foundation soil and rock layers were modelled separately.

Analyses have been conducted using a model framework representative of the maximum TSF cross sections as shown in Figure 7.13.



Figure 7.13 Seepage section locations for the Beta TSFs

Transient seepage analyses have been undertaken to investigate the progress of a wetting front (phreatic surface) through the soil and rock profile beneath the TSF under normal operating conditions as the TSF develops.

The inferred current phreatic surface is an average of 30 mBGL which was taken as the initial groundwater level.

Transient seepage analyses increments of two-week intervals were modelled for each facility, with the respective pond elevation superimposed on the maximum tailings surfaces as a conservative constant head boundary condition.

The materials above the phreatic surface are modelled as “saturated/unsaturated” with variations in the degree of saturation being determined by the model on the basis of material specific volumetric water content and hydraulic conductivity functions with respect to matric suction (negative pore pressure).

These functions were derived on the basis of relevant laboratory test results to modify default SEEP/W database functions for specific material types.

7.4.2 *Material properties*

The hydraulic conductivity properties of materials used were assigned based on available geotechnical data and where no physical test results were available, hydraulic characteristics were inferred based on visual inspection of the materials exposed in the pit walls. The values adopted are presented in Table 4.11.

7.4.3 Results

The graphical results of the analyses are provided in Appendix D.

The analysis indicates that seepage is expected to flow through weathered and extremely altered schist. Based on the assumption that the rock mass units are homogeneous, the horizontal wetting front does not extend a significant distance from the pit rim (<20 m); however, if there are zones of concentrated fracturing or shear zones, localised increases in the extent of the wetting front may occur.

Under normal operating conditions, with a normal operating pond and fully saturated tailings, the anticipated change in groundwater levels outside the tenement is minimal, at less than 1 m.

The estimated magnitude of seepage beyond the BTR Beta site tenement is summarized in Table 7.4, where:

- Section 1 extends from the northeast corner through all pits to the southwest corner of the tenement.
- Section 2 runs from north to south, slightly angled counterclockwise.

The maximum inferred seepage is approximately 400 m³/day, much of which occurs through the southwestern part of the south pit.

Table 7.4 Estimated seepage rates

Analysis Scenario	Section 1 (m ³ /day)		Section 2 (m ³ /day)	
	Northeast	Southwest	North	South
Central and South Beta IPTSFs operational	8.68×10^1	4.36×10^1	7.57×10^{-7}	6.02×10^1
Donut Beta TSF operational	1.65×10^2	2.35×10^2	3.98×10^1	1.72×10^2

The deposited tailings are expected to consolidate over time, leading to a gradual reduction in permeability within the lower layers of the deposit. As a result, seepage through the pit walls is anticipated to decrease progressively over time.

7.4.4 Model limitations

Due to the complex geometry and geology of the Beta pits, 2D seepage modelling is restricted in its ability to accurately estimate seepage rates as it is necessary to extrapolate estimated seepage rates along defined section alignments to the entire area of the pit walls and bases. This is simplistically achieved by estimating the flux through a string of 1 m wide elements, dividing the flux by the length of the section to infer seepage in m³/day per unit area and multiplying this value by the inferred pit wall and base area beneath the equilibrium water level in the different hydrogeological domains represented by extremely altered schist and weathered schist. It is recommended that a transient 3D groundwater model is developed to better assess likely seepage rates during operation and post closure of the Beta TSF's.

7.5 Stability analysis

7.5.1 Overview

Instability of the highly weathered materials on the southern side and a smaller localised bench section of the northwest perimeter of the South pit has previously been documented (STATS, 2013b) and remains evident. There has also been slope instability on the western wall of the central Beta pit and locally below the pit ramp at the northern edge of the current pit lake, which based on aerial imagery occurred prior to October 2015. The areas affected are illustrated on Figure 7.14.

During tailings disposal into the pits, pit access will be limited to installation of tailings delivery lines from the eastern sides of the pit rims and installation of return water lines along the access ramps, which are also on the eastern sides of the pits. Whilst a rising phreatic surface will tend to reduce the strength of extremely weathered zones of the rock mass, the associated rising tailings surface will tend to buttress the pit walls against further instability.

Overall, the stability of the operational tailings disposal areas is not expected to be adversely impacted during pit filling; however, localised remediation of erosion damage and undercutting on the pit access ramps and at the localised bench failure at the northern end of the south pit will be required prior to deposition commencement.

For the purpose of this report, stability analyses have been undertaken for the proposed Donut Beta embankment raising.



Figure 7.14 Localised areas of pit instability

7.5.2 Analyses

Geotechnical stability analyses were conducted for the most critical sections of the Donut Beta embankment, focusing on:

- Section 1: The southwestern flank, as it represents the highest point of the TSF embankment.
- Section 2: The northeastern flank, where the spillway and North Beta buttress are located.
- Section 3: The western flank of the Donut Beta TSF, where the embankment will be built upon extremely altered schist with historical stability issues.

The section locations are illustrated on Figure 7.15.



Figure 7.15 Stability analyses sections

Limit equilibrium analyses were performed using Rocscience Slide2 software, applying the Morgenstern-Price method, which satisfies all static equilibrium conditions, including force and moment equilibrium. Circular shear surfaces were identified using SLOPE/W's iterative search routines to determine the lowest calculated factors of safety for each specified loading condition.

The stability assessment followed the recommended flowchart outlined in the ANCOLD guidelines (ANCOLD, 2019a).

7.5.3 Loading conditions

The stability analyses considered the following scenarios:

- Short-term (End of Construction – EOC):
 - Represents embankment stability immediately after construction, before the dissipation of any excess pore pressures induced by loading.
 - Undrained stress parameters were applied for this analysis.
- Long-term (Normal Operating Conditions):
 - Represents the steady-state condition during and immediately after stage filling, where no excess pore pressures are present within the analysis section.
 - Effective stress parameters were applied to the embankments and foundation materials.

- Post-Seismic:
 - Represents conditions immediately after an earthquake, assuming a conservative scenario where all potentially liquefiable materials have liquefied.
 - Reduced post-seismic shear strengths were assigned to liquefied materials and, where appropriate, to other materials affected by strain softening or increased pore water pressure during the earthquake.

The minimum factors of safety (FOS) recommended by ANCOLD to evaluate the design are listed in Table 4.7.

7.5.4 Strength parameters

The parameters adopted for short-term (undrained) and long-term (drained) stability analyses have been predominantly derived from previous geotechnical investigations, local databases and on-site observations are presented in Table 4.13.

7.5.5 Phreatic surface

A conservative phreatic surface (significantly higher than that predicted by seepage analysis) has been adopted for the stability analyses. It is highly unlikely that the adopted phreatic surface will eventuate and is provided to assess the impact of the phreatic surface on stability.

7.5.6 Results

A summary of the stability analysis results for the Donut Beta TSF embankment under the specified loading conditions is presented in Table 7.5. The figures referenced in the table correspond to the graphical outputs of the critical failure surfaces, which are included in Appendix D.

For the conservative shear strength parameters inferred for the superficial soils, factors of safety less than desirable were obtained at the northern end of the embankment (Section 2), close to the upper 10 m high cut bench of the North pit.

Allowance has been made for buttressing the bench to provide an acceptable factor of safety; however, if preferred it may also be feasible to cut back the bench to a flatter slope or modify the design alignment of the embankment.

Sampling and assessment of the superficial material shear strength properties at this location should be completed before optimising the embankment/bench geometry at this location.

Table 7.5 Stability analysis results for the Donut Beta TSF

Loading conditions	Section 1 FoS	Section 2 FoS (before buttress) [with buttress]	Section 3 FoS	Minimum recommended FoS
Before construction – Extremely altered schist pit wall failure	Note 1	Note 1	1.385	1.3
End of construction - Upstream failure	1.672	Note 2	1.378	1.3
End of construction - Downstream failure	1.976	(0.897) [1.444]	4.952	1.3
End of design life - Downstream failure	2.545	(1.086) [1.824]	4.644	1.5
End of design post seismic - Downstream failure	2.016	(0.934) [1.388]	3.690	1.1

- (1) Not applicable as embankment is not founded near extremely altered schist pit wall
- (2) Not applicable as embankment at section location is less than 0.5 m high.

The analysis confirms that the calculated Factor of Safety (FoS) values for all modelled scenarios meet or exceed the stability criteria outlined in Table 4.7.

7.5.7 Deformation estimation under SEE seismic conditions

Although limit equilibrium shear failure is not anticipated, a simplified deformation analysis was conducted in accordance with ANCOLD guidelines to estimate embankment deformation (crest settlement) under a Safety Evaluation Earthquake (SEE).

The Swaisgood method provides an empirical relationship for estimating earthquake-induced crest settlements based on observed embankment performance following past seismic events:

$$\%Settlement = e^{(6.07 \times PGA + 0.57 \times M - 8.00)}$$

Where:

- % Settlement = Crest settlement (m) divided by the dam height plus foundation alluvium thickness (m).
- PGA = Peak horizontal ground acceleration of foundation rock (g) recorded or estimated at the dam site.
- M = Earthquake magnitude (surface-wave scale, M).

For the adopted SEE, using a PGA of 0.06 g and a magnitude of 6.5, the predicted crest deformation is approximately 0.02% of dam height. For the maximum embankment height of 10 m, this equates to a settlement of less than 3 mm.

As a minimum tailings beach freeboard of 300 mm has been allowed, the expected settlement remains well within acceptable limits, and loss of impoundment is not anticipated under the design earthquake load.

7.6 Water balance

7.6.1 Overview

A daily water balance model has been developed to evaluate the performance and design requirements of the proposed TSF over the anticipated life of mine.

The key objectives of the assessment are to:

- 1 Evaluate water level fluctuations and determine the statistical range of expected water levels in the decant pond.
- 2 Assess operating pond level variations for stormwater storage capacity analysis.
- 3 Estimate the availability of water for return to the process plant.
- 4 Determine the likelihood of spillway activation over the TSF's operational life.
- 5 Assess the performance of the decant system under expected operating conditions.

7.6.2 Inputs and assumptions

The following assumptions have been modelled into the water balance:

- The starting month of tailings deposition is currently unknown; therefore, it is assumed that the deposition will start in June 2026.
- The initial pit lake elevations are as measured during survey on 26 March 2024.
- An operational decant pump capacity of 60 m³/sec.
- Decant pumping to be triggered when the pond is 0.5 m or deeper.
- A maximum seepage rate of 5 mm/day taken from the transient seepage analysis results.
- A conservative evaporation factor (Evap_{actual}/Evap_{Pan}) of 0.5 was adopted (based on the measured supernatant salinity of 0.024) (Newson & Fahey, 2003).

7.6.3 Input climate data

Climate data was obtained from SILO (Scientific Information for Land Owners) which is a database of Australian climate data, hosted by the Science Division of the Queensland Government's Department of Environment and Science (DES). It provides daily datasets for various climate variables across Australia, incorporating interpolated infills for any missing data. These datasets are derived from observational records obtained from the Australian Bureau of Meteorology.

The sourced climate data used in the Water Balance Model is detailed in Table 7.6.

Table 7.6 Rainfall and evaporation input data for water balance

Climate Data	Data Source	Comments
Daily Rainfall Rate (mm/day)	Rainfall data obtained from the SILO Data Drill Program for the Site Location (1889 - 2018)	Applied over dam surface areas, and as an input parameter for the estimation of surface runoff as per the Australian Water Balance Model (AWBM).
Daily Evaporation Rate (mm/day)	Continuous record from SILO Data Drill formed by conjoining: CLIMARC estimates (1889 – 1957) and Class A Evaporation Data from proximate weather stations within the region (1889 – 2018).	Pan evaporation data is scaled by evaporation factors deemed suitable for the site conditions to reflect water storage conditions and expected water quality.
Daily Evapo-transpiration Rate (mm/day)	As calculated by the FAO short crop reference methodology, assuming a wind speed of 2 m/s.	Potential Evapotranspiration (PET) is calculated based on temperature, vapour pressure and solar global exposure parameters derived from climatic data, and is adopted as a reasonable estimate of potential evapotranspiration losses from ground surfaces within the surface runoff model.

7.6.4 TSF surface components

The TSF beach area is subdivided into the following zones:

- wet beach
- dry beach
- decant pond.

The wet beach is the area where tailings have been recently deposited subaerially and still retain water subject to evaporation. At any given time, this area is conservatively estimated to represent 30% of the total exposed beach area.

The dry beach comprises the remaining 70% of the exposed beach area, where most of the water available for evaporation has already been removed.

The decant pond is the zone where bleed water and surface runoff accumulate. Water is removed from this area through evaporation and discharge via the gravity decant system.

To model deposition characteristics, the predicted tailings beach slope and TSF geometry were input into MUK 3D, a deposition modelling software. This model simulates deposition stream characteristics and development over time. Based on this, a set of decant pond volume filling curves was generated, establishing a relationship between beach elevation and time.

During TSF filling, the decant pond shifts in both position and elevation. Relationships between elevation, volume, and area have been determined for the decant pond.

7.6.5 AWBM run-off model

To model the relationship between rainfall and runoff across different geometric areas of the water balance, both runoff coefficients and the AWBM were applied. A runoff coefficient of 1 was assigned to the decant pond area, where nearly all rainfall is converted to runoff.

The AWBM (Australian Water Balance Model) is a catchment water balance model that relates daily rainfall and evapotranspiration to runoff. The model consists of five storage components:

- three surface stores to simulate partial runoff areas
- a base flow store to account for subsurface contributions
- a surface runoff routing store to manage direct runoff processes.

A conceptual schematization of the AWBM model is provided in Figure 7.16.

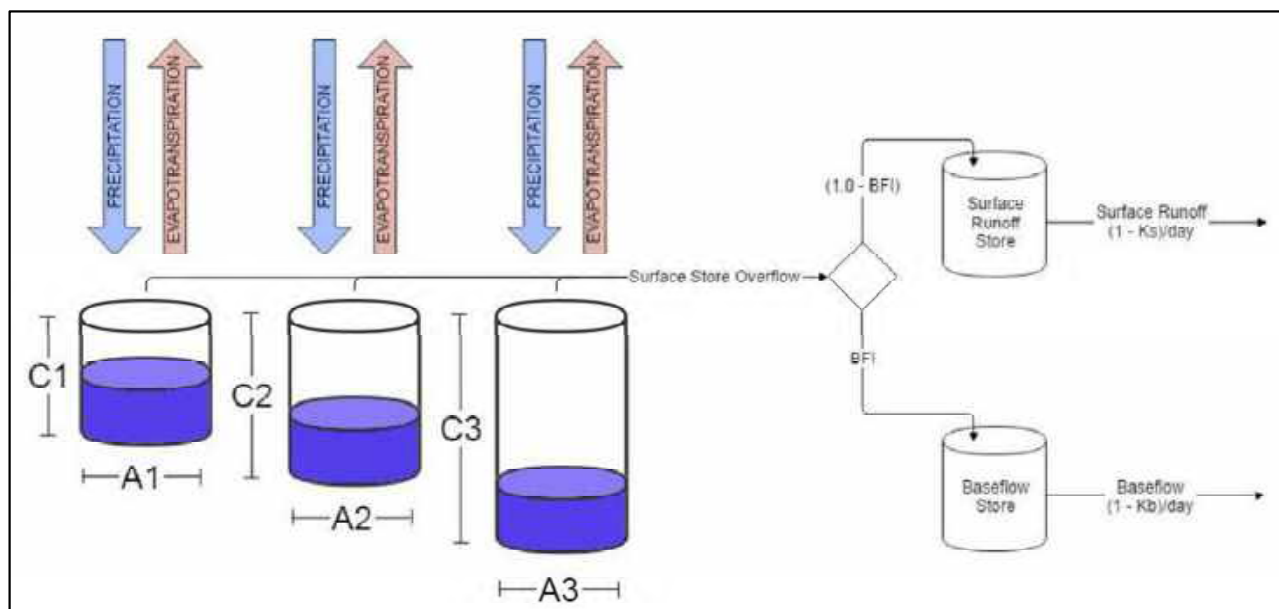


Figure 7.16 AWBM rainfall run-off model schematic

The catchment types, corresponding AWBM model parameters, and average yields from these areas are summarised in Table 7.7. Model parameters were selected based on experience with similar water balance studies and are considered conservative, given the model has not been calibrated.

Within the model, the AWBM is applied only to the dry beach, while a runoff coefficient of 1 is assigned to the wet beach area to reflect full runoff conversion.

Table 7.7 AWBM model parameters

AWBM Parameters	Split Areas (sum=1.0)			Storage Capacities (mm)			Ks (day-1)	BFI	Kb (day-1)
	A1	A2	A3	C1	C2	C3			
Natural	13.4	43.35	43.3	12	120	250	0	0.1	1
Tailings	0	30	45.7	10	30	60	0	0	1

7.6.6 Tailings water release

Tailings deposition initially results in water separating from the slurry and migrating to the decant pond. Bleed water is defined as the difference between the water content in the tailings slurry as it exits the thickener and the retained water content within the tailings. Bleed water is taken to be generated instantaneously during deposition. Ongoing release of interstitial water retained in the tailings deposit occurs due to self-weight consolidation over (and beyond) the operational life of the TSF.

The adopted tailings bleed characteristics were derived from laboratory testing on existing tailings. Bleed water is calculated as a function of:

- slurry solids concentration
- initial settled density
- tailings specific gravity.

The initial settled density and tailings specific gravity determine the volume of entrapped water after the initial settlement of tailings.

Sustained tailings deposition increases overburden pressure, leading to consolidation of previously deposited tailings. This process generates pore water pressure, causing water to migrate from the tailings mass, resulting in an increase in density. The water released during this process is designated as consolidation water. The consolidated density defines the volume of water released as tailings undergo consolidation. An average consolidated density of 1.5 t/m³ was inferred from slurry consolidometer testing.

7.6.7 Methodology

7.6.7.1 Mass balance approach

The TSF water balance model has been prepared on the basis of the conventional mass balance approach, where:

$$\Delta \text{ Storage Volume} = \text{Inputs} - \text{Outputs}$$

7.6.7.2 Water balance realisations

The GoldSim commercial software was used to simulate the water balance model. GoldSim is a probabilistic modelling tool designed to dynamically analyse complex systems.

A total of 100 statistical realisations were generated to stochastically assess possible water balance scenarios for the TSF. Each realisation was run over the facility's operational life, using daily time steps.

7.6.7.3 Stochastic outputs

The GoldSim program generates outputs for various elements within the water balance, either individually or stochastically, with percentile values presented in tabular and graphical formats. These percentile values do not represent a specific realisation but are instead calculated based on data from a given day. This distinction must be considered when interpreting graphical outputs.

For example, the maximum percentile case reflects the highest values recorded each day across all realisations. As a result, the maximum value graph should be viewed as a potential upper boundary rather than representing a single model run. This can be thought of as a “super” scenario, where the maximum values from multiple realisations are combined, providing insight into probabilities and potential limits of the water balance based on climate data.

7.6.8 Results

7.6.8.1 Central Pit IPTSF

A statistical analysis of the decant pond volume, inflow and outflow outcomes (averaged across all model realisations) for the Central Pit IPTSF, based on the stochastic water balance results, are presented in Table 7.8. More detailed probabilistic results are illustrated in Figure 7.17 to Figure 7.23.

Table 7.8 Average probabilistic results for the Central Beta IPTSF

	Averaged decant pond volume (m ³)	Averaged inflow (m ³ /day)	Averaged outflow (m ³ /day)
Minimum	87,238	548	1,084
25th Percentile	88,399	5448	1,144
50th Percentile (Median)	89,456	548	1,174
75th Percentile	92,100	557	1,207
99th Percentile	113,559	1,352	1,458

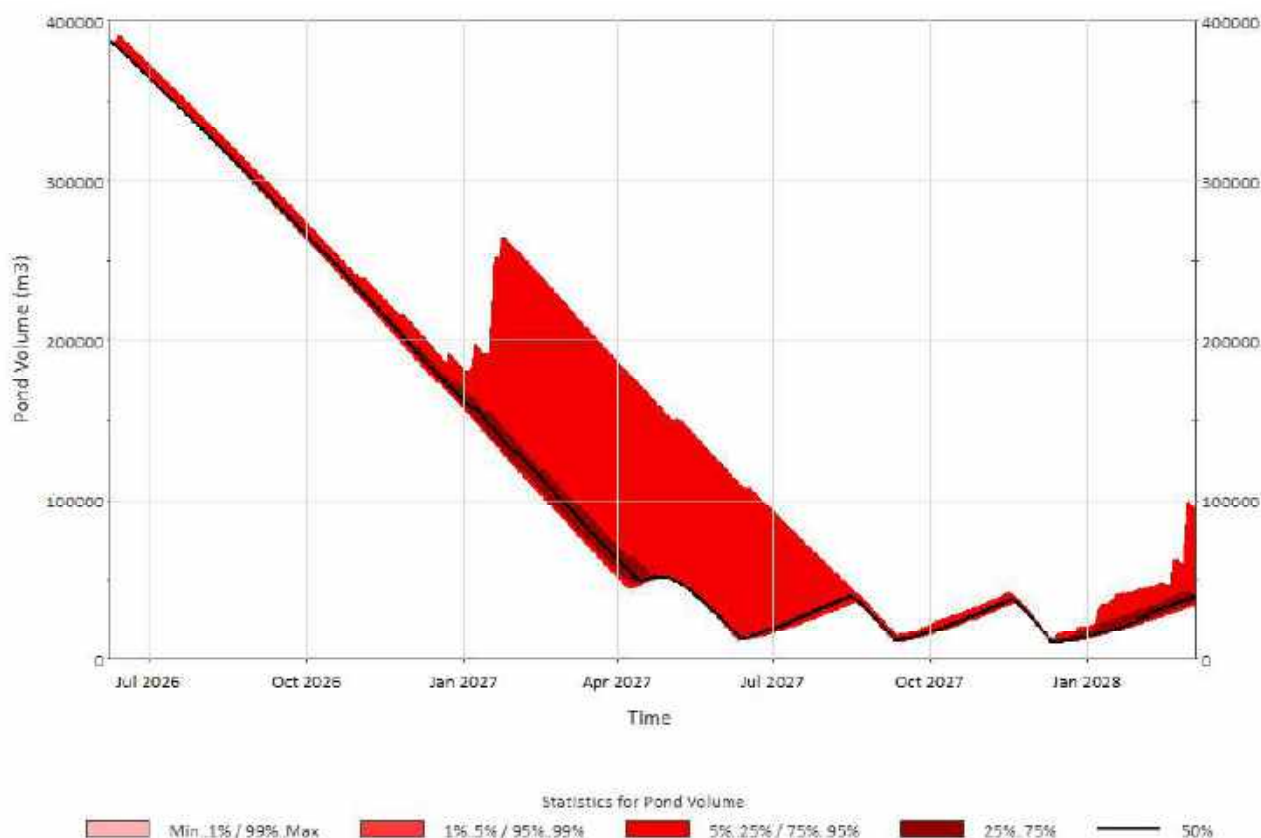


Figure 7.17 Central Beta IPTSF probabilistic decant pond volume results

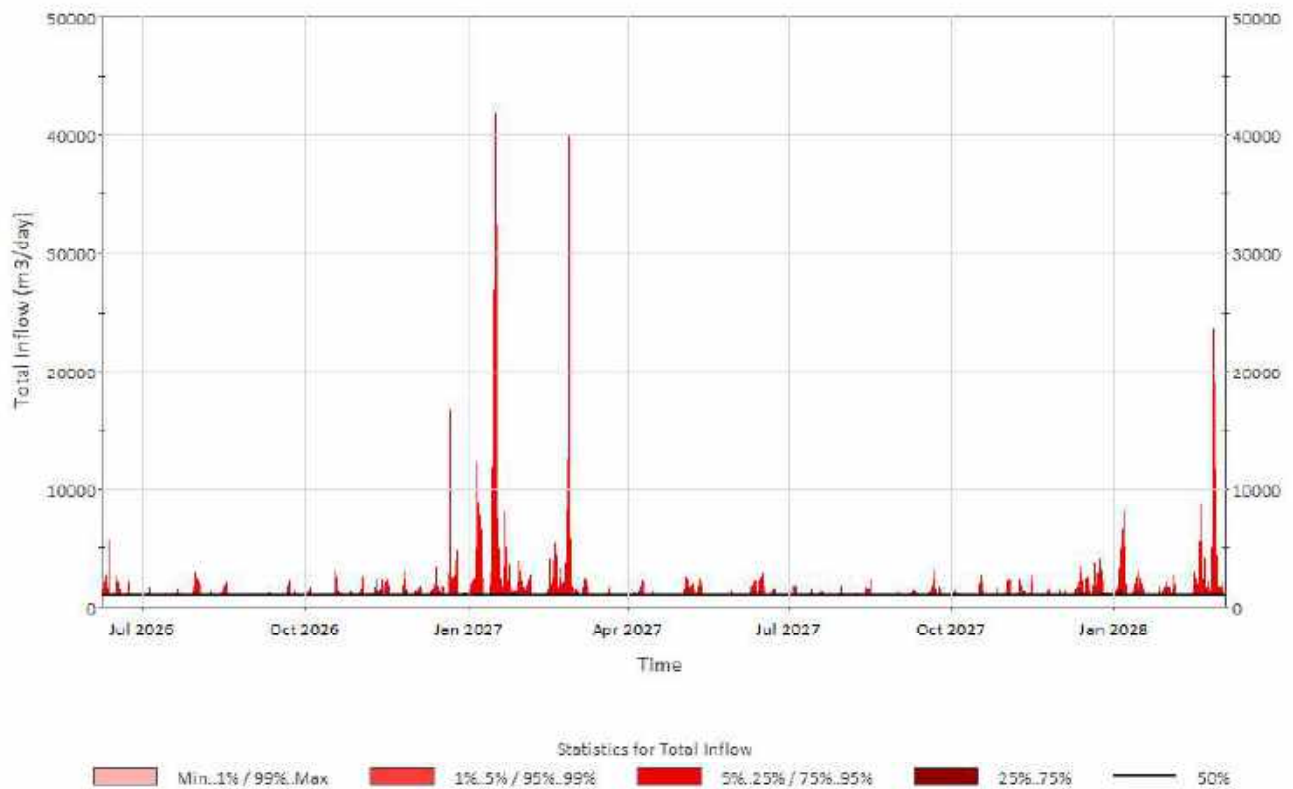


Figure 7.18 Central Beta IPTSF probabilistic total inflow results

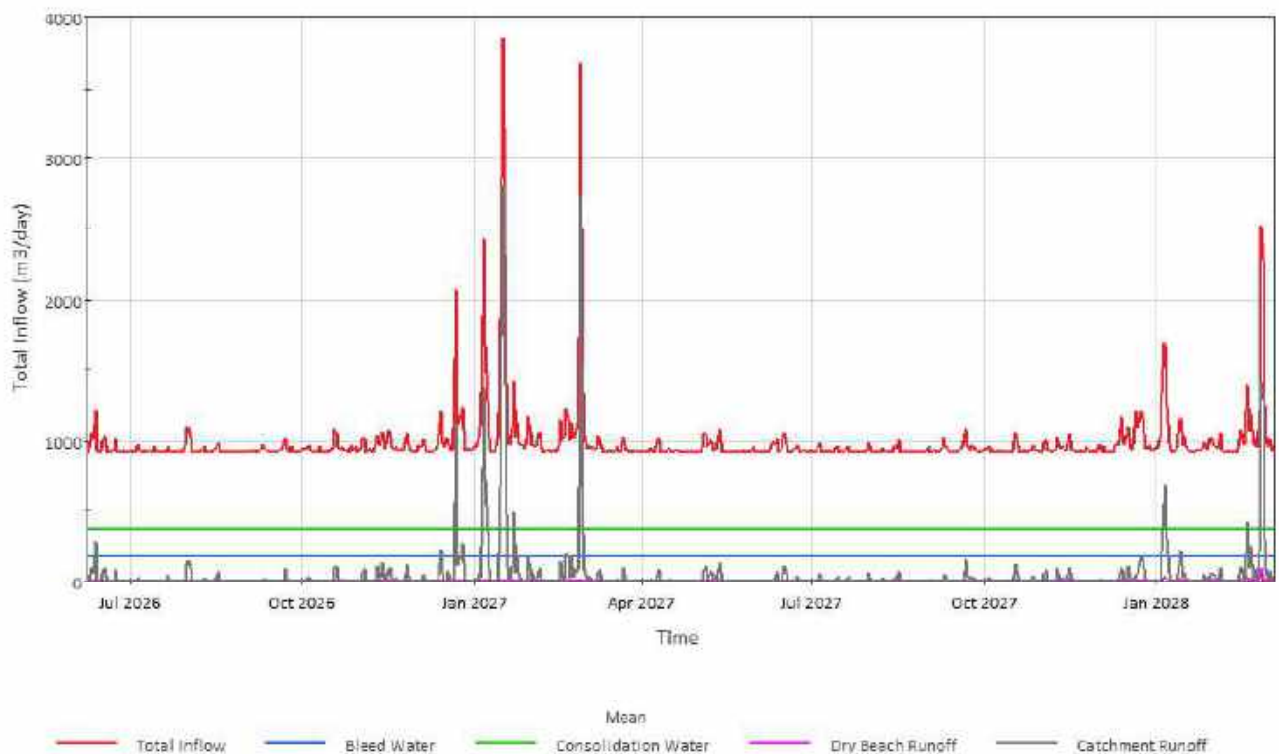


Figure 7.19 Central Beta IPTSF probabilistic inflows (mean)

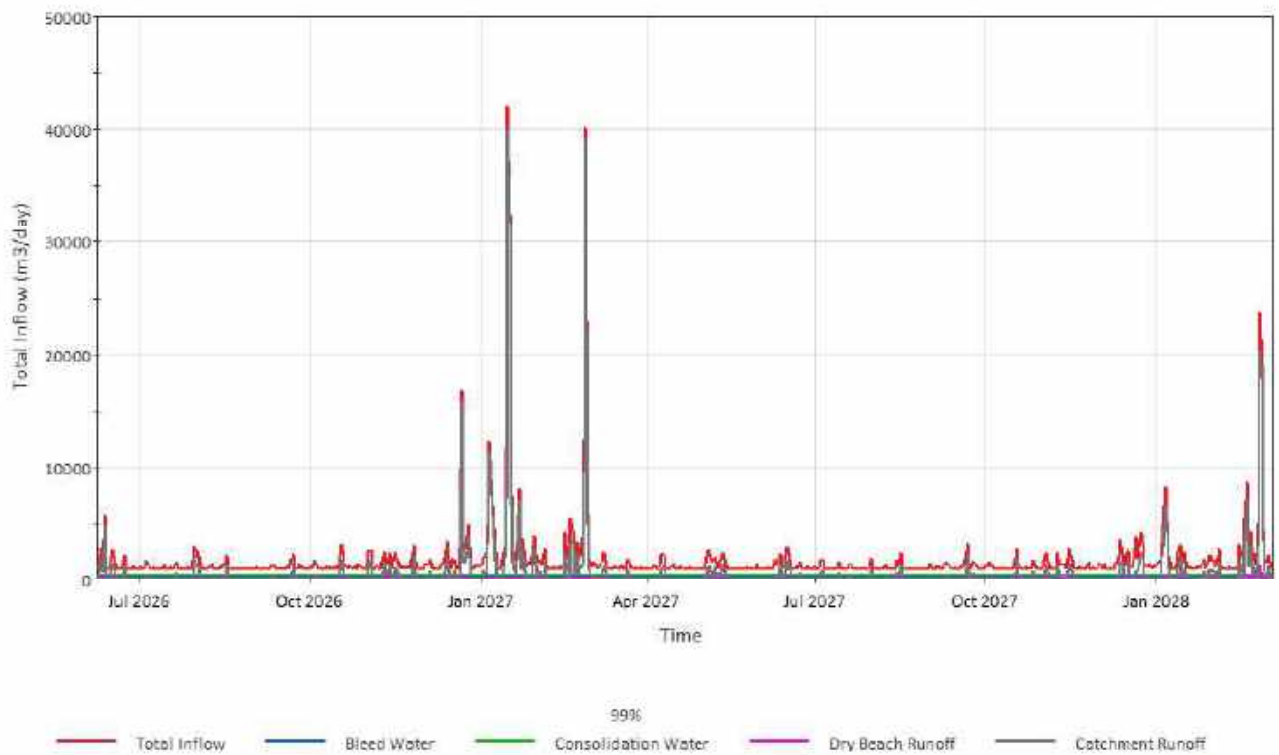


Figure 7.20 Central Beta IPTSF probabilistic inflows (99th percentile)

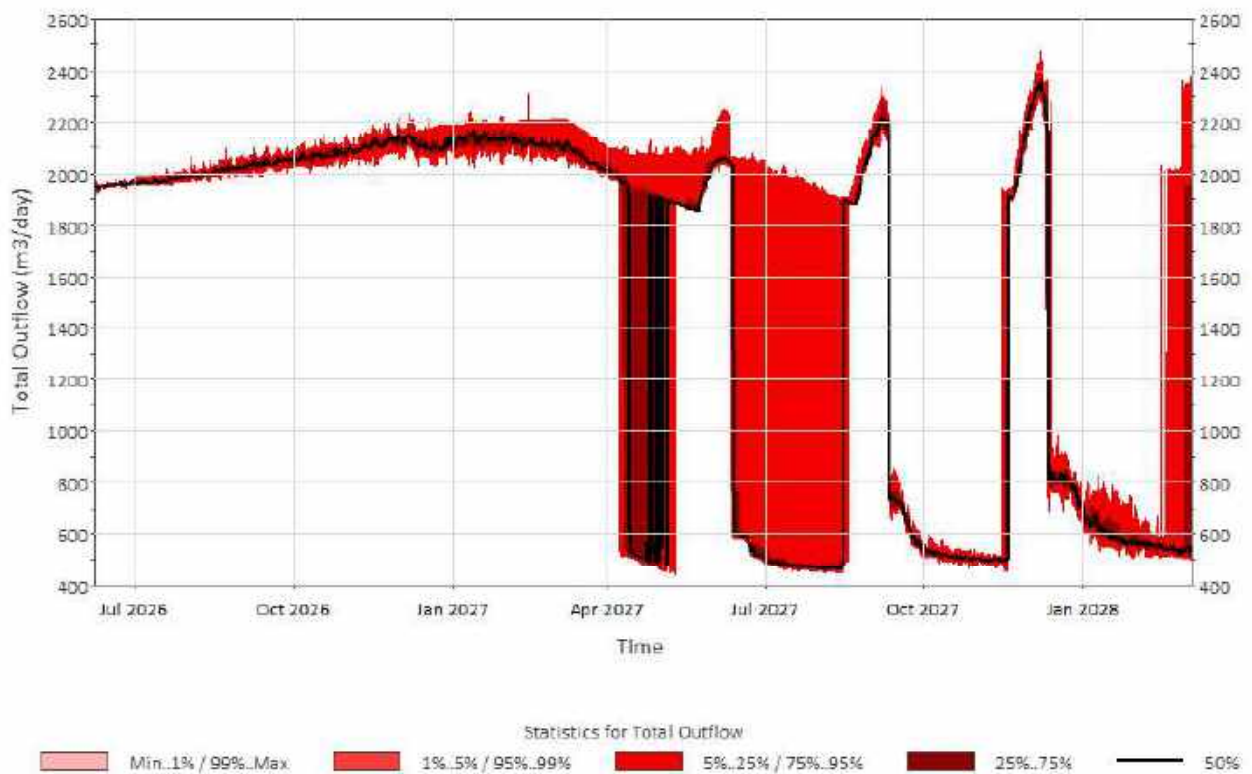


Figure 7.21 Central Beta IPTSF probabilistic total outflow results

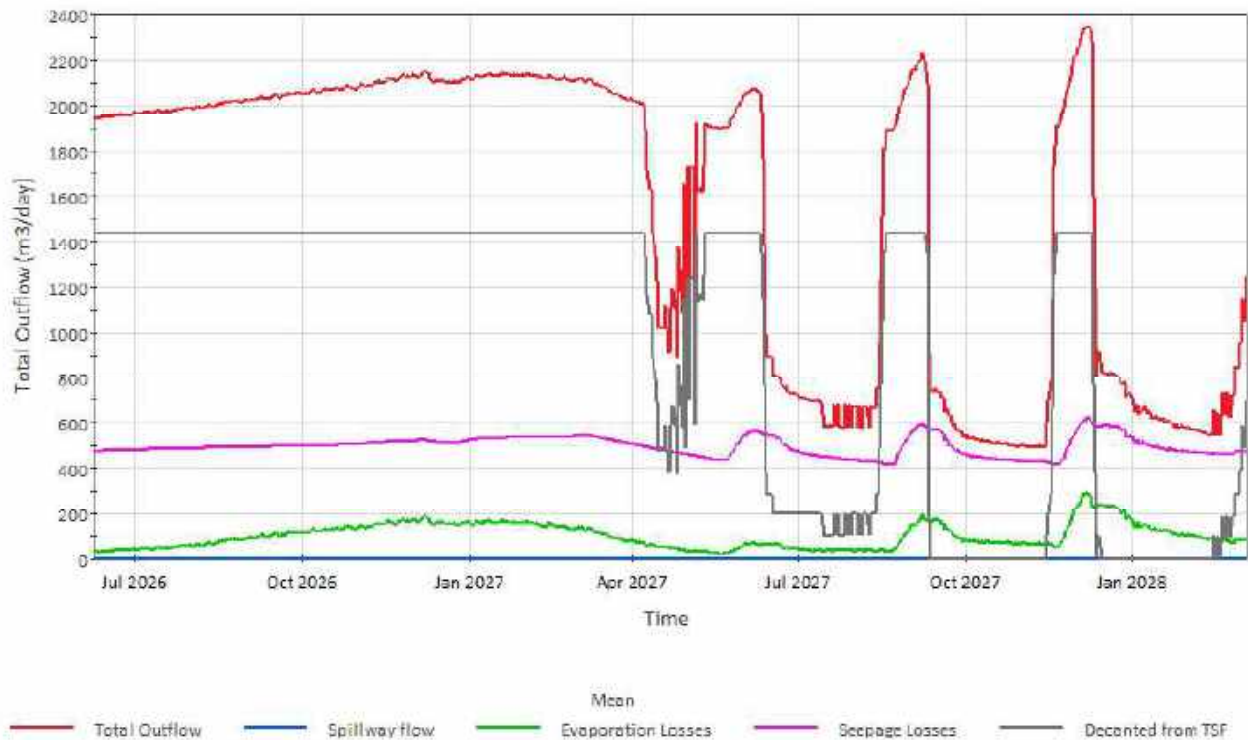


Figure 7.22 Central Beta IPTSF probabilistic outflows (mean)

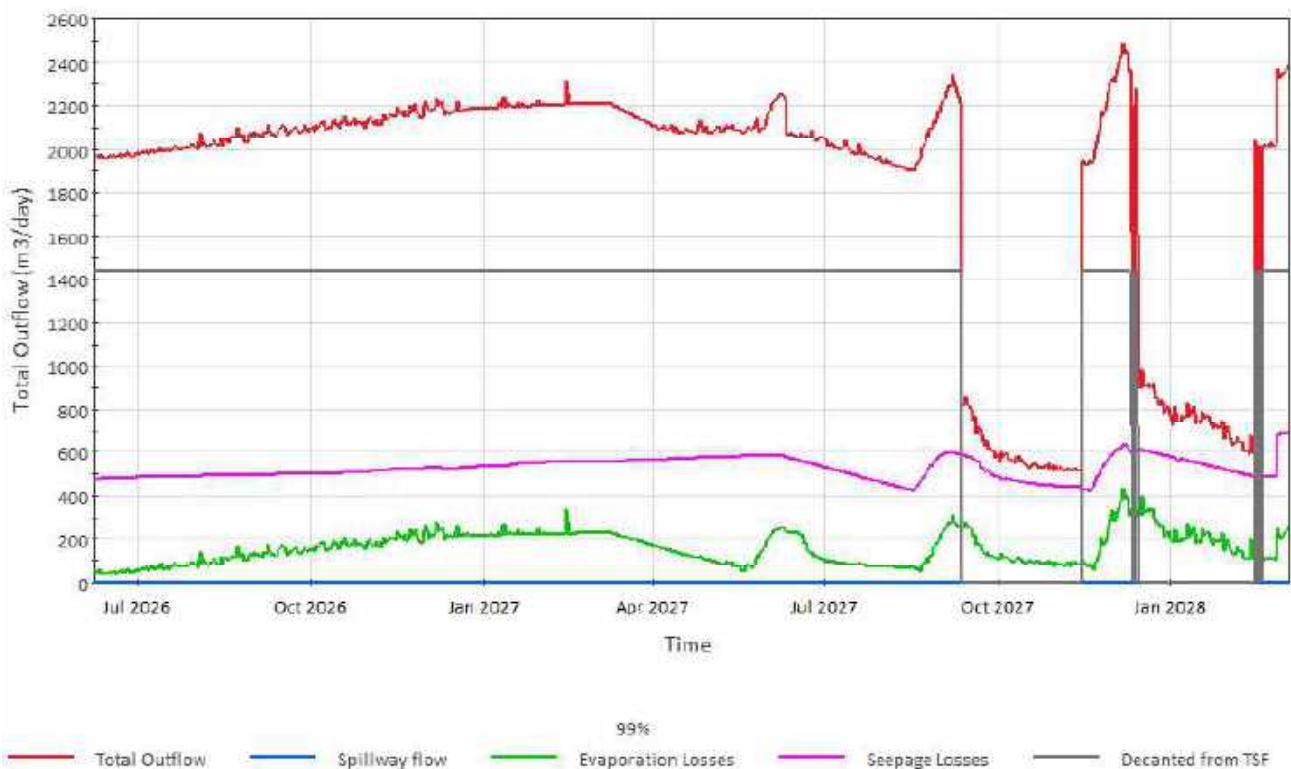


Figure 7.23 Central Beta IPTSF probabilistic outflows (99th percentile)

Water balance modelling for the Central Beta IPTSF identifies tailings bleed water and consolidation water as the primary inflow contributors, with stormwater runoff becoming more significant during the wet season. Decanting from the TSF represents the principal outflow mechanism and will likely be possible throughout the facility's operational life, except during dry seasons.

7.6.8.2 South Pit IPTSF

A statistical analysis of the average decant pond volume, inflow and outflow outcomes (averaged across all model realisations) for the South Pit IPTSF, based on the stochastic water balance results, are presented in Table 7.9. More detailed probabilistic results are illustrated in Figure 7.24 to Figure 7.30.

