



MT CARBINE BANKABLE FEASIBILITY STUDY

CHAPTER 13: OPERATING COST ESTIMATE

DECEMBER 2021



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1. Introduction

1.1. Context

This Chapter 13: Operating Cost Estimate shall be read in conjunction with Chapter 1: Executive Summary and additional references as listed in Section 4.

1.2. Purpose

The purpose of Chapter 13: Operating Cost Estimate is to summarise the basis of the operating cost estimate used in the feasibility study.

2. Basis of Estimate

2.1. Accuracy of Estimate

All operating costs are presented in real terms as of 1 December 2021. All cost assumptions were derived from cost data from varying sources:

- Mining costs were developed using a combination of existing mining data combined with contractor pricing and consultant input (DAS Mining Solutions);
- Crushing screening and sorting pricing from existing data combined with consultant pricing (Mincore); and
- Processing plant pricing from existing data combined with consultant pricing (Ausenco).

Based on the alignment between contract data, and DAS Mining Solutions equipment data base, the order of accuracy for mining equipment has been determined to be between -10%/+15%. This order of accuracy also applies to the crushing, screening, sorting, and gravity processing opex costs based on current expenditure at Mt Carbine.

2.2. Source Documentation

For the compilation of the operating cost estimate, all activities were identified relating to the extraction of ore from the open pit mine and LGS to loading of trucks at the mine gate. Cost estimates were then developed for each activity benchmarked against the following:

- First principles estimates;
- Consultants' data derived from similar external projects;
- Use of actual costs from the existing operation; and
- Contracts currently in place at Mt Carbine.

The activities were separated into:

- Mining activities to deliver ore to the ROM pad;
- Crushing, screening, and sorting;
- Processing; and
- Other site related costs including:
 - Electricity and Water;
 - Accommodation;
 - Site management and support;
 - Insurance fees;
 - Hire / rental costs; and
 - Environmental – rehabilitation and mine closure costs.

2.3. Key Assumptions

The key assumptions utilised in the operating cost estimate are included in Table 1.

Table 1: Operating Cost Estimate Key Assumptions

Item	Assumption
Base Data	Products or services used in more than one function of the operation were identified and used as standard cost assumptions. These items include diesel fuel, explosives, and electricity.
Diesel Fuel Prices	The fuel price is based on the current average prices of existing operations at Mt Carbine. The wholesale cost of diesel fuel was estimated at AUD1.401. Upon application of the diesel rebate (after GST removal) of AUD0.401/L, the diesel price used for opex costs was AUD1.00.
Explosives Costs	Estimates were provided for drill and blast costs by consultants DAS Mining Solutions, with pricing estimates based on recent experience and unit drill and blast costs benchmarked against contractor pricing from Orana Drilling. Prices were all inclusive as a rock on ground (AUD2.83/BCM) service to include drilling, emulsion supply, loading, stemming, and shot firing.
Electricity	The electricity price is based on the forecast provided by the current mine supplier (Ergon). Forecasted data is based on recent historical usage and was considered the most accurate. The electricity price used for opex costs was AUD0.19 per kWh.
Exchange Rates	The base case AUD/USD foreign exchange forecasts assumed for the duration of the operations was 0.73.

2.4. Operating Cost Estimation Process

The development of the operating cost required the use of the basis of estimate methodology, base data assumptions, key equipment assumptions with a suite of software.

The initial mine pit shell was developed in Maptek Pit Optimizer software, based on a set of technical and financial inputs. Following the application of practical constraints, the resultant pit shell and reserves were optimised using Comet Strategy software. This software was utilised to determine the optimal strategic mine plan which was then further detailed in Spry mine scheduling software.

The operating costs for the existing crushing and processing equipment were developed based off historical maintenance and operating cost data.

Additional operating costs from new crushing, screening, sorting, and processing equipment was developed by consultants using vendor recommendations and historical knowledge for maintenance requirements, consumables consumption and power requirements.

Mobile fleet operating costs were developed through a combination of site-specific historical labour costs, OEM performance and maintenance requirements, and vendor recommendations.

3. Operating Costs

3.1. Operating Cost Summary

All operating costs are presented in real terms as of December 2021. A summary of the per tonne operating costs is provided in Table 2, Table 3 shows the project physicals and total costs per year for each activity. Table 4 presents the project costs by year per tonne of concentrate by activity. All revenue and cost values are in AUD unless otherwise specified.

Further details pertaining to the development of the mining and processing scope and costs can be found in Chapter 4: Mining and Chapter 5: Processing.

Table 2: Summary of Operating Costs per Tonne

Operating Cost Item	Cost (USD)
Operating costs of FCA (real) steady state life of mine (C1 cash costs)	113/mtu
Operating Cost Components	Cost (AUD)
Mining Costs	
<ul style="list-style-type: none"> Open cut mining costs of for mining of the open pit by a contractor 	4.50/ ROM t
<ul style="list-style-type: none"> Phase 2 Mining for 24/hr operations 	2.47/t
<ul style="list-style-type: none"> Phase 1 Mining for 12/hr operations 	1.68/t
Mine Closure/Rehabilitation & Ancillary Equipment	0.26/t
Dry processing costs	2.00/t (feed)
Ore Sorting costs	1.49/t (feed)
Gravity processing plant costs incl. by-product management	12.45/t (feed)
Other costs based on internal estimates, lease vehicles, grade control, sampling, drilling and lab testing, contractor mobilisation to site, maintenance facility cost and contractor demobilisation.	1.98/t

