KIMBERLEY MINERAL SANDS

THUNDERBIRD OPERATIONS PTY LTD

In-Pit Tender

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1. OBJECTIVE AND SCOPE

1.1. OBJECTIVE

This document has been prepared from Kimberley Mineral Sands (KMS) Thunderbird Operation Limited (TOPL) to invite for quotation consultants to undertake the design and affiliate documentation of the In-Pit deposition of tailing products of the Process Plant.

1.2. SCOPE

The Consultant is tasked with providing a comprehensive design for the construction and management of TOPL's in-pit tailings and oversize materials storage, along with return water infrastructures for ordinary activities, directing water back to the Process Plant or the DMU.

The tailings, co-mingled with waste (overburden to the ore) and oversize from the DMU (>12mm), will follow the Consultant's guidance. A deposition plan is required for waste, oversize, and tailings disposal into the mining void. Additionally, the plan should incorporate the opportunistic use of waste and oversize for constructing retaining embankments during the In-Pit deposition phase, with an awareness of potential heights exceeding 30 meters as the mine develops.

The Consultant must complete the detailed design (Rev 0) within 15 weeks, with an expectation of delivering a Rev A design within 8 weeks from kick-off. Furthermore, TOPL envisions the Consultant's involvement in finalizing the Geotechnical Management Plan and conducting a hydraulic and hydrology assessment for the open pit development to meet future mining activity requirements.

1.2.1. Scope of Work:

1. In-pit deposition infrastructures design
2. In-pit deposition strategy design (tails and waste materials)
3. Water balance optimisation
4. Additional laboratory testing of tails (if required)
5. Additional laboratory testing of waste material (for embankment construction) as required for design.
6. Construction Technical Specification
7. Site visits and periodical reports of the performance of the designed infrastructures to comply with government authorities reporting regime requirements.
8. Support to TOPL to deal with government departments (if required).
9. Mechanical and piping design of the co-disposal and return water infrastructures.
10. Stability of retaining structure, piping failure susceptibility & critical hydraulic gradient
11. Geotechnical Risk Management Plan of the TOPL open pit development, identifying mitigation strategies for potential geotechnical hazards, monitoring and inspection plans for the pit walls and retaining embankments.
12. Preliminary Hydrogeology Management Plan of the open pit development as per figure 11 below Ground Water Level (GWL) from year 11. Detailed SoW will be discussed in the future.

1.2.2. Scope Detail

The Consultant is required to produce a detailed design for the In-pit Co-disposal SoW to allow TOPL to apply for the licence to the relevant government authorities and to construct the required infrastructures (MTO and Technical Specifications).

The Consultant is required to produce a detailed Geotechnical Risk Management Plant for TOPL open pit development.

The Consultant is required to produce a preliminary hydrogeology management plan for the open pit development, this will be implemented over the years in conjunction with the detailed mining schedules, because, currently TOPL below GWL mining activities are forecasted to commence at year 11.

1.2.3. Timeline

The deliverables are required by the start of September 2024, to meet a broader critical path: (1) timely submission to DMIRS for extension of the mining license (currently, it only covers the 2 years with surface TSF, thus expiring in October 2025), and (2) covenant agreements with KMS lenders require the in-pit design detail to be settled by September 2024. A summary has been presented in Table 1.

Project Timeline	Date
Invitation to Tender issued with RFP	19/12/2023
Site Visit Period	15-18/01/24
Closing date for clarification queries	31/01/2024
Responses by KMS to clarifications	08/02/2024
Closing Date for RFP Submission	15/02/2024
Shortlisting	22/02/2024
Further Clarifications	29/02/2024
Evaluations Complete	28/03/2024
Submit Recommendation for Award to Authorized KMS Delegate for approval	18/04/2024
KMS Delegate Approval	30/04/2024
Notification of Award to successful Proponent	01/05/2024
Award contract	01/05/2024
Project Kickoff meeting, commence design, testing, etc.	02/05/2024
Design Report and affiliate documents Rev A	30/06/2024
Design Report and affiliate documents Rev 0	15/08/2024
Commence License Application Documentation	15/06/2024
Application with DMIRS	16/08/2024
License application granting by DMIRS	15/10/2024
Commence Project Execution planning/procurement	01/07/2024
Finalization Project Execution planning/procurement	01/09/2024
Project Execution Materials delivery completion	15/10/2024
Project Execution Commencement (Earthworks/Piping)	15/10/2024
Project Execution Completion	28/02/2025
In-pit deposition infrastructures commissioning	15/03/2025

In-pit deposition change from TSF	01/04/2025

Table 1: In-Pit deposition project Timeline

1.2.4. Battery Limit

The Consultant Battery Limit are as per below:

In-pit Co-disposal SoW:

- Physical limitations: the Consultant is required to design the infrastructures from the Processing Plant Co-disposal hopper until the deposition point at the pit side then, the decant and return infrastructures from the pit side until the Process Plant water services area.
- Time: In-pit deposition to commence 01/04/2025 (6 months redundancy into existing TSF) for the LOM.

Geotechnical and Hydrogeology SoW:

- TOPL open pit area.

