



APPENDIX X ALTERNATIVES ASSESSMENT



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X. ALTERNATIVES ASSESSMENT

X.1 ALTERNATIVES TO THE PROJECT

Alternative Assessment - Alternatives to the Project				
Environmental Component	Information Requirements	A - Proceed with the Project	B - Delay the Project	C - Do Nothing
Air Quality, vibration, and sound	Environmental Effects	- The Project will generate emissions effecting air quality, sound and vibration.	Same as Alternative A	None
	Potential for mitigation	- Integrated site air quality and noise monitoring, and management plan. Including watering roadways, and progressive reclamation. - Use of power from 115 kV line vs. diesel generators, properly maintained equipment.	Same as Alternative A	N/A
	Significance	3	3	N/A
Drainage	Environmental Effects	- The Goliath Project will require watercourse realignment to Blackwater Creek. Realignment will be designed to maintain existing drainage patterns.	Same as Alternative A	None
	Potential for mitigation	- Drainage is incorporated into integrated site water management plan. - High rate of water recycling within water management plan, limiting discharge to environment.	Same as Alternative A	N/A
	Significance	3	3	N/A
Sedimentation or erosion	Environmental Effects	- Release of sediment and leachate from mine rock area, and site infrastructure.	Same as Alternative A	None
	Potential for mitigation	- Collection ponds, and drainage ditches are incorporated into the site water management plan.	Same as Alternative A	N/A
	Significance	3	3	N/A
Release of excess parameters	Environmental Effects	- Treated effluent water will be discharged to the environment. - Potential for localized spills from heavy equipment on site, and from industrial operations.	Same as Alternative A	None
	Potential for mitigation	- In-plant cyanide destruction will take place using Inco SO ₂ process. Natural degradation post-cyanide destruction within Tailings Storage Facility (TSF), followed by further degradation of effluent in polishing pond facility. In addition further treatment will be conducted on effluent to ensure effluent	Same as Alternative A	N/A



Alternative Assessment - Alternatives to the Project				
Environmental Component	Information Requirements	A - Proceed with the Project	B - Delay the Project	C - Do Nothing
		meets Provincial Water Quality Objectives (PWQO) by reverse osmosis water treatment plant. - High rate of water recycling within water management plan, limiting discharge to environment. - Best management practices will be put into place for spills on site; all regulatory procedures for spills will be incorporated within the spill management plan.		
	Significance	3	3	N/A
Soil and sediment quality	Environmental Effects	- Potential for soil contamination due to spills on site.	Same as Alternative A	None
	Potential for mitigation	- Best management practices will be put into place for spills on site; all regulatory procedures for spills will be incorporated within the spill management plan.	Same as Alternative A	N/A
	Significance	1	1	N/A
Vegetation and habitat	Environmental Effects	- Development of the Goliath Gold Project will displace vegetation and habitat. - Air quality may affect local vegetation and habitat quality.	Same as Alternative A	None
	Potential for mitigation	- Current Project development has been designed to take place in areas previously cut to minimize tree removal. Project site will maintain vegetation barriers where applicable and progressive reclamation of vegetation will occur. - Integrated site air quality and noise monitoring, and management plan. Including watering roadways, and progressive reclamation.	Same as Alternative A	N/A
	Significance	3	3	N/A
Terrestrial Wildlife	Environmental Effects	- Development of the Goliath Gold Project will displace terrestrial wildlife habitat. - Air quality, noise, and vibration may affect local terrestrial wildlife and habitat quality. - Potential for increase in vehicular collision due to increased traffic.	Same as Alternative A	None
	Potential for mitigation	- Integrated site air quality and noise monitoring, and management plan. Including watering roadways, and progressive reclamation.	Same as Alternative A	N/A



Alternative Assessment - Alternatives to the Project				
Environmental Component	Information Requirements	A - Proceed with the Project	B - Delay the Project	C - Do Nothing
		<ul style="list-style-type: none"> - Compact site development. - Progressive reclamation of site. 		
	Significance	3	3	N/A
SAR	Environmental Effects	<ul style="list-style-type: none"> - Displacement of non-specific terrestrial habitat, and disturbance to SAR. 	Same as Alternative A	None
	Potential for mitigation	<ul style="list-style-type: none"> - Compact site development. - Progressive reclamation of site. - Avoidance of SAR habitat if practical (no specific habitat identified on site). 	Same as Alternative A	N/A
	Significance	3	3	N/A
Fish and Aquatic Resources	Environmental Effects	<ul style="list-style-type: none"> - Treated effluent will be discharged through Blackwater Creek to Wabigoon Lake. - Potential for flow reduction/increases due to Project development. 	Same as Alternative A	None
	Potential for mitigation	<ul style="list-style-type: none"> - In-plant cyanide destruction will take place using Inco SO₂ process. Natural degradation post-cyanide destruction within Tailings Storage Facility (TSF), followed by further degradation of effluent in polishing pond facility. In addition further treatment will be conducted on effluent to ensure effluent meets Provincial Water Quality Objectives (PWQO) by reverse osmosis water treatment plant. - High rate of water recycling within water management plan, limiting discharge to environment. - Best management practices will be put into place for spills on site; all regulatory procedures for spills will be incorporated within the spill management plan. Thereby limiting potential for impact to aquatic life. - Use of collection ponds and drainage ditches for site water management. - Fish habitat compensation where appropriate. 	Same as Alternative A	N/A
	Significance	3	3	N/A
Traffic	Environmental Effects	<ul style="list-style-type: none"> - Increased use of Highway 17, Anderson and Tree Nursery Road particularly during construction period. 	Same as Alternative A	None
	Potential for mitigation	<ul style="list-style-type: none"> - Implementation of traffic management plan and promote carpooling. 	Same as Alternative A	N/A

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Alternative Assessment - Alternatives to the Project				
Environmental Component	Information Requirements	A - Proceed with the Project	B - Delay the Project	C - Do Nothing
		<ul style="list-style-type: none"> - Adherence to speed limits on roads. - Bus employees if appropriate. 		
	Significance	2	2	N/A
Recreational Importance	Environmental Effects	<ul style="list-style-type: none"> - Potential for sound disturbance to local hunting activities. - The Project will restrict access north of Normans Road, limiting access to potential Crown parcels north of Project site. 	Same as Alternative A	None
	Potential for mitigation	<ul style="list-style-type: none"> - Maintain a compact site. - Noise monitoring and management plan. 	Same as Alternative A	N/A
	Significance	1	1	N/A
Commitment of non-renewable resources (aggregates)	Environmental Effects	<ul style="list-style-type: none"> - Aggregates will be required for site development and TSF construction. 	Same as Alternative A	None
	Potential for mitigation	<ul style="list-style-type: none"> - Re-use of mine rock as practical and where potential acid generating material has not been identified. - Maintain a compact site. 	Same as Alternative A	N/A
	Significance	3	3	N/A
Sound levels	Environmental Effects	<ul style="list-style-type: none"> - Nearby residents may experience increased sound levels from Project construction, operation, and closure. Traffic locally will increase along Highway 17, Anderson Road, and Tree Nursery Road. 	Same as Alternative A	None
	Potential for mitigation	<ul style="list-style-type: none"> - Noise monitoring and management plan. Noise mitigation strategies will be put in place though all phases of development. 	Same as Alternative A	N/A
	Significance	3	3	N/A
Views and aesthetics	Environmental Effects	<ul style="list-style-type: none"> - Mine rock stockpiles may be partially visible from select locations at full development. 	Same as Alternative A	None
	Potential for mitigation	<ul style="list-style-type: none"> - Sites will be progressively reclaimed. - Final closure will improve aesthetics of site. - TSF will be capped and vegetated. 	Same as Alternative A	N/A
	Significance	2	2	N/A
Adjacent land users	Environmental Effects	<ul style="list-style-type: none"> - Nearby adjacent land is used for logging activities, and recreation. - Limitation to recreation use of Project area, and access via power corridor to adjacent areas. 	Same as Alternative A	None

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Alternative Assessment - Alternatives to the Project				
Environmental Component	Information Requirements	A - Proceed with the Project	B - Delay the Project	C - Do Nothing
	Potential for mitigation	<ul style="list-style-type: none"> - Maintain a compact mine site. - All timber cut as a result of mine development will be made available to local forestry license holder. 	Same as Alternative A	N/A
	Significance	2	2	N/A
Cultural heritage resources	Environmental Effects	<ul style="list-style-type: none"> - No cultural heritage resources have been identified on site. 	Same as Alternative A	None
	Potential for mitigation	<ul style="list-style-type: none"> - Management and procedural plans will be put into place in the event that any resources are discovered through the development of the Goliath Gold Project. 	Same as Alternative A	N/A
	Significance	1	1	N/A
Public health and safety	Environmental Effects	<ul style="list-style-type: none"> - Potential releases of excess parameters in discharged effluents. - Traffic accident potential. 	Same as Alternative A	None
	Potential for mitigation	<ul style="list-style-type: none"> - Mitigation of excess parameters as detailed above and best management practices for spills, and all site procedures. 	Same as Alternative A	N/A
	Significance	2	2	N/A
Local and regional business and economic development	Environmental Effects	<ul style="list-style-type: none"> - Development of the Project will provide both direct and indirect jobs to the local and regional area. - The Goliath Gold Project will be significant to the local economy. 	Same as Alternative A, but at a later date.	This alternative will provide no positive benefits to the local and regional economy.
	Potential for mitigation	<ul style="list-style-type: none"> - Maximize economic benefits. 	Same as Alternative A	N/A
	Significance	4	4	N/A
Tourism	Environmental Effects	<ul style="list-style-type: none"> - Potential for public perception of discharge to Wabgion Lake to cause effects to tourism industry. - Economic benefit of Project may extend to tourism sector, and recreation within the local and regional area. 	Same as Alternative A	None
	Potential for mitigation	<ul style="list-style-type: none"> - Maximize economic benefits. 	Same as Alternative A	N/A
	Significance	2	2	N/A
First Nation communities	Environmental Effects	<ul style="list-style-type: none"> - Development of the Project is expected to have a net positive benefit to the First Nation communities in the regional area. These benefits include potential for employment, training and business opportunities. 	Same as Alternative A, but at a later date.	This alternative will provide no positive benefits to the First Nations communities.
	Potential for mitigation	<ul style="list-style-type: none"> - Continued efforts in engagement and opportunities for Impact Benefit Agreements (IBA) to 	Same as Alternative A	N/A



Alternative Assessment - Alternatives to the Project				
Environmental Component	Information Requirements	A - Proceed with the Project	B - Delay the Project	C - Do Nothing
		optimize opportunities for First Nation communities.		
	Significance	3	3	N/A
Spiritual, ceremonial or cultural sites	Environmental Effects	- None are known to occur within the Project site.	Same as Alternative A	None
	Potential for mitigation	- Management and procedural plans will be put into place in the event that any spiritual, ceremonial, or cultural sites are discovered through the development of the Goliath Gold Project.	Same as Alternative A	N/A
	Significance	1	1	N/A
Traditional land use	Environmental Effects	- Currently no known traditional land uses are known for the Goliath Gold Project site. Country foods are present within the Project area, but are available in other locations in the local area.	Same as Alternative A	None
	Potential for mitigation	- Any adverse effects to traditional land use will be addressed through continued engagement with First Nation communities, and opportunity for compensation can be addressed within IBA with First Nation communities.	Same as Alternative A	N/A
	Significance	2	2	N/A



X.2 MINING METHOD

<u>Alternatives Assessment – Mining Method</u>				
	Alternative	1	2	3
	Description	Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
Criteria	Assessment			
<u>Mining Method – Cost Effectiveness</u>				
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: Conventional method in Ontario, low cost mining method compared to underground, low risk of fatal accidents	Advantages: Small surface footprint, small volumes of waste rock to be managed	Advantages: Combination of positive attributes of both methods, less overall risk to financiers, delays capital spending to develop underground to the production phase of mining
		Disadvantages: Larger volume of waste rock to be managed, pit to remain after closure	Disadvantages: Higher unit cost for near surface mining production, does not allow the mining of mineralized gold that would otherwise be recoverable by Open Pit methods	Disadvantages: Combination of volume of rock to be managed on surface and open pit to be left post closure
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: Less capital input needed with lower cost mining will return a higher ROI	Advantages: None	Advantages: Mining methods have been optimized to maximize ROI
		Disadvantages: Larger volume of waste rock to be managed creates more material handling costs along with additional water management costs	Disadvantages: High upfront Capital costs for development, loss of unrecoverable gold for sale	Disadvantages: None
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: Lowest cost, maximized profitability in early years, minimized risk	Advantages: Allows cost effective mining to a greater depth	Advantages: Maximized profitability over entire project mine life, minimized early mine life risk
		Disadvantages: Applicable only to relatively shallow mining	Disadvantages: Higher unit cost for shallow mining	Disadvantages: None
	Summary of Evaluation	Low capital cost required, however larger volume of waste rock will be created with more handling costs and additional water management costs. Acceptable	Large capital costs required along with high near surface mining costs. Furthermore, loss of unrecoverable gold would be applicable. Unacceptable	Minimal or low risks involved for financiers in creating both mining methods, which maximizes ROI. Preferred

<u>Mining Method - Technical feasibility and technical reliability</u>				
	Alternative	1	2	3
	Description	Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
Criteria	Assessment			



Readily Available Technology	Has been successfully implemented in similar mining Projects and can be relied upon for sufficient performance over an extended period of time.	Advantages: Using readily available and proven technology	Advantages: Using readily available and proven technology	Advantages: Using readily available and proven technology
		Disadvantages: None	Disadvantages: None	Disadvantages: None
	New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	Advantages: Not Applicable	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable	Disadvantages: Not Applicable
		Acceptable	Acceptable	Preferred

<u>Mining Method - Effects to the environment, including human, physical and biological environments</u>				
	Alternative	1	2	3
	Description	Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
Criteria	Assessment			
Local residents and recreational users	Effect on property values	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: Some visual and audible disturbances during mining operations could potentially lower property values	Disadvantages: None apparent	Disadvantages: Elevated Noise and visual disturbances over initial open pit mine life
	Effect on employment opportunities	Advantages: Wide range of direct and indirect employment,	Advantages: Potentially higher wages for underground workers than open pit	Advantages: Combination of wide ranging and higher paying opportunities, longer overall life of mine and employment
		Disadvantages: Shorter overall mine life would provide for less total employment over the life of mine	Disadvantages: Underground mining would not allow for profitable operation resulting in zero employment	Disadvantages: None apparent
	Effect on local access points	Advantages: None apparent	Advantages: Limited disturbance of surface access	Advantages: None apparent
		Disadvantages: Limited access to Open Pit area, blasting perimeters	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on current noise levels	Advantages: attainment of provincial guidelines is probable	Advantages: Reduced noise as compared to Open pit	Advantages: Shorter timeline for surface noise elevations
		Disadvantages: Elevated noise levels during operation	Disadvantages: None apparent	Disadvantages: May require mitigation for noise in the way of upgraded equipment
	Effect on water supply for both well water and drinking water	Advantages: None apparent	Advantages: Lesser effect on well drawdown	Advantages: Minimized possibility of well drawdown, confirmation of drawdown at maximum pit depth while mine continues operation



<u>Mining Method - Effects to the environment, including human, physical and biological environments</u>				
Alternative	1	2	3	
	Description	Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
		Disadvantages: Possible draw down of some surrounding wells	Disadvantages: Some apparent	Disadvantages: Higher possibility of drawdown as compare dot underground only mining
	Effect on visual disturbance	Advantages: None apparent	Advantages: Smallest visual disturbance due to limited rock management	Advantages: Progressive reclamation/vegetation of open pit waste rock while mine continues operation, smaller overall rock piles
		Disadvantages: Waste rock visible from certain vantage points	Disadvantages: None apparent	Disadvantages: Waste rock piles visible
	Potential for adverse health effects	Advantages: None apparent	Advantages: Minimized noise and dust effects	Advantages: Lower potential for dust and noise as compared to open pit only
		Disadvantages: Larger potential for dust and noise create larger potential for adverse effects	Disadvantages: None apparent	Disadvantages: greater potential for noise and dust as compared to underground only mining
Infrastructure	Effect on local access	Advantages: None apparent	Advantages: Ability to place plant location directly above ore-body would maintain access to Tree Nursery Road, smallest footprint of options	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on power supply systems	Advantages: Reduced electrical power needed for underground mining needs (fans, equipment, etc.)	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Public Health and Safety	Attainment of air quality point of impingement standards or scientifically defensible alternatives	Advantages: None apparent	Advantages: Underground operations facilitate dusts management	Advantages: Reduced operating life for surface operations at reduced mining rates
		Disadvantages: Greater potential for increased dust emissions from surface operations, blasting management needed	Disadvantages: Further noise emissions from underground ventilation systems	Disadvantages: Further dust emissions as compared to underground only operations
	Effect on drinking water supply	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent



<u>Mining Method - Effects to the environment, including human, physical and biological environments</u>				
Alternative	1	2	3	
	Description	Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
	Effect on local health services	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Local Economy	Effect on local businesses and economic opportunities	Advantages: Possibility for contract mining based in local communities for open pit mining and maintenance services	Advantages: None apparent	Advantages: Possibility for contract mining based in local communities for open pit mining and maintenance services albeit at a smaller rate than open pit only
		Disadvantages: None apparent	Disadvantages: Underground mining on its own would not support sufficient economics to allow the project to be developed and would eliminate local economic benefits	Disadvantages: None apparent
	Effect on access for tourism operators and/or natural resource harvesters	Advantages: None apparent	Advantages: Smaller overall footprint	Advantages: None apparent
		Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land	Disadvantages: None apparent	Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land
Tourism	Effect on local tourism	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land	Disadvantages: None apparent	Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land
Regional Economy	Effect on regional businesses and economic opportunities	Advantages: Possibility for contract mining based in regional communities for open pit mining and maintenance services, regional increase for transport services	Advantages: None apparent	Advantages: Possibility for contract mining based in regional communities for open pit mining and maintenance services, regional increase for transport services albeit at a smaller level than open pit only
		Disadvantages: None apparent	Disadvantages: Underground mining on its own would not support sufficient economics to allow the project to be developed and would eliminate regional economic benefits	Disadvantages: None apparent



<u>Mining Method - Effects to the environment, including human, physical and biological environments</u>				
	Alternative	1	2	3
	Description	Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
Government Services	Effect on local government services and capacities	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Resource management objectives	Effect on established resource management plans	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: Minor reduction in forest management area for open pit areas	Disadvantages: None apparent	Disadvantages: Minor reduction in forest management area for open pit areas
Built heritage and cultural heritage	Effect on any built heritage resource or cultural heritage features	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Alteration that is not sympathetic or is incompatible with the historic fabric and appearance of cultural heritage resources	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Isolation of a built heritage resource or heritage attribute from its surrounding environment, context or a significant relationship	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Direct or indirect obstruction of significant views or vistas within, from or of built heritage resources or cultural heritage landscapes	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	A change in land use	Advantages: None apparent	Advantages: Smaller overall footprint	Advantages: None apparent
		Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land	Disadvantages: None apparent	Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land
	Avoidance of damage to built heritage resources	Advantages: None apparent	Advantages: Smaller overall footprint	Advantages: None apparent