Table 3: Project Physicals

Period Name	LOM TOTAL	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Cut Off Grade: Cut-off grade	0.075%	0.0750%	0.0752%	0.0750%	0.0754%	0.0750%	0.0750%	0.0750%	0.0750%	0.0750%	0.0750%	0.0750%	0.0750%
Key Material Properties													
Total Period:Mass (kt)	25,201.45	1,000.00	5,993.19	5,999.79	4,418.43	1,014.37	1,000.00	989.58	1,000.00	1,000.00	1,000.00	1,000.00	786.09
To Ore:Mass (kt)	11,382.26	1,000.00	948.62	870.64	783.67	1,003.67	1,000.00	989.58	1,000.00	1,000.00	1,000.00	1,000.00	786.09
To Ore:Grade_WO3 (%)	0.146%	0.075%	0.198%	0.361%	0.637%	0.077%	0.075%	0.075%	0.075%	0.075%	0.075%	0.075%	0.075%
To Ore:TotalTungsten (kt)	16.61	0.75	1.88	3.14	4.99	0.77	0.75	0.74	0.75	0.75	0.75	0.75	0.59
ROM Ore Grade	0.146%	0.075%	0.198%	0.361%	0.637%	0.077%	0.075%	0.075%	0.075%	0.075%	0.075%	0.075%	0.075%
To Waste:Mass (kt)	13,819.19		5,044.57	5,129.15	3,634.76	10.70							
To Waste:Ore_Mass (kt)	8.23		5.95		2.28								
To Waste:TotalTungsten (kt)	0.00617		0.00446		0.00171								
Waste Ore Grade	0.075%		0.075%		0.075%								
To Fines:Mass (kt)	4,097.61	360.00	341.50	313.43	282.12	361.32	360.00	356.25	360.00	360.00	360.00	360.00	282.99
To Fines:Fines_Tungsten (kt)	8.97	0.41	1.01	1.70	2.70	0.42	0.41	0.40	0.41	0.41	0.41	0.41	0.32
Fines Ore Grade	0.219%	0.113%	0.297%	0.541%	0.955%	0.115%	0.113%	0.113%	0.113%	0.113%	0.113%	0.113%	0.113%
To Bypass:Mass (kt)	6.41		1.03	1.62	3.75								
To Bypass:Bypass_Tungsten (kt)	0.18		0.03	0.04	0.11								
Bypass Ore Grade	2.831%		2.895%	2.744%	2.851%								
To Ore Sorter Feed:Sorter_Feed_Mass (kt)	7,278.24	640.00	606.08	555.59	497.79	642.35	640.00	633.33	640.00	640.00	640.00	640.00	503.10
To Ore Sorter Product:Mass (kt)	670.15	44.79	65.47	88.90	122.13	45.36	44.79	44.33	44.79	44.79	44.79	44.79	35.21
To Ore Sorter Product:Sorter_Tungsten (kt)	6.71	0.31	0.75	1.26	1.97	0.32	0.31	0.31	0.31	0.31	0.31	0.31	0.24
Sorter Product Ore Grade	1.002%	0.693%	1.146%	1.417%	1.613%	0.705%	0.693%	0.693%	0.693%	0.693%	0.693%	0.693%	0.693%
To Gravity Plant Feed - Fines Mass:Mass (kt)	4,097.61	360.00	341.50	313.43	282.12	361.32	360.00	356.25	360.00	360.00	360.00	360.00	282.99
To Gravity Plant Feed - Coarse Mass:Mass (kt)	676.56	44.79	66.50	90.53	125.88	45.36	44.79	44.33	44.79	44.79	44.79	44.79	35.21
To Gravity Plant Feed:Mass (kt)	4,774.18	404.79	408.00	403.96	408.00	406.68	404.79	400.58	404.79	404.79	404.79	404.79	318.20
To Gravity Plant Feed - Tungsten Fines:Mass (kt)	8.97	0.41	1.01	1.70	2.70	0.42	0.41	0.40	0.41	0.41	0.41	0.41	0.32
To Gravity Plant Feed - Tungsten Coarse:Mass (kt)	6.90	0.31	0.78	1.30	2.08	0.32	0.31	0.31	0.31	0.31	0.31	0.31	0.24
Gravity Plant Feed Grade	0.332%	0.177%	0.440%	0.743%	1.170%	0.181%	0.177%	0.177%	0.177%	0.177%	0.177%	0.177%	0.177%
To Produced Concentrate - Fines:Mass (kt)	14.26	0.64	1.61	2.70	4.29	0.66	0.64	0.64	0.64	0.64	0.64	0.64	0.51
To Produced Concentrate - Coarse:Mass (kt)	12.41	0.56	1.40	2.35	3.74	0.58	0.56	0.55	0.56	0.56	0.56	0.56	0.44
To Total Produced Concentrate:Mass (kt)	26.68	1.20	3.02	5.04	8.02	1.24	1.20	1.19	1.20	1.20	1.20	1.20	0.95
To Gravity Plant Tailings:Mass (kt)	4,747.50	403.59	404.98	398.91	399.98	405.44	403.59	399.39	403.59	403.59	403.59	403.59	317.26
Operating Costs													
Management & Other Fixed Overheads (\$M)	(29.964)	(1.969)	(3.822)	(3.465)	(3.630)	(2.412)	(2.162)	(2.162)	(2.162)	(2.162)	(2.162)	(2.162)	(1.699)
OC Mining cost - Phase 3B: Cash Flow Total (\$M)	(3.611)		(3.543)	(0.068)									
OC Mining cost - Phase 4B: Cash Flow Total (\$M)	(64.230)		(20.051)	(24.906)	(19.208)	(0.065)							
LGS Mining cost - LGS1: Cash Flow Total (\$M)	(7.530)	(1.677)	(1.258)	(0.755)	(0.252)	(1.677)	(1.677)	(0.234)					
LGS Mining cost - LGS2: Cash Flow Total (\$M)	(9.453)							(1.426)	(1.677)	(1.677)	(1.677)	(1.677)	(1.318)
Dry Processing cost: Cash Flow Total (\$M)	(22.820)	(2.005)	(1.902)	(1.746)	(1.571)	(2.012)	(2.005)	(1.984)	(2.005)	(2.005)	(2.005)	(2.005)	(1.576)
Ore Sorting cost: Cash Flow Total (\$M)	(7.690)	(0.676)	(0.640)	(0.587)	(0.526)	(0.679)	(0.676)	(0.669)	(0.676)	(0.676)	(0.676)	(0.676)	(0.532)
Gravity Plant cost: Cash Flow Total (\$M)	(52.539)	(4.455)	(4.490)	(4.445)	(4.490)	(4.476)	(4.455)	(4.408)	(4.455)	(4.455)	(4.455)	(4.455)	(3.502)
Tailings cost: Cash Flow Total (\$M)	(1.614)	(0.137)	(0.138)	(0.136)	(0.136)	(0.138)	(0.137)	(0.136)	(0.137)	(0.137)	(0.137)	(0.137)	(0.108)
Rehabilitation & Closure cost: Cash Flow Total (\$M)	(3.015)		(1.049)	(1.110)	(0.854)	(0.003)							
FEL cost: Cash Flow Total (\$M)	(15.099)	(1.339)	(1.250)	(1.122)	(0.973)	(1.343)	(1.339)	(1.325)	(1.339)	(1.339)	(1.339)	(1.339)	(1.052)
Ancillary cost: Cash Flow Total (\$M)	(0.905)		(0.315)	(0.333)	(0.256)	(0.001)							
State Govt Royalty cost: Cash Flow Total (\$M)	(11.479)	(0.490)	(1.265)	(2.116)	(3.505)	(0.541)	(0.526)	(0.520)	(0.526)	(0.526)	(0.526)	(0.526)	(0.413)
Total Opex	(229.949)	(12.748)	(39.722)	(40.788)	(35.400)	(13.346)	(12.976)	(12.863)	(12.976)	(12.976)	(12.976)	(12.976)	(10.200)