1.2.5. Tender deliverables

TOPL is expecting the Consultants to deliver a preliminary proposal for the In-pit scope infrastructures like a PID, past similar projects examples, etc.. to valuate the tender from a technical point of view.

Furthermore, a detailed Pricing Schedules for the SoW objects with inclusion/exclusions related to the individual items.

2. DEFINITIONS

Term	Definition
KMS	Kimberley Mineral Sands
TOPL	Thunderbird Operations Limited
MUP	Mining Unit Plant
DMU	Dry Mining Unit
WCP	Wet Concentrate Plant
TSF	Tailing Storage Facility
SSP	Stormwater Storage Pond
LOM	Life of Mine
GWL	Ground Water Level

Table 2: Definitions

3. PROJECT PRESENTATION

3.1. Kimberley Mineral Sands and Thunderbird Operations

Kimberley Mineral Sands (KMS) is a joint venture between Sheffield Resources and Yansteel to progress the Thunderbird Operation (TOPL) into development. TOPL is located in the Kimberley region in northern Western Australia on the Dampier Peninsula and lies 70km west of Derby and 30km north of the sealed Great Northern Highway (GNH) joining Derby and Broome.

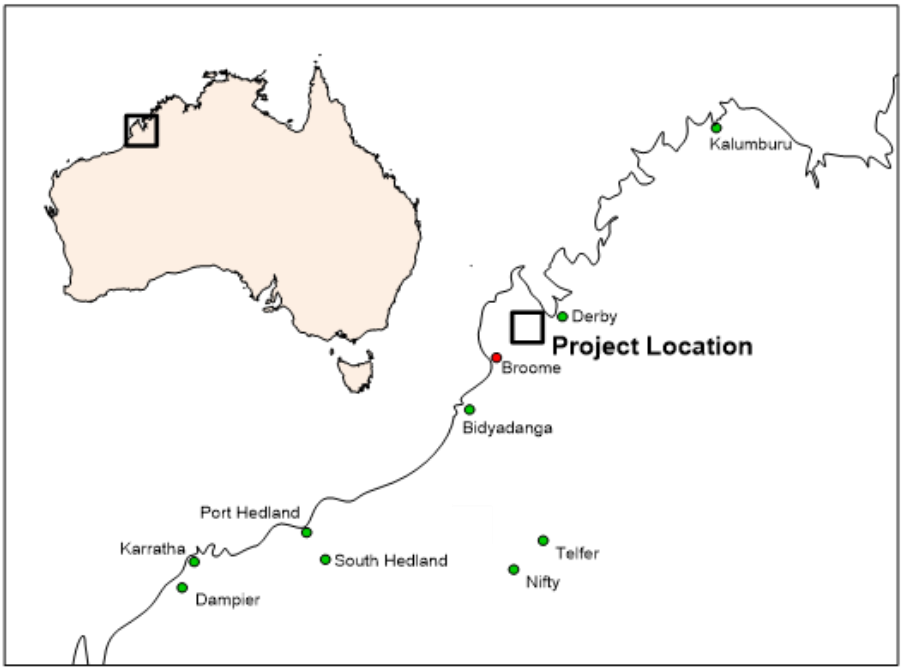

Figure 1: Location of Thunderbird Operations

Thunderbird is the first significant heavy mineral sand deposit to be discovered in the Canning Basin and is one of the largest and highest-grade mineral sands deposits globally, including those currently in production. TOPL produces three concentrate products:

- Magnetic Concentrate (MC), a low-grade ilmenite product,
- Non-Magnetic Concentrate (NMC) product containing zircon and rutile, and
- Paramagnetic Concentrate (PMC) co-product containing titanium units in combination with iron oxides and monazite.

3.2. Geology

A stratigraphic column is presented in Figure 2. The deposit, hosted by highly weathered Broome Sandstone, contains valuable heavy minerals, including ilmenite, zircon, leucoxene, rutile and anatase. The mineralisation is in a thick, broad anticlinal sheet like body striking northwest, folded from flat dip to a dip of about four degrees, extending under cover to the southwest. The

areal extent, width, grade, geological continuity and grainsize of the Thunderbird mineralisation are interpreted to indicate an offshore, sub-wave base depositional environment, not unlike the interpreted depositional environment of the WIM 150 deposit of the Murray Basin in south-eastern Australia.