Table 7.9 Average probabilistic results for the South Beta IPTSF

	Averaged decant pond volume (m ³)	Averaged inflow (m ³ /day)	Averaged outflow (m ³ /day)
Minimum	12,154	548	678
25th Percentile	12,339	548	689
50th Percentile (Median)	12,674	548	699
75th Percentile	13,571	549	718
99th Percentile	16,580	768	773

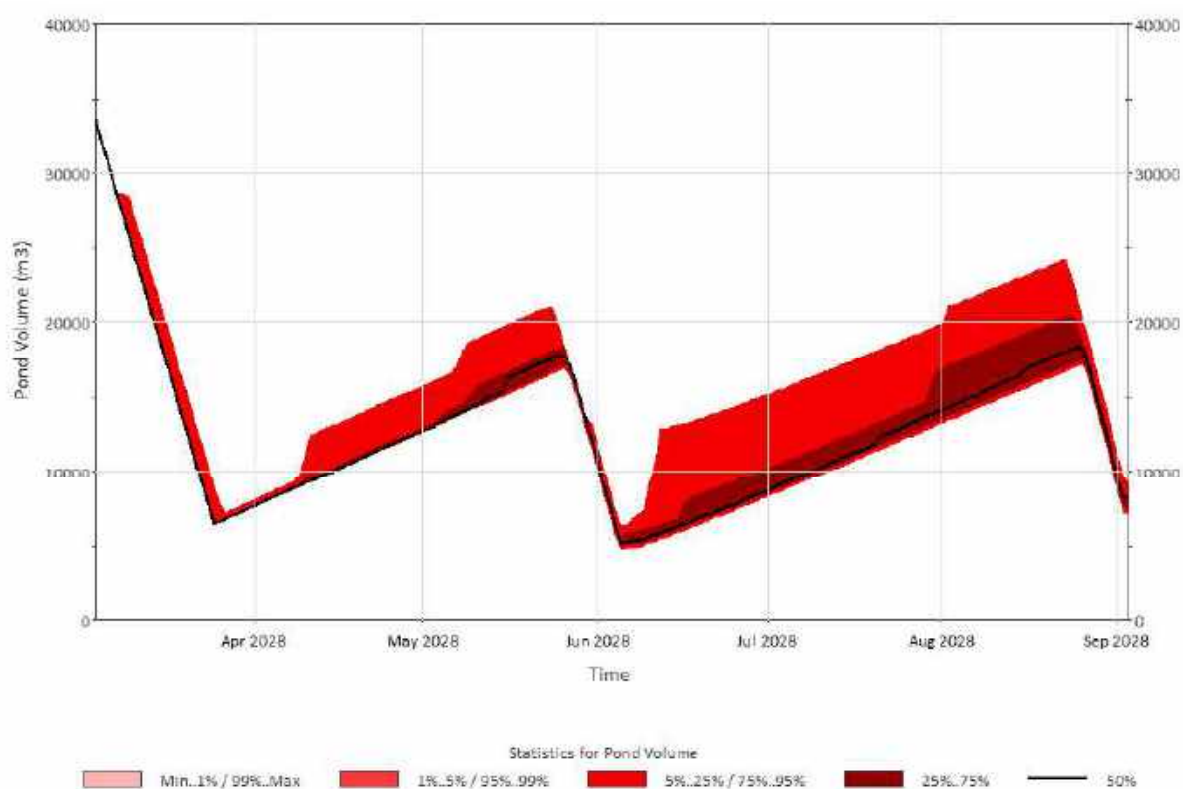


Figure 7.24 South Beta IPTSF probabilistic decant pond volume results

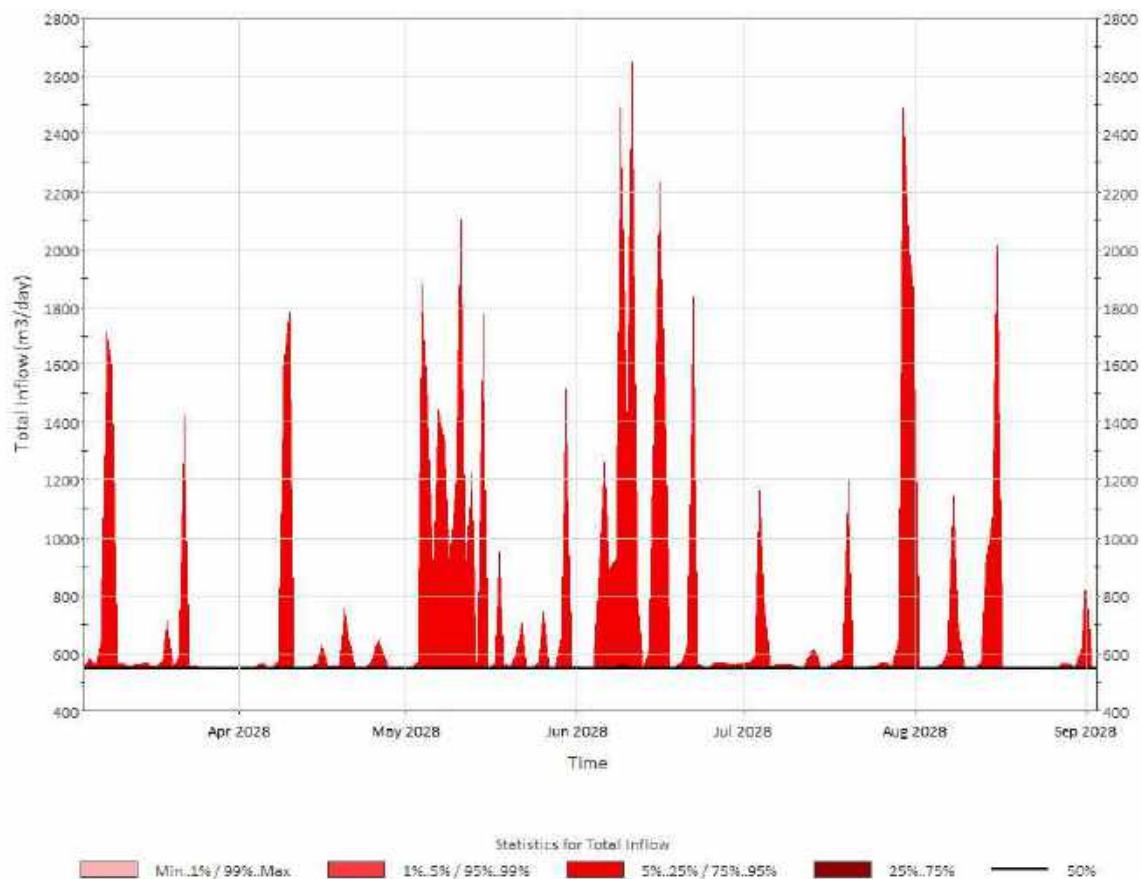


Figure 7.25 South Beta IPTSF probabilistic total inflow results

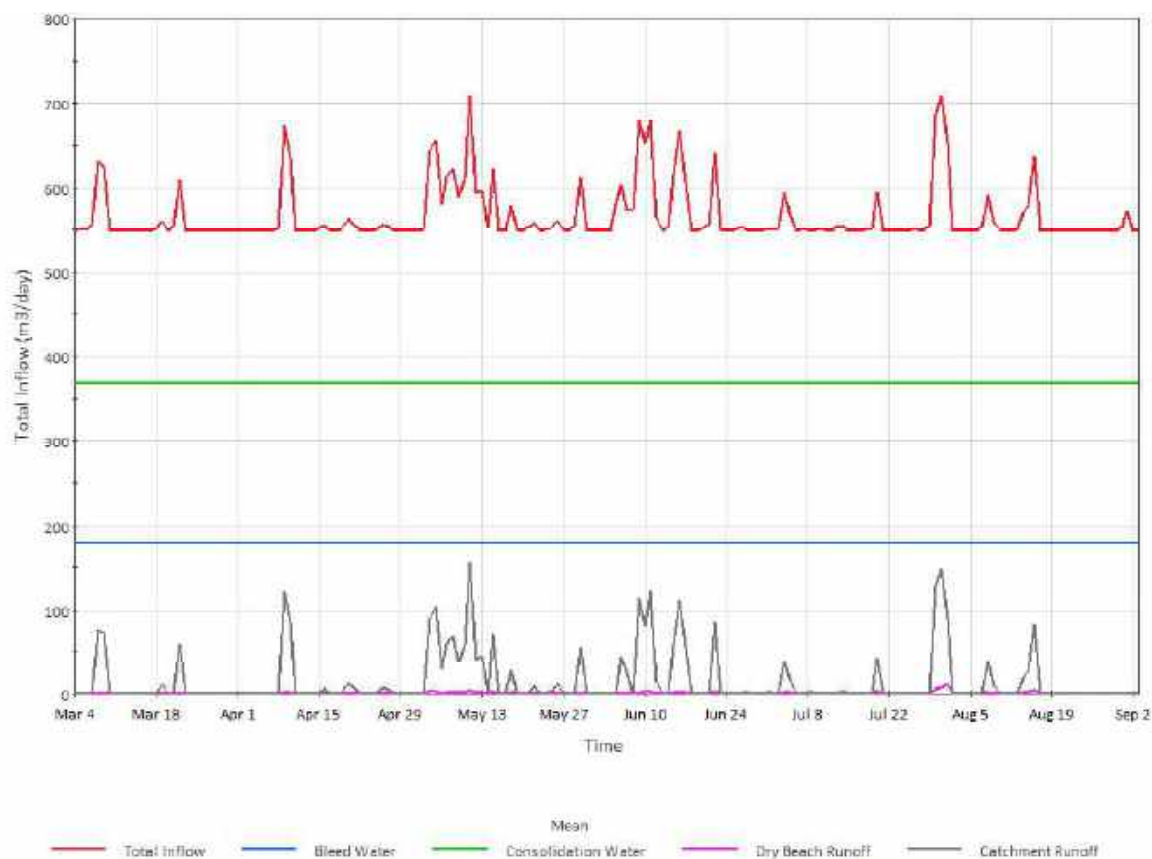


Figure 7.26 South Beta IPTSF probabilistic inflows (mean)

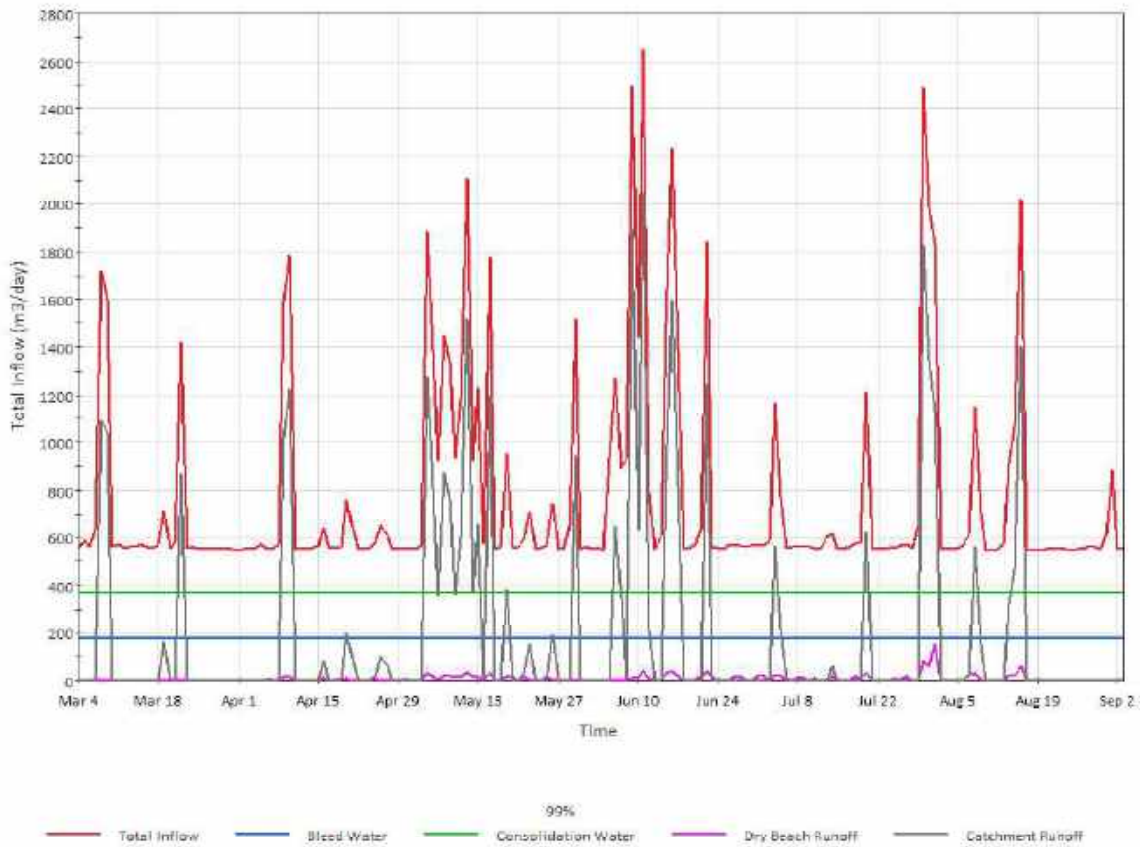


Figure 7.27 South Beta IPTSF probabilistic inflows (99th percentile)

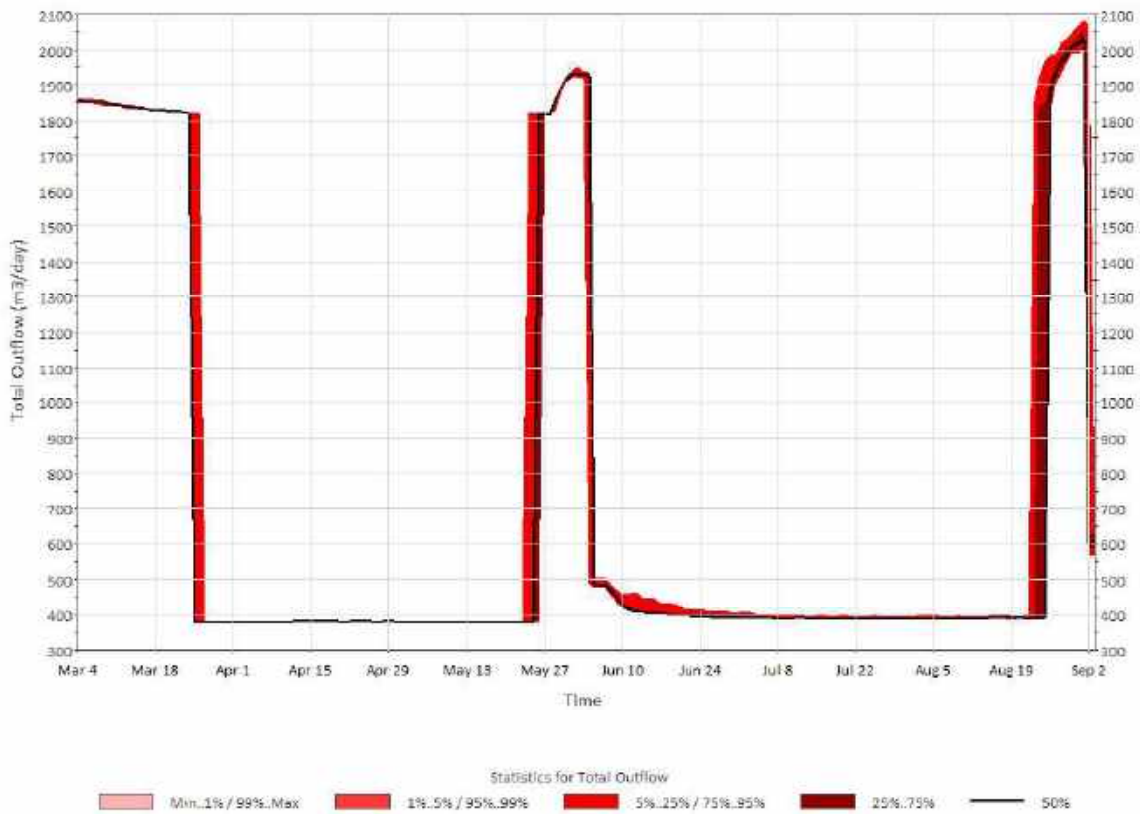


Figure 7.28 South Beta IPTSF probabilistic total outflow results

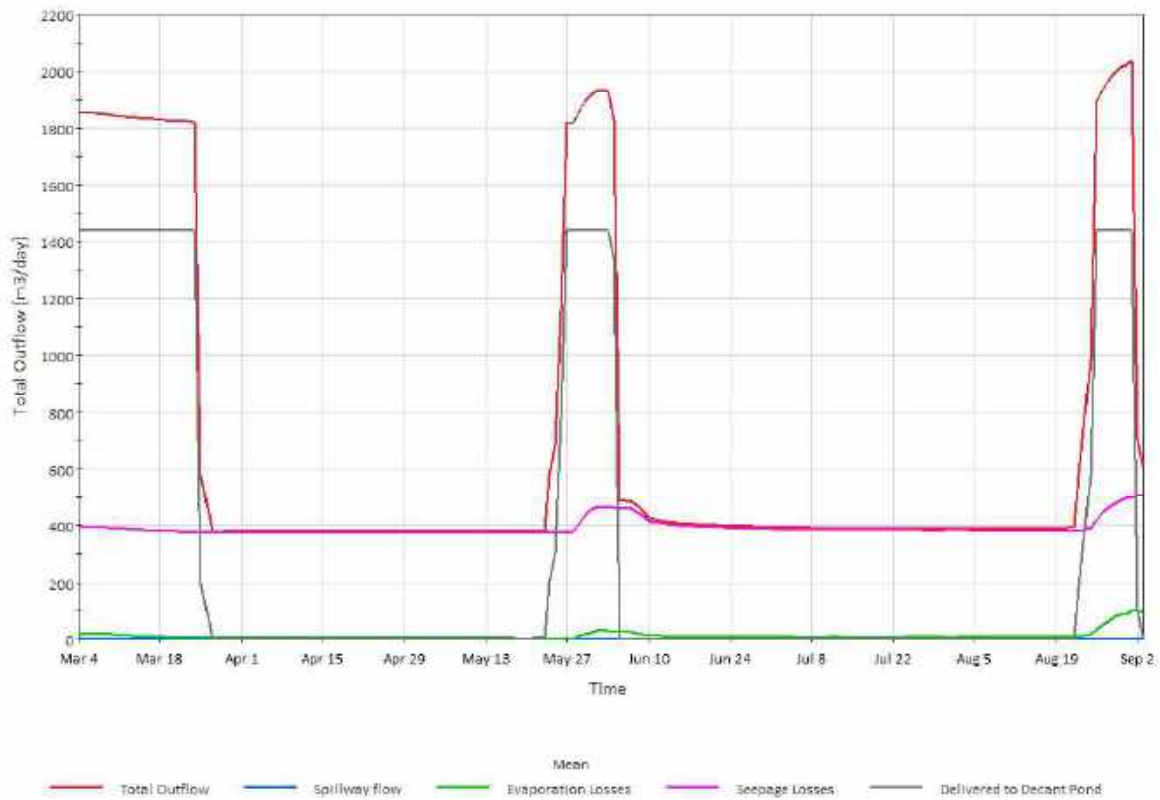


Figure 7.29 South Beta IPTSF probabilistic outflows (mean)

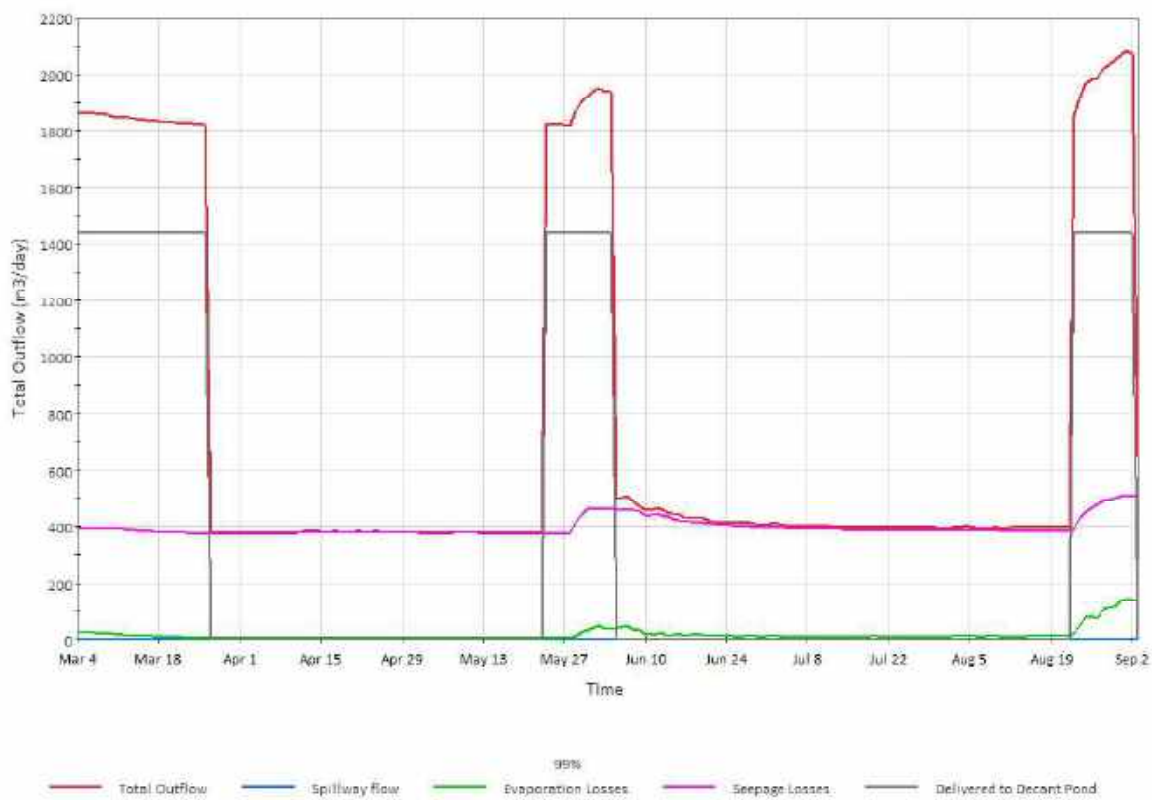


Figure 7.30 South Beta IPTSF probabilistic outflows (99th percentile)

Water balance modelling for the South Beta IPTSF identifies tailings bleed water and consolidation water as the primary inflow contributors, with stormwater runoff becoming more significant during the wet season. Similar to the Central Beta IPTSF, decanting from the TSF represents the principal outflow mechanism. However, decanting will likely be possible while the pond depth exceeds 0.5 m.

7.6.8.3 Donut Beta TSF

Table 7.10 presents a statistical analysis of average decant pond volume, inflow, and outflow outcomes (averaged across all model realisations) for the Donut Beta TSF, based on stochastic water balance results. Figure 7.31 through Figure 7.37 illustrate more detailed probabilistic results.

Table 7.10 Average probabilistic results for the Donut Beta TSF

	Averaged decant pond volume (m ³)	Averaged inflow (m ³ /day)	Averaged outflow (m ³ /day)
Minimum	5,217	548	522
25th Percentile	6,702	548	543
50th Percentile (Median)	7,326	548	558
75th Percentile	8,197	557	581
99th Percentile	11,731	873	698

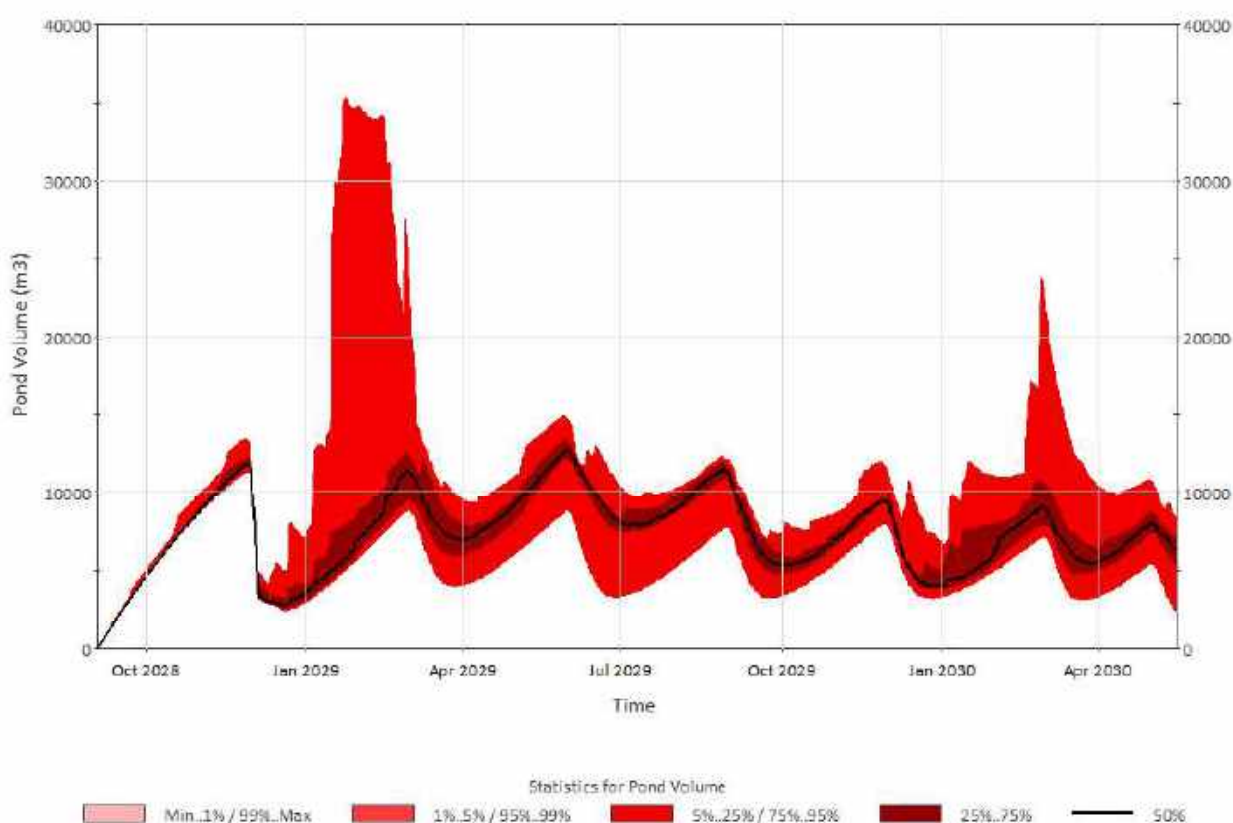


Figure 7.31 Donut Beta TSF probabilistic decant pond volume results

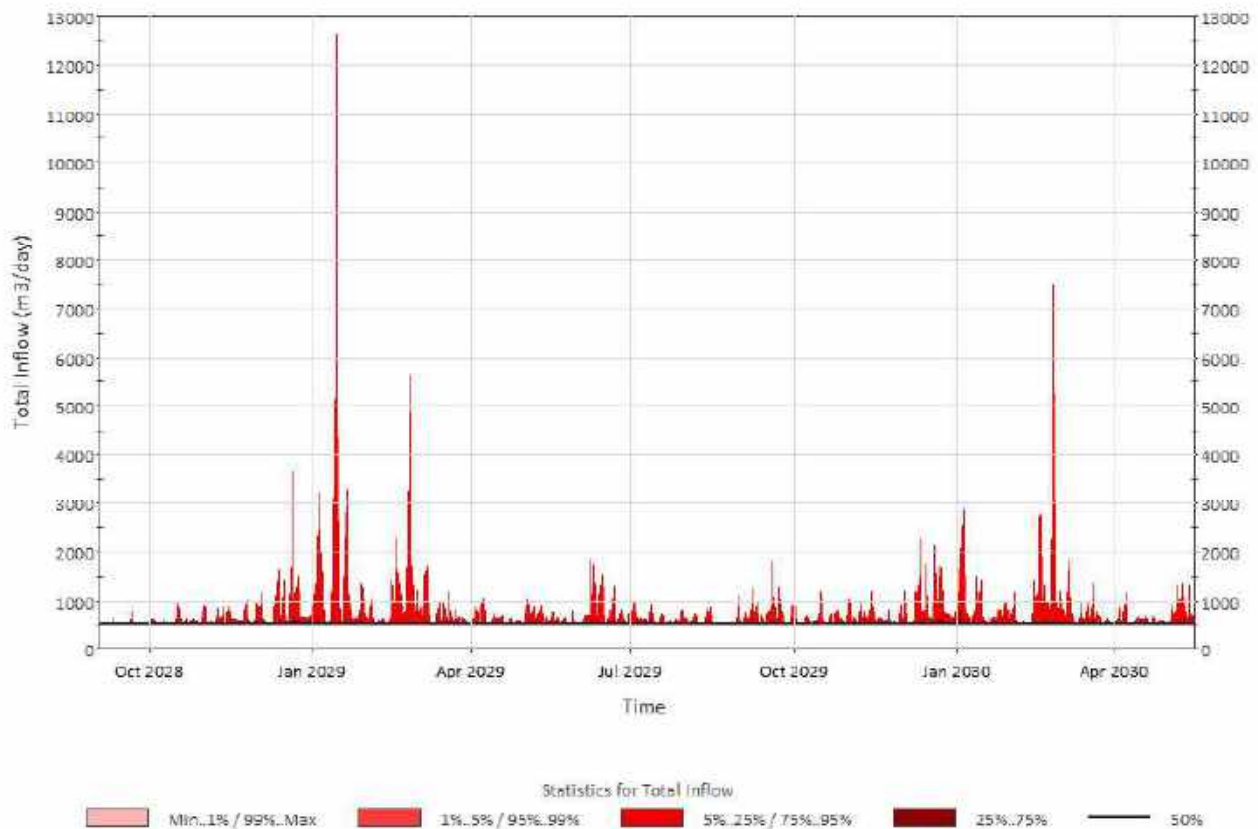


Figure 7.32 Donut Beta TSF probabilistic total inflow results

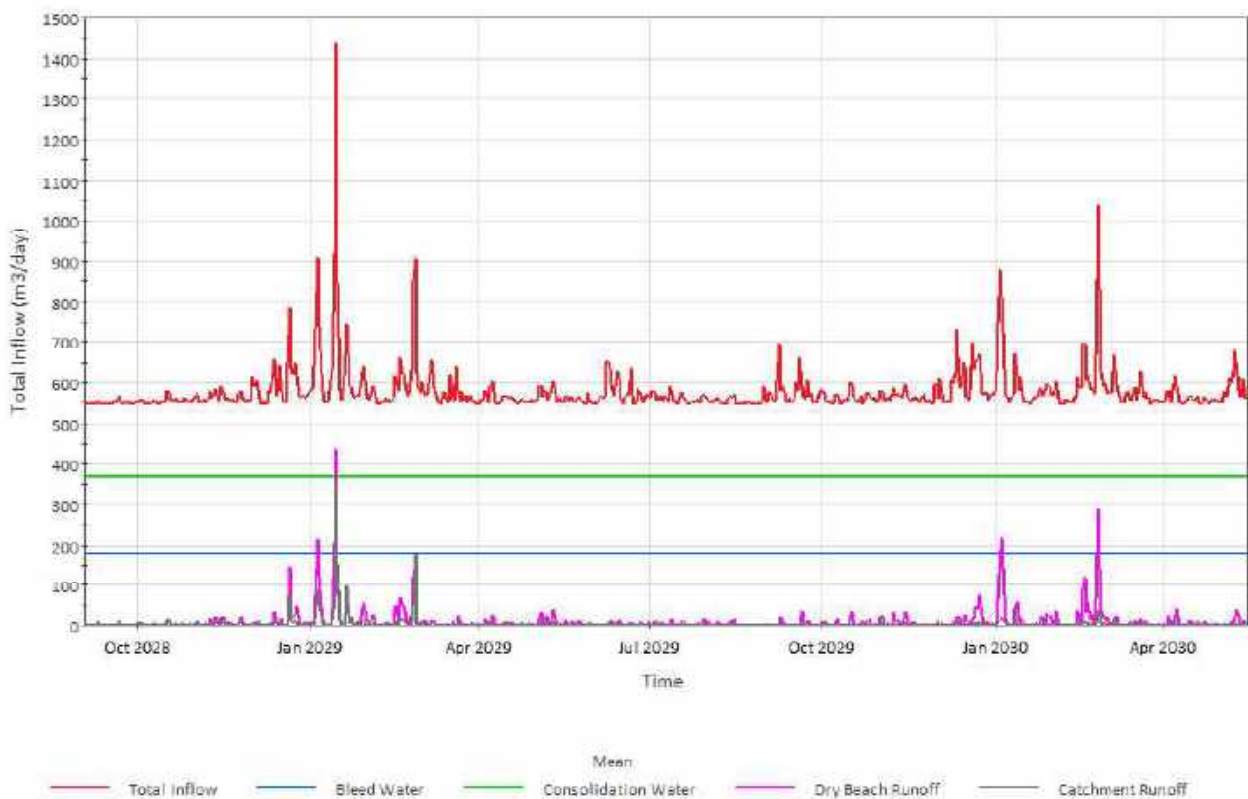


Figure 7.33 Donut Beta TSF probabilistic inflows (mean)

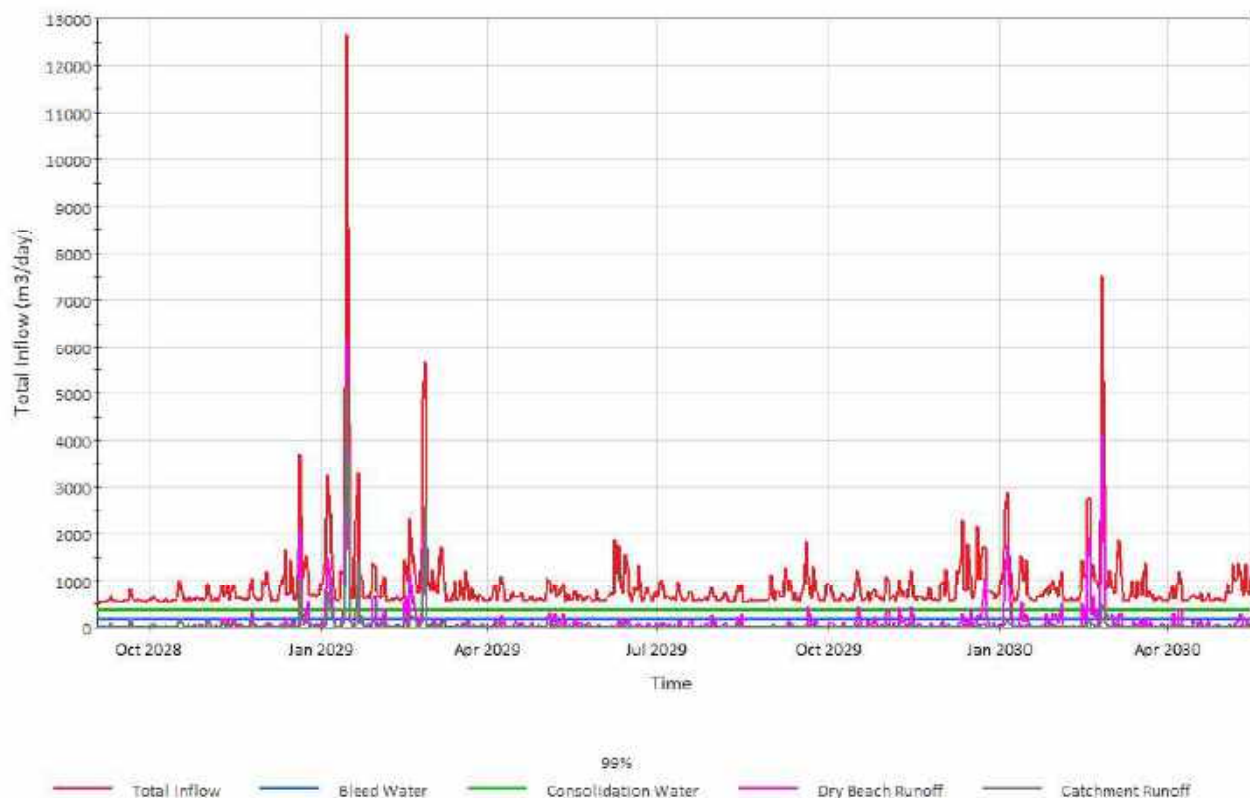


Figure 7.34 Donut Beta TSF probabilistic inflows (99th percentile)

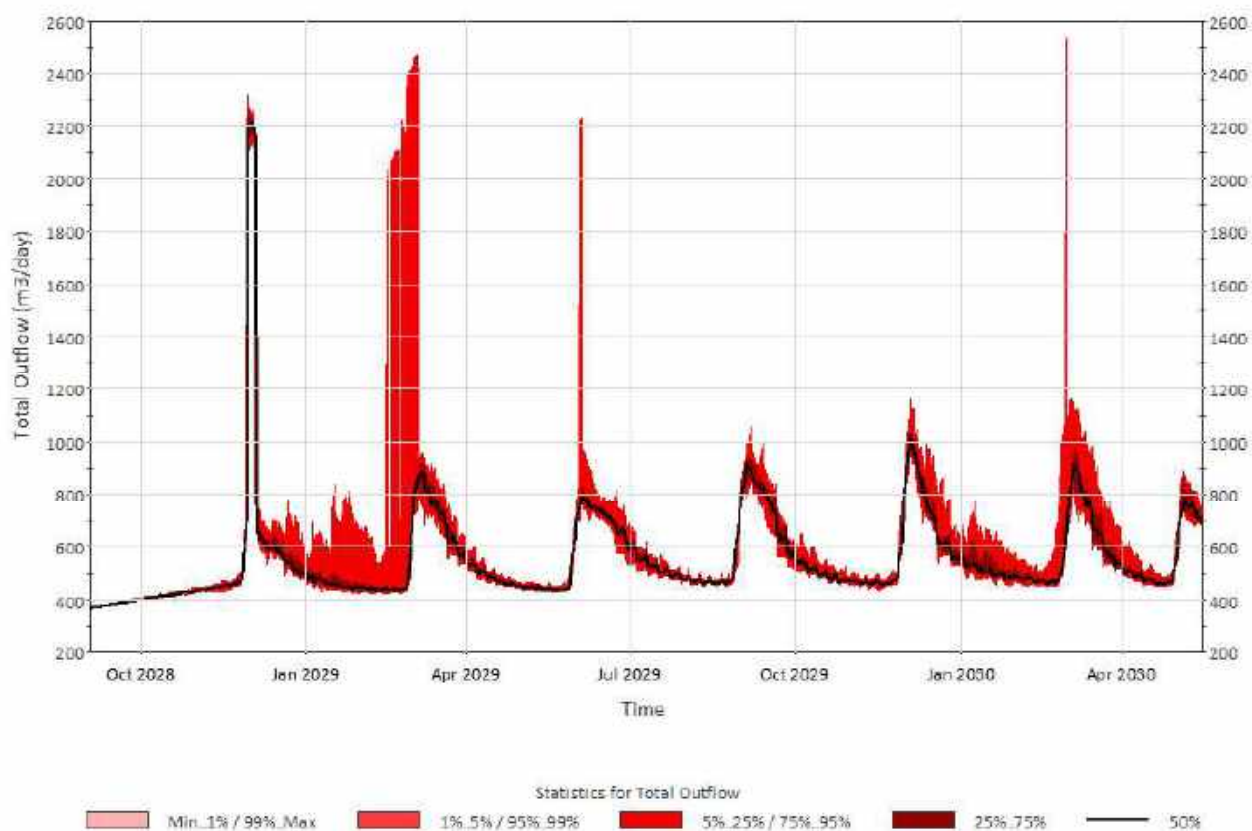


Figure 7.35 Donut Beta TSF probabilistic total outflow results

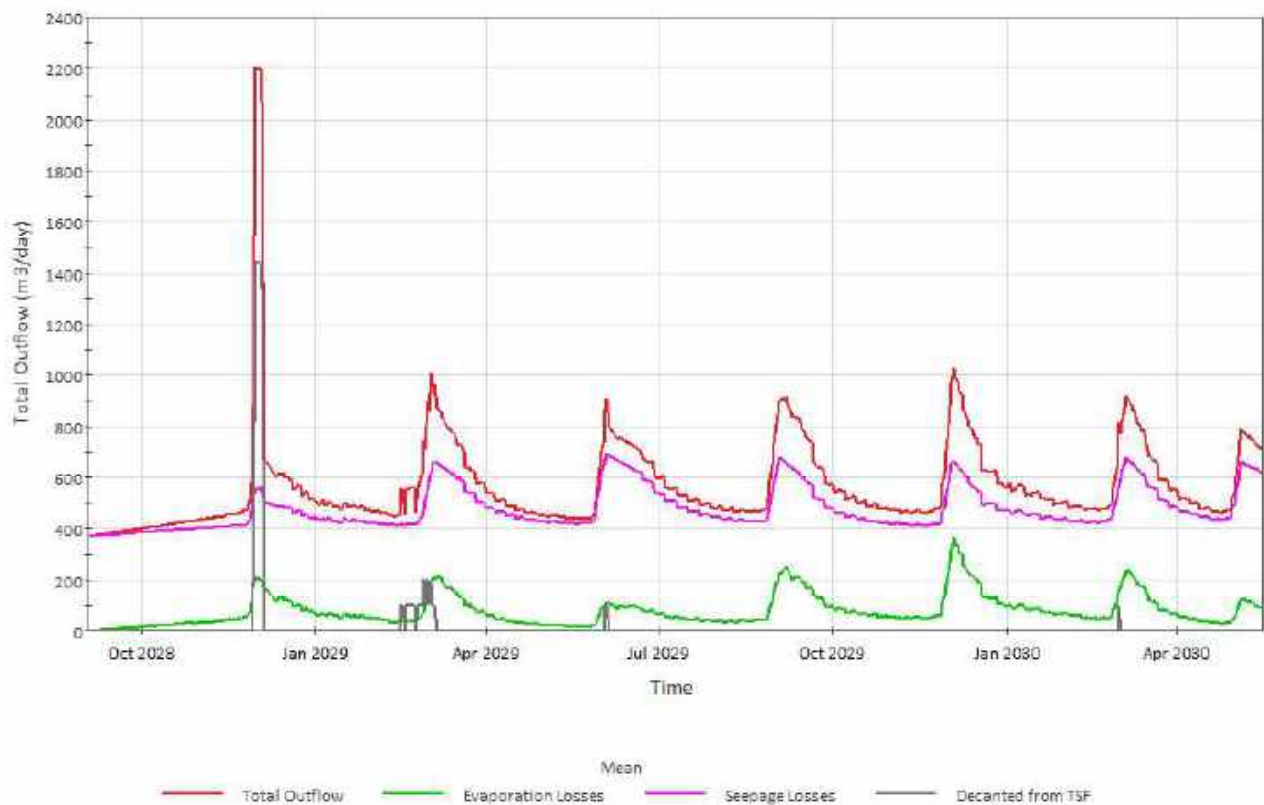


Figure 7.36 Donut Beta TSF probabilistic outflows (mean)

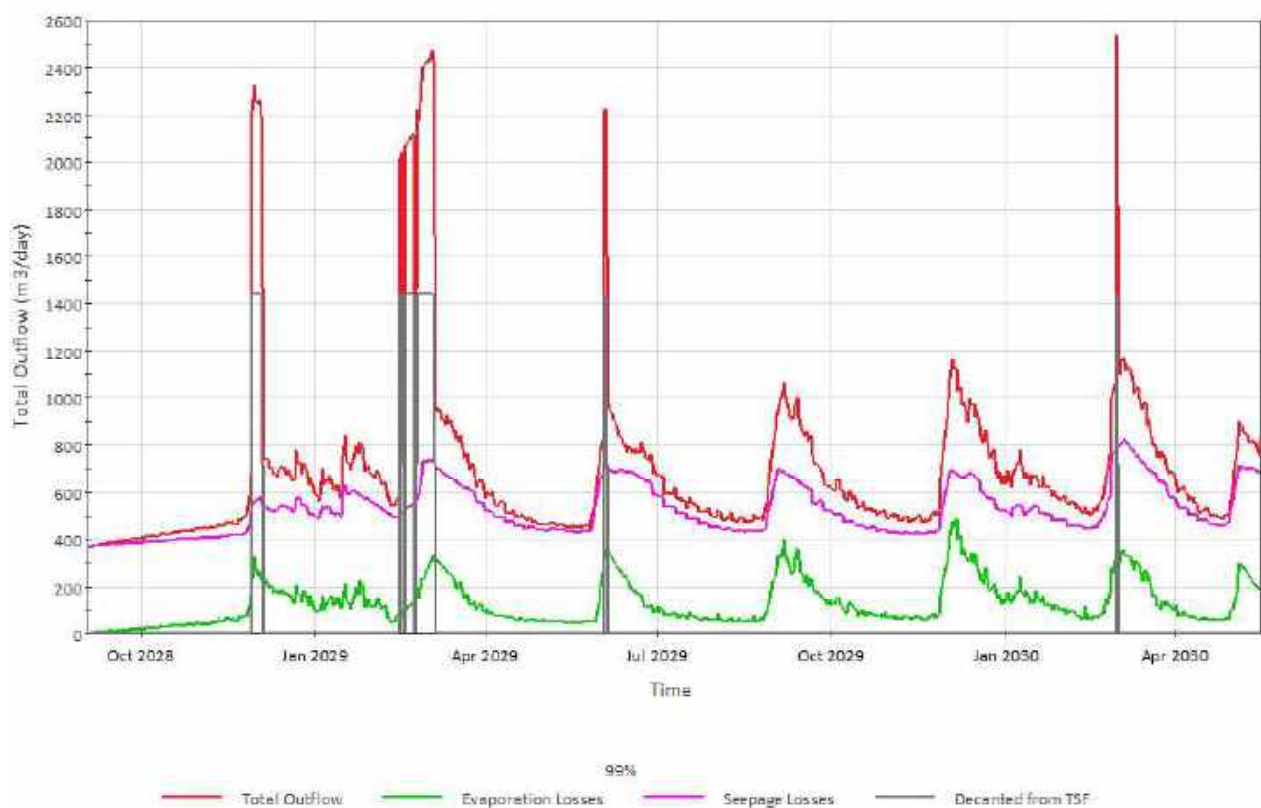


Figure 7.37 Donut Beta TSF probabilistic outflows (99th percentile)

Water balance modelling for the Donut Beta TSF identifies tailings bleed water and consolidation water as the primary inflow contributors, similar to the IPTSFs. However, the primary outflow mechanisms fluctuate with pond depth:

- when pond depth equals or exceeds 0.5 m: Decanting is the primary outflow mechanism
- when pond depth is less than 0.5 m: Seepage and evaporation losses become the primary outflow contributors.

7.7 Beach slope prediction

The beach slope is a critical design parameter as it influences embankment construction timing, wall-raising costs, supernatant pond size, and freeboard requirements.

The beach slope is defined as the gradient formed by tailings after deposition and is primarily influenced by:

- tailings discharge solids concentration
- segregation threshold
- rheology.

If the segregation threshold is significantly lower than the expected discharge solids concentration, little to no segregation or sorting will occur on the beach.

Tailings beach slopes are related to sheared yield stress, viscosity, and total flow rate within the tailings stream:

- higher sheared yield stress and viscosity result in steeper beach slopes
- lower tailings stream flow rates also increase the beach slope, making the number of discharge points a key design consideration.

Rheological testing is planned but has not yet been conducted. In the absence of test data, WSP has reviewed tailings type, production rates, and the proposed multiple-spigot operation against its database of similar projects. Based on this assessment, a 1% beach slope at the top third, 0.75% in the middle third and 0.5% in the lower third, which follows the "rule of thirds" proposed in Pirouz's beach slope estimation research (Pirouz, 2006), is considered appropriate for design purposes.

7.8 Construction materials

7.8.1 *Beta Waste dump material*

The waste dumps (WD) surrounding the Beta site were selected as the preferred fill material for constructing the Donut embankment due to their proximity and availability.

Five samples were collected from different locations within the waste dumps during a site visit in October 2024 as shown in Figure 7.38.



Figure 7.38 Waste dam sample locations

Laboratory testing was conducted on these samples to characterize the material physical properties and assess its suitability for use as perimeter embankment fill, as summarized in Table 7.11.

Table 7.11 Summary of laboratory tests conducted on the Beta waste dump samples

Laboratory Procedures	Number of Tests	Standard
Particle Size Distribution + Hydrometer	5	AS1289.3.6.1 (PSD) AS1289.3.6.3 (Hydrometer)
Atterberg limits	5	AS1289.3.9.1 (Liquid Limit) AS1289.3.2.1 (Linear Shrinkage) AS1289.3.4.1 (Liquid Limit)
Moisture Content	5	AS1289.2.1.1 (Moisture Content)
Particle Density	5	AS1289.3.5.1-2006
Emerson Class Number	5	AS1289.3.8.1-2017
Standard Compaction (Maximum Dry Density & Optimum Moisture Content)	2	AS1289.5.1.1-2017
Permeability @ 95% SMDD (Falling Head Test)	2	AS1289.6.7.2-2001

The laboratory certificates are provided in Appendix B-2.

The results of particle size analyses are summarized in Table 7.12. The results indicate that more than 65% of the material is coarser than 0.075 mm, with over half of the coarse fraction exceeding 2.36 mm. This classification confirms that the primary material is coarse-grained and predominantly fine and medium GRAVEL.

Table 7.12 Waste dump samples PSD summary

Sample ID	% Retained (< 0.075 mm) Fines (clay & silt)	% Retained (0.075 mm - 2.36 mm) Sand	% Retained (2.36 mm - 63 mm) Gravel
WD Sample 1	25.5	29.2	45.3
WD Sample 2	30.9	17.6	51.5
WD Sample 3	35.1	28.0	36.9
WD Sample 4	31.0	25.1	44.0
WD Sample 5	22.9	27.3	49.8

Figure 7.39 presents the PSD data in graph format.

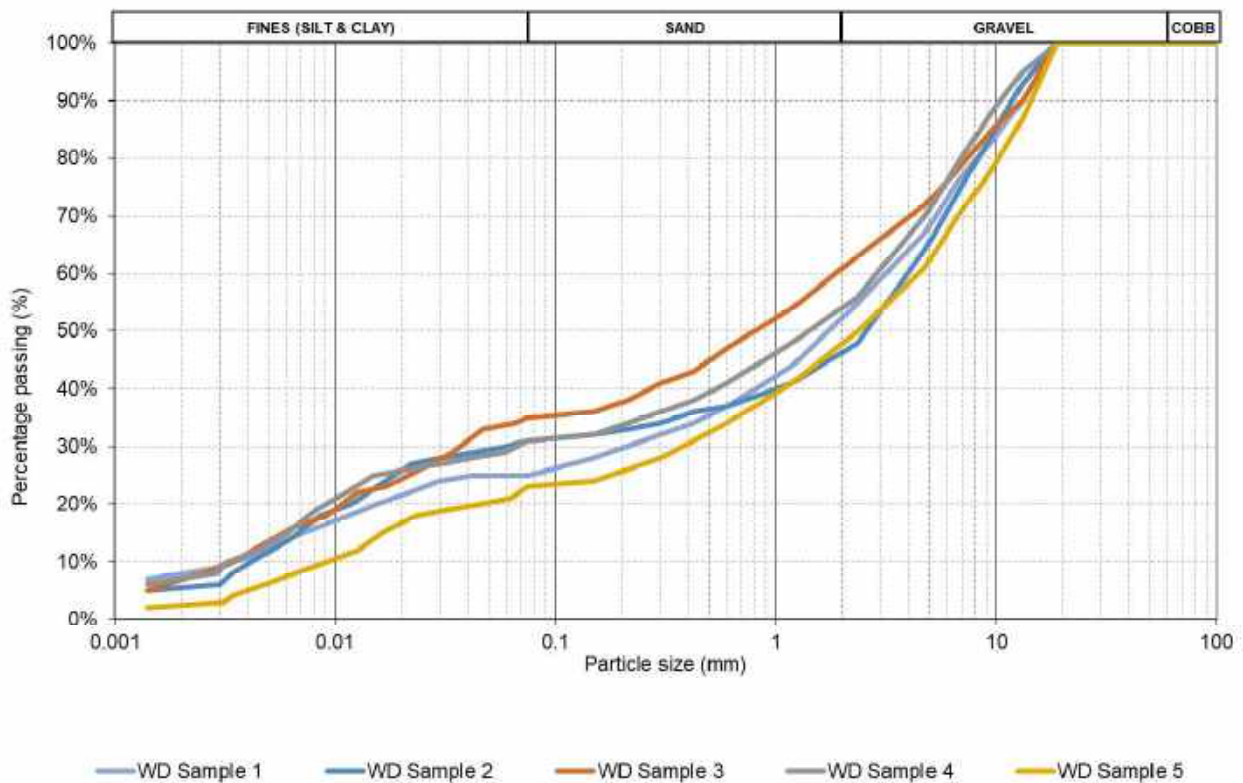


Figure 7.39 PSD graphs of the Beta waste dump samples

Of the five WD samples tested, the sub 425 μm fraction of four exhibited plastic behaviour. The WD material fines varies from non-plastic to high-plasticity silt or clay, as illustrated in Figure 7.40.