Table 4: Project Costs by Year per Tonne Concentrate by Activity

Period Name	LOM TOTAL	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Tungsten Concentrate Sale Price (\$/t)		15,103	15,534	15,534	16,182	16,182	16,182	16,182	16,182	16,182	16,182	16,182	16,182
To Total Produced Concentrate: Mass (kt)	26.68	1.20	3.02	5.04	8.02	1.24	1.20	1.19	1.20	1.20	1.20	1.20	0.95
Tungsten Revenue: Cash Flow Total (\$M)	425.1	18.2	46.9	78.4	129.8	20.0	19.5	19.3	19.5	19.5	19.5	19.5	15.3
Quarry Product Revenue: Cash Flow Total (\$M)	11.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.8
Total Revenue: Cash Flow Total (\$M)	436.8	19.2	47.9	79.3	130.8	21.0	20.5	20.2	20.5	20.5	20.5	20.5	16.1
Operating Costs	LOM Average												
Site Management Overheads (\$/t con)	(1,123.28)	(1,636.7)	(1,266.9)	(686.8)	(452.4)	(1,947.5)	(1,797.0)	(1,815.9)	(1,797.0)	(1,797.0)	(1,797.0)	(1,797.0)	(1,797.0)
OC Mining cost - Phase 3B: Cash Flow Total (\$/t con)	(135.37)		(1,174.5)	(13.5)									
OC Mining cost - Phase 4B: Cash Flow Total (\$/t con)	(2,407.84)		(6,647.3)	(4,937.6)	(2,394.0)	(52.2)							
LGS Mining cost - LGS1: Cash Flow Total (\$/t con)	(282.28)	(1,394.4)	(417.0)	(149.6)	(31.4)	(1,354.5)	(1,394.4)	(196.7)					
LGS Mining cost - LGS2: Cash Flow Total (\$/t con)	(354.37)							(1,197.7)	(1,394.4)	(1,394.4)	(1,394.4)	(1,394.4)	(1,394.4)
Dry Processing cost: Cash Flow Total (\$/t con)	(855.49)	(1,666.8)	(630.5)	(346.1)	(195.8)	(1,625.1)	(1,666.8)	(1,666.8)	(1,666.8)	(1,666.8)	(1,666.8)	(1,666.8)	(1,666.8)
Ore Sorting cost: Cash Flow Total (\$/t con)	(288.29)	(562.2)	(212.3)	(116.4)	(65.6)	(548.1)	(562.2)	(562.2)	(562.2)	(562.2)	(562.2)	(562.2)	(562.2)
Gravity Plant cost: Cash Flow Total (\$/t con)	(1,969.59)	(3,703.5)	(1,488.5)	(881.3)	(559.6)	(3,614.5)	(3,703.5)	(3,703.5)	(3,703.5)	(3,703.5)	(3,703.5)	(3,703.5)	(3,703.5)
Tailings cost: Cash Flow Total (\$/t con)	(60.51)	(114.1)	(45.6)	(26.9)	(16.9)	(111.3)	(114.1)	(114.1)	(114.1)	(114.1)	(114.1)	(114.1)	(114.1)
Rehabilitation & Closure cost: Cash Flow Total (\$/t con)	(113.03)		(347.6)	(220.0)	(106.4)	(2.3)							
FEL cost: Cash Flow Total (\$/t con)	(566.04)	(1,113.1)	(414.4)	(222.5)	(121.3)	(1,085.0)	(1,113.1)	(1,113.1)	(1,113.1)	(1,113.1)	(1,113.1)	(1,113.1)	(1,113.1)
Ancillary cost: Cash Flow Total (\$/t con)	(33.91)		(104.3)	(66.0)	(31.9)	(0.7)							
State Govt Royalty cost: Cash Flow Total (\$/t con)	(430.31)	(407.8)	(419.4)	(419.4)	(436.9)	(436.9)	(436.9)	(436.9)	(436.9)	(436.9)	(436.9)	(436.9)	(436.9)
Total Opex (\$/tonne concentrate)	(8,620.31)	(10,598)	(13,168)	(8,086)	(4,412)	(10,778)	(10,788)	(10,807)	(10,788)	(10,788)	(10,788)	(10,788)	(10,788)

3.2. Mining Costs

An all-inclusive cost of \$4.50 per ROM tonne was used for contract mining of the open pit. This cost includes all labour, equipment, fuel, maintenance, facilities, and other ancillaries required to deliver the mining schedule.

The following sections relate to EQR labour and equipment opex costs.

Table 5: Summary of Mining Costs per Tonne

Mining Cost	Cost (AUD/t)	Comment
LGS Mining	2.47	24hr operations
LGS Mining	1.68	12hr operations
Mine Closure/Rehabilitation	0.20	Experience based assumption.
Ancillary Equipment	0.06	Allowance (lighting, grader, water truck) whilst OC mining.

3.2.1. Labour

Mining labour is built up as per Table 6 and Table 7.

Table 6: Mining Labour Costs 24hr 7-day Roster

Mining – 24hr / 7-days operations	People	AUD/Unit	Cost	Capacity	AUD/t
Excavator Operator	4	94,400	377,600	1,500,000	0.25
Diesel Fitter/Maintenance	5	102,525	512,625	1,500,000	0.34
Quarry/Mining Supervisors	2	127,919	255,838	1,500,000	0.17
Total	11	Total/a	1,146,063	1,500,000	0.76
ADT Operator	12	94,400	1,132,800	1,500,000	0.76

Table 7: Mining Labour Costs 12hr 7-day Roster

Mining – 12hr / 7-day operations	People	AUD/Unit	Cost	Capacity	AUD/t
Excavator Operator	2	94,400	188,800	1,000,000	0.19
Diesel Fitter/Maintenance	5	102,525	512,625	1,500,000	0.34
Quarry/Mining Supervisors	2	127,919	255,838	1,500,000	0.17
Total	9	Total/a	957,263	1,500,000	0.64
ADT Operator	6	94,400	566,400	1,500,000	0.38

3.2.2. Equipment

Mining equipment costs are built up per Table 8.

Table 8: Equipment Opex Costs

Equipment	Fuel Burn (l/hr)	Fuel AUD/L	Interval Cost AUD/hr	AUD /Hr	Annual Hours	Total Required Capacity (Mt)	No. of Units	AUD/t
Excavator 390FL (90t) – 24hr roster	43.75	1.00	45.68	89.43	6048	1.5	1	0.36
Excavator 390FL (90t) – 7-day 12hr roster	43.75	1.00	45.68	89.43	3024	1	1	0.27
Trucks 745C Medium – 24hr roster	25	1.00	39.65	64.65	6048	2	3	0.59
Trucks 745C Medium – 7-day 12 hr roster	25	1.00	39.65	64.65	3024	1.5	3	0.39
FEL 980M Medium	20	1.00	28.59	48.59	6048	1.6	2	0.37

3.3. Crushing, Screening and Sorting Costs

A summary of the dry processing opex costs are included in Table 9.