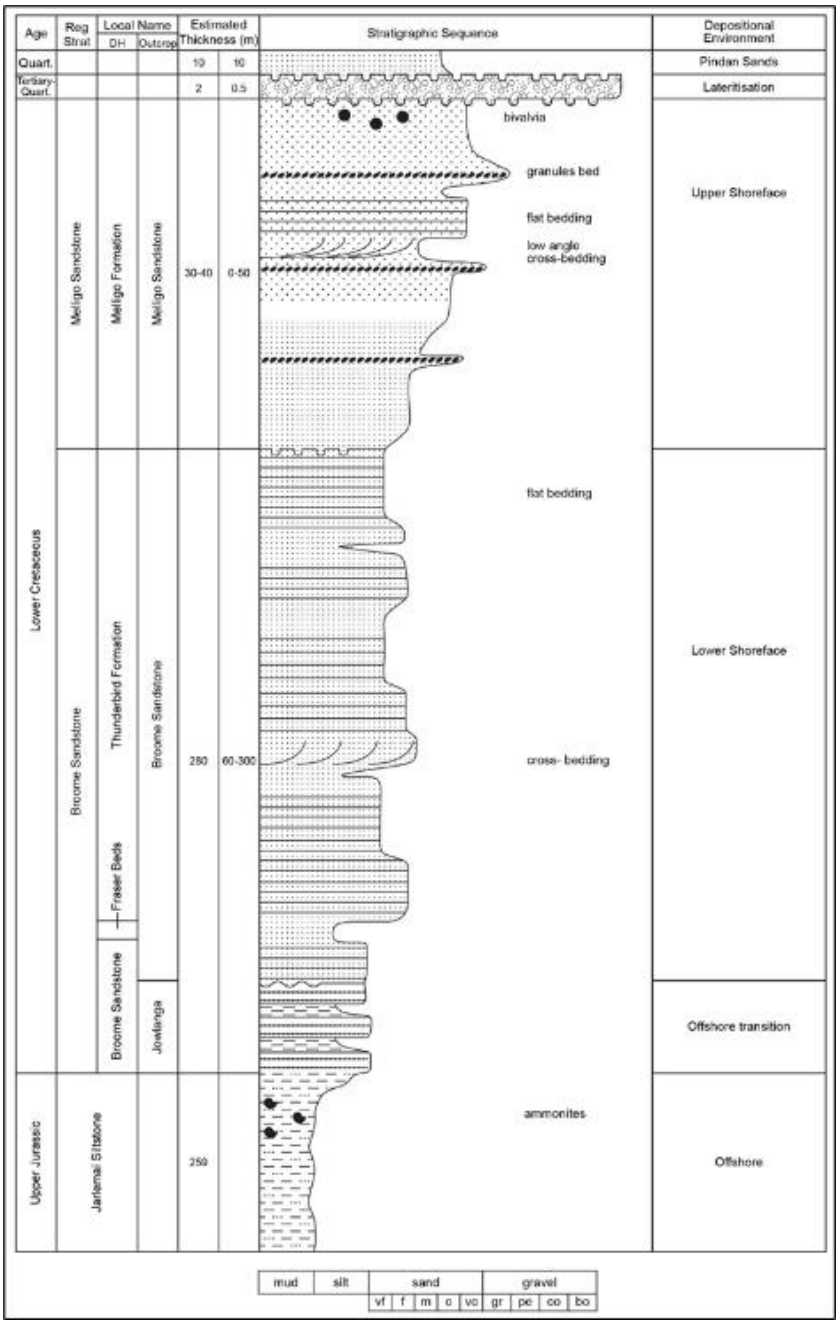

Figure 2: Stratigraphy of Thunderbird Operations

The orebody (Broome Sandstone) is overlain by the Meligo Sandstone and lastly the aeolian Pindan Sands (Figure 3 and 4). The latter are deposits of red sandy and silty soils of Quaternary age and form plains and low dunes on the Broome and Meligo Sandstone over much of the deposit

area. The thickness of Pindan varies from less than 1 m in the north and east where mineralisation comes to surface, to up to more than 20 m in the south and west. Currently, the Pindan Sands are being used to build the TSF embankments and causeway, but there is concern that there may not be sufficient volumes to cater for in-pit tailings embankments.

The Melligo Sandstone is the primary waste unit mined and has initially presented challenges to excavate due to sheets of ~0.5-1m thick silicified material that produced large boulders when broken. It is as yet unknown how extensive this presentation will be, but it is noted to conformably to disconformably overly the Broome Sandstone (and Thunderbird Formation). In outcrop it is variably silicified, with caps on hills formed from silcretised sandstone (Melligo Quartzite). Unsilicified Melligo Sandstone (weakly indurated/highly weathered) is described in the Mount Jowlaenga area on the basis of sedimentary structures and fabric.

In outcrop Melligo Sandstone is characterised as white, cream, and grey in colour and is typically a well sorted, well rounded, fine to medium grained quartz sandstone with fine planar and low angle cross bedding. Within this are poorly sorted, medium to pebble sized matrix supported beds containing well-rounded to polished chert and quartz pebbles. Fossilised bivalve casts and moulds, belemnites and bioturbation are commonly preserved throughout.

Within drill holes the Melligo Sandstone unit is predominantly a white-grey to yellow moderately sorted fine to medium grained tightly packed sand and highly weathered sandstone, with matrix-supported beds of polished chert and quartz pebbles (as seen in outcrop). Less commonly, it occurs as hard silcretised sandstone beds, typically between 10 and 61 cm thickness with close jointing and loose sand interlayers.

Figure 3: Upper portion of drillhole THSD007 noting Pindan Sands and Melligo Sandstone intersections.

Figure 4: Excavation face noting Pindan Sands and Melligo Sandstone intersections

3.3. Mining Method

Bulk mining is the preferred mining method for the project, based on the assessment of material excavatability. The bulk mining will incorporate dozer traps and in-pit feed preparation units. Topsoil and overburden will be excavated and transported by rigid and articulated dump trucks to stockpile areas (Figure 5).