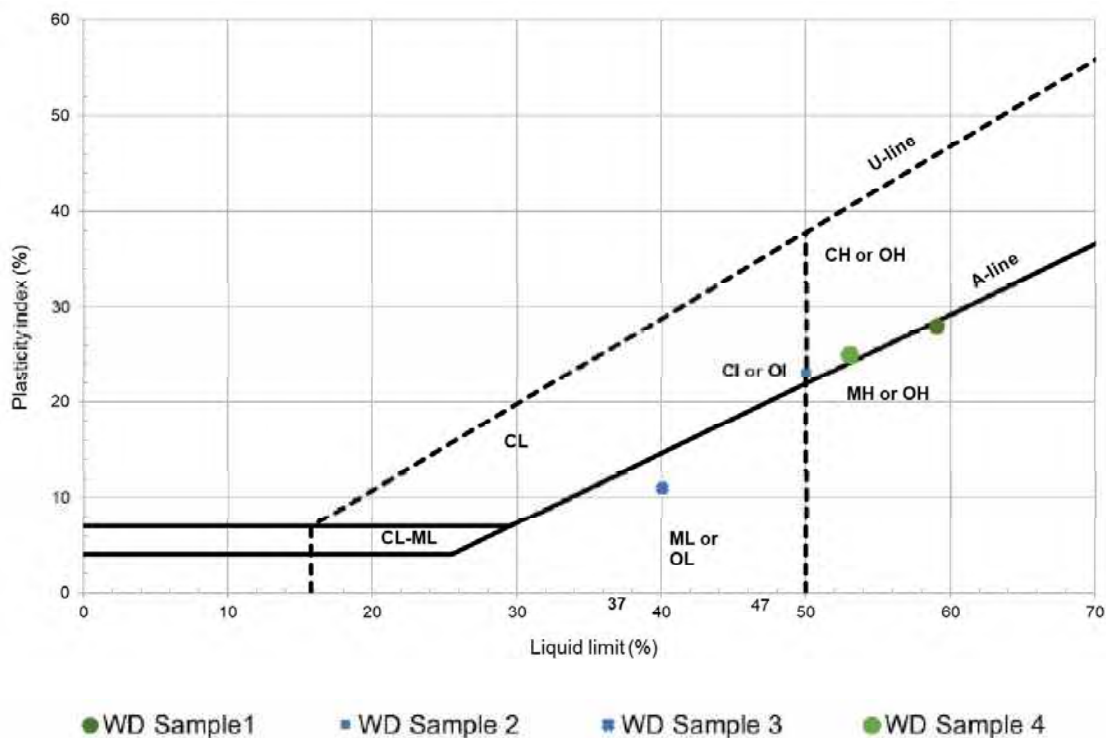


Figure 7.40 Plasticity data of the Beta waste dump samples

The samples were tested for particle density and the results are summarized in Table 7.13.

Table 7.13 Particle density of the Beta waste dump samples

Sample ID	Particle Density (t/m ³)
WD Sample 1	2.70
WD Sample 2	2.73
WD Sample 3	2.69
WD Sample 4	2.72
WD Sample 5	2.65

The samples were tested to determine their Emerson class number, with results summarized in Table 7.14. This laboratory test evaluates a sample's tendency to disperse or diffuse when saturated.

Four of the five samples were classified between Class 2 and Class 4, indicating moderate dispersivity. The remaining sample was classified as Class 5, suggesting it is slightly dispersive.

Table 7.14 Dispersivity of the Beta waste dump samples

Sample ID	Emerson Class Number
WD Sample 1	2
WD Sample 2	4
WD Sample 3	4
WD Sample 4	5
WD Sample 5	3

Standard compaction testing was conducted to determine the relationship between moisture content and dry density of the soil under compaction. Falling head permeability tests were completed on samples of the material reconstituted to 95% SMDD.

Due to sample loss during transport, WD samples 1, 2, and 3 were combined and tested as a single sample, while WD samples 4 and 5 were similarly combined and tested as another. In total, two composite samples were tested, with the results presented in Table 7.15.

Table 7.15 Standard compaction test and permeability results of the Beta waste dump samples

Test no.	Sample ID	Maximum dry density (SMDD) (t/m ³)	Optimal moisture content (%)	Permeability @ 95% SMDD (m/s)
1	WD Samples (1,2, and 3)	1.75	14.5	8.00 x 10 ⁻⁹
2	WD Samples (4, and 5)	1.80	14.0	1.00 x 10 ⁻⁸

The Particle Size Distribution (PSD) and permeability results indicate that the Beta waste dump material is suitable for use as Donut Beta embankment fill, as it consists primarily of well-graded, coarse-grained particles with 20% – 35% fines and exhibits low permeability when compacted.

Sample moisture contents ranged from 7.5% to 9.2% for samples 1 – 4 and 0.3% for sample 5.

Optimum moisture content for combinations of the samples was 14% indicating that moisture conditioning by wetting will be required to optimise compaction.

Emerson test results indicate that the material is slightly to moderately dispersive, making it susceptible to erosion when exposed to excess water, such as heavy rainfall or flooding. To mitigate this risk, erosion protection measures have been incorporated into the embankment earthworks design wherever the waste dump material is intended for use.

The waste dump materials have been inferred to have relatively minor metal and metalloid enrichment and low capacity to generate metalliferous drainage (Soilwater Group, 2012). Geochemical analyses in 2014 identified ten samples of the north and south waste dump materials as non-acid forming, and two samples of mineralised waste from the ROM pad (which would not be used as construction material) as potentially acid forming (Soilwater Consultants, 2014).

Static Acid base accounting tests completed on the samples recovered in October (Appendix C) gave results consistent with these previous findings. Acid Metalliferous Drainage (AMD), Acid Base Accounting (ABA) and Sulphur Content plots are shown in Figure 7.41, Figure 7.42 and Figure 7.43.

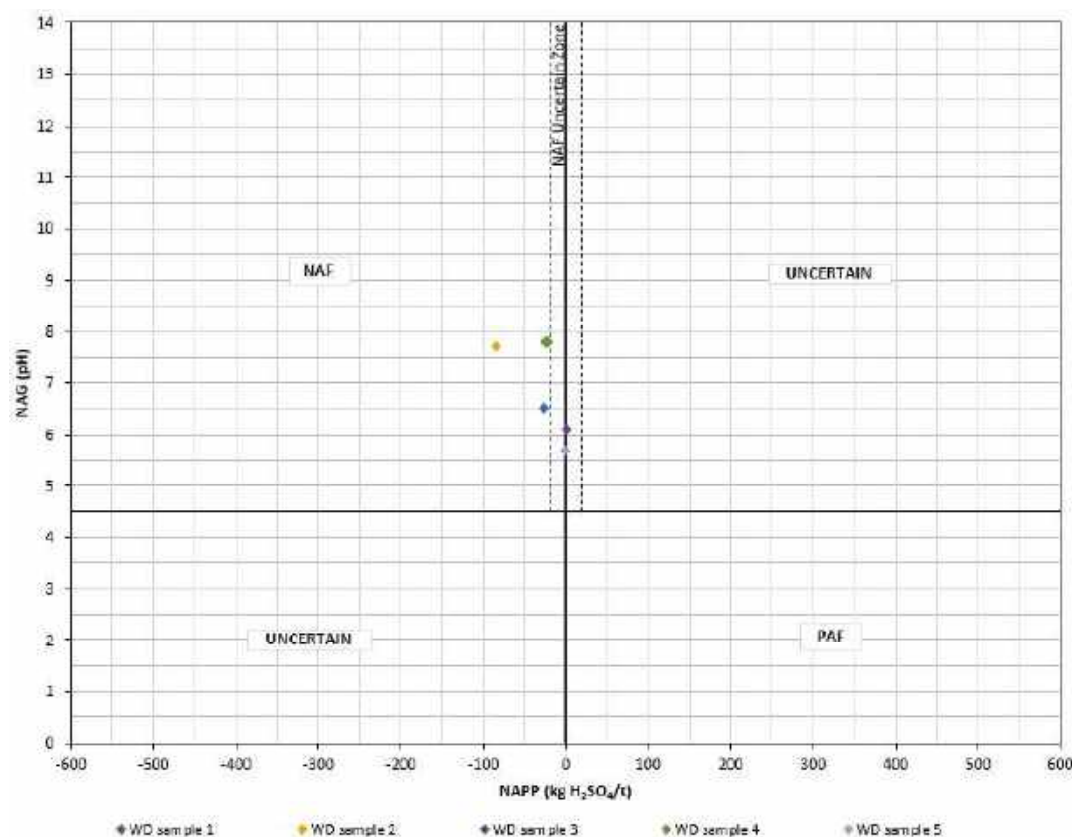


Figure 7.41 AMIRA AMD classification for the waste dump samples

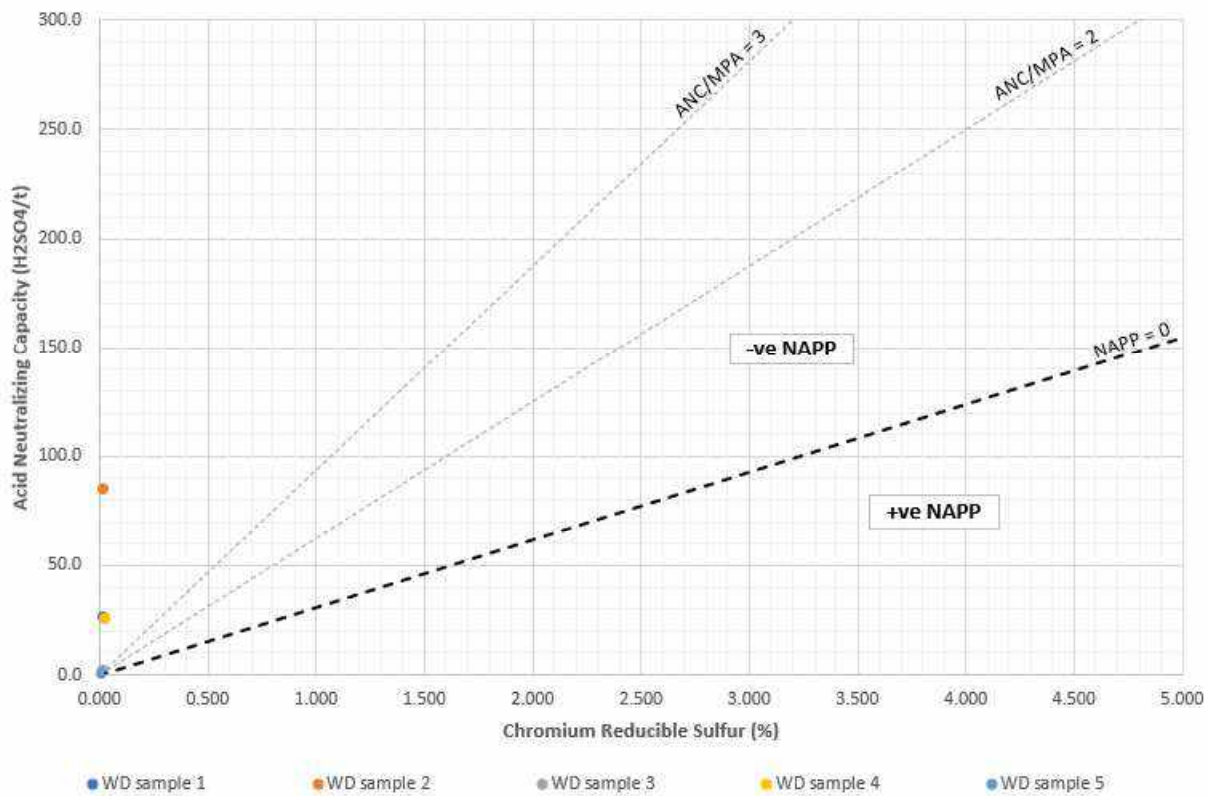


Figure 7.42 ABA plot for the waste dump samples

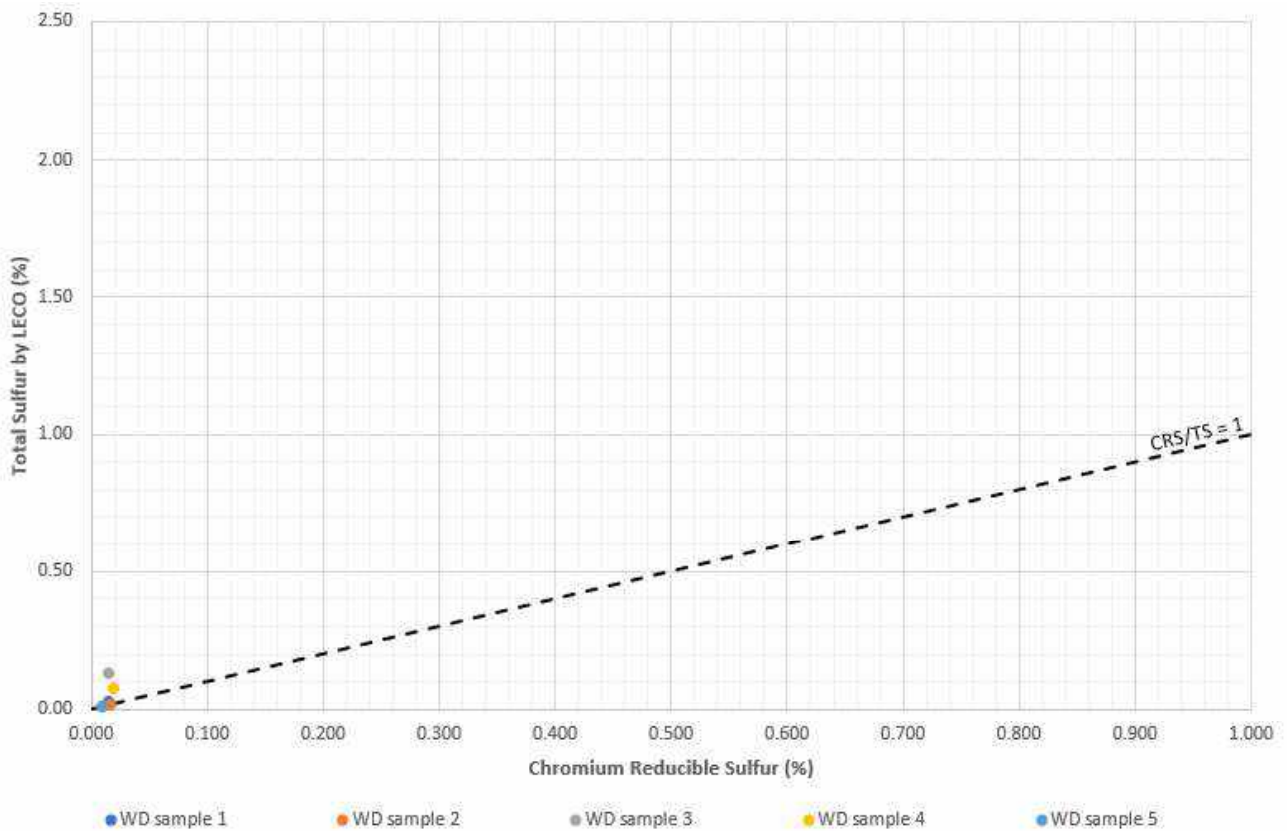


Figure 7.43 Sulphur content plot for the waste dump sample

Table 7.16 summarizes the Static Acid Base Accounting test results, which indicate the waste dumps are likely non-acid forming (NAF). Waste dump sample 3 (from south east side of the south dump) approaches the uncertain classification zone, having ANC lower than MPA but NAG pH above 4.5, and may require additional geochemical testing to confirm its NAF status, although blending with materials with higher ANC would be feasible in practice.

Samples 1, 2, and 4 have ANC values greater than three times their Maximum Potential Acidity (MPA).

Total sulfur concentrations range from 0.01% to 0.13%. Chromium reducible sulfur (sulfidic sulfur) concentrations range from 0.009% to 0.019%, potentially indicating minimal sulfide-sulfur content in the waste dump material.

Table 7.16 Static Acid Base Accounting – Beta Waste Dump samples

Sample	pH	Total sulphur	Maximum potential acidity	Acid Neutralising Capacity			Net Acid Generation		Chromium Reducible Sulphur	Net Acid Producing Potential
	pH unit	%	%	CaCO3	kg H ₂ SO ₄ /t	Fizz Unit	kg H ₂ SO ₄ /t	pH Unit	%	kg H ₂ SO ₄ /t
WD sample 1	7.6	0.03	0.92	2.7	26.6	1.0	11	6.5	0.015	-25.7
WD sample 2	8.4	0.02	0.61	8.7	85.2	2.0	0	7.7	0.016	-84.6
WD sample 3	6.5	0.13	3.98	0.3	2.6	0.0	7	6.1	0.015	1.4
WD sample 4	7.3	0.08	2.45	2.6	25.9	1.0	0	7.8	0.019	-23.5
WD sample 5	6.6	0.01	0.31	0.1	0.7	0.0	20	5.7	0.009	-0.4

7.8.2 Erosion protection

As noted in Section 7.8.1, the Beta waste dump material likely requires erosion protection to minimize dispersivity and reduce erosion risk. The recommended particle size distribution for the erosion protection material is presented in Table 7.17. The material will also be required to be durable and non-acid forming.

It is envisaged that suitable erosion protection material will be available from waste materials generated at the Menzies and Laverton gold projects.

Table 7.17 Recommended erosion protection particle size distribution

Particle size (mm)	Percentage passing
300	50 – 100
150	30 – 100
75	20 – 100
37.5	15 – 75
2.36	5 – 50

7.9 Operational requirements

7.9.1 Tailings delivery and distribution

Once the required earthworks for each facility are completed, the slurry distribution pipework will be assembled at the location specified in Figure A002 and A003. The optimal discharge points will vary across different stages of TSF development, with each stage layout defining the recommended discharge locations for that phase of operation.

The discharge points may be used concurrently or alternated, and it is a design expectation that flow rates and cycling routines are managed during operations to achieve the desired beach profile, as outlined in the stage layouts. Deposition should be managed with minimal disruptions, considering:

- pipe flushing
- shut-downs
- pond control
- beach profile management.

The directional discharge of tailings should be managed daily to maintain an overall drainage gradient toward the decant area, preventing long-term ponding outside designated areas and minimizing drying beach area to enhance consolidation and density gain.

As the tailings beach develops, beach slope will be adjusted by modifying the number of active discharge spigots and directing discharge flow accordingly. To maximize beach slope formation, a minimum of four spigots should be in operation at any time.

The Operating Manual (Section 7.9.4) should include a deposition schedule outlining the planned sequence of cycling deposition locations. This schedule should be updated following operational trials and based on operational experience once deposition begins.

7.9.2 *Decant system*

Supernatant water released from the discharged tailings slurry and incidental rainfall runoff will be collected and stored on the tailings surface within each facility.

As tailings levels rise, the pontoon decant system is expected to float on the supernatant pond and be withdrawn up the pit access ramp(s). Routine inspections must ensure that the pontoon remains operational and does not become bogged within the tailings surface.

Maximizing water return from the Tailings Storage Facility (TSF) is a key operational objective. Pond management will be a primary focus, with the pond maintained at the minimum size required for effective decant system operation. The decanted return water will be pumped back to the process plant throughout operations.

7.9.3 *Seepage management*

To mitigate potential lateral surface seepage through the Donut Beta embankment and into the downstream area, proof compaction of the surficial soils within the impoundment immediately upstream of the embankment has been incorporated into the design. Additional geotechnical investigation to characterise the superficial soils will be undertaken and if any areas are found to be of high permeability, a seepage cut off trench backfilled with compacted low permeability material can be incorporated beneath the upstream embankment toe.

Seepage monitoring will include:

- daily inspections of the embankment toe
- monthly monitoring of groundwater levels and Vibrating Wire Piezometer (VWP) measurements to detect any potential seepage development over time.

These measures will ensure early detection and proactive management of seepage-related risks.

7.9.1 *Surface water management*

Surface water management is a critical consideration for the Beta site to ensure operational stability and environmental compliance.

During in-pit filling, surface water inflows into the pits will be minimised by the presence of the waste dumps and pit perimeter bunds. Localised improvements and modifications will be made to the existing bunding to optimise surface water management.

Construction of the Donut Beta perimeter embankment will create potential for isolated ponding along the embankment/waste dump interfaces, as shown in Figure 7.44 (notwithstanding that the waste dump toe areas will be reprofiled to obtain material for construction of the embankment).

Foundation preparation works for the Donut Beta embankment will include incorporation of a diversion channel system to redirect surface water flows and ensure no isolated ponding occurs along the waste dump or Donut Beta embankment.

The proposed surface water management strategy will:

- minimize potential for isolated ponding
- reduce erosion risks along embankment slopes
- maintain stability of waste dump and embankment structures
- support compliance with environmental requirements.



Figure 7.44 Potential areas of isolated ponding along the Donut Beta TSF and waste dumps

7.9.2 *Erosion and dust control*

The primary measure to minimize dust generation from the TSF is to adjust the orientation of the discharge outlet (or incorporate supplementary spigots) to ensure that fresh wet tailings are deposited over previously settled layers at a frequency that prevents complete drying.

Several inherent characteristics of the tailings will further aid in reducing dust generation, including:

- high moisture content retained within the tailings
- strong inter-particle forces due to the fine-grained and cohesive nature of the tailings
- shrinkage and desiccation cracking, leading to surface cementation within desiccation polygons, which reduces the likelihood of further breakdown into fine dust particles unless disturbed or very wide cracks form
- pit walls and/or containment embankments, which are elevated above the tailings surface and act as a physical barrier, limiting wind-driven dust transport across and beyond the TSF.

When operated in accordance with the design intent, and with contingency measures implemented as needed, the likelihood of dust generation impacting the surrounding environment is expected to be low.

7.9.3 *Design verification*

It is a requirement that the fundamental TSF design parameters be verified at defined intervals to ensure that the actual performance of the TSF aligns with design expectations.

An annual verification schedule, coinciding with annual surveillance audits, is considered appropriate. The following key parameters should be assessed:

- Tailings material characterization, including:
 - particle size distribution
 - specific gravity
 - Atterberg limits
 - initial settled density
 - shrinkage limit density
- Consolidation behaviour, assessed through:
 - Rowe Cell laboratory testing
 - consolidation modelling
- Tailings beach slope and in-situ dry density
- Tailings production rates, to enable calibration of TSF filling rates and determine the ultimate filling level.
- Water balance assessment, including:
 - inputs (rainfall and runoff)
 - outputs (evaporation and return water pumping)
 - calibration of water balance parameters.

During initial deposition in the first year of operation, a tailings sample should be collected for Rowe Cell consolidation testing to confirm tailings parameters and calibrate TSF filling rates and the ultimate filling level. This is expected to be a one-time verification, but additional testing may be required if tailings characteristics change throughout the life of the facility.

This verification process will allow for the calibration of TSF lifecycle projections and create opportunities for future capacity expansion studies.

7.9.4 *Operating manual*

The primary objective of a TSF Operating Manual is to provide a documented operational procedure that ensures the safe and efficient storage of tailings and effective water management within the TSF. The manual will outline operational procedures that align with the assumptions and design principles established by the TSF designer.

The Operating Manual is a requirement under DEMIRS guidelines and must be regularly updated, particularly following design modifications or operational changes.

A site-specific Operating Manual will be developed following TSF construction and prior to commissioning. In accordance with DEMIRS guidelines, the manual will include:

- summary of operational procedures
- detailed descriptions of TSF components
- inspection regime requirements
- maintenance schedule details
- instrumentation and monitoring requirements, including tolerance limits and trigger values
- emergency action plan (EAP).

7.9.5 Performance monitoring and instrumentation

7.9.5.1 Overview

A monitoring and surveillance program will be implemented to assess the performance of the TSF in relation to original design expectations. The monitoring instrumentation plan is illustrated in Appendix A Figure A005.

Data obtained from the monitoring activities will:

- support annual audits
- inform maintenance or remediation programs as needed
- contribute to the detailed design of subsequent stage raises
- assist in the calibration of the site water balance model.

The monitoring program will include:

- routine reconciliation of tailings discharge tonnage and solids concentration
- regular monitoring of tailings beach head and beach toe levels
- routine measurement of pond water levels and return water rates to the process plant
- continuous monitoring of groundwater level fluctuations
- routine assessment of prism displacements to detect pit wall and embankment movement
- routine collection of embankment Vibrating Wire Piezometer (VWP) data and measurement of monitoring borehole water levels
- regular evaluation of groundwater and decant pond water quality
- annual field assessments of tailings beach density and shear strength profiles.

7.9.5.2 Instrumentation

There are six existing groundwater monitoring bores installed along the south and southwest flank of the tenement area to monitor groundwater levels and quality. However, these bores do not provide full coverage of the TSF area. To enhance monitoring, an additional eight bores are proposed—six towards the southwest of the TSF, as transient seepage modelling has identified this as the preferred seepage path, and two in the north to ensure comprehensive coverage. These bores will be sampled and tested quarterly for water quality throughout the life of the facility.

Survey prisms will be installed at a minimum of four strategic locations on the pit walls to monitor slope displacement during pit filling.

An embankment piezometer network is proposed to further enhance seepage and pore pressure monitoring. Six Vibrating Wire Piezometers (VWP) will be installed during the construction of the Donut Beta embankment, with all piezometers positioned within or beneath the embankment, as illustrated in Appendix A Figure A005.

7.9.5.3 Inspections

Routine TSF inspections will be conducted to ensure that the facility's operational strategy is being correctly implemented and to identify any maintenance requirements or performance concerns that require further attention.

Plant operators will conduct daily inspections of the TSF and its appurtenant structures. The Operating Manual will outline inspection procedures, protocols, and reporting requirements, aligned with the facility's risk category. All observations and incidents must be recorded and reported appropriately in compliance with the operating license conditions and statutory regulations.

In accordance with DEMIRS guidelines for the Management and Closure of Tailings Storage Facilities (DEMIRS, 2020), additional monthly inspections and mandatory annual audits are required, as the TSF is classified as a Category 2 facility.

Daily inspections will be conducted twice per day (during day shift and night shift) and will focus on operational issues, including:

- tailings and return water pipelines
- tailings discharge point management
- decant pond location and extent
- decant and return water system operation
- seepage observations
- integrity of embankments
- fauna activity within the TSF area.

Monthly inspections will assess long-term trends that may affect TSF safety or the surrounding environment. These inspections will cover:

- detailed pit wall and embankment inspections, including all appurtenant structures
- evaluation of tailings characteristics
- tailings beach development monitoring
- decant pond level measurements
- performance of the decant and return water system
- inspection of tailings and return water pipelines
- surveillance of all monitoring installations.

Annual TSF audits will be conducted by a qualified geotechnical engineer. These audits focus on:

- visual inspections of embankments and appurtenant structures
- evaluation of potential deficiencies
- review of all surveillance and monitoring data.

Annual audits ensure regulatory compliance with legislation and tenement conditions while identifying any necessary corrective actions for continued safe operation.

7.10 TSF Closure and rehabilitation

7.10.1 Conceptual closure plan

The operational design slope of the Donut Beta TSF embankment downstream batter is 1V:3H, which is considered suitable for closure. Geotechnical stability assessments indicate that the embankment is structurally sound under post-closure conditions.

To enhance long-term erosion protection, additional coarse waste rock may be placed on the outer embankment layer, with progressive rehabilitation of the downstream face possible immediately after construction.

Due to the gravity-driven deposition method, coarser tailings are expected to accumulate near the spigot areas, while finer tailings are likely to concentrate near the decant pond at the centre of the facility.

To mitigate wind erosion and dust generation, areas confirmed as susceptible to dusting will be covered with a layer of benign well graded rock material (capillary break) and a thin veneer of topsoil and to stabilize the surface.

At the end of the TSF design life, the final tailings deposition and cover placement will be planned to ensure that the closure landform facilitates drainage toward the closure spillway channel.

To minimize erosion risk, reshaping and contouring of the cover surface will be optimized to:

- prevent high-velocity, erosive flow concentrations
- establish localized water traps to support targeted revegetation efforts.

A preliminary closure and capping plan is provided in Appendix A Figure A006.

7.10.2 Reshaping of waste dumps

WSP has evaluated reshaping options for the North and South waste dumps within the Beta tenement, as requested by BTR to prepare the site for closure.

The existing waste dumps have external batters of approximately 35°. The estimated volumes of the North and South dump are 1,200,000 m³ and 1,260,000 m³.

The Mine closure plan prepared in 2019 (Stone Resources, 2019) nominated maximum final closure batters of less than 18° based on laboratory testing and erosion modelling undertaken in 2012 (Soilwater Group, 2012).

This assessment included analysing cut and fill volumes for batter angles of 10, 12, 15, and 18 degrees. Table 7.18 presents these results. Allowance was made for maintaining a 5 m wide access road around the base of the landforms and within the tenement boundaries.

Table 7.18 Waste dump reshaping volumes

Batter angle (degrees)	North WD Remodelled volume (m ³)	South WD Remodelled volume (m ³)	Total surplus WD material (m ³) ^{Note 1}
10	≈ 570,000	≈ 365,000	≈ 1,495,000
12	≈ 600,000	≈ 565,000	≈ 1,265,000
15	≈ 630,000	≈ 695,000	≈ 1,100,000
18	≈ 650,000	≈ 730,000	≈ 1,050,000

Note 1: The total surplus waste dump material includes both the material available for constructing the Beta Donut embankment and the additional material that requires storage within the site tenement boundaries.

Following discussions with BTR, WSP recommended the 12-degree option as the preferred solution. The Donut Beta embankment requires approximately 270,000 m³ of material, leaving approximately 1,000,000 m³ of waste dump material that must remain on site.

Fiver options have been identified for storing excess waste dump material within the Beta tenements:

- 1 Spread material over top of the wider sections of the existing dumps.
- 2 Joining north and south waste dumps:
Combining the north and south waste dump structures (as shown by the red polygon in Figure 7.45) provides an additional benefit of reinforcing the downstream side of the Donut Beta TSF along its western embankment flank. However, the limited available area may require designing a multi-layered waste dump to achieve the necessary storage capacity.
- 3 Increasing the Donut Beta embankment's maximum height to 15 m which would enhance its tailings storage capacity. However, this modification may require reclassifying the TSF's consequence category, potentially leading to additional design and operation requirements.
- 4 Placing excess waste material on the legacy TSF surface.
- 5 Placing material on the Donut Beta tailings surface (including select material as capillary break).



Figure 7.45 Joining north and south waste dump approximate footprint

Combining options 1 and 2 may provide enough capacity to achieve the required 1,000,000 m³ storage volume. Option 4 will require a geotechnical investigation of the legacy TSF to determine its current properties. Option 5 will require development of a consolidation model and calibration during operations.

8 Further work

Further work recommended to progress to operation of the Beta pit TSFs is summarised below:

- consolidation modelling for the IPTSFs and the Donut Beta TSF
- 3D groundwater modelling to refine seepage estimates
- baseline groundwater quality assessment
- development of Issue for Tender (IFT) package for the IPTSFs.

To progress closure design (including existing TSF and waste dump domains), additional recommended works are:

- Conduct additional geotechnical investigation on the legacy TSF (highlighted by the red polygon in Figure 8.1) to identify the consolidation state of the tailings and identify phreatic surface conditions.



Figure 8.1 BTR Beta legacy TSF location

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Appendix A

Design figures



LEGEND
EXISTING TOPOGRAPHICAL
CONTOUR AND ELEVATION (mASD)

REFERENCE(S)

1. SURVEY DATA PROVIDED BY BRIGHTSTAR RESOURCES LTD, DATED 28th MARCH 2024.
2. SITE AERIAL IMAGE PROVIDED BY BRIGHTSTAR RESOURCES LTD, DATED 28th MARCH 2024.
3. BASE AERIAL IMAGE REPRODUCED WITH PERMISSION FROM www.bing.com/maps © 2024 MICROSOFT CORPORATION IN ACCORDANCE WITH THE SPECIAL SERVICES TERMS FOR AUTODESKS LIVE MAP DATA.



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PROJECT
BRIGHTSTAR GOLD MINE TSF OPTIONS STUDY

CONSULTANT



TITLE
GENERAL SITE LAYOUT

PROJECT NO. PS205718
DOCUMENT No. 003-R
REV. 0
FIGURE A001

LEGEND

EXISTING TOPOGRAPHICAL
CONTOUR AND ELEVATION (mASD)

DESIGN TOPOGRAPHICAL
CONTOUR AND ELEVATION (mASD)

500

TAILINGS DELIVERY PIPELINES

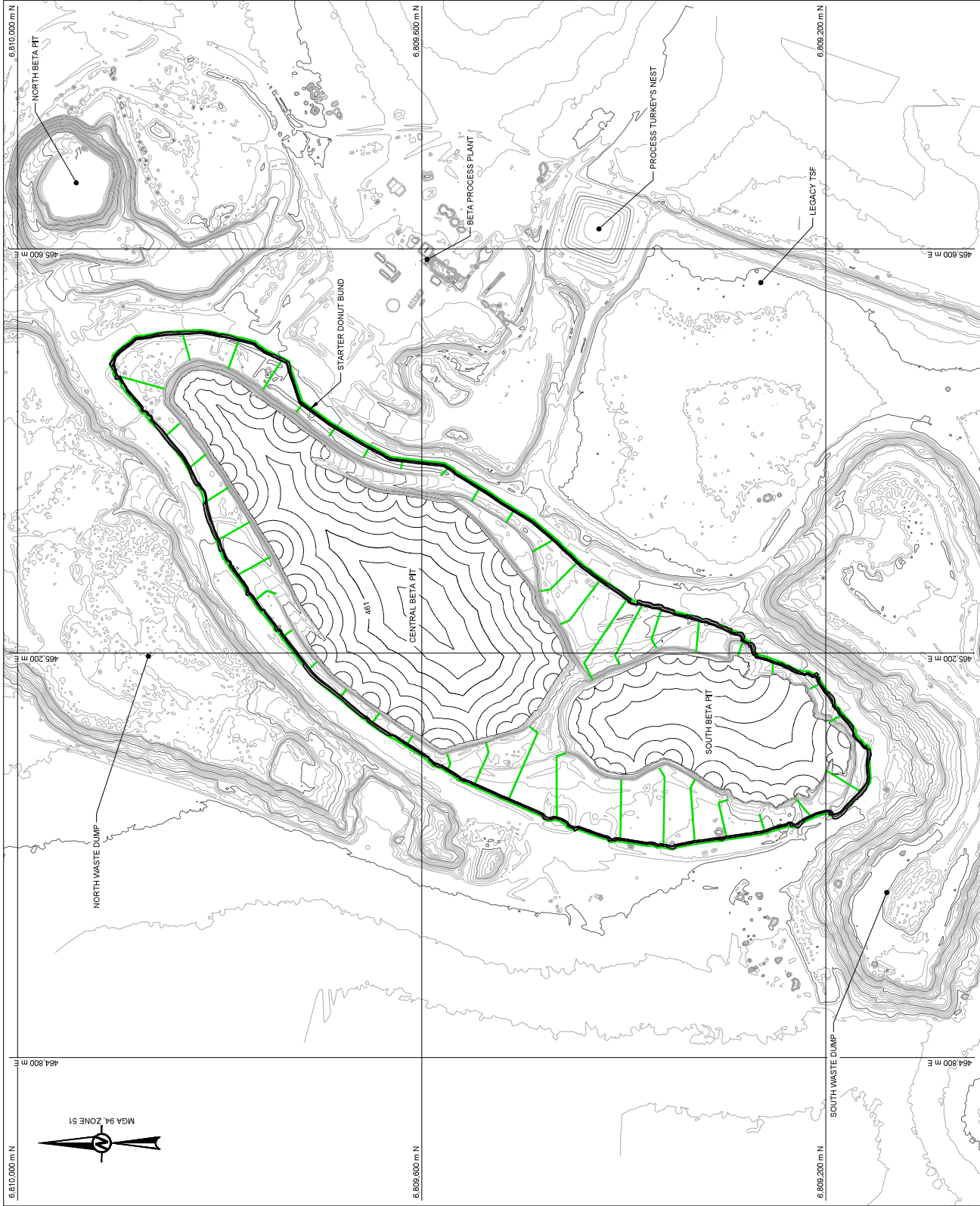
REFERENCES

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NOTE(S)

1. VOLUME OF STARTER DONUT BUND:
CUT VOLUME = 240 m³ AND FILL VOLUME = 1238.68 m³.

2. LENGTH OF TAILINGS DELIVERY PIPELINES = 3,551 m.



PROJECT
BRIGHTSTAR GOLD MINE TSF OPTIONS STUDY

TITLE
CENTRAL AND SOUTH BETA IPTSFs LAYOUT

PROJECT NO.
PS205718

DOCUMENT No.
003-R

REV.
0

FIGURE
A002

CLIENT
BRIGHTSTAR RESOURCES LTD

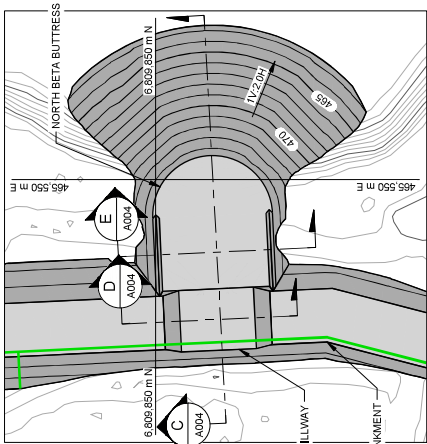
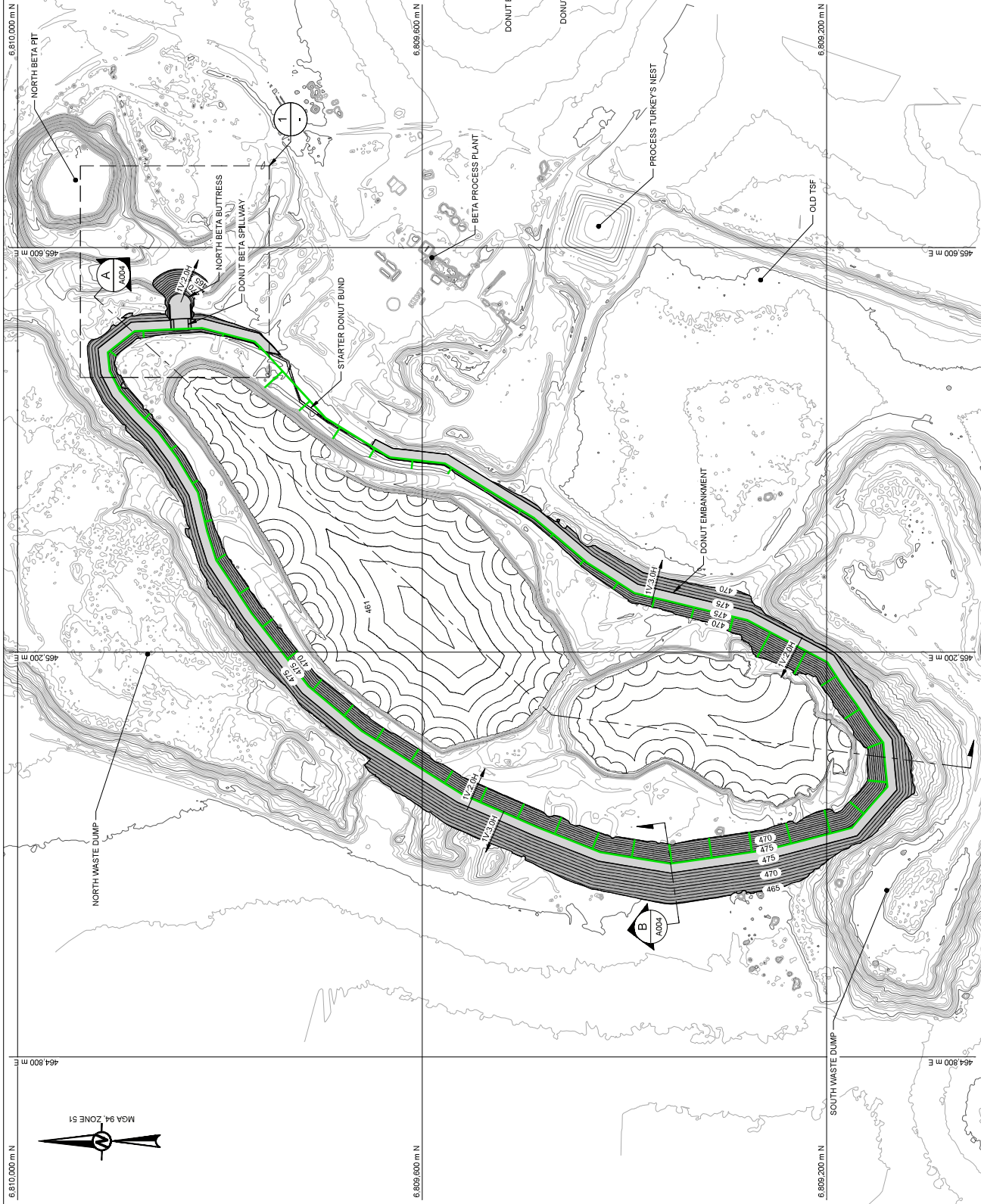
CONSULTANT
wsp

- LEGEND**
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 - DESIGN TOPOGRAPHICAL CONTOUR AND ELEVATION (mASD)
 - 500
 - CONTOUR AND ELEVATION (mASD)
 - TAILINGS DELIVERY PIPELINES

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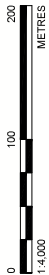
- NOTE(S)**
1. FILL VOLUME OF DONUT BETA EMBANKMENT: 292,973.49 m³
 2. FILL VOLUME OF NORTH BETA BUTTRESS: 5,566.25 m³
 3. CUT VOLUME OF DONUT BETA SPILLWAY: 54,600 m³
 4. LENGTH OF TAILINGS DELIVERY PIPELINES = 3,351 m



SCALE 1:1,000 m

1

DETAIL LAYOUT



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PROJECT
BRIGHTSTAR GOLD MINE TSF OPTIONS STUDY

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TITLE
DONUT BETA TSF LAYOUT

PROJECT NO.
PS205718

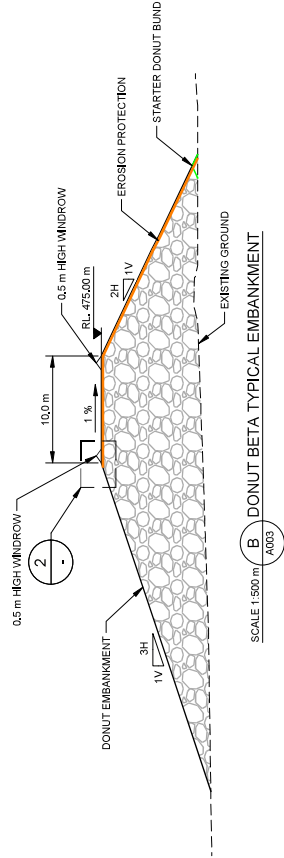
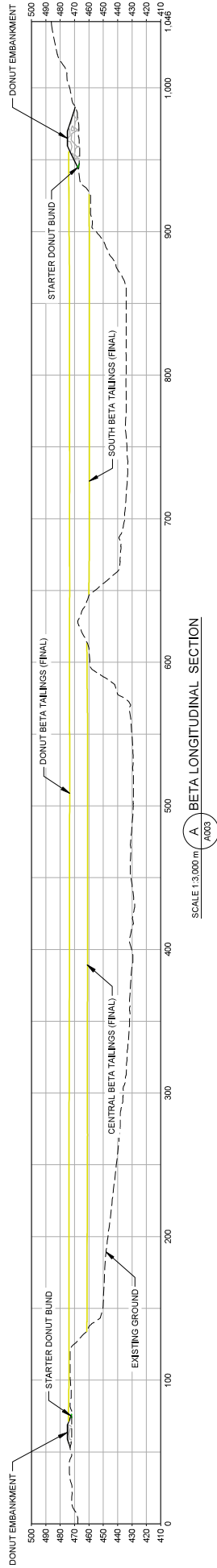
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REV.
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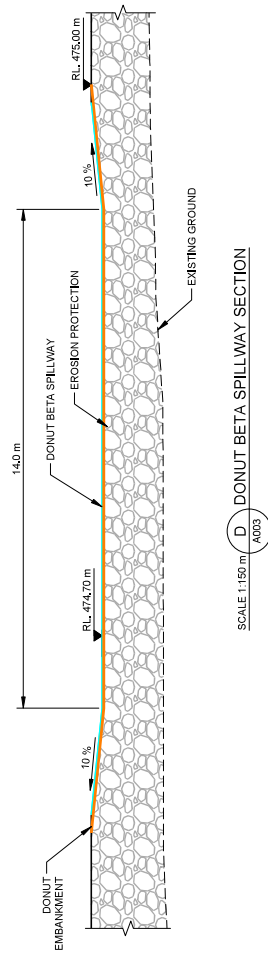
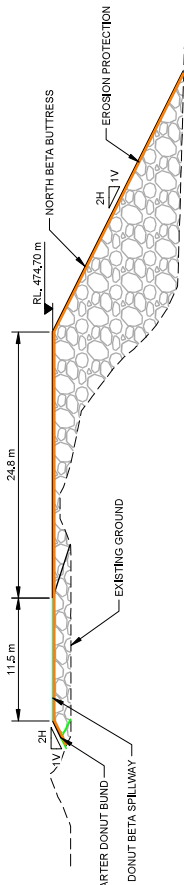
FIGURE
A003

LEGEND

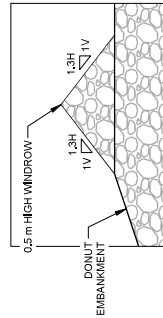
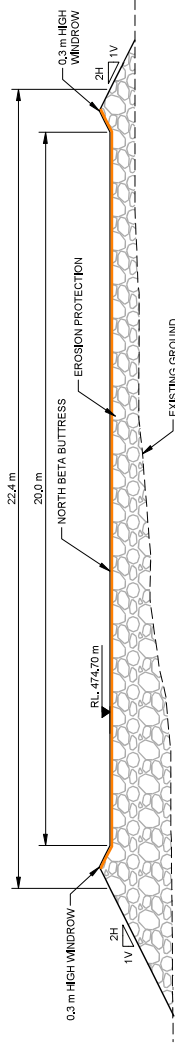
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- EMBANKMENT AND BUTTRESS DESIGN PROFILE
- SPILLWAY DESIGN PROFILE
- DONUT STARTER BUND DESIGN PROFILE
- TAILINGS DESIGN PROFILE
- EROSION PROTECTION
- ZONE 1 (WASTE DUMP MATERIAL)



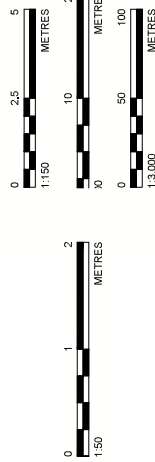
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C NORTH BETA BUTTRESS SECTION
A003



SCALE 1:150 m
E NORTH BETA BUTTRESS SECTION
A003



SCALE 1:50 m
2 WINDROW DETAIL
A003



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BRIGHTSTAR GOLD MINE TSF OPTIONS STUDY

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TITLE
BETA TSF SECTIONS AND DETAILS

PROJECT NO. PS205718
DOCUMENT No. 003-R
REV. 0
FIGURE A004

LEGEND

EXISTING TOPOGRAPHICAL CONTOUR AND ELEVATION (mAHd)

DESIGN TOPOGRAPHICAL CONTOUR AND ELEVATION (mAHd)

M3-B-9 TENEMENT BOUNDARIES

EXISTING MB LOCATIONS

PROPOSED MB LOCATIONS

PROPOSED VWP LOCATIONS

PROPOSED SURVEY PRISM LOCATIONS

1. COMBINED SURVEY DATA PROVIDED BY BRIGHTSTAR RESOURCES LTD, DATED 26th MARCH 2024.

2. SURVEY PRISMS SHOULD BE MOVED TO DONUT EMBANKMENT FOR REUSE PRIOR TO DEPOSITION IN DONUT BETA TSF.

EXISTING MBs LOCATION TABLE		
POINT No.	EASTING (m)	NORTHING (m)
BETA SW CORNER MB	464.808	6.809.080
BSMB1	465.617	6.809.297
BSMB2	465.953	6.809.178
BSMB3	465.513	6.809.969
BSMB4	465.422	6.809.874
BSMB5	465.276	6.809.918

PROPOSED MBs LOCATION TABLE		
POINT No.	EASTING (m)	NORTHING (m)
MB1	464.321	6.809.751
MB2	464.206	6.809.217
MB3	463.885	6.809.753
MB4	463.352	6.807.953
MB5	463.709	6.807.966
MB6	463.929	6.807.686
MB7	465.239	6.810.078
MB8	465.802	6.809.955

PROPOSED VWPs LOCATION TABLE		
POINT No.	EASTING (m)	NORTHING (m)
VWP1	465.020	6.809.183
VWP2	465.001	6.809.259
VWP3	464.987	6.809.354
VWP4	464.999	6.809.425
VWP5	465.044	6.809.536
VWP6	465.524	6.809.843

PROPOSED SURVEY PRISMS LOCATION TABLE (SEE NOTE 2)		
SP No.	EASTING (m)	NORTHING (m)
SP1	465.184	6.809.885
SP2	465.123	6.809.589
SP3	465.050	6.809.222
SP4	465.128	6.809.188

BRIGHTSTAR RESOURCES LTD

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BRIGHTSTAR GOLD MINE TSF OPTIONS STUDY

PROJECT

PROPOSED MONITORING INSTRUMENTATION PLAN

PROJECT NO.

