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Vista Gold Corp
Mt Todd Gold Project
Benchmarking Study Report

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1. EXECUTIVE SUMMARY

1.1 Mining CAPEX Summary

GR Engineering Services (GRES) engaged Mining Plus (MP) to perform a benchmark study for the mining cost of the Vista gold - Mt Todd gold project. A summary of the comparison between the Mt Todd PFS Unit costs, and the average current recent equipment purchase price obtained from the OEM contacts in Australia, with consideration of delivery costs to the Northern Territory is outlined in the comparison table and figure shown below.

CAPEX Comparison - Mt Todd % of Average Unit Cost	
Mining CAPEX Area	**Mt Todd % of Average Unit Cost**
Large Drills (ie: Atlas Copco PV235)	97%
Small Drills (ie: 165mm Rotary Blast Hole Drills	76%
Hydraulic Shovel (28m3 - ie: PC 5500)	104%
Front End Loader (18m3 - ie: Cat 994)	94%
Haul Truck (220t - ie: Cat 793)	109%
Large Dozer (Cat D11)	102%
Small Dozer (Cat D9)	100%
Motor Grader (4.9m - ie: Cat 16H)	89%
Water Truck (ie: Cat 777 with 70kl tank)	97%
Rubber Tyred Dozer (ie:Cat 834H)	72%
AVERAGE (weighted based on Fleet Numbers and Capital)	**104%**

Figure 1.1 CAPEX Benchmarking Comparison – Mt Todd PFS % of Average Unit Cost

With consideration of a weighted average based on the fleet numbers for each equipment type and the unit capital cost it is a weighted average 4% over estimation of the mining equipment CAPEX cost.

1.2 Mining OPEX Summary

Mining Plus was able to compare the five main mining operating costs areas within the mine as outlined below:

- Drilling;
- Blasting;
- Loading;
- Hauling; and
- Labour.

A summary of the comparison between the Mt Todd PFS costs per tonne (AUD/tonne), and the average benchmarked mining costs per tonne in each operating cost area of the mine obtained during this study is outlined in the comparison table and figure shown below.

OPEX Comparison - Mt Todd % of Average $/t	
Mining OPEX Area	**Mt Todd % of Average $/t**
Drilling	97%
Blasting	85%
Loading	116%
Hauling	181%
Drill & Blast	88%
Load & Haul	106%
Labor	133%
AVERAGE (weighted based on total project cost for main work areas of Drilling, Blasting, Loading and Hauling)	**140%**

Figure 1.2 OPEX Benchmarking Comparison – Mt Todd PFS % of Average $/tonne

In summary this data shows the Mt Todd PFS is potentially over estimating the mining OPEX costs; however, the benchmarking population could be larger and overall it is believed the PFS numbers appear reasonable for this level of study.

1.3 Project Capex

GRES believes the capital estimate for the Mt Todd project PFS overall is middle of the band with low and high areas of the estimate balancing out. The major risks that GRES believes should have further work completed includes:

- Owners costs;
- Piping;
- Power generation;
- Contingency.

Table below is a fair summary of the overall project benchmarking.

USD	Aust Gold	Akyem	Ahafo Actual	Rainy River	Mt Todd	Mt Todd
Mtpa	~8.0	7.5	7.5	7.7	10.65	17.75
Capex in USD @ 2019 FX from PFS	$487	$600	$550	$1,034	$623	$826
$/t/a	$59	$80	$73.3	$134	$58.5	$46.5
Including Existing Infrastructure CAPEX (Estimated value of $70M)					$693	$896
$/t/a					$65	$50.5

Figure 1.3 Capex Comparison Summary

GRES therefore believes the PFS outcomes are mid-range of the accuracy scale.

1.4 Project Opex

The Mt Todd project operating cost review, benchmarking against similar projects, and risk assessment summary is:

- The Mt Todd ore average hardness is higher than any other deposit in the Mineralis database. The proposed comminution circuit is suitable for treatment of the ore; however, the overall circuit complexity and number of drives will increase operating cost and increases ramp-up time to reach design capacity and metallurgical performance.
- The Mt Todd process operating cost of US$7.88/t milled is above similar scale gold plants at Detour Lake and Malarctic which use primary and secondary crushing and SABC comminution circuits. The HPGRs in the comminution circuit, the ore sorting plant, and the project location suggests that the Mt Todd 50,000tpd total process operating cost is likely to be above the benchmarked operations particularly in early years.
- The Mt Todd maintenance operating cost factor of 4.1% of tagged equipment capital cost is aligned with the benchmarked comparison projects.
- Particular areas of risk for the Mt Todd project during ramp-up are considered to be in the materials handling, crushing, ore sorting and grinding areas, specifically due to the number of unit operations and conveyors, transfer points, and wear areas in the crushing and HPGR circuits, and the large number of tanks in the CIP leaching and adsorption circuits. Operating cost ramp up factors developed by Mineralis are recommended for the project based on experience at similar operations.
- Removal of the tailings thickener and higher cyanide and lime consumption due to lack of process water recycle have been accounted for in the updated operating cost model.
- Consider design references to the model. The SMBS consumption in the operating cost model of 732g/t is in excess of the calculated requirement of 651g/t at a WAD cyanide concentration of 150ppm in CIP tailings without a tailings thickener. Additional test work may be required to confirm the consumption rate.

Project	Process Opex USD/t	Source
Mt Todd – 50,000tpd Au Plant	7.88	VCGMTP01E_TEM_50ktpd_014jm – Updated 50,000 tpd case
Detour Lake – 55,000tpd Au Plant	6.48	2018 Life of Mine Plan, average 2019 to 2023
Rainy River – 22,000tpd Au Plant	7.12	Rainy-River-NI-43-101-Report-Final-July-25-2018.pdf
Malarctic – 55,000tpd Au Plant	6.06	Malarctic - Agnico Eagle + Yamana 30-09-2014
Gruyere – 22,000tpd Au Plant	10.95	Gold Road Resources – Gruyere Project Report 15-11-16
Project 1 – 15,000tpd Au-Ag Plant	8.66	Operations Review document

Figure 1.4 Mt Todd Opex Comparison with Projects

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2. MINING BENCHMARKING

2.1 Introduction

GR Engineering Services (GRES) engaged Mining Plus (MP) to perform a benchmark study for the mining costs of the Vista Gold - Mt. Todd Gold Project based in the Northern Territory using data provided in the NI43-101 Pre-Feasibility study (PFS) report issued March 2, 2018. Further review was completed based on the updated PFS report issued on October 7, 2019, which is the basis of this report.

Vista Gold provided criteria to focus the benchmarking study and to get as close a comparison to the proposed Mt. Todd Gold Project, with the base case production 50,000 tpd milling as practical. In summary the criteria was based on the sites being:

- Open Pit - Gold
- Based in Australia or Canada
- 25,000 - 70,000 tpd milling (9-25 Mtpa overall material movement)
- Constructed and put into operation in the last 5 years
- Comparison of feasibility study cost estimates Vs Actual in all cases possible.

With very few new gold projects being commenced in the past 5 years especially of a size comparable to Mt. Todd, MP has also added non-gold sites as the operating costs of moving a tonne of rock from a different commodity remains the same and is able to be used as a comparison. In addition, Mining Plus has allowed for mining projects based in the Northern Territory (NT) for comparison as resourcing and mining in the NT tends to be different to other states in Australia, particularly the large and strong mining states such as Western Australia and Queensland.

MP utilised publicly sourced information as well as internal project data for the benchmark study. Some of the projects data is confidential in nature and thus the companies and names of the projects have been omitted and replaced with type of project and general location.

Also capital equipment comparisons have been provided by the use of internal project data, and also through recent correspondence with the local mining equipment suppliers in Australia and particularly those with experience in delivering equipment to mining operations in the Northern Territory.

2.1.1 Mining CAPEX Summary

The Vista Gold – Mt. Todd Gold project utilises large scale open pit mining equipment, with the primary mining equipment and the support equipment specifications and quantity required outlined in the PFS. Overall a significant sized fleet of large mining equipment is expected to be required for the Mt Todd project.

During this benchmarking study MP focussed on the primary mining equipment and support equipment list only. MP used the costs per unit for equipment found in the PFS report to compare with recent equipment purchase costs from MP internal project data, and also through recent correspondence with the local mining equipment

suppliers in Australia and particularly those with experience delivering equipment to mining operations in the Northern Territory.

A summary of the comparison between the Mt Todd PFS Unit costs, and the average current recent equipment purchase price obtained from the OEM contacts in Australia, with consideration of delivery costs to the Northern Territory is outlined in the comparison table and figure shown below.

CAPEX Comparison - Mt Todd % of Average Unit Cost		
Mining CAPEX Area	**Mt Todd % of Average Data Set Unit Cost**	**Units**
Large Drills (ie: Atlas Copco PV235)	97%	16
Small Drills (ie: 165mm Rotary Blast Hole Drills	76%	2
Hydraulic Shovel (28m3 - ie: PC 5500)	104%	4
Front End Loader (18m3 - ie: Cat 994)	94%	2
Haul Truck (220t - ie: Cat 793)	109%	41
Large Dozer (Cat D11)	102%	1
Small Dozer (Cat D9)	100%	4
Motor Grader (4.9m - ie: Cat 16H)	89%	4
Water Truck (ie: Cat 777 with 70kl tank)	97%	2
Rubber Tyred Dozer (ie:Cat 834H)	72%	3
Comparison Delta % to Data Set	**104%**	

Figure 2.1 *CAPEX Benchmarking Comparison – Mt Todd PFS % of Data Set Unit Cost*

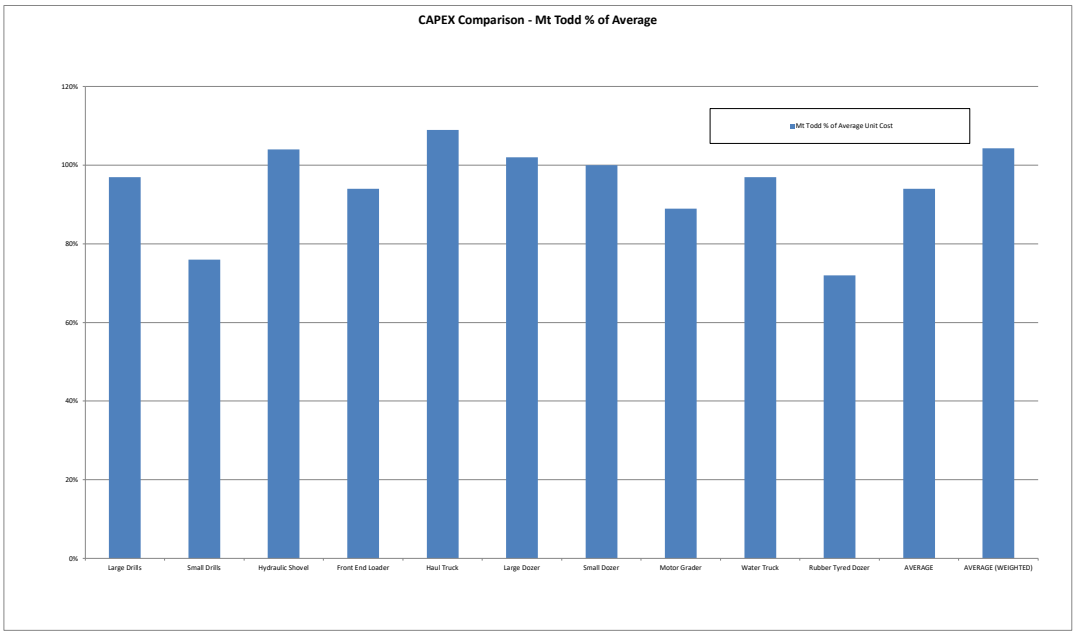

***Figure 2.2** CAPEX Summary Comparison*

This number reflects that on an weighted average basis the Mt Todd PFS quoted capital costs are 104% of the cost currently being quoted in AUD by the OEMs in Australia. Overall it is believed that the Mt Todd PFS is a good estimate of the expected CAPEX cost.

In the original review a systematic underestimation of the CAPEX cost was identified, which seemed to be due to the two main reasons as outlined below. These concerns have now been addressed and rectified in the more recent project update in the 2019 PFS report:

- Delivery costs to the Northern Territory – despite a long history of mining, the NT is not currently considered a strong mining state when compared to the main mining states of Western Australia and Queensland. Due to this and the logistics for OEMs to import equipment into Australia where most is landed in either Brisbane or Perth. An additional cost to deliver to a site in the Northern Territory is likely.
- Additional local content costs – all OEM's contacted have highlighted additional costs for local Australian content which are required when equipment is imported into Australia. This additional cost is due to two requirements. Firstly, there is additional local content including modifications and additions to the equipment to meet Australian mining requirements and Australian standards. Secondly, it's local manufacturing for attachments such as water tanks, and specialised trays for dump trucks. For example, Hastings Deering (the local Caterpillar Dealer for the NT) has included local content of AU$2.2 million out of the total purchase price of AU$11.5 million for a Caterpillar 6050 Excavator. Also for a water truck, the local content is AU$1.15 million out of the total purchase price of AU$3.1 million for a Caterpillar 777G water truck.

While the latest PFS report has address many areas of risk, further detailed work around the logistics is still required to ensure the updated local limitations for landing equipment in to the Port of Darwin can be achieved.

2.1.2 Mining OPEX Summary

Mining Plus was able to compare the five main mining operating costs areas within the mine as outlined below:

- Drilling;
- Blasting;
- Loading;
- Hauling; and
- Labour.

In some cases, cost information available for Drill & Blast and Load & Haul was only available as a combined cost, which is normal. Costs for the five areas are presented separately and then combined into Drill & Blast and Load & Haul respectively. An exchange rate of $0.70 was used to convert Mt. Todd costs to AUD for the comparisons.

A summary of the comparison between the Mt Todd PFS costs per tonne (AUD/tonne), and the average benchmarked mining costs per tonne in each operating cost area of the mining obtained during this study is outlined in the comparison table and figure shown below. In summary the Mt Todd mining OPEX estimate is ~$0.48/t higher than the average $/t for the benchmarked projects.

OPEX Comparison - Mt Todd % of Average $/t and Mt Todd Difference to Average $/t		
Mining OPEX Area	**Mt Todd % of Average $/t**	**Mt Todd difference to Average $/t**
Drilling	97%	-$0.01
Blasting	85%	-$0.09
Loading	116%	$0.04
Hauling	181%	$0.54
Drill & Blast	88%	-$0.11
Load & Haul	106%	$0.08
Labor	133%	$0.18
Comparison Delta	**140%**	**$0.48**

Figure 2.3 *OPEX Benchmarking Comparison – Mt Todd PFS % of Data Set*

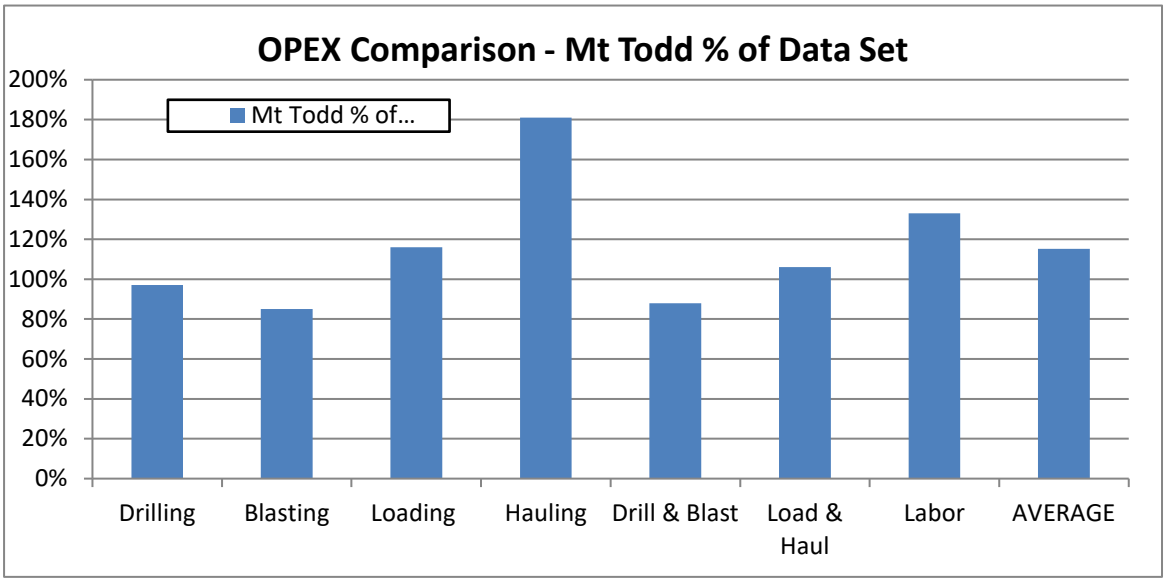

***Figure 2.4** OPEX Summary Comparison*

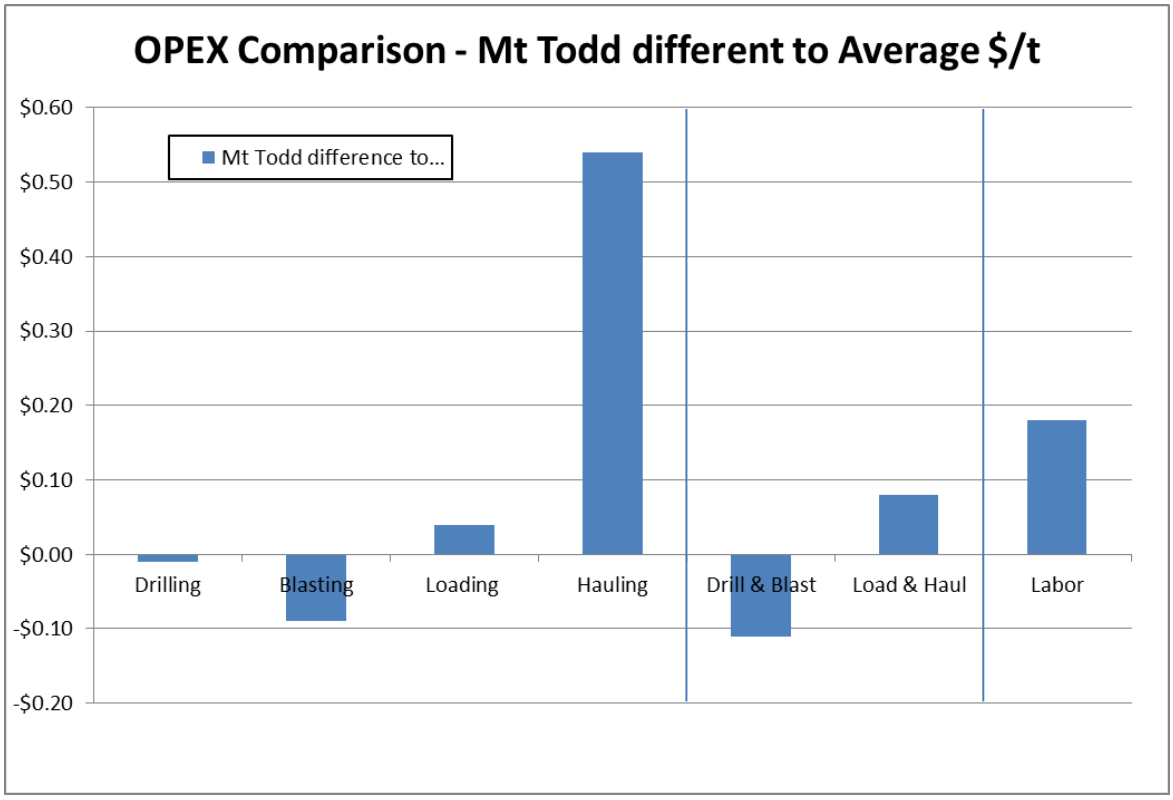

***Figure 2.5** OPEX Summary Comparison*

In summary this data shows the Mt Todd PFS is potentially over estimating the mining OPEX costs; however, the benchmarking population could be larger and overall it is believed the PFS numbers seem reasonable for this level of study. However the labour costs, particularly the salary costs for key job roles may need to be reviewed to ensure they are sufficient to attract qualified and suitable people as part of the start-up.