Figure 5: Pindan Sands and Melligo Sandstone waste stockpile

Gross Oversize material from the in-pit feed preparation unit will be transported to available voids/stockpile areas (Figure 6) within the active pit using rigid and articulated dump trucks. The classified ore (produced by the in-pit feed preparation unit) will be pumped to the process plant as a slurry and the oversize material washed through the DMU and not sent to the WCP (12mm to 350mm) will be transported to available voids/stockpile areas (Figure 7) within the active pit using rigid and articulated dump trucks. This last material could potently be used as filtration material because it is free of fines and has low percentages of Sands.

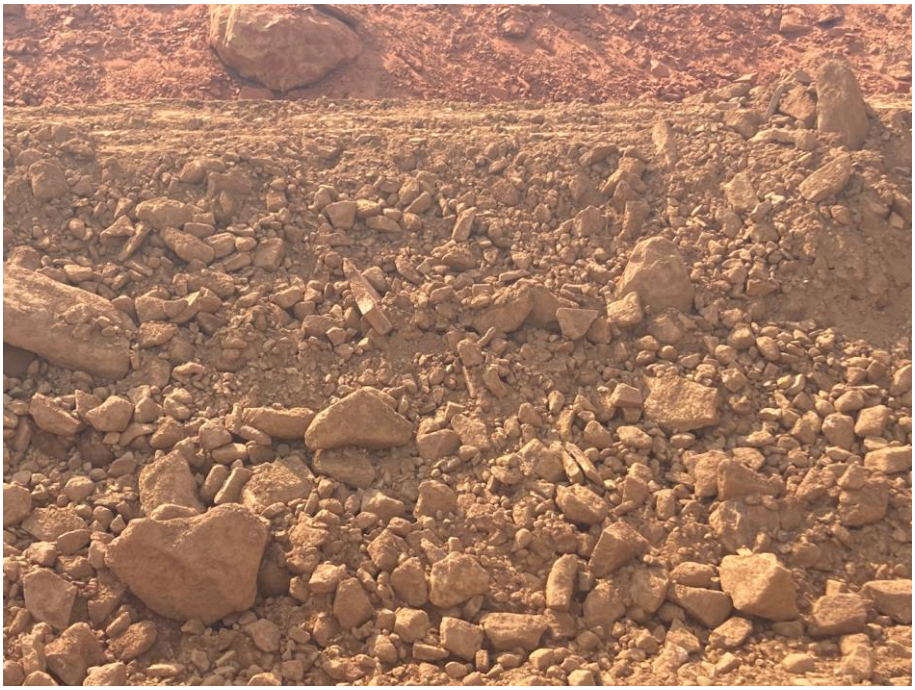

Figure 6: Gross oversize material from the in-pit feed stockpiled.

Figure 7: Oversize material from the DMU plant (12-350mm).

A generalised schematic of the mining sequence is illustrated in Figure 8.

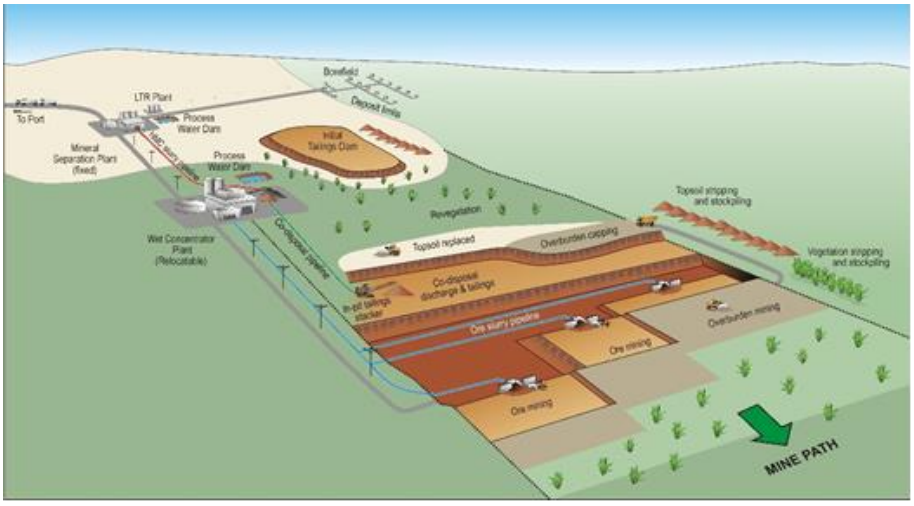

Figure 8: Schematic of mining sequence and activities.

3.4. LOM production plan

The current Stage One (single MUP production profile) LOM for the Thunderbird project is 37 years.

The initial 5 year pit development (2023-2028) is illustrated in Figure 9.

