TABLE 4.1

TREASURY METALS INC.
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 1 - IDENTIFICATION OF CANDIDATE ALTERNATIVES

Project Aspect	Candidate Locations	General Location
Tailings Management Facility Location	Location 1	Northeast of the proposed plant site
	Location 2	Northeast of Location 1
	Location 3	Far east of the plant site
	Location 4	South of Location 1, east side of Tree Nursery Road
	Location 5	Between Location 4 and Location 3
	Location 6	South of proposed mine site and south of existing Normans Road
	Location 7	South of Location 4, potential dry option

Project Aspect	Candidate Tailings Technology
Tailings Disposal Technology	Conventional Slurry Tailings
	Thickened Tailings
	Filtered/Dry Stack Tailings
	Conventional Slurry Tailings with Future Co-Disposal Portion of Tailings into mine workings

Number of Candidate Alternatives	Alternative Identification	Description
1	1A	Location 1- Conventional Slurry Tailings
2	1B	Location 1 - Thickened Tailings
3	1C	Location 1 - Filtered/Dry Stack Tailings
4	1D	Location 1 - Conventional with Future Co-Disposal
5	2A	Location 2- Conventional Slurry Tailings
6	2B	Location 2- Thickened Tailings
7	2C	Location 2 - Filtered/Dry Stack Tailings
8	3A	Location 3 - Conventional Slurry Tailings
9	3B	Location 3 - Thickened Tailings
10	3C	Location 3- Filtered/Dry Stack Tailings
11	4A	Location 4 - Conventional Slurry Tailings
12	4B	Location 4 - Thickened Tailings
13	4C	Location 4 - Filtered/Dry Stack Tailings
14	5A	Location 5- Conventional Slurry Tailings
15	5B	Location 5 - Thickened Tailings
16	5C	Location 5 - Filtered/Dry Stack Tailings
17	6A	Location 6 - Conventional Slurry Tailings
18	6B	Location 6 - Thickened Tailings
19	6C	Location 6 - Filtered/Dry Stack Tailings
20	7A	Location 7 - Conventional Slurry Tailings
21	7B	Location 7 - Thickened Tailings
22	7C	Location 7 - Filtered/Dry Stack Tailings

Notes:
1. Alternatives selected for pre-screening.

TABLE 4.2

TREASURY METALS INC.
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 2 -PRE-SCREENING ASSESSMENT OF CANDIDATE ALTERNATIVES

			Candidate Alternative Idnetifier[1]																				
Criteria #	**Pre-Screening Criteria**	**Rationale**	**1A**	**1B**	**1C**	**1D**	**2A**	**2B**	**2C**	**3A**	**3B**	**3C**	**4A**	**4B**	**4C**	**5A**	**5B**	**5C**	**6A**	**6B**	**6C**	**7A**	**7B**	**7C**
1	Would the TIA sterilize a potential Resource?	If a TIA that is located over an area where there are proven indicators of mineralization, or a reasonable indication of possible mineralization based on regional trends, may be excluded from further consideration.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
2	Is any part of the Tailings Disposal Unproven Technology at the proposed throughput?	If a specific depositional method relies on unproven technology at the project site, then it could justifiability be argued that the alternative should be excluded from further consideration.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
3	Is any part of the Tailings Disposal Unproven Technology at the given climate?	If a specific depositional technology could be adversely affected by the local climate conditions, then it could justifiability be argued that the alternative should be excluded from further consideration.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
4	Does the life-of-mine tailings production exceed the available storage of the alternative?	If the selected alternative does not have the required capacity to hold the produced tailings, it should be eliminated.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
5	Does the disposal site exceed a practical distance from the mill?	If an alternatives location is too far from the production facilities, it may become economically unviable and should be eliminated.	No	No	No	No	No	No	No	Yes	Yes	Yes	No	No	No	No	No	Yes	No	No	No	No	No	No
6	Is the location topography favourable for the tailings deposition technology	Steep topography can be unfavourable for some types of tailings deposition (such as paste) and should be eliminated as an alternative.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No
7	Does the increased cost of an alternative exceed a reasonable threshold for the viability of the project?	The feasibility of any mining project is sensitive to cost. Higher costs may be warranted to eliminate significant adverse effects; however, there is no reason to investigate alternatives requiring significant additional costs unless there is reasonable assumption of environmental gains, and as such, it should be eliminated.	No	No	No	No	No	No	Yes	No	No	Yes	No	No	No	No	No	Yes	No	No	No	No	No	No
8	Does the Alternative present an Unacceptable Environmental Liability?	Treasury Metals Inc., follows the PDAC Framework for Responsible Mining. Treasury Metals policy states that they are committed to responsible stewardship of the environment. Their key focus is on meeting the company's goals of minimizing environmental impact, efficient use of the resources consumed and conserving natural resources for future generations. If an alternative is perceived to present an unacceptable environmental liability, it should be eliminated.	No	No	No	No	No	No	No	No	No	Yes	No	No	No	Yes	Yes	Yes	No	No	No	No	No	No
9	Does the Alternative exceed the risk threshold for failure of engineering containment?	If the tailings management facility exceeds the risk threshold for failure (CDA guidelines), then the Alternative should be eliminated.	No	No	No	No	No	No	No	No	No	No	No	No	No	N o	No	No	No	No	No	No	No	No
10	Does the footprint of the Alternative exceed the land position currently held by Treasury Metals Incorporated?	If the tailing management facility extends beyond the current land boundaries established by Treasury Metals Incorporated, then the Alternative should be eliminated.	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
11	Does the footprint of the Alternative occur above a geohazard, or a structural geological feature?	If the tailings management facility occurs above a geohazard or a structural geological feature that adversely affects the stability of said facility, than the Alternative should be eliminated.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes
		Should the Alternative be Excluded from Further Consideration	**No**	**No**	**No**	**No**	**No**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**	**Yes**	**Yes**	**Yes**

Alternative Identification	Description
1A	Location 1- Conventional Slurry Tailings
1B	Location 1 - Thickened Tailings
1C	Location 1 - Filtered/Dry Stack Tailings
1D	Location 1 - Conventional with Future Co-Disposal
2A	Location 2- Conventional Slurry Tailings
2B	Location 2- Thickened Tailings
2C	Location 2 - Filtered/Dry Stack Tailings
3A	Location 3 - Conventional Slurry Tailings
3B	Location 3 - Thickened Tailings
3C	Location 3- Filtered/Dry Stack Tailings
4A	Location 4 - Conventional Slurry Tailings
4B	Location 4 - Thickened Tailings
4C	Location 4 - Filtered/Dry Stack Tailings
5A	Location 5- Conventional Slurry Tailings
5B	Location 5 - Thickened Tailings
5C	Location 5 - Filtered/Dry Stack Tailings
6A	Location 6 - Conventional Slurry Tailings
6B	Location 6 - Thickened Tailings
6C	Location 6 - Filtered/Dry Stack Tailings
7A	Location 7 - Conventional Slurry Tailings
7B	Location 7 - Thickened Tailings
7C	Location 7 - Filtered/Dry Stack Tailings

Notes:
1. Options that do not pass pre-screening are not advanced though the Alternatives Assessment.

TABLE 4.3

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 3 - ALTERNATIVE CHARACTERIZATION