<u>Mining Method - Effects to the environment, including human, physical and biological environments</u>				
	Alternative	1	2	3
	Description	Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
	or cultural heritage landscapes, or document cultural resources if damage or relocation cannot be reasonably avoided	Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land	Disadvantages: None apparent	Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land
Archaeological resources	Effect on land disturbances	Advantages: None apparent	Advantages: Smaller overall footprint	Advantages: None apparent
		Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land	Disadvantages: None apparent	Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land
	Avoidance of archaeological sites or mitigation by excavation if avoidance is not possible, as per the Standards and Guidelines for Consultant Archaeologists (2010).	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: None apparent	Advantages: Smaller overall footprint	Advantages: None apparent
		Disadvantages: Greater overall footprint from mining operations result in minor loss of access to non-private land	Disadvantages: None apparent	Disadvantages: Greater overall footprint from mining operations result in minor loss of access to non-private land
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: None apparent	Advantages: Smaller overall footprint	Advantages: None apparent
		Disadvantages: Greater overall footprint from mining operations	Disadvantages: Loss off access to limited non-private land	Disadvantages: Greater overall footprint from mining operations result in minor loss of access to non-private land



<u>Mining Method - Effects to the environment, including human, physical and biological environments</u>				
	Alternative	1	2	3
	Description	Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
		result in minor loss of access to non-private land		
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: None apparent	Advantages: Underground operations facilitate dusts management	Advantages: Reduced operating life for surface operations at reduced mining rates
		Disadvantages: Greater potential for increased dust emissions from surface operations, blasting management needed	Disadvantages: Further noise emissions from underground ventilation systems	Disadvantages: Further dust emissions as compared to underground only operations
	Emission rates of greenhouse gases (GHGs)	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: Greater emissions due to larger total volume of rock moved by open pit mining	Disadvantages: None apparent	Disadvantages: Greater emissions due to larger total volume of rock moved by open pit mining, albeit to a lower level than by open pit only
Effect on aquatic life and habitat	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Management of water level in effected water bodies and streams to maintain aquatic life	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Maintenance of fish population	Advantages: Flooded Open pit to create long term fish habitat	Advantages: None apparent	Advantages: Flooded Open pit to create long term fish habitat
		Disadvantages: Change in watercourse for initial pit operations	Disadvantages: None apparent	Disadvantages: Change in watercourse for initial pit operations
	Maintenance of groundwater levels for both flows and quality	Advantages: None apparent	Advantages: None apparent	Advantages:
		Disadvantages: Greater cone of influence for water draw down at the end of open pit mining,	Disadvantages: None apparent	Disadvantages: Greater cone of influence for water draw down at the end of open pit mining,



<u>Mining Method - Effects to the environment, including human, physical and biological environments</u>					
	Alternative	1	2	3	
	Description	Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods	
Effect on wetlands	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Area, type and quality (functionality) of wetlands that would be displaced or altered	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Maintenance of wetland connectivity	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
Effect on terrestrial species and habitat	Area, type and quality of terrestrial habitat that would be displaced or altered	Advantages: None apparent	Advantages: Smaller overall footprint	Advantages: None apparent	
		Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat	Disadvantages: None apparent	Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat, albeit on a smaller level than open pit only.	
	Effects of noise disturbance generated by the project	Advantages: None apparent	Advantages: Noise effects concentrated to specific ventilation fan areas	Advantages: Noise effects concentrated to specific ventilation fan areas once open pit mining has finished	
		Disadvantages: Larger potential for dust and noise create larger potential for adverse effects	Disadvantages: Additional Noise from ventilation systems	Disadvantages: Larger potential for dust and noise create larger potential for adverse effects during open pit operations	
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Effect on overall wildlife population	Advantages: None apparent	Advantages: Smaller overall footprint	Advantages: None apparent	
		Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat	Disadvantages: None apparent	Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat, albeit on a smaller level than open pit only	
	Effect on Species at Risk (SAR)	Sensitivity level of effected SAR (Endangered, Threatened, Special Concern)	Advantages: None apparent	Advantages: Smaller overall footprint	Advantages: None apparent
			Disadvantages: Greater overall footprint from mining operations resulting in minor loss of habitat. Therefore increasing sensitivity level to potential SAR.	Disadvantages: None apparent	Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat, albeit on a smaller level than open pit only. Therefore increasing sensitivity level to potential SAR.



<u>Mining Method - Effects to the environment, including human, physical and biological environments</u>				
Alternative	1	2	3	
	Description	Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
	Area, type and quality of SAR that would be displaced or altered	Advantages: None apparent	Advantages: Smaller size of development will reduce habitat loss generated by the project.	Advantages: None apparent.
		Disadvantages: Greater overall size of development will result in loss of potential SAR habitat.	Disadvantages: None apparent.	Disadvantages: Greater overall size of development will result in loss of potential SAR habitat.
	Effects of noise disturbance generated by the project	Advantages: None apparent.	Advantages: Smaller size of development will reduce noise disturbance generated by the project.	Advantages: None apparent.
		Disadvantages: Greater overall site size and open pit methodology will increase noise disturbance to potential SAR.	Disadvantages: None apparent.	Disadvantages: Greater overall site size and open pit methodology will increase noise disturbance to potential SAR.
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent.	Advantages: Smaller size of development will reduce habitat loss generated by the project, therefore potentially creating additional opportunities for wildlife corridors and plant dispersion.	Advantages: None apparent.
		Disadvantages: Greater overall size of development will result in loss of potential SAR habitat, and therefore limit the availability of wildlife corridors and plant dispersion.	Disadvantages: None apparent.	Disadvantages: Greater overall size of development will result in loss of potential SAR habitat, and therefore limit the availability of wildlife corridors and plant dispersion.
		Acceptable	Acceptable	Preferred



<u>Mining Method - Potential ability for future closure/reclamation processes</u>				
	Alternative	1	2	3
	Description	Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
Criteria	Assessment			
Public Safety and Security	Effect on safety and security risks to the community and general public	Advantages: None Apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: Open pit area to remain part of the closure plan until filled with water which results in a longer period of time with limited access	Disadvantages: None apparent	Disadvantages: Open pit area to remain part of the closure plan until filled with water which results in a longer period of time with limited access, albeit for less time than open pit only due to smaller overall pit volume
Environmental Health and Long Term Sustainability	Effect on long term air quality and the ability to meet point of impingement standards	Advantages: None Apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent	Disadvantages: None Apparent
	Effect on long term water quality and the ability to meet water quality guidelines	Advantages: None Apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent	Disadvantages: None Apparent
	Effect on long term wildlife habitats including SARs	Advantages: None Apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent	Disadvantages: None Apparent
Land Use	Effect on long term land uses	Advantages: None Apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: Change of land area to water after open pit has fully flooded	Disadvantages: None Apparent	Disadvantages: Change of land area to water after open pit has fully flooded
	Effect on long term visual appearance of Project Site	Advantages: None Apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: Change in topography for reclaimed waste rock storage areas	Disadvantages: None Apparent	Disadvantages: Change in topography for reclaimed waste rock storage areas



X.3 PROCESSING METHOD

Alternatives Assessment – Processing Method				
Processing Method – Cost Effectiveness				
	Alternative	1	2	3
	Description	Gravity and C.I.L. Processing	Gravity and Floatation with Off-site Concentrate Processing	Gravity, Floatation and ILR
Criteria	Assessment			
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: Highest gold recovery possible. Allows for a variety of conditions and rock types to be processed in this mill.	Advantages: Low levels of liability risk for long term closure commitments due to offsite use of cyanide and reduced ARD potential for TSF	Advantages: Low levels of liability risk for long term closure commitments due to concentrated use of cyanide and reduced ARD potential for TSF.
		Disadvantages: None Apparent	Disadvantages: Highest risk due to off-site processing and lack of control over gold product.	Disadvantages: None Apparent
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: Highest gold recovery increases ROI. Similar plant capital costs to other options coupled with highest recovery will provide highest ROI	Advantages: None	Advantages: 2 nd highest gold recovery maintains a competitive ROI
		Disadvantages: None Apparent	Disadvantages: Does not provide a competitive ROI. Highest cost for processing at an off-site facility that will charge a premium for additional risk.	Disadvantages: None Apparent
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: Highest gold recovery coupled with lowest risk of variability for different gold bearing rocks creates lowest risk alternative.	Advantages: Lowest capital cost reduces overall risk.	Advantages: Maximized profitability over entire project mine life, minimized early mine life risk
		Disadvantages: Higher cost as compared to off-site concentrate processing	Disadvantages: Longer payback period for capital costs invested.	Disadvantages: Higher cost as compared to off-site concentrate processing
	Summary of Evaluation	Highest ROI with lowest risk alternative. Preferred	High risk due to loss of control over gold processing. High costs for off-site processing. Unacceptable	2 nd best alternative only to Gravity with C.I.L. Processing due to lower gold recoveries Acceptable

Processing Method – Technical feasibility and technical reliability				
	Alternative	1	2	3
	Description	Gravity and C.I.L. Processing	Gravity and Floatation with Off-site Concentrate Processing	Gravity, Floatation and ILR
Criteria	Assessment			



Readily Available Technology	Has been successfully implemented in similar mining Projects and can be relied upon for sufficient performance over an extended period of time.	Advantages: Using readily available and proven technology	Advantages: Using readily available and proven technology	Advantages: Using readily available and proven technology
		Disadvantages: None	Disadvantages: None	Disadvantages: None
	New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	Advantages: Not Applicable	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable	Disadvantages: Not Applicable
		Acceptable	Acceptable	Acceptable

Processing Method - Effects to the environment, including human, physical and biological environments				
	Alternative	1	2	3
	Description	Gravity and C.I.L. Processing	Gravity and Floatation with Off-site Concentrate Processing	Gravity, Floatation and ILR
Criteria	Assessment			
Local residents and recreational users	Effect on property values	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on employment opportunities	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Lower local employment due to less manpower needed for concentrate processing.	Disadvantages: None apparent
	Effect on local access points	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on current noise levels	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on water supply for both well water and drinking water	Advantages: None apparent	Advantages: Lowest risk for ARD potential due to off-site processing of sulphide containing mineralized rock.	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on visual disturbance	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent



Processing Method – Effects to the environment, including human, physical and biological environments				
Alternative	1	2	3	
Description	Gravity and C.I.L. Processing	Gravity and Floatation with Off-site Concentrate Processing	Gravity, Floatation and ILR	
Potential for adverse health effects	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent	
	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
Infrastructure	Effect on local access	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Higher use of local roads and highways due to increased truck traffic shipping concentrate.	Disadvantages: None apparent
	Effect on power supply systems	Advantages: None apparent	Advantages: Lowest Power Consumption due to off-site concentrate processing.	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Public Health and Safety	Attainment of air quality point of impingement standards or scientifically defensible alternatives	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on drinking water supply	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on local health services	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Local Economy	Effect on local businesses and economic opportunities	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on access for tourism operators and/or natural resource harvesters	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent



Processing Method – Effects to the environment, including human, physical and biological environments				
	Alternative	1	2	3
	Description	Gravity and C.I.L. Processing	Gravity and Floatation with Off-site Concentrate Processing	Gravity, Floatation and ILR
Tourism	Effect on local tourism	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Regional Economy	Effect on regional businesses and economic opportunities	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Government Services	Effect on local government services and capacities	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Resource management objectives	Effect on established resource management plans	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Built heritage and cultural heritage	Effect on any built heritage resource or cultural heritage features	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Alteration that is not sympathetic or is incompatible with the historic fabric and appearance of cultural heritage resources	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Isolation of a built heritage resource or heritage attribute from its surrounding environment, context or a significant relationship	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Direct or indirect obstruction of significant views or vistas within, from or of built heritage resources or cultural heritage landscapes	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	A change in land use	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent



Processing Method – Effects to the environment, including human, physical and biological environments				
	Alternative	1	2	3
	Description	Gravity and C.I.L. Processing	Gravity and Floatation with Off-site Concentrate Processing	Gravity, Floatation and ILR
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Avoidance of damage to built heritage resources or cultural heritage landscapes, or document cultural resources if damage or relocation cannot be reasonably avoided	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Archaeological resources	Effect on land disturbances	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Avoidance of archaeological sites or mitigation by excavation if avoidance is not possible, as per the Standards and Guidelines for Consultant Archaeologists (2010).	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent



Processing Method – Effects to the environment, including human, physical and biological environments					
	Alternative	1	2	3	
	Description	Gravity and C.I.L. Processing	Gravity and Floatation with Off-site Concentrate Processing	Gravity, Floatation and ILR	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Emission rates of greenhouse gases (GHGs)	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
Effect on aquatic life and habitat	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: May require highest cost for effluent discharge to meet water discharge requirements	Disadvantages: None apparent	Disadvantages: None apparent	
	Management of water level in effected water bodies and streams to maintain aquatic life	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Maintenance of fish population	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Maintenance of groundwater levels for both flows and quality	Advantages: None apparent	Advantages: Lowest probabilities for ARD potential as majority of sulphides are being sent off-site for processing.	Advantages: Only gravity concentrate will be processed using cyanide allowing for a streamlined cyanide management program which could include a dedicated TSF area for cyanide treated rock.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Effect on wetlands	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
			Disadvantages: May require highest cost for effluent discharge to meet water discharge requirements	Disadvantages: None apparent	Disadvantages: None apparent
		Area, type and quality (functionality) of wetlands that would be displaced or altered	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
			Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent



Processing Method – Effects to the environment, including human, physical and biological environments				
	Alternative	1	2	3
	Description	Gravity and C.I.L. Processing	Gravity and Floatation with Off-site Concentrate Processing	Gravity, Floatation and ILR
	Maintenance of wetland connectivity	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Effect on terrestrial species and habitat	Area, type and quality of terrestrial habitat that would be displaced or altered	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effects of noise disturbance generated by the project	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on overall wildlife population	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Effect on Species at Risk (SAR)	Sensitivity level of effected SAR (Endangered, Threatened, Special Concern)	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Area, type and quality of SAR that would be displaced or altered	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effects of noise disturbance generated by the project	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Summary	Acceptable	Acceptable	Acceptable

Processing Method – Potential ability for future closure/reclamation processes				
	Alternative	1	2	3
	Description	Gravity and C.I.L. Processing	Gravity and Floatation with Off-site Concentrate Processing	Gravity, Floatation and ILR
Criteria	Assessment			
Public Safety and Security	Effect on safety and security risks to the	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent



Processing Method – Potential ability for future closure/reclamation processes				
	Alternative	1	2	3
	Description	Gravity and C.I.L. Processing	Gravity and Floatation with Off-site Concentrate Processing	Gravity, Floatation and ILR
	community and general public	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Environmental Health and Long Term Sustainability	Effect on long term air quality and the ability to meet point of impingement standards	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on long term water quality and the ability to meet water quality guidelines	Advantages: None Apparent	Advantages: Smallest footprint of all tailings options facilitating the easiest closure process. Majority of tailings will have sulphide bearing rock removed with the concentrate which will reduce risk of long term ARD potential	Advantages: Allows for dedicated are for the sulphide bearing rock, which would reduce the ARD potential of non-sulphide bearing tailings in a segregated area. This would facilitate a more straightforward closure methodology.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on long term wildlife habitats including SARs	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Land Use	Effect on long term land uses	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on long term visual appearance of Project Site	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
<u>Potential ability for future closure/reclamation processes</u>	Summary	Acceptable	Acceptable	Acceptable
Overall	Summary	The highest rate of gold recovery and best variability in ability to process varying rock types allows for a revenue stream that offsets all of the mitigation strategies for any of the disadvantages that may come with the CIL plant.	This alternative does not provide a competitive ROI due to the high cost of processing of concentrate product.	This alternative presents an acceptable alternative due to the relative advantages to have a streamlined concentrate stream containing the majority of sulphide bearing material. This would reduce long term ARD potential. The lower recoveries provide a lower ROI to the preferred alternative.
	Rating	Preferred	Unacceptable	Acceptable



X.4 PROCESS EFFLUENT TREATMENT

Alternatives Assessment – Process Effluent Treatment					
	Alternative	1	2	3	4
	Description	Natural Cyanide Degradation in the Tailings Storage Facility	In-Plant Cyanide Destruction Followed by natural Degradation	Natural Degradation Followed by Effluent Treatment	In-Plant Cyanide Destruction Followed by natural Degradation Followed by Effluent Treatment
Criteria	Assessment				
Process Effluent Treatment – Cost Effectiveness					
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: Most cost effective of all methods Provides minimal processing effort of tailings material	Advantages: Cost effective method of water and tailings treatment in terms of capital and operating costs	Advantages: Cost effective method of water and tailings treatment in terms of capital and operating costs albeit higher than the natural degradation only option	Advantages: Provides the minimal risk to operational objectives.
		Disadvantages: None Apparent	Disadvantages: None Apparent	Disadvantages: None Apparent	Disadvantages: Highest cost option in terms of capital and operating
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: Highest overall return on investment	Advantages: Adequate Return on investment	Advantages: Adequate Return on investment	Advantages: None apparent
		Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: Lowest ROI
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: Lowest capital and operating cost provides lowest financial risk.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None Apparent	Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: Highest financial risk due to highest capital and operating costs.
Cost Effectiveness	Summary Evaluation and Rating	Preferred	Acceptable	Acceptable	Acceptable

Process Effluent Treatment – Technical feasibility and technical reliability					
	Alternative	1	2	3	4
	Description	Natural Cyanide Degradation in the Tailings Storage Facility	In-Plant Cyanide Destruction Followed by natural Degradation	Natural Degradation Followed by Effluent Treatment	In-Plant Cyanide Destruction Followed by natural Degradation Followed by Effluent Treatment
Criteria	Assessment				
Readily Available Technology	Has been successfully implemented in similar mining Projects and	Advantages: No technology needed. Natural degradation of cyanide is well understood.	Advantages: Readily Available technology.	Advantages: Readily Available technology	Advantages: Readily Available technology.



Process Effluent Treatment – Technical feasibility and technical reliability					
	Alternative	1	2	3	4
	Description	Natural Cyanide Degradation in the Tailings Storage Facility	In-Plant Cyanide Destruction Followed by natural Degradation	Natural Degradation Followed by Effluent Treatment	In-Plant Cyanide Destruction Followed by natural Degradation Followed by Effluent Treatment
	can be relied upon for sufficient performance over an extended period of time.	Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.
	New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	N/A	N/A	N/A	N/A
Technical feasibility and technical reliability	Summary Evaluation and Rating	Acceptable	Acceptable	Acceptable	Acceptable

Process Effluent Treatment – Effects to the Human Environment					
	Alternative	1	2	3	4
	Description	Natural Cyanide Degradation in the Tailings Storage Facility	In-Plant Cyanide Destruction Followed by natural Degradation	Natural Degradation Followed by Effluent Treatment	In-Plant Cyanide Destruction Followed by natural Degradation Followed by Effluent Treatment
Criteria	Assessment				
Local residents and recreational users	Effect on property values	Advantages: None Apparent	Advantages: None Apparent	Advantages: None apparent.	Advantages: None apparent.
		Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.
	Effect on employment opportunities	N/A	N/A	N/A	N/A
	Effect on local access points	N/A	N/A	N/A	N/A
	Effect on current noise levels	N/A	N/A	N/A	N/A
	Effect on water supply for both well water and drinking water	Advantages: None Apparent	Advantages: Provides best water quality to TSF which in turn will limit risk to seepage.	Advantages: None Apparent	Advantages: Provides best water quality to TSF which in turn will limit risk to seepage.
Disadvantages: Provides lowest quality water to TSF		Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.	