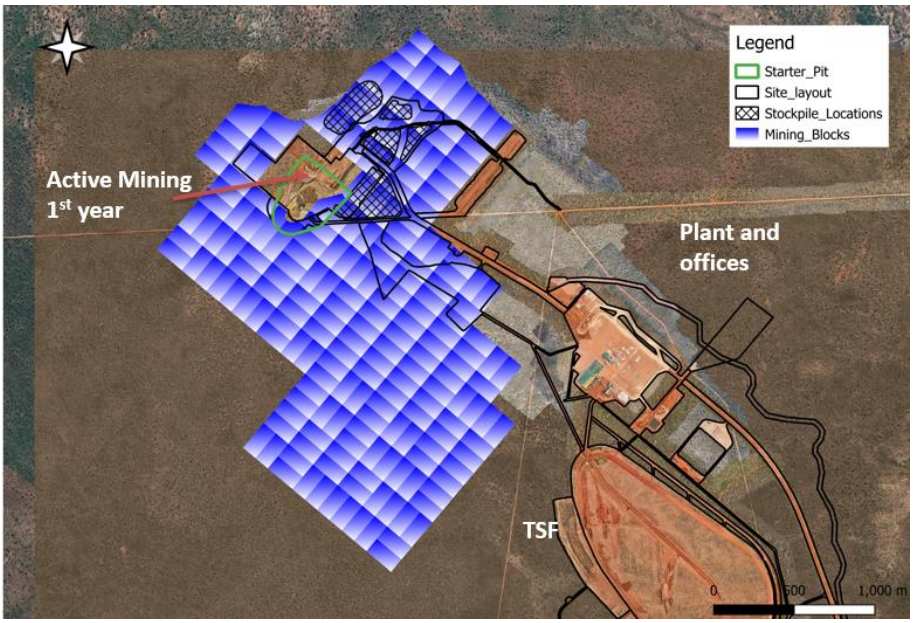

Figure 9: Pit development 2023-28.

A shorter term pit development (2023-2024) is illustrated in Figure 10.

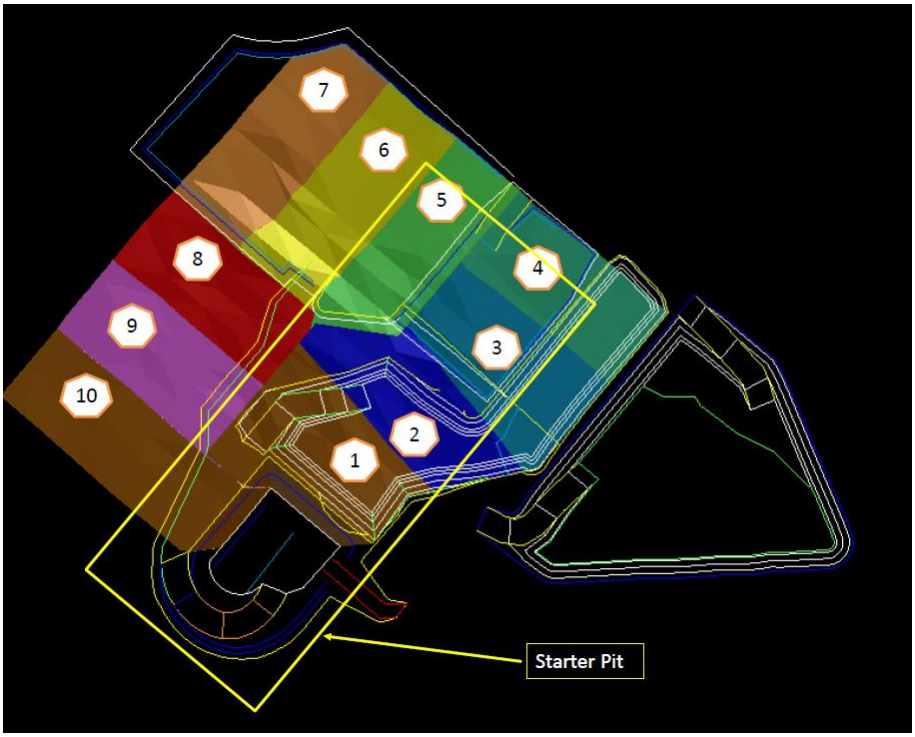

Figure 10: Pit development 2023-24

Table 3 summarises mine development physicals for the initial 5 year and LOM periods, with annual breakdown for the first 5 calendar years.

Material (MTonnes)	Period						
	2023-24	2025	2026	2027	2028	5-Year Total	LOM Total
Ore Mined to MUP	12.2	11.1	11.1	11.5	12.2	57.9	369
Waste Mined	7.9	8.6	8.6	2.8	0	27.9	389
Mineralised Waste Mined	6.2	5.7	5.7	2.2	0	19.8	166
Unmineralised Waste Mined	1.7	2.9	2.9	0.6	0	8.1	223
Waste Mined to Stockpile	3.2	0	0.4	0.2	0	3.8	12
Waste Mined direct to Void	4.7	8.6	8.2	2.6	0	24.1	378
Heavy Minerals	1.8	1.7	1.6	1.8	1.8	8.8	50
Tailing	8.9	8.0	8.2	8.2	8.4	41.7	273
• Slimes	2.0	1.8	1.9	2.0	2.0	9.7	57
• Sands	6.9	6.2	6.3	6.2	6.4	32	216

Table 3: Summary, mine development physicals

Mine development is anticipated to remain above the water table for approximately 14 years, after which the increasing pit depth will see interaction below the currently interpreted water table surface (Figure 11).