2.1.3 Overall Mining Benchmarking Summary

In summary the Mt Todd PFS OPEX numbers seems reasonable for the level of the study. It is clear that the PFS has been completed with some areas having definition closer to a Feasibility study level, particularly in the detailed work in the cost model and the evaluation of the project's equipment number requirements.

In the OPEX the main parameter that could benefit from further work is the labour costs as the overall estimate appears higher when compared to similar sites in Australia, however some key job roles will require higher salaries to attract suitable people for project start-up. However, these labour costs may be site specific and within industry requirements for the Northern Territory. The benchmarking study shows the labour cost are high but it is likely this is required to achieve a successful project implementation and operation.

The Benchmarking study recommends the next phase of work include more detailed descriptions of the equipment requirements to allow the local equipment suppliers to prepare more suitable costs which include:

- mobilisation of equipment to the site, a full breakdown of local content requirements; and
- to ensure the costs estimated for landing equipment in to the Port of Darwin can be achieved,

Overall it is a very good PFS level cost estimate.

2.2 Mining Benchmarking introduction

Due to the nature of the data being sourced from MP internal projects, most of the sites used for the benchmark study remain confidential. Mining Plus relied on publically available information of projects where possible. In meeting the criteria proposed for the benchmark study, Mining Plus initially researched a list of operations that could potentially be a fit for the study. The sites identified are listed in Table below.

Mining Project	Sites Identified for Benchmark Study
1	Cowal Gold Project - NSW
2	Gruyere Gold Project - WA
3	Tomingley Gold Project - NSW
4	Tropicana Gold Project - WA
5	Agate Creek Gold Project - QLD
6	Boddington Gold Operation, WA
7	Uranium Project - WA
8	Lithium Project - WA
9	Gold Project - WA
10	Gold Project - PNG
11	Rare Earths Project - NT
12	Phosphate Project - NT

***Figure 2.6** Identified Sites for Benchmark Study*

2.2.1 Australian Gold Mining Projects

Projects 1-6 listed above are the only Gold operations that remain Open Pit and are based in Australia. A summary of these six gold projects and the availability of data from these projects is outlined in the six sections below

2.2.2 Cowal Gold Project – Evolution Mining

The Cowal Gold Project in New South Wales, Australia is an ideal site for use in benchmarking, as it is designed for a planned 9.8 Mtpa operation. Unfortunately, Mining Plus was unable to source Mining Costing information, as it is not shared publically to analyse. As such, this site was not included in the benchmark study due the lack of available data.

2.2.3 Gruyere Gold Project – Gold Road Resources/Goldfields JV

The Gruyere Gold Project in Western Australia was identified as a possibility; however, falling short of the criteria at 7.5 Mtpa. Mining Operating costs were able to be sourced publically and were used as part of the study.

2.2.4 Tomingley Gold Project – Alkane Resources

The Tomingley Gold Project in New South Wales, Australia was identified but as designed for only a 1.25 Mtpa operation and with no available information, the site was not able to be used for the benchmark study and also deemed not an appropriate site for review.

2.2.5 Tropicana Gold Mine – AngloGold Ashanti

The Tropicana Gold Mine in Western Australia was also identified as a comparable site as it is currently based on 8 Mtpa and cost information that is shared publically was also obtained by Mining Plus for comparison and to be used in this benchmarking study.

2.2.6 *Agate Creek Gold Project – Laneway Resources*

The Agate Creek Project in Queensland, Australia was deemed too small for comparison at only 340 Ktpa. It has not been included as part of the benchmark study.

2.2.7 *Boddington Gold mine - Newmont*

The Boddington Gold mine based in Western Australia was identified as the closest option to the criteria for Vista – Mt Todd. Boddington is based on 35 Mtpa, and is a large open pit mine. However, as with Cowal Gold Mine, information of planned and actual costs for Boddington could not be sourced to be used for the benchmark study.

2.2.8 *Additional Benchmarking Sites*

In addition to the above mentioned gold mining projects, MP identified other possible open pit projects for potential comparable operating costs as listed previously in Table 2.6, sites 7 to 12. Due to some of the specific economic and commercial constraints for the mining industry in the Northern Territory, there was a focus on identification of recent projects in the region. Two sites have been identified which are also located in the Northern Territory, and also one located in WA but close to the Northern Territory border, with these three sites offering more insight into costs for the region as it is generally different to the other states in Australia. These sites are confidential in nature and are sourced from internal MP project data.

After research and gathering of relevant data Mining Plus was unable to source data for some of the sites initially proposed. The following sites where included as part of the benchmark study as data could be obtained, with the final list of sites used for the benchmarking study shown below in Table 2.7.

Mining Project	Sites Used for Benchmark Study
1	Gruyere Gold Project – WA
2	Tropicana Gold Project – WA
3	Uranium Project – WA
4	Lithium Project – WA
5	Small Gold Project – WA
6	Gold Project – PNG
7	Rare Earths Project – NT
8	Phosphate Project – NT

***Figure 2.7** Sites used for the Benchmark Study – Data Obtained*

2.3 CAPEX Benchmarking

2.3.1 CAPEX Benchmarking Introduction

The Vista Gold – Mt. Todd Gold project utilises large scale open pit mining equipment, with the primary mining equipment and the support equipment specifications and quantity required as outlined in the PFS. Overall a significant sized fleet of large mining equipment is expected to be required for the Mt Todd project.

During this benchmarking study MP focussed on the primary mining equipment and support equipment list outlined in the above table.

MP used the costs per unit for equipment found in the PFS report to compare with recent equipment purchase costs from MP internal project data, and also through recent correspondence with the local mining equipment suppliers in Australia and particularly those with experiencing delivering equipment to mining operations in the Northern Territory.

MP notes that Vista Gold PFS project team obtained costing from an equipment database from EMG-LLC, which is a USA based company with all costs in USD. The main mining equipment CAPEX, from both a unit cost and total cost per equipment type has been summarised from the PFS and quoted unit prices for the updated PFS delivered in the report in October are shown in Table below. MP understands that the costs presented in the PFS are inclusive of delivery to site and assembly.

Primary Mining Equipment	Updated PFS Fleet Requirements	Updated PFS Quoted Unit Cost USD $	Updated PFS Fleet Cost USD $
Atlas Copco PV235	16	$ 2,468,400	$ 39,494,400
165MM Rotary Blast Hole Drills	2	$ 1,241,800	$ 2,483,600
28m3 Hyd. Shovel (PC 5500)	4	$ 8,653,900	$ 34,615,600
18M3 Front End Loader (994)	2	$ 4,573,100	$ 9,146,200
250t Haul Truck	41	$ 4,338,200	$ 177,866,200
Support Equipment			
300 Kw Dozer (D11)	1	$ 1,911,600	$ 1,911,600
230 Kw Dozer (D9)	4	$ 966,700	$ 3,866,800
4.9 m Motor Grader (16H)	4	$ 996,900	$ 3,987,600
Water Truck - CAT 777 with 70,000 Litre Tank	2	$ 2,108,700	$ 4,217,400
RTD Dozer (834H)	3	$ 1,150,300	$ 3,450,900

Figure 2.8 *Updated PFS Equipment Costs – Unit and Total Cost*

2.3.2 *Recent Equipment Purchase Pricing Costs*

Mining Plus sourced equipment purchase costs from MP internal project data, and also through recent correspondence with the local mining equipment suppliers in Australia and particularly those with experiencing delivering equipment to mining operations in the Northern Territory.

There was also a focus to make sure the pricing obtained included any requirements and specifications for delivery of the equipment within Australia, and also any applicable delivery and assembly costs. All costs will also be presented in AUD, and for comparison, an exchange rate of 0.70 was used foreign currency conversion between AUD and USD.

Mining Plus was able to compare the main mining equipment capital items, with recent equipment pricing obtained for the following equipment classes as outlined below, with an example type and model of equipment for that class also shown:

- Large Drills (ie: Atlas Copco PV235);
- Small Drills (ie: 165mm Rotary Blast Hole Drills);
- Hydraulic Shovel (28m^3 - ie: PC 5500);
- Front End Loader (18m^3 - ie: Cat 994);
- Haul Truck (220t – i.e.: Cat 793);
- Large Dozer (i.e.: Cat D11);
- Small Dozer (i.e.: Cat D9);
- Motor Grader (4.9m - i.e.: Cat 16H);
- Water Truck (i.e.: Cat 777 with 70kl tank);
- Rubber Tyred Dozer (i.e.: Cat 834H);

This list covers the largest and highest cost equipment required for the Mt Todd project and over the life of the mine, this equipment list will make up to 90% to 95% of the mining capital for the open pit mining operation and has been the focus of the CAPEX benchmarking.

2.3.3 *Large Drills CAPEX Benchmarking*

To obtain CAPEX Benchmarking for large drills, a number of OEM equipment suppliers that currently deliver to mining operations in the Northern Territory where approached for up to date equipment pricing. Pricing considered any local requirements and also estimated cost of delivery to the Mt Todd site. An example type and model of equipment for this equipment class is the Atlas Copco PV235.

A comparison of unit purchase costs in AUD for large drills, compared to the current Mt Todd PFS is shown below.

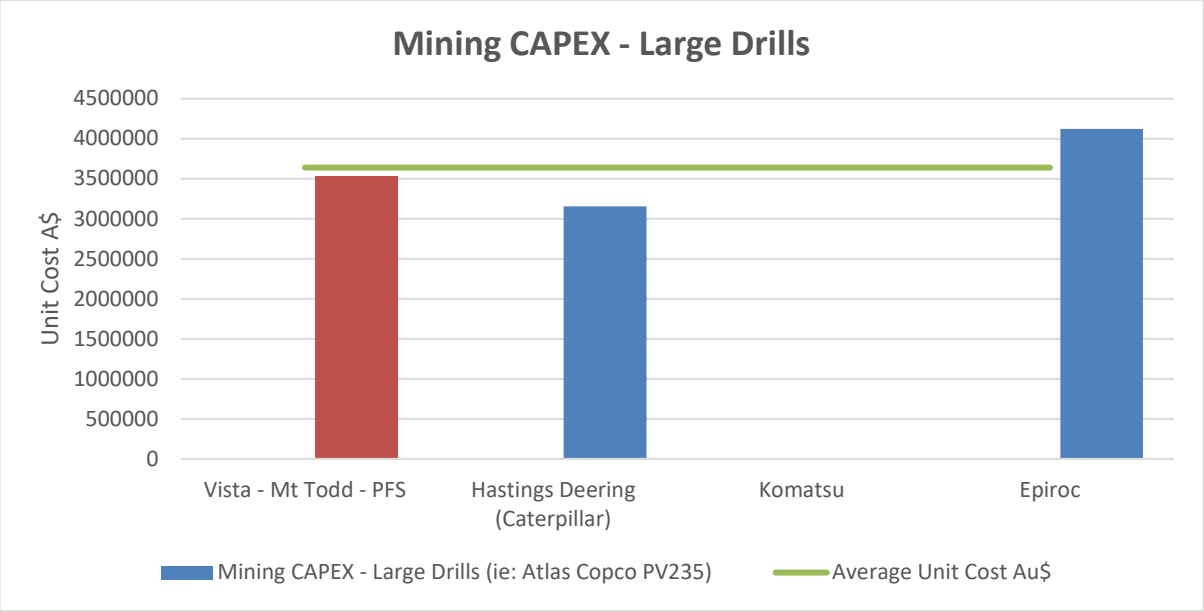

***Figure 2.9** Large Drills CAPEX Comparison*

The Mt Todd PFS CAPEX unit cost for a large drill is 97% of the average unit cost of large drills based on the equipment supplier benchmark costs received, indicating that the current PFS price is a good estimate of the unit cost of a large drill.

2.3.4 *Small Drills CAPEX Benchmarking*

To obtain the CAPEX Benchmarking for small drills, a number of OEM equipment suppliers that currently deliver to mining operations in the Northern Territory where approached for up to date equipment pricing. Pricing considered any local requirements and estimated cost of delivery to the Mt Todd site. An example type and model of equipment for this equipment class is any of the various 165mm rotary blast hole drills available from the various equipment suppliers.

A comparison of unit purchase costs in AUD for small drills, compared to the current Mt Todd PFS is shown below.

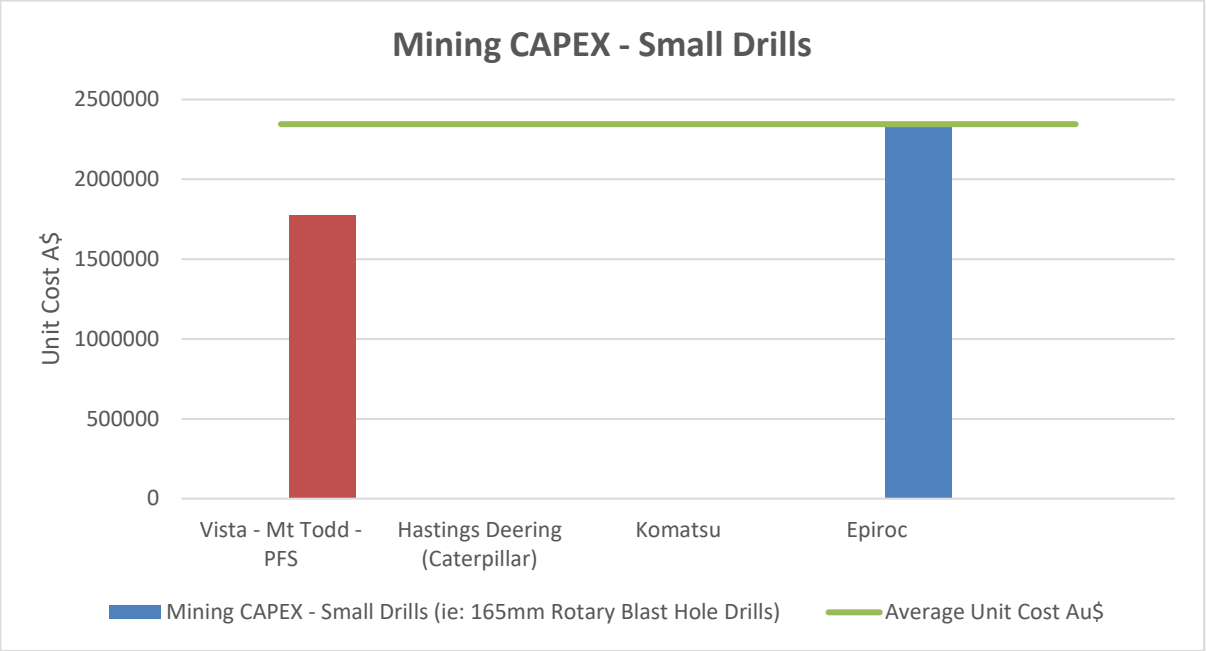

Figure 2.10 *Small Drills CAPEX Comparison*

The Mt Todd PFS CAPEX unit cost for a small drill is 76% of the only equipment supplier benchmark cost received. The current PFS price is potentially underestimating the unit cost of a small drill, but at least one other quote from an equipment supplier would be beneficially to support this benchmark.

2.3.5 Hydraulic Shovel CAPEX Benchmarking

In regards to the CAPEX Benchmarking for hydraulic shovels of a nominal 28m^3 capacity, a number of OEM equipment suppliers that currently deliver to mining operations in the Northern Territory where approached for up to date equipment pricing. Pricing considered any local requirements and also estimated cost of delivery to the Mt Todd site. An example type and model of equipment for this equipment class is a Komatsu PC5500.

