



Tim Callaghan – Resource and Exploration Geology



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KING ISLAND SCHEELITE

HISTORIC TAILINGS

RESERVE ESTIMATION

Prepared for: King Island Scheelite Project.

Tim Callaghan, December 2011



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MAP CONVENTIONS

Coordinates in this report and in digital data associated with this report are recorded as GDA94 Zone 55.

RL's in this report are MSL.



EXECUTIVE SUMMARY

Historic production from the Dolphin and Bold Head Scheelite Mines continued intermittently from the 1930's to the 1990's. The process used a gravity recovery circuit and significant WO_3 is reported to have been lost to the tailings storage facility which was utilized since the early 1970's. The historic tailings storage facility (TSF) is located just east of the Dolphin Mine in an interdunal basin.

King Island Scheelite (KIS) have completed a study into the recovery and reprocessing of the tailings resource in conjunction with the redevelopment of the Dolphin and Bold Head Mines. A JORC compliant resource estimation forms the basis of the tailings reclamation project.

This Reserve Estimation has been produced for the purpose of reclaiming and reprocessing the historic tailings as part of the King Island Scheelite Project. The estimation is based on a kriged blockmodel and digital solid models created from basement and topographic data created in June 2011 (Callaghan, 2011).

The tailings reclamation plan and the design of a new TSF was completed for KIS by engineering consultants GHD in October 2011. GHD propose to reclaim the tailings using dry mining techniques and pumping the reclaimed tailings to the mill as a slurry. A new TSF will be constructed simultaneously to store the reprocessed tailings.

Capital and operating costs of the tailings reclamation were provided by GHD. Capital and operating costs associated with processing the tailings were provided by King Island Scheelite and GR Engineering. Metallurgical investigations and recovery figures from the tailings process were provided by KIS. Financial parameters and shipping and royalty payments were provided by KIS.

Assessment of the physical and financial inputs indicates that a cutoff of 0.10% WO_3 provides the optimum cash flow from the tailings reclamation project.

This Reserve has been estimated utilizing digital terrain models (DTM's) digitised on 40m space NE-SW sections. The sections utilize the provided design criteria and the 0.10% WO_3 cut blockmodel based.

The historic tailings contain a Proven Reserve in accordance with the 2004 edition of the JORC Code of **1.91Mt @ 0.19% WO_3 at a 0.10% WO_3 .**

Table 1. Historic Tailings Proven Reserve

	Mm3	Mt	WO_3 %
Cell 4	0.80	1.29	0.21
Cell 1,2 and 3	0.39	0.62	0.15
Total	1.19	1.91	0.19



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Appendix 2 – Data Discs

- DTM files of tailings basement, surface and reserve cells (Surpac, dxf)
- Block Modeled Resource Estimate (Surpac)
- King Island Tailings Reserve Estimate Report (pdf)

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1 INTRODUCTION

The Dolphin Mine is located in the southeastern corner of King Island, Tasmania. The Mine was originally operated by Geopeko Ltd. along with the satellite Bold Head Mine located several kilometers to the north.

The Dolphin and Bold Head Scheelite Mines operated intermittently since their discovery and start up in 1920 until the 1990, with several forced shutdowns due to low tungsten prices. The site was decommissioned and rehabilitated in 1990.

King Island Scheelite (KIS) have been investigating the potential of re-opening the mine. Initial investigations into the viability of an open cut and seawall were inconclusive and the focus has changed to rehabilitation of the underground workings and production from remnant resources.

Re-estimation of the Dolphin Resource based on geological domains used by Geopeko has resulted in the definition of an Indicated and Inferred Resource 8.94Mt @ 0.92% WO₃ at a cutoff of 0.25% WO₃ (Callaghan, 2010). A Probable Reserve of 3.27Mt @ 0.97% WO₃ at a 0.5% WO₃ cutoff (Fudge, 2011) has resulted in significant improvements in the viability of reopening the Dolphin Mine as an underground operation.

A request was made by KIS to investigate the potential of re-treating the historic tailings to provide an early cash flow during re-commissioning of the mine as well as providing an opportunity to extend the project life.

The historic TSF was utilized since the early 1970's until mine closure. It was constructed in an interdunal basin with a 9m rock wall on the seaward side and a 5m rock wall on the Bold Head Haul Road. A separation wall separates a polishing pond from the main storage facility. The historic mill used a gravity recovery circuit and significant WO₃ is reported to have been lost to the tailings storage facility. Recoveries of 80% were reported but may have been as low as 67% (Alan fudge pers comm).

Resource and Exploration Geology (REG) were contracted to complete a drilling program designed to provide a reliable resource estimation of the historic tailings. Tasmanian Drilling were contacted to complete the drilling program in March 2011. Samples were received from the laboratory and resource estimation completed in June 2011. The Tailings Dam is estimated to contain a total Measured Resource of **2.7Mt @ 0.17% WO₃** at a 0.08% WO₃ cutoff in accordance with the 2004 edition of the JORC Code.