PS205718

DOCUMENT No.

003-R

REV.

0

FIGURE

A005

Appendix B

Laboratory geotechnical testing results



APPENDIX B-1

Cork Tree Well Tailings

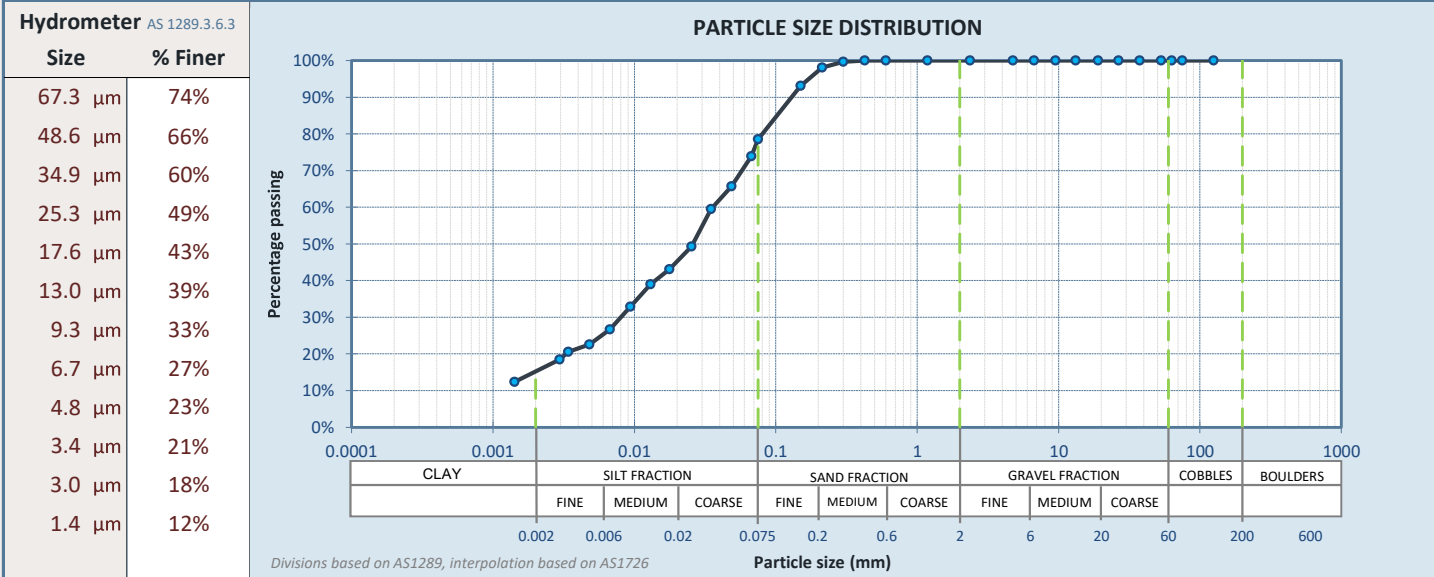
Soils testing - Particle size distribution (PSD) & consistency limits

Standard method (by sieving) with hydrometer follow on

AS 1289.3.6.1, 3.6.3, 2.1.1, 3.9.1, 3.2.1, 3.3.1 & 3.4.1

Test request #:	STRP24-0196	Specimen ID:	LPER202411150	WSP Australia Pty Ltd
Client:	Brightstar Resources			PERTH GEOTECHNICAL LABORATORY
Client address:				780 Marshall Road, Malaga, Western Australia 6090
Project ID:	PS205718	Exploratory Hole		
Project name:	Brightstar Gold Mine TSF Options	CTWOM WSP LT-01	Sample depth (m):	-
Project reference:		Loc. ref.:	Client sample ref:	1 of 2
				Brightstar Gold Mine

Specimen description:				(Based on visual and tactile assessment)				Sampling: Tested as received			
PARTICLE SIZE DISTRIBUTION				AS 1289.3.6.1	(ML) SILT, with sand, low plasticity, brown, fine to medium grained sand.				Easting (m)	Northing (m)	Level (m)
Sieve Size	Passing	LB S	UB S								
125 mm	100%			Standard:	AS 1289.2.1.1	AS 1289.3.9.1	AS 1289.3.2.1	AS 1289.3.3.1	AS 1289.3.4.1		AS 1289.3.5.1
75 mm	100%			Test:	Moisture content	Cone Liquid limit	Plastic limit	Plasticity index	Linear shrinkage	Curling/ Crumbling/ Cracking	Particle density (t/m³)
63 mm	100%				Result:	88.0% As Rcvd.	42%	26%	16%	4.0%	None
53 mm	100%			LB S:						LSM length	-2.36mm fraction
37.5 mm	100%			UB S:						125 mm	
26.5 mm	100%			Specimen history/notes:						PSD preparation method	
19 mm	100%									Dry sieved	
13.2 mm	100%			Hydrometer:	Loss on pre-treatment: 3%			Dispersant: Sodium Hexametaphosphate			
9.5 mm	100%				LB S = Lower bound specification			n/a = Not applicable		NP = Non plastic	
6.7 mm	100%			Definitions:	LSM = Linear shrinkage mould			ND = Not determined		SIB = Slipping In Bowl	
4.75 mm	100%				UB S = Upper bound specification			NO = Not obtainable			
2.36 mm	100%			GRADING SUMMARY							
1.18 mm	100%			Clay*	Silt*	Fines	Sand*	Gravel*	Cobbles*		
600 µm	100%			(<2 µm)	(>2 µm - <75 µm)	(<75 µm)	(>75 µm - <2 mm)	(>2 mm - <60 mm)	(>60 mm - <200 mm)		
425 µm	100%			14.7%	63.8%	78.5%	21.5%	0.0%	0.0%		
300 µm	100%			Hydrometer type = ASTM			*Proportions based on linear interpolation between sieve/particle of nearest size and smaller				
212 µm	98%										
150 µm	93%										
75 µm	78%										



Testing performed by:	aa	Results reviewed by:	PKent	Date reported:	19/12/2024
Cert. ref.: PS205718_CTWOM WSP LT-01_STRP24-0196_CLSF_s2411150_Rep24118315					
NATA accreditation number: 1961 - Site:1598 - Perth					
Accredited for compliance with ISO/IEC 17025 - Testing					
THIS DOCUMENT SHALL ONLY BE REPRODUCED IN FULL (Sheet 1 of 1)					
Phone: +61 (0)8 9441 0700	Fax: +61 (0)8 9441 0701	E-mail:		Web:	www.wsp.com

These tests were carried out in accordance with the Australian standards identified in this certificate.
Test results relate only to the specimens tested.

Rep Combined PSD Hydro - RL24

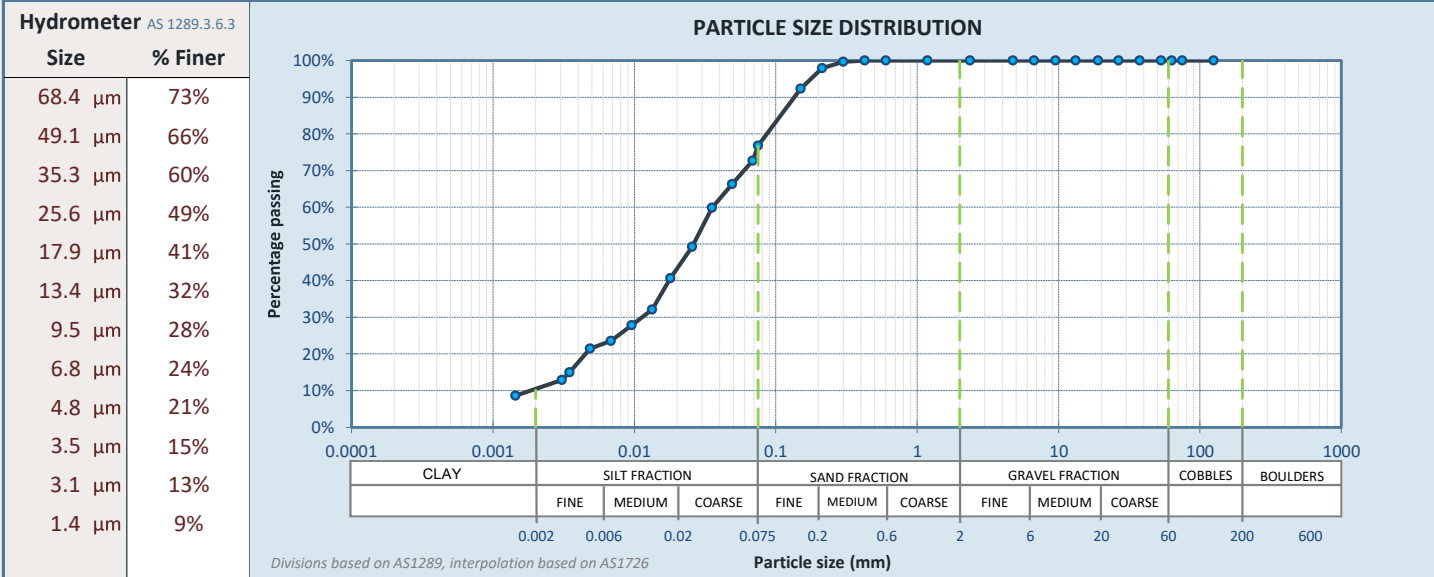
Soils testing - Particle size distribution (PSD) & consistency limits

Standard method (by sieving) with hydrometer follow on

AS 1289.3.6.1, 3.6.3, 2.1.1, 3.9.1, 3.2.1, 3.3.1 & 3.4.1

Test request #:	STRP24-0196	Specimen ID:	LPER202411151	WSP Australia Pty Ltd
Client:	Brightstar Resources			PERTH GEOTECHNICAL LABORATORY
Client address:				780 Marshall Road, Malaga, Western Australia 6090
Project ID:	PS205718	Exploratory Hole		
Project name:	Brightstar Gold Mine TSF Options	CTWOM WSP LT-01	Sample depth (m):	-
Project reference:		Loc. ref.:	Client sample ref:	2 of 2
				Brightstar Gold Mine

Specimen description:				(Based on visual and tactile assessment)				Sampling: Tested as received			
PARTICLE SIZE DISTRIBUTION				AS 1289.3.6.1	(ML) SILT with sand, low plasticity, brown, fine to medium grained sand.				Easting (m)	Northing (m)	Level (m)
Sieve Size	Passing	LB S	UB S								
125 mm	100%			Standard:	AS 1289.2.1.1	AS 1289.3.9.1	AS 1289.3.2.1	AS 1289.3.3.1	AS 1289.3.4.1		AS 1289.3.5.1
75 mm	100%			Test:	Moisture content	Cone Liquid limit	Plastic limit	Plasticity index	Linear shrinkage	Curling/ Crumbling/ Cracking	Particle density (t/m³)
63 mm	100%				Result:	89.0% As Rcvd.	42%	27%	15%	4.0%	None
53 mm	100%			LB S:						LSM length	-2.36mm fraction
37.5 mm	100%			UB S:						125 mm	
26.5 mm	100%			Specimen history/notes:						PSD preparation method	
19 mm	100%									Dry sieved	
13.2 mm	100%			Hydrometer:	Loss on pre-treatment: 1%			Dispersant: Sodium Hexametaphosphate			
9.5 mm	100%				LB S = Lower bound specification			n/a = Not applicable		NP = Non plastic	
6.7 mm	100%			Definitions:	LSM = Linear shrinkage mould			ND = Not determined		SIB = Slipping In Bowl	
4.75 mm	100%				UB S = Upper bound specification			NO = Not obtainable			
2.36 mm	100%			GRADING SUMMARY							
1.18 mm	100%			Clay*	Silt*	Fines	Sand*	Gravel*	Cobbles*		
600 µm	100%			(<2 µm)	(>2 µm - <75 µm)	(<75 µm)	(>75 µm - <2 mm)	(>2 mm - <60 mm)	(>60 mm - <200 mm)		
425 µm	100%			10.0%	66.7%	76.8%	23.2%	0.0%	0.0%		
300 µm	100%			Hydrometer type = ASTM			*Proportions based on linear interpolation between sieve/particle of nearest size and smaller				
212 µm	98%										
150 µm	92%										
75 µm	77%										



Testing performed by:	aa	Results reviewed by:	PKent	Date reported:	19/12/2024
Cert. ref.: PS205718_CTWOM WSP LT-01_STRP24-0196_CLSF_s2411151_Rep24118316					
NATA accreditation number: 1961 - Site:1598 - Perth Accredited for compliance with ISO/IEC 17025 - Testing THIS DOCUMENT SHALL ONLY BE REPRODUCED IN FULL (Sheet 1 of 1)					
Phone: +61 (0)8 9441 0700	Fax: +61 (0)8 9441 0701	E-mail:		Web:	www.wsp.com

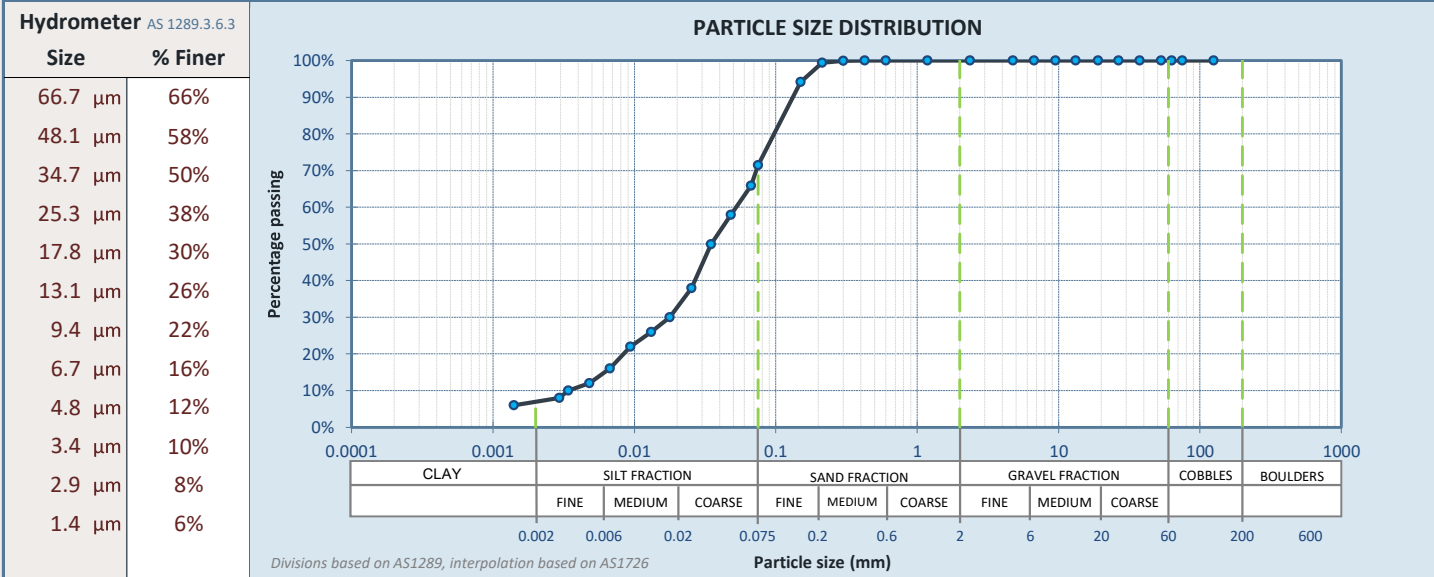
Soils testing - Particle size distribution (PSD) & consistency limits

Standard method (by sieving) with hydrometer follow on

AS 1289.3.6.1, 3.6.3, 2.1.1, 3.9.1, 3.2.1, 3.3.1 & 3.4.1

Test request #:	STRP24-0196	Specimen ID:	LPER202411152	WSP Australia Pty Ltd
Client:	Brightstar Resources			PERTH GEOTECHNICAL LABORATORY
Client address:				780 Marshall Road, Malaga, Western Australia 6090
Project ID:	PS205718	Exploratory Hole		
Project name:	Brightstar Gold Mine TSF Options	CTWTM WSP LT-02	Sample depth (m):	-
Project reference:		Loc. ref.:	Client sample ref:	1 of 2
				Brightstar Gold Mine

Specimen description:				(Based on visual and tactile assessment)				Sampling: Tested as received			
PARTICLE SIZE DISTRIBUTION				AS 1289.3.6.1	(ML) SILT with sand, low plasticity, brown, fine to medium grained sand.				Easting (m)	Northing (m)	Level (m)
Sieve Size	Passing	LB S	UB S								
125 mm	100%			Standard:	AS 1289.2.1.1	AS 1289.3.9.1	AS 1289.3.2.1	AS 1289.3.3.1	AS 1289.3.4.1		AS 1289.3.5.1
75 mm	100%			Test:	Moisture content	Cone Liquid limit	Plastic limit	Plasticity index	Linear shrinkage	Curling/ Crumbling/ Cracking	Particle density (t/m³)
63 mm	100%				Result:	92.0% As Rcvd.	31%	24%	7%	3.0%	None
53 mm	100%			LB S:						LSM length	-2.36mm fraction
37.5 mm	100%			UB S:						125 mm	
26.5 mm	100%			Specimen history/notes:						PSD preparation method	
19 mm	100%									Dry sieved	
13.2 mm	100%			Hydrometer:	Loss on pre-treatment: 2%			Dispersant: Sodium Hexametaphosphate			
9.5 mm	100%			Definitions:	LB S = Lower bound specification			n/a = Not applicable		NP = Non plastic	
6.7 mm	100%				LSM = Linear shrinkage mould			ND = Not determined		SIB = Slipping In Bowl	
4.75 mm	100%				UB S = Upper bound specification			NO = Not obtainable			
2.36 mm	100%			GRADING SUMMARY							
1.18 mm	100%			Clay*	Silt*	Fines	Sand*	Gravel*	Cobbles*		
600 µm	100%			(<2 µm)	(>2 µm - <75 µm)	(<75 µm)	(>75 µm - <2 mm)	(>2 mm - <60 mm)	(>60 mm - <200 mm)		
425 µm	100%			6.8%	64.7%	71.5%	28.5%	0.0%	0.0%		
300 µm	100%			Hydrometer type = ASTM			*Proportions based on linear interpolation between sieve/particle of nearest size and smaller				
212 µm	99%										
150 µm	94%										
75 µm	71%										



Testing performed by:		aa	Results reviewed by:		PKent	Date reported:		19/12/2024
Cert. ref.: PS205718_CTWTM WSP LT-02_STRP24-0196_CLSF_s2411152_Rep24118317						Approved signatory:		
				NATA accreditation number: 1961 - Site:1598 - Perth				
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						Web:		www.wsp.com

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Test results relate only to the specimens tested.

Rep Combined PSD Hydro - RL24

Soils testing - Particle size distribution (PSD) & consistency limits

Standard method (by sieving) with hydrometer follow on

AS 1289.3.6.1, 3.6.3, 2.1.1, 3.9.1, 3.2.1, 3.3.1 & 3.4.1

Test request #:

STRP24-0196

Specimen ID:

LPER202411153

WSP Australia Pty Ltd

Client:

Brightstar Resources

PERTH GEOTECHNICAL LABORATORY

Client address:

780 Marshall Road,

Malaga,

Western Australia 6090

Project ID:

PS205718

Exploratory Hole

Sample depth (m):

-

Project name:

Brightstar Gold Mine TSF Options

CTWTM WSP LT-02

Client sample ref:

2 of 2

Project reference:

Loc. ref.:

Brightstar Gold Mine

Specimen description:

(Based on visual and tactile assessment)

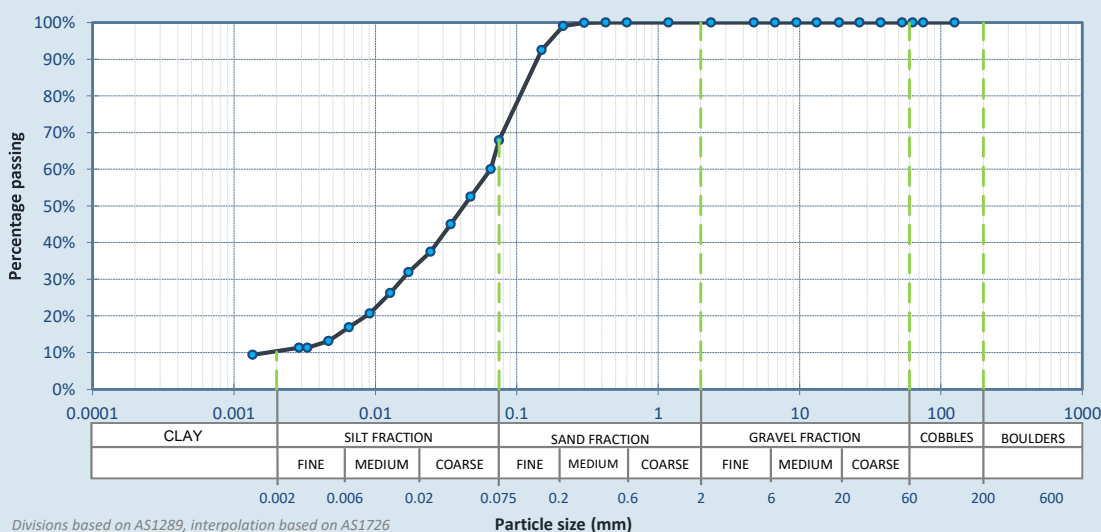
Sampling: Tested as received

PARTICLE SIZE DISTRIBUTION				AS 1289.3.6.1	(CL/ML) Sandy CLAY/SILT, low plasticity, brown, fine to medium grained sand.				Easting (m)		Northing (m)		Level (m)							
Sieve Size	Passing	LB S	UB S		Standard:		AS 1289.2.1.1		AS 1289.3.9.1		AS 1289.3.2.1		AS 1289.3.3.1		AS 1289.3.4.1		AS 1289.3.5.1			
125 mm	100%			Test:	Moisture content	Cone Liquid limit	Plastic limit	Plasticity index	Linear shrinkage	Curling/ Crumbling/ Cracking	Particle density (t/m³)									
75 mm	100%																			
63 mm	100%			Result:	81.5%	32%	23%	9%	1.5%	Cracking	2.79									
53 mm	100%				As Rcvd.							Measured								
37.5 mm	100%			LB S:						LSM length		-2.36mm								
26.5 mm	100%			UB S:						125 mm		fraction								
19 mm	100%			Specimen history/notes:						PSD preparation method										
13.2 mm	100%									Dry sieved										
9.5 mm	100%			Hydrometer:	Loss on pre-treatment: 4%			Dispersant: Sodium Hexametaphosphate												
6.7 mm	100%																			
4.75 mm	100%			Definitions:	LB S = Lower bound specification			n/a = Not applicable			NP = Non plastic									
2.36 mm	100%				LSM = Linear shrinkage mould			ND = Not determined			SIB = Slipping In Bowl									
1.18 mm	100%				UB S = Upper bound specification			NO = Not obtainable												
600 µm	100%			GRADING SUMMARY																
425 µm	100%			Clay*	Silt*	Fines	Sand*	Gravel*	Cobbles*											
300 µm	100%			(<2 µm)	(>2 µm - <75 µm)	(<75 µm)	(>75 µm - <2 mm)	(>2 mm - <60 mm)	(>60 mm - <200 mm)											
212 µm	99%			10.2%	57.7%	67.8%	32.2%	0.0%	0.0%											
150 µm	92%			Hydrometer type = ASTM			*Proportions based on linear interpolation between sieve/particle of nearest size and smaller													
75 µm	68%																			

Hydrometer AS 1289.3.6.3

Size	% Finer
65.3 µm	60%
47.2 µm	53%
34.0 µm	45%
24.5 µm	38%
17.1 µm	32%
12.7 µm	26%
9.1 µm	21%
6.5 µm	17%
4.6 µm	13%
3.3 µm	11%
2.9 µm	11%
1.4 µm	9%

PARTICLE SIZE DISTRIBUTION



Testing performed by:

aa

Results reviewed by:

PKent

Date reported:

19/12/2024

Cert. ref.: PS205718_CTWTM WSP LT-02_STRP24-0196_CLSF_s2411153_Rep24118318

Approved signatory:



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Test results relate only to the specimens tested.

Rep Combined PSD Hydro - RL24

Soils testing - Particle size distribution (PSD) & consistency limits

Standard method (by sieving) with hydrometer follow on

AS 1289.3.6.1, 3.6.3, 2.1.1, 3.9.1, 3.2.1 & 3.4.1

Test request #:

STRP24-0196

Specimen ID:

LPER202411154

WSP Australia Pty Ltd

Client:

Brightstar Resources

PERTH GEOTECHNICAL LABORATORY

Client address:

780 Marshall Road,
Malaga,
Western Australia 6090

Project ID:

PS205718

Exploratory Hole

Project name:

Brightstar Gold Mine TSF Options

CTWFM WSP LT-03

Sample depth (m):

-

Client sample ref:

1 of 2

Project reference:

Loc. ref.:

Brightstar Gold Mine

Specimen description:

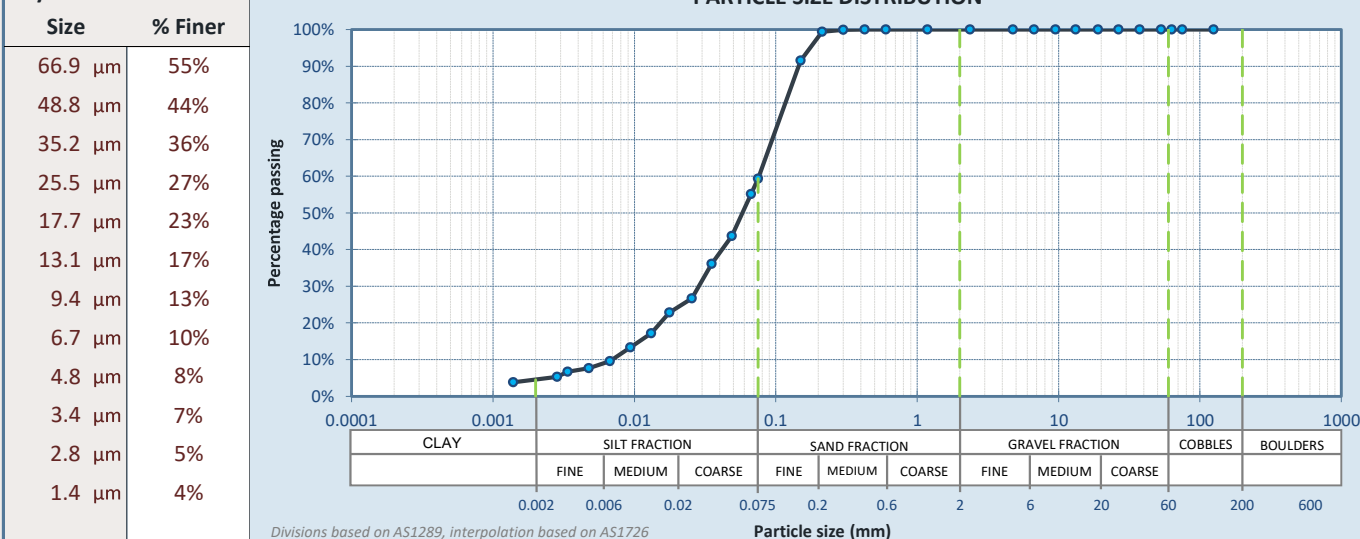
(Based on visual and tactile assessment)

Sampling: Tested as received

PARTICLE SIZE DISTRIBUTION				AS 1289.3.6.1	(ML) Sandy SILT, non-plastic, grey, fine to medium grained sand.				Easting (m)	Northing (m)	Level (m)		
Sieve Size	Passing	LB S	UB S		Standard:	AS 1289.2.1.1	AS 1289.3.9.1	AS 1289.3.2.1	AS 1289.3.3.1	AS 1289.3.4.1		AS 1289.3.5.1	
125 mm	100%			Test:	Moisture content	Cone Liquid limit	Plastic limit	Plasticity index	Linear shrinkage	Curling/ Crumbling/ Cracking	Particle density (t/m³)		
75 mm	100%												
63 mm	100%												
53 mm	100%												
37.5 mm	100%												
26.5 mm	100%												
19 mm	100%			Result:	57.5% As Rcvd.	26%	NP	-	0.0%	None	2.76 Measured		
13.2 mm	100%												
9.5 mm	100%			LB S:							LSM length 125 mm	-2.36mm fraction	
6.7 mm	100%												
4.75 mm	100%			UB S:									
2.36 mm	100%												
1.18 mm	100%			Specimen history/notes:								PSD preparation method	
600 µm	100%											Dry sieved	
425 µm	100%			Hydrometer:	Loss on pre-treatment: 2%		Dispersant: Sodium Hexametaphosphate						
300 µm	100%												
212 µm	99%			Definitions:	LB S = Lower bound specification				n/a = Not applicable		NP = Non plastic		
150 µm	92%				LSM = Linear shrinkage mould				ND = Not determined		SIB = Slipping In Bowl		
75 µm	59%				UB S = Upper bound specification				NO = Not obtainable				
GRADING SUMMARY													
		Clay*	Silt*	Fines	Sand*	Gravel*	Cobbles*						
		(<2 µm)	(>2 µm - <75 µm)	(<75 µm)	(>75 µm - <2 mm)	(>2 mm - <60 mm)	(>60 mm - <200 mm)						
		4.5%	54.8%	59.3%	40.7%	0.0%	0.0%						
Hydrometer type = ASTM				*Proportions based on linear interpolation between sieve/particle of nearest size and smaller									

Hydrometer AS 1289.3.6.3

PARTICLE SIZE DISTRIBUTION



Testing performed by:

aa

Results reviewed by:

PKent

Date reported:

19/12/2024

Cert. ref.: PS205718_CTWFM WSP LT-03_STRP24-0196_CLSF_s2411154_Rep24118313

Approved signatory:



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These tests were carried out in accordance with the Australian standards identified in this certificate.
Test results relate only to the specimens tested.

Rep Combined PSD Hydro - RL24

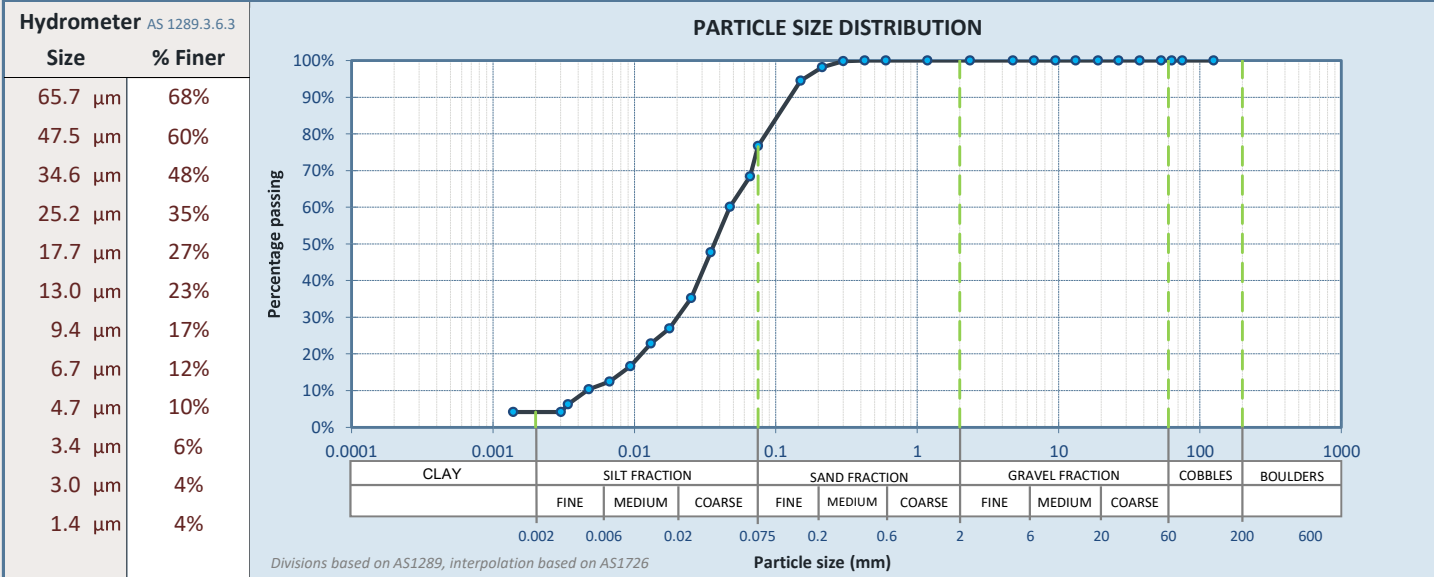
Soils testing - Particle size distribution (PSD) & consistency limits

Standard method (by sieving) with hydrometer follow on

AS 1289.3.6.1, 3.6.3, 2.1.1, 3.9.1, 3.2.1 & 3.4.1

Test request #:	STRP24-0196	Specimen ID:	LPER202411155	WSP Australia Pty Ltd
Client:	Brightstar Resources			PERTH GEOTECHNICAL LABORATORY
Client address:				780 Marshall Road, Malaga, Western Australia 6090
Project ID:	PS205718	Exploratory Hole		
Project name:	Brightstar Gold Mine TSF Options	CTWFM WSP LT-03	Sample depth (m):	-
Project reference:		Loc. ref.:	Client sample ref:	2 of 2
				Brightstar Gold Mine

Specimen description:				(Based on visual and tactile assessment)				Sampling: Tested as received				
PARTICLE SIZE DISTRIBUTION				AS 1289.3.6.1	(ML) SILT with sand, non-plastic, grey, fine to medium grained sand.				Easting (m)	Northing (m)	Level (m)	
Sieve Size	Passing	LB S	UB S	Standard:	AS 1289.2.1.1	AS 1289.3.9.1	AS 1289.3.2.1	AS 1289.3.3.1	AS 1289.3.4.1		AS 1289.3.5.1	
125 mm	100%			Test:	Moisture content	Cone Liquid limit	Plastic limit	Plasticity index	Linear shrinkage	Curling/ Crumbling/ Cracking	Particle density (t/m ³)	
75 mm	100%				Result:	41.5% As Rcvd.	27%	NP	-	0.0%	None	2.75 Measured
63 mm	100%					LB S: UB S:					LSM length 125 mm	-2.36mm fraction
53 mm	100%											
37.5 mm	100%											
26.5 mm	100%			Specimen history/notes:						PSD preparation method		
19 mm	100%									Dry sieved		
13.2 mm	100%			Hydrometer:	Loss on pre-treatment: 1%			Dispersant: Sodium Hexametaphosphate				
9.5 mm	100%				LB S = Lower bound specification			n/a = Not applicable		NP = Non plastic		
6.7 mm	100%			Definitions:	LSM = Linear shrinkage mould			ND = Not determined		SIB = Slipping In Bowl		
4.75 mm	100%				UB S = Upper bound specification			NO = Not obtainable				
2.36 mm	100%			GRADING SUMMARY								
1.18 mm	100%			Clay*	Silt*	Fines	Sand*	Gravel*	Cobbles*			
600 µm	100%			(< 2 µm)	(> 2 µm - <75 µm)	(<75 µm)	(>75 µm - <2 mm)	(> 2 mm - <60 mm)	(>60 mm - <200 mm)			
425 µm	100%			4.2%	72.5%	76.7%	23.3%	0.0%	0.0%			
300 µm	100%			Hydrometer type = ASTM			*Proportions based on linear interpolation between sieve/particle of nearest size and smaller					
212 µm	98%											
150 µm	95%											
75 µm	77%											



Testing performed by:		aa	Results reviewed by:		PKent	Date reported:		19/12/2024
Cert. ref.: PS205718_CTWFM WSP LT-03_STRP24-0196_CLSF_s2411155_Rep24118314						Approved signatory:		
				NATA accreditation number: 1961 - Site:1598 - Perth				
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Liquor Density Relationship Certificate



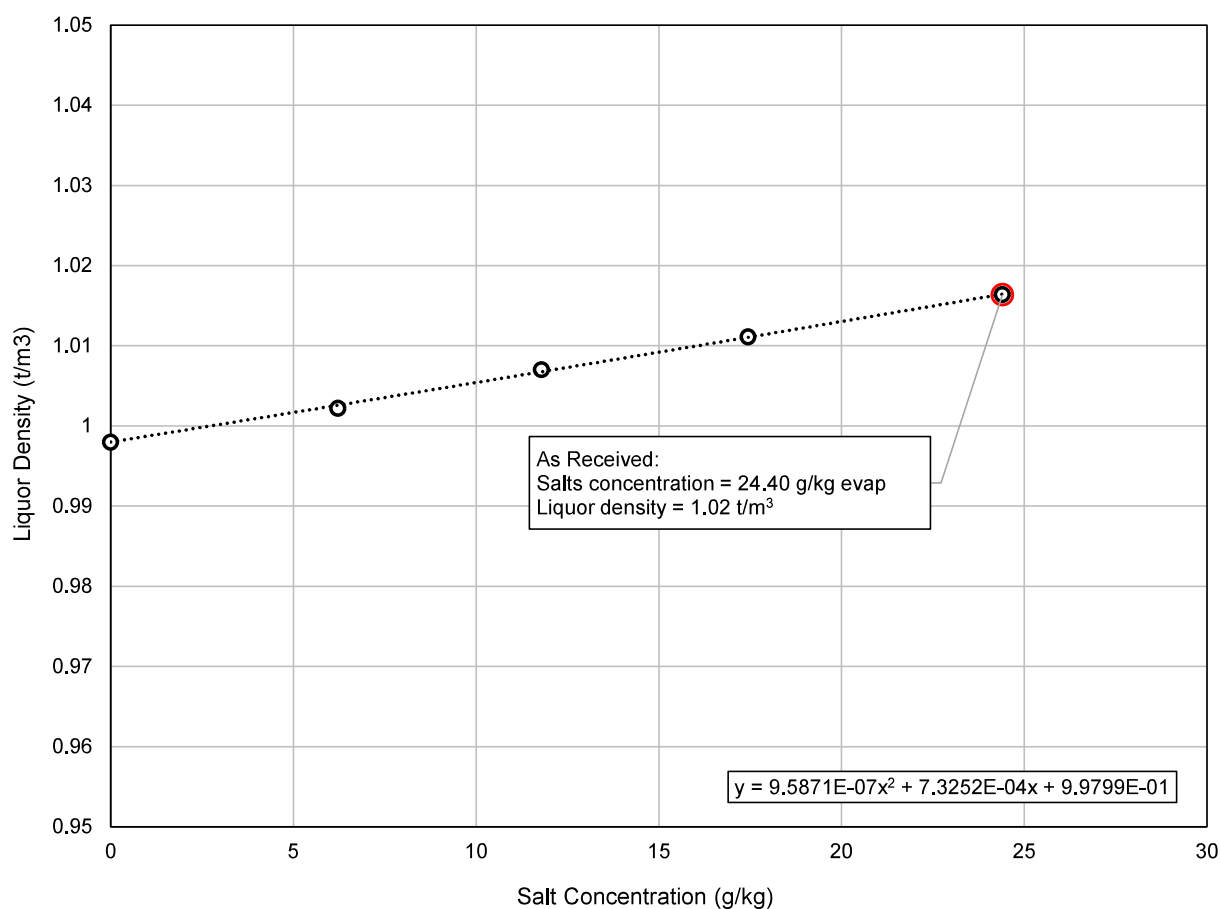
**PERTH
LABORATORY**

780 Marshall Rd. Malaga WA 6090
P: +61 8 9441 0700 F: +61 8 9441 0701
AU-MineWaste-Lab@wsp.com

Client:	Brightstar Resources	Date:	10/12/24
Address:	Level 2, 36 Rowland Street	Project No.:	PS205718
Project:	Brightstar Gold Mine TSF Options	Sample ID:	Process Water
Location:	Brightstar Gold Mine	Laboratory ID:	MW2432L1

Sample	Units	Demineralised Water	Point 1	Point 2	Point 3	Point 4	Point 5	Point 6
Salt Concentration	g/kg*	0.0	6.21	11.79	17.44	24.40		
Liquor Density	t/m ³	0.998	1.002	1.007	1.011	1.016		
Temperature	°C	21.0	20.8	20.8	20.9	21.0		

*grams of salt per kilogram of evaporated water



Additional Notes: Salts concentration of the liquor was modified by adding demineralised water or drying the liquor in a 50°C oven.

Salt Corrected Soil Particle Density Certificate



**PERTH
LABORATORY**

780 Marshall Rd. Malaga WA 6090
P: +61 8 9441 0700 F: +61 8 9441 0701
AU-MineWaste-Lab@wsp.com

Client:	Brightstar Resources	Date:	10/12/24
Address:	Level 2, 36 Rowland Street	Project No.:	PS205718
Project:	Brightstar Gold Mine TSF Options	Lab Sample ID:	See table
Location:	Brightstar Gold Mine	Client Sample ID:	See table
Test Procedure:	WSPMW1.1.5	Sample Description:	See table
		Test ID:	See table

Sample	Units	LT-01 (1/2 + 2/2 blend)	LT-02 (1/2 + 2/2 blend)	LT-03 (1/2 + 2/2 blend)	
		MW243207	MW243208	MW243209	
Soil Particle Density (Uncorrected, as received)	t/m ³	2.89	2.85	2.87	
Salt Corrected Soil Particle Density	t/m ³	2.87	2.83	2.84	
Temperature	°C	21.20	21.45	21.20	
As received Salt Concentration (Salts/(Solids+ Salts))	%	2.08	2.35	2.54	

Sample	Units				
Soil Particle Density (Uncorrected, as received)	t/m ³				
Salt Corrected Soil Particle Density	t/m ³				
Temperature	°C				
As received Salt Concentration (Salts/(Solids+ Salts))	%				

Notes:	Samples combined as received prior testing.	
Page: 1	THIS DOCUMENT SHALL ONLY BE REPRODUCED IN FULL	

Settled void ratio - e0 Test Report



**PERTH
LABORATORY**

780 Marshall Rd. Malaga WA 6090
P: +61 8 9441 0700 F: +61 8 9441 0701
AU-MineWaste-Lab@wsp.com

Client:	Brightstar Resources	Date:	14/01/25
Address:	Laverton, WA	Project No.:	PS205718
Project:	Brightstar Gold Mine TSF Options	Lab Sample ID:	MW243207
Location:	Brightstar Gold Mine	Client Sample ID	CTWOM WSP LT-01 (1 and 2)
Sample Description:	Slurry at 55% solids concentration	Test Procedure:	See Table

Property	Unit	Value (Salt Corrected)	Value (Salt Corrected)
Test Method		Beaker	Tub
Test Procedure		GAPMW 2.7.1	GAPMW 2.7.2
Initial Solids Concentration	%	55.12	55.12
Particle density	g/cc	2.87	2.87
Water density	g/cc	1.00	1.00
Liquor density	g/cc	1.02	1.02
Solids Concentration at e0	%	57.90	58.38
Dry density	g/cc	0.94	0.95
Void Ratio	-	2.05	2.01

Notes:

This sample was dried down to 55% solids concentration and then mixed and poured into a beaker and tub.

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Settled void ratio - e0 Test Report



**PERTH
LABORATORY**

780 Marshall Rd. Malaga WA 6090
P: +61 8 9441 0700 F: +61 8 9441 0701
AU-MineWaste-Lab@wsp.com

Client:	Brightstar Resources	Date:	14/01/25
Address:	Laverton, WA	Project No.:	PS205718
Project:	Brightstar Gold Mine TSF Options	Lab Sample ID:	MW243208
Location:	Brightstar Gold Mine	Client Sample ID	CTWOM WSP LT-02 (1 and 2)
Sample Description:	Slurry at 55% solids concentration	Test Procedure:	See Table

Property	Unit	Value (Salt Corrected)	Value (Salt Corrected)
Test Method		Beaker	Tub
Test Procedure		GAPMW 2.7.1	GAPMW 2.7.2
Initial Solids Concentration	%	55.35	55.35
Particle density	g/cc	2.83	2.83
Water density	g/cc	1.00	1.00
Liquor density	g/cc	1.02	1.02
Solids Concentration at e0	%	57.69	58.74
Dry density	g/cc	0.93	0.96
Void Ratio	-	2.03	1.95

Notes:

This sample was dried down to 55% solids concentration and then mixed and poured into a beaker and tub.

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Settled void ratio - e0 Test Report



**PERTH
LABORATORY**

780 Marshall Rd. Malaga WA 6090
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AU-MineWaste-Lab@wsp.com

Client:	Brightstar Resources	Date:	21/01/25
Address:	Laverton, WA	Project No.:	PS205718
Project:	Brightstar Gold Mine TSF Options	Lab Sample ID:	MW243209
Location:	Brightstar Gold Mine	Client Sample ID	CTWOM WSP LT-03 (1 and 2)
Sample Description:	Slurry at 55% solids concentration	Test Procedure:	See Table

Property	Unit	Value (Salt Corrected)	Value (Salt Corrected)
Test Method		Beaker	Tub
Test Procedure		GAPMW 2.7.1	GAPMW 2.7.2
Initial Solids Concentration	%	55.68	55.68
Particle density	g/cc	2.84	2.84
Water density	g/cc	1.00	1.00
Liquor density	g/cc	1.02	1.02
Solids Concentration at e0	%	65.22	75.38
Dry density	g/cc	1.15	1.49
Void Ratio	-	1.48	0.91

Notes:

This sample was dried down to 55% solids concentration and then mixed and poured into a beaker and tub. It is believed that segregation occurred in the beaker method, leading to higher void ratios.