A comparison of unit purchase costs in AUD for hydraulic shovels, compared to the current Mt Todd PFS is shown below.

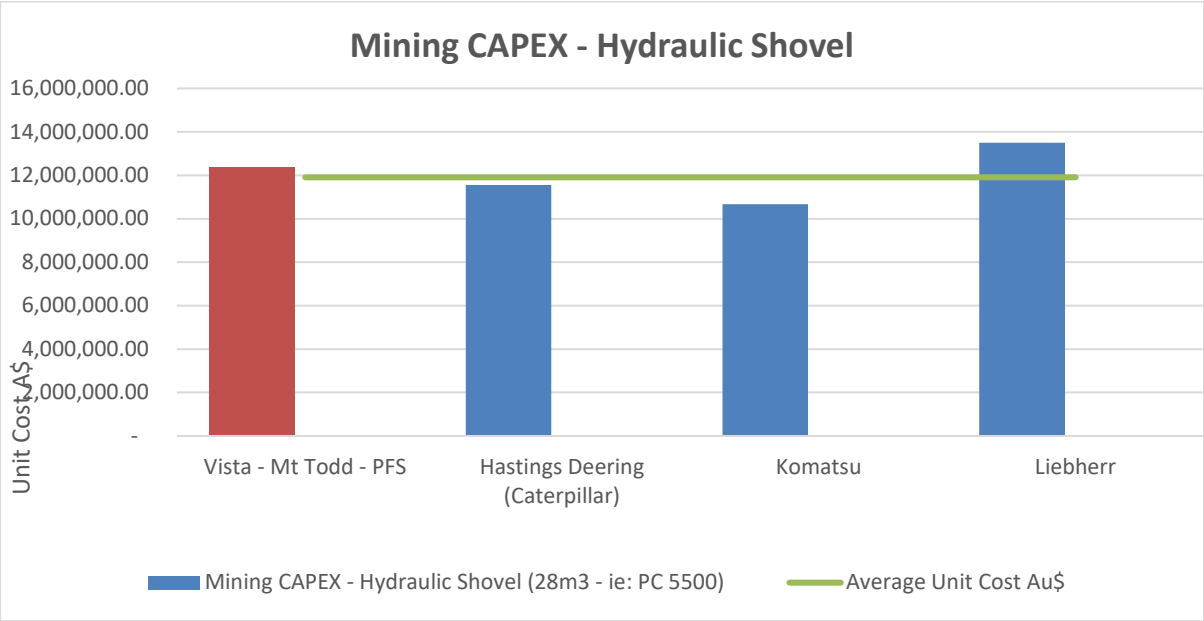

Figure 2.11 *Hydraulic Shovel CAPEX Comparison*

The Mt Todd PFS CAPEX unit cost for a hydraulic shovel is 104% of the average unit cost of hydraulic shovels based on the equipment supplier benchmark costs received. So the current PFS price is a good estimate of the unit cost of a hydraulic shovel.

Furthermore it was previously noted that there are significant local content costs for the hydraulic shovels based on the recent information received. For example Hastings Deering (local Caterpillar Dealer for the NT) has included local content of AU$2.2 million out of the total purchase price of AU$11.5 million for a Caterpillar 6050 Excavator. The local content requirements for this large equipment is included in the CAPEX for the hydraulic excavator.

2.3.6 Front End Loader CAPEX Benchmarking

In regards to the CAPEX Benchmarking for Front End Loader (FEL) of a nominal 18m^3 capacity, a number of OEM equipment suppliers that currently deliver to mining operations in the Northern Territory where approached for up to date equipment pricing. Pricing considered any local requirements and estimated cost of delivery to the Mt Todd site. An example type and model of equipment for this equipment class is a Caterpillar 994 FEL.

A comparison of unit purchase costs in AUD for FEL, compared to the current Mt Todd PFS is shown below.

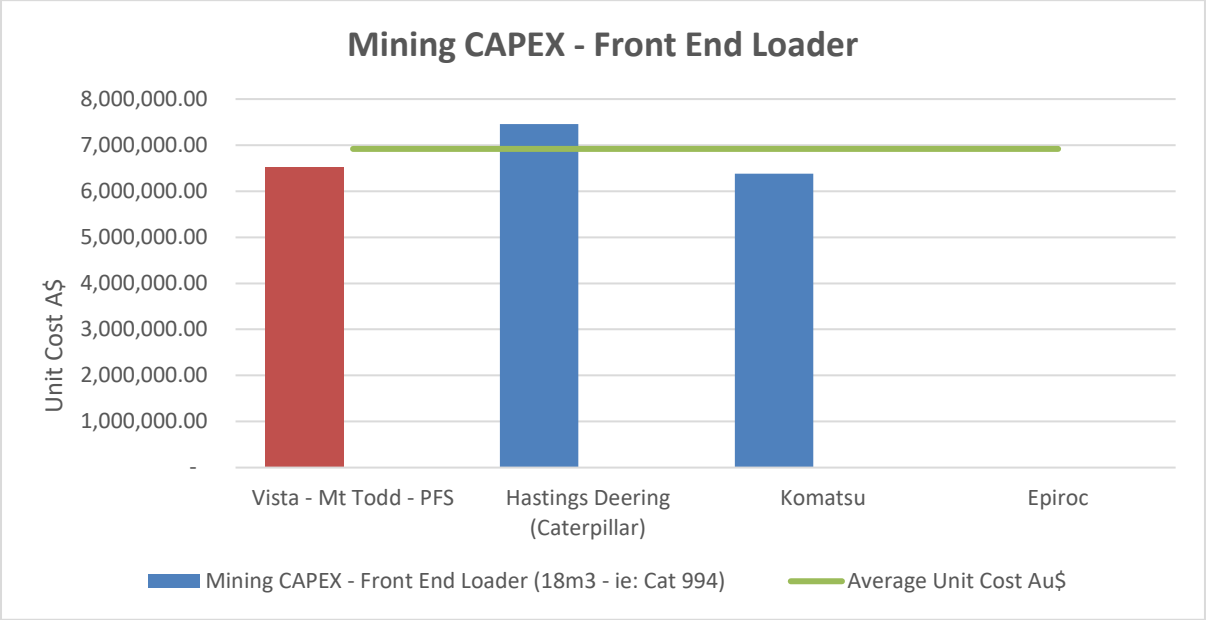

Figure 2.12 *Front End Loader CAPEX Comparison*

It should be noted that the Mt Todd PFS CAPEX unit cost for a FEL is 94% of the average unit cost of FEL based on the equipment supplier benchmark costs received. So the current PFS price is potentially slightly underestimating the unit cost of a FEL, but is a reasonable cost estimate for a PFS study.

2.3.7 Haul Truck CAPEX Benchmarking

In regards to the CAPEX Benchmarking for Haul Truck of a nominal 220t capacity, a number of OEM equipment suppliers that currently deliver to mining operations in the Northern Territory where approached for up to date equipment pricing. Pricing considered any local requirements and estimated cost of delivery to the Mt Todd site. An example type and model of equipment for this equipment class is a Caterpillar 793 truck.

A comparison of unit purchase costs in AUD for a haul truck, compared to the current Mt Todd PFS is shown below.

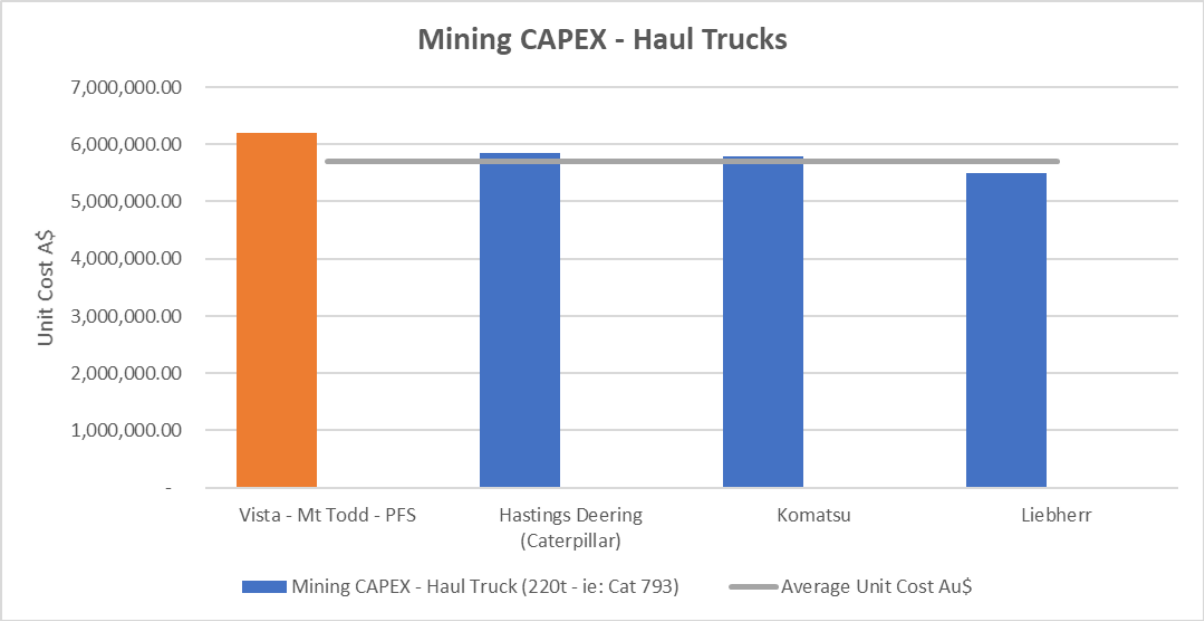

Figure 2.13 *Haul Truck CAPEX Comparison*

The Mt Todd PFS CAPEX unit cost for a haul truck is 109% of the average unit cost of the haul back based on the equipment supplier benchmark costs received. So the current PFS price is potentially over-estimating the unit cost of a haul truck.

As the haul truck has the largest number of equipment units in the proposed Mt Todd Haul Truck Fleet, the over estimation of approximately 9% is important to the overall CAPEX of the project. This is critical because as shown previously by the total fleet cost in Figure 2.8, the haul truck fleet in the PFS is US$143 million, this is 62% of the total main mining fleet cost of approximately US$229 million (comprising the Primary Mining Equipment and the large equipment of the Support Equipment list).

2.3.8 Large Dozer CAPEX Benchmarking

In regards to the CAPEX Benchmarking for a Large Dozer, a number of OEM equipment suppliers that currently deliver to mining operations in the Northern Territory where approached for up to date equipment pricing. Pricing considered any local requirements and estimated cost of delivery to the Mt Todd site. An example type and model of equipment for this equipment class is a Caterpillar D11 track type tractor.

A comparison of unit purchase costs in AUD for a large dozer, compared to the current Mt Todd PFS is shown below.

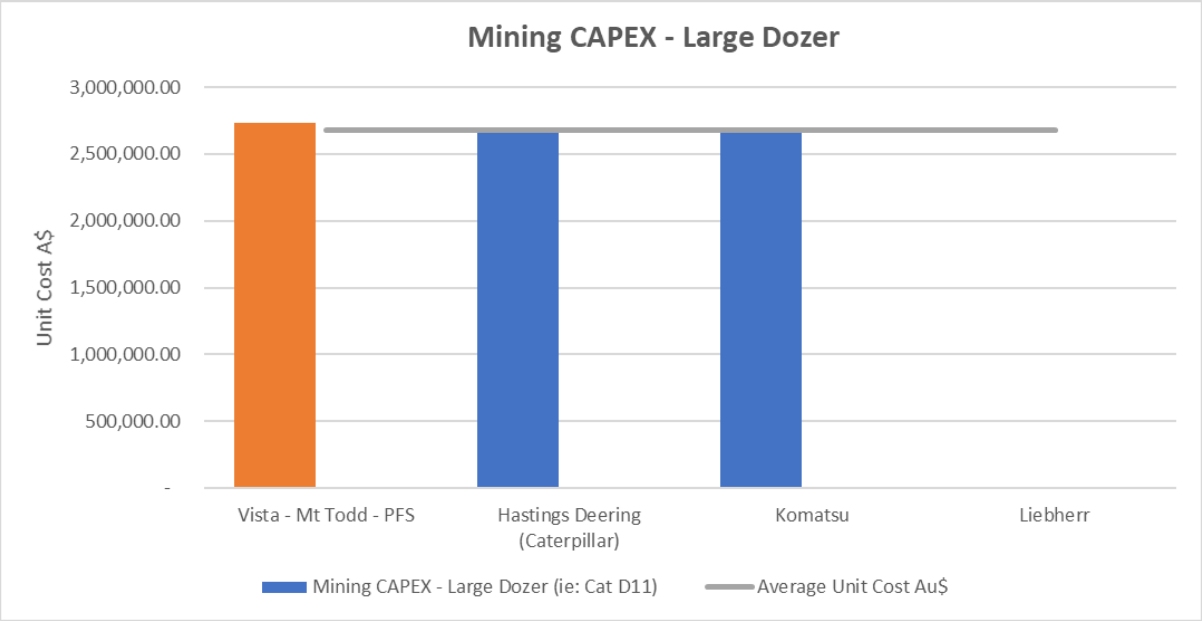

Figure 2.14 *Large Dozer CAPEX Comparison*

The Mt Todd PFS CAPEX unit cost for a large dozer is 102% of the average unit cost of the haul back based on the equipment supplier benchmark costs received. So the current PFS price is a good estimate of the unit cost of a large dozer.

2.3.9 Small Dozer CAPEX Benchmarking

In regards to the CAPEX Benchmarking for a Small Dozer, a number of OEM equipment suppliers that currently deliver to mining operations in the Northern Territory where approached for up to date equipment pricing. Pricing considered any local requirements and estimated cost of delivery to the Mt Todd site. An example type and model of equipment for this equipment class is a Caterpillar D9 track type tractor.

A comparison of unit purchase costs in AUD for a small dozer, compared to the current Mt Todd PFS is shown below

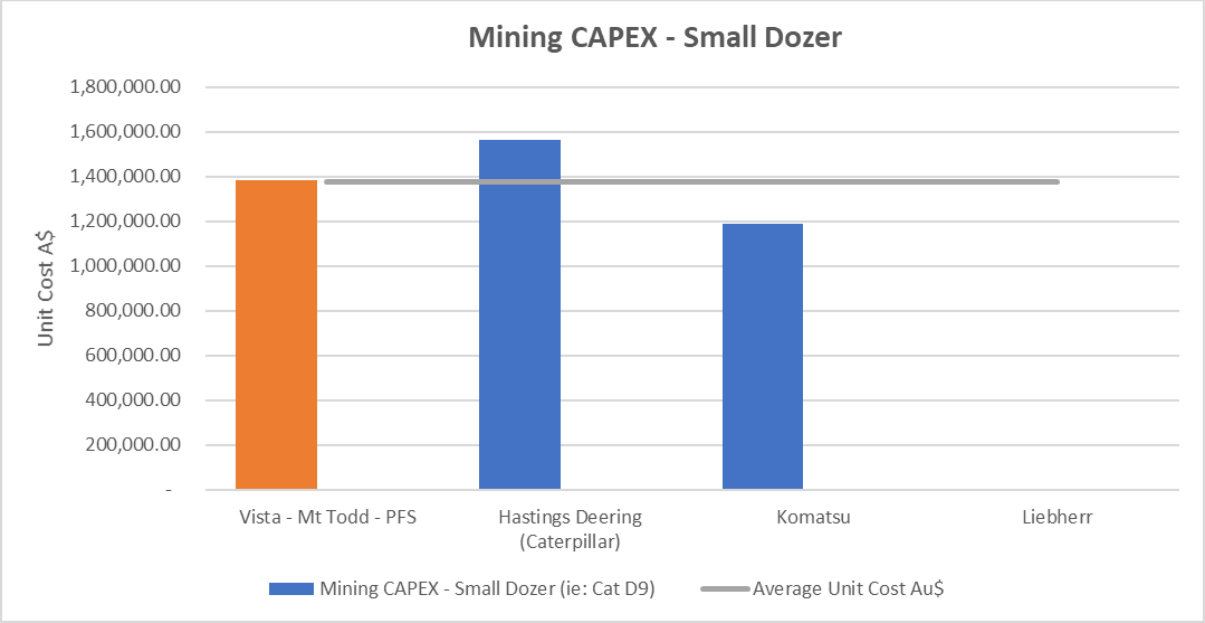

Figure 2.15 *Small Dozer CAPEX Comparison*

It should be noted that the Mt Todd PFS CAPEX unit cost for a small dozer is 100% of the average unit cost of the haul back based on the equipment supplier benchmark costs received. So the current PFS price is a good estimate of the unit cost of a small dozer.

2.3.10 Motor Grader CAPEX Benchmarking

In regards to the CAPEX Benchmarking for a Motor Grader of a nominal 4.9m blade width, a number of OEM equipment suppliers that currently deliver to mining operations in the Northern Territory where approached for up to date equipment pricing. Pricing considered any local requirements and also estimated cost of delivery to the Mt Todd site. An example type and model of equipment for this equipment class is a Caterpillar 16H grader.

A comparison of unit purchase costs in AUD for a grader, compared to the current Mt Todd PFS is shown below.