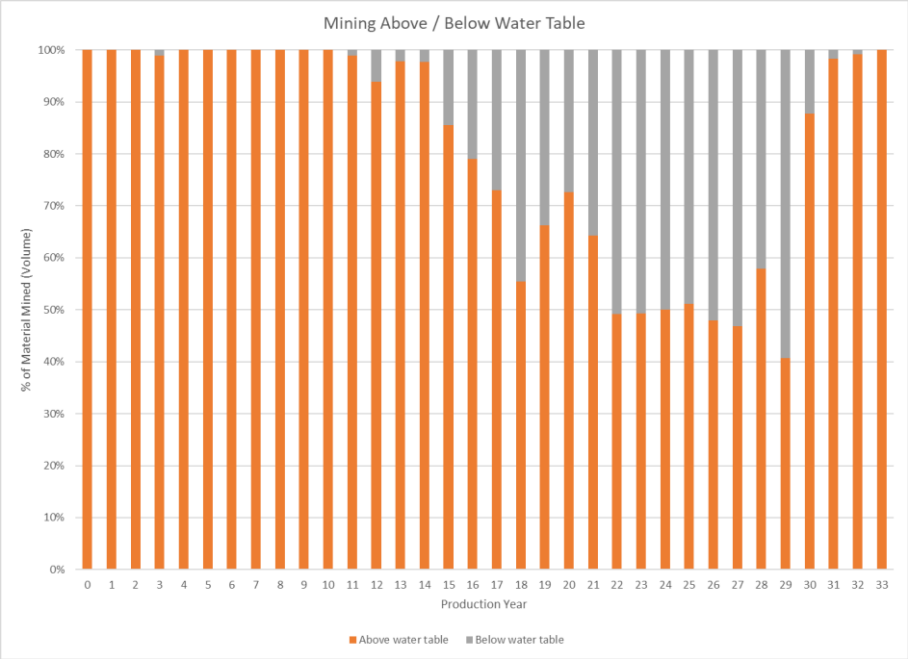

Figure 11: LOM interaction with anticipated water table

3.5. Tailings Storage Requirements

The predicted annual tailings production for an inferred 37-year life of mine (LOM), is illustrated in Figure 12.

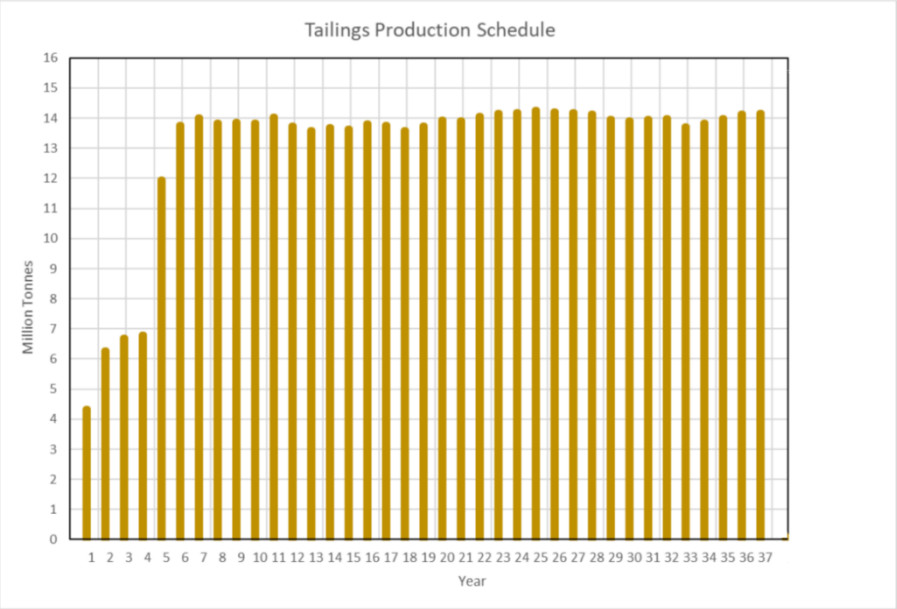

Figure 12: TOPL Tailings Production Schedule

The storage capacity considered for the design of the initial TSF is approximately 19 Mt providing a storage life of about two years (not part of this RFQ), however TOPL has planned to commence the in-pit deposition in 18 months leaving 6 months redundancy into the TSF facility. After that period, tailings generated during mining operations will be disposed into the cells located within the mine void (In-Pit TSF part of this RFQ). Figure 13 illustrates the current LOM void backfill sequence and progression, which encompasses a high-level scheduled return of waste overburden, oversize reject and co-disposed tails to the developing mine void. More detailed annual backfill progression for the initial 5-year period is included in Appendix A.