Table 9: Summary of Dry Processing Costs per tonne

Dry Processing Cost	Cost (AUD/t)	Comment
Dry Processing cost (minus ore sorting)	2.00	\$0.25/t included for jaw crusher, reclaimer, and conveyors.
Ore Sorting cost	1.06	

3.3.1. Labour

Dry processing labour is built up as per Table 10.

Table 10: Dry Processing Labour Cost Build-up 24hr 7-day Roster

Dry processing – 24hr operations	People	AUD/Unit	Cost (AUD)	Capacity	AUD/t
Crush/Screen/Leading Hand operator	4	116,290	465,160	1,000,000	0.47
FEL Operator	8	94,400	755,200	1,600,000	0.47
Sorting Plant Operator	3	94,400	\$283,200	816,000	0.35

3.3.2. Equipment

The crushing, screening, and sorting processing equipment costs are built up as per Table 11.

Table 11: Dry Processing Equipment Costs

Dry Plant (Excl Ore Sorter) – 24hr roster	Annual Cost (AUD)	AUD/Op hour	Capacity	AUD/t
Power	423,844	62.29	1,000,000	0.42
Reagents & Consumables	757,384	111.31	1,000,000	0.76
Maintenance Materials	58,510	8.60	1,000,000	0.06
Administration	50,000	7.35	1,000,000	0.05
Allowance for jaw crusher, reclaimer, conveyor	250,000	36.74	1,000,000	0.25
Total	1,539,738	226.30	1,000,000	1.54
Ore Sorter	578,965	85.09	816,000	0.71

The consultant build-up of the crushing, screening, and sorting operating costs for Phase 1 and Phase 2 is included in Appendix A.

3.4. Processing Costs

A summary of the processing costs is included in Table 12.

Table 12: Summary of Processing Costs per Tonne

Processing Cost	Cost (AUD/t)	Comment
Processing Plant	11.00	
Tailings Management	0.34	As per Phase 1 engineering estimate.

3.4.1. Labour

Processing labour is built up as per Table 13.

Table 13: Processing Labour Cost Build-up 24hr 7 day Roster

Processing Plant – 24hr operations	People	AUD/Unit	Cost (AUD)	Capacity	AUD/t
Operator	12	93,032	1,116,384	408,000	2.74
Electrician	2	110,475	220,950	408,000	0.54
Total	14		1,337,334	408,000	3.28

3.4.2. Equipment

Processing equipment costs are built up as per Table 14.

Table 14: Gravity Processing Equipment Costs

Gravity Processing Plant – 24hr roster	Annual Cost (AUD)	AUD/op hour	Capacity	AUD/t
Electricity – Processing Plant	325,000	47.77	408,000	0.80
Diesel Consumption – Additional	180,000	26.46	408,000	0.44
Gravity Plant Maintenance – EQR Estimate	1,440,000	211.64	408,000	3.53
Test Work	144,000	21.16	408,000	0.35
Other Expenses (ie. consumables, waste removal, security, IT, rent, etc)	60,000	8.82	408,000	0.15
FEL Cost (14% utilisation) - \$0.11/t	44,880	6.60	408,000	0.11
Plant Upgrade Additional Opex (\$2.35/t)	958,800	140.92	408,000	2.35
Total	3,152,680	463.36	408,000	7.73

The build-up for the additional processing costs associated with the Phase 2 upgrade works is included in Appendix B.

3.5. Other Costs

The following fixed costs are included in the operational cost base:

- Grade control practices, including RC drilling, sampling, and testing at the onsite laboratory;
- Three light vehicles on a 3-year rolling lease arrangement; and
- A mechanical ground stabilisation program for the open pit southern wall.

Allowance has also been made for contract mining mobilisation, demobilisation, and preliminary installation of a maintenance facility.

These costs are summarised in Table 15 and Table 16.

Table 15: Additional Fixed Annual Costs and Allowances

Fixed Costs & Allowances	Annual Cost (Million AUD)	Comment
Lease Vehicles	0.050	3 vehicles on 3 yr rolling lease
Grade Control Drilling, Sampling, and Laboratory Testing	0.088	LGS only – excl labour
Grade Control Drilling, Sampling, and Laboratory Testing	0.208	LGS & OC Mining – excl labour
Contractor Mobilisation to Site	0.250	Total sum
Maintenance Facility Cost	0.100	Total sum
Contractor Demobilisation	0.250	Total sum

Table 16: Fixed Costs for Ground Stabilisation Program

Fixed Costs for Ground Stabilisation	Labour (Million AUD)	Equipment (Million AUD)	Drilling & Consumables (Variable)	Annual Cost (Million AUD)
Ground Stabilisation 2023	0.557	0.475	0.523	1.540
Ground Stabilisation 2024	0.557	0.475	0.088	1.183
Ground Stabilisation 2025	0.557	0.475	0.208	1.348
Total	1.671	1.426	1.004	4.071

The build-up for the ground stabilisation costs is included in Appendix C.

4. References

- Chapter 1: Executive Summary
- Chapter 4: Mining
- Chapter 5: Processing

5. List of Abbreviations

Abbreviation	Description
ADT	Articulated dump truck
AUD	Australian Dollar
EQR	EQ Resourced Limited
FCA	Free Carry
FEL	Front end loader
kWh	Kilowatt hour
LGS	Low grade ore stockpile
GST	Goods and Services Tax
OEM	Original equipment manufacturer
Opex	Operational expenditure
RC	Reverse circulation
ROM	Run of mine
USD	United States Dollar



Appendix A Phase 1 and 2 Crushing, Screening and Sorting Operating Cost Breakdown



655 MT CARBINE PROJECT
Speciality Metals International Limited

OPERATING COST - PHASE 1
655-ES-G-001

Rev	Date	Description	Prepared	Reviewed	Func/Fac Appr'd	Project Auth'd	Client Appr'd
B	17/11/2021	Issued for Client Review	AY	TK	CB	CB	
A	14/09/2021	Issued for Client Review	AY	TK	CB	CB	

**655 MT. CARBINE (1MTPA)
Summary Operating Costs - PHASE 1**

Throughput **1 Mtpa**
Operating Hours - Dry Plant **2,847 hrs**
351 tph

Cost Area	Cost per annum \$	Cost \$/tonne processed
Personnel	438,741	\$0.44
Power	787,328	\$0.79
Reagents & Consumables	925,709	\$0.93
Maintenance Materials	204,082	\$0.20
Administration	250,000	\$0.25
Total	\$2,605,859	\$2.61