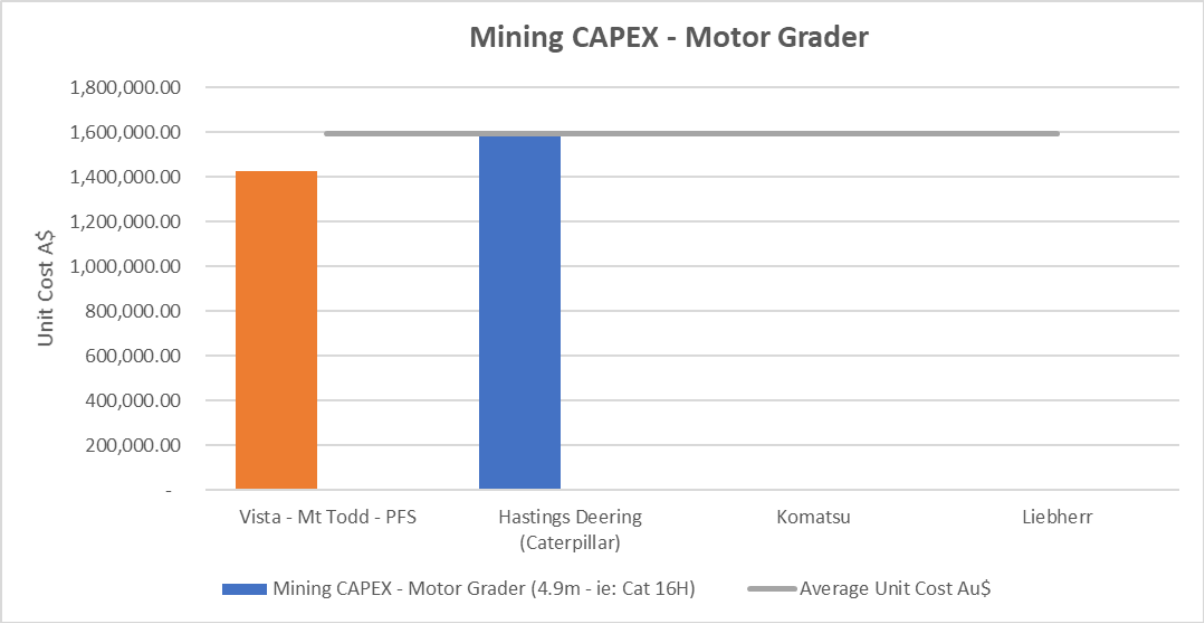

Figure 2.16 *Motor Grader CAPEX Comparison*

It should be noted that the Mt Todd PFS CAPEX unit cost for a grader is 89% of the only equipment supplier benchmark cost received. The current PFS price is potentially underestimating the unit cost of a grader, but at least one other quote from an equipment supplier would be beneficially to support this benchmark.

2.3.11 Water Truck CAPEX Benchmarking

In regards to the CAPEX Benchmarking for a Water truck with a nominal 70kl tank, a number of OEM equipment suppliers that currently deliver to mining operations in the Northern Territory where approached for up to date equipment pricing. Pricing considered any local requirements and estimated cost of delivery to the Mt Todd site. An example type and model of equipment for this equipment class is a Caterpillar 777 truck frame with a 70,000 litre water tank installed.

A comparison of unit purchase costs in AUD for a water truck, compared to the current Mt Todd PFS is shown below.

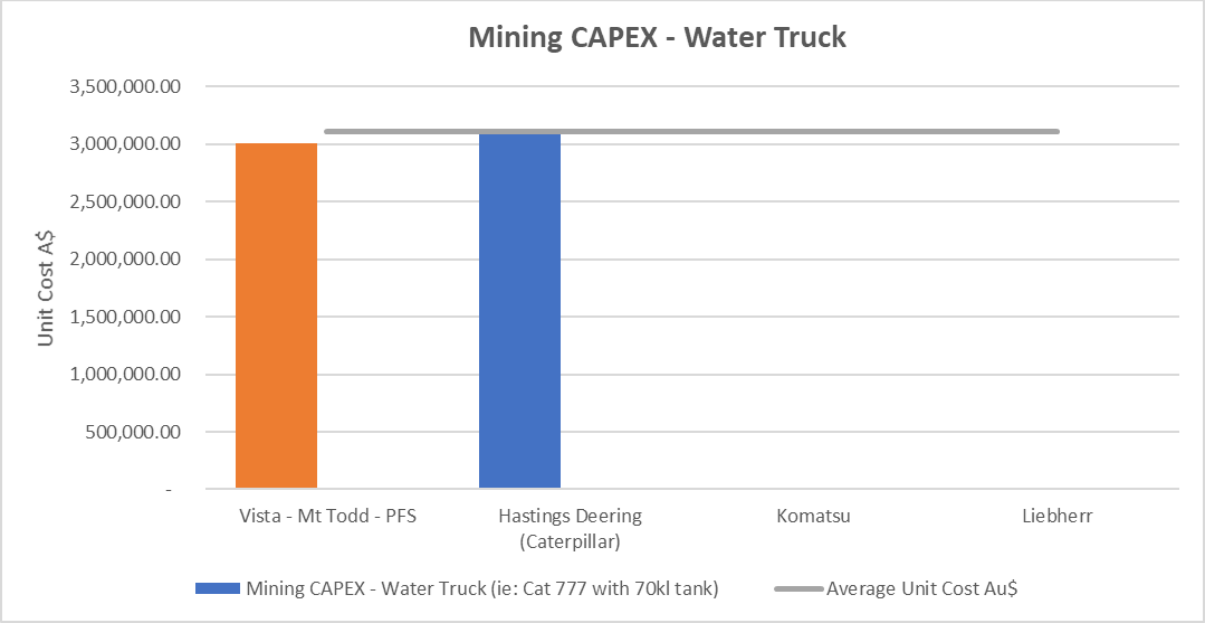

Figure 2.17 *Water Truck CAPEX Comparison*

It should be noted that the Mt Todd PFS CAPEX unit cost for a water truck is 97% of the only equipment supplier benchmark cost received. The current PFS price is a good estimate of the unit cost of a water truck, but at least one other quote from an equipment supplier would be beneficially to support this benchmark.

Furthermore, it should be noted that there are significant local content costs for the water truck based on the recent information received. For example Hastings Deering (local Caterpillar Dealer for the NT) has included local content of AU$1.15 million out of the total purchase price of AU$3.1 million for a Caterpillar 777G water truck. This cost is assumed to be due to the local manufacture and then installation of the water tank, which is then installed on the imported truck frame. These local costs are considered in the revised cost estimate shown in the Figure above.

2.3.12 Rubber Tyred Dozer CAPEX Benchmarking

In regards to the CAPEX Benchmarking for a Rubber Tyred Dozer, a number of OEM equipment suppliers that currently deliver to mining operations in the Northern Territory where approached for up to date equipment pricing. Pricing considered any local requirements and estimated cost of delivery to the Mt Todd site. An example type and model of equipment for this equipment class is a Caterpillar 834G\H rubber tyred dozer.

A comparison of unit purchase costs in AUD for a rubber tyred dozer, compared to the current Mt Todd PFS is shown below.

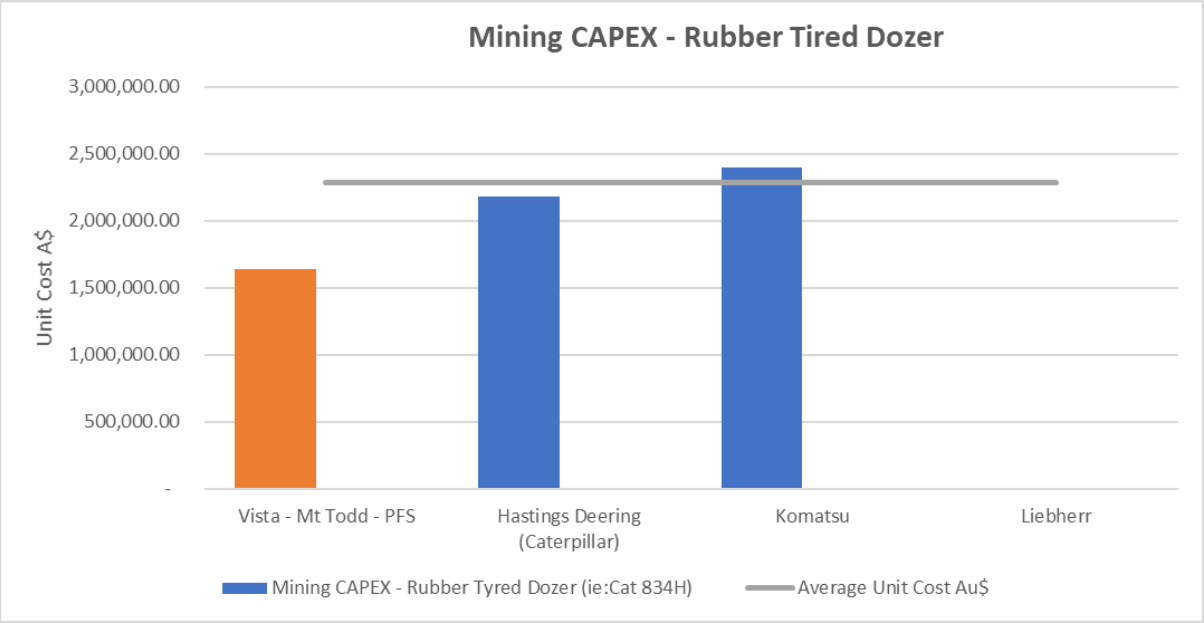

Figure 2.18 *Rubber Tyred Dozer CAPEX Comparison*

It should be noted that the Mt Todd PFS CAPEX unit cost for a rubber tyred dozer is 72% of the average unit cost of the haul back based on the equipment supplier benchmark costs received. So the current PFS price is potentially underestimating the unit cost of a rubber tyred dozer.

2.3.13 Mining CAPEX Benchmarking Summary

A summary of the comparison between the Mt Todd PFS Unit costs, and the average current recent equipment purchase price obtained from the OEM contacts in Australia, with consideration of delivery costs to the Northern Territory is outlined in the comparison Table and Figure shown below.

CAPEX Comparison - Mt Todd % of Average Unit Cost	
Mining CAPEX Area	**Mt Todd % of Average Unit Cost**
Large Drills (ie: Atlas Copco PV235)	97%
Small Drills (ie: 165mm Blast Hole Drills)	76%
Hydraulic Shovel (28m3 - ie: PC 5500)	104%
Front End Loader (18m3 - ie: Cat 994)	94%
Haul Truck (220t - ie: Cat 793)	109%
Large Dozer (Cat D11)	102%
Small Dozer (Cat D9)	100%
Motor Grader (4.9m - ie: Cat 16H)	89%
Water Truck (ie: Cat 777 with 70kl tank)	97%
Rubber Tyred Dozer (ie:Cat 834H)	72%
AVERAGE	**94%**
AVERAGE (weighted based on Fleet Numbers and Capital)	**104%**

Figure 2.19 *CAPEX Benchmarking Comparison – Mt Todd PFS % of Average Unit Cost*

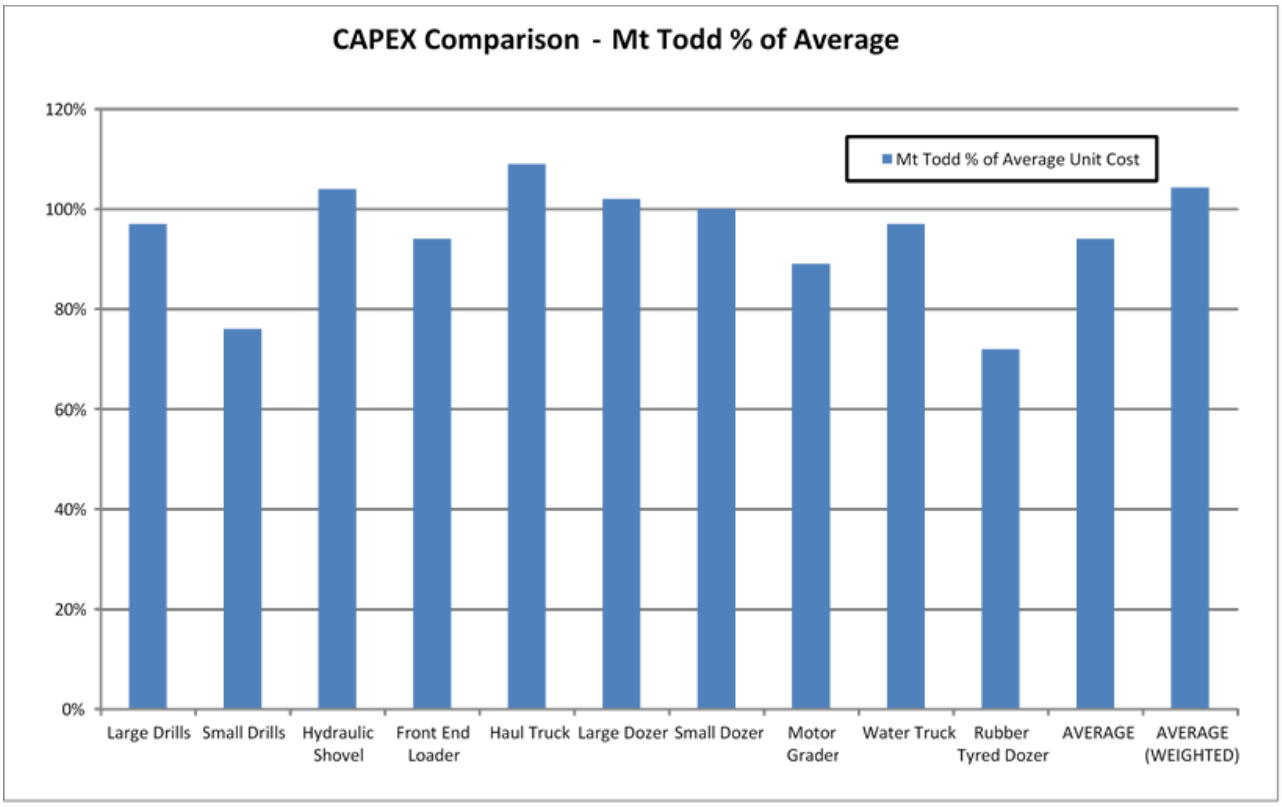

Figure 2.20 *CAPEX Summary Comparison*

In summary this data shows that while the cost of individual pieces of equipment may be either under or overestimated, the total capital cost of the mining fleet is estimated by Vista to be 104% of the cost currently being quoted in AUD by OEMs in Australia. Overall it is believed that the Mt Todd PFS is a good estimate of the expected CAPEX cost.

In the original review a systematic underestimate of the CAPEX cost was identified, which seemed to be due to the two main reasons as outlined below. These concerns have been addressed and rectified in the more recent project update:

- Delivery costs to the Northern Territory – despite a long history of mining, the NT is not currently considered a strong mining state when compared to the main mining states of Western Australia and Queensland. Due to this and the logistics for OEMs to import equipment into Australia where most is landed in either Brisbane or Perth, an additional cost to deliver to a site in the Northern Territory is likely.
- Additional local content costs – all OEM contacted have highlighted additional costs for local Australian content which are required when equipment is imported into Australia. This additional cost is due to two requirements. Firstly, there is additional local content including modifications and additions to the equipment to meet Australian mining requirements and Australian standards. Secondly, is local manufacturing for attachments such as water tanks, and specialised trays for dump trucks. For example, Hastings Deering (the local Caterpillar Dealer for the NT) has included local content of AU$2.2 million out of the total purchase price of AU$11.5 million for a Caterpillar 6050 Excavator. Also for a water truck, the local content is AU$1.15 million out of the total purchase price of AU$3.1 million for a Caterpillar 777G water truck.

This highlights that more detailed work around the logistics to achieve these revised and updated local costs need to be explored in the next stages of study, to ensure the costs estimated for landing equipment in to the Port of Darwin can be achieved. Furthermore work will need to consider the foreign exchange rate of the day and also include discussions for potential reductions in pricing when purchasing multiple pieces of equipment from one OEM or delivery into the Northern Territory.

2.4 OPEX Benchmarking

Mining Plus was able to compare the five main mining operating areas within the mine as outlined below:

- Drilling;
- Blasting;
- Loading;
- Hauling; and
- Labour.

In some cases, cost information available for Drill & Blast and Load & Haul was only available as a combined cost, which is considered usually and also means there is a better set for the combined benchmarking that the separate areas of Drill and Blast, and then Load and Haul. Costs for the five main areas are presented separately and then

combined into Drill & Blast and Load & Haul respectively. An exchange rate of $0.70 was used to convert Mt. Todd costs to AUD for the comparisons.

2.4.1 Drilling OPEX

Base on the size of the Mt. Todd Operation, the drilling costs are very similar to the Gruyere operation, and overall compares similar when taking the average of other operations used in the comparison. The Lithium project is an outlier in this situation as that operation requires a more careful approach to avoid contamination of the lithium ore, through the minimisation of dilution. Figure 1.14 shows the comparison.

In summary the Mt Todd PFS OPEX drilling numbers seems reasonable for the level of the study completed.