Environmental Account					Alternatives Location and Deposition Technology Identifier							
Sub-Account	**Description**	**Rationale**	**Indicator Parameter**	**Unit**	**1A**	**1B**	**1C**	**1D**	**2A**	**2B**	**6A**	**6C**
Land Use	Distance from the Plant Site to Structure	Distance to monitoring, pipeline distance and/or haul distance (for filtered/dry stack tailings only) results in more construction and higher consumables (fuel) and emissions (noise, exhaust, dust)	Direct Distance from Plant Site to Structure	m	Shortest distance to the plant site at ~400 m	Shortest distance to the plant site at ~400 m	Shortest distance to the plant site at ~400 m	Shortest distance to the plant site at ~400 m	Longest distance to the plant site at ~2,200 m	Longest distance to the plant site at ~2,200 m	Medium distance to plant site at ~1,400 m	Medium distance to plant site at ~1,400 m
	Pipeline/Access Road Requirements	Additional requirements for pipeline or access road requirements beyond that existing that will be required for Option	Length of Additional Infrastructure Required	m	Minimal access road required as existing roads can be primarily used for access and pipeline alignments. Estimation of 700 m of additional infrastructure required.	Minimal access road required as existing roads can be primarily used for access and pipeline alignments. Estimation of 700 m of additional infrastructure required.	Existing road infrastructure can be used to haul tailings waste. Increased load requirements to haul tailings will required road enhancements. Increased road maintenance requirements. Estimation of 700 m of additional infrastructure required.	Minimal access road required as existing roads can be primarily used for access and pipeline alignments. Future planned road infrastructure can be used alignments to pump tailings to the mine workings. Estimation of 700 m of additional infrastructure required.	Required development of access roads and pipeline alignments that will disturb existing land and vegetation. Will also require crossing several existing streams. This location is the furthest from the planned infrastructure and an additional 2400 m of infrastructure is estimated.	Required development of access roads and pipeline alignments that will disturb existing land and vegetation. Will also require crossing several existing streams. This location is the furthest from the planned infrastructure and an additional 2400 m of infrastructure is estimated.	More access roads and pipeline alignments required to be constructed than Location 1, but less than Location 2. Existing Tree Nursery Road can be used for part of the alignment. Estimation of 1500 m of additional infrastructure is estimated.	Tree Nursery Road can be used for hauling, however will generate increased truck traffic on road used for mine access. Increased in dust generation around the mine area. Increased road maintenance and design requirements due to hauling of tailings. Estimation of 1500 m of additional infrastructure is estimated.
	Storage Facility and Associated Infrastructure Footprint	A larger footprint resulting in a greater disturbance to vegetation and species	Estimate of Storage Facility(s) Area	ha	Footprint Area ~ 88 ha	Footprint Area ~ 88 ha	Footprint Area ~ 100 ha (includes tailings storage and water collection pond).	Footprint Area ~ 88 ha	Footprint Area ~ 246 ha	Footprint Area ~ 246 ha	Footprint Area ~ 54 ha	Footprint Area ~60 ha (includes tailings storage and water collection pond).
Water Impacts	Potential Impact to surface water availability	Various locations may have an impact to surface water availability. The impact is quantified by the extent of surface water diversions that will be required and site wide water balance models for each alternative.	Qualitative Estimate of Potential Surface Water Impact	Rank	Low to Medium - Requires minimal surface water diversions of minor (tributary) water features. Closest proximity to Thunder Lake, medium proximity to Wabigoon Lake.	Low to Medium - Requires minimal surface water diversions of minor (tributary) water features. Closest proximity to Thunder Lake, medium proximity to Wabigoon Lake.	Low to Medium - Requires minimal surface water diversions of minor (tributary) water features. Larger area impacted than 1A, 1B and 1D. Closest proximity to Thunder Lake, medium proximity to Wabigoon Lake.	Low to Medium - Requires minimal surface water diversions of minor (tributary) water features. Closest proximity to Thunder Lake, medium proximity to Wabigoon Lake.	High - Requires partial diversion of 2 major surface water systems. Farthest from Wabigoon Lake and Thunder Lake .	High - Requires partial diversion of 2 major surface water systems. Farthest from Wabigoon Lake and Thunder Lake .	Medium to High - Requires partial diversion of 1 major surface water system. Closest proximity to Wabigoon Lake Requires partial diversion of 1 major surface water system.	Medium to High - Requires partial diversion of 1 major surface water system. Closest proximity to Wabigoon Lake Requires partial diversion of 1 major surface water system.
	Potential Impacts to Water Quality (ARD, Metal Leaching, etc.)	Locations as well as construction materials may have impacts on water quality	Likelihood of Mining Impacts and ability of mitigation measures to limit ARD and Metal Leaching	Rank	Low to Medium -Anticipated to be contained by natural clay basin and clay lined dam with internal drain system with secondary downstream seepage collection and pump back system and likely water treatment for prolonged period. Tailings are placed with a large amount of water.	Medium - Anticipated to be contained by natural clay basin and clay lined dam with internal drain system with secondary downstream seepage collection and pump back system and likely water treatment for prolonged period. Tailings are placed with minimal water (more oxygen exposure).	High - Tailings waste stockpiled on surface. Runoff collected by perimeter collection ditches and routed to separate facility for containment and reclaim. Expected prolonged water treatment.	Low to Medium - Anticipated to be contained by natural clay basin and clay lined dam with internal drain system with secondary downstream seepage collection and pump back system and likely water treatment for prolonged period. Tailings are placed with a large amount of water.	Low to Medium - Anticipated to be contained by engineered liner in basin and upstream slopes of embankment with internal drain system and secondary downstream seepage collection and pump back system and likely water treatment for prolonged period.	Medium - Anticipated to be contained by engineered liner in basin and upstream slopes of embankment with internal drain system and secondary downstream seepage collection and pump back system and likely water treatment for prolonged period.	Low to Medium - Anticipated to be contained by natural clay basin and clay lined dam with internal drain system with secondary downstream seepage collection and pump back system and likely water treatment for prolonged period. Tailings are placed with a large amount of water.	High - Tailings waste stockpiled on surface. Runoff collected by perimeter collection ditches and routed to separate facility for containment and reclaim. Expected prolonged water treatment.
Aquatic Habitat	Permanent Streams Impacted	Locations may impact one or more permanent streams	No. of Streams Directly Impacted	No.	1 - Blackwater Creek may be permanently affected.	1 - Blackwater Creek may be permanently affected.	1 - Blackwater Creek may be permanently affected.	1 - Blackwater Creek may be permanently affected.	2 - Hughes Creek and Blackwater Creek may be permanently affected.	2 - Hughes Creek and Blackwater Creek may be permanently affected.	1 - Blackwater Creek may be permanently affected.	1 - Blackwater Creek may be permanently affected.
	Indirect impacts (downstream flow reductions)	Locations may have indirect impacts to downstream flows	No. of Streams Potentially Indirectly Impacted (includes tributaries and main creek)	No.	3 - Blackwater Creek, Hoffstroms Bay Creek may be permanently affect due to hydrological changes associated with dam and infrastructure development. Spring freshet level may be directly changed and total discharge volume for each creek may be adversely affected (Blackwater due to loss of tributary, and Hoffstroms Bay due to topographical change due to construction and flow variation).	3 - Blackwater Creek, Hoffstroms Bay Creek may be permanently affect due to hydrological changes associated with dam and infrastructure development. Spring freshet level may be directly changed and total discharge volume for each creek may be adversely affected (Blackwater due to loss of tributary, and Hoffstroms Bay due to topographical change due to construction and flow variation).	3 - Blackwater Creek, Hoffstroms Bay Creek may be permanently affect due to hydrological changes associated with dam and infrastructure development. Spring freshet level may be directly changed and total discharge volume for each creek may be adversely affected (Blackwater due to loss of tributary, and Hoffstroms Bay due to topographical change due to construction and flow variation).	3 - Blackwater Creek, Hoffstroms Bay Creek may be permanently affect due to hydrological changes associated with dam and infrastructure development. Spring freshet level may be directly changed and total discharge volume for each creek may be adversely affected (Blackwater due to loss of tributary, and Hoffstroms Bay due to topographical change due to construction and flow variation).	6 - Hughes Creek and Blackwater Creek may be permanently affected due to hydrological changes associated with damn and infrastructure development. Spring freshet levels may be directly changed and total discharge volume may be adversely affected (Blackwater Creek as the headwaters are in the TSF location and Hughes Creek due to tributary loss).	6 - Hughes Creek and Blackwater Creek may be permanently affected due to hydrological changes associated with damn and infrastructure development. Spring freshet levels may be directly changed and total discharge volume may be adversely affected (Blackwater Creek as the headwaters are in the TSF location and Hughes Creek due to tributary loss).	3 - Blackwater Creek may be permanently affected due to hydrological changes associated with dam and infrastructure development. Spring freshet level may be directly changed and total discharge volume for Blackwater Creek may be adversely affected (Blackwater due to loss of tributary).	3 - Blackwater Creek may be permanently affected due to hydrological changes associated with dam and infrastructure development. Spring freshet level may be directly changed and total discharge volume for Blackwater Creek may be adversely affected (Blackwater due to loss of tributary).
	Direct impact to open water	Various locations may impact open water	No. of Water Bodies Directly Impacted	No.	1 - Only impact associated with open water created by way of beaver dams on Blackwater Creek. Hydrological change to Blackwater Creek may cause flow concerns and abandonment of open water areas by local beaver population.	1 - Only impact associated with open water created by way of beaver dams on Blackwater Creek. Hydrological change to Blackwater Creek may cause flow concerns and abandonment of open water areas by local beaver population.	1 - Only impact associated with open water created by way of beaver dams on Blackwater Creek. Hydrological change to Blackwater Creek may cause flow concerns and abandonment of open water areas by local beaver population.	1 - Only impact associated with open water created by way of beaver dams on Blackwater Creek. Hydrological change to Blackwater Creek may cause flow concerns and abandonment of open water areas by local beaver population.	2 - Impact associated with open water created by beaver dams on Blackwater Creek and beaver dams within the Hughes Creek marshland, and Anderson road culvert dam. Loss of flow may lower water levels and in turn affect the local population at either of these locations.	2 - Impact associated with open water created by beaver damns on Blackwater Creek and beaver dams within the Hughes Creek marshland, and Anderson road culvert dam. Loss of flow may lower water levels and in turn affect the local population at either of these locations.	1 - Only impact associated with open water created by way of beaver dams on Blackwater Creek. Hydrological change to Blackwater Creek may cause flow concerns and abandonment of open water areas by local beaver population.	1 - Only impact associated with open water created by way of beaver dams on Blackwater Creek. Hydrological change to Blackwater Creek may cause flow concerns and abandonment of open water areas by local beaver population.

TABLE 4.3

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 3 - ALTERNATIVE CHARACTERIZATION

	Number of fish bearing lakes impacted	Various locations may impact fish bearing lakes	No of Fish Bearing Lakes Directly Affected	No.	1 - Probable impact associated with Wabigoon Lake. Closest proximity to Thunder Lake, medium proximity to Wabigoon Lake.	1 - Probable impact associated with Wabigoon Lake. Closest proximity to Thunder Lake, medium proximity to Wabigoon Lake.	1 - Probable impact associated with Wabigoon Lake. Closest proximity to Thunder Lake, medium proximity to Wabigoon Lake.	1 - Probable impact associated with Wabigoon Lake. Closest proximity to Thunder Lake, medium proximity to Wabigoon Lake.	1 - Discharge would flow by way of Hughes or Blackwater Creek to Wabigoon Lake. Farthest from Wabigoon Lake and Thunder Lake	1 - Discharge would flow by way of Hughes or Blackwater Creek to Wabigoon Lake. Farthest from Wabigoon Lake and Thunder Lake	1 - Probable impact associated with Wabigoon Lake. Close proximity to Wabigoon Lake	1 - Probable impact associated with Wabigoon Lake. Close proximity to Wabigoon Lake
Terrestrial Habitat	Area of feeding or shelter loss due to TSF or associated structures.	Various locations may impact habitat of animals (moose, deer, bear etc.)	No. of Terrestrial Areas Directly Impacted	No.	1 - Impact area would be associated with footprint area associated with construction of TSF and associated infrastructure.	1 - Impact area would be associated with footprint area associated with construction of TSF and associated infrastructure.	1 - Impact area would be associated with footprint area associated with construction of TSF and associated infrastructure.	1 - Impact area would be associated with footprint area associated with construction of TSF and associated infrastructure.	1 - Impact area would be associated with footprint area associated with construction of TSF and associated infrastructure.	1 - Impact area would be associated with footprint area associated with construction of TSF and associated infrastructure.	1 - Impact area would be associated with footprint area associated with construction of TSF and associated infrastructure.	1 - Impact area would be associated with footprint area associated with construction of TSF and associated infrastructure.
	Existing vegetation, ecosystems will be lost	Various locations may impact wetlands, rare ecosystems, grasslands, forests and associated species.	Loss of Flora and Fauna	No. of Ecosites	FRI indicates that there are 7 varieties of forest type within the area (Ecosites include: Pine / Spruce / Feathermoss: Fresh Silty Soil, Spruce / Pine / Feathermoss: Fresh, Fine, Loamy-Clayey Soil, Hardwood-Fir-Spruce Mixed wood: Fresh, Fine, Loamy-Clayey Soil, Intermediate Swamp: Black Spruce (Tamarack), Organic Soil, Rich Swamp: Black Ash (Hardwoods), Organic Mineral Soil, Thicket Swamp: Mineral Soil). Birds and small mammals will be affected by development. Estimation of 88 ha may be impacted.	FRI indicates that there are 7 varieties of forest type within the area (Ecosites include: Pine / Spruce / Feathermoss: Fresh Silty Soil, Spruce / Pine / Feathermoss: Fresh, Fine, Loamy-Clayey Soil, Hardwood-Fir-Spruce Mixed wood: Fresh, Fine, Loamy-Clayey Soil, Intermediate Swamp: Black Spruce (Tamarack), Organic Soil, Rich Swamp: Black Ash (Hardwoods), Organic Mineral Soil, Thicket Swamp: Mineral Soil). Birds and small mammals will be affected by development. Estimation of 88 ha may be impacted.	FRI indicates that there are 7 varieties of forest type within the area (Ecosites include: Pine / Spruce / Feathermoss: Fresh Silty Soil, Spruce / Pine / Feathermoss: Fresh, Fine, Loamy-Clayey Soil, Hardwood-Fir-Spruce Mixed wood: Fresh, Fine, Loamy-Clayey Soil, Intermediate Swamp: Black Spruce (Tamarack), Organic Soil, Rich Swamp: Black Ash (Hardwoods), Organic Mineral Soil, Thicket Swamp: Mineral Soil). Birds and small mammals will be affected by development. Estimation of 100 ha may be impacted.	FRI indicates that there are 7 varieties of forest type within the area (Ecosites include: Pine / Spruce / Feathermoss: Fresh Silty Soil, Spruce / Pine / Feathermoss: Fresh, Fine, Loamy-Clayey Soil, Hardwood-Fir-Spruce Mixed wood: Fresh, Fine, Loamy-Clayey Soil, Intermediate Swamp: Black Spruce (Tamarack), Organic Soil, Rich Swamp: Black Ash (Hardwoods), Organic Mineral Soil, Thicket Swamp: Mineral Soil). Birds and small mammals will be affected by development. Estimation of 88 ha may be impacted.	FRI indicates that there are 6 different varieties of forest type within the area (Ecosites include: (Poor Swamp: Black Spruce, Organic Soil, Intermediate Swamp: Black Spruce (Tamarack), Organic Soil, Treed Bog: Black Spruce, Organic Soil, Treed Fen: Tamarack-Black Spruce / Sphagnum, Organic Soil, Spruce - Pine / Feathermoss: Fresh, Sandy Coarse Loamy Soil). Birds and small mammals will be affected by development. estimation of 246 ha may be impacted.	FRI indicates that there are 6 different varieties of forest type within the area (Ecosites include: (Poor Swamp: Black Spruce, Organic Soil, Intermediate Swamp: Black Spruce (Tamarack), Organic Soil, Treed Bog: Black Spruce, Organic Soil, Treed Fen: Tamarack-Black Spruce / Sphagnum, Organic Soil, Spruce - Pine / Feathermoss: Fresh, Sandy Coarse Loamy Soil). Birds and small mammals will be affected by development. Estimation of 246 ha may be impacted.	FRI indicates that there are 6 varieties of forest type within the area (Ecosites include: Thicket Swamp: Mineral Soil, Shore Fen: Organic Soil, Fir - Spruce Mixed wood: Fresh, Coarse, Loamy Soil, Rock Barren, Hardwood-Fir-Spruce Mixed wood: Fresh, Fine, Loamy-Clayey Soil, Fir - Spruce Mixed wood: Moist, Silty-Clayey Soil). Birds and small mammals will be affected by development. Estimation of 54 ha may be impacted.	FRI indicates that there are 6 varieties of forest type within the area (Ecosites include: Thicket Swamp: Mineral Soil, Shore Fen: Organic Soil, Fir - Spruce Mixed wood: Fresh, Coarse, Loamy Soil, Rock Barren, Hardwood-Fir-Spruce Mixed wood: Fresh, Fine, Loamy-Clayey Soil, Fir - Spruce Mixed wood: Moist, Silty-Clayey Soil). Birds and small mammals will be affected by development. Estimation of 61 ha may be impacted.
Air Quality	Potential for Dust Emission (contributed by trucks)	Longer haul distances will increase potential dust contribution.	Length of Haulage Roads	m	No hauling of tailings required for tailings disposal. Traffic related to operations, maintenance and surveillance. Additional roads for hauling of tailings are not required.	No hauling of tailings required for tailings disposal. Traffic related to operations, maintenance and surveillance. Additional roads for hauling of tailings are not required.	Shortest haul distance related to tailings placement. Daily traffic required for tailings placement. Also traffic related to operations, maintenance and surveillance. Estimation of 700 m of additional road required to haul tailings to facility	No hauling of tailings required for tailings disposal. Traffic related to operations, maintenance and surveillance. Additional roads for hauling of tailings are not required.	No hauling of tailings required for tailings disposal. Traffic related to operations, maintenance and surveillance. Additional roads for hauling of tailings are not required.	No hauling of tailings required for tailings disposal. Traffic related to operations, maintenance and surveillance. Additional roads for hauling of tailings are not required	No hauling of tailings required for tailings disposal. Traffic related to operations, maintenance and surveillance. Additional roads for hauling of tailings are not required	Longest haul distance related to tailings placement. Daily traffic required for tailings placement. Also traffic related to operations, maintenance and surveillance. Estimation of 1500 m of additional road required to haul tailings to facility.
	Potential for Dust Emission (Contributed by tailings)	Potential for deposited tailings to produce dust	Type of tailings technology used and potential dust generation	Rank	Lowest potential for dusting based on water storage within facility maintaining tailings beach in wet conditions.	Medium potential from conventional tailings based on potential less water being stored in facility.	Highest potential for dusting.	Lowest potential for dusting based on water storage within facility maintaining tailings beach in wet conditions.	Lowest potential for dusting based on water storage within facility maintaining tailings beach in wet conditions.	Medium potential from conventional tailings based on potential less water being stored in facility.	Lowest potential for dusting based on water storage within facility maintaining tailings beach in wet conditions.	Highest potential for dusting.
	Potential for Greenhouse Gas and Noise Emissions (number of truck hours)	Increased truck traffic will increase potential for Greenhouse Gas Emissions and Noise Pollution	Qualitative Rank of Potential Greenhouse Gas Emissions and Noise Pollution due to truck traffic based on tailings disposal technology	Rank	Lowest potential, no hauling of tailings required for tailings disposal. Traffic related to operations, maintenance and surveillance.	Lowest potential, no hauling of tailings required for tailings disposal. Traffic related to operations, maintenance and surveillance.	Medium to High potential based on truck hauling used for tailings deposition, however location is closer than Option 6C.	Lowest potential, no hauling of tailings required for tailings disposal. Traffic related to operations, maintenance and surveillance.	Lowest potential, no hauling of tailings required for tailings disposal. Traffic related to operations, maintenance and surveillance. Furthest distance from plant	Lowest potential, no hauling of tailings required for tailings disposal. Traffic related to operations, maintenance and surveillance. Furthest distance from plant	Lowest potential, no hauling of tailings required for tailings disposal. Traffic related to operations, maintenance and surveillance.	Highest potential based on truck hauling used for tailings deposition. Further from plant than 1C.