Process Effluent Treatment – Effects to the Human Environment					
	Alternative	1	2	3	4
	Description	Natural Cyanide Degradation in the Tailings Storage Facility	In-Plant Cyanide Destruction Followed by natural Degradation	Natural Degradation Followed by Effluent Treatment	In-Plant Cyanide Destruction Followed by natural Degradation Followed by Effluent Treatment
		increasing risk to seepage.			
	Effect on visual disturbance	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.
	Potential for adverse health effects	See Public health and safety criteria	See Public health and safety criteria	See Public health and safety criteria	See Public health and safety criteria
Infrastructure	Effect on local access	Advantages: None Apparent	Advantages: None Apparent	Advantages: None apparent.	Advantages: None apparent.
		Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.
	Effect on power supply systems	Advantages: None Apparent	Advantages: None Apparent	Advantages: None Apparent	Advantages: None Apparent
		Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.
Public Health and Safety	Attainment of air quality point of impingement standards or scientifically defensible alternatives	Advantages: None Apparent	Advantages: None Apparent	Advantages: None apparent.	Advantages: None apparent.
		Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.
	Effect on drinking water supply	Advantages: None Apparent	Provides best water quality to TSF which in turn will limit risk to seepage.	Advantages: None apparent.	Provides best water quality to TSF which in turn will limit risk to seepage.
		Disadvantage: Lowest quality of water entering into TSF increases risk of seepage.	Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.
	Effect on local health services	Advantages: None Apparent	Advantages: None Apparent	Advantages: None apparent.	Advantages: None apparent.
		Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.
Local Economy	Effect on local businesses and economic opportunities	Advantages: None Apparent	Advantages: None Apparent	Advantages: None apparent.	Advantages: None apparent.
		Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.
	Effect on access for tourism operators and/or natural resource harvesters	Advantages: None Apparent	Advantages: None Apparent	Advantages: None apparent.	Advantages: None apparent.
		Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.
Tourism	Effect on local tourism	Advantages: None Apparent	Advantages: None Apparent	Advantages: None apparent.	Advantages: None apparent.
		Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.
Regional Economy	Effect on regional	Advantages: None Apparent	Advantages: None Apparent	Advantages: None apparent.	Advantages: None apparent.



Process Effluent Treatment – Effects to the Human Environment					
	Alternative	1	2	3	4
	Description	Natural Cyanide Degradation in the Tailings Storage Facility	In-Plant Cyanide Destruction Followed by natural Degradation	Natural Degradation Followed by Effluent Treatment	In-Plant Cyanide Destruction Followed by natural Degradation Followed by Effluent Treatment
	businesses and economic opportunities	Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.
Government Services	Effect on local government services and capacities	Advantages: None Apparent	Advantages: None Apparent	Advantages: None apparent.	Advantages: None apparent.
		Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.
Resource management objectives	Effect on established resource management plans	Advantages: None Apparent	Advantages: None Apparent	Advantages: None apparent.	Advantages: None apparent.
		Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.
Built heritage and cultural heritage	Effect on any built heritage resource or cultural heritage features	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Alteration that is not sympathetic or is incompatible with the historic fabric and appearance of cultural heritage resources	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Isolation of a built heritage resource or heritage attribute from it surrounding environment, context or a significant relationship	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Direct or indirect obstruction of significant views or vistas within, from or of built heritage resources or cultural heritage landscapes	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	A change in land use	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent



Process Effluent Treatment – Effects to the Human Environment					
	Alternative	1	2	3	4
	Description	Natural Cyanide Degradation in the Tailings Storage Facility	In-Plant Cyanide Destruction Followed by natural Degradation	Natural Degradation Followed by Effluent Treatment	In-Plant Cyanide Destruction Followed by natural Degradation Followed by Effluent Treatment
	Avoidance of damage to built heritage resources or cultural heritage landscapes, or document cultural resources if damage or relocation cannot be reasonably avoided	Advantages: None Apparent.	Advantages: None Apparent.	Advantages: None Apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Archaeological resources	Effect on land disturbances	Advantages: None apparent.	Advantages: Would contain the smallest footprint of options as natural degradation of cyanide is not needed.	Advantages: None apparent.	Advantages: Would contain the smallest footprint of options as natural degradation of cyanide is not needed.
		Disadvantages: Would contain the largest footprint of TSF to allow increased natural degradation.	Disadvantages: None apparent	Disadvantages: Would contain the largest footprint of TSF to allow increased natural degradation.	Disadvantages: None apparent
	Avoidance of archaeological sites or mitigation by excavation if avoidance is not possible, as per the Standards and Guidelines for Consultant Archaeologists (2010).	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	Advantages: Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise suitability catalogued and managed in	Advantages: Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise suitability catalogued and managed in accordance with applicable regulatory	Advantages: Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise suitability catalogued and managed in accordance with applicable regulatory	Advantages: Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise suitability



Process Effluent Treatment – Effects to the Human Environment					
	Alternative	1	2	3	4
	Description	Natural Cyanide Degradation in the Tailings Storage Facility	In-Plant Cyanide Destruction Followed by natural Degradation	Natural Degradation Followed by Effluent Treatment	In-Plant Cyanide Destruction Followed by natural Degradation Followed by Effluent Treatment
		accordance with applicable regulatory needs and commitments. Any sites discovered during construction can be protected and avoided.	needs and commitments. Any sites discovered during construction can be protected and avoided.	needs and commitments. Any sites discovered during construction can be protected and avoided.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: None apparent.	Advantages: Would contain the smallest footprint of options as natural degradation of cyanide is not needed which could likely be contained wholly within land that is privately owned by Treasury Metals	Advantages: None apparent.	Advantages: Would contain the smallest footprint of options as natural degradation of cyanide is not needed which could likely be contained wholly within land that is privately owned by Treasury Metals
		Disadvantages: Would contain the largest footprint of TSF to allow increased natural degradation.	Disadvantages: None apparent	Disadvantages: Would contain the largest footprint of TSF to allow increased natural degradation.	Disadvantages: None apparent
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: None apparent.	Advantages: Would contain the smallest footprint of options as natural degradation of cyanide is not needed which could likely be contained wholly within land that is privately owned by Treasury Metals	Advantages: None apparent.	Advantages: Would contain the smallest footprint of options as natural degradation of cyanide is not needed which could likely be contained wholly within land that is privately owned by Treasury Metals
		Disadvantages: Would contain the largest footprint of TSF to allow increased natural degradation.	Disadvantages: None apparent	Disadvantages: Would contain the largest footprint of TSF to allow increased natural degradation.	Disadvantages: None apparent
Effects to Human Environment	Rating	Acceptable	Acceptable	Acceptable	Acceptable



Process Effluent Treatment – Effects to the Physical and Biological Environments						
	Alternative	1	2	3	4	
	Description	Natural Cyanide Degradation in the Tailings Storage Facility	In-Plant Cyanide Destruction Followed by natural Degradation	Natural Degradation Followed by Effluent Treatment	In-Plant Cyanide Destruction Followed by natural Degradation Followed by Effluent Treatment	
Criteria	Assessment					
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Emission rates of greenhouse gases (GHGs)	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
Effect on aquatic life and habitat	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Advantages: None apparent.	Advantages: None apparent.	Advantages: None Apparent	Advantages: Provides Highest quality water for discharge meeting all provincial and federal requirements.	
		Disadvantages: Would not meet effluent criteria for discharge into preferred location at Blackwater creek.	Disadvantages: Would not meet effluent criteria for discharge into preferred location at Blackwater creek.	Disadvantages: Would not meet effluent criteria for discharge into preferred location at Blackwater creek.	Disadvantages: None apparent.	
	Management of water level in effected water bodies and streams to maintain aquatic life	Advantages: None Apparent	Advantages: None Apparent	Advantages: None Apparent	Advantages: None apparent.	
		Advantages: None Apparent	Advantages: None Apparent	Advantages: None Apparent	Advantages: None apparent.	
	Maintenance of fish population	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Maintenance of groundwater levels for both flows and quality	Advantages: None Apparent	Provides best water quality to TSF which in turn will limit risk to seepage.	Advantages: None apparent.	Provides best water quality to TSF which in turn will limit risk to seepage.	
		Disadvantage: Lowest quality of water entering into TSF increases risk of seepage.	Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.	
	Effect on wetlands	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
			Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
		Advantages:	Advantages:	Advantages:	Advantages:	



Process Effluent Treatment – Effects to the Physical and Biological Environments						
	Alternative	1	2	3	4	
	Description	Natural Cyanide Degradation in the Tailings Storage Facility	In-Plant Cyanide Destruction Followed by natural Degradation	Natural Degradation Followed by Effluent Treatment	In-Plant Cyanide Destruction Followed by natural Degradation Followed by Effluent Treatment	
	Area, type and quality (functionality) of wetlands that would be displaced or altered	None apparent.	None apparent.	None apparent.	None apparent.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Maintenance of wetland connectivity	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
Effect on terrestrial species and habitat	Area, type and quality of terrestrial habitat that would be displaced or altered	Advantages: None apparent.	Advantages: Would contain the smallest footprint of options as natural degradation of cyanide is not needed.	Advantages: None apparent.	Advantages: Would contain the smallest footprint of options as natural degradation of cyanide is not needed.	
		Disadvantages: Would contain the largest footprint of TSF to allow increased natural degradation.	Disadvantages: None apparent	Disadvantages: Would contain the largest footprint of TSF to allow increased natural degradation.	Disadvantages: None apparent	
	Effects of noise disturbance generated by the project	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Effect on overall wildlife population	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Effect on Species at Risk (SAR)	Sensitively level of effected SAR (Endangered, Threatened, Special Concern)	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
			Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
		Area, type and quality of SAR that would be displaced or altered	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat
		Effects of noise disturbance generated by the project	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat
Maintenance of wildlife movement corridors and plant dispersion		N/A	N/A	N/A	N/A	
		N/A	N/A	N/A	N/A	
Effects to Physical and Biological Environments	Rating	Unacceptable	Unacceptable	Unacceptable	Preferred	



Process Effluent Treatment – Effects to the Physical and Biological Environments					
	Alternative	1	2	3	4
	Description	Natural Cyanide Degradation in the Tailings Storage Facility	In-Plant Cyanide Destruction Followed by natural Degradation	Natural Degradation Followed by Effluent Treatment	In-Plant Cyanide Destruction Followed by natural Degradation Followed by Effluent Treatment
Process Effluent Treatment – Potential ability for future closure/reclamation processes					
	Alternative	1	2	3	4
	Description	Natural Cyanide Degradation in the Tailings Storage Facility	In-Plant Cyanide Destruction Followed by natural Degradation	Natural Degradation Followed by Effluent Treatment	In-Plant Cyanide Destruction Followed by natural Degradation Followed by Effluent Treatment
Criteria	Assessment				
Public Safety and Security	Effect on safety and security risks to the community and general public	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Environmental Health and Long Term Sustainability	Effect on long term air quality and the ability to meet point of impingement standards	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on long term water quality and the ability to meet water quality guidelines	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Effect on long term wildlife habitats including SARs	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	
	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
Land Use	Effect on long term land uses	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on long term visual appearance of Project Site	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Closure and Reclamation	Summary Rating	Acceptable	Acceptable	Acceptable	Acceptable
Overall	Summary Rating	Summary Rating: Unacceptable	Summary Rating: Unacceptable	Summary Rating: Unacceptable	Summary Rating: Preferred



X.5 PLANT AND INFRASTRUCTURE LOCATION

Alternative Assessment – Plant and Infrastructure Location			
	Alternative	1	2
	Description	Plant and Infrastructure Located North of Open Pit area	Plant and Infrastructure Located East and South of Open Pit area
Criteria	Assessment		
Plant and Infrastructure Location – Cost Effectiveness			
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: None Apparent	Advantages: None Apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: None Apparent	Advantages: Located on private land owned by the company
		Disadvantages: None Apparent	Disadvantages: None Apparent
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: None Apparent	Advantages: None Apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
		Acceptable	Preferred

Plant and Infrastructure Location – Technical feasibility and technical reliability			
	Alternative	1	2
	Description	Plant and Infrastructure Located North of Open Pit area	Plant and Infrastructure Located East and South of Open Pit area
Criteria	Assessment		
Readily Available Technology	Has been successfully implemented in similar mining Projects and can be relied upon for sufficient performance over an extended period of time.	Advantages: None Apparent	Advantages: None Apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
	New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable
		Acceptable	Acceptable



Plant and Infrastructure Location – Effects to the environment, including human, physical and biological environments			
	Alternative	1	2
	Description	Plant and Infrastructure Located North of Open Pit area	Plant and Infrastructure Located East and South of Open Pit area
Criteria	Assessment		
Local residents and recreational users	Effect on property values	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on employment opportunities	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable
	Effect on local access points	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Reduced access to Tree Nursery Road during operations phase
	Effect on current noise levels	Advantages: Attainment of provincial guidelines is more probable due to proximity to property boundary relative to other options	Advantages: Further from East Thunder Lake residents
		Disadvantages: None apparent	Disadvantages: Closer to property boundary, attainment of provincial guidelines still probable,
	Effect on water supply for both well water and drinking water	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on visual disturbance	Advantages: None apparent	Advantages: None apparent
		Disadvantages: Greater possibility of visual disturbance for residents to the west such as Thunder Lake residents	Disadvantages: Closer proximity to property boundary will have minimal effect on visual disturbance
	Potential for adverse health effects	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Infrastructure	Effect on local access	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Reduced access to Tree Nursery Road
	Effect on power supply systems	Advantages: None apparent	Advantages: None apparent



Plant and Infrastructure Location – Effects to the environment, including human, physical and biological environments			
	Alternative	1	2
	Description	Plant and Infrastructure Located North of Open Pit area	Plant and Infrastructure Located East and South of Open Pit area
		Disadvantages: None apparent	Disadvantages: None apparent
Public Health and Safety	Attainment of air quality point of impingement standards or scientifically defensible alternatives	Advantages: Further from southern property boundary	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Closer to southern property boundary, attainment of provincial guidelines still probable,
	Effect on drinking water supply	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on local health services	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable
Local Economy	Effect on local businesses and economic opportunities	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable
	Effect on access for tourism operators and/or natural resource harvesters	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on local tourism	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Regional Economy	Effect on regional businesses and economic opportunities	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable
Government Services	Effect on local government services and capacities	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable
Resource management objectives	Effect on established resource management plans	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent



Plant and Infrastructure Location – Effects to the environment, including human, physical and biological environments			
	Alternative	1	2
	Description	Plant and Infrastructure Located North of Open Pit area	Plant and Infrastructure Located East and South of Open Pit area
Built heritage and cultural heritage	Effect on any built heritage resource or cultural heritage features	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Alteration that is not sympathetic or is incompatible with the historic fabric and appearance of cultural heritage resources	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Isolation of a built heritage resource or heritage attribute from it surrounding environment, context or a significant relationship	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Direct or indirect obstruction of significant views or vistas within, from or of built heritage resources or cultural heritage landscapes	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	A change in land use	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Avoidance of damage to built heritage resources or cultural heritage landscapes, or document cultural resources if damage or relocation cannot be reasonably avoided	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Archaeological resources	Effect on land disturbances	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Avoidance of archaeological sites or mitigation by excavation if avoidance is not possible, as per the Standards and Guidelines for Consultant Archaeologists (2010).	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	Advantages: Not Applicable	Advantages: Not Applicable



Plant and Infrastructure Location – Effects to the environment, including human, physical and biological environments			
	Alternative	1	2
	Description	Plant and Infrastructure Located North of Open Pit area	Plant and Infrastructure Located East and South of Open Pit area
		Disadvantages: Not Applicable	Disadvantages: Not Applicable
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: None apparent	Advantages: Situated wholly on privately owned land, effects on treaty rights are minimized
		Disadvantages: None apparent	Disadvantages: None apparent
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: Further from southern property boundary	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Closer to southern property boundary, attainment of provincial guidelines still probable,
	Emission rates of greenhouse gases (GHGs)	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Effect on aquatic life and habitat	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Management of water level in effected water bodies and streams to maintain aquatic life	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Possible realignment of Blackwater Creek Tributary in close proximity to plant location
	Maintenance of fish population	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Maintenance of groundwater levels for both flows and quality	Advantages: None apparent	Advantages: None apparent



Plant and Infrastructure Location – Effects to the environment, including human, physical and biological environments				
	Alternative	1	2	
	Description	Plant and Infrastructure Located North of Open Pit area	Plant and Infrastructure Located East and South of Open Pit area	
		Disadvantages: None apparent	Disadvantages: None apparent	
Effect on wetlands	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Area, type and quality (functionality) of wetlands that would be displaced or altered	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Maintenance of wetland connectivity	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
Effect on terrestrial species and habitat	Area, type and quality of terrestrial habitat that would be displaced or altered	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Effects of noise disturbance generated by the project	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Effect on overall wildlife population	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Effect on Species at Risk (SAR)	Sensitivity level of effected SAR (Endangered, Threatened, Special Concern)	Advantages: None apparent	Advantages: None apparent
			Disadvantages: None apparent	Disadvantages: None apparent
		Area, type and quality of SAR that would be displaced or altered	Advantages: None apparent	Advantages: None apparent



Plant and Infrastructure Location – Effects to the environment, including human, physical and biological environments			
	Alternative	1	2
	Description	Plant and Infrastructure Located North of Open Pit area	Plant and Infrastructure Located East and South of Open Pit area
		Disadvantages: None apparent	Disadvantages: None apparent
	Effects of noise disturbance generated by the project	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
		Acceptable	Preferred

Plant and Infrastructure Location – Potential ability for future closure/reclamation processes			
	Alternative	1	2
	Description	Plant and Infrastructure Located North of Open Pit area	Plant and Infrastructure Located East and South of Open Pit area
Criteria	Assessment		
Public Safety and Security	Effect on safety and security risks to the community and general public	Advantages: None Apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Environmental Health and Long Term Sustainability	Effect on long term air quality and the ability to meet point of impingement standards	Advantages: None Apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
	Effect on long term water quality and the ability to meet water quality guidelines	Advantages: None Apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
	Effect on long term wildlife habitats including SARs	Advantages: None Apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
Land Use	Effect on long term land uses	Advantages: None Apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent



Plant and Infrastructure Location – Potential ability for future closure/reclamation processes			
	Alternative	1	2
	Description	Plant and Infrastructure Located North of Open Pit area	Plant and Infrastructure Located East and South of Open Pit area
	Effect on long term visual appearance of Project Site	Advantages: None Apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
		Acceptable	Acceptable