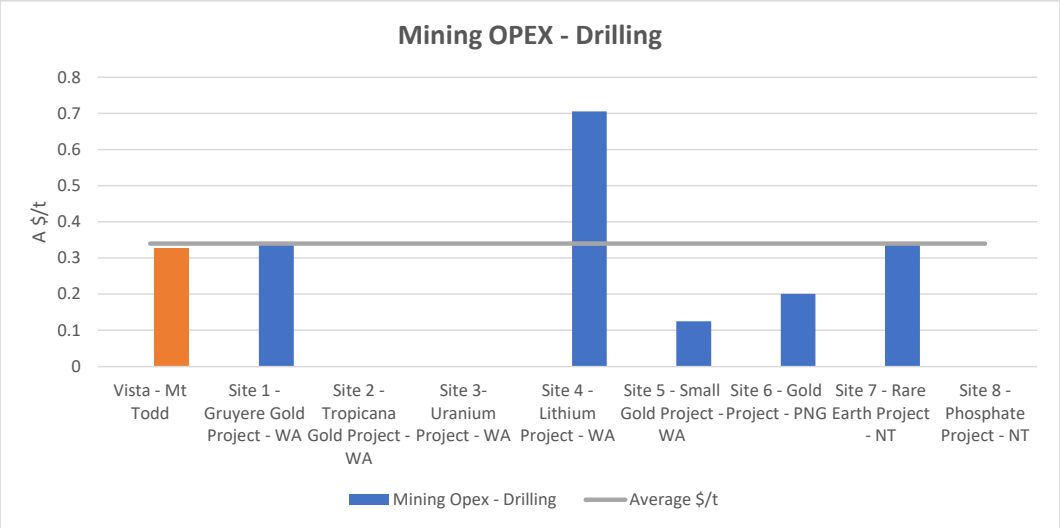

Figure 2.21 *Drilling OPEX Comparison*

2.4.2 Blasting OPEX

In regards to Blasting costs, the Mt. Todd project costs $/t compares lower than most of the benchmarked operations that are closer in size and material movement. These results can be seen in Figure 1.15. The rare earths project is an outlier in this situation as that operation requires smaller diameter holes and more drill metres per tonne of material mined to achieve the required blasting outcomes. In summary the Mt Todd PFS OPEX blasting numbers may merit additional review in future studies

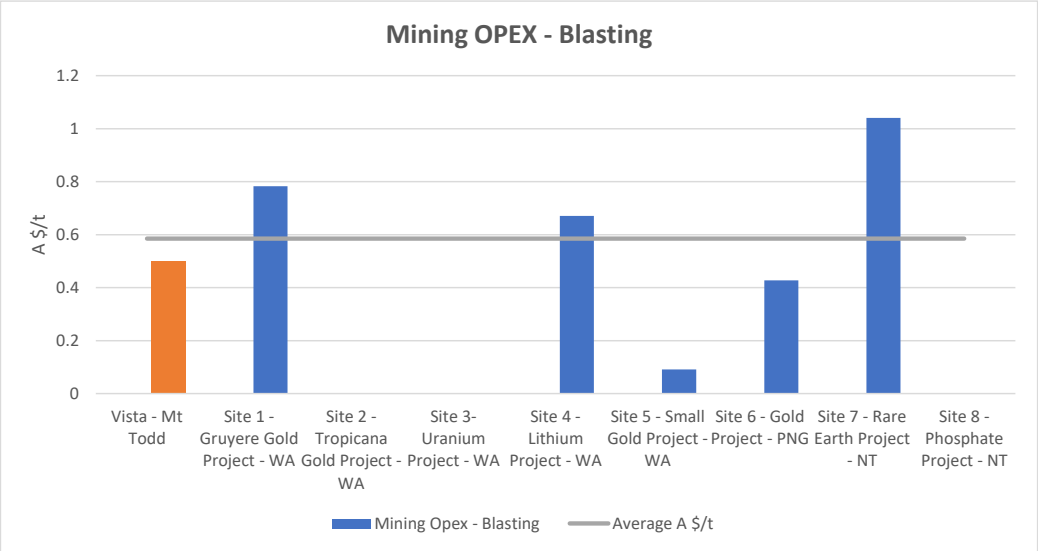

Figure 2.22 *Blasting OPEX Comparison*

2.4.3 *Loading OPEX*

There was very little information to compare loading operating costs however when comparing to the Gruyere operation, the Mt. Todd project is a little lower. These results can be seen in Figure 1.16. Note that the average result is skewed by the data for Site 6, which has very different cost and operating structure due to it being an operation in the PNG. It is advisable in this situation to compare more closely to the Gruyere operation.

In summary the Mt Todd PFS OPEX loading numbers seems reasonable for the level of the study completed.

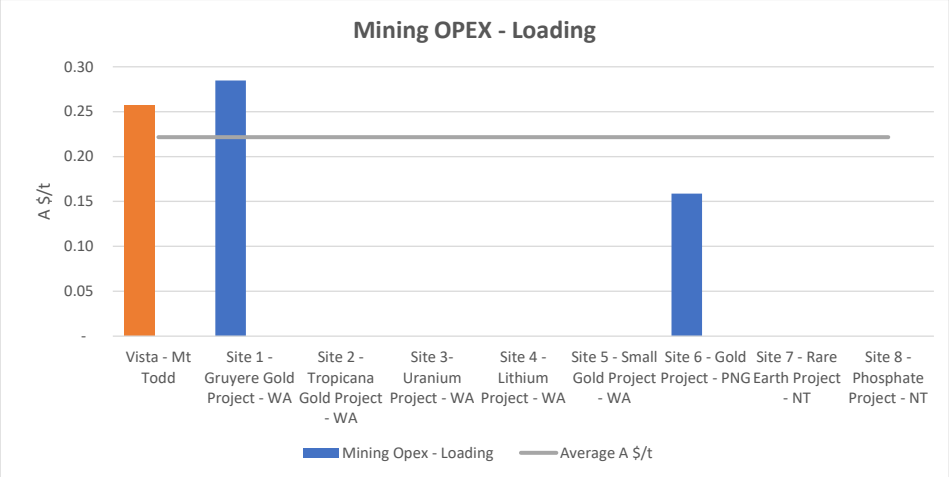

Figure 2.23 *Loading OPEX Comparison*

2.4.4 Hauling OPEX

Similarly to the comparison for loading operating costs, the hauling costs follow the same trend.

There was very little information to compare hauling operating costs however when comparing to the Gruyere operation, the Mt. Todd project is a little bit high. These results can be seen in Figure 1.17. Note that the average result is skewed by the data for Site 6, which has very different cost and operating structure due to it being an operation in the PNG. It is advisable in this situation to compare more closely to the Gruyere operation.

In summary the Mt Todd PFS OPEX hauling numbers seems reasonable for the level of the study completed.

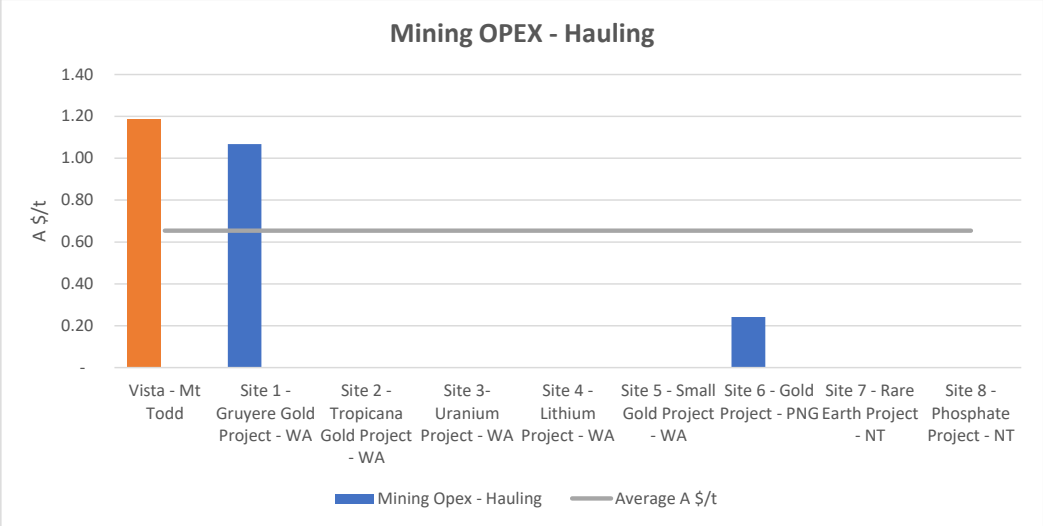

Figure 2.24 *Hauling OPEX Comparison*

2.4.5 *Drill & Blast OPEX*

Due to most of the data available for other sites for benchmarking is being provided as a combined Drill and Blast cost, we have provided below the combined cost to show a better comparison. Overall the cost provided at Mt. Todd is lower than all benchmarked sites of comparable material movement size in Australia. This result can be seen in Figure 1.18.

In summary the Mt Todd PFS OPEX drill and blast numbers, especially the latter, may merit additional review in future studies.

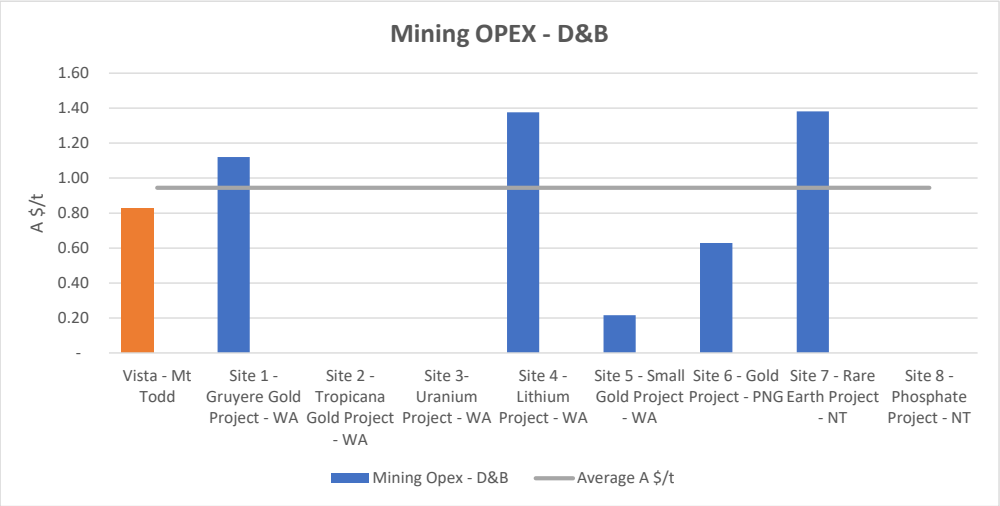

Figure 2.25 *D&B OPEX Comparison*

2.4.6 *Load & Haul OPEX*

On average the L&H costs for Mt. Todd appears to be likely based on the equipment and pit/dump configuration differences. The hauling costs for Mt. Todd are higher than the average and are the reason why the combined cost is also high. These results can be seen in Figure 1.19.

In summary the Mt Todd PFS OPEX load and haul numbers seems reasonable for the level of the study completed.

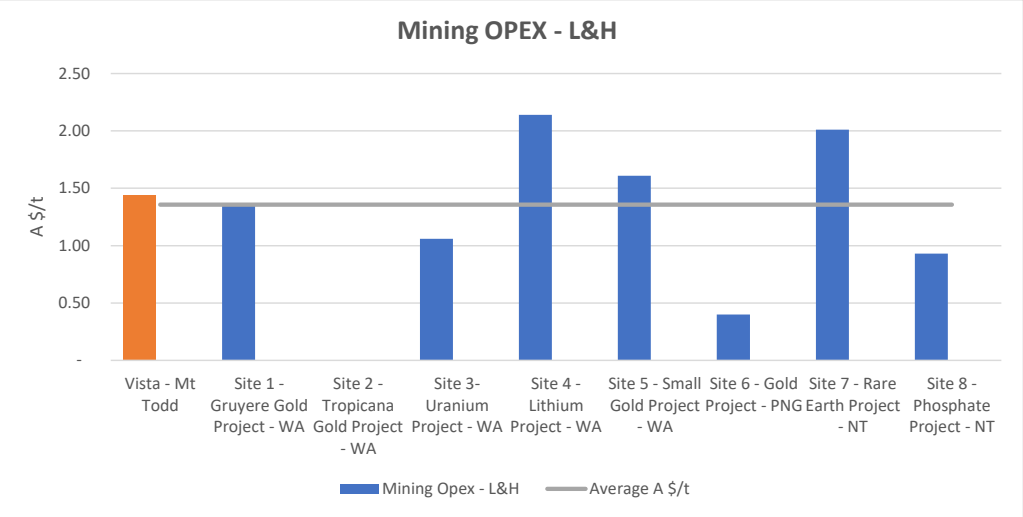

Figure 2.26 *L&H OPEX Comparison*

2.4.7 Labour OPEX

The operating costs for Labour appear to be on par with other benchmarked sites of closer size. The outlier site compared to is again the site in the PNG where Labour costs are higher due to requirement of foreign workers to be flown in numerous expatriate roles and a large number of locals also needing to be employed. When comparing to Gruyere, Mt. Todd is AUD $0.13/t higher. These results can be seen in Figure 1.20.

In summary the Mt Todd PFS OPEX labour numbers seems reasonable for the level of the study completed. This is an overall labour cost acorss thee mining areas, so is likely to be duplicated in some of the area work areas costs, but it is difficult to define in all sites data set.

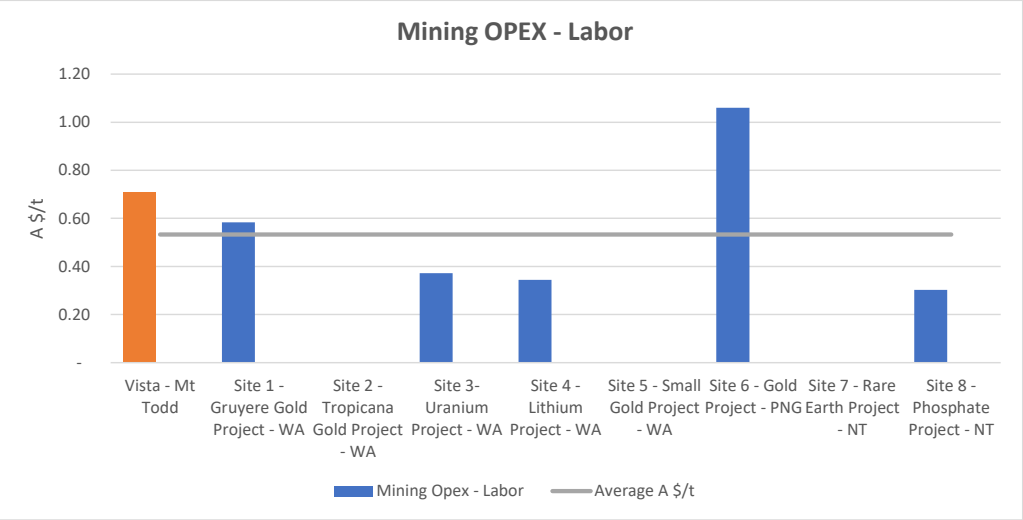

Figure 2.27 *Labour OPEX Comparison*

2.5 Mining OPEX Benchmarking Summary

A summary of the comparison between the Mt Todd PFS costs per tonne (AUD/tonne), and the average benchmarked mining costs per tonne in each operating and cost area of the mining obtained during this study is outlined in the comparison table and Figure shown below. In summary the mining OPEX estimated for Mt Todd appear to be ~$0.48/t higher than the average of the benchmarked projects.

OPEX Comparison - Mt Todd % of Average $/t and Mt Todd Difference to Average $/t		
Mining OPEX Area	**Mt Todd % of Average $/t**	**Mt Todd difference to Average $/t**
Drilling	97%	-$0.01
Blasting	85%	-$0.09
Loading	116%	$0.04
Hauling	181%	$0.54
Drill & Blast	88%	-$0.11
Load & Haul	106%	$0.08
Labor	133%	$0.18
Comparison Delta	**140%**	**$0.48**

Figure 2.28 *OPEX Benchmarking Comparison – Mt Todd PFS % of Average $/tonne*

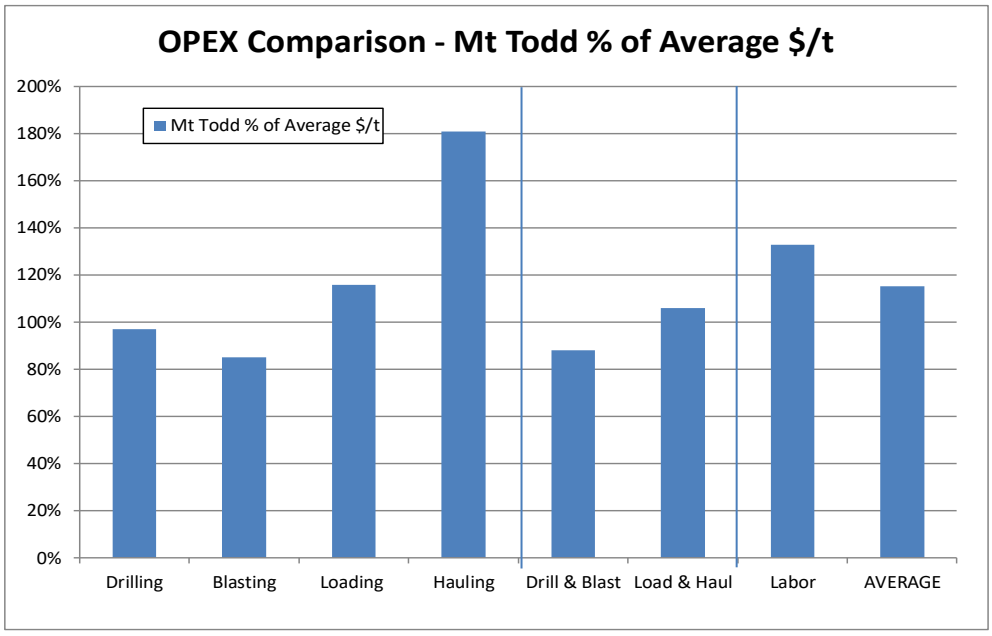

Figure 2.29 *OPEX Summary Comparison*

In summary this data shows the Mt Todd PFS is potentially over estimating the total mining OPEX costs; however, the benchmarking population could be larger and overall it is believed the PFS numbers seem reasonable for this level of study. However, the labour costs may need to be reviewed to ensure they are specific to the site and industry requirements in the Northern Territory, and also in the range to ensure the project can attract a suitable workforce.

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3. SCOPE OF CAPEX BENCHMARKING

GR Engineering Services (GRES) has been requested by Vista Gold (VGZ) to perform a benchmarking study of its Mt Todd project that has recently released a PFS update in 2019.

The scope of the capital cost review was to benchmark the PFS against similar projects built recently. This benchmarking will allow VGZ to identify any potential areas of opportunity or risk in the reported capital, assisting the owner's team in planning the next phase of development work or discussions with third parties such as financiers or partners.

In the process of reviewing the capital estimate GRES has had the opportunity to review the background to the technical basis of the project, in particular key infrastructure such as power supply and the heart of the operation in the process plant. GRES was requested to highlight any fatal flaws or opportunities technically.