Engineering consultants GHD were requested by KIS to complete a study into the design and cost estimation of tailings reclamation and disposal. Design parameters, reclaim method and capital and operating cost estimations from the GHD report have been used for estimation of the Tailings Reserve. Metallurgical recoveries and process cost estimations have been provided by KIS and GR Engineering. Financial parameters and shipping and royalty costs were provided by KIS.



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Technical studies providing the basis for this estimation, including resource estimation, mining methods, TSF design, mineral processing and financial evaluation have been completed by experienced consultants and KIS staff. This Reserve Estimation has been compiled by Tim Callaghan Resource and Exploration Geology using the data provided.



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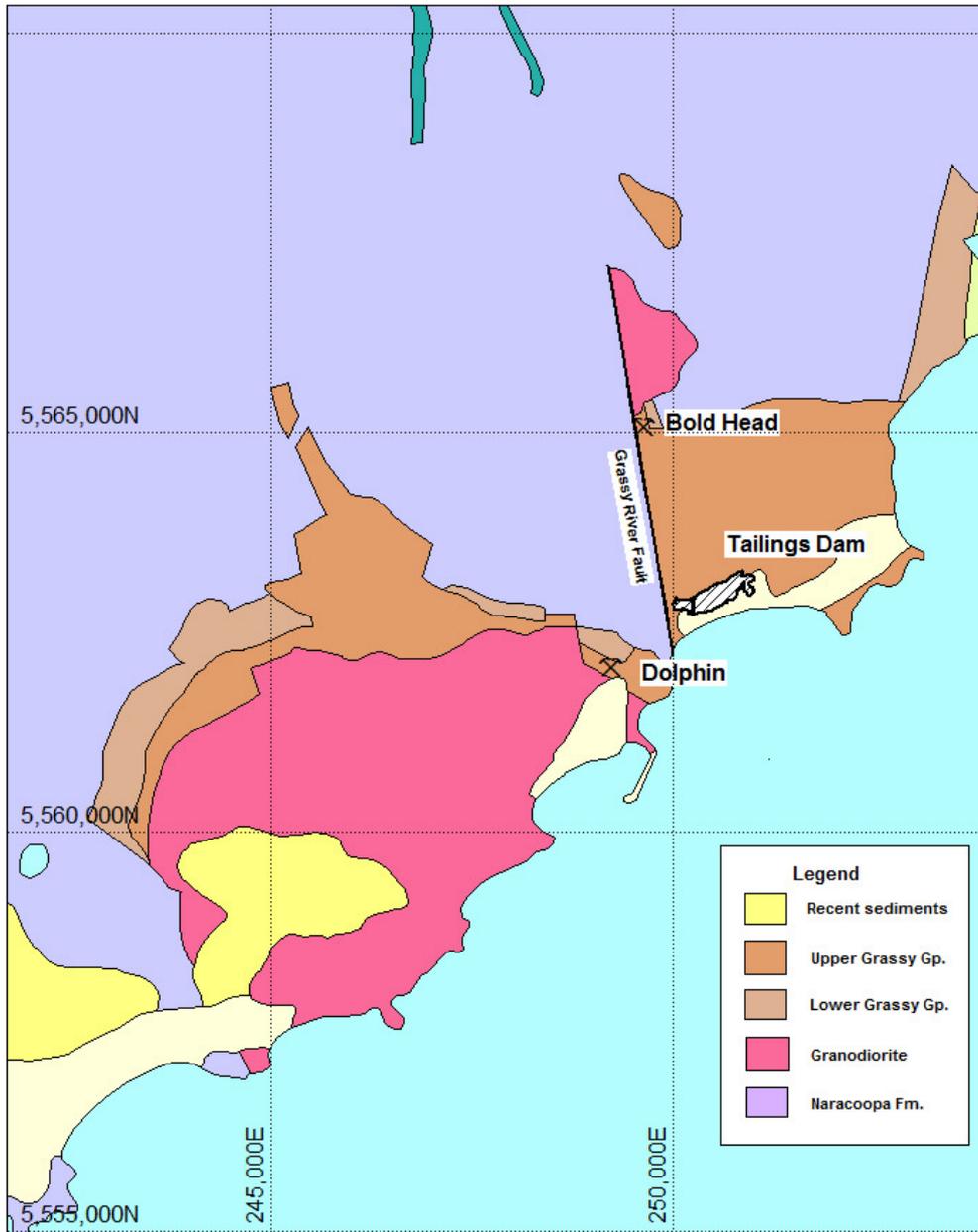


Figure 1. Dolphin Region Location Plan and Simplified Geology.



2 DATA

This Reserve Estimation is based on a kriged blockmodel estimation of the historic tailings resource completed in October 2011. The historic tailings facility is estimated to contain a Measured Resource in accordance with the 2004 JORC Code of **2.7Mt @ 0.17% WO₃** at a 0.08% WO₃ cutoff. The grade reconciles very well with historic production figures with an average tail grade of 0.17% WO₃. The tailings resource has been classified as a Measured Resource because the drill spacing of 40m is less than the variogram range of 60m, the tailings basement is well constrained by drilling and the grade reconciles very well with historic production figures.