THIS DOCUMENT SHALL ONLY BE REPRODUCED IN FULL

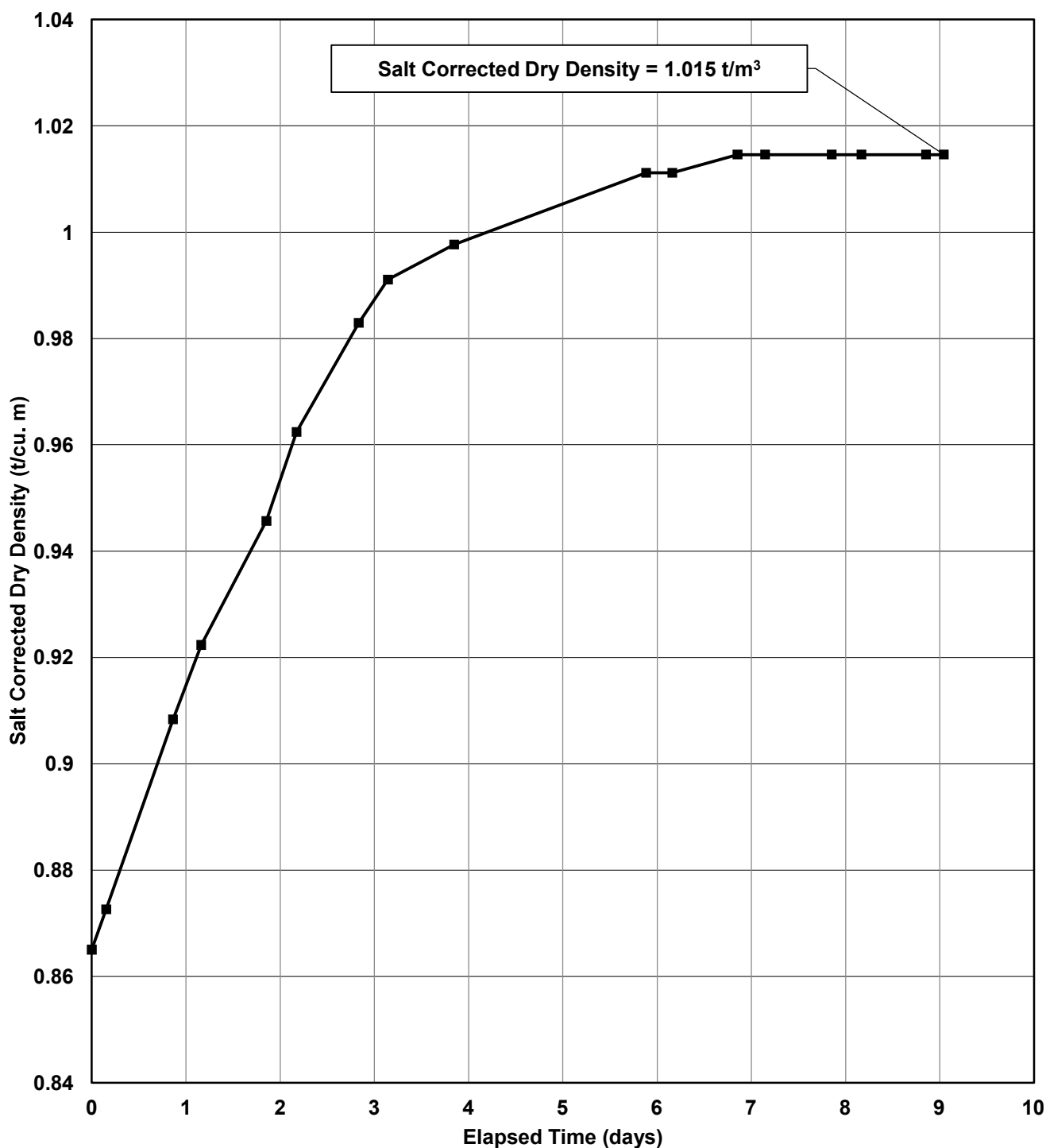
Settling Test Summary Report



**PERTH
LABORATORY**

780 Marshall Rd. Malaga WA 6090
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AU-MineWaste-Lab@wsp.com

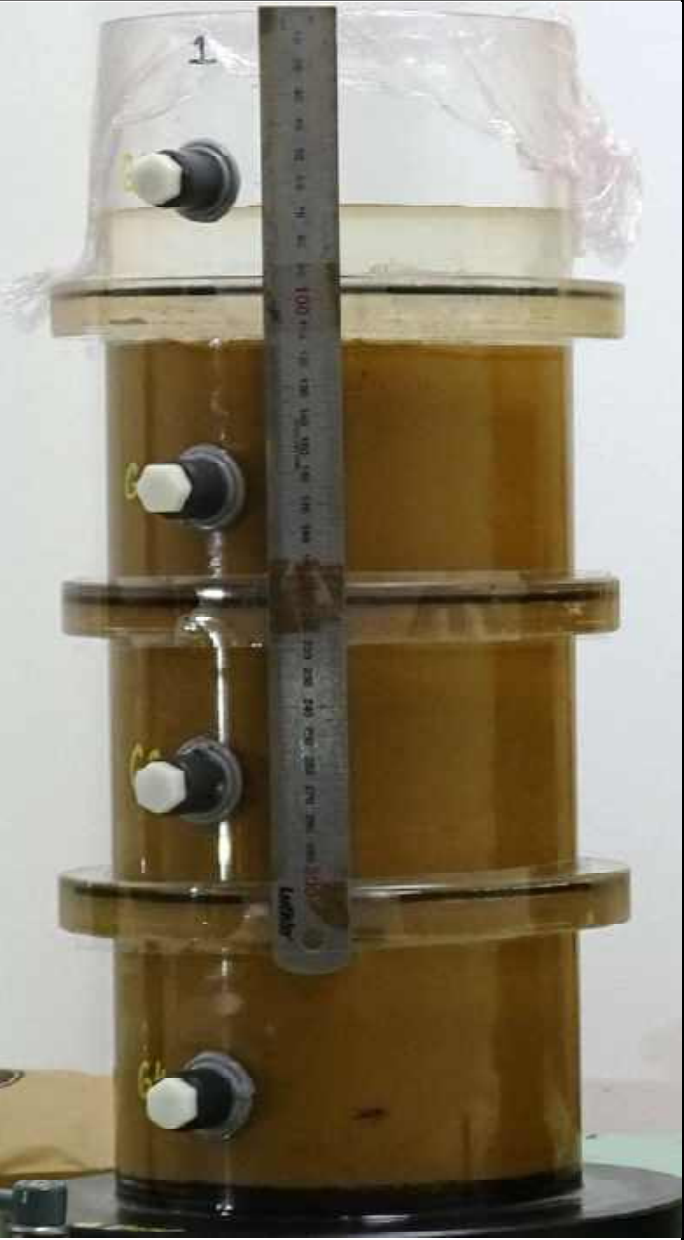
Client:	Brightstar Resources			Date:	14/01/25
Address:	Laverton, WA			Project No.:	PS205718
Project:	Brightstar Gold Mine TSF Options			Lab Sample ID:	MW243207
Location:	Brightstar Gold Mine			Client Sample ID:	CTWOM WSP LT-01 1 and 2
Sample Description:	Slurry at 55% solids concentration			Test ID:	ST01 - 55% Undrained
Test Procedure:	GAPMW 2.3	Initial Percent Solids (% w/w)	54.9	Date Test Started:	14/01/25
Cell Type:	150-mm Stacked rings	Final Percent Solids (% w/w)	60.7	Date Test Finished:	23/01/25



Notes:

The sample was dried down to 55% solids concentration. Slurry was mixed and poured into a column and allowed to settle.

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Settling Test Summary Report				PERTH LABORATORY 780 Marshall Rd. Malaga WA 6090 P: +61 8 9441 0700 F: +61 8 9441 0701 AU-MineWaste-Lab@wsp.com			
Client:		Brightstar Resources		Date:		14/01/25	
Address:		Laverton, WA		Project No.:		PS205718	
Project:		Brightstar Gold Mine TSF Options		Lab Sample ID:		MW243207	
Location:		Brightstar Gold Mine		Client Sample ID:		CTWOM WSP LT-01 1 and 2	
Sample Description:		Slurry at 55% solids concentration		Test ID:		ST01 - 55% Undrained	
Test Procedure:		GAPMW 2.3		Initial Percent Solids (% w/w)		54.9	
Cell Type:		150-mm Stacked rings		Final Percent Solids (% w/w)		60.7	
				Date Test Started:		14/01/25	
				Date Test Finished:		23/01/25	
Full Sample							
Initial State				Final State			
							
Notes:		The sample was dried down to 55% solids concentration. Slurry was mixed and poured into a column and allowed to settle.					
THIS DOCUMENT SHALL ONLY BE REPRODUCED IN FULL							

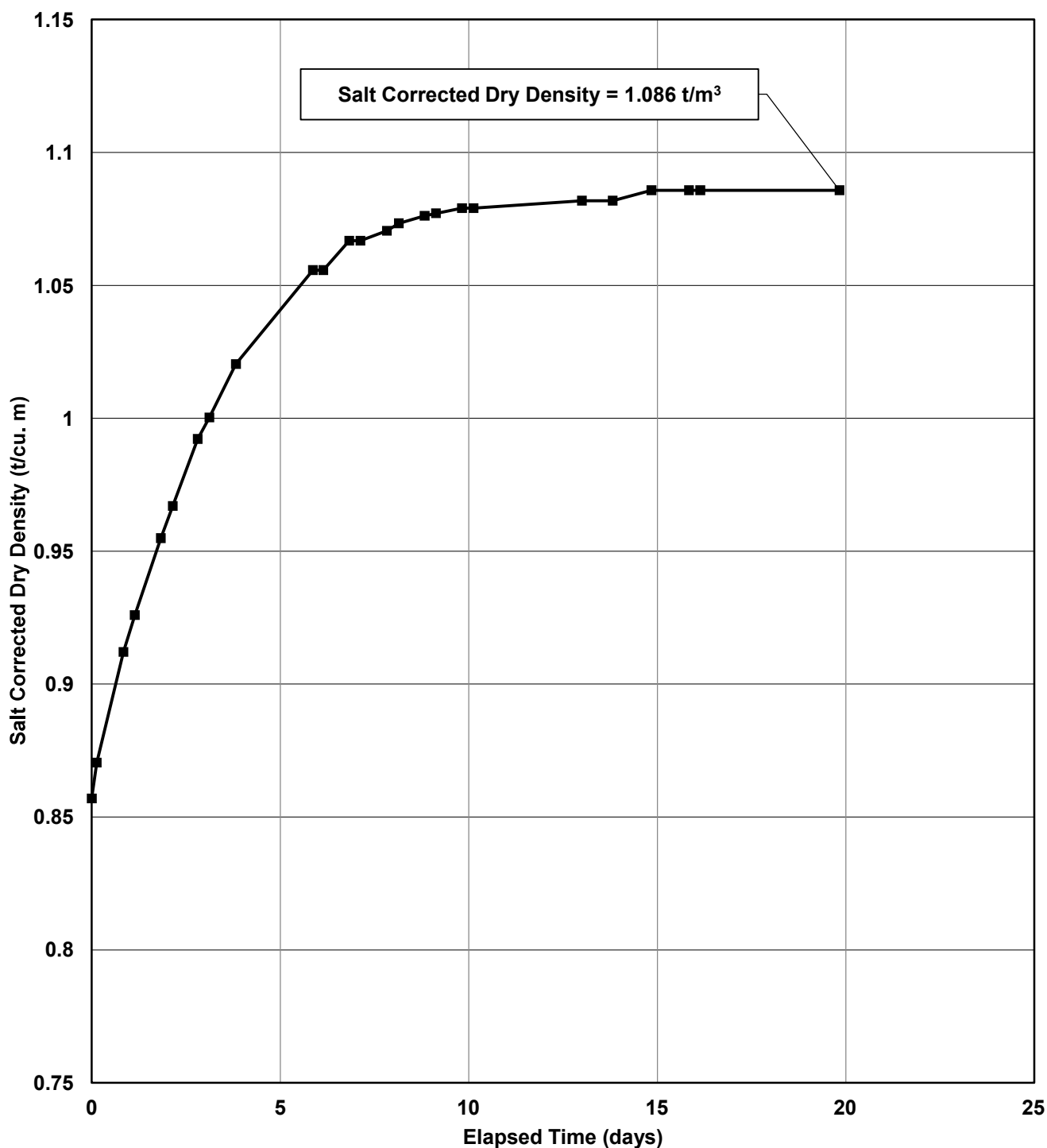
Settling Test Summary Report



**PERTH
LABORATORY**

780 Marshall Rd. Malaga WA 6090
P: +61 8 9441 0700 F: +61 8 9441 0701
AU-MineWaste-Lab@wsp.com

Client:	Brightstar Resources			Date:	14/01/25	
Address:	Laverton, WA			Project No.:	PS205718	
Project:	Brightstar Gold Mine TSF Options			Lab Sample ID:	MW243208	
Location:	Brightstar Gold Mine			Client Sample ID:	CTWOM WSP LT-02 1 and 2	
Sample Description:	Slurry at 55% solids concentration			Test ID:	ST01 - 55% Undrained	
Test Procedure:	GAPMW 2.3	Initial Percent Solids (% w/w)	54.6	Date Test Started:	14/01/25	
Cell Type:	150-mm Stacked rings	Final Percent Solids (% w/w)	63.3	Date Test Finished:	03/01/25	



Notes:

The sample was dried down to 55% solids concentration. Slurry was mixed and poured into a column and allowed to settle.

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Settling Test Summary Report



**PERTH
LABORATORY**

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AU-MineWaste-Lab@wsp.com

Client:	Brightstar Resources			Date:	14/01/25
Address:	Laverton, WA			Project No.:	PS205718
Project:	Brightstar Gold Mine TSF Options			Lab Sample ID:	MW243208
Location:	Brightstar Gold Mine			Client Sample ID:	CTWOM WSP LT-02 1 and 2
Sample Description:	Slurry at 55% solids concentration			Test ID:	ST01 - 55% Undrained
Test Procedure:	GAPMW 2.3	Initial Percent Solids (% w/w)	54.6	Date Test Started:	14/01/25
Cell Type:	150-mm Stacked rings	Final Percent Solids (% w/w)	63.3	Date Test Finished:	03/01/25

Full Sample

Initial State



Final State



Notes:

The sample was dried down to 55% solids concentration. Slurry was mixed and poured into a column and allowed to settle.

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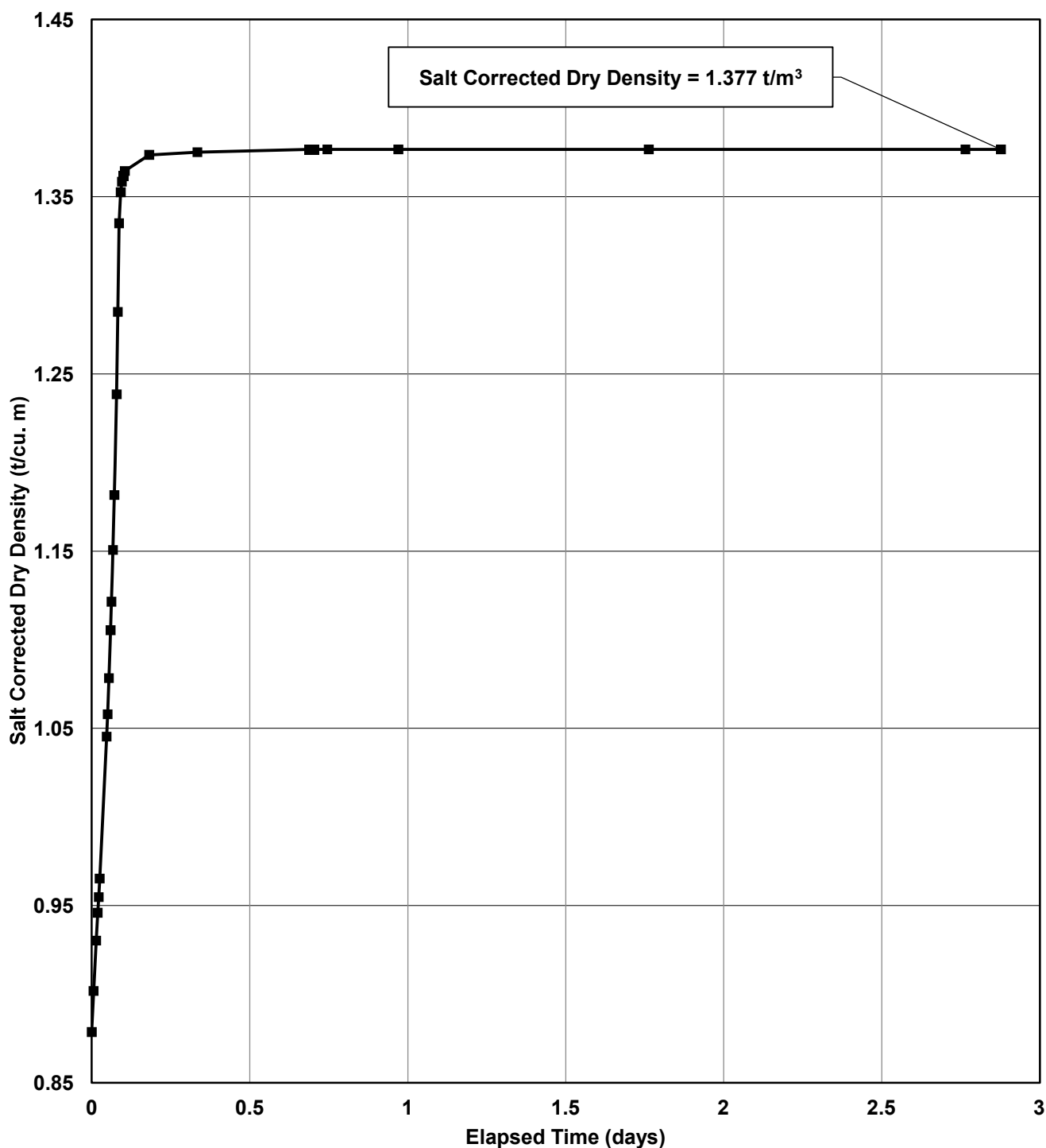
Settling Test Summary Report



**PERTH
LABORATORY**

780 Marshall Rd. Malaga WA 6090
P: +61 8 9441 0700 F: +61 8 9441 0701
AU-MineWaste-Lab@wsp.com

Client:	Brightstar Resources			Date:	20/01/25	
Address:	Laverton, WA			Project No.:	PS205718	
Project:	Brightstar Gold Mine TSF Options			Lab Sample ID:	MW243209	
Location:	Brightstar Gold Mine			Client Sample ID:	CTWOM WSP LT-03 (1 and 2)	
Sample Description:	Slurry at 55% solids concentration			Test ID:	ST01 - 55% Undrained	
Test Procedure:	GAPMW 2.3	Initial Percent Solids (% w/w)	55.4	Date Test Started:	20/01/25	
Cell Type:	150-mm Stacked rings	Final Percent Solids (% w/w)	72.3	Date Test Finished:	23/01/25	



Notes:

The sample was dried down to 55% solids concentration. Slurry was mixed and poured into a column and allowed to settle.

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Settling Test Summary Report				 PERTH LABORATORY 780 Marshall Rd. Malaga WA 6090 P: +61 8 9441 0700 F: +61 8 9441 0701 AU-MineWaste-Lab@wsp.com			
Client:		Brightstar Resources		Date:		20/01/25	
Address:		Laverton, WA		Project No.:		PS205718	
Project:		Brightstar Gold Mine TSF Options		Lab Sample ID:		MW243209	
Location:		Brightstar Gold Mine		Client Sample ID:		CTWOM WSP LT-03 (1 and 2)	
Sample Description:		Slurry at 55% solids concentration		Test ID:		ST01 - 55% Undrained	
Test Procedure:		GAPMW 2.3		Initial Percent Solids (% w/w)		55.4	
Cell Type:		150-mm Stacked rings		Final Percent Solids (% w/w)		72.3	
				Date Test Started:		20/01/25	
				Date Test Finished:		23/01/25	
Full Sample							
Initial State				Final State			
							
Notes:		The sample was dried down to 55% solids concentration. Slurry was mixed and poured into a column and allowed to settle.					
THIS DOCUMENT SHALL ONLY BE REPRODUCED IN FULL							

Air Drying Test Report

Maximum Shrinkage Dry Density

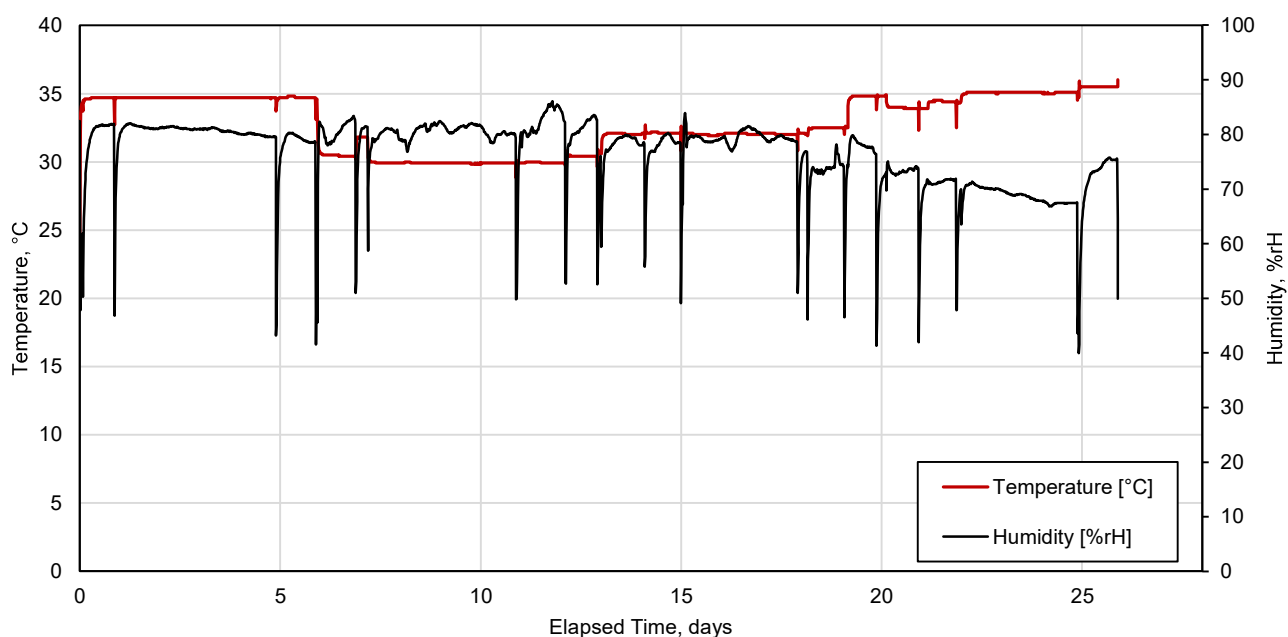
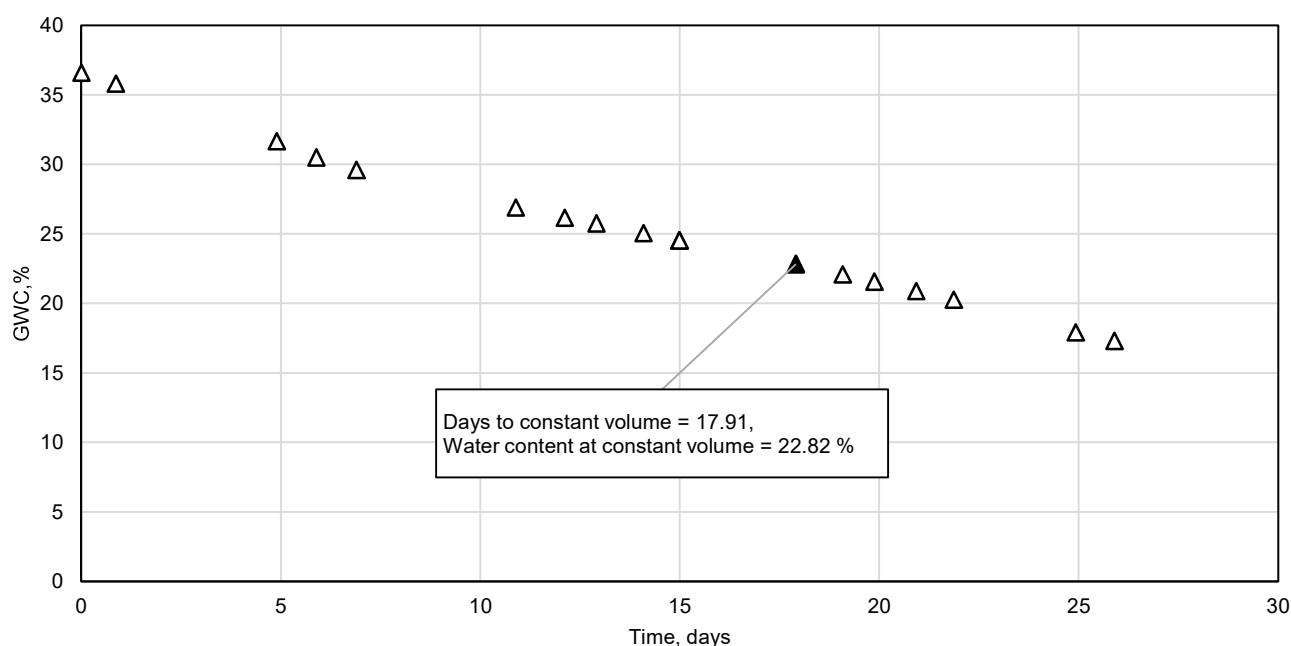


**PERTH
LABORATORY**

780 Marshall Rd. Malaga WA 6090
P: +61 8 9441 0700 F: +61 8 9441 0701
AU-MineWaste-Lab@wsp.com

Client:	Brightstar Resources	Date:	23/01/25
Address:	Laverton, WA	Project No.:	PS205718
Project:	Brightstar Gold Mine TSF Options	Lab Sample ID:	MW243209
Location:	Brightstar Gold Mine	Client Sample ID:	CTWOM WSP LT-03 (1 and 2)
Sample Description:	Slurry at 55% solids concentration		Test ID: AD03
Test Procedure:	GAPMW 2.4	Initial Percent Solids (% w/w)	72.3
Cell Diameter:	149 mm	Solids at constant volume (%)	80.4
		Date Test Started:	23/01/25
		Date Test Finished:	18/02/25

Note: Sample was remove after reaching constant height at wc = 22.82% after 17.91 days.



Preparation
Notes:

placed in a cool oven targeting an evaporation rate of 5 mm/day.

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Air Drying Test Report

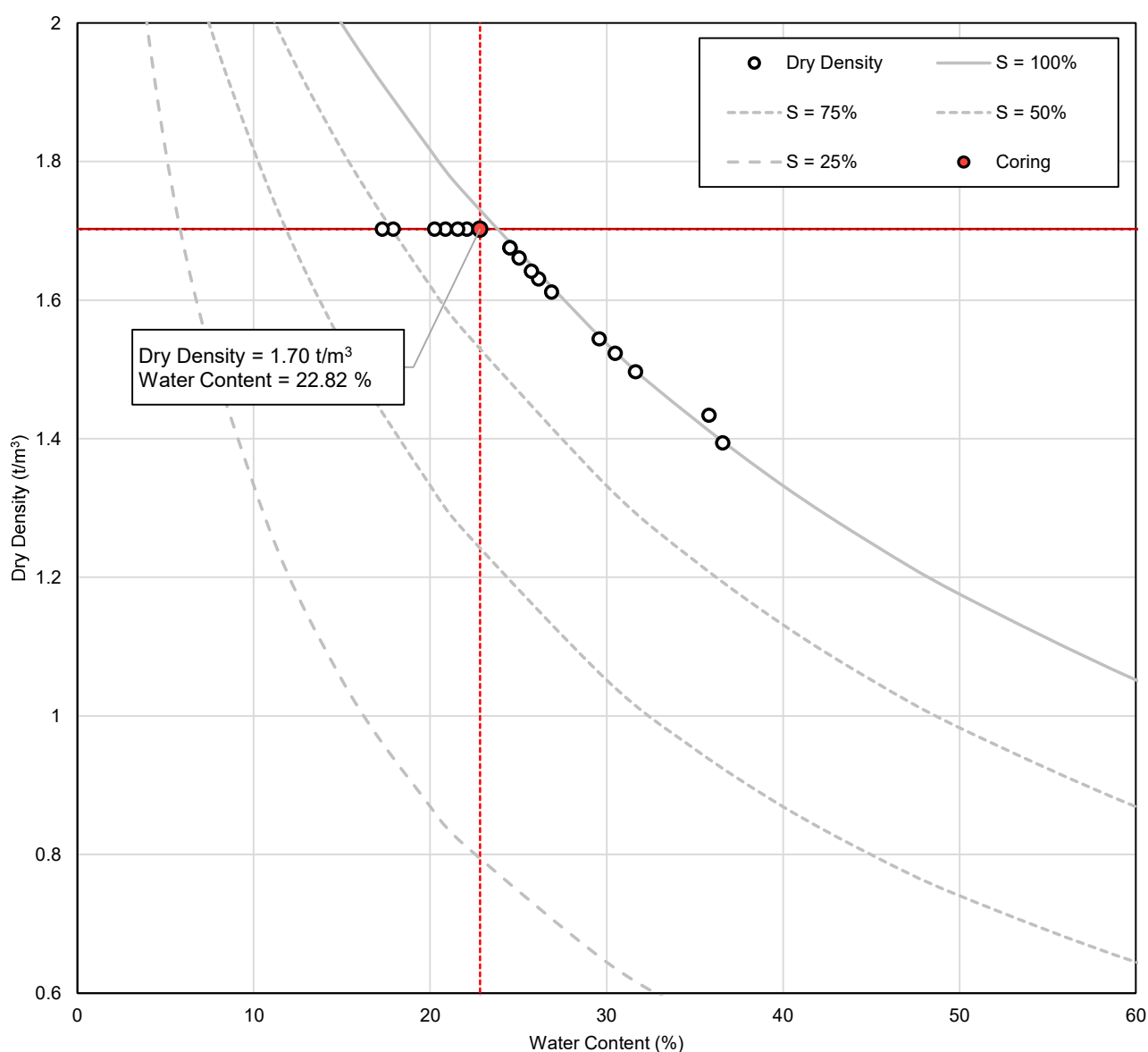
Maximum Shrinkage Dry Density



**PERTH
LABORATORY**

780 Marshall Rd. Malaga WA 6090
P: +61 8 9441 0700 F: +61 8 9441 0701
AU-MineWaste-Lab@wsp.com

Client:	Brightstar Resources			Date:	23/01/25	
Address:	Laverton, WA			Project No.:	PS205718	
Project:	Brightstar Gold Mine TSF Options			Lab Sample ID:	MW243209	
Location:	Brightstar Gold Mine			Client Sample ID:	CTWOM WSP LT-03 (1 and 2)	
Sample Description:	Slurry at 55% solids concentration			Test ID:	AD03	
Test Procedure:	GAPMW 2.4	Initial Percent Solids (% w/w)	72.3	Date Test Started:	23/01/25	
Cell Diameter:	149	mm	Solids at constant volume (%)	80.4	Date Test Finished:	18/02/25



Preparation
Notes:

This sample was allowed to settle and then liquor was decanted off the top. It was then placed in a cool oven targeting an evaporation rate of 5 mm/day.

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Air Drying Test Report

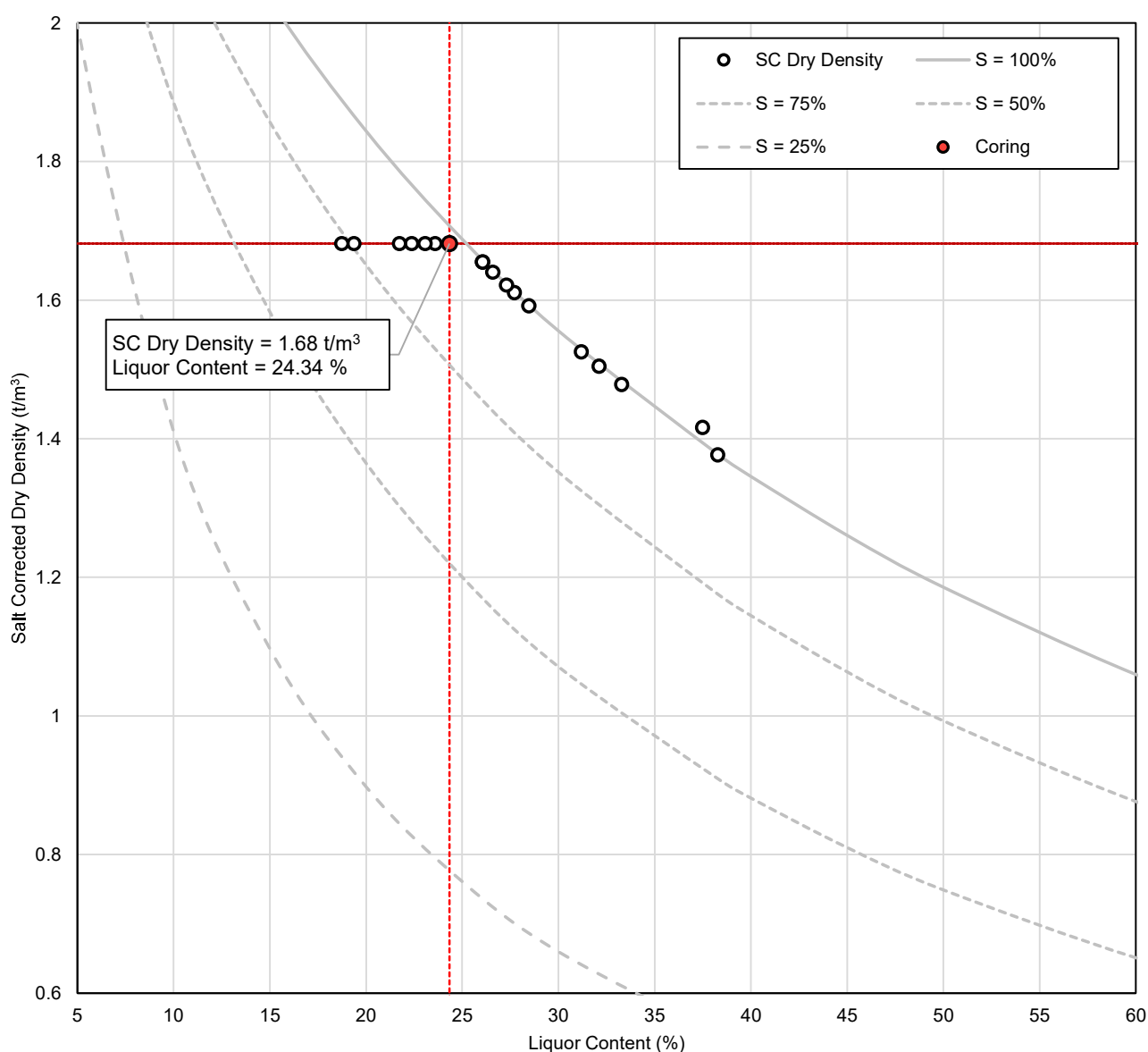
Maximum Shrinkage Dry Density



**PERTH
LABORATORY**

780 Marshall Rd. Malaga WA 6090
P: +61 8 9441 0700 F: +61 8 9441 0701
AU-MineWaste-Lab@wsp.com

Client:	Brightstar Resources			Date:	23/01/25	
Address:	Laverton, WA			Project No.:	PS205718	
Project:	Brightstar Gold Mine TSF Options			Lab Sample ID:	MW243209	
Location:	Brightstar Gold Mine			Client Sample ID:	CTWOM WSP LT-03 (1 and 2)	
Sample Description:	Slurry at 55% solids concentration			Test ID:	AD03	
Test Procedure:	GAPMW 2.4	Initial Percent Solids (% w/w)	72.3	Date Test Started:	23/01/25	
Cell Diameter:	149	mm	Solids at contant volume (%)	80.4	Date Test Finished:	18/02/25



Preparation
Notes:

This sample was allowed to settle and then liquor was decanted off the top. It was then placed in a cool oven targeting an evaporation rate of 5 mm/day.

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Slurry Consolidometer Test Report



**PERTH
LABORATORY**

780 Marshall Rd. Malaga WA 6090
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AU-MineWaste-Lab@wsp.com

Client:	Brightstar Resources	Date:	12/02/2025
Address:	Laverton, WA	Project No.:	PS205718
Project:	Brightstar Gold Mine TSF Options	Lab Sample ID:	MW243208
Location:	Brightstar Gold Mine	Client Sample ID:	CTWTM WSP LT-02 1 and 2
Sample Description:	Tailings	Test ID:	SC02

Test Procedure:	GAPMW 2.2	Test Conditions:	Top drainage of specimen while undergoing compression
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Cell Properties:		Solids Properties:		Fluid Properties:	
Cell Type:	S. Steel Closed Cell	Particle density (g/cc):	2.83	Type:	Process Water
Cell Diameter (mm):	70.9	Initial solids concentration (%):	54.7	Fluid density (g/cc):	1.02
		Initial dry density (g/cc):	0.86	Salts in fluid (g/kg evap water):	29.92
		(initial values when poured into device)		(fluid density and salt contents may vary during test)	

Special Notes:

Sample properties corrected for salts content.

Vertical Effective Pressure σ_v' (kPa)	Void Ratio e (-)	Salt Corrected Dry Density ρ_d (t/m ³)	Permeability k (m/s)	Confining Modulus M (kPa)	Coefficient of Volume Compressibility m_v (m ² /MN)	Coefficient of Consolidation C_v (m ² /yr)
10	1.146	1.32	2.33E-08			
25	1.009	1.41	1.88E-08	235	4.3	15.9
75	0.904	1.49	1.25E-08	1023	1.0	51.3
150	0.841	1.54	8.91E-09	2558	0.4	87.9
300	0.781	1.59	7.53E-09	5381	0.2	142.2
600	0.717	1.65	5.10E-09	9975	0.1	202.5
1000	0.659	1.71	3.90E-09	14809	0.1	214.3
1600	0.614	1.75	3.01E-09	28618	0.0	317.7
400	0.618	1.75				
100	0.623	1.74				
25	0.628	1.74				
5	0.637	1.73				

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Notes:	Sample dried in a 50°C oven to achieve 55% solids concentration.	Report date:	21/03/25
		Revision No.:	0

THIS DOCUMENT SHALL ONLY BE REPRODUCED IN FULL

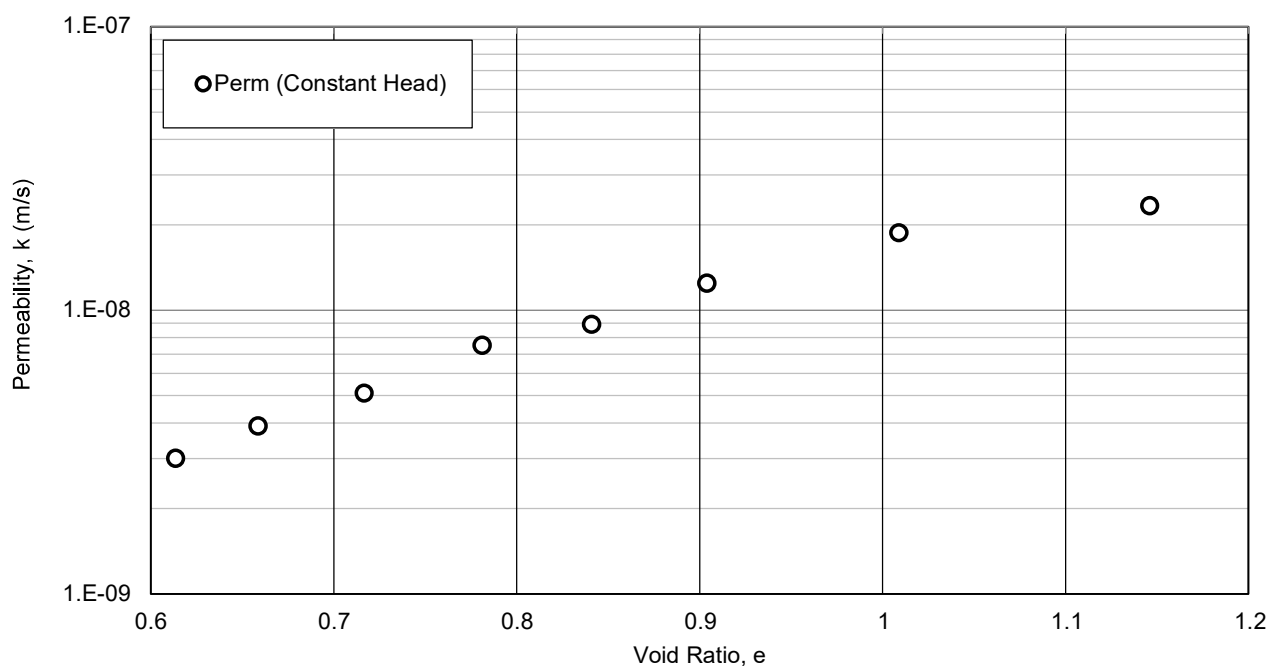
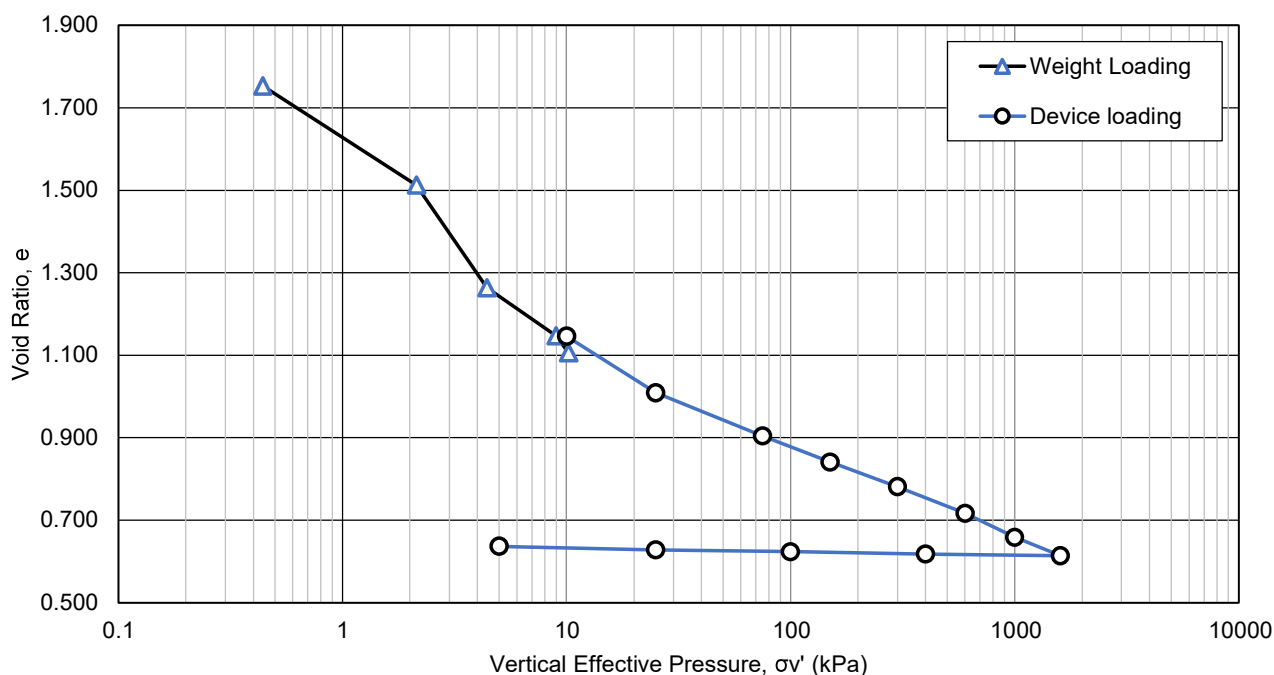
Slurry Consolidometer Test Report



**PERTH
LABORATORY**

780 Marshall Rd. Malaga WA 6090
P: +61 8 9441 0700 F: +61 8 9441 0701
AU-MineWaste-Lab@wsp.com

Client:	Brightstar Resources	Date:	12/02/2025
Address:	Laverton, WA	Project No.:	PS205718
Project:	Brightstar Gold Mine TSF Options	Lab Sample ID:	MW243208
Location:	Brightstar Gold Mine	Client Sample ID:	CTWTM WSP LT-02 1 and 2
Sample Description:	Tailings	Test ID:	SC02
Test Procedure:	GAPMW 2.2	Test Conditions:	Top drainage of specimen while undergoing compression



Notes: Sample dried in a 50°C oven to achieve 55% solids concentration.

Report date: 21/03/25
Revision No.: 0

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APPENDIX B-2

Beta Waste Dump

Soils testing - Report of Particle Density

Standard Method

AS 1289.3.5.1-2006

Test request ID:	STRP24-0191	Lab sample IDs:	202411080-202411220	WSP Australia Pty Ltd
Client:	Brightstar Resources			PERTH GEOTECHNICAL LABORATORY
Client address:	Level 2, 36 Rowland Street			780 Marshall Road, Malaga, Western Australia 6090
Project ID:	PS205718			
Project name:	Brightstar Gold Mine TSF Options	Location:	Brightstar Gold Mine	
		Project reference:		

TEST REPORT - SUMMARY OF ANALYSIS

Lab sample ID	LPER202411080	LPER202411220	LPER202411082	LPER202411083
Exploratory hole ref.	Waste Dump	Waste Dump	Waste Dump	Waste Dump
Sample depth (m)	0	0	0	0
Specimen reference	Sample 1	Sample 2	Sample 3	Sample 4
Date sampled				
Date tested	15/11/24	15/11/24	15/11/24	15/11/24
Specimen description (Based on visual and tactile assessment)	(GC/GM) Clayey/Silty GRAVEL, with sand, fine to medium grained, grey, high plasticity, fine to coarse grained sand	(GC) Clayey GRAVEL, with sand, fine to medium grained, brown, medium plasticity, fine to coarse grained sand	(ML) Gravelly SILT, with sand, medium plasticity, brown, fine to medium grained gravel, fine to coarse grained sand	(GC) Clayey GRAVEL, with sand, fine to medium grained, grey, high plasticity, fine to coarse grained sand
Mean particle density	Passing 2.36mm sieve	2.59	2.59	2.62
	Retained on 2.36mm sieve	2.84	2.88	2.82
Particle Density of Total Soil Sample (t/m ³)	2.7	2.73	2.69	2.72
Notes on test:	Insufficient sample retained on the 2.36mm sieve to meet the requirements of AS1289.3.5.1	Insufficient sample retained on the 2.36mm sieve to meet the requirements of AS1289.3.5.1	Insufficient sample retained on the 2.36mm sieve to meet the requirements of AS1289.3.5.1	Insufficient sample retained on the 2.36mm sieve to meet the requirements of AS1289.3.5.1
Lab sample ID	LPER202411084			
Exploratory hole ref.	Waste Dump			
Sample depth (m)	0			
Specimen reference	Sample 5			
Date sampled				
Date tested	15/11/24			
Specimen description (Based on visual and tactile assessment)	(GM) Silty GRAVEL, with sand, fine to medium grained, white, non-plastic fines, fine to coarse grained sand			
Mean particle density	Passing 2.36mm sieve	2.6		
	Retained on 2.36mm sieve	2.71		
Particle Density of Total Soil Sample (t/m ³)	2.65			
Notes on test:	Insufficient sample retained on the 2.36mm sieve to meet the requirements of AS1289.3.5.1			

Definitions: Specimens prepared by: AA Tests performed by: AA
 ND = Not determined Results reviewed by: Slenihan Date reported: 22/11/2024

Cert. ref.: PS205718_STRP24-0191_PD_202411080-202411220_LPER_24117550	Approved signatory:
 	
NATA accreditation number: 1961 - Site:1598 - Perth Accredited for compliance with ISO/IEC 17025 - Testing	
THIS DOCUMENT SHALL ONLY BE REPRODUCED IN FULL	

Phone: +61 (0)8 9441 0700

Fax: +61 (03) 8862 3501

E-mail:

www.golder.com.au

This test was carried out in accordance with AS 1289.3.5.1-2006. Test results relate only to the specimens tested.