X.6 WATERCOURSE REALIGNMENT

Alternative Assessment – Watercourse Realignment			
	Alternative	1	2
	Description	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek Tributary # 2	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek
Criteria	Assessment		
Watercourse Realignment – Cost Effectiveness			
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: None Apparent	Advantages: None Apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: Located on private land owned by the company	Advantages: Located on private land owned by the company
		Disadvantages: None Apparent	Disadvantages: None Apparent
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: None Apparent	Advantages: None Apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
Cost Effectiveness Rating		Acceptable	Acceptable

Watercourse Realignment – Technical feasibility and technical reliability			
	Alternative	1	2
	Description	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek Tributary # 2	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek
Criteria	Assessment		
Readily Available Technology	Has been successfully implemented in similar mining Projects and can be relied upon for sufficient performance over an extended period of time.	Advantages: None Apparent	Advantages: None Apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
	New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable
Technical feasibility and reliability Rating		Acceptable	Acceptable



Watercourse Realignment – Effects to the environment, including human, physical and biological environments			
	Alternative	1	2
	Description	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek Tributary # 2	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek
Criteria	Assessment		
Local residents and recreational users	Effect on property values	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on employment opportunities	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable
	Effect on local access points	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on current noise levels	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on water supply for both well water and drinking water	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on visual disturbance	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Potential for adverse health effects	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Infrastructure	Effect on local access	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on power supply systems	Advantages: None apparent	Advantages: None apparent



Watercourse Realignment – Effects to the environment, including human, physical and biological environments				
	Alternative	1	2	
	Description	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek Tributary # 2	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek	
		Disadvantages: None apparent	Disadvantages: None apparent	
Public Health and Safety	Attainment of air quality point of impingement standards or scientifically defensible alternatives	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Effect on drinking water supply	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Effect on local health services	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
Local Economy	Effect on local businesses and economic opportunities	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Effect on access for tourism operators and/or natural resource harvesters	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Tourism	Effect on local tourism	Advantages: None apparent	Advantages: None apparent
			Disadvantages: None apparent	Disadvantages: None apparent
Regional Economy	Effect on regional businesses and economic opportunities	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
Government Services	Effect on local government services and capacities	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
Resource management objectives	Effect on established resource management plans	Advantages: None apparent	Advantages: None apparent	



Watercourse Realignment – Effects to the environment, including human, physical and biological environments				
	Alternative	1	2	
	Description	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek Tributary # 2	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek	
		Disadvantages: None apparent	Disadvantages: None apparent	
Built heritage and cultural heritage	Effect on any built heritage resource or cultural heritage features	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Alteration that is not sympathetic or is incompatible with the historic fabric and appearance of cultural heritage resources	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Isolation of a built heritage resource or heritage attribute from it surrounding environment, context or a significant relationship	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Direct or indirect obstruction of significant views or vistas within, from or of built heritage resources or cultural heritage landscapes	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	A change in land use	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Avoidance of damage to built heritage resources or cultural heritage landscapes, or document cultural resources if damage or relocation cannot be reasonably avoided	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Archaeological resources	Effect on land disturbances	Advantages: None apparent	Advantages: None apparent
			Disadvantages: None apparent	Disadvantages: None apparent
Avoidance of archaeological sites or mitigation by excavation if avoidance is not possible, as per the Standards and Guidelines for		Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	



Watercourse Realignment – Effects to the environment, including human, physical and biological environments			
	Alternative	1	2
	Description	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek Tributary # 2	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek
	Consultant Archaeologists (2010).		
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: Situated wholly on privately owned land, effects on treaty rights are minimized	Advantages: Situated wholly on privately owned land, effects on treaty rights are minimized
		Disadvantages: None apparent	Disadvantages: None apparent
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Emission rates of greenhouse gases (GHGs)	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Effect on aquatic life and habitat	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Potential concern with COC with road parallel to creek realignment, which potentially could impact water resources downstream of final discharge location.
	Management of water level in effected water bodies and streams to maintain aquatic life	Advantages: Stream realignment length will limit hydrological variance to current hydrological regime.	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Stream realignment length and location will potentially disturb/remove drainage from Blackwater Creek Tributary # 2 potentially impacting the hydrological regime. Also due to



Watercourse Realignment – Effects to the environment, including human, physical and biological environments			
	Alternative	1	2
	Description	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek Tributary # 2	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek
			parallel nature of realignment storm water and run off may be concerns as added contributors to the main channel of Blackwater Creek.
	Maintenance of fish population	Advantages: Realignment will maintain the original channel and fish population.	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Realignment will the limit the hydrological potential of Blackwater Creek Tributary # 2 potentially impacting fish population.
	Maintenance of groundwater levels for both flows and quality	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Effect on wetlands	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Potential concern with COC with road parallel to creek realignment, which potentially could impact water resources downstream of final discharge location.
	Area, type and quality (functionality) of wetlands that would be displaced or altered	Advantages: Maintains	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Maintenance of wetland connectivity	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Effect on terrestrial species and habitat	Area, type and quality of terrestrial habitat that would be displaced or altered	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Effects of noise disturbance generated by the project	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent



Watercourse Realignment – Effects to the environment, including human, physical and biological environments			
	Alternative	1	2
	Description	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek Tributary # 2	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek
	Effect on overall wildlife population	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Effect on Species at Risk (SAR)	Sensitivity level of effected SAR (Endangered, Threatened, Special Concern)	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Area, type and quality of SAR that would be displaced or altered	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Effects of noise disturbance generated by the project	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Effects to the environment, including human, physical and biological environments Rating		Preferred	Acceptable

Watercourse Realignment – Potential ability for future closure/reclamation processes			
	Alternative	1	2
	Description	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek Tributary # 2	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek
Criteria	Assessment		
Public Safety and Security	Effect on safety and security risks to the community and general public	Advantages: None Apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Environmental Health and Long Term Sustainability	Effect on long term air quality and the ability to meet point of	Advantages: None Apparent	Advantages: None apparent



Watercourse Realignment – Potential ability for future closure/reclamation processes			
	Alternative	1	2
	Description	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek Tributary # 2	Realignment of Blackwater Creek Tributary # 2 northeast of processing plant, discharge point within Blackwater Creek
	impingement standards	Disadvantages: None Apparent	Disadvantages: None Apparent
	Effect on long term water quality and the ability to meet water quality guidelines	Advantages: None Apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
	Effect on long term wildlife habitats including SARs	Advantages: None Apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
Land Use	Effect on long term land uses	Advantages: None Apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
	Effect on long term visual appearance of Project Site	Advantages: None Apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
Closure Rating		Acceptable	Acceptable
Overall Summary Rating		<p>Realignment will allow for continued use of Blackwater Creek Tributary # 2 by fish species, as aquatic habitat will be maintained. In addition COC contamination potential is limited due to limited immediate contact with the proposed road network. Storm water management will be aided by natural attenuation within the current channel design and natural systems. Realignment design has not been finalized, consultation with appropriate regulators will occur to design system that will contribute to the health of the current biological system and fish population. In addition it could potentially serve as an integrated part of the water management system, as TML could potentially limit inflow to the upstream section of the realignment.</p> <p>Summary Rating: Preferred</p>	<p>Realignment will cause the loss of the southern portion of Blackwater Creek Tributary # 2. The construction of the proposed realignment will run parallel to road development associated with the processing plant facility. This location may potentially be the cause of COC within the creek potentially impacting aquatic species downstream within the main channel of Blackwater Creek. In addition to potential effects this stream realignment will cause the disturbance of the aquatic species and habitat within the southern section of Blackwater Creek Tributary # 2, while also potentially causing a hydrological shift in the catchment area. This proposed realignment however presents an opportunity for increased water management practices due to its location. In addition it could potentially serve as an integrated part of the water management system.</p> <p>Summary Rating: Acceptable</p>



X.7 WATER SUPPLY

Alternative Assessment – Water Supply					
	Alternative	1	2	3	4
	Description	Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
Criteria	Assessment				
Water Supply – Cost Effectiveness					
Goliath Gold Project Financing	Investor desirability and/or risk	<p>Advantages: Water supply is critical to operation of the Goliath Gold Project, and important to investor confidence in the Project. Wabigoon Lake on its own has the potential to meet Project's water supply needs, when used in proposed design. Wabigoon Lake will require the construction of a pipeline infrastructure needs are increased as is risk and cost.</p>	<p>Advantages: Water supply is critical to operation of the Goliath Gold Project, and important to investor confidence in the Project. Thunder Lake on its own has the potential to meet Project's water supply needs, when used in proposed design. Thunder Lake will require the construction of a pipeline infrastructure needs are increased as is risk and cost.</p>	<p>Advantages: Water supply is critical to operation of the Goliath Gold Project, and important to investor confidence in the Project. Close proximity of nearby Tree Nursery Ponds allows for reduce infrastructure development, risk, and costs. The Tree Nursery Ponds do not support the water needs for any local residents.</p>	<p>Advantages: Water supply is critical to operation of the Goliath Gold Project, and important to investor confidence in the Project. Groundwater has the potential to provide for limited potable water needs, and therefore will form part of an integrated water supply system.</p>
		<p>Disadvantages: Wabigoon Lake is a water-level controlled lake. Residents on Wabigoon Lake. Closure costs required.</p>	<p>Disadvantages: Thunder Lake is a water-level controlled lake. Residents on Thunder Lake. Closure costs required.</p>	<p>Disadvantages: None apparent.</p>	<p>Disadvantages: Groundwater supplies are limited to provide a major water source for Project operations.</p>
Return on Investment (ROI)	Provides a competitive and acceptable ROI	<p>Advantages: Close proximity to the site limits infrastructure costs though less than the alternative.</p>	<p>Advantages: Close proximity to the site limits infrastructure costs though less than the alternative</p>	<p>Advantages: Tree Nursery Ponds will provide adequate water supply for the Project. Close proximity to site allows for low infrastructure costs.</p>	<p>Advantages: Close proximity to the site limits infrastructure costs for this alternative. Water supply is limited and would be adequate for short term needs only.</p>
		<p>Disadvantages: Infrastructure and closure needs for developing both Wabigoon and Thunder Lake would be greater than using Tree Nursery Ponds, thereby risking ROI and causing higher initial capital cost.</p>	<p>Disadvantages: Infrastructure and closure needs for developing both Wabigoon and Thunder Lake would be greater than using Tree Nursery Ponds, thereby risking ROI and causing higher initial capital cost.</p>	<p>Disadvantages: None apparent.</p>	<p>Disadvantages: Wells would have to be developed causing increased capital costs, as well as closure costs.</p>
Financial Risk	Provides a manageable or acceptable financial risk	<p>Advantages: Alternative has ability to support water supply needs.</p>	<p>Advantages: Alternative has ability to support water supply needs.</p>	<p>Advantages: Alternative able to support the Projects needs when coupled with integrative</p>	<p>Advantages: None apparent.</p>



Alternative Assessment – Water Supply					
	Alternative	1	2	3	4
	Description	Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
		Due to large volume of lake water uptake is not expected to have effect on water levels.	Due to large volume of lake water uptake is not expected to have effect on water levels.	management system (recycling, storage). No residents on tributaries support the Tree Nursery Ponds. Low potential for EA/permitting delays.	
		Disadvantages: Wabigoon Lake, downstream of Project supports residents, tourism operators, and other recreational facilities which may cause EA/permitting delays.	Disadvantages: Thunder Lake, downstream of Project supports residents, Provincial Park, and other recreational facilities which may cause EA/permitting delays.	Disadvantages: None apparent.	Disadvantages: Supply constraints.
Cost Effectiveness	Summary Evaluation and Rating	Wabigoon Lake is capable of supporting the Project's water supply needs. Due to the potential risk in ROI and potential risk to EA/permitting timelines due to resident, tourism operator interest Wabigoon Lake is seen as a viable alternative but other alternatives are better suited to the Goliath Project. Summary Rating: Acceptable	Thunder Lake is capable of supporting the Project's water supply needs. Due to potential risk to EA/permitting timelines due to resident, tourism operator interest Thunder Lake is seen as a viable alternative but other alternatives are better suited to the Goliath Project. Summary Rating: Acceptable	Tree Nursery Ponds are capable of supporting the Projects water supply needs. The Tree Nursery Ponds provide the lower cost opportunities for infrastructure. Summary Rating: Preferred	Groundwater supplies are inadequate to provide mind water supply needs. Summary Rating: Unacceptable

Water Supply – Technical feasibility and technical reliability					
	Alternative	1	2	3	4
	Description	Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
Criteria	Assessment				
Readily Available Technology	Has been successfully implemented in similar mining Projects and can be relied upon for sufficient performance over an extended period of time.	Advantages: Seasonal use of lakes to provide water for mine and process plant use is a common industry practice.	Advantages: Seasonal use of lakes to provide water for mine and process plant use is a common industry practice.	Advantages: Seasonal use of surface water sources to provide water for mine and process plant use is a common industry practice.	Advantages: Groundwater use to provide water for mine and process plant use is a common industry practice where supplies are adequate.
		Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.



Water Supply – Technical feasibility and technical reliability					
Alternative	1	2	3	4	
Description	Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater	
New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	N/A	N/A	N/A	N/A	
Technical feasibility and technical reliability	Summary Evaluation and Rating	Use of lakes for water supply is an industry common practice. Summary Rating: Acceptable	Use of lakes for water supply is an industry common practice. Summary Rating: Acceptable	Use of creeks for water supply is an industry common practice. Summary Rating: Acceptable	Use of groundwater for water supply is an industry common practice. Summary Rating: Acceptable

Water Supply – Effects to the Human Environment					
Alternative	1	2	3	4	
Description	Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater	
Criteria	Assessment				
Local residents and recreational users	Effect on property values	Advantages: Water taking would not adversely affect availability of lake water to local residents and tourism operators in the area.	Advantages: Water taking would not adversely affect availability of lake water to local residents in the area.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantage: Downstream users present. Industrial intake from lake and water bodies could be perceived as an infringement or disturbance and potentially impact property values.	Disadvantage: Downstream users present. Industrial intake from lake and water bodies could be perceived as an infringement or disturbance and potentially impact property values.	Disadvantage: None apparent.	Disadvantage: None apparent.
	Effect on employment opportunities	N/A	N/A	N/A	N/A
	Effect on local access points	N/A	N/A	N/A	N/A
	Effect on current noise levels	N/A	N/A	N/A	N/A
	Effect on water supply for both well	Advantages: No known potential to interfere with area well users.	Advantages: No known potential to interfere with area well users.	Advantages: No residents or local water users along Tree	Advantages: 17 wells within draw down cone of the Project.



Water Supply – Effects to the Human Environment					
	Alternative	1	2	3	4
	Description	Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
	water and drinking water			Nursery Ponds or drainage tributaries. No known potential to interfere with area well users.	
		Disadvantage: Downstream users present. Industrial intake from lake and water bodies could be perceived as an infringement or disturbance and seen as a risk to drinking water supply.	Disadvantage: Downstream users present. Industrial intake from lake and water bodies could be perceived as an infringement or disturbance and seen as a risk to drinking water supply.	Disadvantages: None apparent.	Disadvantages: None apparent.
	Effect on visual disturbance	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
Potential for adverse health effects	See Public health and safety criteria	See Public health and safety criteria	See Public health and safety criteria	See Public health and safety criteria	
Infrastructure	Effect on local access	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
	Effect on power supply systems	N/A	N/A		
Public Health and Safety	Attainment of air quality point of impingement standards or scientifically defensible alternatives	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
	Effect on drinking water supply	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
	Effect on local health services	N/A	N/A	N/A	N/A
N/A		N/A	N/A	N/A	
Local Economy	Effect on local businesses and economic opportunities	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
	Effect on access for tourism operators and/or natural resource harvesters	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
Tourism	Effect on local tourism	Advantages: Controlled intake to Wabigoon Lake would limit potential for adverse effects to fisheries resources.	Advantages: Controlled intake to Thunder Lake would limit potential for adverse effects to fisheries resources.	Advantages: Controlled intake of Tree Nursery Ponds would limit potential for adverse effects to fisheries resources.	N/A



Water Supply – Effects to the Human Environment					
	Alternative	1	2	3	4
	Description	Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
		Disadvantages: Potential for perceived disruption of recreational use and fisheries.	Disadvantages: Potential for perceived disruption of recreational use and fisheries.	Disadvantages: Potential for perceived disruption of recreational use and fisheries.	N/A
Regional Economy	Effect on regional businesses and economic opportunities	Advantages: No known adverse effects.	Advantages: No known adverse effects.	Advantages: No known adverse effects.	Advantages: No known adverse effects.
		Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.	Disadvantage: None apparent.
Government Services	Effect on local government services and capacities	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
Resource management objectives	Effect on established resource management plans	Advantages: Water taking would be managed and controlled by regulatory conditions set by the Province.	Advantages: Water taking would be managed and controlled by regulatory conditions set by the Province.	Advantages: Water taking would be managed and controlled by regulatory conditions set by the Province.	N/A
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	N/A
Built heritage and cultural heritage	Effect on any built heritage resource or cultural heritage features	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Alteration that is not sympathetic or is incompatible with the historic fabric and appearance of cultural heritage resources	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Isolation of a built heritage resource or heritage attribute from it surrounding environment, context or a significant relationship	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Direct or indirect obstruction of significant views or vistas within, from or of built heritage resources or cultural	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent



Water Supply – Effects to the Human Environment					
	Alternative	1	2	3	4
	Description	Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
	heritage landscapes				
	A change in land use	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Avoidance of damage to built heritage resources or cultural heritage landscapes, or document cultural resources if damage or relocation cannot be reasonably avoided	Advantages: Archeological and built heritage sites (if any) would be identified and avoided, or otherwise catalogued according to applicable regulations and standards. Any sites discovered during construction can be protected and/or avoided.	Advantages: Archeological and built heritage sites (if any) would be identified and avoided, or otherwise catalogued according to applicable regulations and standards. Any sites discovered during construction can be protected and/or avoided.	Advantages: Any sites discovered during construction can be protected and/or avoided.	Advantages: None apparent.
Disadvantages: None apparent		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
Archaeological resources	Effect on land disturbances	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Avoidance of archaeological sites or mitigation by excavation if avoidance is not possible, as per the Standards and Guidelines for Consultant Archaeologists (2010).	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
Disadvantages: None apparent		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	Advantages: Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise suitability catalogued and managed in accordance with applicable	Advantages: Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise suitability catalogued and managed in accordance with applicable regulatory needs and commitments.	Advantages: Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise suitability catalogued and managed in accordance with applicable regulatory needs and commitments.	Advantages: None apparent.