Technical Account

Sub-Account	Description	Rationale	Indicator Parameter	Unit	1A	1B	1C	1D	2A	2B	6A	6C
	Foundation Conditions	Conditions of the foundation may be undesirable and may require additional stability measures	Qualitative Rank ofSuitability of Foundation Conditions	Rank	High Suitability - Natural ground in the area generally consisting of clay materials. Potential containment in basin area.	High Suitability - Natural ground in the area generally consisting of clay materials. Potential containment in basin area.	High Suitability - Natural ground in the area generally consisting of clay materials. Potential containment in basin area.	High Suitability - Natural ground in the area generally consisting of clay materials. Potential containment in basin area.	Low Suitability - Natural ground in the area generally consisting of sands and gravels. Not suitable for basin containment.	Low Suitability - Natural ground in the area generally consisting of sands and gravels. Not suitable for basin containment.	Moderate Suitability - Potentially consisting of clay to bedrock knobs. Possible containment in basin area	Moderate Suitability - Potentially consisting of clay to bedrock knobs. Possible containment in basin area.
	Distance from Plant	Longer distance results in more access roads (or haul roads for dry stack) and pipeline construction, more pumping energy and potential booster stations (for conventional slurry or paste). Takes into account preliminary pipeline alignment distances and perimeter distance of impoundment facility for piping or haulage of tailings. Longer pipelines have an increased operational complexity, additional required efforts for monitoring and increased risk for rupture due to additional components and longer pipe lengths.	Distance From Plant Site to Far End of Facility for pipeline or haul road.	m	Closest proximity to plant site. Projected pipeline distance to far side of facility is 2,200 m.	Closest proximity to plant site. Projected pipeline distance to far side of facility is 2,200 m.	Closest proximity to plant site. Projected haulage distance to far side of facility is 2,200 m using perimeter roads.	Closest proximity to plant site. Projected pipeline distance to far side of facility is 2,200 m.	Farthest distance to plant site. Projected pipeline distance to far side of facility is 5,200 m	Farthest distance to plant site. Projected pipeline distance to far side of facility is 5,200 m	Medium proximity to plant site. Projected pipeline distance to far side of facility is 2,400 m.	Medium proximity to plant site. Projected pipeline distance to far side of facility is 2,400 m.

TABLE 4.3

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 3 - ALTERNATIVE CHARACTERIZATION

Design	Topographic Complexity	More complex topography may constrain approaches to type of seepage ditch construction (based on expected flow velocity). Areas with some topographic relief may provide opportunities to minimize embankment heights	Qualitative Rank of Topographic Complexity	Rank	Moderate Complexity - Local topography can be used to minimize embankment heights and future raising. Minimal topographic change from the plant site allowing for simple drainage and containment.	Moderate Complexity - Local topography can be used to minimize embankment heights and future raising. Minimal topographic change from the plant site allowing for simple drainage and containment.	Low Complexity - Local topography is suitable for storage of tailings solids and water management. Minimal topographic change from the plant site allowing for simple drainage and containment.	Low to Moderate Complexity - Local topography can be used to minimize embankment heights and future raising. Directing tailings underground in future years operations will also reduce required embankment heights. Minimal topographic change from the plant site allowing for simple drainage and containment.	Very High Complexity - Local topography can be used to minimize embankment heights and future raising. Moderate complexity due to topography to address drainage and containment.	High Complexity - Local topography can be used to minimize embankment heights and future raising. Moderate complexity due to topography to address drainage and containment.	Very High Complexity - Local topography can be used to minimize embankment height and future raising. Higher complexity issues with respect to potential bedrock can hinder establishing perimeter ditches.	Moderate Complexity - Local topography can be used to minimize embankment heights. Undulating topography will require operational planning for tailings placement. Higher complexity issues with respect to potential bedrock can hinder establishing perimeter ditches.
	Topography	Elevation difference between processing plant and tailings storage facility affects pumping requirements	Elevation Difference From Plant Site to Final Embankment Arrangement	m	Medium topographic change from the plant site (27 m)	Medium topographic change from the plant site (25 m).	Dry stack tailings are hauled to facility and is unaffected by elevation differences.	Medium topographic change from the plant site (25 m).	Largest topographic difference to the plant site (35 m).	Large topographic difference to the plant site (34 m).	Location is at equal or lower elevation difference from the plant site. Some topographic undulation between plant site and location (24 m).	Dry stack tailings are hauled to facility and is unaffected by elevation differences.
	Dam Complexity	More complex dam design will result in more difficult construction requirements and associated monitoring conditions	Qualitative Rank of Dam Complexity	Rank	Zoned earth fill with low permeable clay layer or liner material. Foundation favourable for foundation key-in. Dam can be raised during operations.	Zoned earth fill with low permeable clay layer or liner material. Foundation favourable for foundation key-in. Dam can be raised during operations. Paste fill technology will result in lower embankment heights due to higher in situ density conditions than 1A.	Design will require a containment dam for water collection and reclaim as a separate facility from dry stack pile. Structure is smaller (less material and height) and less complex than other options.	Zoned earth fill with low permeable clay layer or liner material. Foundation favourable for foundation key-in. Dam can be raised during operations. Anticipated lower dam heights than 1A and 1B due to portion of tailings waste directed to the mine workings for storage.	Zoned earth fill with low permeable clay layer or liner material. Foundation anticipated to consist of sand or gravel that will require basin lining. Dam can be raised during operations.	Zoned earth fill with low permeable clay layer or liner material. Foundation anticipated to consist of sand or gravel that will require basin lining. Dam can be raised during operations. Paste fill technology will result in lower embankment heights due to higher in situ density conditions than 2A.	Zoned earth fill with low permeable clay layer or liner material. Foundation may consist of rock that will be more complex for embankment key-in or liner anchorage. Foundation consisting of rock will provide good embankment stability. Dam can be raised during operations.	Design will require a containment dam for water collection and reclaim as a separate facility from dry stack pile. Structure is smaller (less material and height). Will require using existing topography and bedrock to establish containment dam.
	Dam Hazard Classification	Based on classification systems, various designs can be assessed a hazard classification	CDA Dam Classification Estimate	Classification	HPC will be dependent on Environmental considerations and proximity to the plant site.	HPC will be dependent on Environmental considerations and proximity to the plant site.	HPC based on Water Collection Pond	HPC will be dependent on Environmental considerations and proximity to the plant site.	HPC will be dependent on Environmental considerations.	HPC will be dependent on Environmental considerations.	Anticipated to require a higher HPC due to proximity to Hwy 17 and Wabigoon Lake.	HPC based on Water Collection Pond
	Construction Material Availability	Areas closer to confirmed borrow pit sources and amount of material required to construct dams.	Qualitative Rank of Construction Material Volume Requirements and Availability	Rank	Medium to High - In moderate proximity to local clay borrow source and mine waste rock that will be provided from the open pit mining area. Adjacent to established roads for materials hauled from external sources.	Medium - In moderate proximity to local clay borrow source and mine waste rock that will be provided from the open pit mining area. Adjacent to established roads for materials hauled from external sources. Will require less materials for construction than Option 1A due to lower embankment height.	Low - Close to local clay borrow source and mine waste rock that will be provided from the open pit mining area. Adjacent to established roads for materials hauled from external sources. Will require less materials for construction than Option 1A, 1B and 1D due to lower embankment height.	Low to Medium - Close to local clay borrow source and mine waste rock that will be provided from the open pit mining area. Adjacent to established roads for materials hauled from external sources. Will require less material for construction than Option 1A and 1B, but more than 1C.	Medium to High - Farther distance that Location 1 and 6 for local borrow sources, mine waste rock and external supplied materials. Will also require establishing construction roads for access. Will require more construction material than Option 2B.	High - Farther distance that Location 1 and 6 for local borrow sources, mine waste rock and external supplied materials. Will also require establishing construction roads for access. Will require less construction material than Option 2A.	Medium - Closest proximity for local borrow material, mine waste rock and also external supplied materials than Location 1 and 2. Will require more construction material than 6C.	Very Low - Closest proximity for local borrow material, mine waste rock and also external supplied materials than Location 1 and 2. Will require less construction material than 6A.
	Slope Stability	Taller slopes required to achieve the required volume while minimizing footprint increases risk of instability	Preliminary Estimate of Total Embankment Height	m	24	22	18 (estimate of final height of tailings pile)	22	30	29	34	27 (estimate of final height of tailings pile)
	Slope Stability	Steeper slopes required to achieve the required volume while minimizing footprint increases risk of instability	Estimate of Slope Angle during operations	H:V	1.5H:1V	1.5H:1V	2.1H:1V	1.5H:1V	1.5H:1V	1.5H:1V	1.5H:1V	2.1H:1V
	Distance between storage facility and Mill Site	Longer access road requirements, longer transport distance for tailings materials required increased surveillance and potential for spills outside of containment areas.	Distance from Plant Site to Far End of Facility	m	2,200	2,200	2,200	2,200	5,200	5,200	2,400	2,400

TABLE 4.3

TREASURY METALS
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TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 3 - ALTERNATIVE CHARACTERIZATION