Reclaim mining methodology and design has been provided by engineering consultants GHD (GHD report 55371-KIS Tails Reclaim Feasibility).

Data used for the estimate includes:

- Drilling database (REG, Access)
- Topographic DTM (REG, surpac)
- Resource Blockmodel (REG, surpac)
- Tailings reclaim plan (GHD dxf)
- Tailings storage facility plan (GHD dxf)
- Design criteria (GHD report)
- Financial parameters (KIS)
- Metallurgical recoveries (KIS)

Data provided with this report includes:

- Block modeled Resource Estimate (Surpac)
- Movable Resource Estimate Report (pdf)
- Reserve DTM's (Surpac)



3 RESERVE ESTIMATION

3.1 TAILINGS RECLAMATION MINING PLAN

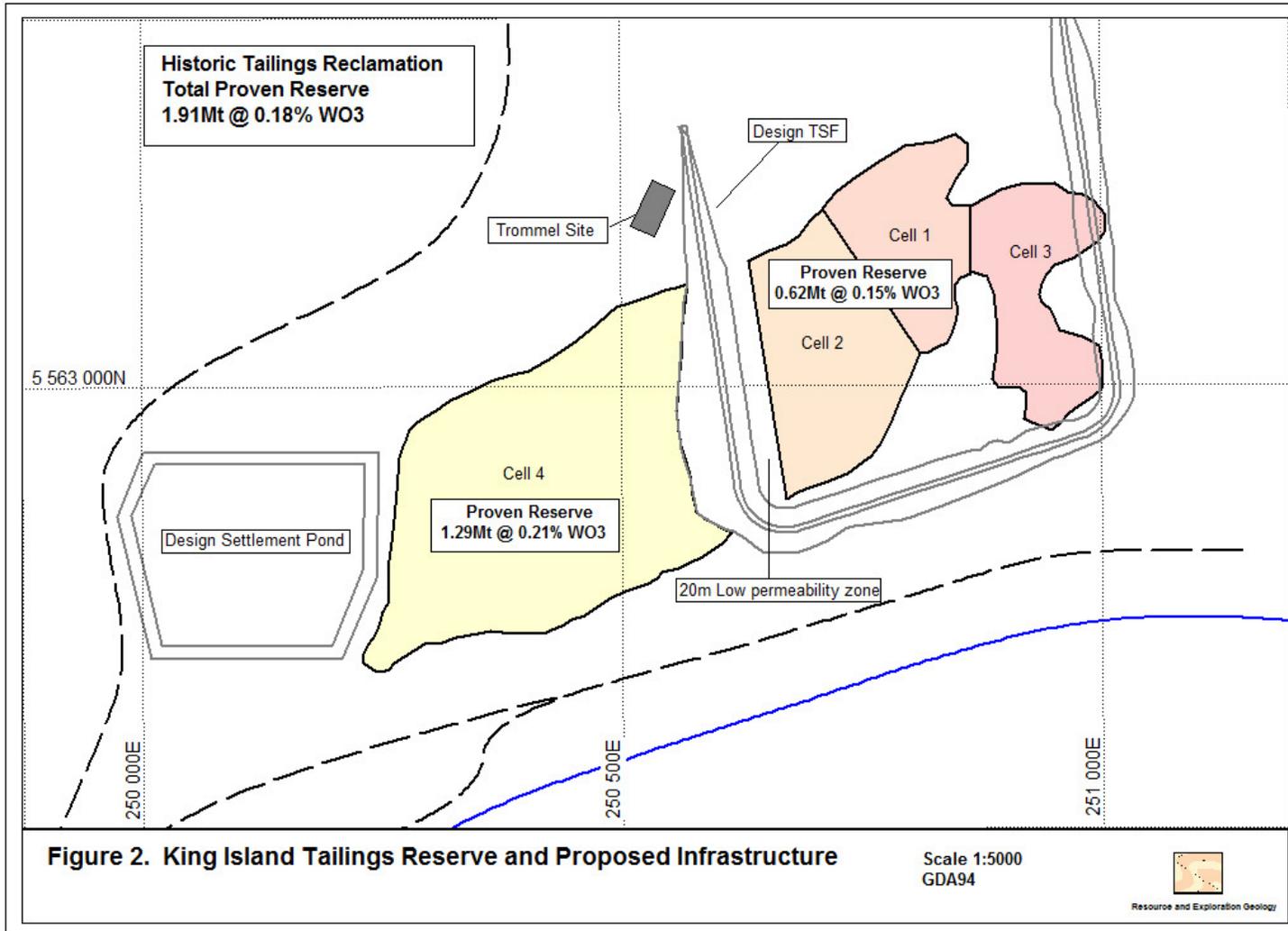
A TSF reclamation mining plan has been created by GHD and is documented in report *55371 KIS Tails Reclaim Feasibility*. The tailings reclamation will be undertaken using dry mining techniques with the active reclaim face appropriately benched and dewatered to reduce the risk of collapse. Reclaimed tailings will be stockpiled and fed into a slurry plant and pumped to the mill at a nominal rate of 165tph. Reclaim mining will operate on a 12hr day and the slurry plant will operate on a 24hr basis.