Notes:

FEL reclaim and plant labour included in Comet Model

PHASE 1

1 Mtpa

Personnel - Labour

	Number	Roster	Base Annual Salary per Personnel \$	Overhead Cost 23% %	Loading Cost 2.5% %	Annual Salary Total Persons \$
Mill Manager	0		160,000	23%	2.5%	0
Metallurgist	0		96,000	23%	2.5%	0
Senior Plant Operator	0		84,000	23%	2.5%	0
Crusher Operators	4		72,000	23%	2.5%	363,096
Mill Operators	0		72,000	23%	2.5%	0
Leach Operators	0		72,000	23%	2.5%	0
Day Crew / Goldroom	0		72,000	23%	2.5%	0
Loader/Mobile Equipment Operator	1		60,000	23%	2.5%	75,645
Lab Technicians	0		60,000	23%	2.5%	0
Lab Sample Preparation Technicians	0		72,000	23%	2.5%	0
Maintenance Engineer	0		100,000	23%	2.5%	0
Boiler Makers/Fitter	0		90,000	23%	2.5%	0
Electricians	0		90,000	23%	2.5%	0
Trades Assistant	0		75,000	23%	2.5%	0
Total	5					438,741
\$/Tonne Treated						0.44

PHASE 1

1 Mtpa

Reagents and Operating Consumables (FEL included in Commet Model)

	Unit	Usage Rate tpa	Unit Supply Cost \$/tonne	Process Unit Cost \$/year	Reference
Crushing and Grinding					
Screening Media	No. Off	1.0	115,000	115,000	
Cone Crushing Liner	No. Off	4.0	43,719	174,875	
Ore Sorter	No. Off	1.0	56,834	56,834	
VSI - Rehandling Circuit*		12.0	12,000	144,000	
Double-Deck Screen - Rehandling Circuit		1.0	40,000	40,000	
Conveyors		1.0	255,000	255,000	
Laboratory Consumables					
Assays				100,000	Guess
Consumables					
Operating Consumables					
Consumables					
Diesel					
Light Vehicles, 6	l/month	0	0.80	0	
Fork Lift	l/month	0	0.80	0	
Mobile Crane	l/month	0	0.80	0	
BobCat	l/month	0	0.80	0	
Loader	l/h	0	0.80	0	
Water					
Potable Water	m3	20,000	2.00	40,000	
TOTAL				925,709	
\$/Tonne Treated				0.93	

Note: Ore testwork required

PHASE 1

1 Mtpa

Maintenance Costs

Area	Capital Cost \$ M	%	Annual Allowance \$
Triple Deck Wet Screen	0.145	5%	7,250
Cone Crusher	0.427	5%	21,344
Ore Sorter	0.650	5%	32,500
Feeders - PF01/02	0.034	5%	1,692
VSI - Rehandling Circuit	0.110	5%	5,500
Double-Deck Screen - Rehandling Circuit	0.075	5%	3,750
Feeder - Rehandling Circuit	0.017	5%	846
Conveyors	2.6	5%	130,000
Services, Air and Water	0.04	3%	1,200
Total	4.10		204,082
\$/Tonne Treated			0.20

PHASE 1

1 Mtpa

Power Load List

0.19 per kW

Power Cost

Facility	Installed	Operating	Operating kW	Utilisation	Total Cost per annum
Primary Crushing & Screening	125	0.80	100	90%	149,796
Secondary Crushing	192	0.80	153.6	90%	230,087
Ore Sorting	112	0.80	89.6	90%	134,217
Rehandling Circuit	104	0.80	83.2	90%	124,630
Product Dewatering Circuit	124	0.80	99.2	90%	148,598
Water Services	105	0.80	84	90%	125,829
Air Services	35	0.80	28	90%	41,943
Total	657		525.6		787,328
\$/Tonne Treated					0.79

PHASE 1

1 Mtpa

Administration Costs

Item	Facility	Annual Cost \$	\$/tonne treated
1	Allowance G&A	250,000	0.3



655 MT CARBINE PROJECT
Speciality Metals International Limited

OPERATING COST - PHASE 2
655-ES-G-002

Rev	Date	Description	Prepared	Reviewed	Func/Fac Appr'd	Project Auth'd	Client Appr'd
B	17/11/2021	Issued for Client Review	AY	TK	CB	CB	
A	15/09/2021	Issued for Client Review	AY	TK	CB	CB	

**655 MT. CARBINE (1MTPA)
Summary Operating Costs - PHASE 2**

Throughput **1 Mtpa**
Operating Hours - Dry Plant **2,847 hrs**
351 tph

Cost Area	Cost per annum \$	Cost \$/tonne processed
Personnel	438,741	\$0.44
Power	1,224,732	\$1.22
Reagents & Consumables	1,237,887	\$1.24
Maintenance Materials	234,713	\$0.23
Administration	250,000	\$0.25
Total	\$3,386,073	\$3.39

Notes:

FEL reclaim and plant labour included in Comet Model

PHASE 2

1 Mtpa

Personnel - Labour

	Number	Roster	Base Annual Salary per Personnel \$	Overhead Cost 23% %	Loading Cost 2.5% %	Annual Salary Total Persons \$
Mill Manager	0		160,000	23%	2.5%	0
Metallurgist	0		96,000	23%	2.5%	0
Senior Plant Operator	0		84,000	23%	2.5%	0
Crusher Operators	4		72,000	23%	2.5%	363,096
Mill Operators	0		72,000	23%	2.5%	0
Leach Operators	0		72,000	23%	2.5%	0
Day Crew / Goldroom	0		72,000	23%	2.5%	0
Loader/Mobile Equipment Operator	1		60,000	23%	2.5%	75,645
Lab Technicians	0		60,000	23%	2.5%	0
Lab Sample Preparation Technicians	0		72,000	23%	2.5%	0
Maintenance Engineer	0		100,000	23%	2.5%	0
Boiler Makers/Fitter	0		90,000	23%	2.5%	0
Electricians	0		90,000	23%	2.5%	0
Trades Assistant	0		75,000	23%	2.5%	0
Total	5					438,741
\$/Tonne Treated						0.44

PHASE 2

1 Mtpa

Reagents and Operating Consumables (FEL included in Commet Model)