Operations	Operational Risks and Other Uncertainties	Various depositional technologies and locations may have additional operational risks	Qualitative Rank of operations assessment based on tailings and water management.	Rank	Low to Medium - Tailings solids and water management contained within perimeter embankments. Requires tailings deposition planning and operational management with consideration of seasonal influences for water management. Water management requires several reclaim lines and monitoring.	Medium to High - Tailings and water storage within single containment facility, potential requirements for further containment for water management. Capacity dependent on achieving consistent beach slopes and in situ densities in summer and winter conditions. Requires tailings deposition planning and operation management. Potential seasonal influence on tailings deposition. Water management may require two facilities and several reclaim lines and monitoring.	Medium - Tailings solids not contained within perimeter embankments. Potential dusting issue in summer. Potential to trap ice lenses in lifts. Will require snow removal during winter operations. Requires collection and containment of surface water runoff. Requires truck placement of tailings. Water management in separate facility with reclaim line.	Low - Tailings solids and water management contained within perimeter embankments. Water reclaim from the facility. Direction of a portion of the tailings to the underground reduces the volume of tailings required to be stored on surface within the facility. Requires tailings deposition planning and operational management with consideration of seasonal influence for water management. Water reclaim requires several reclaim lines and monitoring.	Low to Medium - Tailings solids and water management contained within perimeter embankments. Requires tailings deposition planning and operational management with consideration of seasonal influences for water management. Water management requires several reclaim lines and monitoring. Water reclaim from the facility. Furthest location from site for monitoring purposes.	High - Tailings and water storage within single containment facility, potential requirements for further containment for water management. Capacity dependent on achieving consistent beach slopes and in situ densities in summer and winter conditions. Requires tailings deposition planning and operational management. Potential seasonal influence on tailings deposition. Water management may potentially require two facilities and several reclaim lines and monitoring. Furthest location from site for monitoring.	Low to Medium - Tailings solids and water management contained within perimeter embankments. Requires tailing deposition planning and operational management with consideration of seasonal influences for water management. Water management requires several reclaim lines and monitoring	Medium - Tailings solids not contained within perimeter embankments. Potential dusting issue in summer. Potential to trap ice lenses in lifts. Will require snow removal during winter operations. Requires collection and containment of surface water runoff. Requires truck placement of tailings. Water management in separate facility with reclaim line.
	Water Treatment Requirements	The depositional technologies have various water treatment requirements	Estimate of Water Treatment Volume	m^3	Highest anticipated volume of water released to supernatant pond. Facility required to provide storage of surplus water for direction to treatment.	Medium volume of water released to supernatant pond. May require inclusion of secondary water management facility during the operations.	Tailings dewatered at the plant site prior to being stored at the facility. Water treatment from runoff collection from stored tailings and other water collection at the site.	Highest volume of water released to supernatant pond. Facility required to provide storage of surplus water for direction to treatment.	Highest volume of water released to supernatant pond. Facility required to provide storage of surplus water for direction to treatment.	Medium volume of water released to supernatant pond. May require inclusion of secondary water management facility	Highest volume of water released to supernatant pond. Facility required to provide storage of surplus water for direction to treatment.	Tailings dewatered at the plant site prior to being stored at the facility. Water treatment from runoff collection from stored tailings and other water collection at the site.
Closure	Remediation Requirements	Complexity of Remediation requirements for Closure	Quantitative Rank of Remediation Requirements	Rank	Highest complexity, requiring facility closure (includes stabilize slopes and closure for containment area) and surface water management design.	Medium to High complexity, requiring closure of facility. Includes embankment slopes and containment area. Potential reclamation of water collection pond if used.	Lowest complexity, requiring closure and capping of facility and providing stable final surfaces. Potential for progressive reclamation. Reclamation of water management facility.	Highest complexity, requiring facility closure (includes stabilize slopes and closure for containment area) and surface water management design. However, smaller amount of material stored on surface than option 1A.	Highest complexity, requiring facility closure (includes stabilize slopes and closure for containment area) and surface water management design.	Medium to High complexity, requiring closure of facility. Includes embankment slopes and containment area. Potential reclamation of water collection pond if used.	Highest complexity, requiring facility closure (includes stabilize slopes and closure for containment area) and surface water management design.	Lowest complexity, requiring closure and capping of facility and providing stable final surfaces. Potential for progressive reclamation. Reclamation of water management facility.
	Post Closure Water Treatment Requirements	Post Closure water treatment requirements may be more involved for various options.	Qualitative Rank of Potential Post Closure Water Treatment Requirements	Rank	Low - Potential short-term water treatment until closure activities are completed	Low - Potential short-term water treatment until closure activities are completed	Medium - Potential long-term water treatment requirements - to be determined with monitoring of seepage and runoff after closure activities are completed.	Low - Potential short-term water treatment until closure activities are completed	Low - Potential short-term water treatment until closure activities are completed	Low - Potential short-term water treatment until closure activities are completed	Low - Potential short-term water treatment until closure activities are completed	Medium Potential long-term water treatment requirements - to be determined with monitoring of seepage and runoff after closure activities are completed.
	Post Closure Landform Stability	Various landform designs may be more stable than others	Qualitative Rank - Estimate of Risk Associated with Post Closure Landform Stability	Rank	Medium - Closure requires long-term stability of embankments, potential grading of slopes, medium embankment height. Single dam structure stabilized at closure.	High - Closure requires long-term stability of embankments, potential grading of slopes, medium embankment height. Potentially two dam structures requiring stabilization at closure.	Very Low - Closure requires long-term stability of tailings pile slopes, may require regrading at closure for placement of cover material, lowest final height of options. Includes closure of dam structure for water management.	Low to Medium - Closure requires long-term stability of embankments, potential grading of slopes, lowered embankment height than 1A and 1B. Single dam structure stabilized at closure.	Medium to High - Closure requires long-term stability of embankments, potential grading of slopes, higher final embankment height than 2B. Single dam structure stabilized at closure.	Medium - Closure requires long-term stability of embankments, potential grading of slopes, lower final embankment height than 2A. Single dam structure stabilized at closure.	High - Closure requires long-term stability of embankments, potential grading of slopes, highest final embankment height. Potentially two dam structures requiring stabilization at closure.	Low - Closure requires long-term stability of tailings pile slopes, may require regrading at closure for placement of cover material, lower final embankment height than 6A. Includes closure of dam structure for water management.
	Post Closure Chemical Stability	Various closure plans may allow for more chemical stability	Qualitative Rank - Estimate of Post Closure Chemical Stability	Rank	Medium - Closure anticipated to consist of capping final tailings surface with low permeable liner or clay material and inclusion of a shedding cover with revegetation to prevent water infiltration into deposited tailings.	Medium - Closure anticipated to consist of capping final tailings surface with low permeable liner or clay material and inclusion of a shedding cover with revegetation to prevent water infiltration into deposited tailings.	Low - Closure anticipated to consist of capping final tailings surface with low permeable clay material and revegetation. Facility uses foundation seepage collection.	Medium - Closure anticipated to consist of capping final tailings surface with low permeable liner or clay material and inclusion of a shedding cover with revegetation to prevent water infiltration into deposited tailings.	High - Closure anticipated to consist of capping final tailings surface with low permeable liner or clay material and inclusion of a shedding cover with revegetation to prevent water infiltration into deposited tailings. Facility uses engineered liner for embankments and basin.	High - Closure anticipated to consist of capping final tailings surface with low permeable liner or clay material and inclusion of a shedding cover with revegetation to prevent water infiltration into deposited tailings. Facility uses engineered liner for embankments and basin.	Medium - Closure anticipated to consist of capping final tailings surface with low permeable liner or clay material and inclusion of a shedding cover with revegetation to prevent water infiltration into deposited tailings.	Low - Closure anticipated to consist of capping final tailings surface with low permeable clay material and revegetation. Facility uses foundation seepage collection.
Capacity	Tailings Storage Expansion Capacity	Some geographical locations and designs may allow for additional expansion requirements more easily than others	Qualitative Rank of Potential Expansion	Rank	High - Area is favourable to expansion for additional tailings storage through embankment raising and possibly to footprint area.	High - Area is favourable to expansion for additional tailings storage through embankment raising and possibly to footprint area	High - Area is favourable to expansion for additional tailings storage with increases to footprint area or increased pile heights.	High - Area is favourable to expansion for additional tailings storage through embankment raising and possibly to footprint area.	Medium - Area is favourable to expansion for additional tailings storage through embankment raising. Some opportunities for expansion to footprint area, expansion is limited to north due to property boundary	Medium - Area is favourable to expansion for additional tailings storage through embankment raising. Limited opportunities for expansion to footprint area, expansion is limited to north due to property boundary	Low - Area is less favourable to expansion due to local topography and adjacent property boundaries as well as the proximity of the Open Pit operations to the North	Low - Area is less favourable to expansion due to local topography and adjacent property boundaries as well as the proximity of the Open Pit operations to the North

TABLE 4.3

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STEP 3 - ALTERNATIVE CHARACTERIZATION

	Storage Efficiency	Designs may be more efficient than others at storing tailings	Storage Capacity Volume per Construction Material Volume	m^3/m^3	5	5.3	>7	5.2	4.6	4.1	2.4	>7
Water Management	Sensitivity to Climate Variability	Some locations and other influences can produce options that are more sensitive to climate variability. Locations can be influenced by topography, elevation, proximity to water, wind direction, and geographic location. Due to proximity of all options, climate variability is not expected to be measurably variable across all locations.	Qualitative Rank of climate sensitivity	Rank	Low sensitivity to climate variability, requires reclaim from pond during winter with ice buildup in pond. Relatively flat topography.	Low to Medium sensitivity to climate variability, requires reclaim from pond during winter with ice buildup in pond. Relatively flat topography.	Low sensitivity to climate variability, requires reclaim from pond during winter with ice buildup in pond. Relatively flat topography.	Low sensitivity to climate variability, requires reclaim from pond during winter with ice buildup in pond. Relatively flat topography.	Low sensitivity to climate variability, requires reclaim from pond during winter with ice buildup in pond. Relatively flat topography.	Low to medium sensitivity to climate variability, requires reclaim from pond during winter with ice buildup in pond. Relatively flat topography.	Low sensitivity to climate variability, requires reclaim from pond during winter with ice buildup in pond. Relatively flat topography.	Low sensitivity to climate variability, requires reclaim from pond during winter with ice buildup in pond. Relatively flat topography.
	Surface Water Control Measures	Various options may require more complex surface water control measures	Qualitative Rank of Surface Water Control Complexity	Rank	Low complexity, consisting of containment within facility and reclaim from the facility. To be completed with surface water operational plan.	Moderate complexity. Bleed water anticipated, management within Cell 2 during initial phase of operations. Additional water management facility required in second phase of operations and required to store water from mine dewatering.	Moderate to High complexity. Surface water management required consisting of runoff from tailings pile and surrounding catchment runoff management. Separate facility required to store water from mine dewatering.	Lowest complexity, consisting of containment within facility and reclaim from the facility. To be completed with surface water operational plan. Less process water with portion of the tailings being directed to the underground.	Low complexity, consisting of containment within facility and reclaim from the facility. To be completed with surface water operational plan.	Moderate complexity. Bleed water anticipated, water management will include separate facility to manage surface water and mine dewatering.	Low complexity, consisting of containment within facility and reclaim from the facility. To be completed with surface water operational plan.	Moderate to High complexity. Surface water management required consisting of runoff from tailings pile and surrounding catchment runoff management. Separate facility required to store water from mine dewatering.
	Seepage Control Measures	Ability to restrict the migration of mine water	Qualitative Rank of Effectiveness of Seepage Control	Rank	High - Seepage control with low permeable clay or liner materials. Collection of seepage with downstream ditching and pump back system.	Medium to High - Seepage control with low permeable clay or liner materials. Collection of seepage with downstream ditching and pump back system from two potential containment areas.	Low - Seepage control with foundation liners (natural or product) and perimeter containment ditching and berm with transfer to secondary containment facility. Secondary containment facility to have berm and ditch with pump back system.	High - Seepage control with low permeable clay or liner materials. Collection of seepage with downstream ditching and pump back system.	High - Seepage control with low permeable clay or liner materials. Collection of seepage with downstream ditching and pump back system.	Medium to High - Seepage control with low permeable clay or liner materials. Collection of seepage with downstream ditching and pump back system from two potential containment areas.	High - Seepage control with low permeable clay or liner materials. Collection of seepage with downstream ditching and pump back system.	Low - Seepage control with foundation liners (natural or product) and perimeter containment ditching and berm with transfer to secondary containment facility. Secondary containment facility to have berm and ditch with pump back system.