The GHD mining plan is to split the TSF into four mining cells, progressively mined in sequence to provide mill feed while simultaneously constructing storage capacity for disposal of reprocessed tailings. It is likely that a fraction of the reprocessed tailings will be used as cemented paste fill for the rehabilitation of the Dolphin Mine.

Cells 1, 2 and 3 are located in the eastern part of the TSF separated by the western arm of the proposed new TSF from Cell 4 to the west (Figure 2.) Cells 1, 2 and 3 are in low grade, generally coarser grained tailings while Cell 4 is higher grade but generally of a finer grain size. Part of Cell 4 is required to be mined early in the sequence to allow construction of the western wall of the new TSF.

The required reclaim fleet to meet production requirements and the various work components include:

- 1 CAT D7R Bulldozer
- 2 CAT 349E Excavators
- 3 CAT 740 Articulated Dump Trucks
- 1 CAT 980K Front End Loader
- 1 CAT 450E Backhoe Loader
- 1 Water Truck
- 1 Fuel/Service Vehicle





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3.2 RECLAMATION DESIGN ASSUMPTIONS

The following physical design assumptions were made in the development of the Tailings Reclamation plan:

Table 2. Reclamation Design Assumptions

Item	Assumption	Source/Reason
Reclaim exclusion zone around TSF edge to provide low permeability zone.	6.0m	GHD - Design
Reclaim exclusion zone around TSF dividing embankment to provide low permeability zone	20.0m	GHD - Design
Reclaim tailings at low efficiency and reduced production due to vegetation on floor of original tailings basin	1.0m	GHD - Design
Batter Slope on reclaim exclusion zones	1:3 (H:V)	GHD - Design
Dividing Embankment sterilization area	WO ₃ grade < 0.12%	Tailings Resource Blockmodel
Dry Mining Reclaim Rate	1.36Mtpa	KIS



3.3 CUTOFF GRADE OPTIMISATION

Input parameters used to investigate the effects of cutoff grade on the TSF reclamation cash flow include:

DOLPHIN TAILINGS CUT OFF GRADE OPTIMISATION		
	Input	Source
Start Up Capital		
Tailings Capex \$M	\$4.85	GHD
Mill Capex \$M	\$8.59	KIS/GR
Total capex \$M	\$13.44	
Physicals		
WO ₃ price \$/t	\$ 28,000	KIS
Recovery %	59%	KIS
Tonnes Mt	2.52	REG
Head grade %	0.18%	REG
Operating Costs		
Mining cost \$/t	\$5.74	GHD
Milling cost \$/t	\$9.79	KIS/GR
Royalties/Shipping \$/t	\$1.34	KIS/GR
Total Opex \$/t	\$16.87	
Revenue \$/t	\$29.74	
Gross Revenue \$M	\$74.93	
Pre Tax Cash Flow \$M	\$18.98	

The grade-tonnage curve figures at varying cutoff grades from the resource estimation (Figure 3) were input as variables to calculate the pre-tax cash flow using all the other physical and financial inputs. Analysis of the results indicates that an optimal cutoff between 0.10% and 0.12% WO₃ provides the best the best return for the project (Figure 4). To facilitate modeling and reduce internal dilution, a block cutoff of 0.10% WO₃ was used for reserve modeling.



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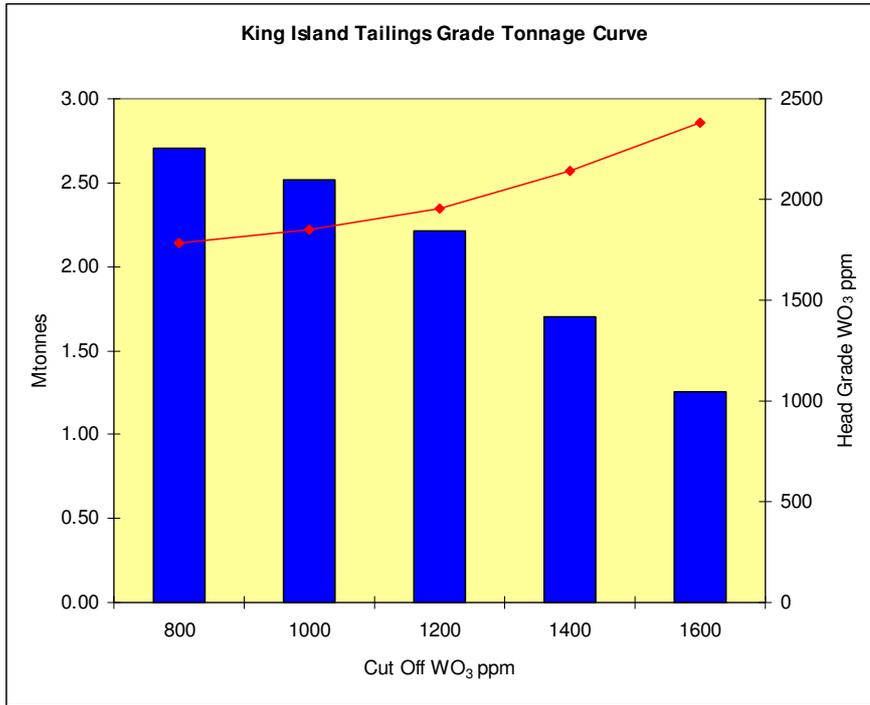