Rep AS 1289.3.5.1-2006 - RL9

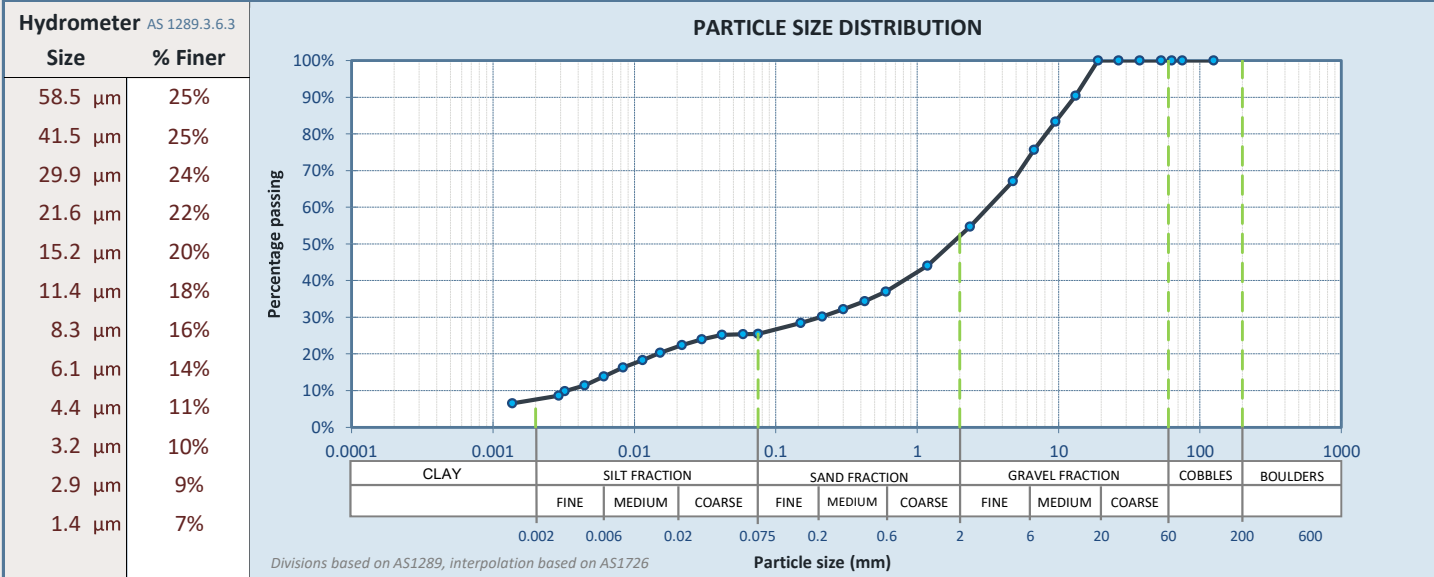
Soils testing - Particle size distribution (PSD) & consistency limits

Standard method (by sieving) with hydrometer follow on

AS 1289.3.6.1, 3.6.3, 2.1.1, 3.9.1, 3.2.1, 3.3.1 & 3.4.1

Test request #:	STRP24-0191	Specimen ID:	LPER202411080	WSP Australia Pty Ltd
Client:	Brightstar Resources			PERTH GEOTECHNICAL LABORATORY
Client address:	Level 2, 36 Rowland Street			780 Marshall Road, Malaga, Western Australia 6090
Project ID:	PS205718	Exploratory Hole		Sample depth (m): 0.00 - 0.00
Project name:	Brightstar Gold Mine TSF Options	Waste Dump		Client sample ref: Sample 1
Project reference:		Loc. ref.:	Brightstar Gold Mine	

Specimen description:				(Based on visual and tactile assessment)				Sampling: Tested as received					
PARTICLE SIZE DISTRIBUTION				AS 1289.3.6.1	(GC/GM) Clayey/Silty GRAVEL, with sand, fine to medium grained, grey, high plasticity, fine to coarse grained sand				Easting (m)	Northing (m)	Level (m)		
Sieve Size	Passing	LB S	UB S										
125 mm	100%			Standard:	AS 1289.2.1.1	AS 1289.3.9.1	AS 1289.3.2.1	AS 1289.3.3.1	AS 1289.3.4.1		AS 1289.3.5.1		
75 mm	100%			Test:	Moisture content	Cone Liquid limit	Plastic limit	Plasticity index	Linear shrinkage	Curling/ Crumbling/ Cracking	Particle density (t/m³)		
63 mm	100%												
53 mm	100%			Result:	9.2% As Rcvd.	59%	31%	28%	8.0%	Curling	2.59 Measured		
37.5 mm	100%												
26.5 mm	100%			LB S:							LSM length	-2.36mm fraction	
19 mm	100%			UB S:							125 mm		
13.2 mm	90%			Specimen history/notes:							PSD preparation method		
9.5 mm	83%										Dry sieved		
6.7 mm	76%			Hydrometer:	Loss on pre-treatment: n/a			Dispersant: Sodium Hexametaphosphate					
4.75 mm	67%				LB S = Lower bound specification			n/a = Not applicable		NP = Non plastic			
2.36 mm	55%			Definitions:	LSM = Linear shrinkage mould			ND = Not determined		SIB = Slipping In Bowl			
1.18 mm	44%				UB S = Upper bound specification			NO = Not obtainable					
600 µm	37%			GRADING SUMMARY									
425 µm	34%			Clay*	Silt*	Fines	Sand*	Gravel*	Cobbles*				
300 µm	32%			(<2 µm)	(>2 µm - <75 µm)	(<75 µm)	(>75 µm - <2 mm)	(>2 mm - <60 mm)	(>60 mm - <200 mm)				
212 µm	30%			7.4%	18.1%	25.5%	29.2%	45.3%	0.0%				
150 µm	28%			Hydrometer type = ASTM			*Proportions based on linear interpolation between sieve/particle of nearest size and smaller						
75 µm	25%												



Testing performed by:		AA	Results reviewed by:		SLenihan	Date reported:		22/11/2024
Cert. ref.:	PS205718_Waste Dump_STRP24-0191_CLSF_s2411080_Rep24117540					Approved signatory:		
	NATA accreditation number: 1961 - Site:1598 - Perth							
	Accredited for compliance with ISO/IEC 17025 - Testing							
	THIS DOCUMENT SHALL ONLY BE REPRODUCED IN FULL							
Phone: +61 (0)8 9441 0700		Fax: +61 (0)8 9441 0701		E-mail:				
						Web:		www.wsp.com

Phone: +61 (0)8 9441 0700

Fax: +61 (0)8 9441 0701

E-mail:

Web:

www.wsp.com

These tests were carried out in accordance with the Australian standards identified in this certificate.
Test results relate only to the specimens tested.

Rep Combined PSD Hydro - RL24

Soils testing - Report of Emerson class number

Soil classification

AS 1289.3.8.1-2017

Test request ID:

STRP24-0191

Specimen ID:

LPER202411080

WSP Australia Pty Ltd

Client:

Brightstar Resources

PERTH GEOTECHNICAL LABORATORY

Client address:

Level 2, 36 Rowland Street

780 Marshall Road,

Malaga,

Western Australia 6090

Project ID:

PS205718

Exploratory Hole

Sample depth (m): 0.00 - 0.00

Project name:

Brightstar Gold Mine TSF Options

Waste Dump

Client sample ref: Sample 1

Project reference:

Loc. ref.:

Brightstar Gold Mine

Specimen
description: GREY

Sampling co-ordinates
Easting (m) Northing (m) Reduced
Level

TEST REPORT - SUMMARY OF ANALYSIS

Visual reference



Date sampled: Unknown - tested as rcvd.

Date tested: 15/11/24 8:00

Temperature (°C): 21.0°

Type of water used: Demineralised

Observations / Notes

Emerson class number

Class 2

Emerson Class

Definition / Notes

Class 1

Air-dried crumbs of soil show a strong dispersing reaction, i.e., a colloidal cloud covers nearly the whole of the bottom of the beaker, usually in a very thin layer. The reaction should be evident within 10 minutes. In extreme cases all the water in the beaker becomes cloudy, leaving only a coarse residue in a cloud of clay.

Class 2

If a recognisable cloud of colloids in solution spreads as a thin streak on the bottom of the beaker (moderate dispersion) or there is a bare hint of a cloud in the water on the surface of the crumb (slight dispersion), classify the soil as Class 2. NOTE: If the soil does not disperse after two hours move to next stage to assess for Class 3 and above.

Class 3

The soil remoulded at the plastic limit disperses in water.

Class 4

The remoulded soil does not disperse in water. Calcium carbonate (calcite) or calcium sulfate (gypsum) is present.

Class 5

The remoulded soil does not disperse in water and the 1:5 soil/water suspension remains dispersed after 10 minutes.

Class 6

The remoulded soil does not disperse in water and the 1:5 soil/water suspension begins to flocculate within 10 minutes.

Class 7

The air-dried crumbs of soil remain coherent in water and swell.

Class 8

The air-dried crumbs of soil remain coherent in water and do not swell.

Definitions:

ND = Not determined

Result reviewed by:

SLenihan

Test performed by:

sw

Date reported:

22/11/2024

Cert. ref.: PS205718_STRP24-0191_Emerson_LPER202411080_R117545

Approved signatory:



NATA accreditation number: 1961 - Site:1598 - Perth
Accredited for compliance with ISO/IEC 17025 - Testing

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Soils testing - Particle size distribution (PSD) & consistency limits

Standard method (by sieving) with hydrometer follow on

AS 1289.3.6.1, 3.6.3, 2.1.1, 3.1.1, 3.2.1, 3.3.1 & 3.4.1

Test request #:

STRP24-0191

Specimen ID:

LPER202411220

WSP Australia Pty Ltd

Client:

Brightstar Resources

PERTH GEOTECHNICAL LABORATORY

Client address:

Level 2, 36 Rowland Street

780 Marshall Road,

Malaga,

Western Australia 6090

Project ID:

PS205718

Exploratory Hole

Project name:

Brightstar Gold Mine TSF Options

Waste Dump

Sample depth (m): 0.00 - 0.00

Client sample ref: Sample 2

Project reference:

Loc. ref.:

Brightstar Gold Mine

Specimen description:

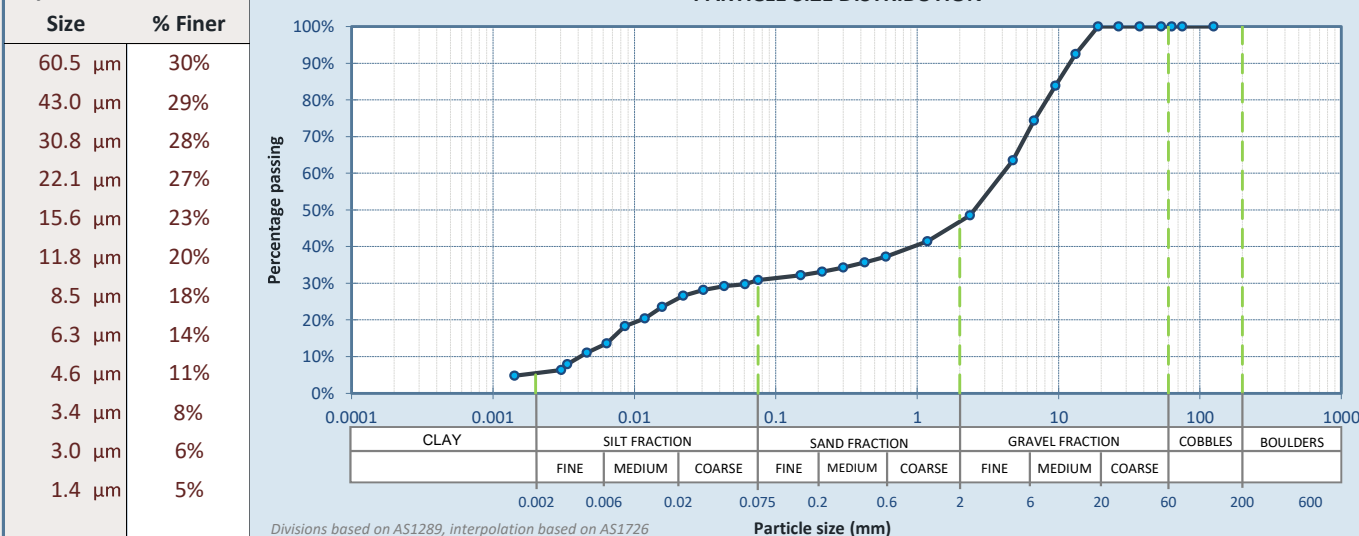
(Based on visual and tactile assessment)

Sampling: Tested as received

PARTICLE SIZE DISTRIBUTION				AS 1289.3.6.1	(GC) Clayey GRAVEL, with sand, fine to medium grained, brown, medium plasticity, fine to coarse grained sand				Easting (m)		Northing (m)		Level (m)				
Sieve Size	Passing	LB S	UB S														
125 mm	100%			Standard:	AS 1289.2.1.1		AS 1289.3.1.1	AS 1289.3.2.1	AS 1289.3.3.1	AS 1289.3.4.1			AS 1289.3.5.1				
75 mm	100%			Test:	Moisture content	4 point Liquid limit	Plastic limit	Plasticity index	Linear shrinkage	Curling/ Crumbling/ Cracking	Particle density (t/m³)						
63 mm	100%				Result:	7.5% As Rcvd.	50%	27%	23%	7.0%	Curling	2.59 Measured					
53 mm	100%			LB S:								LSM length	-2.36mm fraction				
37.5 mm	100%				UB S:							125 mm					
26.5 mm	100%			Specimen history/notes:										PSD preparation method			
19 mm	100%				Hydrometer:									Dry sieved			
13.2 mm	93%			Definitions:		Loss on pre-treatment: n/a		Dispersant: Sodium Hexametaphosphate									
9.5 mm	84%				LB S = Lower bound specification				n/a = Not applicable		NP = Non plastic						
6.7 mm	74%			LSM = Linear shrinkage mould				ND = Not determined		SIB = Slipping In Bowl							
4.75 mm	64%			UB S = Upper bound specification				NO = Not obtainable									
2.36 mm	48%			GRADING SUMMARY													
1.18 mm	41%			Clay* (<2 µm)		Silt* (>2 µm - <75 µm)		Fines (<75 µm)		Sand* (>75 µm - <2 mm)		Gravel* (>2 mm - <60 mm)		Cobbles* (>60 mm - <200 mm)			
600 µm	37%			5.3%		25.6%		30.9%		17.6%		51.5%		0.0%			
425 µm	36%			Hydrometer type = ASTM				*Proportions based on linear interpolation between sieve/particle of nearest size and smaller									
300 µm	34%																
212 µm	33%																
150 µm	32%																
75 µm	31%																

Hydrometer AS 1289.3.6.3

PARTICLE SIZE DISTRIBUTION



Testing performed by:

AA

Results reviewed by:

Slenihan

Date reported:

22/11/2024

Cert. ref.: PS205718_Waste Dump_STRP24-0191_CLSF_s2411220_Rep24117541

Approved signatory:



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Rep Combined PSD Hydro - RL24

Soils testing - Report of Emerson class number

Soil classification

AS 1289.3.8.1-2017

Test request ID:

STRP24-0191

Specimen ID:

LPER202411220

WSP Australia Pty Ltd

Client:

Brightstar Resources

PERTH GEOTECHNICAL LABORATORY

Client address:

Level 2, 36 Rowland Street

780 Marshall Road,

Malaga,

Western Australia 6090

Project ID:

PS205718

Exploratory Hole

Sample depth (m): 0.00 - 0.00

Project name:

Brightstar Gold Mine TSF Options

Waste Dump

Client sample ref: Sample 2

Project reference:

Loc. ref.:

Brightstar Gold Mine

Specimen
description: BROWN

Sampling co-ordinates
Easting (m) Northing (m) Reduced
Level

TEST REPORT - SUMMARY OF ANALYSIS

Visual reference



Date sampled: Unknown - tested as rcvd.

Date tested: 15/11/24 8:02

Temperature (°C): 21.0°

Type of water used: Demineralised

Observations / Notes

Emerson class number

Class 3

Emerson Class

Definition / Notes

Class 1

Air-dried crumbs of soil show a strong dispersing reaction, i.e., a colloidal cloud covers nearly the whole of the bottom of the beaker, usually in a very thin layer. The reaction should be evident within 10 minutes. In extreme cases all the water in the beaker becomes cloudy, leaving only a coarse residue in a cloud of clay.

Class 2

If a recognisable cloud of colloids in solution spreads as a thin streak on the bottom of the beaker (moderate dispersion) or there is a bare hint of a cloud in the water on the surface of the crumb (slight dispersion), classify the soil as Class 2. NOTE: If the soil does not disperse after two hours move to next stage to assess for Class 3 and above.

Class 3

The soil remoulded at the plastic limit disperses in water.

Class 4

The remoulded soil does not disperse in water. Calcium carbonate (calcite) or calcium sulfate (gypsum) is present.

Class 5

The remoulded soil does not disperse in water and the 1:5 soil/water suspension remains dispersed after 10 minutes.

Class 6

The remoulded soil does not disperse in water and the 1:5 soil/water suspension begins to flocculate within 10 minutes.

Class 7

The air-dried crumbs of soil remain coherent in water and swell.

Class 8

The air-dried crumbs of soil remain coherent in water and do not swell.

Definitions:

ND = Not determined

Result reviewed by:

Test performed by: sw

Date reported: 22/11/2024

Cert. ref.: PS205718_STRP24-0191_Emerson_LPER202411220_R117546

Approved signatory:



NATA accreditation number: 1961 - Site:1598 - Perth

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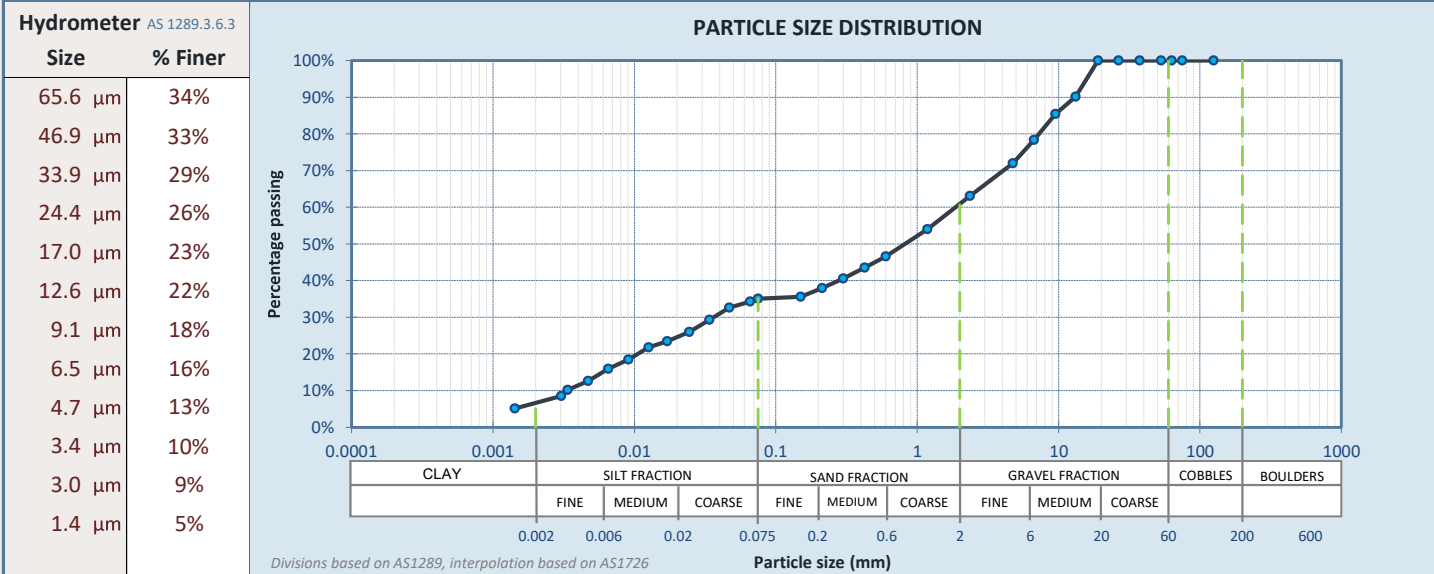
Soils testing - Particle size distribution (PSD) & consistency limits

Standard method (by sieving) with hydrometer follow on

AS 1289.3.6.1, 3.6.3, 2.1.1, 3.9.1, 3.2.1, 3.3.1 & 3.4.1

Test request #:	STRP24-0191	Specimen ID:	LPER202411082	WSP Australia Pty Ltd
Client:	Brightstar Resources			PERTH GEOTECHNICAL LABORATORY
Client address:	Level 2, 36 Rowland Street			780 Marshall Road, Malaga, Western Australia 6090
Project ID:	PS205718	Exploratory Hole		Sample depth (m): 0.00 - 0.00
Project name:	Brightstar Gold Mine TSF Options	Waste Dump		Client sample ref: Sample 3
Project reference:		Loc. ref.:		Brightstar Gold Mine

Specimen description:				Sampling: Tested as received			
PARTICLE SIZE DISTRIBUTION				(Based on visual and tactile assessment)			
Sieve Size	Passing	LB S	UB S	AS 1289.3.6.1	Eastings (m)	Northing (m)	Level (m)
125 mm	100%			(ML) Gravelly SILT, with sand, medium plasticity, brown, fine to medium grained gravel, fine to coarse grained sand			
75 mm	100%			Standard: AS 1289.2.1.1 AS 1289.3.9.1 AS 1289.3.2.1 AS 1289.3.3.1			
63 mm	100%			Test: Moisture content			
53 mm	100%			Cone Liquid limit			
37.5 mm	100%			Plastic limit			
26.5 mm	100%			Plasticity index			
19 mm	100%			Linear shrinkage			
13.2 mm	90%			Curling/ Crumbling/ Cracking			
9.5 mm	85%			Particle density (t/m ³)			
6.7 mm	78%			Result: 7.8% As Rcvd.			
4.75 mm	72%			40%			
2.36 mm	63%			29%			
1.18 mm	54%			11%			
600 µm	47%			2.5%			
425 µm	43%			None			
300 µm	41%			2.62			
212 µm	38%			Measured			
150 µm	36%			-2.36mm fraction			
75 µm	35%			LSM length 125 mm			
				PSD preparation method			
				Dry sieved			
				Hydrometer: Loss on pre-treatment: n/a			
				Dispersant: Sodium Hexametaphosphate			
				Definitions: LB S = Lower bound specification			
				n/a = Not applicable			
				NP = Non plastic			
				LSM = Linear shrinkage mould			
				ND = Not determined			
				SIB = Slipping In Bowl			
				UB S = Upper bound specification			
				NO = Not obtainable			
GRADING SUMMARY							
Clay*	Silt*	Fines	Sand*	Gravel*	Cobbles*		
(<2 µm)	(>2 µm - <75 µm)	(<75 µm)	(>75 µm - <2 mm)	(>2 mm - <60 mm)	(>60 mm - <200 mm)		
6.3%	28.7%	35.1%	28.0%	36.9%	0.0%		
Hydrometer type = ASTM				*Proportions based on linear interpolation between sieve/particle of nearest size and smaller			



Testing performed by:		AA	Results reviewed by:		SLenihan	Date reported:		22/11/2024
Cert. ref.:		PS205718_Waste Dump_STRP24-0191_CLSF_s2411082_Rep24117542						
	NATA accreditation number: 1961 - Site:1598 - Perth							
	Accredited for compliance with ISO/IEC 17025 - Testing							
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These tests were carried out in accordance with the Australian standards identified in this certificate.
Test results relate only to the specimens tested.

Rep Combined PSD Hydro - RL24

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Soils testing - Report of Emerson class number

Soil classification

AS 1289.3.8.1-2017

Test request ID:

STRP24-0191

Specimen ID:

LPER202411082

WSP Australia Pty Ltd

Client:

Brightstar Resources

PERTH GEOTECHNICAL LABORATORY

Client address:

Level 2, 36 Rowland Street

780 Marshall Road,

Malaga,

Western Australia 6090

Project ID:

PS205718

Exploratory Hole

Sample depth (m): 0.00 - 0.00

Project name:

Brightstar Gold Mine TSF Options

Waste Dump

Client sample ref: Sample 3

Project reference:

Loc. ref.:

Brightstar Gold Mine

Specimen description: BROWN

Sampling co-ordinates
Easting (m) Northing (m) Reduced Level

TEST REPORT - SUMMARY OF ANALYSIS

Visual reference



Date sampled: Unknown - tested as rcvd.

Date tested: 18/11/24

Temperature (°C): 21.0°

Type of water used: Demineralised

Observations / Notes

Slight reaction to Barium Chloride.

Emerson class number

Class 4

Emerson Class

Definition / Notes

Class 1

Air-dried crumbs of soil show a strong dispersing reaction, i.e., a colloidal cloud covers nearly the whole of the bottom of the beaker, usually in a very thin layer. The reaction should be evident within 10 minutes. In extreme cases all the water in the beaker becomes cloudy, leaving only a coarse residue in a cloud of clay.

Class 2

If a recognisable cloud of colloids in solution spreads as a thin streak on the bottom of the beaker (moderate dispersion) or there is a bare hint of a cloud in the water on the surface of the crumb (slight dispersion), classify the soil as Class 2. NOTE: If the soil does not disperse after two hours move to next stage to assess for Class 3 and above.

Class 3

The soil remoulded at the plastic limit disperses in water.

Class 4

The remoulded soil does not disperse in water. Calcium carbonate (calcite) or calcium sulfate (gypsum) is present.

Class 5

The remoulded soil does not disperse in water and the 1:5 soil/water suspension remains dispersed after 10 minutes.

Class 6

The remoulded soil does not disperse in water and the 1:5 soil/water suspension begins to flocculate within 10 minutes.

Class 7

The air-dried crumbs of soil remain coherent in water and swell.

Class 8

The air-dried crumbs of soil remain coherent in water and do not swell.

Definitions:

ND = Not determined

Result reviewed by:

SLenihan

Test performed by:

sw

Date reported:

22/11/2024

Cert. ref.: PS205718_STRP24-0191_Emerson_LPER202411082_R117547

Approved signatory:



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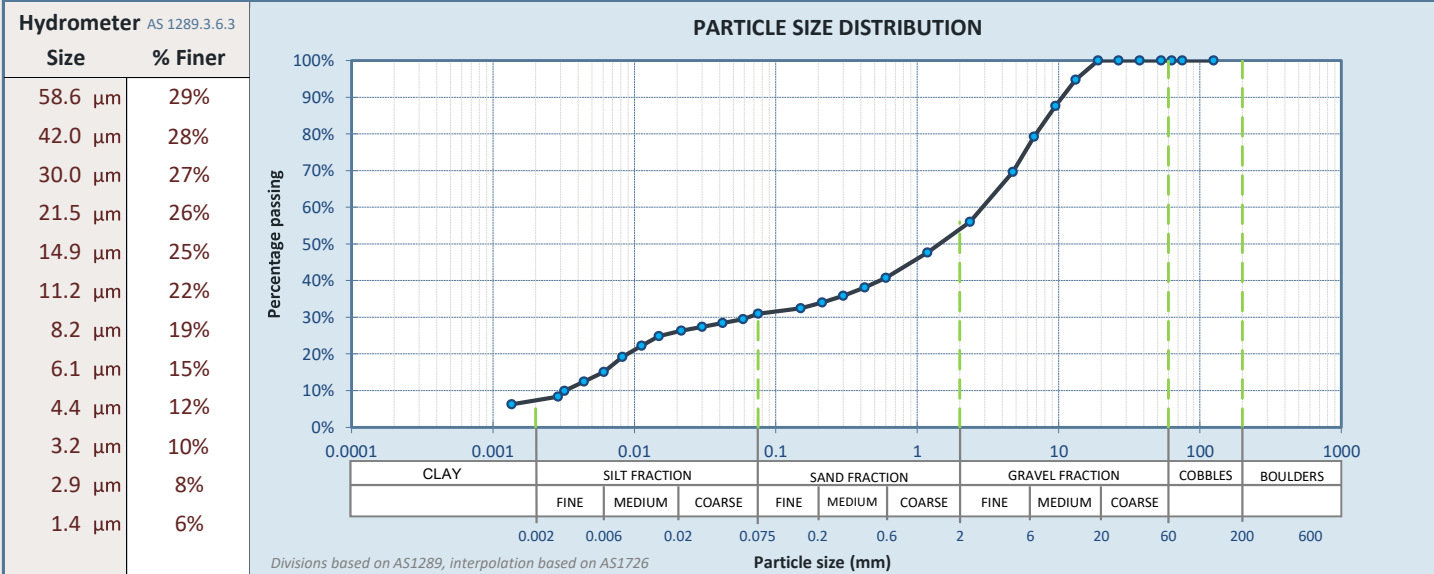
Soils testing - Particle size distribution (PSD) & consistency limits

Standard method (by sieving) with hydrometer follow on

AS 1289.3.6.1, 3.6.3, 2.1.1, 3.9.1, 3.2.1, 3.3.1 & 3.4.1

Test request #:	STRP24-0191	Specimen ID:	LPER202411083	WSP Australia Pty Ltd
Client:	Brightstar Resources			PERTH GEOTECHNICAL LABORATORY
Client address:	Level 2, 36 Rowland Street			780 Marshall Road, Malaga, Western Australia 6090
Project ID:	PS205718	Exploratory Hole		Sample depth (m): 0.00 - 0.00
Project name:	Brightstar Gold Mine TSF Options	Waste Dump		Client sample ref: Sample 4
Project reference:		Loc. ref.:		Brightstar Gold Mine

Specimen description:				(Based on visual and tactile assessment)				Sampling: Tested as received			
PARTICLE SIZE DISTRIBUTION				AS 1289.3.6.1	(GC) Clayey GRAVEL, with sand, fine to medium grained, grey, high plasticity, fine to coarse grained sand				Easting (m)	Northing (m)	Level (m)
Sieve Size	Passing	LB S	UB S								
125 mm	100%			Standard:	AS 1289.2.1.1	AS 1289.3.9.1	AS 1289.3.2.1	AS 1289.3.3.1	AS 1289.3.4.1		AS 1289.3.5.1
75 mm	100%			Test:	Moisture content	Cone Liquid limit	Plastic limit	Plasticity index	Linear shrinkage	Curling/ Crumbling/ Cracking	Particle density (t/m³)
63 mm	100%				Result:	7.7% As Rcvd.	53%	28%	25%	5.5%	Cracking
53 mm	100%			LB S:						LSM length	-2.36mm fraction
37.5 mm	100%			UB S:						125 mm	
26.5 mm	100%			Specimen history/notes:						PSD preparation method	
19 mm	100%									Dry sieved	
13.2 mm	95%			Hydrometer:	Loss on pre-treatment: n/a			Dispersant: Sodium Hexametaphosphate			
9.5 mm	88%			Definitions:	LB S = Lower bound specification			n/a = Not applicable		NP = Non plastic	
6.7 mm	79%				LSM = Linear shrinkage mould			ND = Not determined		SIB = Slipping In Bowl	
4.75 mm	70%				UB S = Upper bound specification			NO = Not obtainable			
2.36 mm	56%			GRADING SUMMARY							
1.18 mm	48%			Clay*	Silt*	Fines	Sand*	Gravel*	Cobbles*		
600 µm	41%			(<2 µm)	(>2 µm - <75 µm)	(<75 µm)	(>75 µm - <2 mm)	(>2 mm - <60 mm)	(>60 mm - <200 mm)		
425 µm	38%			7.1%	23.8%	31.0%	25.1%	44.0%	0.0%		
300 µm	36%			Hydrometer type = ASTM			*Proportions based on linear interpolation between sieve/particle of nearest size and smaller				
212 µm	34%										
150 µm	32%										
75 µm	31%										



Testing performed by:		AA	Results reviewed by:		SLenihan	Date reported:		22/11/2024
Cert. ref.:	PS205718_Waste Dump_STRP24-0191_CLSF_s2411083_Rep24117543					Approved signatory:		
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These tests were carried out in accordance with the Australian standards identified in this certificate.
Test results relate only to the specimens tested.

Soils testing - Report of Emerson class number

Soil classification

AS 1289.3.8.1-2017

Test request ID:

STRP24-0191

Specimen ID:

LPER202411083

WSP Australia Pty Ltd

Client:

Brightstar Resources

PERTH GEOTECHNICAL LABORATORY

Client address:

Level 2, 36 Rowland Street

780 Marshall Road,

Malaga,

Western Australia 6090

Project ID:

PS205718

Exploratory Hole

Sample depth (m): 0.00 - 0.00

Project name:

Brightstar Gold Mine TSF Options

Waste Dump

Client sample ref: Sample 4

Project reference:

Loc. ref.:

Brightstar Gold Mine

Specimen
description: grey

Sampling co-ordinates
Easting (m) Northing (m) Reduced
Level

TEST REPORT - SUMMARY OF ANALYSIS

Visual reference



Date sampled: Unknown - tested as rcvd.

Date tested: 18/11/24

Temperature (°C): 21.0°

Type of water used: Demineralised

Observations / Notes

Strong reaction to Barium Chloride.

Emerson class number

Class 4

Emerson Class

Definition / Notes

Class 1

Air-dried crumbs of soil show a strong dispersing reaction, i.e., a colloidal cloud covers nearly the whole of the bottom of the beaker, usually in a very thin layer. The reaction should be evident within 10 minutes. In extreme cases all the water in the beaker becomes cloudy, leaving only a coarse residue in a cloud of clay.

Class 2

If a recognisable cloud of colloids in solution spreads as a thin streak on the bottom of the beaker (moderate dispersion) or there is a bare hint of a cloud in the water on the surface of the crumb (slight dispersion), classify the soil as Class 2. NOTE: If the soil does not disperse after two hours move to next stage to assess for Class 3 and above.

Class 3

The soil remoulded at the plastic limit disperses in water.

Class 4

The remoulded soil does not disperse in water. Calcium carbonate (calcite) or calcium sulfate (gypsum) is present.

Class 5

The remoulded soil does not disperse in water and the 1:5 soil/water suspension remains dispersed after 10 minutes.

Class 6

The remoulded soil does not disperse in water and the 1:5 soil/water suspension begins to flocculate within 10 minutes.

Class 7

The air-dried crumbs of soil remain coherent in water and swell.

Class 8

The air-dried crumbs of soil remain coherent in water and do not swell.

Definitions:

ND = Not determined

Result reviewed by:

Slenihan

Test performed by:

sw

Date reported:

22/11/2024

Cert. ref.: PS205718_STRP24-0191_Emerson_LPER202411083_R117548

Approved signatory:



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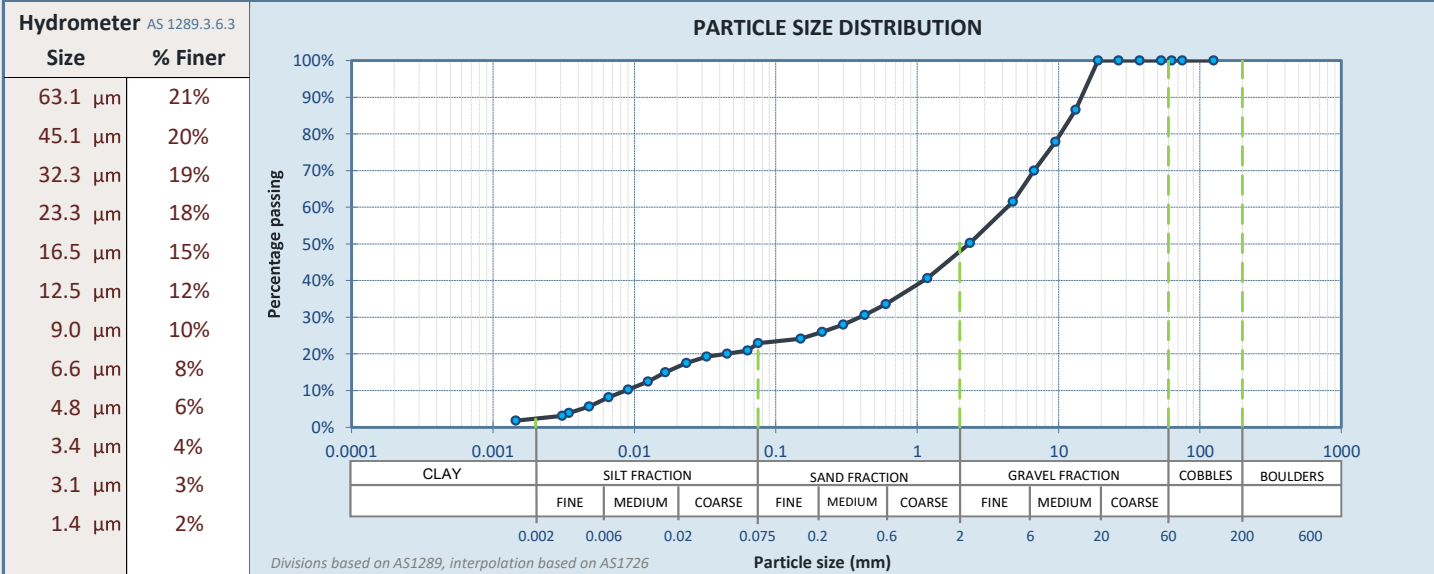
Soils testing - Particle size distribution (PSD) & consistency limits

Standard method (by sieving) with hydrometer follow on

AS 1289.3.6.1, 3.6.3, 2.1.1, 3.9.1, 3.2.1 & 3.4.1

Test request #:	STRP24-0191	Specimen ID:	LPER202411084	WSP Australia Pty Ltd
Client:	Brightstar Resources			PERTH GEOTECHNICAL LABORATORY
Client address:	Level 2, 36 Rowland Street			780 Marshall Road, Malaga, Western Australia 6090
Project ID:	PS205718	Exploratory Hole		Sample depth (m): 0.00 - 0.00
Project name:	Brightstar Gold Mine TSF Options	Waste Dump		Client sample ref: Sample 5
Project reference:		Loc. ref.:		Brightstar Gold Mine

Specimen description:				Sampling: Tested as received			
PARTICLE SIZE DISTRIBUTION				(Based on visual and tactile assessment)			
Sieve Size	Passing	LB S	UB S	AS 1289.3.6.1	Eastings (m)	Northing (m)	Level (m)
125 mm	100%			Standard:	AS 1289.2.1.1	AS 1289.3.9.1	AS 1289.3.2.1
75 mm	100%				AS 1289.3.3.1	AS 1289.3.4.1	AS 1289.3.5.1
63 mm	100%			Test:	Moisture content	Cone Liquid limit	Plastic limit
53 mm	100%				Plasticity index	Linear shrinkage	Curling/ Crumbling/ Cracking
37.5 mm	100%			Result:	0.3%	34%	NP
26.5 mm	100%				As Rcvd.	1.0%	None
19 mm	100%			LB S:		LSM length	2.60
13.2 mm	87%			UB S:		125 mm	Measured
9.5 mm	78%			Specimen history/notes:			PSD preparation method
6.7 mm	70%			Hydrometer:			Dry sieved
4.75 mm	61%			Loss on pre-treatment: n/a			Dispersant: Sodium Hexametaphosphate
2.36 mm	50%			Definitions:			LB S = Lower bound specification
1.18 mm	41%			LSM = Linear shrinkage mould			n/a = Not applicable
600 µm	34%			UB S = Upper bound specification			NP = Non plastic
425 µm	31%			GRADING SUMMARY			SIB = Slipping In Bowl
300 µm	28%			Clay*	Silt*	Fines	Sand*
212 µm	26%			(<2 µm)	(>2 µm - <75 µm)	(<75 µm)	(>75 µm - <2 mm)
150 µm	24%			2.2%	20.7%	22.9%	27.3%
75 µm	23%						49.8%
							0.0%
				Hydrometer type = ASTM			
				*Proportions based on linear interpolation between sieve/particle of nearest size and smaller			



Testing performed by:		AA	Results reviewed by:		SLenihan	Date reported:		22/11/2024
Cert. ref.:	PS205718_Waste Dump_STRP24-0191_CLSF_s2411084_Rep117544_2					Approved signatory:		
	NATA accreditation number: 1961 - Site:1598 - Perth							
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Test results relate only to the specimens tested.

Rep Combined PSD Hydro - RL24

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Soils testing - Report of Emerson class number

Soil classification

AS 1289.3.8.1-2017

Test request ID:

STRP24-0191

Specimen ID:

LPER202411084

WSP Australia Pty Ltd

Client:

Brightstar Resources

PERTH GEOTECHNICAL LABORATORY

Client address:

Level 2, 36 Rowland Street

780 Marshall Road,

Malaga,

Western Australia 6090

Project ID:

PS205718

Exploratory Hole

Project name:

Brightstar Gold Mine TSF Options

Waste Dump

Sample depth (m): 0.00 - 0.00

Client sample ref: Sample 5

Project reference:

Loc. ref.:

Brightstar Gold Mine

Specimen
description: WHITE

Sampling co-ordinates
Easting (m) Northing (m) Reduced
Level

TEST REPORT - SUMMARY OF ANALYSIS

Visual reference



Date sampled: Unknown - tested as rcvd.

Date tested: 18/11/24

Temperature (°C): 21.0°

Type of water used: Demineralised

Observations / Notes

Emerson class number

Class 5

Emerson Class

Definition / Notes

Class 1

Air-dried crumbs of soil show a strong dispersing reaction, i.e., a colloidal cloud covers nearly the whole of the bottom of the beaker, usually in a very thin layer. The reaction should be evident within 10 minutes. In extreme cases all the water in the beaker becomes cloudy, leaving only a coarse residue in a cloud of clay.

Class 2

If a recognisable cloud of colloids in solution spreads as a thin streak on the bottom of the beaker (moderate dispersion) or there is a bare hint of a cloud in the water on the surface of the crumb (slight dispersion), classify the soil as Class 2. NOTE: If the soil does not disperse after two hours move to next stage to assess for Class 3 and above.

Class 3

The soil remoulded at the plastic limit disperses in water.

Class 4

The remoulded soil does not disperse in water. Calcium carbonate (calcite) or calcium sulfate (gypsum) is present.

Class 5

The remoulded soil does not disperse in water and the 1:5 soil/water suspension remains dispersed after 10 minutes.

Class 6

The remoulded soil does not disperse in water and the 1:5 soil/water suspension begins to flocculate within 10 minutes.

Class 7

The air-dried crumbs of soil remain coherent in water and swell.

Class 8

The air-dried crumbs of soil remain coherent in water and do not swell.

Definitions:

ND = Not determined

Result reviewed by:

Slenihan

Test performed by:

sw

Date reported:

22/11/2024

Cert. ref.: PS205718_STRP24-0191_Emerson_LPER202411084_R117549

Approved signatory:



NATA accreditation number: 1961 - Site:1598 - Perth
Accredited for compliance with ISO/IEC 17025 - Testing

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E-mail:

Web:

www.wsp.com

Soils testing - Determination of the dry density moisture relationship

Standard compaction method

AS 1289.5.1.1-2017

Test request ID:	STRP24-0191	Specimen ID:	LPER202411132	WSP Australia Pty Ltd	
Client:	Brightstar Resources	PERTH GEOTECHNICAL LABORATORY			
Client address:		780 Marshall Road, Malaga, Western Australia 6090			
Project ID:	PS205718	Exploratory Hole		Sample depth (m): -	
Project name:	Brightstar Gold Mine TSF Options	Waste Dump		Client sample ref: Sample 1,2 & 3 combined	
Project reference:		Loc. ref.:		Brightstar Gold Mine	

Specimen description: Clayey GRAVEL, with sand, brown.

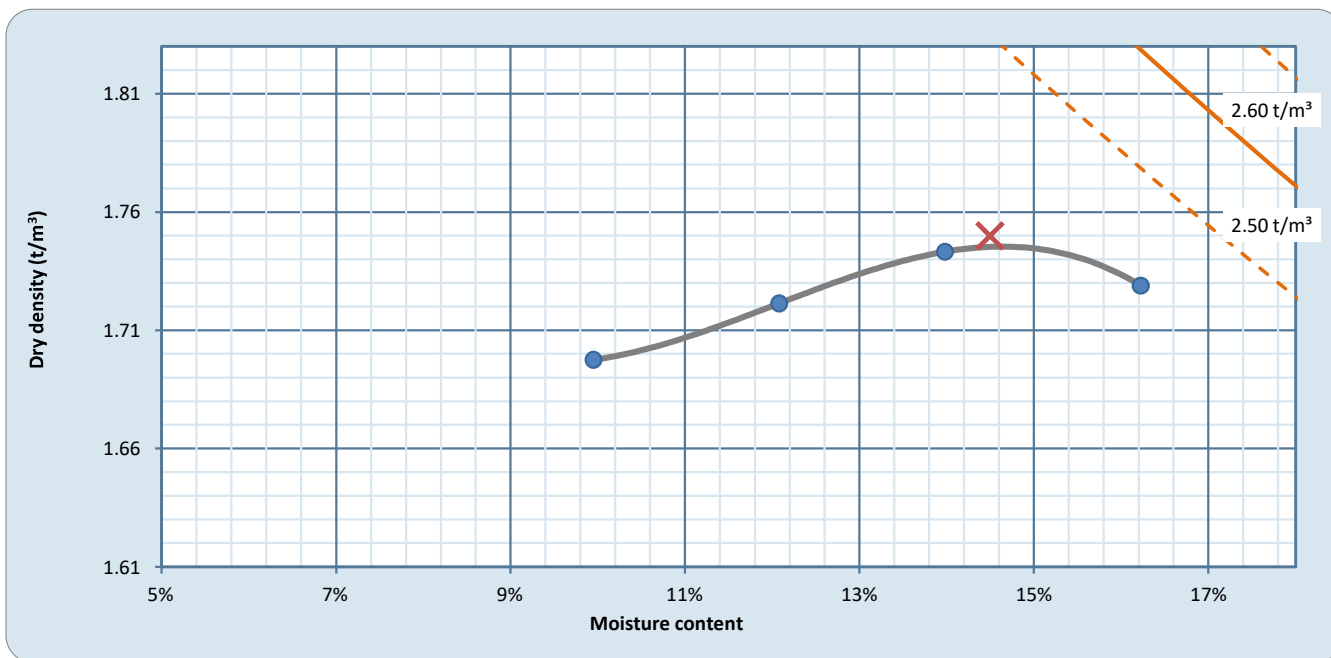
Sampling co-ordinates
Easting (m) Northing (m) Reduced Level

SPECIMEN PREPARATION & CURING COMPLIANCE

Material type	Liquid Limit			Moisture content:	7.9%	AS 1289 2.1.1-2005
Granular	Measured:	Assumed:	Adopted:	Field		
	Curing times are compliant			Cure:	44.75 hrs	Portion test performed on: -19 mm

TEST REPORT - COMPACTION RESULTS

	Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Oversize material - (by wet mass)	
Dry density (t/m ³):	1.74	1.73	1.72	1.70			No oversize correction required	+19 mm: 0%
Moisture content:	14.0%	16.2%	12.1%	10.0%				+37.5 mm: No oversize material present



Notes:

Standard maximum dry density (t/m³):
Standard optimum moisture content:

Result	Adjusted for oversize
1.75	
14.5%	

Specimens prepared by: Tests performed by: SL Date tested: 15/11/2024
Definition: ND = Not Determined Results reviewed by: PKent Date reported: 27/11/2024

Cert. ref.:	PS205718_Waste Dump_STRP24-0191_StndComp_s2411132_Rep24117673	Approved signatory:
	NATA accreditation number: 1961 - Site:1598 - Perth Accredited for compliance with ISO/IEC 17025 - Testing	
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Phone: +61 (0)8 9441 0700 Fax: +61 (0)8 9441 0701 E-mail:

Soils testing - Determination of the dry density moisture relationship

Standard compaction method

AS 1289.5.1.1-2017

Test request ID:	STRP24-0191	Specimen ID:	LPER202411133	WSP Australia Pty Ltd	
Client:	Brightstar Resources	PERTH GEOTECHNICAL LABORATORY			
Client address:		780 Marshall Road, Malaga, Western Australia 6090			
Project ID:	PS205718	Exploratory Hole		Sample depth (m): -	
Project name:	Brightstar Gold Mine TSF Options	Waste Dump		Client sample ref: Sample 4 & 5 combined	
Project reference:		Loc. ref.:		Brightstar Gold Mine	

Specimen description: Clayey GRAVEL, with sand, pale brown.