Economic Account

Sub-Account	Description	Rationale	Indicator Parameter	Unit	1A	1B	1C	1D	2A	2B	6A	6C
Life of Mine Costs	Capital	Larger Capital Costs will result in a decreased project return.	$M, Life of Mine (differentiating)	$	34.5	28.8	9.9	29.1	119.3	113.4	54.1	6.3
	Operational	Larger Operational costs will result in a decreased project return	$M, Life of Mine (differentiating)	$	2.9	10.9	31.3	10.9	3.7	11.7	3.1	31.3
	Fish Habitat Compensation	Increased fish habitat impacts increases compensation costs (including bonding, capital and monitoring)	$M, Life of Mine (differentiating)	$	Not Assessed - Each Alternative Assigned a Neutral Rating							
	Closure and Reclamation Costs	More complex dam design will result in more difficult construction requirements and associated monitoring conditions	$M, Life of Mine (differentiating)	$	18.4	18.4	10.8	18.4	51.5	51.5	11.5	7.4

Socio-Economic Account

Sub-Account	Description	Rationale	Indicator Parameter	Unit	1A	1B	1C	1D	2A	2B	6A	6C
Archaeology	Archaeological Potential	Tailings Storage Facility that impacts archaeological resources will potentially require additional investigation, permitting and may attract adverse public concern	Area of direct impact and archaeological potential	ha/potential	No archeological potential.	No archeological potential.	No archeological potential.	No archeological potential.	No archeological potential.	No archeological potential.	No archeological potential.	No archeological potential.
Health and Safety	Risk to Worker Health and Safety	Tailings facilities that can generate tailings dust or potential discharge of untreated water can cause adverse affects to worker health. Facilities that are upstream of other operating facilities or require increased manpower for operations can be higher risk to worker safety	Qualitative Rank of Worker Health and Safety Risk	Rank	Medium to High risk based on water management, location and required operations.	Medium to High risk based on water management, location and required operations.	High risk based on potential surface dusting, and on required daily operations.	Medium to High risk based on water management, location and required operations.	Medium risk based on lower embankments and water management and required operations.. Site is further from plant site than other options.	Medium risk based on lower embankments and water management and required operations.. Site is further from plant site than other options.	High Risk based on high dams and water management, location and required operations. Close to plant site and open pit site.	Very high risk based on potential surface dusting, location and required daily operations. Close to plant site and open pit site.
	Risk to Public Safety	Facilities with significant embankment heights can be less stable. Facilities without perimeter containment can be higher risk. Facilities dependent on water management can be higher risk if unwanted water is released from the facility.	Qualitative Rank of Public Safety Risk	Rank	Medium risk based on dam heights and water management	Medium risk based on dam heights and water management	Low to Medium risk based on reduced water management and tailings storage arrangement	Medium risk based on dam heights and water management	Low risk based on location and water management	Low risk based on location and water management	Medium risk based on dam heights and water management	Low to Medium risk based on reduced water management and tailings storage arrangement
Socio-Economic Indicators	Economic Benefits to Regional Communities	Facilities requiring startup and future construction activities as well as on-going operations can beneficial to the regional community.	Qualitative Rank of Economic Benefits to Community including job creation and diversity	Rank	Medium indirect employment with initial construction costs, future construction costs and with low impact as TSF becomes operational to closure.	Medium indirect employment with initial construction costs, future construction costs and with low impact as TSF becomes operational to closure.	Low - Low initial costs to construct with higher employment as operational staff is greater in nature than traditional tailings facility. Shorter haul distance than Option 6C resulting in fewer jobs.	Medium indirect employment with initial construction costs, future construction costs and with low impact as TSF becomes operational to closure.	Medium to High - higher indirect employment with initial construction costs, future construction costs and with low impact as TSF becomes operational to closure.	Medium to High - higher indirect employment with initial construction costs, future construction costs and with low impact as TSF becomes operational to closure.	Medium to High - higher indirect employment with initial construction costs, with low impact as TSF becomes operational to closure.	Low to Medium - Low initial costs to construct with higher employment as operational staff is greater in nature then traditional tailings facility.
	Indirect Employment	Direct relation of Regional Job Creation.	Qualitative Rank of Potential Indirect Employment	Rank	Low to Medium indirect employment with initial construction costs, with low impact as TSF becomes operational to closure.	Low to Medium indirect employment with initial construction costs, with low impact as TSF becomes operational to closure.	Low - initial costs to construct with medium indirect employment as operational staff is greater in nature then traditional tailings facility.	Low to Medium indirect employment with initial construction costs, with low impact as TSF becomes operational to closure.	Low to Medium indirect employment with initial construction costs, with low impact as TSF becomes operational to closure.	Low to Medium indirect employment with initial construction costs, with low impact as TSF becomes operational to closure.	Low to Medium indirect employment with initial construction costs, with low impact as TSF becomes operational to closure.	Low - initial costs to construct with medium indirect employment as operational staff is greater in nature then traditional tailings facility.

TABLE 4.3

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STEP 3 - ALTERNATIVE CHARACTERIZATION

First Nation Impacts	Extent of Traditional Land Use	Potential impacts to Traditional Land Use by Person	Qualitative Rank of Traditional Land Use	Rank	Medium-Low. This location offers potential opportunities for traditional practices including food gathering and hunting. Land is classified as private parcel.	Medium-Low. This location offers potential opportunities for traditional practices including food gathering and hunting. Land is classified as private parcel.	Medium-Low. This location offers potential opportunities for traditional practices including food gathering and hunting. Land is classified as private parcel.	Medium-Low. This location offers potential opportunities for traditional practices including food gathering and hunting. Land is classified as private parcel.	Medium. This location offers potential opportunities for traditional practices including food gathering and hunting. Land is classified as crown land	Medium. This location offers potential opportunities for traditional practices including food gathering and hunting. Land is classified as crown land.	Low. This location offers minimal potential opportunities for traditional practices including food gathering and hunting. Land is classified as private parcel.	Low. This location offers minimal potential opportunities for traditional practices including food gathering and hunting. Land is classified as private parcel.
	Extent of Traditional Land Use	Potential impacts to Traditional Land Use by Activity	Qualitative Rank of Traditional Land Use Activities	Rank	Medium. Traditional uses of the area include that of berry picking, hunting, trapping, and mushroom picking.	Medium. Traditional uses of the area include that of berry picking, hunting, trapping, and mushroom picking.	Medium. Traditional uses of the area include that of berry picking, hunting, trapping, and mushroom picking.	Medium. Traditional uses of the area include that of berry picking, hunting, trapping, and mushroom picking.	Medium to Low. Traditional uses of the area includes hunting and trapping and due to recent forestry activities in the area, traditional food options have become available.	Medium to Low. Traditional uses of the area includes hunting and trapping and due to recent forestry activities in the area, traditional food options have become available.	Low. Due to access concerns and the presence of private and Company own land this area has been only used for hunting.	Low. Due to access concerns and the presence of private and Company own land this area has been only used for hunting.
Recreational and Commercial Land Use	Impact to Navigable Waters	Facility impact to established waterways used for travel	Area of Direct Impact	ha	0 - No impact to navigable waters throughout course of project.	0 - No impact to navigable waters throughout course of project.	0 - No impact to navigable waters throughout course of project.	0 - No impact to navigable waters throughout course of project.	0 - No impact to navigable waters throughout course of project.	0 - No impact to navigable waters throughout course of project.	0 - No impact to navigable waters throughout course of project.	0 - No impact to navigable waters throughout course of project.
	Extent of Recreational Land Use	Facility negatively impacting Recreational Land Use.	Qualitative Rank of Recreational Use	Rank	Low to Medium, concern for recreational activity as traditional use for area include berry picking, hunting, trapping, and mushroom picking. However area is under private property therefore activities have been limited .	Low to Medium, concern for recreational activity as traditional use for area include berry picking, hunting, trapping, and mushroom picking. However area is under private property therefore activities have been limited .	Low to Medium, concern for recreational activity as traditional use for area include berry picking, hunting, trapping, and mushroom picking. However area is under private property therefore activities have been limited .	Low to Medium, concern for recreational activity as traditional use for area include berry picking, hunting, trapping, and mushroom picking. However area is under private property therefore activities have been limited .	Low, limited recreational activities due to access issues. Limited to hunting and trapping.	Low, limited recreational activities due to access issues. Limited to hunting and trapping.	Very Low, limited recreational activities due to access and private parcel	Very Low, limited recreational activities due to access and private parcel
	Extent of Commercial Land Use	Facility negatively impacting Commercial Land Use.	Qualitative Rank of Commercial Use	Rank	Low - No impact to commercial land use.	Low - No impact to commercial land use.	Low - No impact to commercial land use.	Low - No impact to commercial land use.	Low - No impact to commercial land use.	Low - No impact to commercial land use.	Low - No impact to commercial land use.	Low - No impact to commercial land use.

Alternative Identification	Description
1A	Location 1- Conventional Slurry Tailings
1B	Location 1 - Thickened Tailings
1C	Location 1 - Filtered/Dry Stack Tailings
1D	Location 1 - Conventional with Future Co-Disposal
2A	Location 2- Conventional Slurry Tailings
2B	Location 2- Thickened Tailings
6A	Location 6 - Conventional Slurry Tailings
6C	Location 6 - Filtered/Dry Stack Tailings

Notes:

1. Indicators that can not be quantified have been assigned a rank to enable comparison for assessment.

TABLE 4.4

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 4 - MULTIPLE ACCOUNTS LEDGER FOR CANDIDATE ALTERNATIVES

Environmental Account				Indicator Quantity								
Sub-Account	**Description**	**Indicator**	**Indicator Parameter**	**1A**	**1B**	**1C**	**1D**	**2A**	**2B**	**6A**	**6C**	**Data Source**
Land Use	Distance from the Mine	Direct Distance from Plant Site to Structure	m	400	400	400	400	2,200	2,200	1,400	1,400	WSP
	Pipeline/Access Road Requirements	Length of Additional Infrastructure Required	m	700	700	700	700	2,400	2,400	1,500	1,500	WSP
	Storage Facility and Associated Infrastructure Footprint	Estimate of Storage Facility(s) Area	ha	88	88	100	88	246	246	54	61	WSP
Water Impacts	Impact to surface water availability	Qualitative Estimate of Potential Surface Water Impact	Rank	Low to Medium	Low to Medium	Low to Medium	Low to Medium	High	High	Medium to High	Medium to High	WSP
	Potential Impacts to Water Quality (ARD, Metal Leaching, etc.)	Likelihood of Mining Impacts and ability of mitigation measures to limit ARD and Metal Leaching	Rank	Low-Medium	Medium	High	Low-Medium	Low-Medium	Medium	Low-Medium	High	AMEC Foster Wheeler (Appendix M of EIS) Ecometrix (Appendix K and Appendix L)
Aquatic Habitat	Permanent Streams Impacted	No. of Streams Directly Impacted	No	1	1	1	1	2	2	1	1	WSP
	Indirect impacts (downstream flow reductions)	No of Streams Potentially Indirectly Impacted	No	3	3	3	3	6	6	3	3	WSP
	Direct impact to open water	No of Water Bodies Directly Impacted	No	1	1	1	1	1	1	1	1	WSP
	Fish Bearing Lakes	No of Fish Bearing Lakes Directly Affected	No	1	1	1	1	1	1	1	1	Appendix G of EIS, Appendix Q of EIS
Terrestrial Habitat	Area of feeding or shelter loss due to TSF or associated structures.	No of Terrestrial Areas Directly Impacted	No	1	1	1	1	1	1	1	1	WSP
	Existing vegetation, ecosystems will be lose	Potential Loss to Flora and Fauna with construction and operations	No. of Ecosites	7	7	7	7	6	6	6	6	WSP
Air Quality	Potential for Dust Emission (contributed by trucks)	Length of Haulage Roads	m	0	0	700	0	0	0	0	1,500	WSP
	Potential for Dust Emission (Contributed by tailings)	Type of tailings technology used and potential dust generation	Rank	Low	Medium	High	Low	Low	Medium	Low	High	WSP
	Potential for Greenhouse Gas and Noise Emissions (number of truck hours)	Qualitative Rank of Potential Greenhouse Gas Emissions and Noise Pollution due to truck traffic based on tailings disposal technology	Rank	Low	Low	Medium to High	Low	Low	Low	Low	High	WSP

Technical Account				Indicator Quantity								
Sub-Account	**Description**	**Indicator**	**Indicator Parameter**	**1A**	**1B**	**1C**	**1D**	**2A**	**2B**	**6A**	**6C**	**Data Source**
	Foundation Conditions	Qualitative Rank of Suitability of Foundation Conditions	Rank	High	High	High	High	Low	Low	Moderate	Moderate	WSP