Figure 3. King Island Tailings Resource Grade-Tonnage Curve.

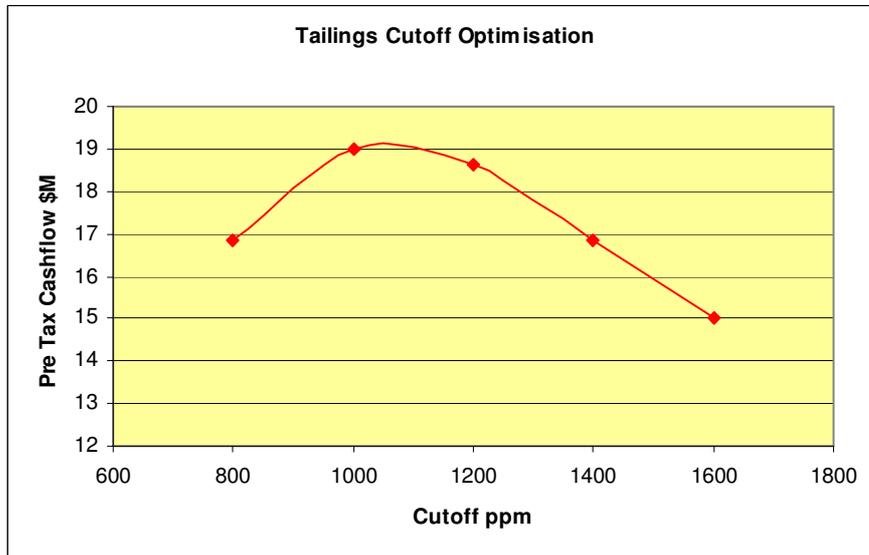


Figure 4 King Island Tailings Cutoff Grade Optimization Curve



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3.4 RESERVE ESTIMATION METHODOLOGY

The King Island tailings reserve was estimated utilising two DTM's (reserve_c1.dtm and reserve_c4.dtm) created on 40m spaced NW-SE oriented sections. The DTM basement was digitized to include mineralisation above the 0.10% WO₃ cut off as much as possible while respecting limitations of the mining equipment. Some internal blocks below the 0.10% WO₃ cutoff were included at higher levels if they were underlain by high grade blocks.

A 6m skin of tailings was left on the existing dam wall as a low permeability zone as required by the GHD design. The low grade tailings forming the base of the cutoff wall were excluded from the reserve. A 20m low permeability zone was excluded on the eastern side of the designed cutoff wall. A 1m skin was left on the base of the tailings dam to reduce dilution and to eliminate a possible zone of low productivity due to remnant vegetation on the base of the dam.

A reserve attribute was added to the blockmodel and a zone code of 1 was copied for the eastern DTM (reserve_c1.dtm) and 2 for the western DTM (reserve_c4.dtm). Reserve grade and tonnage figures were reported by reserve zone codes.



4 RESULTS

The Historic Tailings dam contains a Proven Reserve in accordance with the 2004 edition of the JORC code of 1.91Mt @ 0.19% WO₃.

Table 3. Historic Tailings Proven Reserve

	Mm3	Mt	WO₃ %
Cell 4	0.80	1.29	0.21
Cell 1,2 and 3	0.39	0.62	0.15
Total	1.19	1.91	0.19

Cell 4 located on the western side of the design cutoff wall contains 1.29Mt @ 0.21% WO₃. Cells 1, 2 and 3 located on the eastern side of the design cutoff wall contain 0.62Mt @ 0.15% WO₃. The significantly higher grade and tonnage of the Cell 4 will provide a higher cash flow at the start of operations. It is recommended that the mining sequence be reviewed to include early reclamation and processing of Cell 4.

The ore is categorized as a Proven Reserve as it was derived from a Measured Resource. It is considered that sufficient metallurgical testwork and technical studies by experienced and competent professionals into the reclamation process exists to justify the classification according to the 2004 edition of the JORC Code.