Water Supply – Effects to the Human Environment					
	Alternative	1	2	3	4
	Description	Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
		regulatory needs and commitments. Any sites discovered during construction can be protected and avoided.	Any sites discovered during construction can be protected and avoided.	Any sites discovered during construction can be protected and avoided.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Effects to Human Environment	Summary Evaluation and Rating	Water taking from Wabigoon Lake would not be expected to cause any adverse effects on the human environment. Lake residents and tourist operators may perceive industrial taking of water from recreational lake as an infringement or disturbance to their recreational use, and may cause EA delays due to resistance. Summary Rating: Acceptable	Water taking from Thunder Lake would not be expected to cause any adverse effects on the human environment. Lake residents and tourist operators may perceive industrial taking of water from recreational lake as an infringement or disturbance to their recreational use, and may cause EA delays due to resistance. Summary Rating: Acceptable	Water taking to the Tree Nursery ponds would not be expected to have any adverse effects to the human environment during normal operations. There are no residents or water users along the Tree Nursery Ponds and tributaries. Summary Rating: Preferred	No known potential for adverse effects. Summary Rating: Preferred

Water Supply – Effects to the Physical and Biological Environments					
	Alternative	1	2	3	4
	Description	Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
Criteria	Assessment				
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Emission rates of greenhouse gases (GHGs)	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Effect on aquatic life and habitat	Fulfilment of water quality standards and guidelines for protection of	Advantages: None apparent.	Advantages: None apparent.	Advantages: Water taking from Tree Nursery Ponds would be confined to approximately 26%.	Advantages: None apparent.



Water Supply – Effects to the Physical and Biological Environments					
	Alternative	1	2	3	4
	Description	Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
	aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Disadvantages: Water taking could result in a negligible reduction in lake levels.	Disadvantages: Water taking could result in a negligible reduction in lake levels.	Disadvantages: Water taking from Tree Nursery ponds could reduce volume of flow to other water bodies.	Disadvantages: None apparent.
	Management of water level in effected water bodies and streams to maintain aquatic life	Advantages: Water taking during normal operation with Wabigoon Lake is not expected to alter associated aquatic or other habitats.	Advantages: Water taking during normal operation with Thunder Lake is not expected to alter aquatic or other habitats.	Advantages: Water taking during normal operation with the Tree Nursery Ponds is not expected to alter aquatic or other habitats. Flow decrease due to intake could be seasonally offset by avoiding or minimizing discharge during high flow periods.	Advantages: None apparent.
		Disadvantages: As above.	Disadvantages: As above.	Disadvantages: As above.	Disadvantages: None apparent.
	Maintenance of fish population	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Maintenance of groundwater levels for both flows and quality	Local surface water and groundwater systems are not functionally connected.	Local surface water and groundwater systems are not functionally connected.	Local surface water and groundwater systems are not functionally connected.	Local surface water and groundwater systems are not functionally connected.
Effect on wetlands	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Advantages: Water taking from lakes does not cause any appreciable effects on wetlands.	Advantages: Water taking from lakes does not cause any appreciable effects on wetlands.	Advantages: Flow reduction in Tree Nursery Pond tributaries could be seasonally offset by avoiding water taking during low flow periods.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: Capture of water on site has been integrated into the site water management plan. This change may diminish flows in those systems affected.	Disadvantages: None apparent
	Area, type and quality (functionality) of wetlands that would be displaced or altered	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
	Maintenance of wetland connectivity	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A



Water Supply – Effects to the Physical and Biological Environments					
	Alternative	1	2	3	4
	Description	Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
Effect on terrestrial species and habitat	Area, type and quality of terrestrial habitat that would be displaced or altered	N/A	N/A	N/A	N/A
	Effects of noise disturbance generated by the project	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
	Maintenance of wildlife movement corridors and plant dispersion	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
	Effect on overall wildlife population	N/A	N/A	N/A	N/A
N/A		N/A	N/A	N/A	
Effect on Species at Risk (SAR)	Sensitively level of effected SAR (Endangered, Threatened, Special Concern)	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Area, type and quality of SAR that would be displaced or altered	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat
	Effects of noise disturbance generated by the project	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat
	Maintenance of wildlife movement corridors and plant dispersion	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
Effects to Physical and Biological Environments	Summary Evaluation and Rating	Water taking from Wabigoon Lake would not be expected to affect level or alter aquatic and other habitat functions. Summary Rating Acceptable	Water taking from Thunder Lake would not be expected to affect level or alter aquatic and other habitat functions Summary Rating: Acceptable.	Water taking from Tree Nursery Ponds is not anticipated to affect aquatic and habitat functions. Flow will be reduced though tributary system by 26%. Summary Rating: Acceptable	Groundwater taking would not be expected to adversely affect the natural environment. Summary Rating: Acceptable

Water Supply – Potential ability for future closure/reclamation processes					
	Alternative	1	2	3	4
	Description	Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
Criteria	Assessment				



Water Supply – Potential ability for future closure/reclamation processes					
	Alternative	1	2	3	4
	Description	Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
Public Safety and Security	Effect on safety and security risks to the community and general public	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
Environmental Health and Long Term Sustainability	Effect on long term air quality and the ability to meet point of impingement standards	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
	Effect on long term water quality and the ability to meet water quality guidelines	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
	Effect on long term wildlife habitats including SARs	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
Land Use	Effect on long term land uses	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
	Effect on long term visual appearance of Project Site	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
Closure and Reclamation	Summary Rating	There are no water discharge limitations or liabilities relating to site reclamation at closure.	There are no water discharge limitations or liabilities relating to site reclamation at closure.	There are no water discharge limitations or liabilities relating to site reclamation at closure.	There are no water discharge limitations or liabilities relating to site reclamation at closure.
		Summary Rating: Acceptable	Summary Rating: Acceptable	Summary Rating: Acceptable	Summary Rating: Acceptable
Overall	Summary Rating	Wabigoon Lake is capable of supporting the Projects water supply needs though start-up to closure. Wabigoon Lake is relatively close to the Project but alternative provide increased cost – effectiveness. It is a reliable source of water due to its size. Water intake would be controlled and would not have any adverse effects on water level, aquatics, and local users. Intake from	Thunder Lake is capable of supporting the Projects water supply needs though start-up to closure. Thunder Lake is relatively close to the Project but alternative provide increased cost –effectiveness. It is a reliable source of water due to its size. Water intake would be controlled and would not have any adverse effects on water level, aquatics, and local users. Intake from Thunder Lake may be seen in a significant negative view by local	The Tree Nursery Ponds are capable of meeting the Project’s water supply needs. Water uptake would be restricted and controlled and is not expected to have any adverse effects on the aquatics or local users. The water level of the tributary would decrease due to the intake of 26% of the projected flow; this is not anticipated to cause adverse effects to water level. This alternative provides the lowest cost infrastructure and	Groundwater supplies are not currently understood and therefore are termed inadequate for the water supply needs for the Project. Groundwater may be able to supply potable water. No known adverse environmental effects would be expected with this alternative.



Water Supply – Potential ability for future closure/reclamation processes					
Alternative	1	2	3	4	
Description	Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater	
	<p>Wabigoon Lake may be seen in a significant negative view by local users who use the lake for recreational purposes and may perceive an industrial intake pipe as an infringement or disturbance and may resist which could translate to EA delays.</p> <p>Summary Rating: Acceptable</p>	<p>users who use the lake for recreational purposes and may perceive an industrial intake pipe as an infringement or disturbance and may resist which could translate to EA delays.</p> <p>Summary Rating: Acceptable</p>	<p>provides the lowest risk for the Project.</p> <p>Summary Rating: Preferred</p>	<p>Summary Rating: Unacceptable</p>	



X.8 WATER DISCHARGE LOCATION

Alternatives Assessment – Water Discharge Location						
Water Discharge Location – Cost Effectiveness						
	Alternative	1	2	3	4	5
	Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
Criteria	Assessment					
Water Discharge Location – Cost Effectiveness						
Goliath Gold Project Financing	Investor desirability and/or risk	<p>Advantages: Water discharge is essential for proposed operations, and noteworthy investor confidence. Wabigoon Lake is the largest water body in the vicinity of the Project site. Additional capital required to fund purchase of property to reach Wabigoon Lake. Close proximity of Wabigoon Lake to the Project, reduces water discharge infrastructure needs and associated costs and risks.</p>	<p>Advantages: Water discharge is essential for proposed operations, and noteworthy investor confidence. Thunder Lake is the second largest water body in the vicinity of the Project site. Close proximity of Thunder Lake to the Project, particularly infrastructure needs and associated costs and risks.</p>	<p>Advantages: Water discharge is essential for proposed operations, and noteworthy investor confidence. Hartman Lake is the third largest water body in the vicinity of the Project site.</p>	<p>Advantages: Tree Nursery ponds have the potential to support the Project’s water discharge needs. Close proximity to Project site.</p>	<p>Advantages: Blackwater Creek has the potential to support the Project’s water discharge needs. Close proximity to Project site.</p>
		<p>Disadvantages: Wabigoon Lake is water level controlled lake. Residents on Wabigoon Lake. Closure costs required.</p>	<p>Disadvantages: Thunder Lake is a water-level controlled lake. Residents on Thunder Lake. Closure costs required.</p>	<p>Disadvantages: Greater capital costs due to infrastructure development. Residents on Hartman Lake. Closure costs required.</p>	<p>Disadvantages: None apparent.</p>	<p>Disadvantages: None apparent.</p>
Return on Investment (ROI)	Provides a competitive and acceptable ROI	<p>Advantages: Close proximity to the site limits infrastructure costs though less than the alternative.</p>	<p>Advantages: Close proximity to the site limits infrastructure costs though less than the alternative</p>	<p>Advantages: None apparent.</p>	<p>Advantages: Close proximity to the site limits infrastructure costs though less than the alternative.</p>	<p>Advantages: Close proximity to the site limits infrastructure costs for this alternative.</p>
		<p>Disadvantages: Potentially carries risk to ROI, as property purchase could be variable and potentially effect</p>	<p>Disadvantages: Potentially carries risk to ROI.</p>	<p>Disadvantages: Greater operational and construction costs would affect ROI.</p>	<p>Disadvantages: None apparent.</p>	<p>Disadvantages: None apparent.</p>



Alternatives Assessment – Water Discharge Location						
Water Discharge Location – Cost Effectiveness						
	Alternative	1	2	3	4	5
	Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
		timeline of Project.				
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: Alternative able to support Project water discharge needs. Larger volume presents an advantage in the event of greater than expected water discharge.	Advantages: Alternative able to support Project water discharge needs. Larger volume presents an advantage in the event of greater than expected water discharge.	Advantages: Alternative able to support Project water discharge needs. Larger volume presents an advantage in the event of greater than expected water discharge.	Advantages: Alternative able to support Project water discharge needs. No residents or recreational facilities along Tree Nursery Ponds of tributaries, which reduces risk to EA/permitting timelines.	Advantages: Alternative able to support Project water discharge needs. No residents or recreational facilities along Tree Nursery Ponds of tributaries, which reduces risk to EA/permitting timelines. Discharge to Blackwater Creek will aid to make-up potential flow deficits due to watercourse realignments.
		Disadvantages: Wabigoon Lake, downstream of Project supports residents, tourism operators, and other recreational facilities which may cause EA/permitting delays.	Disadvantages: Thunder Lake, downstream of Project supports residents, Provincial Park, and other recreational facilities which may cause EA/permitting delays.	Disadvantages: Hartman Lake supports residents, and other recreational facilities which may cause EA/permitting delays.	Disadvantages: None apparent.	Disadvantages: None apparent.
Cost Effectiveness	Summary Evaluation and Rating	Wabigoon Lake is capable of supporting the Project's water discharge needs. Due to the potential risk in ROI and potential risk to EA/permitting timelines due to resident, tourism operator interest Wabigoon Lake is seen as a viable alternative but other alternatives are better suited to the Goliath Project.	Thunder Lake is capable of supporting the Project's water discharge needs. Due to potential risk to EA/permitting timelines due to resident, tourism operator interest Thunder Lake is seen as a viable alternative but other alternatives are better suited to the Goliath Project. Summary Rating: Acceptable	Hartman Lake is capable of supporting the Project's water discharge needs. Due to the potential risk in ROI and potential risk to EA/permitting timelines due to residents, high operational costs, and complex nature of construction Hartman Lake is not seen as a viable alternative as other alternatives are better suited to the Goliath Project. Summary Rating: Unacceptable	Tree Nursery Ponds are capable of supporting the Projects water discharge needs. The Tree Nursery Ponds provide the lower cost opportunities for infrastructure, but the ponds serve as the fresh water source for the Project Summary Rating: Acceptable	Blackwater Creek is capable of supporting the Projects water discharge needs and will aid in mitigating potential flow deficits due to proposed watercourse realignments. Blackwater Creek provides the lowest cost and most suitable location for discharge as Blackwater flows by all supporting water discharge infrastructure, and does not serve as a fresh water supply. Summary Rating: Preferred



Alternatives Assessment – Water Discharge Location						
Water Discharge Location – Cost Effectiveness						
	Alternative	1	2	3	4	5
	Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
		Summary Rating: Acceptable				

Water Discharge Location – Technical feasibility and technical reliability						
	Alternative	1	2	3	4	5
	Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
Criteria	Assessment					
Readily Available Technology	Has been successfully implemented in similar mining Projects and can be relied upon for sufficient performance over an extended period of time.	Advantages: Discharge of excess water and treated effluent to lakes is an industry common practice.	Advantages: Discharge of excess water and treated effluent to lakes is an industry common practice.	Advantages: Discharge of excess water and treated effluent to lakes is an industry common practice.	Advantages: Discharge of excess water and treated effluent to creeks is an industry common practice.	Advantages: Discharge of excess water and treated effluent to creeks is an industry common practice.
		Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.
	New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	N/A	N/A	N/A	N/A	N/A
Technical feasibility and technical reliability	Summary Evaluation and Rating	Use of lakes for water discharge is an industry common practice. Summary Rating: Acceptable	Use of lakes for water discharge is an industry common practice. Summary Rating: Acceptable	Use of lakes for water discharge is an industry common practice. Summary Rating: Acceptable	Use of creeks for water discharge is an industry common practice. Summary Rating: Acceptable	Use of creeks for water discharge is an industry common practice. Summary Rating: Acceptable

Water Discharge Location – Effects to the Human Environment						
	Alternative	1	2	3	4	5
	Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
Criteria	Assessment					
		Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.



Water Discharge Location – Effects to the Human Environment						
Alternative	1	2	3	4	5	
Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek	
Local residents and recreational users	Effect on property values	-	-	-	-	-
	Effect on employment opportunities	N/A	N/A	N/A	N/A	N/A
	Effect on local access points	N/A	N/A	N/A	N/A	N/A
	Effect on current noise levels	N/A	N/A	N/A	N/A	N/A
	Effect on water supply for both well water and drinking water	Advantages: Water discharge would not adversely affect availability of lake water to local residents or tourism operators in the area during operations. Water quality reporting and local resident notification procedures could be established to provide up to date water quality information to local residents and mitigate risks to drinking water supply. No known potential to interfere with area well users.	Advantages: Water discharge would not adversely affect availability of lake water to local residents in the area during operations. Water quality reporting and local resident notification procedures could be established to provide up to date water quality information to local residents and mitigate risks to drinking water supply. No known potential to interfere with area well users.	Advantages: Water discharge would not adversely affect availability of lake water to local residents in the area during operations. Water quality reporting and local resident notification procedures could be established to provide up to date water quality information to local residents and mitigate risks to drinking water supply. No known potential to interfere with area well users.	Advantages: No residents or local water users along Tree Nursery Ponds or drainage tributaries. No known potential to interfere with area well users.	Advantages: No residents or local water users along Blackwater Creek or drainage tributaries. No known potential to interfere with area well users.
		Disadvantages: Receiving waters are used for private residents, tourism outfitters, and the City of Dryden. Local residents and tourist operators may perceive industrial water discharge to lakes/creeks as an infringement/disturbance, and	Disadvantages: Receiving waters are used for private residents. Local residents and tourist operators may perceive industrial water discharge to lakes/creeks as an infringement/disturbance, and resist the action which may lead to delays in Project EA/permitting schedule.	Disadvantages: Receiving waters are used for private residents. Local residents and tourist operators may perceive industrial water discharge to lakes/creeks as an infringement/disturbance, and resist the action which may lead to delays in Project EA/permitting schedule.	Disadvantages: Local residents and tourist operators may perceive industrial water discharge to lakes/creeks as an infringement/disturbance, and resist the action which may lead to delays in Project EA/permitting schedule.	Disadvantages: Local residents and tourist operators may perceive industrial water discharge to lakes/creeks as an infringement/disturbance, and resist the action which may lead to delays in Project EA/permitting schedule.



Water Discharge Location – Effects to the Human Environment						
	Alternative	1	2	3	4	5
	Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
		resist the action which may lead to delays in Project EA/permitting schedule.				
	Effect on visual disturbance	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
	Potential for adverse health effects	See Public health and safety criteria	See Public health and safety criteria	See Public health and safety criteria	See Public health and safety criteria	See Public health and safety criteria
Infrastructure	Effect on local access	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
	Effect on power supply systems	N/A	N/A	N/A		
Public Health and Safety	Attainment of air quality point of impingement standards or scientifically defensible alternatives	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
	Effect on drinking water supply	Advantages: Treated effluent would be in compliance with final effluent standards required to attain or maintain receiving water protection of aquatic life standards, or scientifically defensible alternatives.	Advantages: Treated effluent would be in compliance with final effluent standards required to attain or maintain receiving water protection of aquatic life standards, or scientifically defensible alternatives.	Advantages: Treated effluent would be in compliance with final effluent standards required to attain or maintain receiving water protection of aquatic life standards, or scientifically defensible alternatives.	Advantages: Treated effluent would be in compliance with final effluent standards required to attain or maintain receiving water protection of aquatic life standards, or scientifically defensible alternatives.	Advantages: Treated effluent would be in compliance with final effluent standards required to attain or maintain receiving water protection of aquatic life standards, or scientifically defensible alternatives.
		Disadvantages: Potential for water quality effects in the event of an unintended release of effluent.	Disadvantages: Potential for water quality effects in the event of an unintended release of effluent.	Disadvantages: Potential for water quality effects in the event of an unintended release of effluent.	Disadvantages: Potential for water quality effects in the event of an unintended release of effluent.	Disadvantages: Potential for water quality effects in the event of an unintended release of effluent.
	Effect on local health services	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
Local Economy	Effect on local businesses and economic opportunities	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
	Effect on access for tourism operators	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A