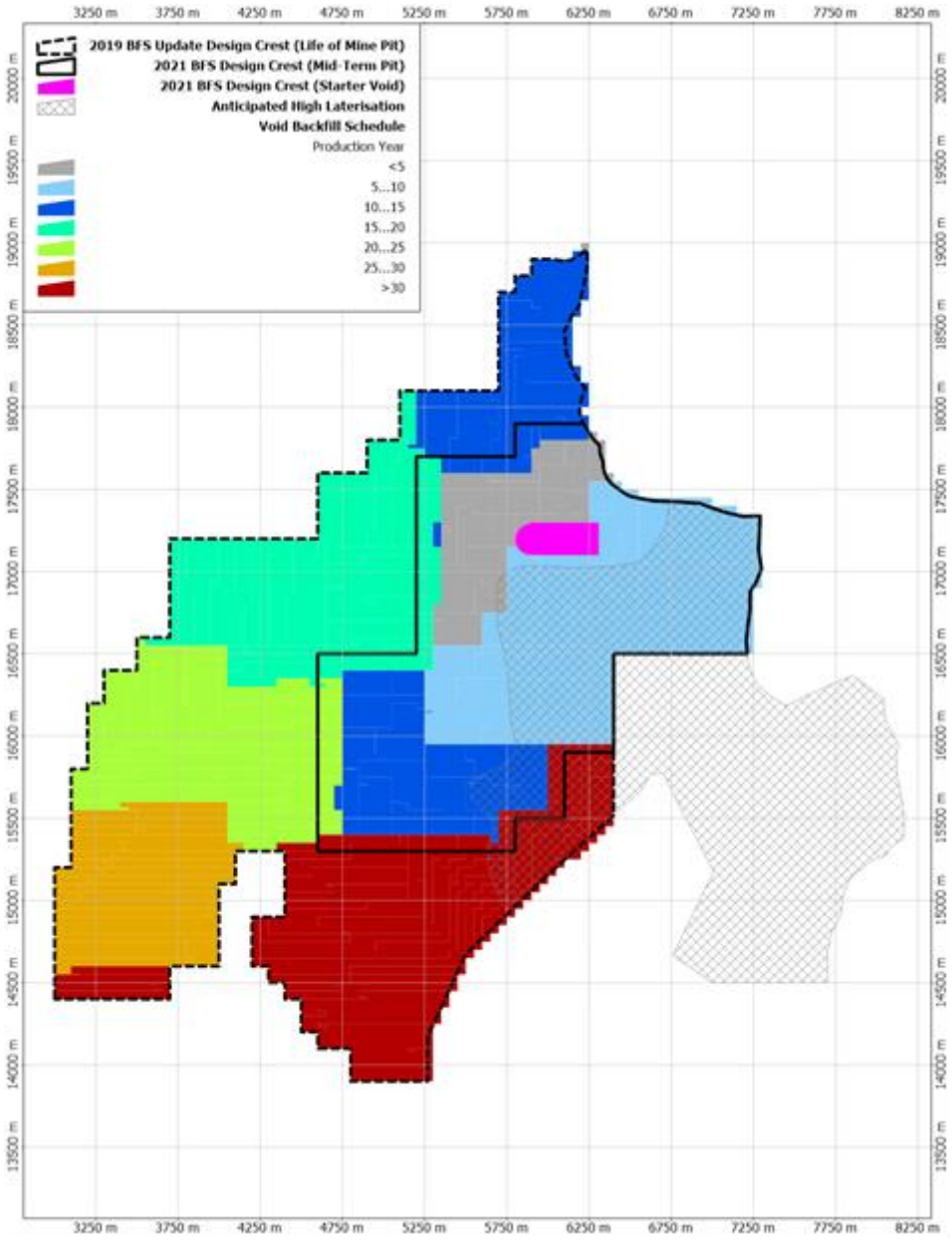

Figure 13: TOPL void backfill sequence

3.5.1. Tailings Production

Based on mass balance data provided by GR Engineering Services (November 2021), the Basis of Design details for tailings production are:

- Co-disposal slurry solids concentration (Cw) 46.1%
- Nominal co-disposal deposition rate 1,277 dtph @ 1.49tonnes/m3
- WCP Plant availability 85%

- Nominal co-disposal annual deposition 9.5 Mt
- Sand/Slimes ratio 79:21
- Tailings Initial Settled Density 1.5 tonnes/m3

3.5.2. Tailings Beach Properties (Design summary from ATCW for initial TSF)

3.5.2.1. Density

Based on the results of laboratory testing and benchmarking with other mineral sands deposits, the overall tailings deposit dry densities adopted for the purposes of the storage capacity assessment for the Initial TSF are:

- Lower limit: 1.4 t/m3 (drained initial settled density).
- Upper limit: 1.6 t/m3 (shrinkage limit density).
- Design value: 1.4 t/m3

At the design initial settled density, daily tailings beach accretion is approximately 14,700 m3.

3.5.2.2. Beach Slope

A tailings beach slope of 1% was postulated in the BFS; however, ATCW for the TSF considering their previous experience with the technique of in-line flocculation of predominantly sandy tailings, the deposited strength is a much more significant factor, provided control is maintained over the flocculant/polymer addition at the pipe head.

The resulting beach slope is typically much steeper than would be predicted by estimates for conventional deposition. Beach slopes as high as between 5% and 10% have been observed in operational mineral sands tailings facilities.

The methodology for beach slope predictions is based on the infinite slope theory (a methodology ATCW has employed for numerous years for secondary flocculated tailings as designer for the initial TSF), and the results are sufficiently conservative for the purposes of the current design.