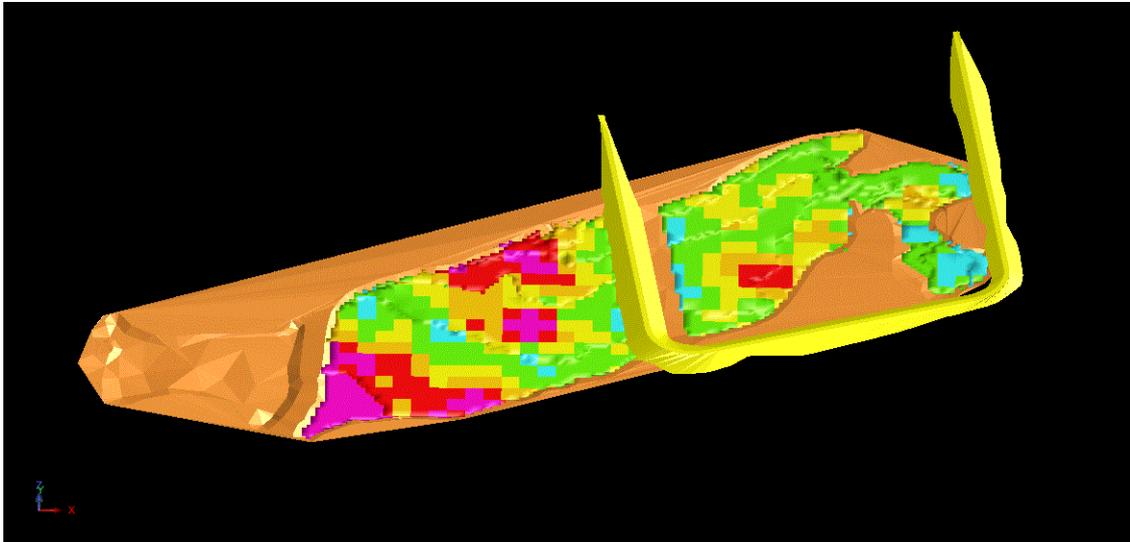
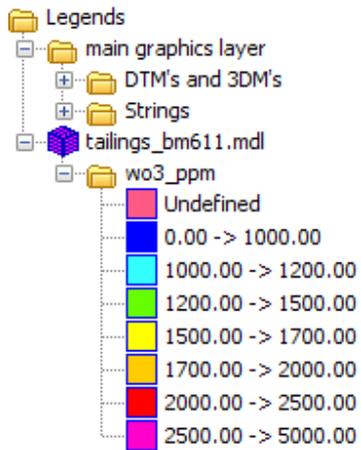


Figure 5. Historic Tailings Reserve blockmodel and design TSF looking north.





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ADDITIONAL NOTES

LIMITATIONS AND CONSENT

The report is provided to the King Island Scheelite Project in the context of a Mineral Reserve Estimate and should not be used or relied upon for any other purpose.

This report has been prepared using information available to the Author at the time of writing. The opinions stated herein are given in good faith and with the belief that the basic assumptions are factual and correct and the interpretations reasonable.

This report is not intended for the use as a public document nor, in whole or in part, in a public document without written consent to the form and context in which it appears.

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COMPETENT PERSON AND JORC CODE

This report was prepared in accordance with the 2004 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves' ("JORC Code") by Tim Callaghan, who is a Member of The Australian Institute of Mining and Metallurgy ("AusIMM"), has a minimum of five years experience in the estimation and assessment and evaluation of Mineral Resources and Reserves of this style and is the competent Person as defined in the JORC Code. This announcement accurately summarises and fairly reports his estimations and he has consented to the reserve report in the form and context it appears.

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STATEMENT OF INDEPENDENCE

Tim Callaghan has no material interest or entitlement in the securities or assets of the King Island Scheelite project or any associated companies.