Water Discharge Location – Effects to the Human Environment						
	Alternative	1	2	3	4	5
	Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
	and/or natural resource harvesters					
Tourism	Effect on local tourism	Advantages: Controlled discharge to Wabigoon Lake would limit potential for adverse effects to fisheries resources.	Advantages: Controlled discharge to Thunder Lake would limit potential for adverse effects to fisheries resources.	Advantages: Controlled discharge to Hartman Lake would limit potential for adverse effects to fisheries resources.	Advantages: Controlled discharge to Tree Nursery Ponds would limit potential for adverse effects to fisheries resources.	Advantages: Controlled discharge to Blackwater Creek would limit potential for adverse effects to fisheries resources.
		Disadvantages: Potential for perceived disruption of recreational use and fisheries.	Disadvantages: Potential for perceived disruption of recreational use and fisheries.	Disadvantages: Potential for perceived disruption of recreational use and fisheries.	Disadvantages: Potential for perceived disruption of recreational use and fisheries.	Disadvantages: Potential for perceived disruption of recreational use and fisheries.
Regional Economy	Effect on regional businesses and economic opportunities	Advantages: No known adverse effects.	Advantages: No known adverse effects.	Advantages: No known adverse effects.	Advantages: No known adverse effects.	Advantages: No known adverse effects.
		Disadvantages: If delays to the Project EA/permitting schedule were to occur due to a result of potential resident and tourism operator interests, there would be a corresponding delay in project related employment and business opportunities to the region.	Disadvantages: If delays to the Project EA/permitting schedule were to occur due to a result of potential resident and tourism operator interests, there would be a corresponding delay in project related employment and business opportunities to the region.	Disadvantages: If delays to the Project EA/permitting schedule were to occur due to a result of potential resident and tourism operator interests, there would be a corresponding delay in project related employment and business opportunities to the region.	Disadvantages: If delays to the Project EA/permitting schedule were to occur due to a result of potential resident and tourism operator interests, there would be a corresponding delay in project related employment and business opportunities to the region.	Disadvantages: If delays to the Project EA/permitting schedule were to occur due to a result of potential resident and tourism operator interests, there would be a corresponding delay in project related employment and business opportunities to the region.
Government Services	Effect on local government services and capacities	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
Resource management objectives	Effect on established resource management plans	Advantages: Effluent will only be discharged when in compliance with final effluent standards, in line with Federal and Provincial guidelines.	Advantages: Effluent will only be discharged when in compliance with final effluent standards, in line with Federal and Provincial guidelines.	Advantages: Effluent will only be discharged when in compliance with final effluent standards, in line with Federal and Provincial guidelines.	Advantages: Effluent will only be discharged when in compliance with final effluent standards, in line with Federal and Provincial guidelines.	Advantages: Effluent will only be discharged when in compliance with final effluent standards, in line with Federal and Provincial guidelines.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Built heritage and cultural heritage	Effect on any built heritage resource or cultural	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent



Water Discharge Location – Effects to the Human Environment							
	Alternative	1	2	3	4	5	
	Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek	
	heritage features						
	Alteration that is not sympathetic or is incompatible with the historic fabric and appearance of cultural heritage resources	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Isolation of a built heritage resource or heritage attribute from it surrounding environment, context or a significant relationship	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Direct or indirect obstruction of significant views or vistas within, from or of built heritage resources or cultural heritage landscapes	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	A change in land use	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Avoidance of damage to built heritage resources or cultural heritage landscapes, or document cultural resources if damage or relocation cannot be reasonably avoided	Advantages: Archeological and built heritage sites (if any) would be identified and avoided, or otherwise catalogued according to applicable regulations and standards. Any sites discovered during construction can be protected and/or avoided.	Advantages: Archeological and built heritage sites (if any) would be identified and avoided, or otherwise catalogued according to applicable regulations and standards. Any sites discovered during construction can be protected and/or avoided.	Advantages: Archeological and built heritage sites (if any) would be identified and avoided, or otherwise catalogued according to applicable regulations and standards. Any sites discovered during construction can be protected and/or avoided.	Advantages: Archeological and built heritage sites (if any) would be identified and avoided, or otherwise catalogued according to applicable regulations and standards. Any sites discovered during construction can be protected and/or avoided.	Advantages: Archeological and built heritage sites (if any) would be identified and avoided, or otherwise catalogued according to applicable regulations and standards. Any sites discovered during construction can be protected and/or avoided.	Advantages: Archeological and built heritage sites (if any) would be identified and avoided, or otherwise catalogued according to applicable regulations and standards. Any sites discovered during construction can be protected and/or avoided.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent



Water Discharge Location – Effects to the Human Environment							
	Alternative	1	2	3	4	5	
	Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek	
Archaeological resources	Effect on land disturbances	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Avoidance of archaeological sites or mitigation by excavation if avoidance is not possible, as per the Standards and Guidelines for Consultant Archaeologists (2010).	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	Advantages: Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise suitability catalogued and managed in accordance with applicable regulatory needs and commitments. Any sites discovered during construction can be protected and avoided.	Advantages: Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise suitability catalogued and managed in accordance with applicable regulatory needs and commitments. Any sites discovered during construction can be protected and avoided.	Advantages: Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise suitability catalogued and managed in accordance with applicable regulatory needs and commitments. Any sites discovered during construction can be protected and avoided.	Advantages: Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise suitability catalogued and managed in accordance with applicable regulatory needs and commitments. Any sites discovered during construction can be protected and avoided.	Advantages: Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise suitability catalogued and managed in accordance with applicable regulatory needs and commitments. Any sites discovered during construction can be protected and avoided.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: Controlled discharge to Wabigoon Lake would limit potential for adverse effects	Advantages: Controlled discharge to Thunder Lake would limit potential for adverse effects to	Advantages: Controlled discharge to Hartman Lake would limit potential for adverse effects to	Advantages: Controlled discharge to Tree Nursery Ponds would limit potential for adverse effects to	Advantages: Controlled discharge to Blackwater Creek would limit potential for adverse effects to fisheries resources.	



Water Discharge Location – Effects to the Human Environment						
	Alternative	1	2	3	4	5
	Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
		to fisheries resources.	fisheries resources.	fisheries resources.	fisheries resources.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Effects to Human Environment	Summary Evaluation and Rating	Water discharge to Wabigoon Lake would not be expected to have any adverse effects to the human environment during normal operations. Local residents and tourism operators along Wabigoon Lake may perceive industrial water discharge as an infringement/disturbance and resist the action.	Water discharge to Thunder Lake would not be expected to have any adverse effects to the human environment during normal operations. Local residents along Thunder Lake may perceive industrial water discharge as an infringement/disturbance and resist the action.	Water discharge to Hartman Lake would not be expected to have any adverse effects to the human environment during normal operations. Local residents and tourism operators along Hartman Lake may perceive industrial water discharge as an infringement/disturbance and resist the action.	Water discharge to the Tree Nursery ponds would not be expected to have any adverse effects to the human environment during normal operations. There are no residents or water users along the Tree Nursery Ponds and tributaries.	Water discharge to Blackwater Creek ponds would not be expected to have any adverse effects to the human environment during normal operations. There are no residents or water users along Blackwater Creek and tributaries.
		Summary Rating: Acceptable	Summary Rating: Acceptable	Summary Rating: Acceptable	Summary Rating: Acceptable	Summary Rating: Preferred

Water Discharge Location – Effects to the Physical and Biological Environments						
	Alternative	1	2	3	4	5
	Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
Criteria	Assessment					
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Emission rates of greenhouse gases (GHGs)	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Effect on aquatic life and habitat	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality	Advantages: Excess water and treated effluent to be discharged would be compliance with final Federal and Provincial effluent	Advantages: Excess water and treated effluent to be discharged would be compliance with final Federal and Provincial effluent standards required to attain	Advantages: Excess water and treated effluent to be discharged would be compliance with final Federal and Provincial effluent standards required to attain	Advantages: Excess water and treated effluent to be discharged would be compliance with final Federal and Provincial effluent standards required to attain	Advantages: Excess water and treated effluent to be discharged would be compliance with final Federal and Provincial effluent standards required to attain or maintain receiving water protection of



Water Discharge Location – Effects to the Physical and Biological Environments							
	Alternative	1	2	3	4	5	
	Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek	
if current conditions do not match PWQO		standards required to attain or maintain receiving water protection of aquatic life standards, or scientifically defensible alternatives.	or maintain receiving water protection of aquatic life standards, or scientifically defensible alternatives.	or maintain receiving water protection of aquatic life standards, or scientifically defensible alternatives.	or maintain receiving water protection of aquatic life standards, or scientifically defensible alternatives.	aquatic life standards, or scientifically defensible alternatives.	
		Disadvantages: Potential for effects on water quality effects in the event of an unintended release.	Disadvantages: Potential for effects on water quality effects in the event of an unintended release.	Disadvantages: Potential for effects on water quality effects in the event of an unintended release.	Disadvantages: Potential for effects on water quality effects in the event of an unintended release.	Disadvantages: Potential for effects on water quality effects in the event of an unintended release.	
	Management of water level in effected water bodies and streams to maintain aquatic life	Advantages: Water discharge during normal operation with Wabigoon Lake is not expected to alter associated aquatic or other habitats.	Advantages: Water discharge during normal operation with Thunder Lake is not expected to alter associated aquatic or other habitats.	Advantages: Water discharge during normal operation with Hartman Lake is not expected to alter associated aquatic or other habitats.	Advantages: Water discharge during normal operation with the Tree Nursery Ponds is not expected to alter associated aquatic or other habitats. Flow increases due to discharge could be seasonally offset by avoiding or minimizing discharge during high flow periods.	Advantages: Water discharge during normal operation with Blackwater Creek is not expected to alter associated aquatic or other habitats. Flow increases due to discharge could be seasonally offset by avoiding or minimizing discharge during high flow periods.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: As above	Disadvantages: As above	
	Maintenance of fish population	Advantages: Flow increases during water discharge are not expected to affect fish populations.	Advantages: Flow increases during water discharge are not expected to affect fish populations.	Advantages: Flow increases during water discharge are not expected to affect fish populations.	Advantages: Flow increases during water discharge are not expected to affect fish populations.	Advantages: Flow increases during water discharge are not expected to affect fish populations.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Maintenance of groundwater levels for both flows and quality	Local surface water and groundwater systems are not functionally connected.	Local surface water and groundwater systems are not functionally connected.	Local surface water and groundwater systems are not functionally connected.	Local surface water and groundwater systems are not functionally connected.	Local surface water and groundwater systems are not functionally connected.	
	Effect on wetlands	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current	See equivalent indicator in Effects on fish and aquatic habitat	See equivalent indicator in Effects on fish and aquatic habitat	See equivalent indicator in Effects on fish and aquatic habitat	See equivalent indicator in Effects on fish and aquatic habitat	See equivalent indicator in Effects on fish and aquatic habitat



Water Discharge Location – Effects to the Physical and Biological Environments						
	Alternative	1	2	3	4	5
	Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
	conditions do not match PWQO					
	Area, type and quality (functionality) of wetlands that would be displaced or altered	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
	Maintenance of wetland connectivity	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
Effect on terrestrial species and habitat	Area, type and quality of terrestrial habitat that would be displaced or altered	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
	Effects of noise disturbance generated by the project	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
	Maintenance of wildlife movement corridors and plant dispersion	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
	Effect on overall wildlife population	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
Effect on Species at Risk (SAR)	Sensitivity level of effected SAR (Endangered, Threatened, Special Concern)	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.
	Area, type and quality of SAR that would be displaced or altered	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat
	Effects of noise disturbance generated by the project	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat
	Maintenance of wildlife movement corridors and plant dispersion	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A



Water Discharge Location – Effects to the Physical and Biological Environments						
	Alternative	1	2	3	4	5
	Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
Effects to Physical and Biological Environments	Summary Evaluation and Rating	Water discharge to Wabigoon Lake would not alter aquatic and other habitat functions during normal operation, and will meet applicable effluent standards. Because of greater assimilative capacity the potential for aquatic impacts during a potential unintended release is less likely to cause aquatic impacts compare to the alternative. Flow would be managed to comply with water level controls for Wabigoon Lake. Summary Rating: Acceptable	Water discharge to Thunder Lake would not alter aquatic and other habitat functions during normal operation, and will meet applicable effluent standards. Because of greater assimilative capacity the potential for aquatic impacts during a potential unintended release is less likely to cause aquatic impacts compare to the alternative. Flow would be managed to comply with water level controls for Thunder Lake. Summary Rating: Acceptable	Water discharge to Thunder Lake would not alter aquatic and other habitat functions during normal operation, and will meet applicable effluent standards. Because of greater assimilative capacity the potential for aquatic impacts during a potential unintended release is less likely to cause aquatic impacts compare to the alternative. Summary Rating: Acceptable	Water discharge to the Tree Nursery Ponds would not alter aquatic and other habitat functions during normal operation, and will meet applicable effluent standards. Summary Rating: Acceptable	Water discharge to Blackwater Creek would not alter aquatic and other habitat functions during normal operation, and will meet applicable effluent standards. Summary Rating: Acceptable

Water Discharge Location – Potential ability for future closure/reclamation processes						
	Alternative	1	2	3	4	5
	Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
Criteria	Assessment					
Public Safety and Security	Effect on safety and security risks to the community and general public	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
Environmental Health and Long Term Sustainability	Effect on long term air quality and the ability to meet point of impingement standards	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
	Effect on long term water quality and the	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A



Water Discharge Location – Potential ability for future closure/reclamation processes						
	Alternative	1	2	3	4	5
	Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
	ability to meet water quality guidelines					
	Effect on long term wildlife habitats including SARs	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
Land Use	Effect on long term land uses	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
	Effect on long term visual appearance of Project Site	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
Closure and Reclamation	Summary Rating	There are no water discharge limitations or liabilities relating to site reclamation at closure. Summary Rating: Acceptable	There are no water discharge limitations or liabilities relating to site reclamation at closure. Summary Rating: Acceptable	There are no water discharge limitations or liabilities relating to site reclamation at closure. Summary Rating: Acceptable	There are no water discharge limitations or liabilities relating to site reclamation at closure. Summary Rating: Acceptable	There are no water discharge limitations or liabilities relating to site reclamation at closure. Summary Rating: Acceptable
Overall	Summary Rating	Wabigoon Lake is capable of meeting the Project's water discharge needs. Water discharge would be treated, restricted, and controlled and is not expected to have any adverse effects. Local and downstream users may perceive water discharge infrastructure as an infringement/disturbance and may resist such action, which could translate in EA and permitting delays. However, due to the assimilative capacity of Wabigoon Lake impacts to the aquatic environment	Thunder Lake is capable of meeting the Project's water discharge needs. Water discharge would be treated, restricted, and controlled and is not expected to have any adverse effects. Local and downstream users may perceive water discharge infrastructure as an infringement/disturbance and may resist such action, which could translate in EA and permitting delays. However, due to the assimilative capacity of Thunder Lake impacts to the aquatic environment and disruptions are less likely.	Hartman Lake is capable of meeting the Project's water discharge needs. Water discharge would be treated, restricted, and controlled and is not expected to have any adverse effects. Local and downstream users may perceive water discharge infrastructure as an infringement/disturbance and may resist such action, which could translate in EA and permitting delays. High operational, complex requirements of construction provide high risk to ROI and Project development. However, due to the assimilative capacity of Hartman Lake impacts to the aquatic	Blackwater Creek is capable of meeting the Project's water discharge needs. Water discharge would be treated, restricted, and controlled and is not expected to have any adverse effects. The potential risk to EA/permitting is reduce due to no residents living along the creek. In addition Blackwater Creek provides the lowest cost alternative and most suitable to Project development.	Blackwater Creek is capable of meeting the Project's water discharge needs. Water discharge would be treated, restricted, and controlled and is not expected to have any adverse effects. The potential risk to EA/permitting is reduce due to no residents living along the creek. In addition Blackwater Creek provides the lowest cost alternative and most suitable to Project development.



Water Discharge Location – Potential ability for future closure/reclamation processes						
Alternative	1	2	3	4	5	
Description	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek	
	and disruptions are less likely. Summary Rating; Acceptable	Summary Rating; Acceptable	environment and disruptions are less likely. Summary Rating; Unacceptable	Summary Rating; Preferred	Summary Rating; Preferred	



X.9 NON-HAZARDOUS WASTE

Alternatives Assessment – Non-Hazardous Waste				
Non-Hazardous Waste – Cost Effectiveness				
	Alternative	1	2	3
	Description	Acquire an off-site landfill	Develop an on-site landfill(s)	Truck waste to an existing off site landfill
Criteria	Assessment			
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: <ul style="list-style-type: none"> - Operated by Treasury Metals, eliminating the risk of operation delays. - Low operation cost (short haul) 	Advantages: <ul style="list-style-type: none"> - Operated by Treasury Metals, eliminating the risk of operation delays. - Low operation cost (short haul) 	Advantages: <ul style="list-style-type: none"> - Development of on-site landfill requirements will not be needed. - Operated by others, eliminating potential environmental and human environment effects on the Project site. - No closure costs required. - Some capital required for permitting
		Disadvantages: <ul style="list-style-type: none"> - Capital required for development. - Access roads would be required. - Closure costs required. - Potential liability risk which would require long term management and monitoring, requiring more capital. - Potentially longer haul distance. 	Disadvantages: <ul style="list-style-type: none"> - Capital required for development. - Access roads would be required. - Closure costs required. - Potential liability risk which would require long term management and monitoring, requiring more capital. 	Disadvantages: <ul style="list-style-type: none"> - Haul distances, depending on location, could be costly. - Dependent on external services.
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: <ul style="list-style-type: none"> - Low operating costs. 	Advantages: <ul style="list-style-type: none"> - Low operating costs. 	Advantages: <ul style="list-style-type: none"> - No closure costs. - Some capital required.
		Disadvantages: <ul style="list-style-type: none"> - Capital required for landfill acquisition. - Potential expansion may be required. 	Disadvantages: <ul style="list-style-type: none"> - Capital required for landfill development. 	Disadvantages: <ul style="list-style-type: none"> - Potentially high hauling costs.
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: <ul style="list-style-type: none"> - None Apparent. 	Advantages: <ul style="list-style-type: none"> - None Apparent. 	Advantages: <ul style="list-style-type: none"> - Some capital required.
		Disadvantages: <ul style="list-style-type: none"> - High capital costs. - Closer costs. - Risk of seepage with elevated concentrations. 	Disadvantages: <ul style="list-style-type: none"> - High capital costs. - Closer costs. - Risk of seepage with elevated concentrations. 	Disadvantages: <ul style="list-style-type: none"> - Dependent on out-source. - Potentially high hauling costs. - Risk of delayed, reliant on landfill provider.