GRES was also requested to comment on the project capital overruns experienced in the industry and how that experience may relate to the Mt Todd project.

3.1 Technical Commentary

3.1.1 Process Flowsheet and Equipment

The current Mt Todd flowsheet has been developed to address legacies of the previous attempts to exploit the deposit. The testwork undertaken has attempted to gain a much deeper level of understanding of the nature of the occurrence of the gold within the host rock. It is understood that a much finer grind is required and that this needs to be done whilst at the same time minimising the energy involved in the grinding of rock where there is no gold.

The introduction of HPGR's and ore sorting attempts to address this and a significant amount of work has gone into selecting not only the process route but also the ore sorting technology most suitable for the application with the selection of Tomra over Steinert for the separate laser and X Ray sorters. As such two stage crushing has been incorporated in order to reduce particle sizes to feed the HPGR's.

The 2019 PFS update has modified the two stage grinding approach to achieve a 40 micron P_{80} grind size in lieu of 60 microns. GRES acknowledge the improvement in vertical milling technologies and capital costs which has been demonstrated in the most recent testwork. GRES would would recommend further testwork to ensure the proposed equipment and configuration are optimised.

A leach CIP adsorption circuit has been chosen in lieu of the more conventional CIL used in Australia. This is seen to have benefits with the solution tenors expected and an effective means to reduce carbon inventories. The leach tank sizes are amongst the largest in the world but similar sizes do exist.

The balance of the flowsheet is robust in terms of standard tried and proven unit operations for a gold processing with a 22 tonne split AARL desorption circuit and carbon regeneration etc.

Reagents and services facilities are standard; however, the recent increase in the cyanide consumption together with the deletion of the tailings thickener, reduction in grind size from 60 to 40 microns and the consequential increase in viscosity resulted in an increase in SMBS consumption. It is understood that the capital savings on the deletion of the tailings thickener on balance outweigh the increase in operating costs for the additional reagent consumption.

In terms of the Infrastructure, the drawings provided suggest a modest approach similar to that adopted by Newcrest at its Cadia operation in NSW. This is appropriate for the climate and environment for the Mt Todd project location.

The selection of equipment is sound with only reputable vendors being selected for equipment. The sizing approach is also seen as robust with the equipment selected being upsized one size or in the case of multiple units an additional unit being added.

No fatal flaws are immediately apparent although GRES has some reservations on the proposed power supply configuration with high capacity reciprocating high efficiency gas fired generators for the base load. The selected engines have limited capacity to absorb load fluctuations and the proposed link to the Northern Territory power grid for starting the mills is currently seen as ambitious. GRES understand further work is being completed on the power grid and its infrastructure to mitigate this risk in lieu of a standalone power source.

3.2 Electrical and Power Supply

The PFS has been generated on the basis that the majority of power for the site would be generated on site through base-load gas-fired reciprocating generators, with a connection to the Darwin – Katherine electricity grid. The gas would be supplied through a local spur from the gas pipeline that runs parallel to the Stuart Highway.

The power station proposed is intended as a predominantly base-load power station, with no installed redundancy; the, connection to the Darwin-Katherine power system would provide supplementary power in events where the site power station is unable to supply the entire site load, including during periods where individual site generators are unavailable.

GRES believes that the proposed connection to the Darwin-Katherine grid is likely to require a capital contribution to upgrade of some network and generation infrastructure and that a material investment in network support (power quality) equipment will be mandated. In addition, GRES recommends that the next phase of engineering include:

- A detailed assessment of the composition of the electricity supply costs from the grid to ensure that fixed costs associated with the network charge are not a component that results in a significant increase over the assumed realised average power cost from the grid.
- A review of the reliability of the grid connection, particularly as the proposed site power station has no black start capability.
- Advanced negotiations with an electricity retailer.
- An evaluation of the benefits of a larger capacity power station with no connection to the grid.
- Completion of a trade-off study to evaluate the merits of installing the power station close to the existing gas pipeline with a very short spur to the power station with power transmitted to the site via 33kv powerlines as compared to capitalizing the pipeline with an annual fixed maintenance and compliance cost paid to a third party as an operating cost.
- The installation of variable speed drives on the ball mills and the development of detailed mill start-up sequence plans to ensure that the designed power plant is able to meet the required load.

3.3 Basis of Review

3.3.1 Mt Todd Data

GRES have utilised the data provided by VGZ in the Vistagold data room. The data provided was extensive in some areas, reflecting Feasibility Study levels of accuracy while other areas, such as electrical engineering or piping have been limited to a PFS level.

GRES predominantly relied on the 2019 PFS NI43101 update report released in Oct 19. The detailed financial model was also provided for reference. Further backup was provided in the data room that was part of the 2018 PFS update and utilized where relevant.

Additional electrical clarifications were provided via emails through the benchmarking process.

The process GRES follows in a benchmarking review includes:

- Summary capex comparisons to similar projects in comparable locations/costs
- Breakdown capex comparisons for similar project areas or WBS that are comparative
- Compare capital efficiency as $ per tonne throughput capacity
- Breakdown comparison of key capex inputs such as:
  - Electrical;
  - Equipment pricing;
  - Bulk material quantities;
  - Bulk material supply rates;
  - Installation productivity;
  - Installation costs;
  - Indirect costs (incl. EPCM & Owners);
  - Contingency and overrun expectations.

3.3.2 *Limits of Review*

Electrical

The electrical power supply review is based on publicly available information related to the Darwin – Katherine power system, and available information related to spark-ignition reciprocating engines. The likelihood that a gas connection can be secured has been considered.

Typical equipment installed in high throughput gold processing plants has been considered, including a high level of automation, a relatively advanced process control system, a high industry standard of electrical safety and industry standard level of redundancy on electrical distribution infrastructure.

It has been assumed that a local 11 kV power distribution system in the plant would be installed. However, a 33 kV system would be more expensive, but within the level of accuracy of the PFS. If local generation (at the plant location) is utilised, 11 kV generation and distribution is practical. Local generation located close to the gas pipeline would necessitate stepping up to at least 33 kV, and probably that voltage regulation equipment be installed at the power station end of the 33 kV system. 33 kV distribution could be utilised, but a significant portion of the load (mills and large pumps) would likely be fed at 11 kV, incurring further capital costs for stepdown equipment.

Plant Design

The review assumed the project would meet the minimum requirement of the Australian Standards. No specific insurance requirements for business interruption were tabled by VGZ. GRES understand the philosophy for the plant design was to ensure redundancy or capacity in the circuit and equipment selection can exceed the design criteria.

Foreign Exchange

The Mt Todd PFS update 2019 used updated FX rates. The benchmarking has used these exchange rates were a conversion to AUD is required.

3.4 Project Owner Influence

GRES has been involved in many large scale project developments including studies and EPC contracting tenders. It has also completed the recent large project studies for clients such Oz Minerals, Gold Road Resources and additional large scale project reviews throughout Australasia. All projects are obviously heavily influenced by the owner/operator.

In this regard GRES understands and has observed that the PFS for Mt Todd that has included the potential impact of an experienced owner/operator. The equipment sizing, circuit, testwork, geology and mining have all been completed with a Tier 1 or 2 operator in mind. Other project costs that can be heavily influenced by the owners team including general owners costs, site accommodation and workforce. These items are particular to the style and proposed operational structure and will require further reviews as the project develops.

3.4.1 Project Capital Overruns

GRES was requested to comment on the general industry experience with project capital cost overruns.

Some of the projects identified, similar in scale, built in the last 10-15 years included:

- Malartic;
- Rainy River;
- Cerro Moro;
- Ahafo and Akyem;
- Gruyere.

While some literature and reporting indicated >35% cost overruns could be expected, GRES believe the background to the specifics are worth recognising, specifically because many of them could be considered a lower risk to Mt Todd. The fact that Mt Todd have inherited substantial infrastructure is an example of a critical difference to other large capital greenfield projects.

Gruyere has forecast an overrun to their original budget at the plant commissioning stage. This has been attributed to a number of areas that have been compared with Mt Todd. As mentioned the ownership has a major effect. Rainy River had substantial overruns with earthworks which appears to be related to TSF and water dam designs and costings.

Of the major influences on project over-runs, GRES commentary would be as follows:

PFS/FS Development Quality

While many influences are outside the control of the development engineers and contractors, the use of quality engineering that reflects how the plant will be built and operated is still a major influence on

project outcomes. This is particularly important with metallurgy, plant design and the downstream expectations of an owner. GRES maintains that if the engineer takes the responsibility for the design and construction of a facility the warranty of the outcome should rest with the engineer/contractor. GRES has experienced/observed numerous changes to project capital budgets when a financier has requested that an engineer/contractor be given the responsibility to warrant the outcomes which can easily effect the capital budget. The sooner this influence can be accounted for in the project development capital budget the more flexibility the owners and stakeholders have.

Bulk Earthworks and TSF

Mt Todd doesn't not have the TSF and water management issues that projects like Rainy River faced and would therefore not be considered a high risk

Process Plant Design

Many project capital overruns have been due to process plant design changes and scope creep. Mt Todd has also limited this risk with substantial metallurgical testwork and circuit design considerations. The approach to the plant appears robust and accounts for ore variability.

Construction and Schedule

The Mt Todd PFS has endeavored to ensure the construction risk has been included in the costs and contingency. An advantage VGZ has in the Australian market is the EPC construction environment. The detailed work done in the project development will allow VGZ to group scopes and work areas, align them with a preferred contracting style that will best protect the stake-holders interests. The schedule used for the PFS is reasonable for the location, however, a good example of overruns not included in any capex estimates is force majeure. Gruyere experienced some extreme weather delays that may have been outside the contingency and any sub-contracts, hence impacting on the owner. This risk would need to be reviewed in more detail for Mt Todd.

Where projects have less definition, large non-transferable risks or very large owner or in house engineering team capacity with proven track records, an EPCM approach is very common. EPCM style developments typically have no contractual way of limiting overrun in a standard EPCM structure. GRES would expect the process plant at Mt Todd for example could be tendered or developed into a market competitive fixed price or similar EPC style contract limiting some of the overrun risks.

Additional plant rampup cost and time has been included in the 2019 PFS which reflects a more realistic timeframe for the plant to be operating at a commercial level.

Power

GRES do believe any reliance on the NT grid power for the major processing plant elements would be high risk and could easily impact the capex and to a lesser extent the opex. While this has not been

identified as a common element across comparable projects GRES believe this should be assigned a high risk profile in future phases.

Infrastructure

Again this has been a common overrun on other projects. With the exclusion of accommodation GRES believe the infrastructure Mt Todd has limited the overrun risk in the area. However, there are some unit operations in the plant that require special operational experience and attracting those resources to live in Katherine could prove difficult.

Owners Costs

This area has been identified on many project over-run reports. As mentioned previously GRES believe this could be a higher risk for Mt Todd depending on the corporate structure expected to be used for the project development and operations.

Other considerations for the potential over-runs to this area include free issued goods or services to Contractors. For example accommodation costs, flights, even process equipment have been free issued by clients on project with the expectation it will save costs or contractor margin. This can be true if managed contractually, however many projects result in major over-runs in site construction personnel and for process equipment, the free issuing results in another contractual interface with the engineer and builder.

Sustaining Costs

These costs are often not reported or highlighted in regards to over-runs given the plant is usually operating.

3.5 Capital Estimate Review Outcomes

3.5.1 Summary Level Benchmark

Benchmarking the Mt Todd project process plant from a capital cost perspective is a challenge in some ways. The project is not unique in terms of throughput, ore hardness, flowsheet unit operations or location as far as each of these parameters go for a gold plant. However, collectively these parameters in a single plant, make Mt Todd unique.

There are no gold plants at this size in Australia that share the flowsheet or the ore hardness or the relative location in terms of ease of access.

The proximity of Darwin as a port for the importation for equipment and supplies makes its location attractive in terms of distance for carriage although a logistics study for oversized loads has not been sighted. The road from the port to the site unfortunately passes through the city of Darwin and as such may make it necessary to have the ball mill shell and head segments reviewed to ensure they can be transported from Darwin to site. Previously large mills and equipment have been transported to the

original Mt Todd plant but some of this equipment was road freighted from Adelaide or Whyalla. This should not present an insurmountable issue and more recent information provided by Vista infers the mining fleet would be brought in through Darwin. From a construction labour access perspective, there is a domestic airport at Katherine and a paved road from the international airport in Darwin.

In terms of Australian projects against which to benchmark metrics the following parallels are drawn.

Goldfields' Tropicana and Gruyere projects are similar in some respects but do not have the same throughput with Tropicana initially a 4.5 Mt/a plant (now ~8.2 Mt/a) and Gruyere around half the capacity of Mt Todd. The ores at these plants whilst competent are not as hard as Mt Todd but Tropicana does have HPGR's. Ore characteristics for Tropicana are crushing work Index of approximately 20 kWhr/t and similar bond ball mill indices with a JK Axb 32 – 33 and abrasion indices of 0.3 to 0.4. Additionally these plants are more isolated in terms of location than Mt Todd in terms of construction logistics. The Gruyere plant does have some comparable metrics to the 33 kTpd option for Mt Todd.

Newcrest's Cadia Valley operation may be relevant as a comparison for ore hardness but its flowsheet is very different as a flotation concentrator and now an underground operation. In terms of capacity it is almost twice the size of Mt Todd. Its Telfer operation was also comparable in terms of throughput at 23.4 Mt/a but again a very different flowsheet and initially an open pit and underground operation it's now an underground operation.

Vista indicated the following gold projects may be pertinent for comparison.

Newmont's Ahafo and Akyem operations in Ghana are both approximately half the capacity of Mt Todd at 7.5 Mt/a and are relatively simple flowsheets with a less competent ore than Mt Todd and construction costs had a very different labour makeup than Mt Todd would require. As an example, Ahafo at its peak construction period in 2005/6 had over 3,000 workers and required 75 buses to transport its work force to and from the site each day from local villages and towns. Similarly for Akyem which was initially a carbon copy of Ahafo. At the time of construction the plant and infrastructure CAPEX, excluding the mining fleet was in the order of US$500 M for Ahafo. It was undertaken on an EPCM basis. Akyem was commissioned in 2013 and CAPEX was approximately US$600 M.

On the other hand, Newmont's 35 Mt/a Boddington copper / gold plant in Western Australia does have some parallels that could be drawn although the data is not readily accessible. There is widespread unofficial information about the issues during ramp up but the actual causes of the issues and the remedial actions taken are unknown. The ore hardness is definitely comparable but its proximity to Perth made for some very unusual construction labour force accommodation arrangements.

Rainy River in Ontario, Canada is a 21 kTpd plant with cold weather implications that do not apply to Mt Todd even though the ore hardness is comparable. The estimate generation varies only slightly from the approach used by TTP. Concrete quantities were from MTO's from the design with rates from similar projects. These rates would not apply to Mt Todd and the quantities would be too low. Structural steel

used current market rates at the time and quantities were benchmarked. Again the rates and quantities would not scale for Mt Todd on the basis of timing of the project, location or location of sourcing for supply and fabrication. The construction labour make up may be similar although this is not necessarily an approach that would be used in Australia.

Malartic, also in Canada is similarly not considered a suitable project for benchmarking for plant and infrastructure capital costs even though it is similar in throughput. The flowsheet is similar but the individual unit operations are configured differently and again has a very different climate and logistics profile and as such drawing a cost comparison may not be valid.

3.5.2 Capex Summary

The capex benchmarking was based on the Mt Todd PFS update in 2019. The complex flowsheet, ore hardness and throughput (10.65 & 17.75 Mt/a Options) made comparisons difficult with recent Australian gold projects. See below basic flowsheet highlighting the additional front end equipment.

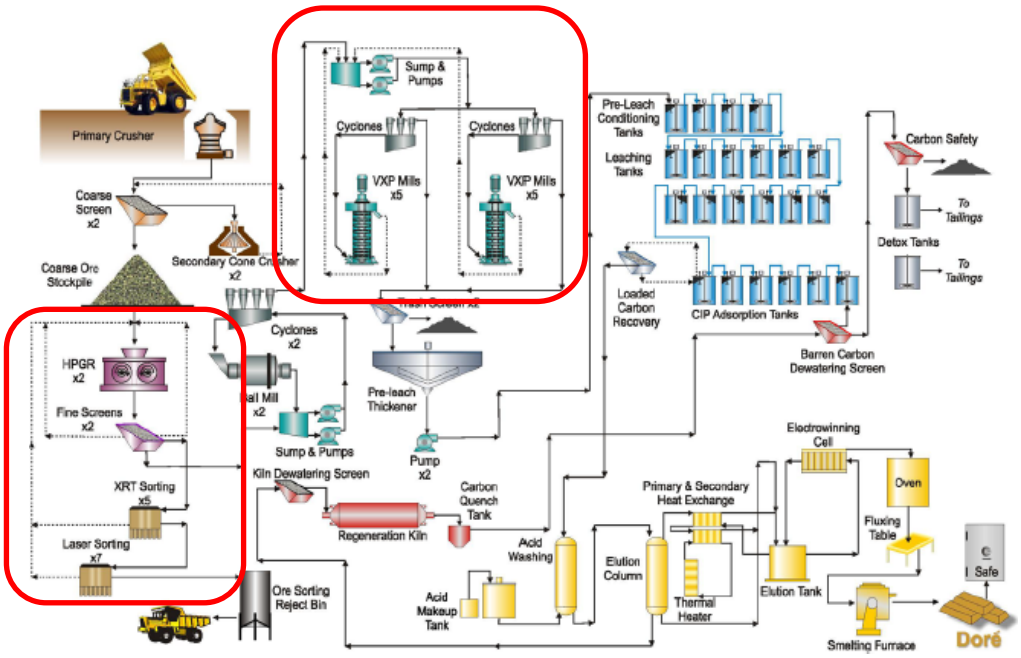

Figure 3.1 Mt Todd Flowsheet

In regards capex, the most appropriate projects to compare were large Australian Gold Projects (Aust Gold) using public data and our interpretation of the data. These projects are well known to GRES and have comparable project inputs, unit operations and remote location in Australia. Additionally comparisons to Rainy River in Canada, Malartic in Canada, Newmont's Ahafo and Akyem operations in Ghana are both approximately half the capacity of Mt Todd at 7.5 Mt/a. Other reference points include feasibility study results published for large mineral processing facilities in similar locations and regions, and our internal database for equipment and bulk commodity supply.