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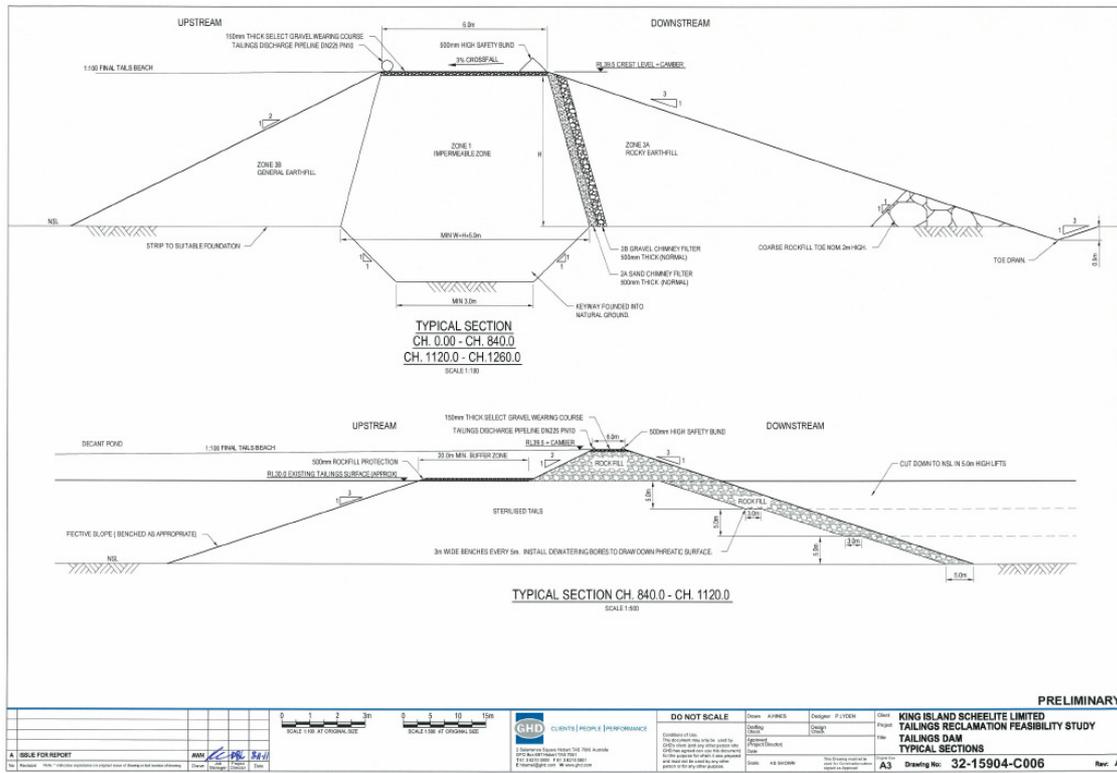
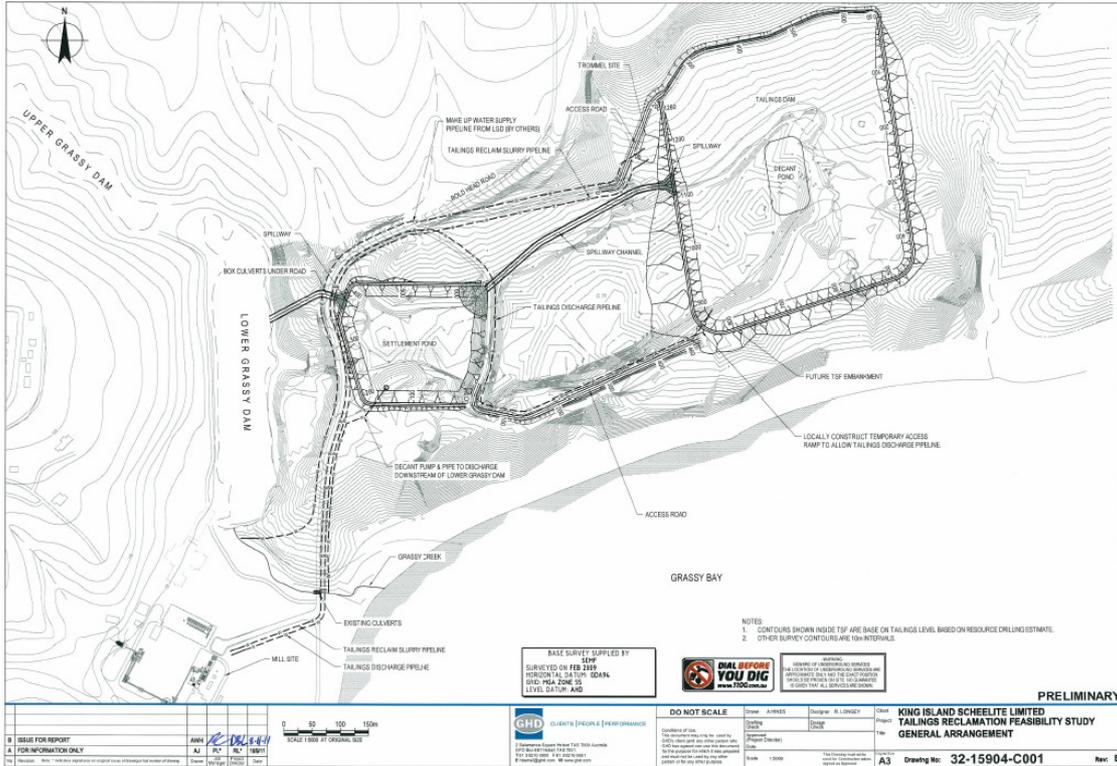


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Appendix 1
GHD Design Criteria