Alternatives Assessment – Non-Hazardous Waste				
Non-Hazardous Waste – Cost Effectiveness				
	Alternative	1	2	3
	Description	Acquire an off-site landfill	Develop an on-site landfill(s)	Truck waste to an existing off site landfill
Cost Effectiveness	Summary Evaluation and Rating	Acquiring a landfill would allow Treasury Metals to have full control over the operational components of the landfill, however contains the same risks as alternative 2. Summary Rating: Acceptable	An on-site facility would allow Treasury Metals to have full control over the operational components of the landfill. This option would be the highest cost alternative providing additional costs upon closure. Furthermore, there is a risk of seepage with elevated concentrations which could lead to long-term liabilities, requiring post-closure monitoring and proper mitigation design. Summary Rating: Acceptable	This alternative has many advantages for the project as an off-site location is available in close proximity to the mine site. Following the closure of the mine, there would be no closure costs, and no risks or liabilities to Treasury Metals as alternatives 1 and 2 pose. Additionally, an off-site landfill requires less capital compared to the other alternatives. Summary Rating: Preferred

Non-Hazardous Waste – Technical feasibility and technical reliability				
	Alternative	1	2	3
	Description	Acquire an off-site landfill	Develop an on-site landfill(s)	Truck waste to an existing off site landfill
Criteria	Assessment			
Readily Available Technology	Has been successfully implemented in similar mining Projects and can be relied upon for sufficient performance over an extended period of time.	Advantages: - Proven technology used at other mine locations.	Advantages: - Proven technology used at other mine locations.	Advantages: - Proven technology used at other mine locations. - Usage at a regional waste management facility allows for recycling of material.
		Disadvantages: - None Apparent.	Disadvantages: - None apparent.	Disadvantages: - Reliance on external service.
	New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	N/A	N/A	N/A
Technical feasibility and technical reliability	Summary Evaluation and Rating	All alternatives are applicable and acceptable. Summary Rating: Acceptable	All alternatives are applicable and acceptable. Summary Rating: Acceptable	All alternatives are applicable and acceptable. Reliance on external service. Summary Rating: Preferred

Non-Hazardous Waste – Effects to the Human Environment				
	Alternative	1	2	3
	Description	Acquire an off-site landfill	Develop an on-site landfill(s)	Truck waste to an existing off site landfill
Criteria	Assessment			



Non-Hazardous Waste – Effects to the Human Environment				
	Alternative	1	2	3
	Description	Acquire an off-site landfill	Develop an on-site landfill(s)	Truck waste to an existing off site landfill
Local residents and recreational users	Effect on property values	N/A	Advantages: - None apparent.	N/A
			Disadvantages: - Development of landfill(s).	
	Effect on employment opportunities	Advantages: - Potential for employment opportunities.	Advantages: - Potential for employment opportunities.	Advantages: - Employment opportunities for third party.
			Disadvantages: - None apparent	
	Effect on local access points	N/A	N/A	Advantages: - Increased activity.
				Disadvantages: - Increased activity.
	Effect on current noise levels	Advantages: - Limited and temporary effect.	Advantages: - None apparent.	Advantages: - Limited and temporary effect.
			Disadvantages: - Potential noise levels by landfill activity.	
	Effect on water supply for both well water and drinking water	N/A	N/A	Advantages: - None Apparent.
				Disadvantages: - Greater potential for interference with high groundwater table on the Project site.
Effect on visual disturbance	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - Away from Project site.	
		Disadvantages: - None apparent.		Disadvantages: - None apparent.
Potential for adverse health effects	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.	
		Disadvantages: - None apparent.		Disadvantages: - Potential for increased local traffic, increased potential of accidents.
Infrastructure	Effect on local access	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - Increased traffic on local roads.	Disadvantages: - None apparent.	Disadvantages: - Increased traffic on local roads.
	Effect on power supply systems	N/A	N/A	N/A
Public Health and Safety	Attainment of air quality point of impingement standards or scientifically defensible alternatives	Advantages: - None Apparent.	Advantages: - None Apparent.	Advantages: - None Apparent.
		Disadvantages: - Trucking solid waste to off-site landfill location increases air emissions, likely below standards.	Disadvantages: - None Apparent.	Disadvantages: - Trucking solid waste to off-site landfill location increases air emissions, likely below standards.



Non-Hazardous Waste – Effects to the Human Environment				
	Alternative	1	2	3
	Description	Acquire an off-site landfill	Develop an on-site landfill(s)	Truck waste to an existing off site landfill
	Effect on drinking water supply	N/A	N/A	N/A
	Effect on local health services	N/A	N/A	N/A
Local Economy	Effect on local businesses and economic opportunities	Advantages: - Potential for employment opportunities.	Advantages: - Potential for employment opportunities.	Advantages: - Employment opportunities for third party.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
	Effect on access for tourism operators and/or natural resource harvesters	N/A	N/A	N/A
Tourism	Effect on local tourism	N/A	N/A	N/A
Regional Economy	Effect on regional businesses and economic opportunities	Advantages: - Waste management would result in an increase of employment needs.	Advantages: - Waste management would result in an increase of employment needs.	Advantages: - Increased potential for employment at regional landfill.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
Government Services	Effect on local government services and capacities	Advantages: - Landfill capacity would likely need increasing, which could benefit local residents.	Advantages: - None apparent.	N/A
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	
Resource management objectives	Effect on established resource management plans	N/A	N/A	N/A
Built heritage and cultural heritage	Effect on any built heritage resource or cultural heritage features	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
	Alteration that is not sympathetic or is incompatible with the historic fabric and appearance of cultural heritage resources	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
	Isolation of a built heritage resource or heritage attribute from it surrounding environment, context or a significant relationship	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
Disadvantages: - None apparent		Disadvantages: - None apparent.	Disadvantages: - None apparent.	



Non-Hazardous Waste – Effects to the Human Environment				
	Alternative	1	2	3
	Description	Acquire an off-site landfill	Develop an on-site landfill(s)	Truck waste to an existing off site landfill
	Direct or indirect obstruction of significant views or vistas within, from or of built heritage resources or cultural heritage landscapes	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
	A change in land use	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
Avoidance of damage to built heritage resources or cultural heritage landscapes, or document cultural resources if damage or relocation cannot be reasonably avoided	Advantages: - None apparent.	Advantages: - Archeological and built heritage sites (if any) would be identified and avoided, or otherwise catalogued according to applicable regulations and standards. - Any sites discovered during construction can be protected and/or avoided.	Advantages: - None apparent.	
	Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.	
Archaeological resources	Effect on land disturbances	Advantages: - Same as above.	Advantages: - Same as above.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
	Avoidance of archaeological sites or mitigation by excavation if avoidance is not possible, as per the Standards and Guidelines for Consultant Archaeologists (2010).	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	Advantages: - None apparent.	Advantages: - Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise	Advantages: - None apparent.



Non-Hazardous Waste – Effects to the Human Environment				
	Alternative	1	2	3
	Description	Acquire an off-site landfill	Develop an on-site landfill(s)	Truck waste to an existing off site landfill
			suitability catalogued and managed in accordance with applicable regulatory needs and commitments. - Any sites discovered during construction can be protected and avoided.	
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
Effects to Human Environment	Summary Evaluation and Rating	There is no appreciable or predicted effect or benefit to the human environment. Summary Rating: Acceptable	There is no appreciable or predicted effect or benefit to the human environment. Summary Rating: Acceptable	There would also be an increase in local business opportunities which would result in more employment opportunities, however there are no appreciable or predicted effect or benefit to the human environment. Summary Rating: Acceptable

Non-Hazardous Waste – Effects to the Physical and Biological Environments				
	Alternative	1	2	3
	Description	Acquire an off-site landfill	Develop an on-site landfill(s)	Truck waste to an existing off site landfill
Criteria	Assessment			
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: - Remote location of landfill limits effects of odors.	Advantages: - None apparent.	Advantages: - Remote location of landfill limits effects of odors.
		Disadvantages: - Trucking solid waste to an off-site landfill increases air emissions.	Disadvantages: - Potential odor effects could occur over a broader area.	Disadvantages: - Trucking solid waste to an off-site landfill increases air emissions.
	Emission rates of greenhouse gases (GHGs)	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - Hauling distance could increase GHG emissions.	Disadvantages: - None apparent.	Disadvantages: - Hauling distance could increase GHG emissions.
Effect on aquatic life and habitat	Fulfilment of water quality standards and guidelines for protection of aquatic	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages:	Disadvantages:	Disadvantages:



Non-Hazardous Waste – Effects to the Physical and Biological Environments				
	Alternative	1	2	3
	Description	Acquire an off-site landfill	Develop an on-site landfill(s)	Truck waste to an existing off site landfill
	life or ensuring no further degradation of water quality if current conditions do not match PWQO	- Potential leachate or seepage concerns, which can be mitigated through proper design and monitoring.	- Potential leachate or seepage concerns, which can be mitigated through proper design and monitoring.	- Potential leachate or seepage concerns, which can be mitigated through proper design and monitoring.
	Management of water level in effected water bodies and streams to maintain aquatic life	N/A	N/A	N/A
	Maintenance of fish population	N/A	N/A	N/A
	Maintenance of groundwater levels for both flows and quality	N/A	N/A	N/A
Effect on wetlands	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	See equivalent indicator in Effects on aquatic and habitat		
	Area, type and quality (functionality) of wetlands that would be displaced or altered	N/A	N/A	N/A
	Maintenance of wetland connectivity	N/A	N/A	N/A
Effect on terrestrial species and habitat	Area, type and quality of terrestrial habitat that would be displaced or altered	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - Could potentially attract unwanted wildlife.	Disadvantages: - Could potentially attract unwanted wildlife.	Disadvantages: - Could potentially attract unwanted wildlife.
	Effects of noise disturbance generated by the project	Advantages: - Minimal additional noise due to off-site.	Advantages: - Minimal noise would be generated from landfill operations.	Advantages: - Minimal additional noise due to off-site.
		Disadvantages: - Minor dust and noise emissions. - Potential for noise if expansion is required.	Disadvantages: - Potential for noise during construction phase.	Disadvantages: - Minor dust and noise emissions.
	Maintenance of wildlife movement corridors and plant dispersion	N/A	N/A	N/A
Effect on overall wildlife population	N/A	N/A	N/A	



Non-Hazardous Waste – Effects to the Physical and Biological Environments				
	Alternative	1	2	3
	Description	Acquire an off-site landfill	Develop an on-site landfill(s)	Truck waste to an existing off site landfill
Effect on Species at Risk (SAR)	Sensitively level of effected SAR (Endangered, Threatened, Special Concern)	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - Increases size of development and therefore, could potential effect SAR.	Disadvantages: - None apparent.
	Area, type and quality of SAR that would be displaced or altered	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat
	Effects of noise disturbance generated by the project	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat
	Maintenance of wildlife movement corridors and plant dispersion	N/A	N/A	N/A
Effects to Physical and Biological Environments	Summary Evaluation and Rating	GHG would temporarily increase during mine production for hauling. Minimal noise would be evident. Summary Rating: Acceptable	No off-site trucking would be required limiting GHG emissions, however with the creation of landfill(s) could increase the attraction of unwanted wildlife. Summary Rating: Acceptable	GHG would temporarily increase during mine production for hauling. Minimal noise would be evident. Summary Rating: Preferred

Non-Hazardous Waste – Potential ability for future closure/reclamation processes				
	Alternative	1	2	3
	Description	Acquire an off-site landfill	Develop an on-site landfill(s)	Truck waste to an existing off site landfill
Criteria	Assessment			
Public Safety and Security	Effect on safety and security risks to the community and general public	Advantages: - None apparent.	N/A	Advantages: - None apparent.
		Disadvantages: - Increase of local traffic.		Disadvantages: - Increase of local traffic.
Environmental Health and Long Term Sustainability	Effect on long term air quality and the ability to meet point of impingement standards	Advantages: - Remote locations limit effects of odor.	Advantages: - None apparent.	Advantages: - Remote locations limit effects of odor.
		Disadvantages: - None apparent.	Disadvantages: - Negligible odor effects, which can be mitigated upon closure.	Disadvantages: - None apparent.
	Effect on long term water quality and the ability to meet water quality guidelines	N/A	See equivalent indicator in Effect on fish and aquatic habitat.	N/A
	Effect on long term wildlife habitats including SARs	Advantages: - None apparent.	Advantages: - Terrestrial habitat for vegetation and wildlife species would be	N/A



Non-Hazardous Waste – Potential ability for future closure/reclamation processes				
	Alternative	1	2	3
	Description	Acquire an off-site landfill	Develop an on-site landfill(s)	Truck waste to an existing off site landfill
		Disadvantages: - Potential disturbance if expansion is required.	established at closure. Disadvantages: - Disturbance of a new site.	
Land Use	Effect on long term land uses	Advantages: - Opportunities for productive land uses associated with all alternatives, at closure, are limited mainly to the development of terrestrial habitat for vegetation and wildlife. Disadvantages: - None apparent.	Advantages: - Opportunities for productive land uses associated with all alternatives at closure are limited mainly to the development of terrestrial habitat for vegetation and wildlife. Disadvantages: - None apparent.	Advantages: - Opportunities for productive land uses associated with all alternatives at closure are limited mainly to the development of terrestrial habitat for vegetation and wildlife. Disadvantages: - None apparent.
	Effect on long term visual appearance of Project Site	Advantages: - All alternatives are broadly similar in their potential to develop an aesthetically pleasing site at closure. Disadvantages: - None apparent.	Advantages: - All alternatives are broadly similar in their potential to develop an aesthetically pleasing site at closure. Disadvantages: - None apparent.	N/A
	Closure and Reclamation	Summary Evaluation and Rating	No expected off-site property leachate migration following closure. The site can be returned to a productive vegetation habitat for terrestrial wildlife upon closure. Summary rating: Acceptable	No off-site property leachate migration or closure required. The site can be returned to a productive vegetation habitat for terrestrial wildlife upon closure. Summary rating: Acceptable
Overall Summary Rating		Acquiring an off-site landfill(s) would be an acceptable alternative, however there would capital required to purchase a landfill(s), potential expansion and closure. Furthermore, using an off-site location would potentially limit the Projects footprint from crushing and blasting required on-site, and air emissions. However, GHG emissions could potentially be increased. Hauling would increase local traffic and could potentially	An on-site landfill(s) provides acceptable alternatives to meet the Projects non-hazardous waste management needs, however requires higher capital costs. This alternative would allow Treasury Metals to have full control over the operational aspects of the landfill, reducing transportation emissions, and to ensure habitat would be restored upon mine closure.	This alternative is preferred as the capital cost required is minor and would not require any closure costs. A nearby off-site landfill is already suitable for the project's needs. Using an off-site location would potentially limit the Projects footprint from crushing and blasting required on-site, and air emissions. However, GHG emissions could potentially be increased. Hauling would increase local traffic and could potentially increase the risk of traffic accidents.



Non-Hazardous Waste – Potential ability for future closure/reclamation processes				
Alternative	1	2	3	
Description	Acquire an off-site landfill	Develop an on-site landfill(s)	Truck waste to an existing off site landfill	
	increase the risk of traffic accidents Unacceptable	Acceptable	Preferred	



X.10 DOMESTIC WASTE MANAGEMENT

Alternatives Assessment – Domestic Waste Management				
Domestic Waste Management – Cost Effectiveness				
	Alternative	1	2	3
	Description	Septic tanks and tile fields	Package sewage treatment plant	Trucking domestic sewage waste off-site to licensed treatment plant
Criteria	Assessment			
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: - More economic than off-site treatment.	Advantages: - More economic than off-site treatment. - Smallest footprint of all the alternatives.	Advantages: - Off-site treatment plant would be managed by others. - No closure costs required.
		Disadvantages: - Closure costs required.	Disadvantages: - Reduced closure costs required.	Disadvantages: - Greater operational costs due to hauling of wastes off-site.
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: - Potential for more competitive ROI compared to off-site treatment.	Advantages: - Potential for more competitive ROI compared to off-site treatment.	Advantages: - No closure costs.
		Disadvantages: - Tile field construction would require imported fill; land space for development of a tile field.	Disadvantages: - May or may not be cost comparative with a septic tank and tile system.	Disadvantages: - Greater operational costs would affect ROI.
Financial Risk	Provides a manageable or acceptable financial risk	All alternatives carry an equivalent (low) level financial risk.	All alternatives carry an equivalent (low) level financial risk.	All alternatives carry an equivalent (low) level financial risk.
Cost Effectiveness	Summary Evaluation and Rating	Based on the site conditions, the septic tank and tile field alternative would require additional material and site preparation. This alternative also requires capital for closure costs. Summary Rating: Acceptable	Package sewage treatment plants provide a cost-competitive, risk-free technology with reduced closure costs. This alternative may or may not be competitive with septic system. Summary Rating: Preferred	Reliable technology cost associated with trucking domestic waste is highest, making alternative less desirable. Summary Rating: Acceptable

Domestic Waste Management – Technical feasibility and technical reliability				
	Alternative	1	2	3
	Description	Septic tanks and tile fields	Package sewage treatment plant	Trucking domestic sewage waste off-site to licensed treatment plant
Criteria	Assessment			
Readily Available Technology	Has been successfully implemented in similar mining Projects and can be relied upon for sufficient	Advantages: - Proven and effective technology with low operation risks.	Advantages: - Proven and effective technology with low operation risks. - Smallest footprint compared to other options.	Advantages: Proven and effective technology with low operation risks.



Domestic Waste Management – Technical feasibility and technical reliability				
	Alternative	1	2	3
	Description	Septic tanks and tile fields	Package sewage treatment plant	Trucking domestic sewage waste off-site to licensed treatment plant
	performance over an extended period of time.	Disadvantages: - Technology is better suited to smaller scale operations.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
	New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	N/A	N/A	N/A
Technical feasibility and technical reliability	Summary Evaluation and Rating	This is a frequently applied and proven effective technology. Summary Rating: Acceptable	This is a frequently applied and proven effective technology. Summary Rating: Acceptable	This is a frequently applied and proven effective technology. Summary Rating: Preferred

Domestic Waste Management – Effects to the Human Environment				
	Alternative	1	2	3
	Description	Septic tanks and tile fields	Package sewage treatment plant	Trucking domestic sewage waste off-site to licensed treatment plant
Criteria	Assessment			
Local residents and recreational users	Effect on property values	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on employment opportunities	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - A third party would be required for transport of the sewage to the local sewage plant.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on local access points	N/A	N/A	N/A
	Effect on current noise levels	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on water supply for both well water and drinking water	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on visual disturbance	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Potential for adverse health effects	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent



Domestic Waste Management – Effects to the Human Environment				
	Alternative	1	2	3
	Description	Septic tanks and tile fields	Package sewage treatment plant	Trucking domestic sewage waste off-site to licensed treatment plant
Infrastructure	Effect on local access	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - Would utilize capacity from the local sewage treatment plant.
	Effect on power supply systems	All alternatives would draw power from the Provincial electrical grid.		
Public Health and Safety	Attainment of air quality point of impingement standards or scientifically defensible alternatives	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - Potential for air quality effects, which can be mitigated by proper design and remote location.	Disadvantages: - Potential for air quality effects, which can be mitigated by proper design and remote location.	Disadvantages: - Trucking sewage off-site to treatment plant increases air emissions. - Potential for air quality effects.
	Effect on drinking water supply	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on local health services	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
Local Economy	Effect on local businesses and economic opportunities	Advantages: - Third party may be required to transport sewage sludge if septic at capacity.	Advantages: - None apparent.	Advantages: - Third party may be required to transport sewage to the local treatment plant.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on access for tourism operators and/or natural resource harvesters	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
Tourism	Effect on local tourism	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
Regional Economy	Effect on regional businesses and economic opportunities	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - Third party may be required to transport sewage to the local treatment plant.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
Government Services	Effect on local government services and capacities	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
Resource management objectives	Effect on established resource management plans	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent



Domestic Waste Management – Effects to the Human Environment				
	Alternative	1	2	3
	Description	Septic tanks and tile fields	Package sewage treatment plant	Trucking domestic sewage waste off-site to licensed treatment plant
Built heritage and cultural heritage	Effect on any built heritage resource or cultural heritage features	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Alteration that is not sympathetic or is incompatible with the historic fabric and appearance of cultural heritage resources	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Isolation of a built heritage resource or heritage attribute from its surrounding environment, context or a significant relationship	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Direct or indirect obstruction of significant views or vistas within, from or of built heritage resources or cultural heritage landscapes	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	A change in land use	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Avoidance of damage to built heritage resources or cultural heritage landscapes, or document cultural resources if damage or relocation cannot be reasonably avoided	Advantages: - Archeological and built heritage sites (if any) would be identified and avoided, or otherwise catalogued according to applicable regulations and standards. - Any sites discovered during construction can be protected and/or avoided.	Advantages: - Archeological and built heritage sites (if any) would be identified and avoided, or otherwise catalogued according to applicable regulations and standards. - Any sites discovered during construction can be protected and/or avoided.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
Archaeological resources	Effect on land disturbances	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent