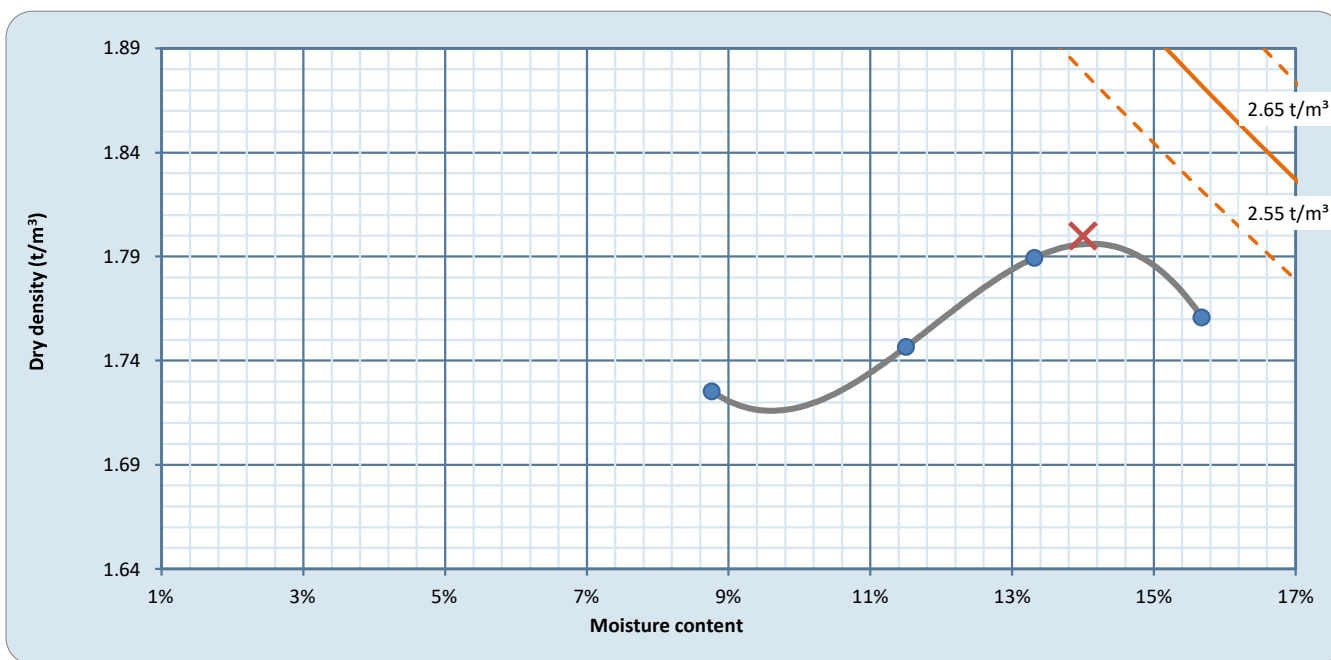
Sampling co-ordinates
Easting (m) Northing (m) Reduced Level

SPECIMEN PREPARATION & CURING COMPLIANCE

Material type	Liquid Limit			Moisture content:	3.0%	AS 1289 2.1.1-2005
Granular	Measured:	Assumed:	Adopted:	Field		
	Curing times are compliant			Cure:	47.5 hrs	Portion test performed on: -19 mm

TEST REPORT - COMPACTION RESULTS

	Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Oversize material - (by wet mass)	
Dry density (t/m ³):	1.75	1.79	1.76	1.73			No oversize correction required	+19 mm: 0%
Moisture content:	11.5%	13.3%	15.7%	8.8%				+37.5 mm: No oversize material present



Notes:

Standard maximum dry density (t/m³):
Standard optimum moisture content:

Result	Adjusted for oversize
1.80	
14.0%	

Specimens prepared by: Tests performed by: SL Date tested: 15/11/2024
Definition: ND = Not Determined Results reviewed by: PKent Date reported: 27/11/2024

Cert. ref.:	PS205718_Waste Dump_STRP24-0191_StndComp_s2411133_Rep24117674	Approved signatory:
	NATA accreditation number: 1961 - Site:1598 - Perth Accredited for compliance with ISO/IEC 17025 - Testing	
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Soil testing - Determination of permeability of a saturated specimen

Falling head method

AS 1289.6.7.2-2001

Test request #:	STRP24-0191	Specimen ID:	LPER202411132	WSP Australia Pty Ltd
Client:	Brightstar Resources			PERTH GEOTECHNICAL LABORATORY
Client address:				780 Marshall Road, Malaga, Western Australia 6090
Project ID:	PS205718	Location ID		
Project name:	Brightstar Gold Mine TSF Options	Waste Dump		Sample depth (m): 0.00 - Client sample ref: Sample 1,2 & 3 combined
Project reference:		Loc. ref.:		

Specimen description: Clayey GRAVEL, with sand, brown.

Purpose:

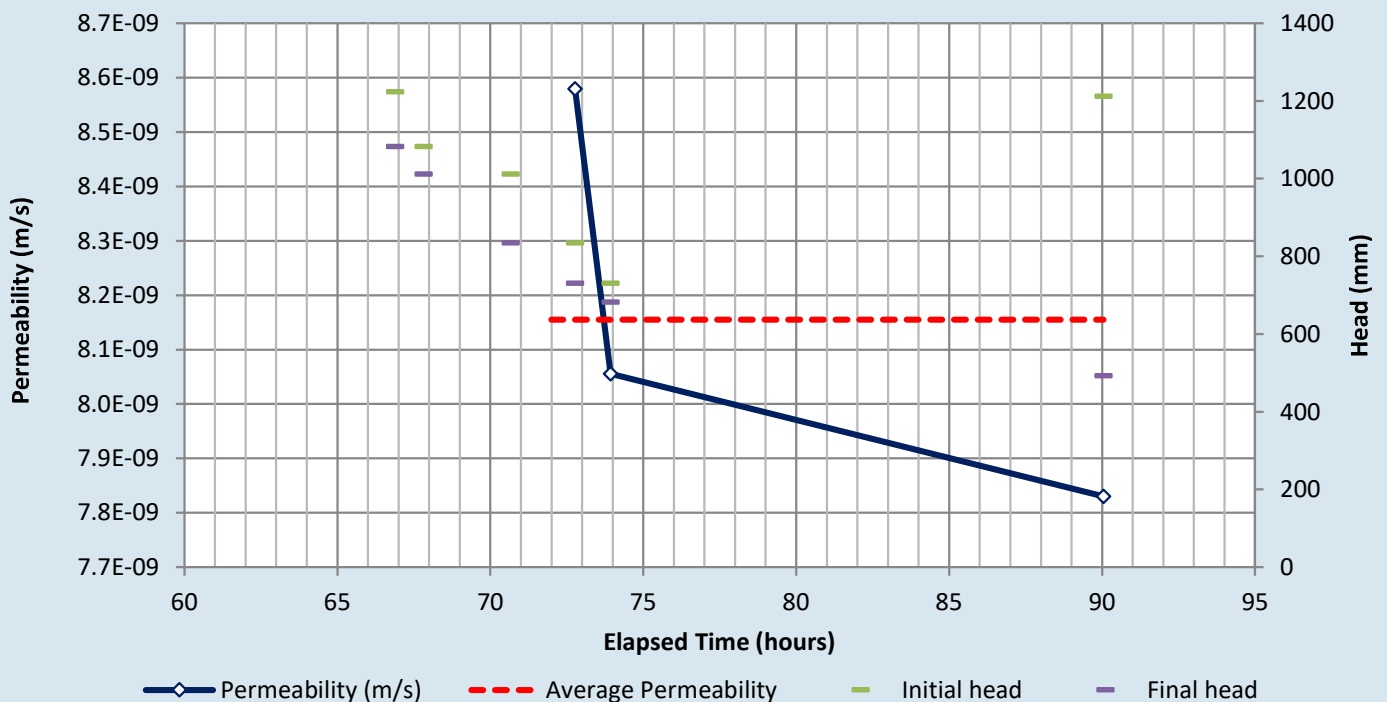
Sample type: D

Specimen before testing

Compaction Details

Height [H] (mm)	115.8	Method:	Standard compaction
Diameter [D] (mm)	101.1	Material retained on 19mm sieve (g):	0.00
[D]:[H]	1:1.15	Optimum Moisture Content:	14.5%
Mass (g)	1772.4	Maximum Dry Density (t/m ³):	1.75
Moisture Content:	14.4%	Target moisture content to OMC:	14.50
Dry Density (t/m ³):	1.67	Target dry density relative to MDD:	1.66
Surcharge Applied [kg] kPa:	2.3 2.6	Laboratory Moisture Ratio:	99.5%
Permeant:	Potable water	Laboratory Density Ratio:	95.0%

Permeability



Permeability: (m/s)

8E-09

Notes: Specimen was prepared to a target density of 95%SMDD

Definitions: Specimen Prepared by: SL
ND = Not Determined Results Reviewed by: PKent

Test Performed by: SL
Date Reported: 27/11/24

Cert. Ref.: PS205718_Waste Dump_2411132_STRP24-0191_FHPm_R24117675

Approved signatory



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Soil testing - Determination of permeability of a saturated specimen

Falling head method

AS 1289.6.7.2-2001

Test request #:	STRP24-0191	Specimen ID:	LPER202411133	WSP Australia Pty Ltd
Client:	Brightstar Resources			PERTH GEOTECHNICAL LABORATORY
Client address:				780 Marshall Road, Malaga, Western Australia 6090
Project ID:	PS205718	Location ID		
Project name:	Brightstar Gold Mine TSF Options	Waste Dump		Sample depth (m): - Client sample ref: Sample 4 & 5 combined
Project reference:		Loc. ref.:		

Specimen description: Clayey GRAVEL, with sand, pale brown.

Purpose:

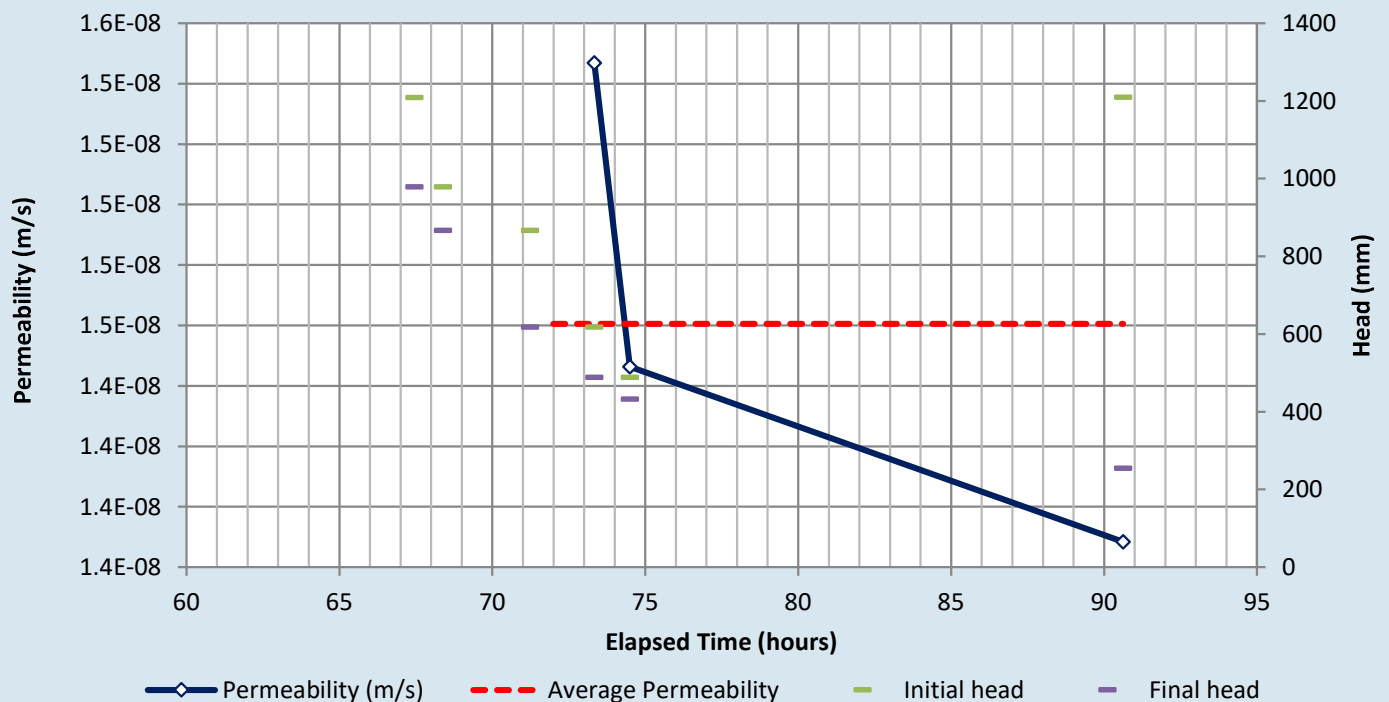
Sample type: D

Specimen before testing

Compaction Details

Height [H] (mm)	115.7	Method:	Standard compaction
Diameter [D] (mm)	99.8	Material retained on 19mm sieve (g):	0.00
[D]:[H]	1:1.16	Optimum Moisture Content:	14.0%
Mass (g)	1764.8	Maximum Dry Density (t/m ³):	1.80
Moisture Content:	14.5%	Target moisture content to OMC:	14.00
Dry Density (t/m ³):	1.70	Target dry density relative to MDD:	1.71
Surcharge Applied [kg] kPa):	2.3 2.6	Laboratory Moisture Ratio:	103.5%
Permeant:	De-aired water	Laboratory Density Ratio:	94.5%

Permeability



Permeability: (m/s)

1E-08

Notes: Specimen was prepared to a target density of 95% SMDD

Definitions: Specimen Prepared by: SL Test Performed by: SL
ND = Not Determined Results Reviewed by: PKent Date Reported: 27/11/24

Cert. Ref.: PS205718_Waste Dump_2411133_STRP24-0191_FHPm_R24117676

Approved signatory



NATA accreditation number: 1961 - Site:1598 - Perth
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Appendix C

Laboratory geochemical testing results





CERTIFICATE OF ANALYSIS

Work Order	: EP2417852	Page	: 1 of 6
Client	: WSP Australia Pty Ltd	Laboratory	: Environmental Division Perth
Contact			
Address			
Telephone			
Project	: PS205718 Brightstar Tailings Management Study	Date Samples Received	: 28-Nov-2024 13:00
Order number	: ----	Date Analysis Commenced	: 29-Nov-2024
C-O-C number	: ----	Issue Date	: 10-Dec-2024 13:04
Sampler			
Site	: Brightstar, Laverton		
Quote number	: EN/000		
No. of samples received	: 5		
No. of samples analysed	: 5		



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories

Position

Accreditation Category



Page : 2 of 6
Work Order : EP2417852
Client : WSP Australia Pty Ltd
Project : PS205718 Brightstar Tailings Management Study

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- ASS: EA029 (SPOCAS): Analysis is performed as per the Acid Sulfate Soils Laboratory Methods Guidelines (2004), 4969.12-2009 Analysis of Acid Sulphate Soil and the updated National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual, Department of Agriculture and Water Resources, Canberra, ACT (2018)
- ASS: EA033 (CRS Suite): Analysis is performed as per the Acid Sulfate Soils Laboratory Methods Guidelines (2004) and the updated National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual, Department of Agriculture and Water Resources, Canberra, ACT (2018)
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA029 (SPOCAS): Laboratory determinations of ANC needs to be corroborated by effectiveness of the measured ANC in relation to incubation ANC. Unless corroborated, the results of ANC testing should be discounted when determining Net Acidity for comparison with action criteria, or for the determination of the acidity hazard and required liming amounts.
- ASS: EA033 (CRS Suite): Laboratory determinations of ANC needs to be corroborated by effectiveness of the measured ANC in relation to incubation ANC. Unless corroborated, the results of ANC testing should be discounted when determining Net Acidity for comparison with action criteria, or for the determination of the acidity hazard and required liming amounts.
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m³ in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m³'.
- ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m³ in-situ soil, multiply reported results x wet bulk density of soil in t/m³.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Sample ID		WD sample 1	WD sample 2	WD sample 3	WD sample 4	WD sample 5
Compound	CAS Number	Sampling date / time		[28-Nov-2024]	[28-Nov-2024]	[28-Nov-2024]	[28-Nov-2024]	[28-Nov-2024]
		LOR	Unit	EP2417852-001	EP2417852-002	EP2417852-003	EP2417852-004	EP2417852-005
				Result	Result	Result	Result	Result
EA009: Net Acid Production Potential								
Net Acid Production Potential	-----	0.5	kg H2SO4/t	-25.7	-84.6	1.4	-23.4	-0.7
EA011: Net Acid Generation								
pH (OX)	-----	0.1	pH Unit	6.5	7.7	6.1	7.8	5.7
NAG (pH 4.5)	-----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	-----	0.1	kg H2SO4/t	11.3	<0.1	7.3	<0.1	19.6
EA013: Acid Neutralising Capacity								
ANC as H2SO4	-----	0.5	kg H2SO4 equiv./t	26.6	85.2	2.6	25.9	0.7
ANC as CaCO3	-----	0.1	% CaCO3	2.7	8.7	0.3	2.6	<0.1
Fizz Rating	-----	0	Fizz Unit	1	2	0	1	0
EA029-A: pH Measurements								
pH KCl (23A)	-----	0.1	pH Unit	7.6	8.4	6.5	7.3	6.6
pH OX (23B)	-----	0.1	pH Unit	8.1	8.7	5.8	8.6	6.3
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	-----	2	mole H+ / t	<2	<2	<2	<2	<2
Titratable Peroxide Acidity (23G)	-----	2	mole H+ / t	<2	<2	5	<2	2
Titratable Sulfidic Acidity (23H)	-----	2	mole H+ / t	<2	<2	5	<2	2
sulfidic - Titratable Actual Acidity (s-23F)	-----	0.020	% pyrite S	<0.020	<0.020	<0.020	<0.020	<0.020
sulfidic - Titratable Peroxide Acidity (s-23G)	-----	0.020	% pyrite S	<0.020	<0.020	<0.020	<0.020	<0.020
sulfidic - Titratable Sulfidic Acidity (s-23H)	-----	0.020	% pyrite S	<0.020	<0.020	<0.020	<0.020	<0.020
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	-----	0.020	% S	0.020	<0.020	0.136	0.081	<0.020
Peroxide Sulfur (23De)	-----	0.020	% S	0.024	<0.020	0.141	0.084	<0.020
Peroxide Oxidisable Sulfur (23E)	-----	0.020	% S	<0.020	<0.020	<0.020	<0.020	<0.020
acidity - Peroxide Oxidisable Sulfur (a-23E)	-----	10	mole H+ / t	<10	<10	<10	<10	<10
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	-----	0.020	% Ca	0.126	0.374	0.040	0.220	<0.020



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID		WD sample 1	WD sample 2	WD sample 3	WD sample 4	WD sample 5
				Sampling date / time		[28-Nov-2024]	[28-Nov-2024]	[28-Nov-2024]	[28-Nov-2024]	[28-Nov-2024]
Compound	CAS Number	LOR	Unit			EP2417852-001	EP2417852-002	EP2417852-003	EP2417852-004	EP2417852-005
						Result	Result	Result	Result	Result
EA029-D: Calcium Values - Continued										
Peroxide Calcium (23Wh)	-----	0.020	% Ca			0.144	0.598	0.043	0.296	<0.020
Acid Reacted Calcium (23X)	-----	0.020	% Ca			<0.020	0.224	<0.020	0.076	<0.020
acidify - Acid Reacted Calcium (a-23X)	-----	10	mole H+ / t			<10	112	<10	38	<10
sulfidic - Acid Reacted Calcium (s-23X)	-----	0.020	% S			<0.020	0.179	<0.020	0.061	<0.020
EA029-E: Magnesium Values										
KCl Extractable Magnesium (23Sm)	-----	0.020	% Mg			0.303	0.153	0.122	0.352	<0.020
Peroxide Magnesium (23Tm)	-----	0.020	% Mg			0.404	0.296	0.122	0.435	<0.020
Acid Reacted Magnesium (23U)	-----	0.020	% Mg			0.100	0.143	<0.020	0.083	<0.020
Acidity - Acid Reacted Magnesium (a-23U)	-----	10	mole H+ / t			83	118	<10	69	<10
sulfidic - Acid Reacted Magnesium (s-23U)	-----	0.020	% S			0.133	0.189	<0.020	0.110	<0.020
EA029-F: Excess Acid Neutralising Capacity										
Excess Acid Neutralising Capacity (23Q)	-----	0.020	% CaCO3			0.880	1.34	----	1.24	----
acidify - Excess Acid Neutralising Capacity (a-23Q)	-----	10	mole H+ / t			176	269	----	248	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	-----	0.020	% S			0.282	0.430	----	0.397	----
EA029-H: Acid Base Accounting										
ANC Fineness Factor	-----	0.5	-			1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	-----	0.02	% S			<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	-----	10	mole H+ / t			<10	<10	<10	<10	<10
Limiting Rate	-----	1	kg CaCO3/t			<1	<1	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	-----	0.02	% S			<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	-----	10	mole H+ / t			<10	<10	<10	<10	<10
Limiting Rate excluding ANC	-----	1	kg CaCO3/t			<1	<1	<1	<1	<1
EA033-A: Actual Acidity										
pH KCl (23A)	-----	0.1	pH Unit			7.6	8.4	6.5	7.3	6.6
Titratable Actual Acidity (23F)	-----	2	mole H+ / t			<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	-----	0.02	% pyrite S			<0.02	<0.02	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Sample ID		WD sample 1		WD sample 2		WD sample 3		WD sample 4		WD sample 5	
Compound		CAS Number	LOR	Sampling date / time	Unit	Result		Result		Result		Result	
EA033-B: Potential Acidity													
Chromium Reducible Sulfur (22B)			0.005		% S	0.015		0.016		0.015		0.019	
acidity - Chromium Reducible Sulfur (a-22B)			10		mole H+ / t	<10		10		<10		12	
EA033-C: Acid Neutralising Capacity													
Acid Neutralising Capacity (19A2)			0.01		% CaCO3	2.52		3.77		0.10		2.62	
acidity - Acid Neutralising Capacity (a-19A2)			10		mole H+ / t	503		753		20		523	
sulfidic - Acid Neutralising Capacity (s-19A2)			0.01		% pyrite S	0.81		1.21		0.03		0.84	
EA033-E: Acid Base Accounting													
ANC Fineness Factor			0.5		-	1.5		1.5		1.5		1.5	
Net Acidity (sulfur units)			0.02		% S	<0.02		<0.02		<0.02		<0.02	
Net Acidity (acidity units)			10		mole H+ / t	<10		<10		<10		<10	
Liming Rate			1		kg CaCO3/t	<1		<1		<1		<1	
Net Acidity excluding ANC (sulfur units)			0.02		% S	<0.02		<0.02		<0.02		<0.02	
Net Acidity excluding ANC (acidity units)			10		mole H+ / t	<10		10		<10		12	
Liming Rate excluding ANC			1		kg CaCO3/t	<1		<1		<1		<1	
EA055: Moisture Content (Dried @ 105-110°C)													
Moisture Content			0.1		%	7.9		6.9		6.9		7.0	
ED042T: Total Sulfur by LECO													
Sulfur - Total as S (LECO)			0.01		%	0.03		0.02		0.13		0.08	
												<0.01	



Inter-Laboratory Testing

Analysis conducted by ALS Brisbane, NATA accreditation no. 825, site no. 818 (Chemistry / Biology).

- (SOIL) EA009: Net Acid Production Potential
- (SOIL) ED042T: Total Sulfur by LECO
- (SOIL) EA013: Acid Neutralising Capacity
- (SOIL) EA033-B: Potential Acidity
- (SOIL) EA033-C: Acid Neutralising Capacity
- (SOIL) EA033-D: Retained Acidity
- (SOIL) EA033-A: Actual Acidity
- (SOIL) EA033-E: Acid Base Accounting
- (SOIL) EA011: Net Acid Generation
- (SOIL) EA029-D: Calcium Values
- (SOIL) EA029-E: Magnesium Values
- (SOIL) EA029-F: Excess Acid Neutralising Capacity
- (SOIL) EA029-H: Acid Base Accounting
- (SOIL) EA029-G: Retained Acidity
- (SOIL) EA029-A: pH Measurements
- (SOIL) EA029-C: Sulfur Trail
- (SOIL) EA029-B: Acidity Trail



CERTIFICATE OF ANALYSIS

Work Order : EP2500945

Client : WSP Australia Pty Ltd

Contact

Address

Telephone

Project : PS205718 Brightstar Tailings Management Study

Order number

C-O-C number

Sampler

Site

Quote number : EN/000

No. of samples received : 6

No. of samples analysed : 6

Page : 1 of 8

Laboratory : Environmental Division Perth

Date Samples Received : 17-Jan-2025 09:00

Date Analysis Commenced : 24-Jan-2025

Issue Date : 04-Feb-2025 13:25



Accreditation No. 825
Accredited for compliance with
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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories

Position

Accreditation Category



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

Δ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EA031 (Saturated Paste pH): NATA accreditation does not cover the performance of this service.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- ASS: EA029 (SPOCAS): Analysis is performed as per the Acid Sulfate Soils Laboratory Methods Guidelines (2004), 4969.12-2009 Analysis of Acid Sulphate Soil and the updated National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual, Department of Agriculture and Water Resources, Canberra, ACT (2018)
- ASS: EA033 (CRS Suite): Analysis is performed as per the Acid Sulfate Soils Laboratory Methods Guidelines (2004) and the updated National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual, Department of Agriculture and Water Resources, Canberra, ACT (2018)
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA029 (SPOCAS): Laboratory determinations of ANC needs to be corroborated by effectiveness of the measured ANC in relation to incubation ANC. Unless corroborated, the results of ANC testing should be discounted when determining Net Acidity for comparison with action criteria, or for the determination of the acidity hazard and required liming amounts.
- ASS: EA033 (CRS Suite): Laboratory determinations of ANC needs to be corroborated by effectiveness of the measured ANC in relation to incubation ANC. Unless corroborated, the results of ANC testing should be discounted when determining Net Acidity for comparison with action criteria, or for the determination of the acidity hazard and required liming amounts.
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m3 in-situ soil, multiply reported results x wet bulk density of soil in t/m3.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.



Analytical Results

Sub-Matrix: SOIL		(Matrix: SOIL)		Sample ID		CTWOM LT-01		CTWOM LT-02		CTWOM LT-03		---		
Compound		CAS Number	LOR	Unit	Sampling date / time		[17-Jan-2025]		[17-Jan-2025]		[17-Jan-2025]		---	
					Result		Result		Result		Result			
EA009: Net Acid Production Potential						-23.2		-98.7		-206		---		
Net Acid Production Potential		0.5		kg H2SO4/t										
EA010: Conductivity (1:5)														
Electrical Conductivity @ 25°C		1		µS/cm		2480		3040		1460		---		
EA011: Net Acid Generation														
pH (OX)		0.1		pH Unit		7.5		9.4		9.5		---		
NAG (pH 4.5)		0.1		kg H2SO4/t		<0.1		<0.1		<0.1		---		
NAG (pH 7.0)		0.1		kg H2SO4/t		<0.1		<0.1		<0.1		---		
EA013: Acid Neutralising Capacity														
ANC as H2SO4		0.5		kg H2SO4 equiv./t		26.3		103		227		---		
ANC as CaCO3		0.1		% CaCO3		2.7		10.5		23.2		---		
Fizz Rating		0		Fizz Unit		1		3		3		---		
EA029-A: pH Measurements														
pH KCl (23A)		0.1		pH Unit		9.0		9.1		9.5		---		
pH OX (23B)		0.1		pH Unit		9.0		9.0		8.5		---		
EA029-B: Acidity Trail														
Titratable Actual Acidity (23F)		2		mole H+ / t		<2		<2		<2		---		
Titratable Peroxide Acidity (23G)		2		mole H+ / t		<2		<2		<2		---		
Titratable Sulfidic Acidity (23H)		2		mole H+ / t		<2		<2		<2		---		
sulfidic - Titratable Actual Acidity (s-23F)		0.020		% pyrite S		<0.020		<0.020		<0.020		---		
sulfidic - Titratable Peroxide Acidity (s-23G)		0.020		% pyrite S		<0.020		<0.020		<0.020		---		
sulfidic - Titratable Sulfidic Acidity (s-23H)		0.020		% pyrite S		<0.020		<0.020		<0.020		---		
EA029-C: Sulfur Trail														
KCl Extractable Sulfur (23Ce)		0.020		% S		0.099		0.114		0.093		---		
Peroxide Sulfur (23De)		0.020		% S		0.113		0.122		0.444		---		
Peroxide Oxidisable Sulfur (23E)		0.020		% S		<0.020		<0.020		0.350		---		
acidity - Peroxide Oxidisable Sulfur (a-23E)		10		mole H+ / t		<10		<10		218		---		

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID		
				Sampling date / time		
Compound	CAS Number	LOR	Unit	CTWOM LT-01	CTWOM LT-02	CTWOM LT-03
				[17-Jan-2025]	[17-Jan-2025]	[17-Jan-2025]



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Sample ID				
		Sampling date / time				
Compound	CAS Number	LOR	Unit	CTWOM LT-01	CTWOM LT-02	CTWOM LT-03
				[17-Jan-2025]	[17-Jan-2025]	[17-Jan-2025]
				EP2500945-001	EP2500945-002	EP2500945-003
				Result	Result	Result
EA033-A: Actual Acidity - Continued						
pH KCl (23A)		0.1	pH Unit	9.0	9.1	9.5
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02
EA033-B: Potential Acidity						
Chromium Reducible Sulfur (22B)		0.005	% S	0.015	0.051	0.686
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	32	428
EA033-C: Acid Neutralising Capacity						
Acid Neutralising Capacity (19A2)		0.01	% CaCO3	1.73	9.12	19.4
acidity - Acid Neutralising Capacity (a-19A2)		10	mole H+ / t	346	1820	3880
sulfidic - Acid Neutralising Capacity (s-19A2)		0.01	% pyrite S	0.56	2.92	6.22
EA033-E: Acid Base Accounting						
ANC Fineness Factor		0.5	-	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	<10
Liming Rate		1	kg CaCO3/t	<1	<1	<1
Net Acidity excluding ANC (sulfur units)		0.02	% S	<0.02	0.05	0.68
Net Acidity excluding ANC (acidity units)		10	mole H+ / t	<10	32	428
Liming Rate excluding ANC		1	kg CaCO3/t	<1	2	32
EA055: Moisture Content (Dried @ 105-110°C)						
Moisture Content		1.0	%	30.3	29.8	15.5
ED040S : Soluble Sulfate by ICPAES						
Sulfate as SO4 2-	14808-79-8	10	mg/kg	2630	2880	880
ED042T: Total Sulfur by LECO						
Sulfur - Total as S (LECO)		0.01	%	0.10	0.14	0.69
ED045G: Chloride by Discrete Analyser						
Chloride	16887-00-6	10	mg/kg	4390	5040	2020



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Sample ID									
Compound	CAS Number	LOR	Sampling date / time		Unit	CTWOM LT-01		CTWOM LT-02		CTWOM LT-03	
						[17-Jan-2025]		[17-Jan-2025]		[17-Jan-2025]	
						EP2500945-001		EP2500945-002		EP2500945-003	
						Result		Result		Result	
ED093S: Soluble Major Cations											
Calcium	7440-70-2	10	mg/kg	630	700	210					
Magnesium	7439-95-4	10	mg/kg	120	180	160					
Sodium	7440-23-5	10	mg/kg	2540	2840	930					
Potassium	7440-09-7	10	mg/kg	120	190	110					



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID			
Compound	CAS Number	Sampling date / time		CTWOM LT-01	CTWOM LT-02	CTWOM LT-03
		LOR	Unit			
		Result				
EA005P: pH by PC Titrator						
pH Value	-----	0.01	pH Unit	7.62	7.98	7.77
EA015: Total Dissolved Solids dried at 180 ± 5 °C						
Total Dissolved Solids @180°C	-----	10	mg/L	23000	25400	24600
ED037P: Alkalinity by PC Titrator						
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	17	30	47
Total Alkalinity as CaCO3	-----	1	mg/L	17	30	47
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA						
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2450	2980	4090
ED045G: Chloride by Discrete Analyser						
Chloride	16887-00-6	1	mg/L	10200	11500	9500
ED093F: Dissolved Major Cations						
Calcium	7440-70-2	1	mg/L	1640	1490	1060
Magnesium	7439-95-4	1	mg/L	453	600	1000
Sodium	7440-23-5	1	mg/L	5350	6330	5510
Potassium	7440-09-7	1	mg/L	164	261	393
EK025SF: Free CN by Segmented Flow Analyser						
Free Cyanide	-----	0.004	mg/L	<0.004	<0.004	<0.004
EK026SF: Total CN by Segmented Flow Analyser						
Total Cyanide	57-12-5	0.004	mg/L	0.144	0.151	0.298
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser						
Weak Acid Dissociable Cyanide	-----	0.004	mg/L	<0.004	<0.004	<0.004
EN055: Ionic Balance						
∅ Total Anions	-----	0.01	meq/L	339	387	354
∅ Total Cations	-----	0.01	meq/L	356	406	385
∅ Ionic Balance	-----	0.01	%	2.44	2.36	4.17



Inter-Laboratory Testing

Analysis conducted by ALS Brisbane, NATA accreditation no. 825, site no. 818 (Chemistry / Biology).

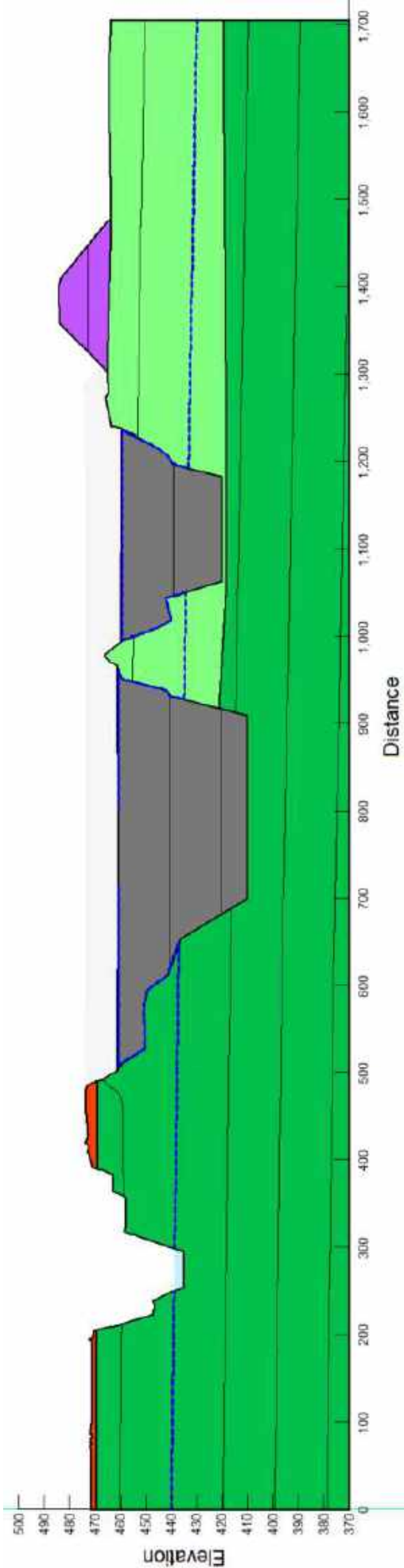
- (SOIL) EA013: Acid Neutralising Capacity
- (SOIL) ED042T: Total Sulfur by LECO
- (SOIL) EA033-B: Potential Acidity
- (SOIL) EA033-C: Acid Neutralising Capacity
- (SOIL) EA033-D: Retained Acidity
- (SOIL) EA033-A: Actual Acidity
- (SOIL) EA033-E: Acid Base Accounting
- (SOIL) EA011: Net Acid Generation
- (SOIL) EA029-D: Calcium Values
- (SOIL) EA029-E: Magnesium Values
- (SOIL) EA029-F: Excess Acid Neutralising Capacity
- (SOIL) EA029-H: Acid Base Accounting
- (SOIL) EA029-G: Retained Acidity
- (SOIL) EA029-A: pH Measurements
- (SOIL) EA029-C: Sulfur Trail
- (SOIL) EA029-B: Acidity Trail
- (SOIL) EA009: Net Acid Production Potential

Appendix D

Seepage and stability results



Colour	Name	Hydraulic Material Model	Sat Ks (m/Sec)	Ky /Kx'
■	Surficial Material	Saturated / Unsaturated	1.00E-06	1
■	Weathered Schist	Saturated / Unsaturated	4.50E-07	1
■	Extremely Altered Schist	Saturated / Unsaturated	1.00E-06	1
■	Tailings	Saturated / Unsaturated	1.00E-08	0.11
■	Embankment Material	Saturated / Unsaturated	1.00E-08	1
■	Waste Dump	Saturated / Unsaturated	1.00E-07	1



Notes:
Figures are not to scale

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Brightstar Gold Mine

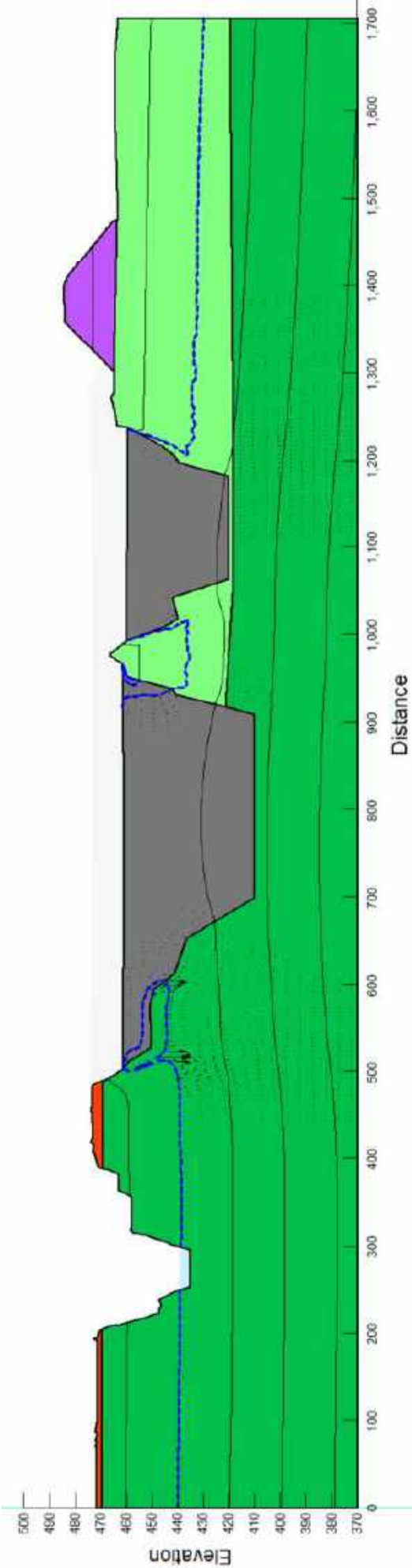
Seepage Modelling Results - Section 1
Central and South Beta - Initial Conditions

Revision

0

Figure D1

Colour	Name	Hydraulic Material Model	Sat Kx (m/sec)	Ky/Kx¹
■	Surficial Material	Saturated / Unsaturated	1.00E-06	1
■	Weathered Schist	Saturated / Unsaturated	4.50E-07	1
■	Extremely Altered Schist	Saturated / Unsaturated	1.00E-06	1
■	Tailings	Saturated / Unsaturated	1.00E-08	0.11
■	Embankment Material	Saturated / Unsaturated	1.00E-08	1
■	Waste Dump	Saturated / Unsaturated	1.00E-07	1



Notes:
Figures are not to scale

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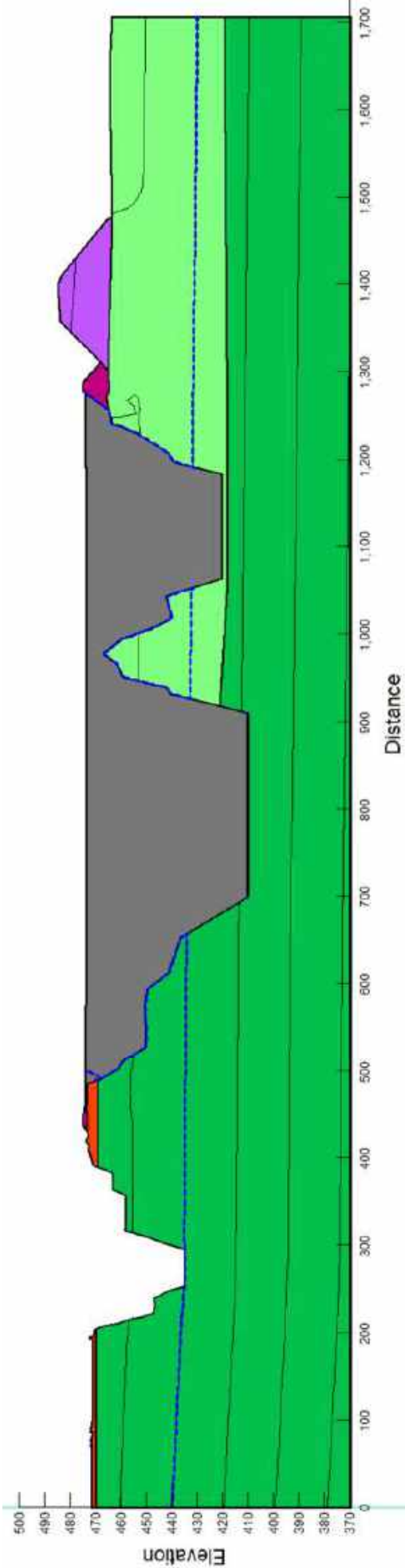
Seepage Modelling Results - Section 1
Central and South Beta - End of Design Life (28 months)

Revision

0

Figure D2

Colour	Name	Hydraulic Material Model	Sat Ks (m/sec)	Ky/Kx'
■	Surficial Material	Saturated / Unsaturated	1.00E-06	1
■	Weathered Schist	Saturated / Unsaturated	4.50E-07	1
■	Extremely Altered Schist	Saturated / Unsaturated	1.00E-06	1
■	Tailings	Saturated / Unsaturated	1.00E-08	0.11
■	Embankment Material	Saturated / Unsaturated	1.00E-08	1
■	Waste Dump	Saturated / Unsaturated	1.00E-07	1



Notes:
Figures are not to scale

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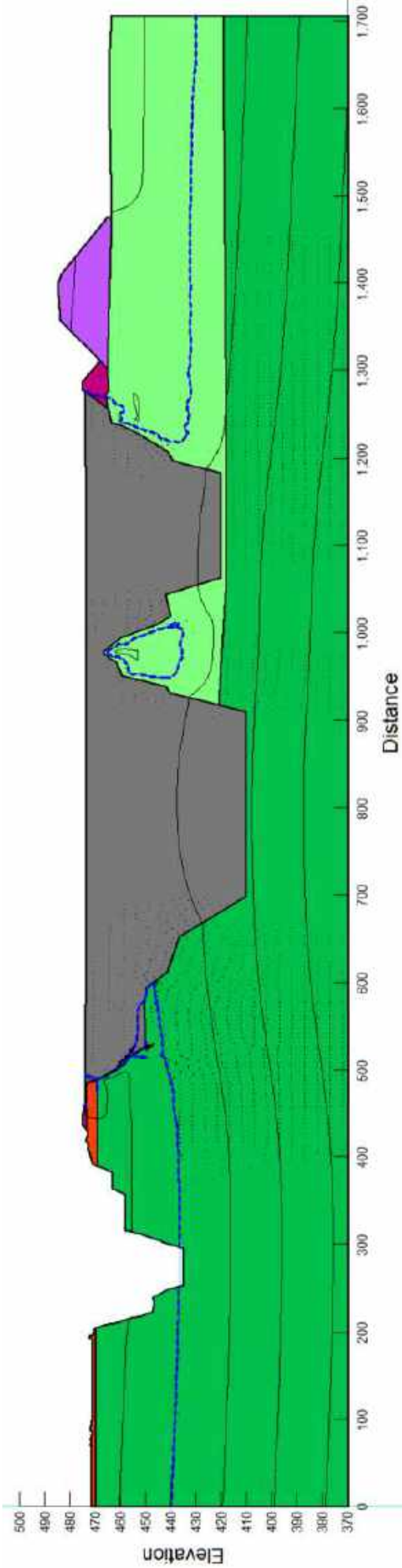
Seepage Modelling Results - Section 1
Donut Beta - Initial Conditions

Revision

0

Figure D3

Colour	Name	Hydraulic Material Model	Set Kx (m/sec)	Ky/Kx'
■	Surficial Material	Saturated / Unsaturated	1.00E-06	1
■	Weathered Schist	Saturated / Unsaturated	4.50E-07	1
■	Extremely Altered Schist	Saturated / Unsaturated	1.00E-06	1
■	Tailings	Saturated / Unsaturated	1.00E-06	0.11
■	Embankment Material	Saturated / Unsaturated	1.00E-06	1
■	Waste Dump	Saturated / Unsaturated	1.00E-07	1



Notes:
Figures are not to scale

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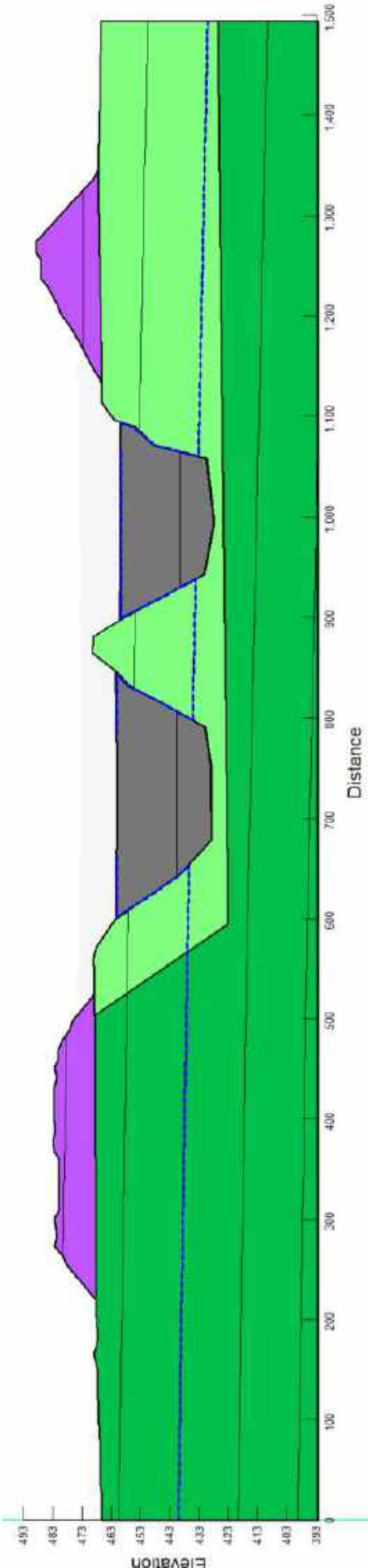
Seepage Modelling Results - Section 1
Donut Beta - End of Design Life (48 months)

Revision

0

Figure D4

Colour	Name	Hydraulic Material Model	Sat Ks (m/sec)	Ky/Kx
	Surficial Material	Saturated / Unsaturated	1.00E-06	1
	Weathered Schist	Saturated / Unsaturated	4.50E-07	1
	Extremely Altered Schist	Saturated / Unsaturated	1.00E-06	1
	Tailings	Saturated / Unsaturated	1.00E-08	0.11
	Embankment Material	Saturated / Unsaturated	1.00E-08	1
	Waste Dump	Saturated / Unsaturated	1.00E-07	1