TABLE 4.4

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 4 - MULTIPLE ACCOUNTS LEDGER FOR CANDIDATE ALTERNATIVES

Design	Distance From Plant Site	Distance From Plant Site to Far End of Facility for pipeline or haul road.	m	2,200	2,200	2,200	2,200	5,200	5,200	2,400	2,400	WSP
	Topographic Complexity	Qualitative Rank of Topographic Complexity	Rank	Low	Low	Very Low	Low	Medium	Low to Medium	Medium to High	High	WSP
	Topography	Elevation Difference From Plant Site at final Embankment Arrangement. For tailings pumping.	m	27	25	No Pumping	25	35	34	24	No Pumping	WSP
	Dam Complexity	Qualitative Rank of Dam Complexity	Rank	Moderate	Moderate	Low	Low to Moderate	Very High	High	Very High	Moderate	WSP
	Dam Hazard Classification	CDA Dam Classification, MNR Dam Classification	CDA Dam Classification Estimate	High	High	High	High	High	High	Very High	Very High	WSP
	Construction Material Availability	Qualitative Rank of Construction Material Volume Requirements and Availability	Qualitative Rank of Construction Material Availability	Medium to High	Medium	Low	Low to Medium	Medium to High	High	Medium	Very Low	WSP
	Slope Stability	Preliminary Estimate of Total Embankment Height	m	24	22	18	22	30	29	34	27	WSP
	Slope Stability	Estimate of Slope Angle during operations	H:V	1.5H:1V	1.5H:1V	2.1H:1V	1.5H:1V	1.5H:1V	1.5H:1V	1.5H:1V	2.1H:1V	WSP
Operations	Operation Distance	Distance From Plant Site to Far End of Facility	m	2,200	2,200	2,200	2,200	5,200	5,200	2,400	2,400	WSP
	Operational Risks and Other Uncertainties	Qualitative Rank of operations assessment based on tailings and water management	Rank	Low to Medium	Medium to High	Medium	Low	Low to Medium	High	Low to Medium	Medium	WSP
	Water Treatment Requirements	Estimate of Water Treatment Volume	$m^3/yr.$	340,000	250,000	720000	340,000	702,000	620,000	260,000	690,000	WSP
Closure	Remediation Requirements	Quantitative Rank of Remediation Requirements by complexity	Rank	Very High	Medium to High	Low	High	Very High	Medium to High	Very High	Low	WSP
	Post Closure Water Treatment Requirements	Qualitative Rank of Potential Post Closure Water Treatment Requirements	Rank	Low	Low	Medium	Low	Low	Low	Low	Medium	WSP, Appendix L of EIS
	Post Closure Landform Stability	Qualitative Rank - Estimate of Risk Associated with Post Closure Landform Stability	Rank	Medium	High	Very Low	Low to Medium	Medium to High	Medium	High	Low	WSP
	Post Closure Chemical Stability	Qualitative Rank - Estimate of Post Closure Chemical Stability	Rank	Medium	Medium	Low	Medium	High	High	Medium	Low	WSP, Appendix M of EIS, Appendix L of EIS

TABLE 4.4

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 4 - MULTIPLE ACCOUNTS LEDGER FOR CANDIDATE ALTERNATIVES

Capacity	Tailings Storage Expansion Capacity	Qualitative Rank of Potential Expansion	Rank	High	High	High	High	Medium	Medium	Low	Low	WSP
	Storage Efficiency	Storage Capacity Volume per Construction Material Volume	m^3/m^3	5.0	5.3	>7	5.2	4.6	4.1	2.4	>7	WSP
Water Management	Sensitivity to Climate Variability	Qualitative Rank of climate sensitivity	Rank	Low	Low to Medium	Low	Low	Low	Low to Medium	Low	Low	WSP, Appendix J and G of EIS
	Surface Water Control Measures	Qualitative Rank of Surface Water Control Complexity	Rank	Low	Medium	Medium to High	Very Low	Low	Medium	Low	Medium to High	WSP
	Seepage Control Measures	Qualitative Rank of Effectiveness of Seepage Control	Rank	High	Medium to High	Low	High	High	Medium to High	High	Low	WSP

Economic Account				**Indicator Quantity**								
Sub-Account	**Description**	**Indicator**	**Indicator Parameter**	**1A**	**1B**	**1C**	**1D**	**2A**	**2B**	**6A**	**6C**	**Data Source**
Life of Mine Costs	Capital	Capital Costs, $M, Life of Mine (differentiating)	$	34.5	28.8	9.9	29.1	119.3	113.4	54.1	6.3	WSP
	Operational	Operational Cost Estimate, $M, Life of Mine	$	2.9	10.9	31.3	10.9	3.7	11.7	3.1	31.3	WSP
	Fish Habitat Compensation	Potential Fish Habitat Compensation, $M, Life of Mine	$	Not Assessed - Each Alternative Assigned a Neutral Rating								-
	Closure and Reclamation Costs	Closure Cost Estimate, $M, Life of Mine (differentiating)	$	18.4	18.4	10.8	18.4	51.5	51.5	11.5	7.4	WSP

Socio-Economic Account				**Indicator Quantity**								
Sub-Account	**Description**	**Indicator**	**Indicator Parameter**	**1A**	**1B**	**1C**	**1D**	**2A**	**2B**	**6A**	**6C**	**Data Source**
Archaeology	Archaeological Potential	Area of direct impact and archaeological potential	ha/potential	0, Low	0, Low	0, Low	0, Low	0, Low	0, Low	0, Low	0, Low	Appendix U of EIS
Health and Safety	Risk to Worker Health and Safety	Qualitative Rank of Worker Health and Safety Risk	Rank	Medium to High	Medium to High	High	Medium to High	Medium	Medium	High	Very High	Appendix W
	Risk to Public Safety	Qualitative Rank of Public Safety Risk	Rank	Medium	Medium	Low - Medium	Medium	Low	Low	Medium	Low to Medium	Appendix GG and HH of EIS
Socio-Economic Indicators	Economic Benefits to Regional Communities Including Job Creation and Diversity	Qualitative Rank of Economic Benefits to Community including job creation and diversity	Rank	Medium	Medium	Low	Medium	Medium to High	Medium to High	Medium to High	Low to Medium	Appendix T of EIS

TABLE 4.4

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 4 - MULTIPLE ACCOUNTS LEDGER FOR CANDIDATE ALTERNATIVES

	Indirect Employment	Qualitative Rank of Potential Indirect Employment	Rank	High	High	Low	High	High	High	High	Low	Appendix T of EIS
First Nation Impacts	Extent of Traditional Land Use (# of individual users)	Qualitative Rank of Traditional Land Use	Rank	Medium to Low	Medium to Low	Medium to Low	Medium to Low	Medium	Medium	Low	Low	Appendix B, DD, EE of EIS
	Extent of Traditional Land Use (# of Activities)	Qualitative Rank of Traditional Land Use Activities	Rank	Medium	Medium	Medium	Medium	Medium to Low	Medium to Low	Low	Low	Appendix B, DD, EE of EIS
Recreational and Commercial Land Use	Impact to Navigable Waters	Area of Direct Impact	ha	0	0	0	0	0	0	0	0	WSP
	Extent of Recreational Land Use	Qualitative Rank of Recreational Use	Rank	Low to Medium	Low to Medium	Low to Medium	Low to Medium	Low	Low	Very Low	Very Low	Appendix T of EIS
	Extent of Commercial Land Use	Qualitative Rank of Commercial Use	Rank	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very low	Very Low	Appendix T of EIS

Alternative Identification	Description
1A	Location 1- Conventional Slurry Tailings
1B	Location 1 - Thickened Tailings
1C	Location 1 - Filtered/Dry Stack Tailings
1D	Location 1 - Conventional with Future Co-Disposal
2A	Location 2- Conventional Slurry Tailings
2B	Location 2- Thickened Tailings
6A	Location 6 - Conventional Slurry Tailings
6C	Location 6 - Filtered/Dry Stack Tailings

Notes:
1. Inputs for Indicators based on available information and work completed to date.

TABLE 4.5

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 5 - VALUE-BASED DECISION PROCESS
QUANTITATIVE SCORING FOR CANDIDATE ALTERNATIVES INDICATORS

Environmental Account						
Indicator	**Descriptor**					
	1 (Worst)	**2**	**3**	**4**	**5**	**6 (Best)**
Direct Distance from Plant Site to Structure	>2,000	2,000 - 1,600	1,600 - 1,200	1,200 - 800	400-800	≤400
Length of Additional Infrastructure Required	>2,300	1,900 - 2,300	1,500 - 1,900	1,100 - 1,500	700 - 1,100	≤700
Estimate of Storage Facility(s) Area	>220	180 - 220	140 - 180	100 - 140	60 - 100	≤60
Qualitative Estimate of Potential Surface Water Impact	High - requires full diversion of 2 major surface water features	High to Medium - requires partial diversion of 1 major surface water feature	Medium - requires diversion of minor (tributary) surface water features	Medium to Low - requires minimal or minor diversion of minor surface water feature only	Low - requires only diversion of seasonal surface water feature	Very Low - does not require any surface water diversions (major, minor or seasonal)
Likelihood of Mining Impacts and ability of mitigation measures to limit ARD and Metal Leaching	High - High Potential for mining impacts. Prolonged water treatment and/or collection system(s). Expected ARD and metal leaching.	High to Medium Potential	Medium Potential - Likely some form of prolonged water treatment and/or collection system(s). Probable ARD and metal leaching.	Medium to Low Potential	Low Potential	Very Low Potential - No water or collection systems required. No expected ARD or metal leaching
No. of Streams Directly Impacted	>2	2	-	-	1	<1
No of Streams Potentially Indirectly Impacted	>6	6	5	4	3	<3
No of Water Bodies Directly Impacted	5	4	3	2	1	<1
No. of Fish Bearing Lakes Directly Affected	5	4	3	2	1	<1
No of Terrestrial Areas Directly Impacted	5	4	3	2	1	<1
Potential Loss to Flora and Fauna with construction and operations	>7 ecosites affected	7 ecosites affected and greater than 100 ha affected	7 ecosites affected and less than 100 ha affected	6 ecosites affected and greater than 100 ha affected	6 ecosites affected and less than 100 ha affected	<6 ecosites affected
Length of Haulage Roads	>1,300	1,100 - 1,300	900 - 1,100	700 - 900	500 - 700	≤500

TABLE 4.5

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 5 - VALUE-BASED DECISION PROCESS
QUANTITATIVE SCORING FOR CANDIDATE ALTERNATIVES INDICATORS

Type of tailings technology used and potential dust generation	High	High to Medium	Medium	Medium to Low	Low	Very Low
Qualitative Rank of Potential Greenhouse Gas Emissions and Noise Pollution due to truck traffic based on tailings disposal technology	High	High to Medium	Medium	Medium to Low	Low	Very Low

Technical Account						
Indicator	**Descriptor**					
	1 (Worst)	**2**	**3**	**4**	**5**	**6 (Best)**
Qualitative Rank of Suitability of Foundation Conditions	Low - Conditions providing poor foundation strength and poor containment, consisting primarily of swamp or organic materials.	Low to Moderate - Conditions providing poor foundation strength and poor containment, having areas of potential swamp or organic materials.	Moderate - Conditions providing fair foundation strength and fair containment, having areas of potential swamp or organic material.	Moderate to High - Conditions providing good foundation strength and poor containment, minimal areas of swamp or organic material.	High - Conditions providing fair foundation strength and poor containment, minimal areas of swamp or organic material	Very High - Conditions providing good foundation conditions and low permeable material for containment, no presence of swamp or organic material.
Distance From Plant Site to Far End of Facility for pipeline or haul road.	>5000	4300 to 5000	3600 to 4300	2900 to 3600	2200 to 2900	Less than or equal to 2200
Qualitative Rank of Topographic Complexity	High - Topography provides difficulties to dam construction, embankment raising, tailings and water management.	Medium to High - Topography provides difficulties to dam construction, embankment raising, and tailings management but is suitable for water management.	Medium - Topography provides difficulties to dam construction, embankment raising, but is suitable for tailings and water management.	Low to Medium - Topography is suitable for dam construction and embankment raising but is not suitable for tailings and water management.	Low - Topography is suitable for dam construction, embankment raising and tailings management but is not suitable for water management.	Very Low - Topography is suitable for dam construction and embankment raising, tailings and water management.
Elevation Difference From Plant Site at Final Embankment Elevation, for tailings pumping.	>33 m	31 to 33 m	29 to 31 m	27 to 29 m	25 to 27 m	≤25 m