	Unit	Usage Rate tpa	Unit Supply Cost \$/tonne	Process Unit Cost \$/year	Reference
Crushing and Grinding					
Screening Media	No. Off	1.0	115,000	115,000	
Primary Crushing Liner	No. Off	4.0	60,586	242,344	
Cone Crushing Liner	No. Off	4.0	43,719	174,875	
Ore Sorter	No. Off	1.0	113,668	113,668	
VSI - Rehandling Circuit		12.0	16,500	198,000	
Double-Deck Screen - Rehandling Circuit		1.0	50,000	50,000	
Conveyors		1.0	204,000	204,000	
Laboratory Consumables					
Assays				100,000	Guess
Consumables					
Operating Consumables					
Consumables					
Diesel					
Light Vehicles, 6	l/month	0	0.80	0	
Fork Lift	l/month	0	0.80	0	
Mobile Crane	l/month	0	0.80	0	
BobCat	l/month	0	0.80	0	
Loader	l/h	0	0.80	0	
Water					
Potable Water	m3	20,000	2.00	40,000	
TOTAL				1,237,887	
\$/Tonne Treated				1.24	

PHASE 2

1 Mtpa

Maintenance Materials

Area	Capital Cost \$ M	%	Annual Allowance \$
Triple Deck Wet Screen	0.145	5%	7,250
Cone Crusher	0.427	5%	21,344
Ore Sorter	1.300	5%	65,000
Feeders - PF01/02	0.118	5%	5,921
VSI - Rehandling Circuit	0.362	5%	18,076
Double-Deck Screen - Rehandling Circuit	0.118	5%	5,922
Conveyors	2.2	5%	110,000
Services, Air and Water	0.04	3%	1,200
Total	4.71		234,713
\$/Tonne Treated			0.23

PHASE 2

1 Mtpa

Power Load List

0.19 per kW

Facility	Installed	Operating	Operating kW	Utilisation	Total Cost per annum
Primary Crushing & Screening	76	0.80	60.8	90%	91,076
Secondary Crushing	276	0.80	220.8	90%	330,750
Ore Sorting	141	0.80	112.8	90%	168,970
Rehandling Circuit	175	0.80	140	90%	209,714
Product Dewatering Circuit	139	0.80	111.2	90%	166,573
Tails Dewatering Circuit	75	0.80	60	90%	89,878
Water Services	105	0.80	84	90%	125,829
Air Services	35	0.80	28	90%	41,943
Total	1022		817.6		1,224,732
\$/Tonne Treated					1.22

PHASE 2

1 Mtpa

Administration Costs

Item	Facility	Annual Cost \$	\$/tonne treated
1	Allowance G&A	250,000	0.3



Appendix B Phase 2 Processing Operating Cost Breakdown

Calculation

Operational Cost	Calculation No: 105969-RX-CALC-0002
-------------------------	---

Project Title:	Mt Carbine FS Support	Project No:	105969-02
Area/Code:	-		
Equipment Description:	Process Plant (Ausenco Scope)		
Equipment No:	-		

Design Inputs	References
Project Mechanical Equipment List	Rev B 105969-LST-001
Process Design Criteria	Rev B 105969-RX-DC-0001
Mass balance	Rev B 105969-MB-0001

(Note all inputs where not explicitly stated are in the design criteria.)

Design Assumptions and Basis
<ul style="list-style-type: none"> • • • • •

Calculation Summary and Outcome		
Overall Incremental Cost of the Upgrades		
	Cost (AUD/y)	Unit Cost (AU c/t)
Total	958,760	235

Other calculations if this calculation is revised:

Rev	Date	Description	Prepared	Checked	Approved
A	16/11/2021	Issued for Study	APH		APH

Calculation

Operational Cost

Calculation No:

105969-RX-CALC-0002

Project Title: Mt Carbine FS Support

Project No: 105969-02

Rev: A

Overall Summary by Cost Element

Element	Cost (AUD/y)	Unit Cost (AU c/t)
Reagents	1,615	0.40
2700 Collector - PAX (Arsenic Removal)	581	0.14
2700 Frother - MIBC (Arsenic Removal)	1,034	0.25
Consumables	446,159	109.25
2700 25mm Balls Tungsten Re grind	1,667	0.41
2300 SC-004 Panels Jig Overflow Screen	40,000	9.79
2300 SC-005 Panels Scavenger Feed Screen	53,333	13.06
2400 SC-006 Panels Table Feed Screen	40,000	9.79
2300 CR-00X Rolls Scavenging	64,000	15.67
2400 CR-00X Rolls Table Feed Preparation	136,000	33.30
2800 Diesel Tungsten Dryer	1,380	0.34
2800 Concentrate Bags Tungsten Concentrate	102,578	25.12
2600 Table Spares	5,400	1.32
2300 Spiral Spares	1,800	0.44
Power	389,999	95.50
2100 Feed Preparation	-38,694	-9.47
2200 Jig Circuit	49,143	12.03
2300 Scavenging Circuit	217,988	53.38
2400 Table Feed Preparation	54,523	13.35
2500 Coarse Tables	51,005	12.49
2600 Fines Tables	33,728	8.26
2700 Arsenic Removal	15,095	3.70
2800 Drying and Separation	7,211	1.77
2900 Process Water	0	0.00
3000 Tailings Pumping	0	0.00
Maintenance	120,987	29.63
2100 Feed Preparation	2,454	0.60
2200 Jig Circuit	12,700	3.11
2300 Scavenging Circuit	30,722	7.52
2400 Table Feed Preparation	15,676	3.84
2500 Coarse Tables	3,174	0.78
2600 Fines Tables	27,247	6.67
2700 Arsenic Removal	22,265	5.45
2800 Drying and Separation	6,750	1.65
2900 Process Water	0	0.00
Total	958,760	235

WBS	Cost (AUD/y)	Unit Cost (AU c/t)
2100 Feed Preparation	-36,240	-8.87
2200 Jig Circuit	61,843	15.14
2300 Scavenging Circuit	407,843	99.87
2400 Table Feed Preparation	246,199	60.29
2500 Coarse Tables	54,179	13.27
2600 Fines Tables	66,375	16.25
2700 Arsenic Removal	40,641	9.95
2800 Drying and Separation	117,920	28.87
2900 Process Water	0	0.00
3000 Tailings Pumping	0	0.00
Total	958,760	235

Calculation

Operational Cost	Calculation No: 105969-RX-CALC-0002
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Project Title:	Mt Carbine FS Support	Project No:	105969-02
Rev:	A		

Input Data		
Inputs	Units	Data
Exchange Rate (AUS\$:US\$)	-	0.75
Basis Of Estimate	-	AU\$
Tonnes Processed (Nominal)	t/h	60
Tonnes Milled (Nominal)	t/y	
Plant Operating Hours (Nominal)	hr	6807
Plant Operating Availability	%	77.7
Process Plant Throughput	t/h	60
Diesel Price	AU\$/L	1
Power Price	AU\$/kWh	0.19
Mechanical Maintenance	of equip cost	4.0%
Electrical Maintenance	of equip cost	1.5%
Contract Maintenance	of equip cost	2.0%