Notes:
Figures are not to scale

Brightstar Resources Limited

Brightstar Gold Mine

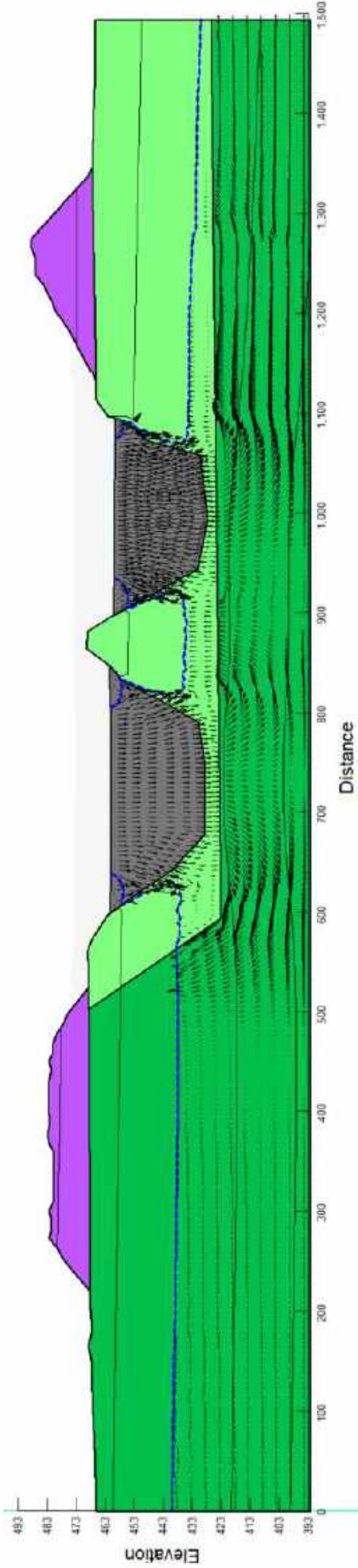
Seepage Modelling Results - Section 2
Central and South Beta - Initial Conditions

Figure D5

Revision

0

Colour	Name	Hydraulic Material Model	Sat Ks (m/sec)	Ky/Kx'
■	Surficial Material	Saturated / Unsaturated	1.00E-06	1
■	Weathered Schist	Saturated / Unsaturated	4.50E-07	1
■	Extremely Altered Schist	Saturated / Unsaturated	1.00E-06	1
■	Tailings	Saturated / Unsaturated	1.00E-08	0.11
■	Embankment Material	Saturated / Unsaturated	1.00E-08	1
■	Waste Dump	Saturated / Unsaturated	1.00E-07	1



Notes:
Figures are not to scale

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Brightstar Gold Mine

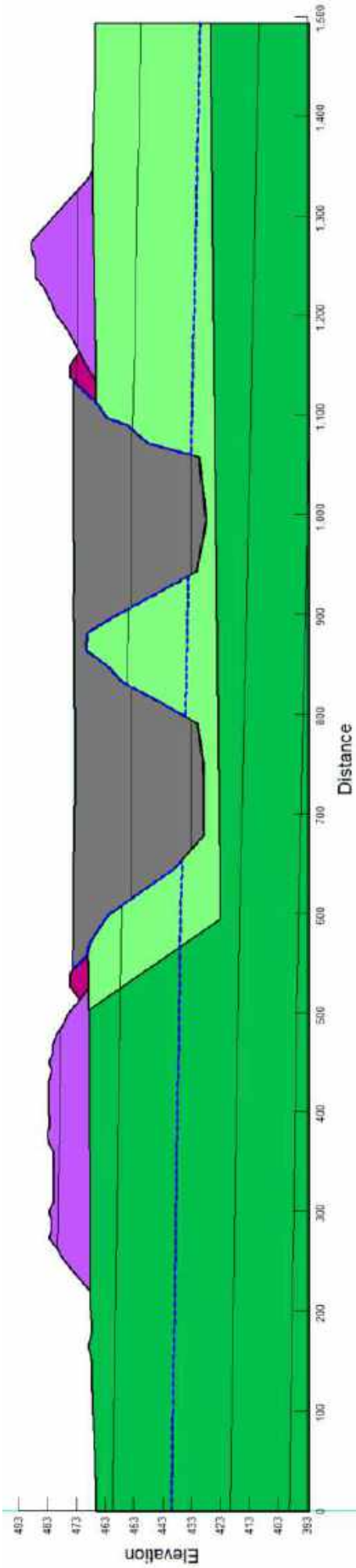
Seepage Modelling Results - Section 2
Central and South Beta - End of Design Life (28 months)

Revision

0

Figure D6

Colour	Name	Hydraulic Material Model	Sat Kx (m/sec)	Ky/Kx'
■	Surficial Material	Saturated / Unsaturated	1.00E-06	1
■	Weathered Schist	Saturated / Unsaturated	4.50E-07	1
■	Extremely Altered Schist	Saturated / Unsaturated	1.00E-06	1
■	Tailings	Saturated / Unsaturated	1.00E-08	0.11
■	Embankment Material	Saturated / Unsaturated	1.00E-08	1
■	Waste Dump	Saturated / Unsaturated	1.00E-07	1



Notes:
Figures are not to scale

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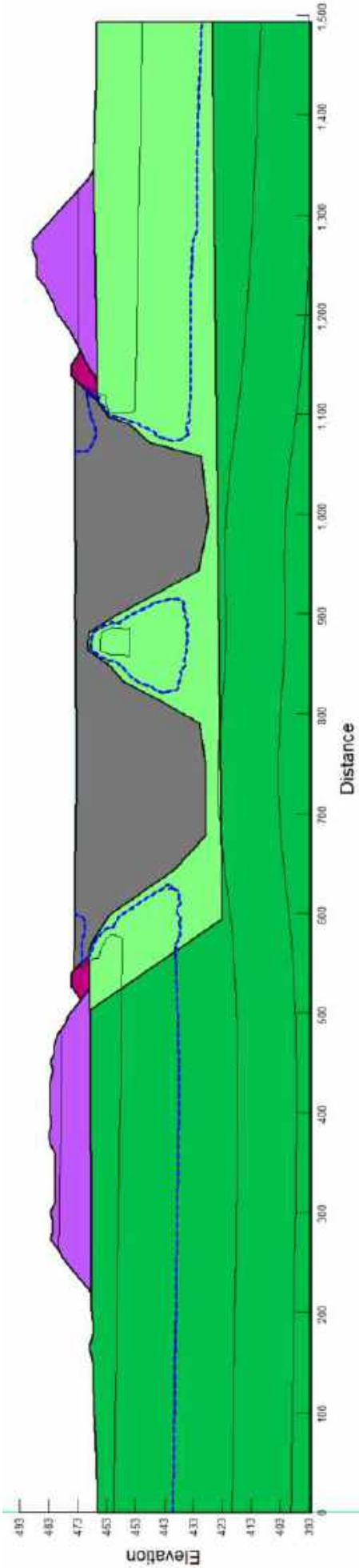
Seepage Modelling Results - Section 2
Donut Beta - Initial Conditions

Revision

0

Figure D7

Colour	Name	Hydraulic Material Model	Sat Ks (m/sec)	Ky/Kx'
■	Surficial Material	Saturated / Unsaturated	1.00E-06	1
■	Weathered Schist	Saturated / Unsaturated	4.50E-07	1
■	Extremely Altered Schist	Saturated / Unsaturated	1.00E-06	1
■	Tailings	Saturated / Unsaturated	1.00E-08	0.11
■	Embankment Material	Saturated / Unsaturated	1.00E-08	1
■	Waste Dump	Saturated / Unsaturated	1.00E-07	1



Notes:
Figures are not to scale

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Seepage Modelling Results - Section 2

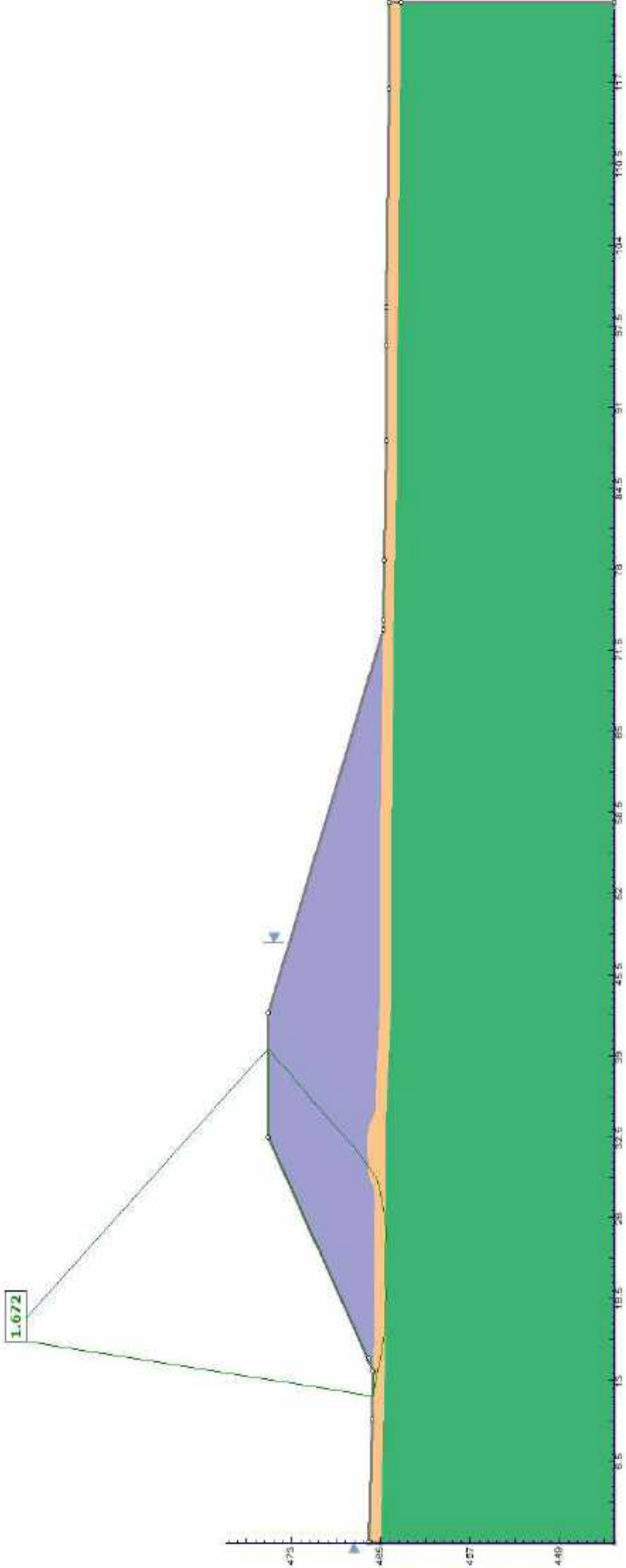
Donut Beta - End of Design Life (48 months)

Revision

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Figure D8

Material Name	Colour	Unit Weight (kN/m³)	Strength Type	Cohesion (kPa)	Phi (°)	Vertical Stress Ratio
Weathered Schist		22	Mohr-Coloumb	0	38	
Surficial Material Undrained		20	Vertical Stress Ratio			0.35
Embankment Material Undrained		17	Vertical Stress Ratio			0.33



Notes:
Figures are not to scale

Brightstar Resources Limited

Brightstar Gold Mine

Stability Modelling Results - Section 1

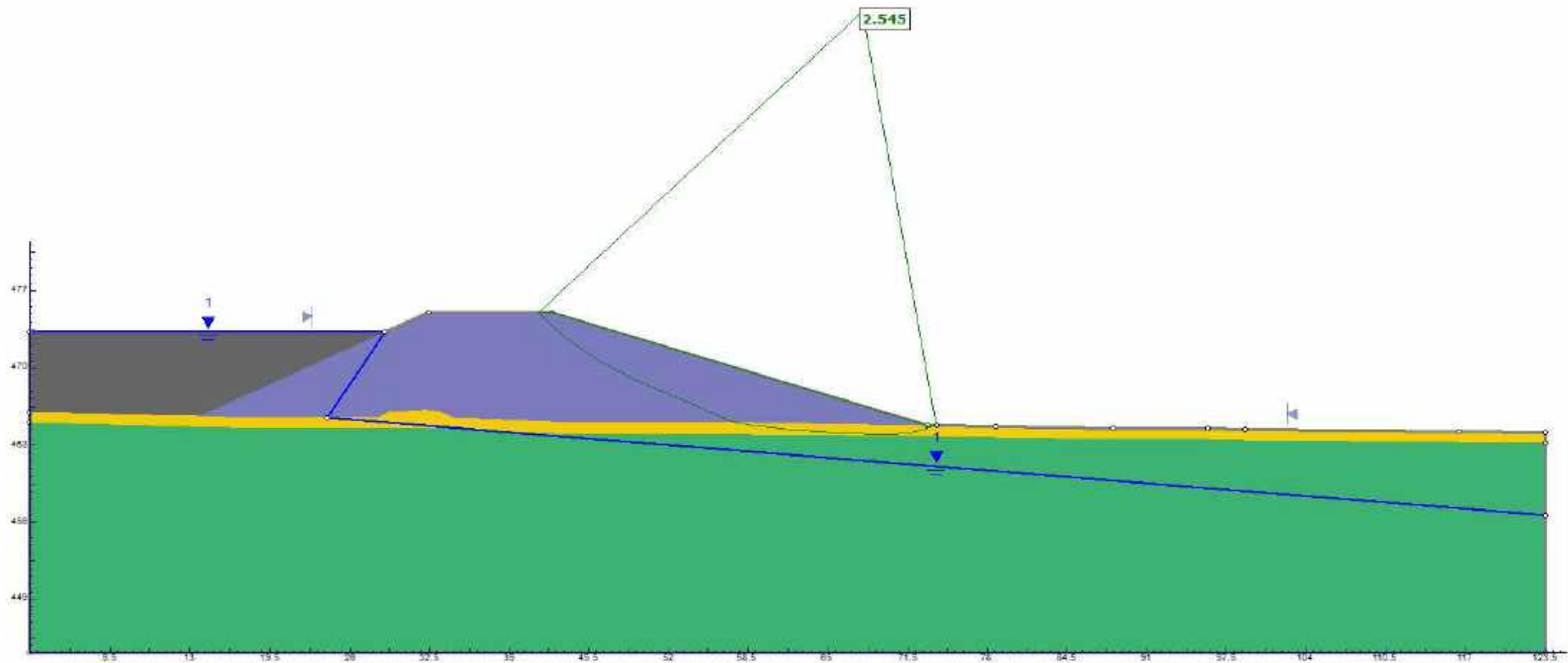
Donut Beta End of Construction Upstream Failure

Revision

0

Figure D9

Material Name	Colour	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (°)	Vertical Stress Ratio
Surficial Material		20	Mohr-Coloumb	0	33	
Weathered Schist		22	Mohr-Coloumb	0	38	
Embankment Material		17	Mohr-Coloumb	5	36	
Tailings		19	Vertical Stress Ratio			0.11



Notes:
Figures are not to scale

Brightstar Resources Limited

Brightstar Gold Mine

Stability Modelling Results - Section 1

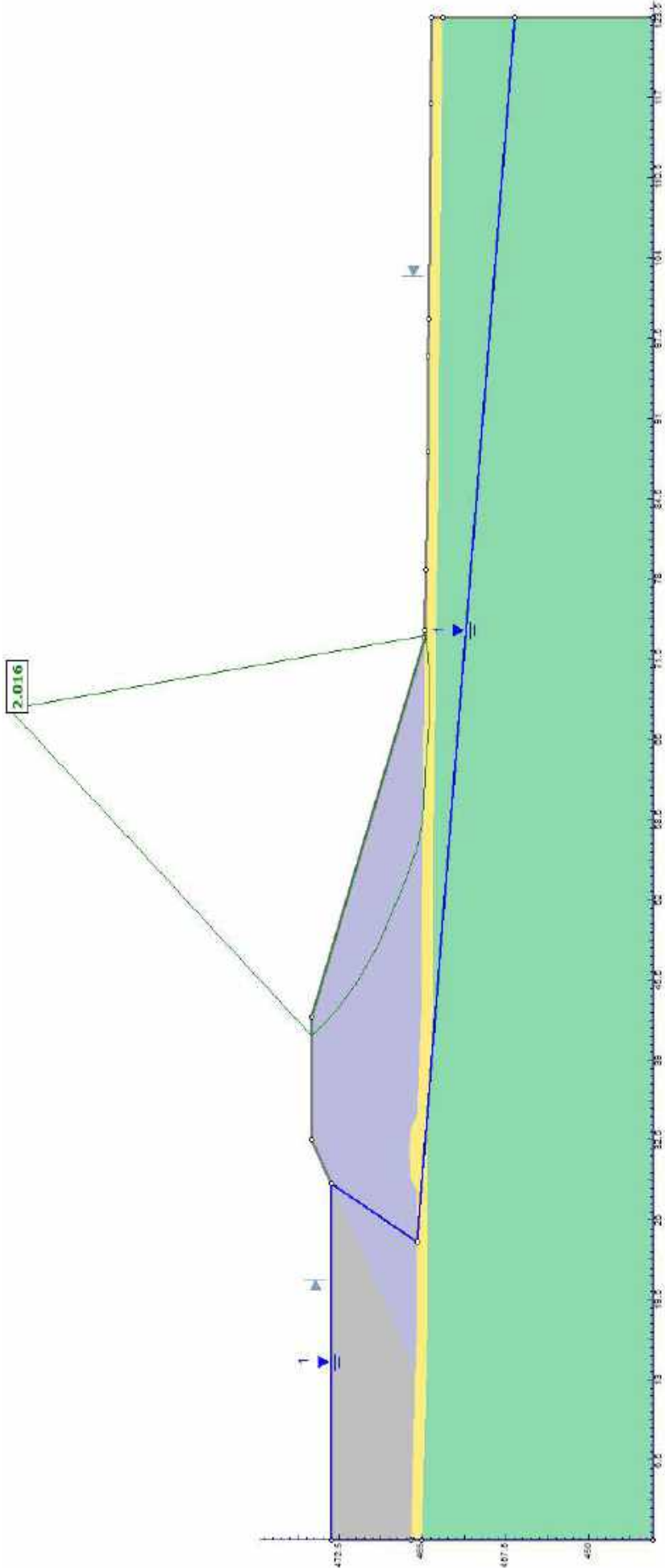
Donut Beta End of Design Life Downstream Failure

Revision

0

Figure D10

Material Name	Colour	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (°)	Vertical Stress Ratio
Surficial Material Post Seismic			20 Mohr-Coloumb	0	29	
Weathered Schist Post Seismic			22 Mohr-Coloumb	0	34	
Extremely Weathered Schist Post Seismic			18 Mohr-Coloumb	0	31	
Tailings Post Seismic			19 Vertical Stress Ratio			0.07



Notes:
Figures are not to scale

Brightstar Resources Limited

Brightstar Gold Mine

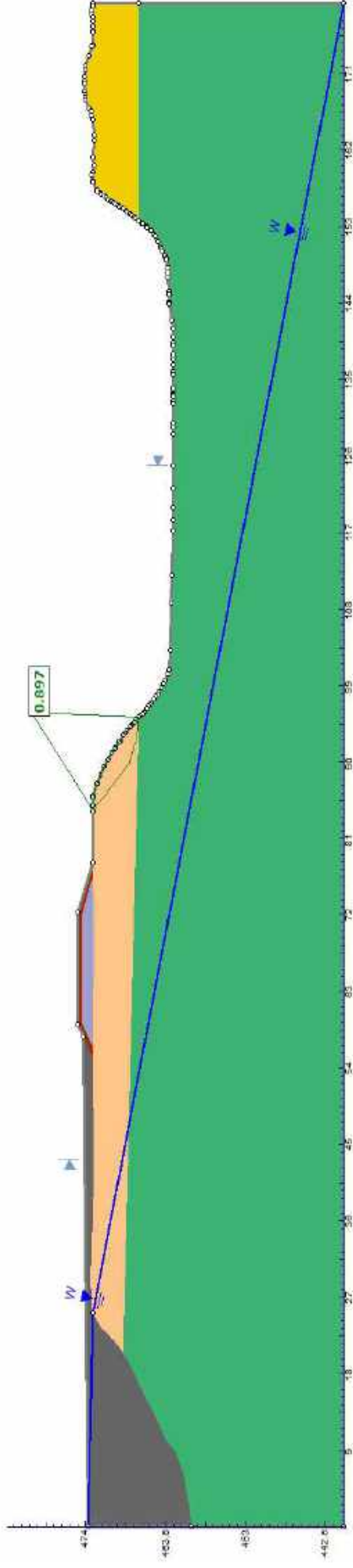
Stability Modelling Results - Section 1
Donut Beta End of Design Life Post Seismic

Revision

0

Figure D11

Material Name	Colour	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (°)	Vertical Stress Ratio
Surficial Material			20 Mohr-Coloumb		0 33	
Weathered Schist			22 Mohr-Coloumb		0 38	
Erosion Protection			22 Mohr-Coloumb		0 36	
Tailings			15 Vertical Stress Ratio			0.11
Surficial Material Undrained			20 Vertical Stress Ratio			0.35
Embankment Material Undrained			17 Vertical Stress Ratio			0.33



Notes:
Figures are not to scale

Brightstar Resources Limited

Brightstar Gold Mine

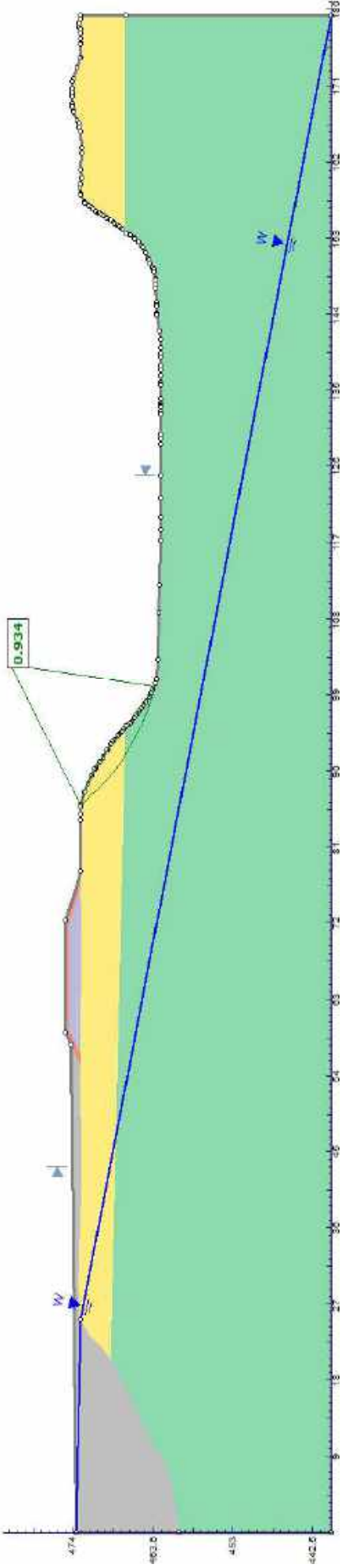
Stability Modelling Results - Section 2 before buttress
Donut Beta End of Construction Downstream Failure

Revision

0

Figure D12

Material Name	Colour	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	phi (°)	Vertical Stress Ratio
Surficial Material Post Seismic		20 Mohr-Coloumb		0	29	
Weathered Schist Post Seismic		22 Mohr-Coloumb		0	34	
Extremely Weathered Schist Post Seismic		18 Mohr-Coloumb		0	31	
Tailings post Seismic		15 Vertical Stress Ratio				0.07
Erosion Protection Post Seismic		22 Mohr-Coloumb		0	32	



Notes:
Figures are not to scale

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Brightstar Gold Mine

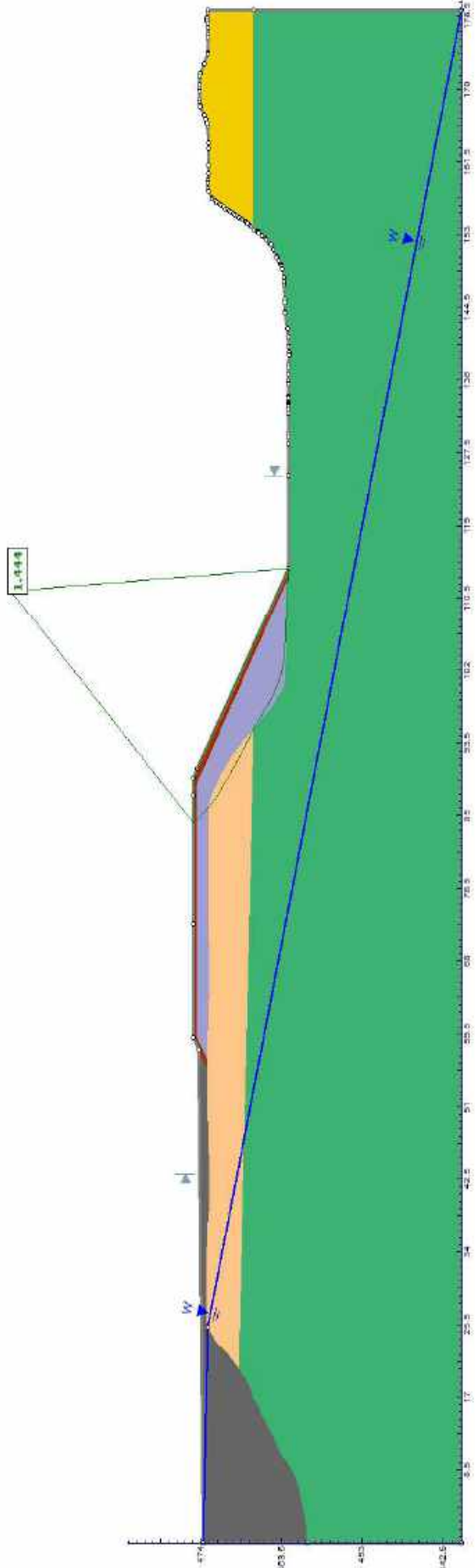
Stability Modelling Results - Section 2 before buttress
Donut Beta End of Design Life Post Seismic

Revision

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Figure D14

Material Name	Colour	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (°)	Vertical Stress Ratio
Surficial Material		20 Mohr-Coloumb		0	33	
Weathered Schist		22 Mohr-Coloumb		0	38	
Erosion Protection		22 Mohr-Coloumb		0	36	
Tailings		15 Vertical Stress Ratio				0.11
Surficial Material Undrained		20 Vertical Stress Ratio				0.35
Embankment Material Undrained		17 Vertical Stress Ratio				0.33



Notes:
Figures are not to scale

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Brightstar Gold Mine

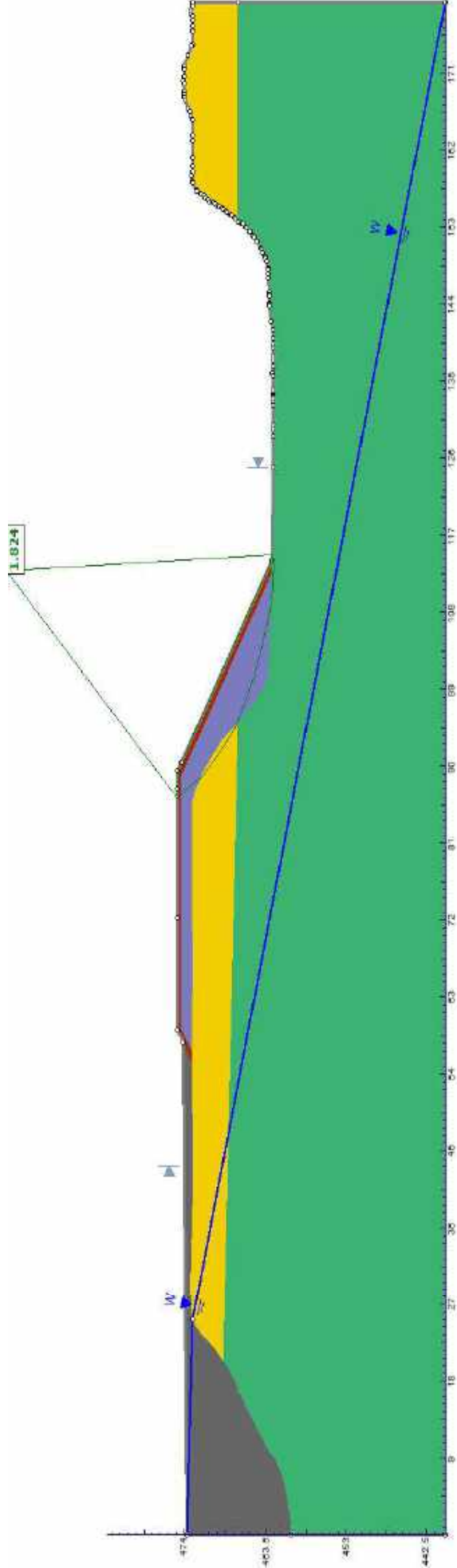
Stability Modelling Results - Section 2 with buttress
Donut Beta End of Construction Downstream Failure

Revision

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Figure D15

Material Name	Colour	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (°)	Vertical Stress Ratio
Surficial Material		20 Mohr-Coloumb		0	33	
Weathered Schist		22 Mohr-Coloumb		0	38	
Embankment Material		17 Mohr-Coloumb		5	36	
Tailings		19 Vertical Stress Ratio				0.11
Erosion Protection		22 Mohr-Coloumb		0	36	



Notes:
Figures are not to scale

Brightstar Resources Limited

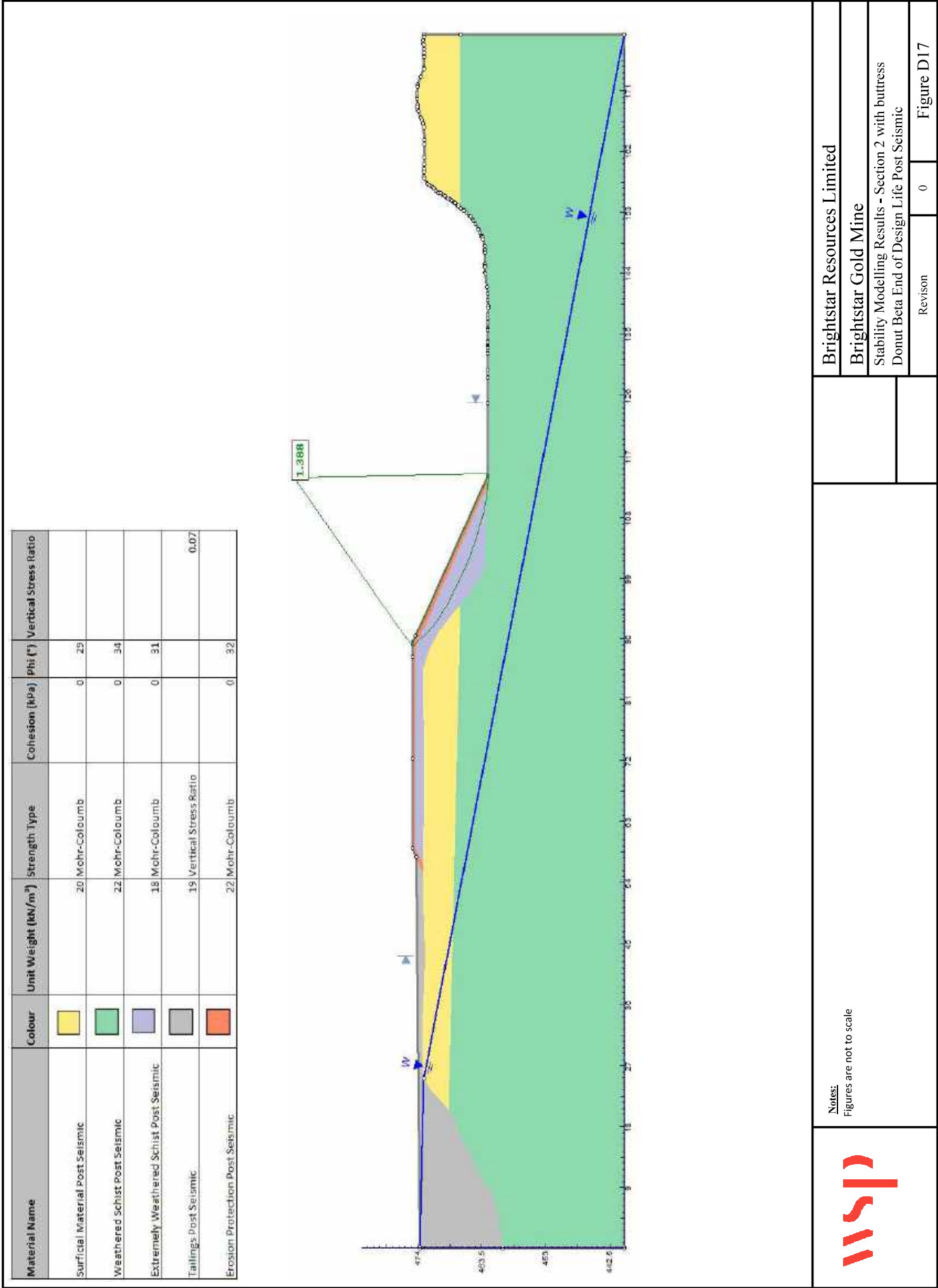
Brightstar Gold Mine

Stability Modelling Results - Section 2 with buttress
Donut Beta End of Design Life Downstream Failure

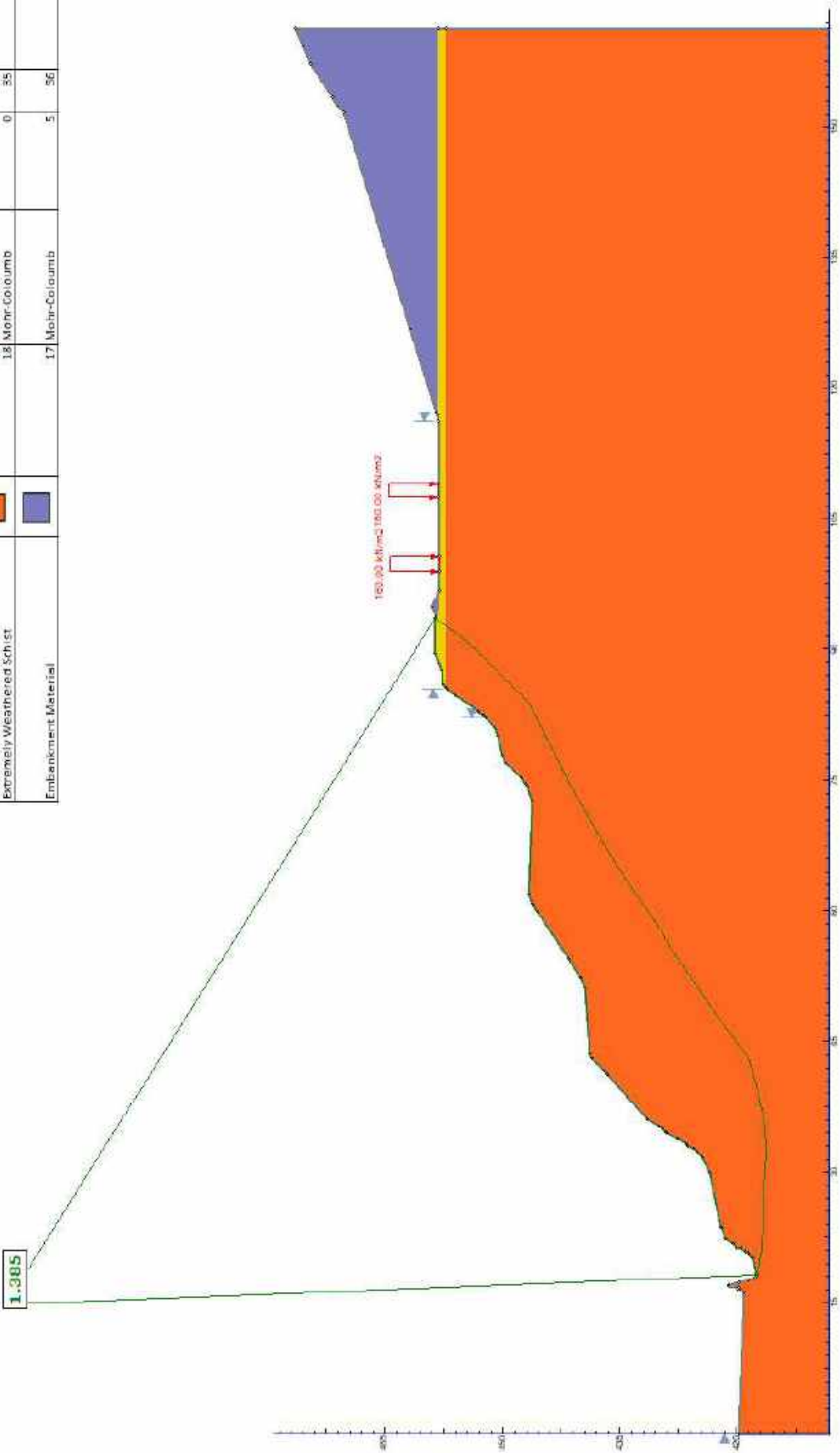
Figure D16

Revision

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Material Name	Colour	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (°)	Vertical Stress Ratio
Surficial Material		20	Mohr-Coulomb	0	33	
Extremely Weathered Schist		18	Mohr-Coulomb	0	35	
Embankment Material		17	Mohr-Coulomb	5	56	



Notes:
Figures are not to scale

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Stability Modelling Results - Section 3

Donut Beta Before Construction XA Schist Pit Wall

Revision

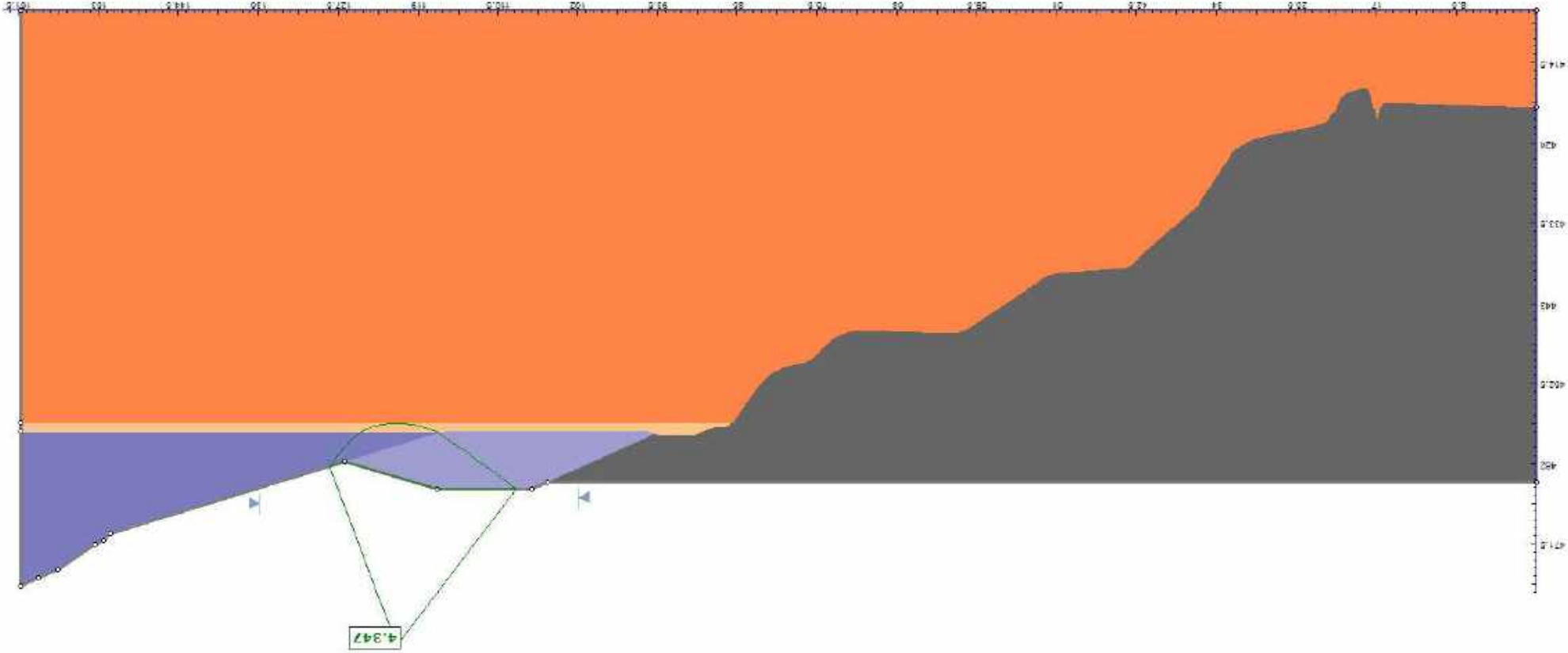
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Figure D18



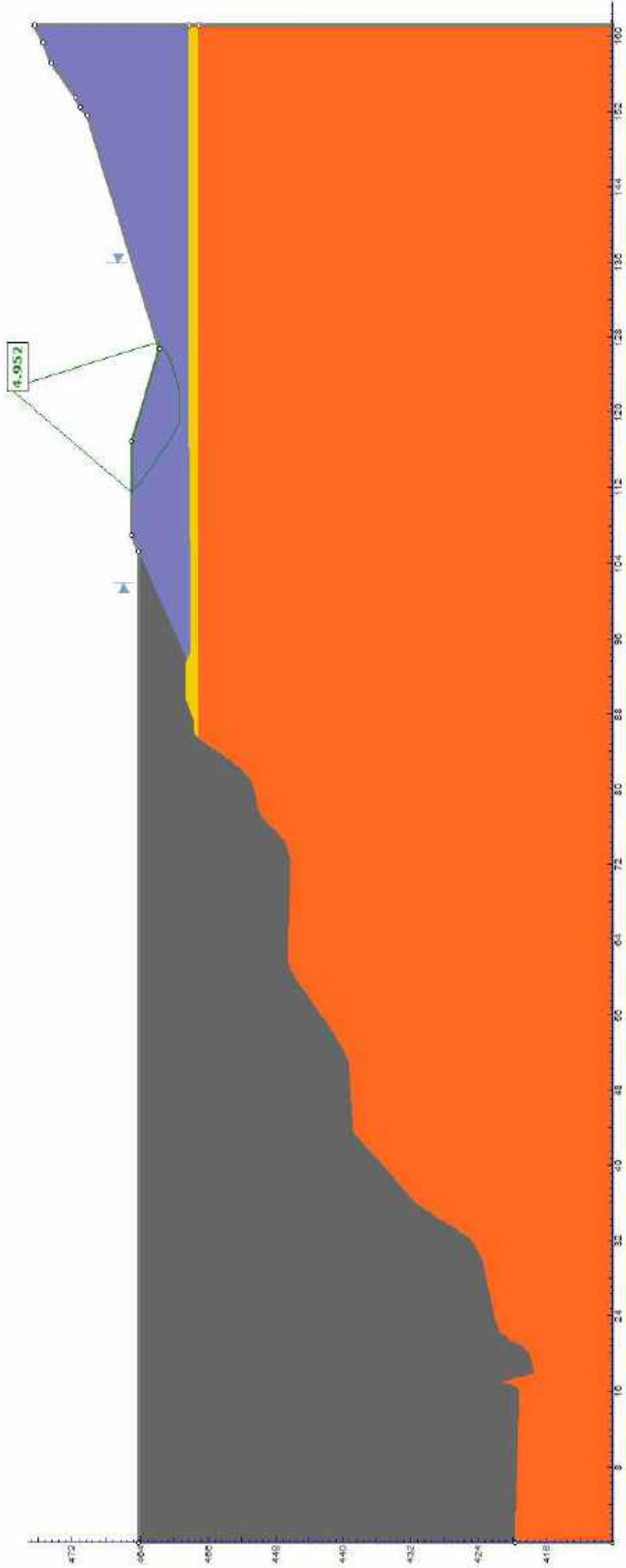
Notes:
Figures are not to scale

Brigntstar Resources Limited
Brigntstar Gold Mine
Stability Modelling Results - Section 3
Donut Beta End of Construction Downstream Failure
Revision
0
Figure D20



Material Name	Colour	Unit Weight (kN/m³)	Strength Type	Cohesion (kPa)	Phi (°)	Vertical stress Ratio
Embankment Material		17	Mohr-Coulomb	5	32	
Tailings		15	Vertical Stress Ratio			0.11
Surficial Material Undrained		20	Vertical Stress Ratio			0.35
Extremely Weathered schist Undrained		18	Vertical Stress Ratio			0.36
Embankment Material Undrained		17	Vertical Stress Ratio			0.33

Material Name	Colour	Unit Weight (kN/m³)	Strength Type	Cohesion (kPa)	Phi (°)	Vertical Stress Ratio
Surficial Material		20	Mohr-Coulomb	0	55	
Extremely Weathered Schist		18	Mohr-Coulomb	0	35	
Embankment Material		17	Mohr-Coulomb	5	36	
Tailings		15	Vertical Stress Ratio			0.11



Notes:
Figures are not to scale



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Brightstar Gold Mine

Stability Modelling Results - Section 3

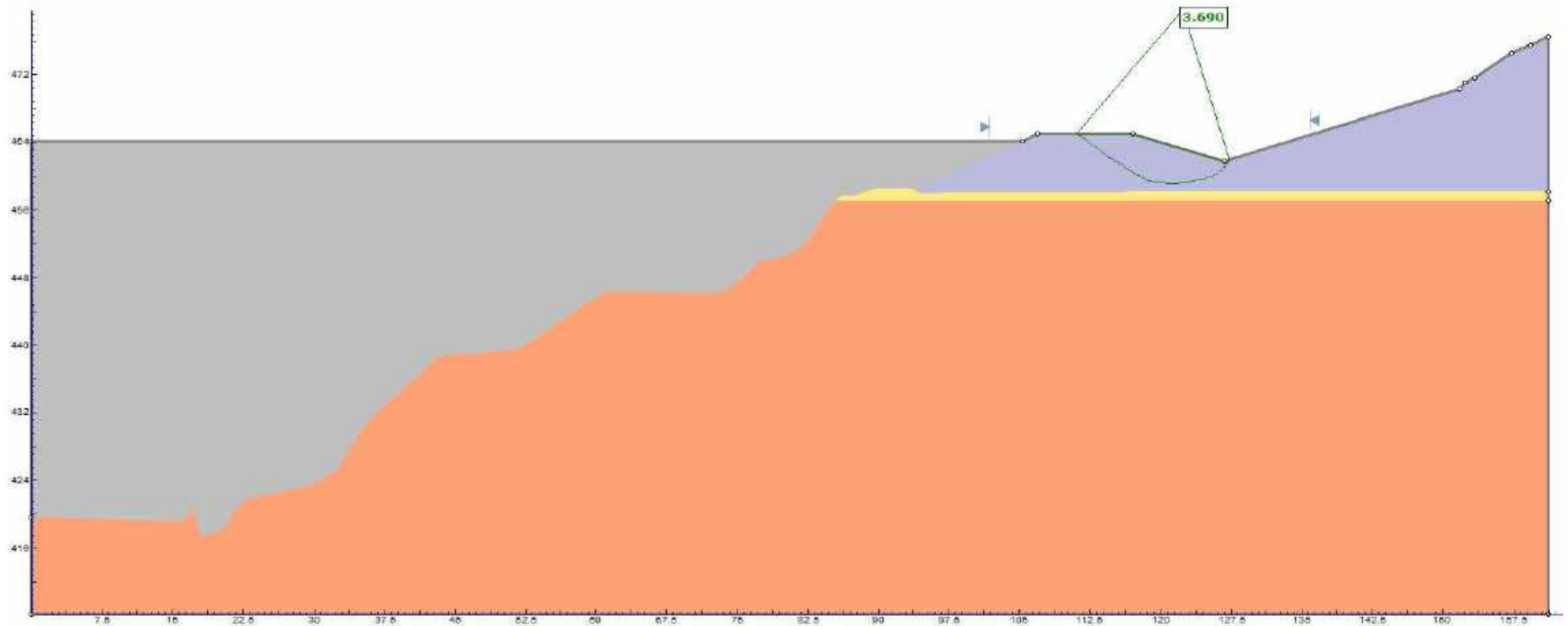
Donut Beta End of Design Life Downstream Failure

Revision

0

Figure D21

Material Name	Colour	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (°)	Vertical Stress Ratio
Surficial Material Post Seismic		20	Mohr-Coulomb	0	29	
Extremely Weathered Schist Post Seismic		18	Mohr-Coulomb	0	31	
Extremely Weathered Schist Post Seismic		18	Mohr-Coulomb	0	31	
Tailings Post Seismic		19	Vertical Stress Ratio			0.07



Notes:
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Stability Modelling Results - Section 3
Donut Beta End of Design Life Post Seismic

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Figure D22

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