Utilising an infinite slope concept, the estimated tailings beach profile for the purpose of design has been calculated by adopting the following relevant parameters:

- Dry density: 1.2 t/m3 (lower bound value);
- Particle density: 2.77 g/cc;
- Undrained strength ratio (Su/σv): 0.2 (lower bound value).

The calculated beach slopes are 7% (upper), 5% (middle) and 3% (lower).

The laboratory test work completed by ATCW infers that initial settled dry density is likely to be at least 1.4 t/m3 and undrained strength ratio (Su/σv) could be as high as 0.8. In this instance, achieved beach slopes could be greater than assumed for design, in which case final perimeter embankment heights will be lower but the operational discharge causeway stage lifts will be higher.

TOPL has commence deposition into the TSF facility in late October 2023 and survey data have shown beach slopes (lower) approximately 2%.

Figure 14 shows the initial tailing deposition into the TSF.

Figure 14: View of TOPL TSF facility southern deposition side.

3.5.2.3. Run off

Bleed water release from the tailings beach at the deposition point is expected to be rapid, and drainage to the decant area will occur in relatively narrow channels across the tailings surface and the natural soils while they are exposed in the impoundment. For the purposes of assessing infiltration characteristics, it is assumed that the “wet” beach area will comprise 20% of the total tailings stack. No infiltration is assumed for the wet beach and operational pond areas.

3.6. Inputs from Client

3.6.1. Geotechnical/Geological available data

Geotechnical/Geological inputs could be found in the below reports previously completed for KMS by various consultancy companies over the past years.

3.6.1.1. ATCW, Feasibility Geotech investigation, pit area.

2014, 113094.01R01_REV0

Data:

- Geological Structure
- Site Investigations: BH
- In-situ testing: SPT, Falling Head Perm Test
- Lab testing: PSD, MC, AL, Triaxial Shear, Point Load and Uniaxial Compressive Strength
- Design: Open Pit Stability and Dredging potential

3.6.1.2. PGM, Geotechnical Window mapping of Trial Pit area

2020 202012 THTP007

Data:

- Site Investigations: Trial Pit slope mapping prior wet season

3.6.1.3. PGM, Geotechnical Window mapping of Trial Pit area post wet season

2021 20210802

Data:

- Site Investigations: Trial Pit slope mapping

3.6.2. Tailing available data

Tailing characteristics inputs could be found in the below reports previously completed for KMS by various consultancy companies over the past years.

TOPL is in the process of performing tailings material laboratory testing and data will be available in early 2024.

The tendering company is encouraged to provide guidance on the laboratory tests necessary for design of tailing facilities. TOPL is prepared to facilitate these tests, offering the option for them to be conducted either at our on-site laboratory facilities or at external off-site laboratories prior the awarding of the Consulting contract. Your insights and recommendations are valued, and we are committed to working collaboratively to ensure the testing process aligns with your needs and preferences.

3.6.2.1. Golder, Tailings Laboratory Testing.

2017 1664136-001-R-Rev0

Data:

- Index Tests: SG, PSD, Hydrometer testing, AL
- Polymer Treatment of samples
- Settling Tests
- Shrinkage Tests
- Slurry Consolidometer Tests
- Drying Columns
- Strength Tests: DSS, Triaxial

3.6.2.2. ATCW, Tailings Laboratory Testing.

2018 113094.05 R02

Data:

- Index Tests: Solids/moisture content (slurry), pH, EC, SG, PSD
- Flocculant Sighter Tests
- Drainage Tray Settling with base suction
- Rowe cell consolidation
- Sighter Tests with various polymer or flocculant selections and dosages
- Settling Tests
- Water release on deposition
- Beach slope
- Consolidation Tests

3.6.3. Environmental available data

3.6.3.1. MBS Environmental, Mine Residue Characterisation.

2016 Mine Residue Characterisation

Data:

- Determination the potential for acid and metalliferous drainage (AMD), neutral or saline drainage to occur from process waste streams.
- Environmental risk assessment

3.6.4. LOM available data

3.6.4.1. Entech Mining reports.

Mining schedules and models can be found in the below report, furthermore, KMS will constantly produce short/medium terms schedules and these will be provided to the consultant. 1 year plan will be available in yearly-mid January 2024

2021 Thunderbird Stage 1 – Enhanced Early Schedule and Mining Model Update

2023 5 year Void backfill Progression illustration

2023 3 Month Plan

3.6.5. SMP available data

3.6.5.1. GR Engineering Services, Process Plant EPC.

GRES has been the main contractor at Thunderbird and was engaged under EPC contract arrangement for Stage 1.

For the Co-disposal scope the below are the available documents

2022 KMP-2000-DSC-PR-2968775_8 Design Criteria Process Design Criteria and Mass Balance.

2021 Thunderbird Stage 1 – Enhanced Early Schedule and Mining Model Update

2022 Co-Disposal pump-pipes data

2023 Drawings: Mechanical, Piping and Electrical

2023 KMP-2000-PI-025_2 Mineral Processing Stage 1 Area 2600 - Tailings Storage Facility (TSF) - P&ID