Calculation

Operational Cost	Calculation No: 105969-RX-CALC-0002
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Project Title:	Mt Carbine FS Support	Project No:	105969-02
Rev:	A		

Reagents Unit Consumption Rates				All Cases
Reagents	Use	Consumption	Units	Stream
Collector - PAX	Arsenic Removal	150	g/t	Coarse and Fine Table Concentrate
Frother - MIBC	Arsenic Removal	82	g/t	Coarse and Fine Table Concentrate

Calculation

Operational Cost	Calculation No: 105969-RX-CALC-0002
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Project Title:	Mt Carbine FS Support	Project No:	105969-02
Rev:	A		

Consumables Consumption Rates				All Cases
Consumables	Use	Consumption	Units	Stream
25mm Balls	Tungsten Regrind	0.24	kg/t	Coarse and Fine Table Concentrate
SC-004 Panels	Jig Overflow Screen	2.0	set/screen/y	
SC-005 Panels	Scavenger Feed Screen	2.0	set/screen/y	
SC-006 Panels	Table Feed Screen	2.0	set/screen/y	
CR-00X Rolls	Scavenging	8.0	set/y	
CR-00X Rolls	Table Feed Preparation	8.0	set/y	
Diesel	Tungsten Dryer	0.38	L/t	Low Arsenic Tungsten Concentrate
Screen Panels	Grinding Screens	2.4	changes/panel/ screen/y	
Concentrate Bags	Tungsten Concentrate	4.0	ea/t	Tungsten Concentrate
Table Spares		0.5	set/year	

Calculation

Operational Cost	Calculation No: 105969-RX-CALC-0002
------------------	---

Project Title:	Mt Carbine FS Support	Project No:	105969-02
Rev:	A		

Reagent Costs								#REF!
Reagents	Consumption	Units	Consumption	Units	Cost	Units	Freight (AUS/t)	Total (AUS/y)
Collector - PAX (Arsenic Removal)	150.00	g/t	0.5	t/y	0.987	AUS/kg	100.0	581
Frother - MIBC (Arsenic Removal)	82.00	g/t	0.3	t/y	2.58	US\$/kg	100.0	1,034

Calculation

Operational Cost	Calculation No: 105969-RX-CALC-0002
------------------	---

Project Title: Mt Carbine FS Support	Project No: 105969-02
Rev: A	

Consumable Costs								#REF!
Consumables	Consumption	Units	Consumption	Units	Cost	Units	Freight	Total (AU\$/y)
25mm Balls Tungsten Regrind	0.24	kg/t	0.9	t/y	1850	AUS/t	100.0	1,667
SC-004 Panels Jig Overflow Screen	2.00	set/screen/y	2.0	Set/y	15.0k	US\$/set		40,000
SC-005 Panels Scavenger Feed Screen	2.00	set/screen/y	2.0	Set/y	20.0k	US\$/set		53,333
SC-006 Panels Table Feed Screen	2.00	set/screen/y	2.0	Set/y	15.0k	US\$/set		40,000
CR-00X Rolls Scavenging	12.00	set/y	12.0	Set/y	4.0k	US\$/set		64,000
CR-00X Rolls Table Feed Preparation	12.00	set/y	12.0	Set/y	8.5k	US\$/set		136,000
Diesel Tungsten Dryer	0.38	L/t	1353	L/y	1.02	AUS/t		1,380
Concentrate Bags Tungsten Concentrate	4.00	ea/t	14247.0	ea/y	7.20	AUS/ea		102,578
Table Spares	2% of capital							5,400
Spiral Spares	2% of capital							1,800

Calculation

Operational Cost	Calculation No: 105969-RX-CALC-0002
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Project Title:	Mt Carbine FS Support	Project No:	105969-02
Rev:	A		

Power Demand		Current		
Facility No.	Facility Name	Installed (Duty) (kW)	Power Draw (kW)	Total (MWh/y)
2000	Process Plant - Process	305	244	1,661
2100	Feed Preparation	101	81	550
2200	Jig Circuit	60	48	327
2300	Scavenging Circuit	-	0	0
2400	Table Feed Preparation	30	24	163
2500	Coarse Tables	47	38	256
2600	Fines Tables	-	0	0
2700	Arsenic Removal	-	0	0
2800	Drying and Separation	-	0	0
2900	Process Water	67	54	365
3000	Tailings	55	44	299
3000	Tailings Pumping	55	44	299

Calculation

Operational Cost	Calculation No: 105969-RX-CALC-0002
------------------	---

Project Title:	Mt Carbine FS Support	Project No:	105969-02
Rev:	A		

Power Demand		FS Upgrade		
Facility No.	Facility Name	Installed (Duty) (kW)	Power Draw (kW)	Total (MWh/y)
2200	Process Plant - Process	682	546	3,714
2210	Feed Preparation	64	51	346
2220	Jig Circuit	108	86	585
2230	Scavenging Circuit	211	169	1,147
2240	Table Feed Preparation	83	66	450
2250	Coarse Tables	96	77	525
2260	Fines Tables	33	26	178
2270	Arsenic Removal	15	12	79
2280	Drying and Separation	7	6	38
2290	Process Water	67	54	365
2300	Tailings	55	44	299
2310	Tailings Pumping	55	44	299

Calculation

Operational Cost	Calculation No: 105969-RX-CALC-0002
------------------	---

Project Title:	Mt Carbine FS Support	Project No:	105969-02
Rev:	A		

Power Cost				Current
Facility No.	Facility Name	Power Demand (MWh/y)	Cost (AU\$/y)	
2000	Process Plant - Process	1,661	315,654	
2100	Feed Preparation	550	104,494	
2200	Jig Circuit	327	62,075	
2300	Scavenging Circuit	0	0	
2400	Table Feed Preparation	163	31,038	
2500	Coarse Tables	256	48,729	
2600	Fines Tables	0	0	
2700	Arsenic Removal	0	0	
2800	Drying and Separation	0	0	
2900	Process Water	365	69,318	
3000	Tailings	299	56,903	
3000	Tailings Pumping	299	56,903	

Calculation

Operational Cost	Calculation No: 105969-RX-CALC-0002
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Project Title:	Mt Carbine FS Support	Project No:	105969-02
Rev:	A		