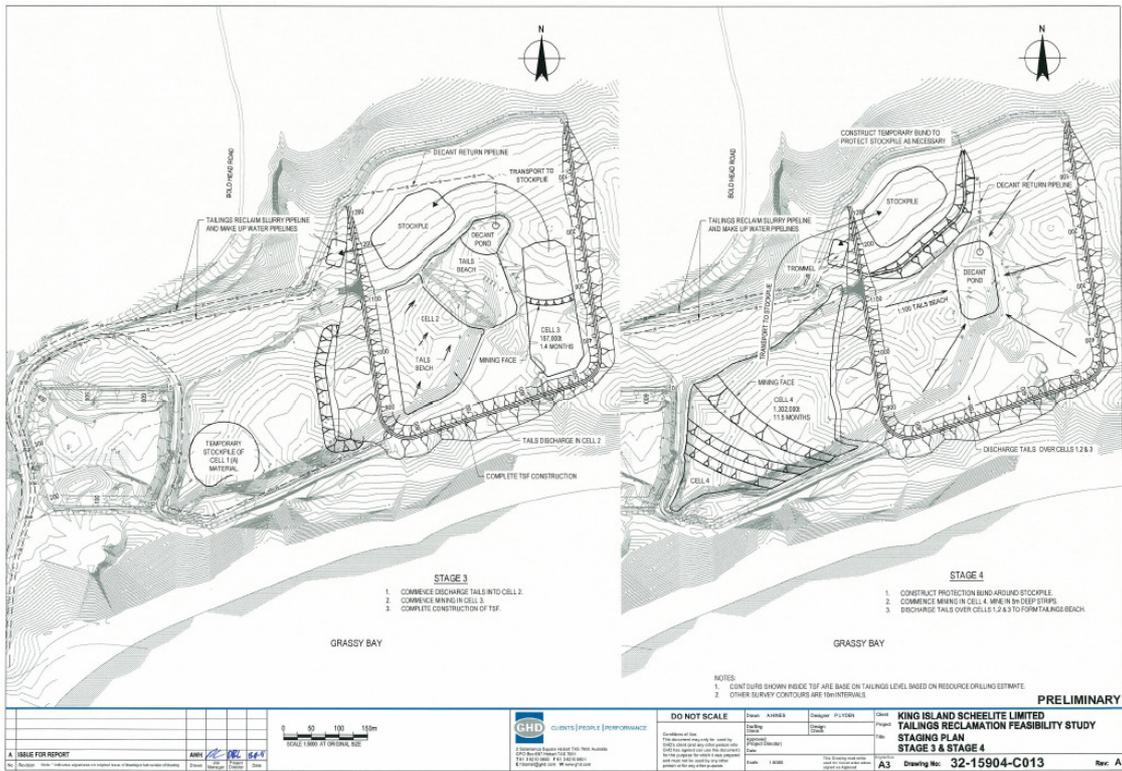
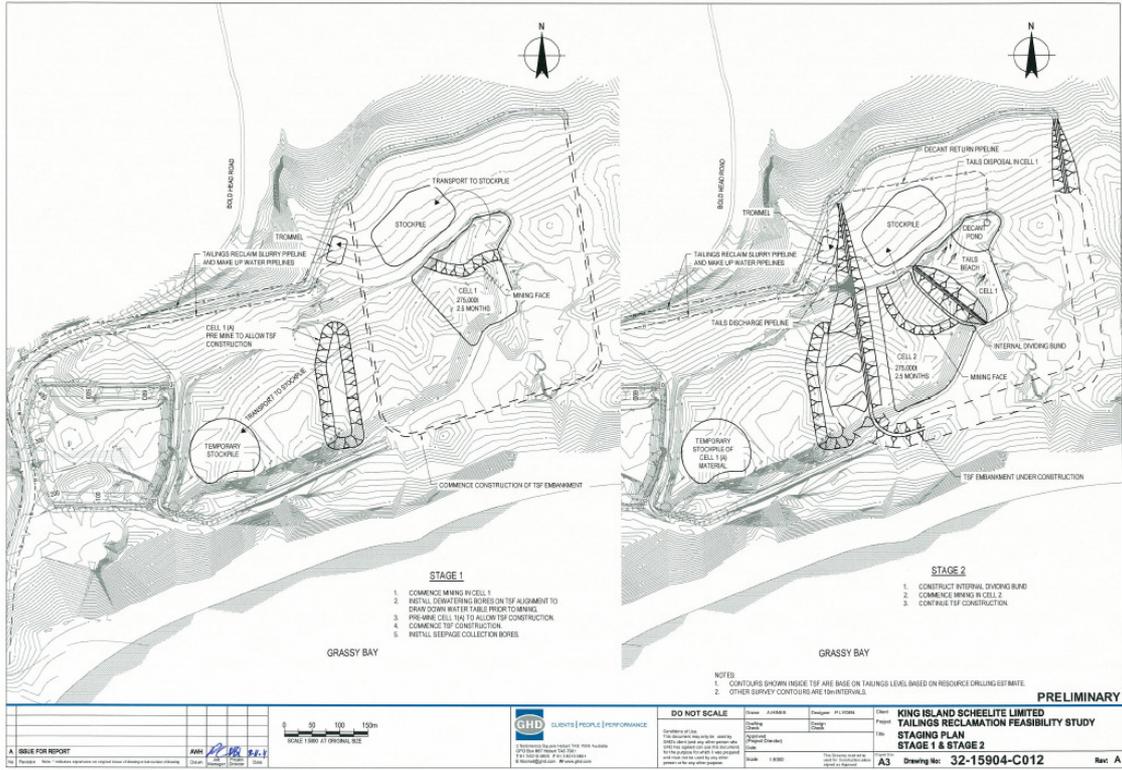


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