The following tables compare interpreted capital costs from public data as well as capital efficiency. To authenticate the benchmark as much as possible, particular elements have been interpreted/altered to get an "apples for apples" comparison. This includes unit operations, infrastructure and foreign exchange.

3.5.3 Summary Tables

Total reported Capex to achieve first operation in PFS & todays Foreign Exchange rates compared to Mt Todd PFS updates.

	Aust Gold	Akyem	Ahafo	Rainy River *	Mt Todd PFS 19	Mt Todd PFS 19
Mtpa	~8.0	7.5	7.5	7.7	10.65	17.75
~Capex in USD @ todays FX	$487	$625	$580	$1,034	$623	$826
~Capex in AUD todays FX (0.7 USD)	$621	-	-	-	$890	$1180

Table 3.1 Capex Summary Comparison

Ahafo 2005, Akyem 2013 Ghana, Rainy River 2017 CAD.

*Rainy River experienced a substantial overruns due to a change to the tailings and water dam designs and associated capex.

Capex breakdown for reference

AUD @0.7 USD PFS	Aust Gold	Aust Gold	Rainy River FS	Rainy River	Mt Todd PFS 19	Mt Todd PFS 19
Mtpa	~7.5	~8.0	7.7	7.7	10.65	17.75
Total Reported Capex AUD	$532	$621	$920	$1,292	$890	$1108
Process Plant & Associated Infra	*$187*	*$217*	*$313*	*No data available*	*$399*	*$524*
Scope change		*$30*	*$50*		*$9*	*$9*
Infrastructure & Water	*$83*	*$83*			*$58*	*$66*
Mine Dev	*$38*	*$38*	*$40*		*$83*	*$173*
Power Supply	*$21*	*$21*	*$10*		*$95*	*$117*
Site Civils	*$8*	*$8*	*$117*		*$27*	*$27*
Eng & Contractor Indirects	*$90*	*$90*	*$106*		*$101*	*$117*
Owner & Pre Prod	*$52*	*$52*	*$210*		*$18*	*$23*
Spares	*$7*	*$7*				
Contingency	*$45*	*$75*	*73.3*		*$99*	*$124*
*Existing Infrastructure***					*$100*	*$100*

Table 3.2 Capex Breakdown Comparison AUD

** - value given to the existing infrastructure at Mt Todd to consider when comparing projects. Not included in "Total Report Capex AUD" row.

See below the $/throughput tonne in USD.

USD	Aust Gold	Akyem	Ahafo	Rainy River *	Mt Todd	Mt Todd
Mtpa	~8.0	7.5	7.5	7.7	10.65	17.75
Capex in USD @ 2019 FX from PFS	$487	$600	$550	$1,034	$623	$826
$/t/a	$59	$80	$73.3	$134	$58.5	$46.5
Including Existing Infrastructure CAPEX Estimated value of $70M					$693	$896
$/t/a					$65	$50.5

Table 3.3 Capital Efficiency Comparisons

The table below represents an equivalent EPC Process Plant scope and capital estimate using the Aust Gold pricing and the 2019 Mt Todd PFS. The scope is limited to the processing facilities.

USD @ 2019 FX from PFS	Aust Gold	Mt Todd	Mt Todd
Mtpa	~8.0	10.65	17.75
EPC Process Plant $M	$248	$379	$503
$/t/a	$30.2	$35.6	$28.3

Table 3.4 Process Plant Capital Efficiency Comparisons

To compare with a similar plant flowsheet and non-process infrastructure in general then the following changes have been made to the capex summaries. These changes are costings from the Mt Todd PFS updates.

~ Additional $USD 90M added to Aust Gold to reflect the Mt Todd HPGR, Ore Sorting & VXP Mills circuits

	Aust Gold	Mt Todd	Mt Todd
Mtpa	~8.0	10.65	17.75
EPC Process Plant USD $M	$338	$391	$517
$/t/a	$41.2	$35.6	$28.3
EPC Process Plant AUD $M	$430	$558	$740
$/t/a	$52.3	$52.4	$41.6

Table 3.5 Normalised Process Plant Capital Efficiency Comparisons

	Aust Gold	Mt Todd	Mt Todd
EPC Process Plant AUD $M	$430	$558	$740
Capex 6/10th Rule on Throughput*		*$501*	*$682*
$/t/a	$52.3	*$47.1*	*$38.4*

Table 3.6 Baseline comparison to Aust Gold on the 6/10ths Rule

*- The 6/10th rule is a well-known guide for the comparison of costs based on known capacities in engineering applications.

Based on the comparison of the tables above, Mt Todd appears in line with expectations for the 10.65Mtpa plant. The larger 17.75Mpta plant is more difficult to benchmark, however the throughput comparison does provide some additional comfort in the expected capital efficiency of a larger plant. In addition, the backup to the capital estimate does not provide any additional material concerns to the capex when considered a PFS accuracy.

3.5.4 Detailed Capex Benchmarks

GRES performed a detailed review of the major inputs to the Mt Todd PFS update capex. These inputs include:

- Site labour costs and productivity;
- Bulk materials supply;
- Electrical and power supply;
- Equipment supply.

3.5.5 Site Labour and Productivity

GRES compared the Mt Todd estimates with its own projects and database of comparable projects.

For site labour costs, a total direct labour gang rate was assessed for the typical work and location. The table below highlights that the rates used are in line with our expectations.

AUD	Mt Todd	Aust Gold
Ave Gang Rate $/hr	164.90	160.41

Table 3.7 Gang Rate Comparison

For SMP work in isolation, the following comparison highlighted some differences in gang rate build up, specifically in the construction plant costs.

AUD	Mt Todd	Aust Gold
Base $/hr	97.29	82.94
Indirect $/hr	45.47	46.10
Plant $/hr	20.91	31.7
Ave Gang Rate $/hr	163.67	176.8

Table 3.8 SMP Gang Rate Comparison

Mechanical Installation	Mt Todd	Aust Gold
Mt/a	17.75	~8.0
Direct hrs	95,310	~75,000

Table 3.9 Mech Install Comparison

GRES would expect the mechanical installation hours for Mt Todd could be underestimated by 25-50K hours, or potentially > USD$4M of costs. On review the installation productivities used are above and below the GRES norms.

Concrete Installation	Mt Todd	Mt Todd	Aust Gold
Mt/a	10.65	17.75	~8.0
Hrs/m^3	9.30	11.20	11.81

Table 3.10 Conc Install Comparison

The concrete installation productivity for larger Mt Todd plant appear slightly higher than expected and would be an opportunity for optimisation.

Steelwork Installation	Mt Todd	Mt Todd	Aust Gold
Mt/a	10.65	17.75	~8.0
Hrs/t	51.37	52.86	29.44

Table 3.11 Steel Install Comparison

GRES believes the Mt Todd structural steel installation productivity is high and could be a reduction of up to $5M AUD.

Platework Installation	Mt Todd	Mt Todd	Aust Gold
Mt/a	10.65	17.75	~8.0
Hrs/t	40.72	40.87	24.27

Table 3.12 Plate Install Comparison

Again GRES believes there may be an opportunity to reduce the labour costs for platework installation.

Tankage Installation	Mt Todd	Mt Todd	Aust Gold
Mt/a	10.65	17.75	~8.0
Hrs/t	40.51	40.61	53.71

Table 3.13 Tankage Install Comparison

GRES believes the site fabricated tank installation costs will be higher than that estimated in the PFS.

Piping Installation	Mt Todd	Mt Todd	Aust Gold
Mt/a	10.65	17.75	~8.0
Hrs	65,000	80,000	60,000

Table 3.14 Piping Install Comparison

GRES believes the piping installation hours could be substantially higher than that included in the PFS estimate, potentially doubled.

Electrical Installation	Mt Todd	Mt Todd	Aust Gold
Mt/a	10.65	17.75	~8.0
Hrs	144,766	188,070	~70,000

Table 3.15 Electrical Install Comparison

GRES believes there may be an opportunity to reduce the electrical installation hours in the PFS estimate.

Vista has reviewed these comments previously and has suggested it would prefer to maintain the hours as given in the Rawlinson's data.

Bulk Materials

The bulk materials supply rates were all reviewed. The rates & productivity used for concrete appears to be on the high side of expectations. GRES calculates the PFS all in rate for Mt Todd concrete works is ~$2800/m3 AUD. This would be on the high side and could be an opportunity to reduce with further work.

Structural steelwork, mechanical plate work and tankage supply rates are all lower than typical Australian supply rates. They may be appropriate for major structural steel supplied from Asia, however for major plate work and potentially tankage GRES believes the rates used are low.

Material Quantities

GRES has similar projects to compare overall material quantities. The table below is the summary of the GRES assessment.

	Concrete	Steelwork	Tankage
GRES MTO difference	-20%	-20%	-2%

Table 3.16 MTO Comparison

GRES believes there is an opportunity to reduce overall quantities from the PFS design.

Overall the percentage included for piping is reasonable.

EPCM

The overall EPCM allowance equates to ~11% of the direct costs which would be in the band of expectations. However, a significant proportion of this allowance appears to be allocated to an owners team ~30M which would need clarification should that allowance not be set aside for the EPCM team.

Contingency

The contingency appears to be ~11% of the project costs. While this allowance is in line with most project developments GRES is aware financiers may request additional overrun facilities to account for unforeseen circumstances. As discussed previously in this report over-runs of 10 to 20% are not uncommon and may be expected for budgeting in Australia.

Sustaining Capital

As mentioned previously in the report, sustaining capital is often difficult to benchmark. In this case the tailings storage facility costs have been estimated in detail and would appear reasonable. The capital asset sales also look modest and reasonable.

Electrical

Process Plant

The plant electrical (electrical, instrumentation and control) costs were factored in the PFS estimate. GRES developed a very rough but detailed capital cost estimate based on equipment and material quantities from relevant parts of similar projects. Based on an 11kV power distribution system throughout the plant, GRES finds that the allowances for equipment and materials made by TTP are appropriate, and that the man-hour allowances to perform the installation more than allow for foreseeable contingency events. The estimated supply costs of ~AU$25M appears to be appropriate.

Power Generation

The power station scope has been priced in detail. GRES can identify no issues with the costings for the scope that has been estimated. However, considerations should be given to expanding the scope to include onsite redundancy and black start capability. This could be an additional US$20M of costs.

Power Supply and Reticulation

The power supply WBS 4200 includes general allowances for power supply equipment. Allowance has been made for 7.1 km of powerlines around the site, at US $300K per km. GRES's experience is that a powerline cost of AU$140K/km will be sufficient, based on steel or concrete poles, 33 kV insulators and an overhead earthwire.

The remainder of the allowances that have been made appear to be associated with the connection to the Darwin-Katherine power system. Those allowances would be appropriate solely for the connection works; it may be expected that any power quality equipment that may be required to meet the network operator's power quality requirements may have a cost in the order of US$7M. However, if a standalone power system were to be installed (with no grid connection) these items would be unnecessary.

An allowance has obviously not been made for a powerline between the power station (located near the main pipeline) and the plant, which is discussed as an opportunity in the PFS.

Site Communications

Allowances have been made for site communications in the WBS areas 4300 and 5800. The total allowance for fibre would appear to be appropriate for sole-use trenches; some cost reductions could be expected to be realised if multi-use trenches were utilised, or the powerline considered as a means of supporting the incoming fibre to site.

The site-wide radio communications allowance is assumed to include a telecommunications and WIFI provision.

Equipment Pricing

The majority of mechanical equipment pricing has been from recent vendor quotations albeit at a budget level. The quotations are typically from reputable vendors to the mining industry in Australia. As such the factoring that is typically applied to the cost of mechanical equipment for other disciplines will be reasonable provided that the appropriate factor is within the ranges normally applied in the industry.

Vista has advised that the approach to equipment sizing has been to size the equipment for the nominal duty and then either upsize it by one size or in the case of multiple units as in the ore-sorters and the secondary mills, add an extra unit. Whilst being conservative this approach does offer a level of robustness which appears appropriate given the development stage and the project history.

A review of the equipment sizes listed in the equipment list confirms this when bench marked against other projects. As an example the primary crusher selected is a FLS 1,600 x 2,400 primary gyratory, (60 x 89). The nominal throughput is approximately 2,700 tph. The crusher one size down from this, 54 x 75 has multiple installations in Australia where it is consistently crushing at rates in excess of 3,000 tph. Whilst the throughput is comparable, the other parameters that need benchmarking are feed top-size and to a lesser extent hardness, (hardness mainly affects power consumption). Crusher

manufacturers give ranges of throughputs for their ranges of sizes of gyratory crushers with notes about hardness and topsize.

Another reason for selecting a larger primary crusher is to enable the crushing plant to operate for either 12 or 18 hours per day instead of nominally 24 hours per day although that is not the intention here.

The selection of the crusher here is considered appropriate.

There are other equipment selections that could be revised slightly with modifications to the layout depending on a full understanding of the constraints that led to the TTP layout presented but on balance the sizing appears to appropriate. An exception to this is the size of the conveyors as no conveyor widths are given in the estimate, mechanical equipment list or process design criteria.

The selections of packaged desorption/goldroom and carbon regeneration systems is a recent trend in projects for entry level owners and small operations. GRES would typically buy the key equipment such as the strip solution heater, the associated pumps, electrowinning cells and regeneration kiln and design the rest in-house.

Installation Costs

A high level review was done on the installation manhours. Whilst some of the installation hours numbers in the estimates are supported by quotations from vendors and some are taken from Rawlinson's Estimators Manhour Guide and yet others use a "manhours/tonne" rate, there seems to be some discrepancies.

As an example for the HPGR's a rate of 10 hours per tonne is used and for the HPGR's giving a total number of hours of 3,560 hours each suggesting a weight of 365 tonnes.

The selected primary gyratory installation hours are nominated as 1,440. It weighs approximately 400 tonnes and as such would suggest 4,000 hours at 10 hours per tonne in lieu of the 3.6 hours per tonne for the 1,440 hours. GRES allowed 1,200 hours for a crusher one size smaller than this which supports the 3.6 hours per tonne or a range of 3.5 to 4.0 hours per tonne.

The secondary crushers weigh almost 72 tonnes with installation hours of 480 in lieu of 720 using the 10 hours per tonne approach. These machines are similar to the Gyratory and as such a similar rate of 3.6 hours per tonne would be applicable giving 260 hours per crusher.

As the HPGR's are slightly more difficult and sensitive to installation tolerances assume twice the hours per tonne than the crushers which would give approximately 2,600 hours per unit.

For the ball mills which have a dry weight of approximately 958 tonnes the hours are 12,480 according to Metso. This indicates 13 hours per tonne. For a similar sized but slightly larger diameter mill GRES allowed 19,000 hours.

It needs to be mentioned that all these items of equipment have both hydraulic and oil lubrication systems which are labour intensive from piping and electrical disciplines. The crushers and the HPGR's have few very heavy components that do not take long to install, whereas the ball mills have many more components to be lifted individually and are more labour intensive to install. This suggests that the manhours per tonne rates for the type of equipment that arrives on site in many sub assemblies could be revised to:

- Crushers - 3.5 to 4.0 manhours per tonne
- HPGRs - 7.0 to 8.0 manhours per tonne
- Mills - 17.5 to 20 manhours per tonne

For the cyclone feed pumps TTP have allowed 350 hours each but GRES would typically allow 160 for the same task.

As mentioned above Vista has indicated that it would prefer to retain the approach taken in the PFS and as such the recommendations here can be considered as potential opportunities.

3.6 Summary and Recommendations

GRES believes the capital estimate for the Mt Todd project PFS overall is middle of the band with low and high areas of the estimate balancing out. The major risks that GRES believes should have further work completed includes:

- Owners costs;
- Piping;
- Power generation;
- Contingency.

Table 3.17 below is a fair summary of the overall project benchmarking.

USD	Aust Gold	Akyem	Ahafo	Rainy River I	Mt Todd	Mt Todd
Mtpa	~8.0	7.5	7.5	7.7	10.65	17.75
Capex in USD @ 2019 FX from PFS	$487	$600	$550	$1,034	$623	$826
$/t/a	$59	$80	$73.3	$134	$58.5	$46.5
Including Existing Infrastructure CAPEX (Estimated value of $70M)					$693	$896
$/t/a					$65	$50.5

Table 3.17

GRES therefore believes the PFS outcomes are mid range of the accuracy scale and more work is required in the next phase to increase the confidence levels in the estimate.

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4. BENCHMARKING

4.1 Scope of Work

The Mineralis scope of work was to:

- Review the raw pre-feasibility study operating cost data provided by Vista Gold to assess whether any costs were missing, or notably excessive or inadequate.
- Benchmark the Mt Todd project operating costs against similar operations which provide a meaningful basis of comparison, plus other operations as available to provide a larger source of data;
  - Available project history over ramp-up period into steady state operations
  - 10 - 20Mtpa gold operations
  - Low grade (approximately 1g/t Au)
  - Similar cost base to Australia
  - Similar flowsheet to the proposed Mt Todd flowsheet (HPGR, ore sorting, separate leach adsorption trains and cyanide detoxification,)
- Highlight key areas of risk while providing recommendations & benchmark operating cost information and "rules of thumb" for project ramp-up based on Mineralis experience.