Power Cost		FS Upgrade	
Facility No.	Facility Name	Power Demand (MWh/y)	Cost (AU\$/y)
2200	Process Plant - Process	3,714	705,653
2210	Feed Preparation	346	65,800
2220	Jig Circuit	585	111,219
2230	Scavenging Circuit	1,147	217,988
2240	Table Feed Preparation	450	85,561
2250	Coarse Tables	525	99,735
2260	Fines Tables	178	33,728
2270	Arsenic Removal	79	15,095
2280	Drying and Separation	38	7,211
2290	Process Water	365	69,318
2300	Tailings	299	56,903
2310	Tailings Pumping	299	56,903

Calculation

Operational Cost	Calculation No: 105969-RX-CALC-0002
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Project Title:	Mt Carbine FS Support	Project No:	105969-02
Rev:	A		

Maintenance Costs	#REF!
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Facility No.	Facility Name	Equipment Capital Cost AU\$M	Mechanical Maintenance (AU\$M/y)	Electrical Maintenance (AU\$M/y)	Contract Maintenance (AU\$M/y)
2000	Process Plant - Process	1.6	0.1	0.0	0.0
2100	Feed Preparation	0.0	0.0	0.0	0.0
2200	Jig Circuit	0.2	0.0	0.0	0.0
2300	Scavenging Circuit	0.4	0.0	0.0	0.0
2400	Table Feed Preparation	0.2	0.0	0.0	0.0
2500	Coarse Tables	0.0	0.0	0.0	0.0
2600	Fines Tables	0.4	0.0	0.0	0.0
2700	Arsenic Removal	0.3	0.0	0.0	0.0
2800	Drying and Separation	0.1	0.0	0.0	0.0
2900	Process Water	0.0	0.0	0.0	0.0
3000	Tailings	0.0	0.0	0.0	0.0
3000	Tailings Pumping	0.0	0.0	0.0	0.0



Appendix C Ground Stabilisation Cost Breakdown

Physicals								
Year	Toe Elevation (RL)	Length of pit wall	Area	Horizontal Spacing	No. of Rows	Min length of bolt (m)	Number of bolts	Bolt metres
2023	380	261	2463	3	2	10	174	1740
2023	360	491	9820	3	4	10	654.6666667	6546.667
2023	340	453	9060	3	6	10	906	9060
2024	300	349	6980	3	5	10	581.6666667	5816.667
2024	320	413	8260	3	5	10	688.3333333	6883.333
2025	280	333	6660	3	5	10	555	5550
2025	260	270	5400	3	5	10	450	4500
2025	240	211	4220	3	5	10	351.6666667	3516.667
2025	220	51	1020	3	5	10	85	850
Total		2832	53883				4446.333333	44463.33
Inputs								
Drilling m per 12hr shift		100						
Year	No. of shifts	No. of hours	Months to complete	Required Grout Volume	Required Cement (kg)	Required Water (lt)	Required Cement Bags	
			567	(Includes 10% contingency)	At 0.45 WC ratio	At 0.45 WC ratio	20kg bags	
2023	173	2082	3.67	72509	96679	43419	4834	
2024	127	1524	2.69	53086	70781	31788	3539	
2025	144	1730	3.05	60262	80349	36085	4017	
Total	445	5336	9.4	185857	247809	111291	12390	
Costs								
Labour Roster		12hr M-F	Monthly Equipment Hire		\$39,617			
Annual Hours		2160	Contract Length		36			
Labour p/h (3 person crew)		\$257.93						
Year	Labour (\$)	Equipment (\$)	Drilling	Consumables	Fixed Cost	Total		
2023	557118	475404.96	158375.0667	221696.6448	15000	\$1,427,595		
2024	557118	475404.96	115951	162310.572	-	\$1,310,785		
2025	557118	475404.96	131624.1667	184250.19	15000	\$1,363,397		
Total	\$1,671,354	\$1,426,215	\$405,950	\$568,257	\$30,000	\$4,101,777		

Description	Unit	Quantity	Unit rate	Amount	Comment
Mob	Cost plus	1	15%	\$15,000.00	
Demo	Cost plus	1	15%	\$15,000.00	
Fixed Cost Total				\$30,000.00	
Ground Su	12hr shift	1	\$1,019.76	\$1,019.76	
Geotech d	12hr shift	1	\$1,103.70	\$1,103.70	
Ground Su	12hr shift	1	\$971.64	\$971.64	
Labour Total				\$3,095.10	
Mine spec	Month	1	\$3,571.20	\$3,571.20	
Grout/Rod	Month	1	\$10,253.00	\$10,253.00	
Aux compr	Month	1	\$2,936.33	\$2,936.33	
20ft sea cc	Month	1	\$322.36	\$322.36	
manitou t	Month	1	\$5,616.22	\$5,616.22	
Work bask	Month	1	\$1,635.82	\$1,635.82	
DR28 - Sco	Month	1	\$14,279.13	\$14,279.13	
Cable bolt	Month	1	\$1,003.02	\$1,003.02	
Equipment Total				\$39,617.08	

Drill 76mm metre 1 \$9.13 Work on 80-100m per shift

4.3m twin each \$39.86 Rate only
6.3 twin st each \$59.40 Rate only
8.3m twin each \$76.55 Rate only
10.3m twin each \$104.73 Rate only
2 hole cable each \$26.63 Rate only
barrel and each \$2.37 Rate only
friction sta each \$6.05 Rate only
Combi plate each \$6.94 Rate only
GP cement 20kg bag \$8.28 Rate only
Grout addi 20kg bag \$3.50 Rate only

GROUT CONSISTENCY TABLE

GROUT MIX DESIGN									
# of BAGS	Kgs of CEMENT	RATIO (WATER - LITRE @ DIFF W:C)							
		0.3	0.325	0.35	0.375	0.4	0.425	0.45	0.5
8	160	48	52	56	60	64	68	72	80
9	180	54	58	63	68	72	77	81	90
10	200	60	65	70	75	80	85	90	100
11	220	66	71	77	83	88	94	99	110
12	240	72	78	84	90	96	102	108	120
13	260	78	84	91	98	104	111	117	130
14	280	84	91	98	105	112	119	126	140

CABLE BOLT GROUT REQUIREMENTS

WCR = GROUTING MIX WCR RATIOS

Cement (KG)	Water (Litres)	WCR	Grout Mix (litres)
260	130	0.50	208
260	117	0.45	195
260	105	0.40	183
120	60	0.50	96
120	54	0.45	90
120	48	0.40	84
60	30	0.50	48
60	27	0.45	45
60	24	0.40	42

CABLE BOLT GROUT REQUIREMENTS

GROUT VOLUMES

Hole depth (76mm hole)	Litres required
4 meters	15
6 meters	23
10 meters	38
20 meters	77

Bolt length	Plus 10% contingency for fractured ground
4m	16.5
6m	25.3
10m	41.8
20m	84.7

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