TABLE 4.5

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 5 - VALUE-BASED DECISION PROCESS
QUANTITATIVE SCORING FOR CANDIDATE ALTERNATIVES INDICATORS

Qualitative Rank of Tailings Dam Complexity	Very High - Embankment Constructed on sloping ground, difficult foundation key-in, significant internal drain system with engineering products required for containment.	High - Embankment Constructed on sloping ground, favourable foundation key-in, significant internal drain system and engineering products required for containment.	Moderate to High - Embankment Constructed mostly perpendicular to sloping ground, favourable foundation key-in, significant internal drain system and engineering products required for containment.	Moderate - Embankment Constructed primarily perpendicular to ground, favourable foundation key-in, moderate internal drain system and engineering products required for containment.	Low to Moderate - Embankments constructed primarily perpendicular to sloping ground, favourable foundation key-in conditions, moderate internal drain system and low permeable fill material.	Low - Low height berm and ditch system for surface runoff containment.
CDA Dam Classification Estimate	Extreme	Very High	High	Significant	Low	No Rating
Qualitative Rank of Construction Material Volume Requirements and Availability	High - Farthest Distance from Sources, Dependent on Mine Waste	Medium to High - Farthest distance, not dependent on mine waste	Medium - Medium Distance, Dependent on Mine Waste	Low to Medium - Medium Distance, not dependent on mine waste	Low - Close to Source, dependent on mine waste	Very Low - Close to Sources, not dependent on Mine Waste
Preliminary Estimate of Total Embankment Height	>32	29 to 32	26 to 29	23 to 26	20 to 23	≤20
Estimate of Slope Angle during operations	1.5H:1V	1.6H:1V	1.7H:1V	1.8H:1V	1.9H:1V	≥2.0H:1V
Distance From Plant Site to Far End of Facility	>5000	4300 to 5000	3600 to 4300	2900 to 3600	2200 to 2900	≤2200
Qualitative Rank of operations assessment based on tailings and water management	High - Potential difficulty with tailings and water management.	Medium to High - Potential difficulty with tailings management, moderate difficulty with water management.	Medium - Moderate Difficulty with tailings and water management.	Low to Medium - Favourable water management, moderate difficulty with tailings management.	Low - Favourable tailings management, moderate difficulty with water management.	Very Low - Favourable tailings and water management.
Estimate of Water Treatment Volume per Year	650,000 to 750,000	550,000 to 650,000	450,000 to 550,000	350,000 to 450,000	250,000 to 350,000	≤250,000
Quantitative Rank of Remediation Requirements	Very High - Reclamation of more than one facility with potential long term water management requirements.	High - Reclamation of more than one facility with water management requirements.	Medium to High - Reclamation of more than one facility with no water management requirements	Medium - Reclamation of single facility with potential water management requirements.	Low to Medium - Reclamation of single facility with no potential water management.	Low - Reclamation of single facility with no potential water management and potential progressive reclamation.

TABLE 4.5

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 5 - VALUE-BASED DECISION PROCESS
QUANTITATIVE SCORING FOR CANDIDATE ALTERNATIVES INDICATORS

Qualitative Rank of Potential Post Closure Water Treatment Requirements	High - Water treatment in perpetuity	Medium to High - Long-Term Water treatment to Perpetuity	Medium - Long-Term Water Treatment.	Low to Medium - Long-Term to Short-Term Water Treatment	Low - Short-Term Water Treatment.	Very low - No water treatment requirements
Qualitative Rank - Estimate of Risk Associated with Post Closure Landform Stability	High	Medium to High	Medium	Low to Medium	Low	Very Low
Qualitative Rank - Estimate of Post Closure Chemical Stability	Very Low	Low	Low to Medium	Medium	Medium to High	High
Qualitative Rank of Potential Expansion	Very Low	Low	Low to Medium	Medium	Medium to High	High
Storage Capacity Volume per Construction Material Volume	<3	3-4	4-5	5-6	6-7	>7
Qualitative Rank of climate sensitivity	High	Medium to High	Medium	Low to Medium	Low	Very Low
Qualitative Rank of Surface Water Control Complexity	High	Medium to High	Medium	Low to Medium	Low	Very Low
Qualitative Rank of Effectiveness of Seepage Control	Very Low - lowest ability to collect and retain seepage	Low	Low to Medium	Medium	Medium to High	High - system has a high ability to contain and collect all seepage

Economic Account						
Indicator	**Descriptor**					
	1 (Worst)	**2**	**3**	**4**	**5**	**6 (Best)**
Capital Costs, $M, Life of Mine (differentiating)	>90	70 - 90	50 - 70	30 - 50	10 - 30	≤10
Operational Cost Estimate, $M, Life of Mine	>27	21-27	15-21	9-15	3-9	≤3
Potential Fish Habitat Compensation, $M, Life of Mine	5	4	3	2	1	0
Closure Cost Estimate, $M, Life of Mine (differentiating)	>50	50-40	40-30	30-20	20-10	≤10

TABLE 4.5

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 5 - VALUE-BASED DECISION PROCESS
QUANTITATIVE SCORING FOR CANDIDATE ALTERNATIVES INDICATORS

Socio-Economic Account						
Indicator	**Descriptor**					
	1 (Worst)	**2**	**3**	**4**	**5**	**6 (Best)**
Area of direct impact and archaeological potential	High	High to Medium	Medium	Medium to Low	Low	Very Low
Qualitative Rank of Worker Health and Safety Risk	Very High	High	Medium to High	Medium	Low to Medium	Low
Qualitative Rank of Public Safety Risk	High	High to Medium	Medium	Medium to Low	Low	Very Low
Qualitative Rank of Economic Benefits to Community including job creation and diversity	Very Low	Low	Low to Medium	Medium	Medium to High	High
Qualitative Rank of Potential Indirect Employment	Very Low	Low	Low to Medium	Medium	Medium to High	High
Qualitative Rank of Traditional Land Use	High	High to Medium	Medium	Medium to Low	Low	Very Low
Qualitative Rank of Traditional Land Use Activities	High	High to Medium	Medium	Medium to Low	Low	Very Low
Area of Direct Impact	>50	50-40	40-30	30-20	20-10	≤10
Qualitative Rank of Recreational Use	High	High to Medium	Medium	Medium to Low	Low	Very Low
Qualitative Rank of Commercial Use	High	High to Medium	Medium	Medium to Low	Low	Very Low

Notes:
1. Scoring based on inputs for assessment Indicators.

TABLE 4.6

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 5 - VALUE-BASED DECISION PROCESS
QUANTITATIVE WEIGHTING FOR CANDIDATE ALTERNATIVES INDICATORS

Environmental Account																			
Sub-Account	Indicator	Indicator Weight	Alternatives Location and Deposition Technology Identifier																
			1A		1B		1C		1D		2A		2B		6A		6C		
			Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	
		W	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	
Land Use	Direct Distance from Plant Site to Structure	6	6	36	6	36	6	36	6	36	1	6	1	6	3	18	3	18	
	Length of Additional Infrastructure Required	6	6	36	6	36	6	36	6	36	1	6	1	6	4	24	4	24	
	Estimate of Storage Facility(s) Area	6	5	30	5	30	4	24	5	30	1	6	1	6	6	36	5	30	
Water Impacts	Qualitative Estimate of Potential Surface Water Impact	6	4	24	4	24	4	24	4	24	1	6	1	6	2	12	2	12	
	Likelihood of Mining Impacts and ability of mitigation measures to limit ARD and Metal Leaching	6	4	24	3	18	1	6	4	24	4	24	3	18	4	24	1	6	
Aquatic Habitat	No. of Streams Directly Impacted	6	5	30	5	30	5	30	5	30	2	12	2	12	5	30	5	30	
	No of Streams Potentially Indirectly Impacted	6	5	30	5	30	5	30	5	30	2	12	2	12	5	30	5	30	
	No of Water Bodies Directly Impacted	6	5	30	5	30	5	30	5	30	5	30	5	30	5	30	5	30	
	No of Fish Bearing Lakes Directly Affected	6	5	30	5	30	5	30	5	30	5	30	5	30	5	30	5	30	
Terrestrial Habitat	No of Terrestrial Areas Directly Impacted	6	5	30	5	30	5	30	5	30	5	30	5	30	5	30	5	30	
	Potential Loss to Flora and Fauna with construction and operations	6	3	18	3	18	2	12	3	18	4	24	4	24	5	30	5	30	
Air Quality	Length of Haulage Roads	6	6	36	6	36	5	30	6	36	6	36	6	36	6	36	1	6	
	Type of tailings technology used and potential dust generation	6	5	30	3	18	1	6	5	30	5	30	3	18	5	30	1	6	
	Qualitative Rank of Potential Greenhouse Gas Emissions and Noise Pollution due to truck traffic based on tailings disposal technology	6	5	30	5	30	2	12	5	30	5	30	5	30	5	30	1	6	

TABLE 4.6

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 5 - VALUE-BASED DECISION PROCESS
QUANTITATIVE WEIGHTING FOR CANDIDATE ALTERNATIVES INDICATORS

Technical Account																	
Sub-Account	Indicator	Indicator Weight	Alternatives Location and Deposition Technology Identifier														
			1A		1B		1C		1D		2A		2B		6A		6C	
			Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score
		W	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)
Design	Qualitative Rank of Suitability of Foundation Conditions	3	5	15	5	15	5	15	5	15	2	6	2	6	3	9	3	9
	Distance From Plant Site to Far End of Facility for pipeline or haul road.	3	6	18	6	18	6	18	6	18	1	3	1	3	5	15	5	15
	Qualitative Rank of Topographic Complexity	3	5	15	5	15	6	18	5	15	3	9	4	12	2	6	1	3
	Elevation Difference From Plant Site at final embankment height, for tailings pumping	3	4	12	5	15	6	18	5	15	1	3	1	3	6	18	6	18
	Qualitative Rank of Dam Complexity	3	4	12	4	12	6	18	5	15	1	3	2	6	1	3	4	12
	CDA Dam Classification Estimate	3	3	9	3	9	3	9	3	9	3	9	3	9	2	6	2	6
	Qualitative Rank of Construction Material Volume Requirements and Availability	3	2	6	3	9	5	15	4	12	2	6	1	3	3	9	6	18
	Preliminary Estimate of Total Embankment Height	3	4	12	5	15	6	18	5	15	2	6	2	6	1	3	3	9
	Estimate of Slope Angle during operations	3	1	3	1	3	6	18	1	3	1	3	1	3	1	3	6	18
Operations	Distance From Plant Site to Far End of Facility	3	6	18	6	18	6	18	6	18	1	3	1	3	5	15	5	15
	Qualitative Rank of operations assessment based on tailings and water management .	3	4	12	2	6	3	9	5	15	4	12	1	3	4	12	3	9
	Estimate of Water Treatment Volume	3	5	15	6	18	1	3	5	15	1	3	2	6	5	15	1	3
Closure	Quantitative Rank of Remediation Requirements	3	1	3	3	9	5	15	2	6	1	3	3	9	1	3	5	15
	Qualitative Rank of Potential Post Closure Water Treatment Requirements	3	5	15	5	15	3	9	5	15	5	15	5	15	5	15	3	9
	Qualitative Rank - Estimate of Risk Associated with Post Closure Landform Stability	3	3	9	1	3	6	18	4	12	2	6	3	9	1	3	5	15
	Qualitative Rank - Estimate of Post Closure Chemical Stability	3	4	12	4	12	2	6	4	12	6	18	6	18	4	12	2	6

TABLE 4.6

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 5 - VALUE-BASED DECISION PROCESS
QUANTITATIVE WEIGHTING FOR CANDIDATE ALTERNATIVES INDICATORS