4.2 Mt Todd Ore Characteristics

The characteristics of the Mt Todd deposit have been reviewed from the data provided by Vista Gold, to inform the operating cost assessment. Particularly notable is both coarse and fine particle hardness as measured by the Bond Ball Mill Work Index (BWi) and SMC Drop Weight Index (DWi) parameters. The Mt Todd average BWi and DWi relationship is presented in Figure 4.1, compared with a range of other deposit types. The size of the marker for the deposits is proportional to the number of available data points, with a minimum of 25 data points used.

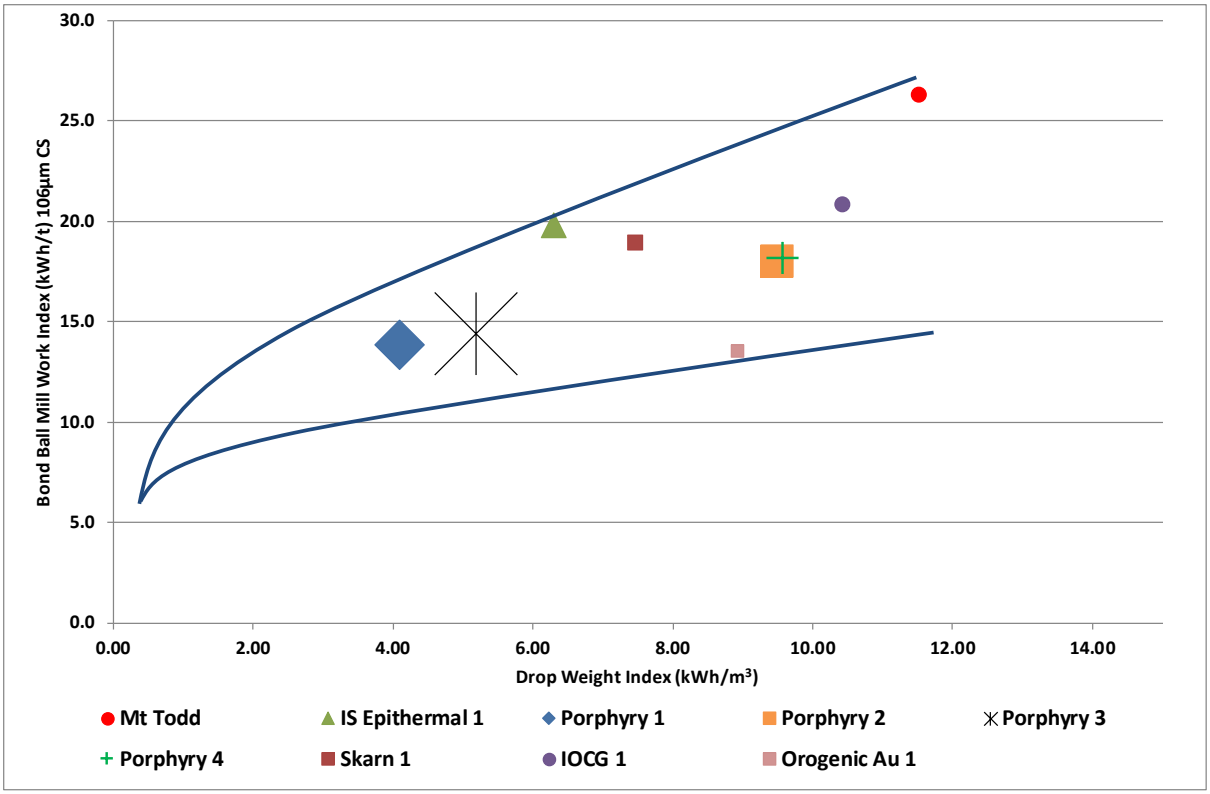

Figure 4.1 Mt Todd BWi and DWi comparison with other deposits

Abrasion index data indicates that the ore exhibits low to medium abrasiveness. The ore contains sulphides such as pyrrhotite & pyrite. Gold particle size is less than 25µm, which limits the ability to leach at a coarser particle size to reduce comminution energy. Gold association is with both sulphide minerals and quartz veins in the host rock. Based on the test work data provided in Tables 13-21 to 13-26 in the NI 43-101 Technical Report, Mt Todd Gold Project 50,000 tpd Preliminary Feasibility Study, Vista Gold Corp, there is a reasonable strength correlation (R^2 of 0.4) between grind size and leach residue gold grade and a strong correlation (R^2 of 0.7) between gold head grade and leach residue gold grade which indicates predictable metallurgical response from the tested Mt Todd samples.

4.3 PROCESS OPERATING COST BENCHMARKING

4.3.1 Mt Todd Operating Cost Data

The cost and operating data supplied by Vista developed a whole-of-site economic evaluation. The process operating costs are separated into operating areas based on the project work breakdown structure and are built up by cost element. The Vista Gold approach is normal for development of operating costs and provides suitable detail for labour, consumables, reagents and grinding media, maintenance, power, and general costs.

No major cost elements which would have material impact on the processing operating cost were discovered to be missing during this review.

Cost items that appear to be inadequate are:

- Sheet 3000-Process Opex, section 14 training costs, with a training coordinator and two plant trainers allowed for in the labour pool but only A$35,000 in total costs allocated for training materials, training allowances, and seminars. It is recognised that operating staff are being recruited and on site two months prior to commencement of ramp-up in the updated case, however the Mt Todd plant is complex, large, and successful ramp-up and operation will rely on a skilled workforce, and training costs are recommended to be checked for suitability to meet these aims over the longer term.
- Contractor expenses, particularly re-lining in sheet 3000-Process Opex, with no specific line item in section 9 Consumables or section 13 Contract Expenses describing mill re-lining costs (mobilisation, accommodation and messing, and contract costs). Roll change-out and refurbishment costs are likewise not apparent for the HPGR units.
- General Consultants allowance in section 13.1 row 1273 is A$40,000, this is considered "light" particularly during early years when vendor and consultant support is often required for improvements to materials handling, comminution, metallurgical, operational, maintenance, and laboratory services to achieve reliable operations.

4.3.2 Operating Cost Benchmark Projects

The benchmarked operations and projects include:

- Detour Lake – 20Mtpa gold operation, Canada
- Rainy River – 8Mtpa gold operation, Canada
- Canadian Malarctic – 20Mtpa gold operation, Canada
- Gruyere – 7.5Mtpa gold operation, Australia

Numerous other base metal and gold operations have been benchmarked as data availability or access to direct experience allows.

The majority of operating costs for Mt Todd has been built up by line item, including labour (by role and number), reagents (by test work consumption), and consumables (estimated). Consumables appear to be generally in line with benchmarked operations.

4.3.3 Total Operating Costs

The comparison between unit operating costs for the benchmarked gold projects and the July 2019 and updated October 2019 Mt Todd unit operating costs is presented in Figure 4.2 below. The XE.com

average 90 days before 5 August 2019 exchange rates of AUD/USD of $0.70 (equivalent to the updated PFS AUD/USD exchange rate) and CAD/USD of $0.75 have been used for conversion to USD.

Project	Process Opex USD/t	Source
Mt Todd – 50,000tpd Au Plant	7.88	VCGMTP01E_TEM_50ktpd_014jm – Updated 50,000 tpd case
Detour Lake – 55,000tpd Au Plant	6.48	2018 Life of Mine Plan, average 2019 to 2023
Rainy River – 22,000tpd Au Plant	7.12	Rainy-River-NI-43-101-Report-Final-July-25-2018.pdf
Malarctic – 55,000tpd Au Plant	6.06	Malarctic - Agnico Eagle + Yamana 30-09-2014
Gruyere – 22,000tpd Au Plant	10.95	Gold Road Resources – Gruyere Project Report 15-11-16
Project 1 – 15,000tpd Au-Ag Plant	8.66	Operations Review document

Figure 4.2 Projects processing operating cost comparison

The updated total Life of Mine processing operating costs for Mt Todd of US$7.88/t milled is above benchmark operating costs for similar scale and flowsheet process plants Detour Lake and Malarctic.

The HPGRs in the comminution circuit, the ore sorting plant, and the project location indicates that Mt Todd total process operating cost is expected to be above the benchmarked operations, particularly in early years. Gruyere is a notable outlier for the scale of project due to very high fuel oil generated power costs.

4.3.4 Maintenance Costs

Maintenance operating cost factored from a percentage of tagged equipment capital cost is a common method of estimation. The use of different factors for different plant areas is good practice, with the Mt Todd maintenance cost breakdown presented in Figure 4.3 below. Major wear linings (mills, crushers) are generally excluded.

Project	Maintenance Cost (% of Tagged Equipment Capex)	Updated Maintenance Cost (% of Tagged Equipment Capex)
Support Facilities, e.g. HV Workshop	1.0%	1.1%
Crushing, Screening and Stockpile	4.8%	5.1%
Coarse Ore Reclaim & HPGR	4.8%	5.1%
Classification & Grinding	3.5%	3.7%
Pre-Leach Thickening, Pre-Aeration & CIP	3.5%	3.7%
Desorption & Goldroom	3.5%	3.7%
Detoxification & Tailings Pumping	3.5%	3.7%
Reagents	3.5%	3.7%
Services	4.0%	4.2%
Weighted Average	3.9%	4.1%

Figure 4.3 Mt Todd maintenance cost % by area – July 2019 and October 2019 Updated

Mineralis have used actual maintenance operating costs for projects and capital costs from study reports or actual capital costs as available. The Mt Todd maintenance cost comparison (July 2019 and updated October 2019) with operating plants is presented in TFigure 4.4 below.

Project	Maintenance Cost (% of Tagged Equipment Capex)	Source
Mt Todd – 50,000tpd Au Plant - Updated	4.1	VCGMTP01E_TEM_50ktpd_014jm.xlsx
Project 1 – 15,000tpd Au-Ag Plant	5.0	Actual capex and opex
Project 2 – 55,000tpd Cu Plant	4.1	Actual capex and opex
Project 3 – 110,000tpd Cu Plant	4.1	Study capex, actual opex
Project 4 – 120,000tpd Cu Plant	3.9	Study capex, actual opex

Figure 4.4 Maintenance operating cost comparison

The updated Mt Todd maintenance operating cost factor of 4.1% is aligned with actual operating costs recorded for comparison projects.

4.4 PROCESS OPERATING COST RECOMMENDATIONS

4.4.1 Ramp-Up

Ramp-up occurs from commencement of ore treatment until steady-state operation is achieved and applies to all activities from geology and mining through processing to final product delivery to customers. Note that steady-state operation does not necessarily equate to design, with many operations never achieving the production and metallurgical outcomes expected at the project development approval stage.

Mt Todd project has substantial costs associated with materials handling, crushing, ore sorting and grinding areas, specifically due to the large number of unit operations and conveyors, transfer points, and wear areas in the crushing and HPGR circuits, and the large number of tanks in the CIP leaching and adsorption circuit. Detour Lake provide good information on ramp-up issues pertinent to Mt Todd in their March 2017 NI43-101 Technical Report update, some four years after commencement of operations, with mill drives, wear points, and conveyors described as the major causes of the 5% absolute operating time shortfall against target.

HPGR circuits are complex, for example at the Boddington gold project as described by Hart et al (2011), although increase in the number of installations has improved HPGR circuit design and control and subsequently ramp-up times since 2010, for example as described by Kock et al (2015).

The lack of appropriate skills for HPGR circuits in the Northern Territory with the requirement to import these skills for operation and maintenance is recommended to be allowed for in Contractor expenses.

The ramp-up factors presented in Figure 4.5 are recommended to be applied to Mt Todd processing operating costs as a minimum. The factors applied have been developed by Mineralis from benchmarking of conventional greenfield process plants are based on typical requirement for:

- Post-commissioning fixed plant, sampling and analysis equipment vendor support;
- Mechanical, electrical and process engineering support for improvement, re-design and modification to fixed plant and major equipment for materials handling, such as conveyors, chutes, hoppers and bins, and electrical and instrumentation and control systems;
- Maintenance support including contractors, labour and materials to implement changes to designs and modifications; and
- Metallurgical and assaying technical support including contractors and consultants for surveying, sample analysis, process analysis, laboratory and systems development and improvement.

Operation Year	Increase over steady-state operating cost (%)
Year 1 (post commissioning)	25%
Year 2	10%
Year 3	5%
Year 4	0%

Figure 4.5 Recommended operating cost ramp-up factors

Ore sorting has been stated by Vista Gold to be able to "run without", so no escalation of ramp-up operating costs is applied for this circuit

4.4.2 Reagent Consumption

Metallurgical test programs have been used to estimate reagent consumption in leaching, adsorption, elution, and cyanide detox for operating cost development.

The exclusion of the tailings thickener in the updated process design due to the difficulty in dewatering and handling of fine thickened slurry with the reduction of leach feed particle size from 60µm to 40µm has increased cyanide consumption from 450g/t to 876g/t and lime consumption from 1.2kg/t to 2.8kg/t which is accounted for in the updated October 2019 PFS operating cost.

The exclusion of the tailings thickener results in a significant increase in mass of WAD cyanide to be destroyed in detoxification. The example calculation for the July 2019 50,000tpd case and the updated October 2019 50,000tpd case excluding the thickener is provided inFigure 4.6 and Figure 4.7.

Basis Data	Value	Unit	Source
Throughput	2,060.35	Tph	F.2 - Mass Balance - 50,000 tpd Case (3000-CP-025)

Solution with Thickener	1,710.18	m^3/hr	F.2 - Mass Balance - 50,000 tpd Case (3000-CP-025)
Solution without Thickener	2,981.14	m^3/hr	F.2 - Mass Balance - 50,000 tpd Case (3000-CP-025)
CN WAD in CIP Tail	150	g/m^3	J.Rozelle Vista Gold 16 Oct 2019 (150ppm - 200ppm)
SMBS g/CN g	3	Ratio	D.2 - Process Design Criteria - 50,000 tpd Case (3000-BP-004_F)

Figure 4.6SMBS consumption basis data – with and without tailings thickener

Calculated Data	kg/hr	kg/t milled
SMBS (with Thickener)	770	0.374
SMBS (without Thickener)	1,342	0.651
Difference	+572	+0.278

Figure 4.7 SMBS consumption – with and without tailings thickener

The exclusion of the tailings thickener increases SMBS consumption by 43%. However, the SMBS consumption allowed for in the operating cost model is 730g/t, which provides an 80g/t SMBS excess of the calculated requirement of 651g/t at a WAD cyanide concentration of 150ppm in CIP tailings solution. If WAD cyanide in CIP tailings solution increases to above 170ppm, the SMBS consumption will exceed the operating cost model allowance.

4.5 Summary

The Mt Todd project operating cost review, benchmarking against similar projects, and risk assessment summary is:

- The Mt Todd ore average hardness is higher than any other deposit in the Mineralis database. The proposed comminution circuit is suitable for treatment of the ore; however, the overall circuit complexity and number of drives will increase operating cost and increases ramp-up time to reach design capacity and metallurgical performance.
- The Mt Todd processing operating cost of US$7.88/t milled is above similar scale gold plants at Detour Lake and Malarctic which use primary and secondary crushing and SABC comminution circuits. The HPGRs in the comminution circuit, the ore sorting plant, and the project location suggests that the Mt Todd 50,000tpd total process operating cost is likely to be above the benchmarked operations particularly in early years.
- The Mt Todd maintenance operating cost factor of 4.1% of tagged equipment capital cost is aligned with the benchmarked comparison projects.
- Particular areas of risk for the Mt Todd project during ramp-up are considered to be in the materials handling, crushing, ore sorting and grinding areas, specifically due to the number of unit operations and conveyors, transfer points, and wear areas in the crushing and HPGR circuits, and the large number of tanks in the CIP leaching and adsorption circuits. Operating cost ramp up factors developed by Mineralis are recommended for the project based on experience at similar operations.
- Removal of the tailings thickener and higher cyanide and lime consumption due to lack of process water recycle have been accounted for in the updated operating cost model.. The

SMBS consumption in the operating cost model of 732g/t is in excess of the calculated requirement of 651g/t at a WAD cyanide concentration of 150ppm in CIP tailings without a tailings thickener. Additional test work may be required to confirm the consumption rate.

4.6 LIMITS TO THIS BENCHMARKING REVIEW

Operating cost data is generally difficult to acquire, verify, and determine what specifically is included in a specific cost centre when undertaking a comparison. As well as the cost details usually being unavailable due to confidentiality, comparisons are further complicated by:

- Location factors – country factors, climate factors, terrain factors, labour and specialist skills availability and costs
- Different annual throughput
- Different flowsheets and equipment
- Different ore hardness and abrasion and handling characteristics
- Different grind and regrind particle sizing
- Different mineralogy and mineral chemistry, for gold leach operations the influence of oxygen and cyanide consumers on reagent consumption is important
- Varying water quality (influence on corrosion and reagent consumption)
- Varying utility prices (especially power and water)
- Residential versus fly-in-fly-out or drive-in drive-out workforce
- Data from different years
- Different operating input currencies and exchange rates
- Different practices to allocate costs between areas and between cost items (e.g. mill liners may be in “maintenance parts”, “grinding media and liners” or “operating consumables”); labour may be reported in aggregate rather than split between areas (e.g. operating, maintenance, administration); tailings may be part of processing operating costs or separated.

Even when actual operating costs are available (or can be inferred), there is rarely enough detail to compare them on a “like” basis. The comments in this review must be considered as a general guide based on the best (but limited) data available, rather than a rigorous analysis.

4.7 References

a) Kock, F., Siddall, L., Lovatt, I-A., Giddy, M., and DiTrento, M., *Rapid Ramp-up of the Tropicana HPGR Circuit*, SAG 2015

b) Hart, S., Parker, B., Rees, T., Manesh, A., and Mcgaffin, I., *Commissioning and Ramp-Up of the HPGR Circuit at Newmont Boddington Gold*, SAG 2011