Capacity	Qualitative Rank of Potential Expansion	3	6	18	6	18	6	18	6	18	4	12	4	12	2	6	2	6
	Storage Capacity Volume per Construction Material Volume	3	3	9	4	12	6	18	4	12	3	9	3	9	1	3	6	18
Water Management	Qualitative Rank of climate sensitivity	3	5	15	5	15	4	12	5	15	5	15	4	12	5	15	5	15
	Qualitative Rank of Surface Water Control Complexity	3	5	15	3	9	2	6	6	18	5	15	3	9	5	15	3	9
	Qualitative Rank of Effectiveness of Seepage Control	3	6	18	5	15	2	6	6	18	6	18	5	15	6	18	2	6
Economic Account																		
Sub-Account	**Indicator**	**Indicator Weight**	**Alternatives Location and Deposition Technology Identifier**															
			1A		**1B**		**1C**		**1D**		**2A**		**2B**		**6A**		**6C**	
			Indicator Value	**Indicator Merit Score**	**Indicator Value**	**Indicator Merit Score**	**Indicator Value**	**Indicator Merit Score**	**Indicator Value**	**Indicator Merit Score**	**Indicator Value**	**Indicator Merit Score**	**Indicator Value**	**Indicator Merit Score**	**Indicator Value**	**Indicator Merit Score**	**Indicator Value**	**Indicator Merit Score**
		W	**S**	**(SxW)**	**S**	**(SxW)**	**S**	**(SxW)**	**S**	**(SxW)**	**S**	**(SxW)**	**S**	**(SxW)**	**S**	**(SxW)**	**S**	**(SxW)**
Life of Mine Costs	Capital Costs, $M, Life of Mine (differentiating)	1.5	4	6	5	7.5	6	9	5	7.5	1	1.5	1	1.5	3	4.5	6	9
	Operational Cost Estimate, $M, Life of Mine	1.5	6	9	4	6	1	1.5	4	6	5	7.5	4	6	5	7.5	1	1.5
	Potential Fish Habitat Compensation, $M, Life of Mine	1.5	3	4.5	3	4.5	3	4.5	3	4.5	3	4.5	3	4.5	3	4.5	3	4.5
	Closure Cost Estimate, $M, Life of Mine (differentiating)	1.5	5	7.5	5	7.5	5	7.5	5	7.5	1	1.5	1	1.5	5	7.5	6	9

TABLE 4.6

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 5 - VALUE-BASED DECISION PROCESS
QUANTITATIVE WEIGHTING FOR CANDIDATE ALTERNATIVES INDICATORS

Socio-Economic Account																		
Sub-Account	Indicator	Indicator Weight	Alternatives Location and Deposition Technology Identifier															
			1A		1B		1C		1D		2A		2B		6A		6C	
			Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score	Indicator Value	Indicator Merit Score
		W	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)
Archaeology	Area of direct impact and archaeological potential	3	5	15	5	15	5	15	5	15	5	15	5	15	5	15	5	15
Health and Safety	Qualitative Rank of Worker Health and Safety Risk	3	3	9	3	9	2	6	3	9	4	12	4	12	2	6	1	3
	Qualitative Rank of Public Safety Risk	3	3	9	3	9	4	12	3	9	6	18	6	18	3	9	5	15
Socio-Economic Indicators	Qualitative Rank of Economic Benefits to Community including job creation and diversity	3	4	12	4	12	2	6	4	12	5	15	5	15	5	15	3	9
	Qualitative Rank of Potential Indirect Employment	3	4	12	4	12	2	6	4	12	6	18	6	18	4	12	2	6
First Nation Impacts	Qualitative Rank of Traditional Land Use	3	4	12	4	12	4	12	4	12	3	9	3	9	5	15	5	15
	Qualitative Rank of Traditional Land Use Activities	3	3	9	3	9	3	9	3	9	4	12	4	12	5	15	5	15
Recreational and Commerical Land Use	Area of Direct Impact	3	6	18	6	18	6	18	6	18	6	18	6	18	6	18	6	18
	Qualitative Rank of Recreational Use	3	4	12	4	12	4	12	4	12	5	15	5	15	6	18	6	18
	Qualitative Rank of Commercial Use	3	6	18	6	18	6	18	6	18	6	18	6	18	6	18	6	18
Sub-Account Merit Score			**828**		**808.5**		**757.5**		**856.5**		**624**		**598.5**		**759**		**678**	
Sub-Account Merit Rating			**4.52**		**4.42**		**4.14**		**4.68**		**3.41**		**3.27**		**4.15**		**3.70**	

Alternative Identification	Description
1A	Location 1- Conventional Slurry Tailings
1B	Location 1 - Thickened Tailings
1C	Location 1 - Filtered/Dry Stack Tailings
1D	Location 1 - Conventional with Future Co-Disposal
2A	Location 2- Conventional Slurry Tailings
2B	Location 2- Thickened Tailings
6A	Location 6 - Conventional Slurry Tailings
6C	Location 6 - Filtered/Dry Stack Tailings

TABLE 4.7

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 5 - VALUE-BASED DECISION PROCESS
QUANTITATIVE WEIGHTING AND ANALYSIS FOR CANDIDATE ALTERNATIVES SUB-ACCOUNTS

Environmental Account

Sub-Account	Sub-Account Weight	Alternatives Location and Deposition Technology Identifier															
		1A		1B		1C		1D		2A		2B		6A		6C	
		Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score
	W	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)
Land Use	6	5.7	34.0	5.7	34.0	5.3	32.0	5.7	34.0	1.0	6.0	1.0	6.0	4.3	26.0	4.0	24.0
Water Impacts	6	4.0	24.0	3.5	21.0	2.5	15.0	4.0	24.0	2.5	15.0	2.0	12.0	3.0	18.0	1.5	9.0
Aquatic Habitat	6	5.0	30.0	5.0	30.0	5.0	30.0	5.0	30.0	3.5	21.0	3.5	21.0	5.0	30.0	5.0	30.0
Terrestrial Habitat	6	4.0	24.0	4.0	24.0	3.5	21.0	4.0	24.0	4.5	27.0	4.5	27.0	5.0	30.0	5.0	30.0
Air Quality	6	5.3	32.0	4.7	28.0	2.7	16.0	5.3	32.0	5.3	32.0	4.7	28.0	5.3	32.0	1.0	6.0

Technical Account

Sub-Account	Sub-Account Weight	Alternatives Location and Deposition Technology Identifier															
		1A		1B		1C		1D		2A		2B		6A		6C	
		Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score
	W	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)
Design	3	3.8	11.3	4.1	12.3	5.4	16.3	4.3	13.0	1.8	5.3	1.9	5.7	2.7	8.0	4.0	12.0
Operations	3	5.0	15.0	4.7	14.0	3.3	10.0	5.3	16.0	2.0	6.0	1.3	4.0	4.7	14.0	3.0	9.0
Closure	3	3.3	9.8	3.3	9.8	4.0	12.0	3.8	11.3	3.5	10.5	4.3	12.8	2.8	8.3	3.8	11.3
Capacity	3	4.5	13.5	5.0	15.0	6.0	18.0	5.0	15.0	3.5	10.5	3.5	10.5	1.5	4.5	4.0	12.0
Water Management	3	5.3	16.0	4.3	13.0	2.7	8.0	5.7	17.0	5.3	16.0	4.0	12.0	5.3	16.0	3.3	10.0

Economic Account

Sub-Account	Sub-Account Weight	Alternatives Location and Deposition Technology Identifier															
		1A		1B		1C		1D		2A		2B		6A		6C	
		Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score
	W	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)
Life of Mine Costs	1.5	4.5	6.8	4.3	6.4	3.8	5.6	4.3	6.4	2.5	3.8	2.3	3.4	4.0	6.0	4.0	6.0

Socio-Economic Account

Sub-Account	Sub-Account Weight	Alternatives Location and Deposition Technology Identifier															
		1A		1B		1C		1D		2A		2B		6A		6C	
		Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score	Sub-Account Merit Rating	Sub-Account Merit Score
	W	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)
Archaeology	3	5.0	15.0	5.0	15.0	5.0	15.0	5.0	15.0	5.0	15.0	5.0	15.0	5.0	15.0	5.0	15.0
Health and Safety	3	3.0	9.0	3.0	9.0	3.0	9.0	3.0	9.0	5.0	15.0	5.0	15.0	2.5	7.5	3.0	9.0
Socio-Economic Indicators	3	4.0	12.0	4.0	12.0	2.0	6.0	4.0	12.0	5.5	16.5	5.5	16.5	4.5	13.5	2.5	7.5
First Nation Impacts	3	3.5	10.5	3.5	10.5	3.5	10.5	3.5	10.5	3.5	10.5	3.5	10.5	5.0	15.0	5.0	15.0
Recreational and Commercial Land Use	3	5.3	16.0	5.3	16.0	5.3	16.0	5.3	16.0	5.7	17.0	5.7	17.0	6.0	18.0	6.0	18.0
Account Merit Score		**278.8**		**270.0**		**240.5**		**285.1**		**227.1**		**216.3**		**261.8**		**223.8**	
Account Merit Rating		**4.5**		**4.4**		**3.9**		**4.6**		**3.7**		**3.5**		**4.3**		**3.6**	

Alternative Identification	Description
1A	Location 1- Conventional Slurry Tailings
1B	Location 1 - Thickened Tailings
1C	Location 1 - Filtered/Dry Stack Tailings
1D	Location 1 - Conventional with Future Co-Disposal
2A	Location 2- Conventional Slurry Tailings
2B	Location 2- Thickened Tailings
6A	Location 6 - Conventional Slurry Tailings
6C	Location 6 - Filtered/Dry Stack Tailings

TABLE 4.8

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 5 - VALUE-BASED DECISION PROCESS
QUANTITATIVE WEIGHTING AND ANALYSIS FOR CANDIDATE ALTERNATIVES ACCOUNTS

Account	Account Weight	Alternatives Location and Deposition Technology Identifier															
		1A		1B		1C		1D		2A		2B		6A		6C	
		Account Merit Rating	Account Merit Score	Account Merit Rating	Account Merit Score	Account Merit Rating	Account Merit Score	Account Merit Rating	Account Merit Score	Account Merit Rating	Account Merit Score	Account Merit Rating	Account Merit Score	Account Merit Rating	Account Merit Score	Account Merit Rating	Account Merit Score
	W	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)	S	(SxW)
Environment	6	4.8	28.8	4.6	27.4	3.8	22.8	4.8	28.8	3.4	20.2	3.1	18.8	4.5	27.2	3.3	19.8
Technical	3	4.4	13.1	4.3	12.8	4.3	12.9	4.8	14.5	3.2	9.7	3.0	9.0	3.4	10.2	3.6	10.9
Project Economics	1.5	4.5	6.8	4.3	6.4	3.8	5.6	4.3	6.4	2.5	3.8	2.3	3.4	4.0	6.0	4.0	6.0
Socio-Economic	3	4.2	12.5	4.2	12.5	3.8	11.3	4.2	12.5	4.9	14.8	4.9	14.8	4.6	13.8	4.3	12.9
Alternative Merit Score			**61.2**		**59.1**		**52.6**		**62.1**		**48.4**		**46.0**		**57.2**		**49.6**
Alternative Merit Rating			**4.53**		**4.38**		**3.90**		**4.60**		**3.59**		**3.40**		**4.23**		**3.67**

Alternative Identification	Description
1A	Location 1- Conventional Slurry Tailings
1B	Location 1 - Thickened Tailings
1C	Location 1 - Filtered/Dry Stack Tailings
1D	Location 1 - Conventional with Future Co-Disposal
2A	Location 2- Conventional Slurry Tailings
2B	Location 2- Thickened Tailings
6A	Location 6 - Conventional Slurry Tailings
6C	Location 6 - Filtered/Dry Stack Tailings

TABLE 4.9

TREASURY METALS
GOLIATH PROJECT

TAILINGS STORAGE FACILITY
ALTERNATIVES ASSESSMENT

STEP 6 - SENSITIVITY ANALYSIS

Analysis ID	Scenario Description	Alternative Merit Rating							
		1A	1B	1C	1D	2A	2B	6A	6C
Base Case	Results of Alternatives Assessment	4.53	4.38	3.90	4.60	3.59	3.40	4.23	3.67
No. 1	Change All Environmental Weights to 9	4.03	3.94	3.33	4.05	3.31	3.16	3.87	3.38
No. 2	Change All Technical Weights to 6	4.00	3.90	3.43	4.03	3.42	3.24	3.66	3.38
No. 3	Change All Weights to 1	4.03	3.96	3.46	4.05	3.40	3.18	3.73	3.54
No. 4	Change all Socio-Economic Weights to 1.5	4.07	3.97	3.39	4.09	3.27	3.09	3.81	3.38

Alternative Identification	Description
1A	Location 1- Conventional Slurry Tailings
1B	Location 1 - Thickened Tailings
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1D	Location 1 - Conventional with Future Co-Disposal
2A	Location 2- Conventional Slurry Tailings
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