Domestic Waste Management – Effects to the Human Environment				
	Alternative	1	2	3
	Description	Septic tanks and tile fields	Package sewage treatment plant	Trucking domestic sewage waste off-site to licensed treatment plant
	Avoidance of archaeological sites or mitigation by excavation if avoidance is not possible, as per the Standards and Guidelines for Consultant Archaeologists (2010).	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	Advantages: - Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise suitability catalogued and managed in accordance with applicable regulatory needs and commitments. - Any sites discovered during construction can be protected and avoided.	Advantages: - Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise suitability catalogued and managed in accordance with applicable regulatory needs and commitments. - Any sites discovered during construction can be protected and avoided.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
Effects to Human Environment	Summary Evaluation and Rating	There is no appreciable or predicted effect or benefit to the human environment. Summary Rating: Acceptable	There is no appreciable or predicted effect or benefit to the human environment. Summary Rating: Acceptable	Handling of the sewage by a third party allows for local business opportunities. Summary Rating: Acceptable



Domestic Waste Management – Effects to the Physical and Biological Environments					
	Alternative	1	2	3	
	Description	Septic tanks and tile fields	Package sewage treatment plant	Trucking domestic sewage waste off-site to licensed treatment plant	
Criteria	Assessment				
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.	
		Disadvantages: - Potential for air quality effects, which can be mitigated by proper design and remote location.	Disadvantages: - Potential for air quality effects, which can be mitigated by proper design and remote location.	Disadvantages: - Trucking sewage off-site to treatment plant increases air emissions. - Potential for air quality effects.	
	Emission rates of greenhouse gases (GHGs)	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.	
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - Trucking sewage off-site to treatment plan increases GHG emissions.	
Effect on aquatic life and habitat	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.	
		Disadvantages: - Potential for effects on water quality due to seepage from tile field, however this option would be designed to prevent/mitigate effects on the receiving environment.	Disadvantages: - Potential for effects on water quality due to discharge of processed effluent, however this option would be designed to meet discharge criteria.	Disadvantages: - Potential effects on water quality in event of a vehicular incident.	
	Management of water level in effected water bodies and streams to maintain aquatic life	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.	
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent	
	Maintenance of fish population	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.	
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent	
	Maintenance of groundwater levels for both flows and quality	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.	
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent	
	Effect on wetlands	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
			Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent



Domestic Waste Management – Effects to the Physical and Biological Environments				
	Alternative	1	2	3
	Description	Septic tanks and tile fields	Package sewage treatment plant	Trucking domestic sewage waste off-site to licensed treatment plant
	not match PWQO			
	Area, type and quality (functionality) of wetlands that would be displaced or altered	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Maintenance of wetland connectivity	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
Effect on terrestrial species and habitat	Area, type and quality of terrestrial habitat that would be displaced or altered	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - Limited disturbance over small area for the holding tank.
		Disadvantages: - Limited potential for habitat disruption, however it would be located to minimize any effect.	Disadvantages: - Limited potential for habitat disruption, however it would be located to minimize any effect.	Disadvantages: - Disturbances would occur due to off-site hauling activities.
	Effects of noise disturbance generated by the project	Advantages: - Limited to no potential for noise disturbances.	Advantages: - Limited to no potential for noise disturbances.	Advantages: - Limited to no potential for noise disturbances.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
Effect on overall wildlife population	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.	
	Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent	
Effect on Species at Risk (SAR)	Sensitivity level of effected SAR (Endangered, Threatened, Special Concern)	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - Domestic waste would be trucked off-site to an existing treatment plant.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Area, type and quality of SAR that would be displaced or altered	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat
	Effects of noise disturbance generated by the project	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent



Domestic Waste Management – Effects to the Physical and Biological Environments				
	Alternative	1	2	3
	Description	Septic tanks and tile fields	Package sewage treatment plant	Trucking domestic sewage waste off-site to licensed treatment plant
Effects to Physical and Biological Environments	Summary Evaluation and Rating	With proper design, effects on the physical and biological environment will be minimal. Summary Rating: Acceptable	With proper design, effects on the physical and biological environment are not anticipated. Summary Rating: Acceptable	Physical and biological environment are not anticipated. Due to trucking sewage off-site, the environmental effects can potentially affect a greater area compared to the alternatives. Summary Rating: Acceptable

Domestic Waste Management – Potential ability for future closure/reclamation processes				
	Alternative	1	2	3
	Description	Septic tanks and tile fields	Package sewage treatment plant	Trucking domestic sewage waste off-site to licensed treatment plant
Criteria	Assessment			
Public Safety and Security	Effect on safety and security risks to the community and general public	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
Environmental Health and Long Term Sustainability	Effect on long term air quality and the ability to meet point of impingement standards	Advantages: - Potential to be fully removed. - If tile material is hauled off-site it would reduce required closure measures.	Advantages: - Full removal of package sewage plant from the Project site at closure.	Advantages: - Full removal of storage tanks from the Project site at closure.
		Disadvantages: - If tile material reclaimed on site, potential for extended temporary odor effects.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
	Effect on long term water quality and the ability to meet water quality guidelines	See equivalent indicator in Effect on fish and aquatic habitat.	See equivalent indicator in Effect on fish and aquatic habitat.	Advantages: - No discharge water or seepage.
				Disadvantages: - None apparent.
	Restoration of passive drainage systems	Advantages: - Passive drainage would be re-established after closure.	Advantages: - Passive drainage would be re-established after closure.	N/A
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	
Effect on long term wildlife habitats including SARs	Advantages: - Terrestrial habitat for vegetation and wildlife species would be established at closure.	Advantages: - Terrestrial habitat for vegetation and wildlife species would be established at closure.	N/A	
	Disadvantages: - None apparent.	Disadvantages: - None apparent.		
Land Use	Effect on long term land uses	Advantages:	Advantages:	Advantages: - None apparent.



Domestic Waste Management – Potential ability for future closure/reclamation processes				
	Alternative	1	2	3
	Description	Septic tanks and tile fields	Package sewage treatment plant	Trucking domestic sewage waste off-site to licensed treatment plant
		<ul style="list-style-type: none"> - Opportunities for productive land uses associated with all alternatives at closure are limited mainly to the development of terrestrial habitat for vegetation and wildlife. 	<ul style="list-style-type: none"> - Opportunities for productive land uses associated with all alternatives at closure are limited mainly to the development of terrestrial habitat for vegetation and wildlife. 	
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
	Effect on long term visual appearance of Project Site	Advantages: <ul style="list-style-type: none"> - All alternatives are broadly similar in their potential to develop an aesthetically pleasing site at closure. 	Advantages: <ul style="list-style-type: none"> - All alternatives are broadly similar in their potential to develop an aesthetically pleasing site at closure. 	N/A
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	
Overall	Summary Rating	All alternatives provide an effective and reliable alternative to meet Project domestic sewage management needs. The septic tank and tile field alternative requires more capital and land, with potential for capacity constraints. Summary Rating: Acceptable	All alternatives provide an effective and reliable alternative to meet Project domestic sewage management needs. The package sewage treatment plant alternative provides a low risk, and cost-competitive technology without capacity constraints. Summary Rating: Acceptable	All alternatives provide an effective and reliable alternative to meet Project domestic sewage management needs. The trucking of domestic waste to an off-site alternative has a higher operational cost, and dependence on an external service provider. Initial capital costs are lower, and there are no capacity constraints. Summary Rating: Preferred



X.11 AGGREGATE SUPPLY

Alternatives Assessment – Aggregate Supply				
Aggregate Supply – Cost Effectiveness				
	Alternative	1	2	3
	Description	Overburden/Mine Rock	On-Site Aggregate pit	Commercial off-site aggregate pits
Criteria	Assessment			
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: - Low sulphide rock better suited for some types of concrete manufacture.	Advantages: - Low sulphide rock better suited for some types of concrete manufacture.	Advantages: - Development of on-site pits or crushing requirements will not be needed. - No closure costs required.
		Disadvantages: - Closure costs required. - Crushing Required.	Disadvantages: - Crushing may be required. - Blasting may be required. - Closure costs required.	Disadvantages: - Haul distances, depending on location, could be costly. - Dependent on out-source.
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: - Use of mine rock would limit footprint (no additional pits).	Advantages: - Aggregate rock can potentially be suitable for other construction purposes.	Advantages: - No closure costs.
		Disadvantages: - Material required for concrete manufacture of sulphide content.	Disadvantages: - High operational costs.	Disadvantages: - Potentially high hauling costs.
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: - High operational costs.	Advantages: - High operational costs.	Advantages: - High operational costs.
		Disadvantages: - High operational costs. - Closer costs. - Potentially low aggregate supply if mining plans increase.	Disadvantages: - High operational costs. - Closer costs. - Potential disturbance to residents from blasting.	Disadvantages: - Dependent on out-source. - Potentially high hauling costs. - Potential disturbance to residents depending on location of supplier.
Cost Effectiveness	Summary Evaluation and Rating	Based on the site conditions, mine rock (PAG) would be available which suits no other purpose to the mine site, except possibly for some types of concrete manufacture. Costs would be high for crushing to produce fine aggregate.	There are no on-site aggregate pit(s) which would require high operational costs and start-up capital. On site pit(s) would reduce hauling costs, however blasting would be required which increases the projects footprint and increases the disturbance to local residents and wildlife. Crushing costs could also be	This alternative has many advantages for the project as an off-site location aggregate supply is available in close proximity to the mine site. Following the closure of the mine, there would be no closure costs. Hauling costs could be costly.



		Summary Rating: Acceptable	additional if pit(s) are comprised of glacial deposits and till. Summary Rating: Acceptable	Summary Rating: Preferred
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Aggregate Supply – Technical feasibility and technical reliability				
	Alternative	1	2	3
	Description	Overburden/Mine Rock	On-Site Aggregate pit	Commercial off-site aggregate pits
Criteria	Assessment			
Readily Available Technology	Has been successfully implemented in similar mining Projects and can be relied upon for sufficient performance over an extended period of time.	Advantages: - Predictably effective.	Advantages: - Predictably effective.	Advantages: - Predictably effective.
		Disadvantages: - None Apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
	New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	N/A	N/A	N/A
Technical feasibility and technical reliability	Summary Evaluation and Rating	All alternatives are applicable and acceptable. Summary Rating: Acceptable	All alternatives are applicable and acceptable. Summary Rating: Acceptable	All alternatives are applicable and acceptable. Reliance on external sources. Summary Rating: Preferred

Aggregate Supply – Effects to the Human Environment				
	Alternative	1	2	3
	Description	Overburden/Mine Rock	On-Site Aggregate pit	Commercial Off-site Aggregate Pit(s)
Criteria	Assessment			
Local residents and recreational users	Effect on property values	N/A	Advantages: - None apparent.	N/A
			Disadvantages: - Development of pit(s).	
	Effect on employment opportunities	Advantages: - Potential for employment opportunities. Disadvantages: - None apparent	Advantages: - Potential for employment opportunities.	Advantages: - Employment opportunities for third party.
			Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on local access points	N/A	N/A	Advantages: - Increased activity. Disadvantages: - Increased activity.
Effect on current noise levels	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - Limited and temporary effect.	



Aggregate Supply – Effects to the Human Environment				
Alternative	1	2	3	
Description	Overburden/Mine Rock	On-Site Aggregate pit	Commercial Off-site Aggregate Pit(s)	
	Disadvantages: - Increased activity as a result from crushing and potential blasting.	Disadvantages: - Increased activity as a result from crushing and blasting.	Disadvantages: - None apparent	
Effect on water supply for both well water and drinking water	Advantages: - None apparent. Disadvantages: - None apparent.	Advantages: - None apparent. Disadvantages: - None apparent.	N/A	
Effect on visual disturbance	Advantages: - None apparent. Disadvantages: - None apparent.	Advantages: - None apparent. Disadvantages: - None apparent.	Advantages: - None apparent. Disadvantages: - None apparent.	
Potential for adverse health effects	Advantages: - None apparent. Disadvantages: - None apparent.	Advantages: - None apparent. Disadvantages: - None apparent.	Advantages: - None apparent. Disadvantages: - Potential for increased local traffic, increased potential for accidents.	
Infrastructure	Effect on local access	Advantages: - None apparent. Disadvantages: - None apparent.	Advantages: - None apparent. Disadvantages: - None apparent.	Advantages: - None apparent. Disadvantages: - Increased traffic on local roads.
	Effect on power supply systems	N/A	N/A	N/A
Public Health and Safety	Attainment of air quality point of impingement standards or scientifically defensible alternatives	Advantages: - Mitigation measures can be put in place to achieve compliance with air quality point of impingement standards. Disadvantages: - Crushing increases air missions.	Advantages: - Mitigation measures can be put in place to achieve compliance with air quality point of impingement standards. Disadvantages: - Blasting and crushing generates increased air emissions.	Advantages: - Mitigation measures can be put in place to achieve compliance with air quality point of impingement standards. Disadvantages: - None Apparent.
	Effect on drinking water supply	N/A	N/A	N/A
	Effect on local health services	N/A	N/A	N/A
Local Economy	Effect on local businesses and economic opportunities	Advantages: - Potential for employment opportunities. Disadvantages: - None apparent.	Advantages: - Potential for employment opportunities. Disadvantages: - None apparent.	Advantages: - Employment opportunities for third party. Disadvantages: - None apparent.
	Effect on access for tourism operators	Advantages: - None apparent. Disadvantages:	Advantages: - None apparent. Disadvantages:	Advantages: - None apparent. Disadvantages:



Aggregate Supply – Effects to the Human Environment				
	Alternative	1	2	3
	Description	Overburden/Mine Rock	On-Site Aggregate pit	Commercial Off-site Aggregate Pit(s)
	and/or natural resource harvesters	- None apparent.	- None apparent.	- None apparent.
Tourism	Effect on local tourism	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
Regional Economy	Effect on regional businesses and economic opportunities	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
Government Services	Effect on local government services and capacities	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
Resource management objectives	Effect on established resource management plans	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
Built heritage and cultural heritage	Effect on any built heritage resource or cultural heritage features	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
	Alteration that is not sympathetic or is incompatible with the historic fabric and appearance of cultural heritage resources	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Isolation of a built heritage resource or heritage attribute from it surrounding environment, context or a significant relationship	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Direct or indirect obstruction of significant views or vistas within, from or of built heritage resources or cultural heritage landscapes	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	A change in land use	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Avoidance of damage to built heritage resources or cultural heritage landscapes, or document cultural resources if damage or relocation cannot be reasonably avoided	Advantages: - Archeological and built heritage sites (if any) would be identified and avoided, or otherwise catalogued according to applicable	Advantages: - Archeological and built heritage sites (if any) would be identified and avoided, or otherwise catalogued according to applicable regulations and standards.	Advantages: - None apparent.



Aggregate Supply – Effects to the Human Environment				
Alternative	1	2	3	
Description	Overburden/Mine Rock	On-Site Aggregate pit	Commercial Off-site Aggregate Pit(s)	
	<ul style="list-style-type: none"> regulations and standards. - Any sites discovered during construction can be protected and/or avoided. 	<ul style="list-style-type: none"> - Any sites discovered during construction can be protected and/or avoided. 		
	Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.	
Archaeological resources	Effect on land disturbances	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
	Avoidance of archaeological sites or mitigation by excavation if avoidance is not possible, as per the Standards and Guidelines for Consultant Archaeologists (2010).	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	Advantages: <ul style="list-style-type: none"> - Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise suitability catalogued and managed in accordance with applicable regulatory needs and commitments. - Any sites discovered during construction can be protected and avoided. 	Advantages: <ul style="list-style-type: none"> - Spiritual, ceremonial, cultural heritage and archeological sites would be identified through Traditional Knowledge and archeological studies and would be avoided or otherwise suitability catalogued and managed in accordance with applicable regulatory needs and commitments. - Any sites discovered during construction can be protected and avoided. 	Advantages: <ul style="list-style-type: none"> - None apparent.



Aggregate Supply – Effects to the Human Environment				
	Alternative	1	2	3
	Description	Overburden/Mine Rock	On-Site Aggregate pit	Commercial Off-site Aggregate Pit(s)
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
Effects to Human Environment	Summary Evaluation and Rating	There is no appreciable or predicted effect or benefit to the human environment. Summary Rating: Acceptable	There is no appreciable or predicted effect or benefit to the human environment. Summary Rating: Acceptable	The use of an off-site aggregate supply would result in increased traffic on local roads which potentially increases the risk or frequency of traffic accidents. There would also be an increase in local business opportunities which would result in more employment opportunities. Summary Rating: Acceptable

Aggregate Supply – Effects to the Physical and Biological Environments				
	Alternative	1	2	3
	Description	Overburden/Mine Rock	On-Site Aggregate pit	Commercial off-site aggregate pits
Criteria	Assessment			
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: - Mitigation measures can be put in place to achieve compliance with air quality point of impingement standards.	Advantages: - Mitigation measures can be put in place to achieve compliance with air quality point of impingement standards.	Advantages: - Mitigation measures can be put in place to achieve compliance with air quality point of impingement standards.
		Disadvantages: - Crushing generates increased air emissions.	Disadvantages: - Blasting and crushing generates increased air emissions.	Disadvantages: - Off-site crushing would generate increased air emissions.
	Emission rates of greenhouse gases (GHGs)	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - Power for crushing may be required, and machinery used for crushing would result in increased GHG emissions	Disadvantages: - Power for crushing and blasting may be required, and machinery used for crushing would result in increased GHG emissions.	Disadvantages: - Hauling distance would increase GHG emissions.
Effect on aquatic life and habitat	Fulfilment of water quality standards and guidelines for protection of	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages:	Disadvantages:	Disadvantages:



Aggregate Supply – Effects to the Physical and Biological Environments				
Alternative	1	2	3	
Description	Overburden/Mine Rock	On-Site Aggregate pit	Commercial off-site aggregate pits	
aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	- Pit(s) discharge water would contain ammonia residuals from blasting material, if additional blasting is required, which would result in management. In addition due to PAG material ARD would be concern to local aquatic life and habitat.	- Pit(s) discharge water would contain ammonia residuals from blasting material, if additional blasting is required, which would result in management.	- Pit(s) discharge water would contain ammonia residuals from blasting material, if additional blasting is required, which would result in management.	
Management of water level in effected water bodies and streams to maintain aquatic life	N/A	N/A	N/A	
Maintenance of fish population	N/A	N/A	N/A	
Maintenance of groundwater levels for both flows and quality	N/A	N/A	N/A	
Effect on wetlands	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO			
	See equivalent indicator in Effects on aquatic and habitat			
Area, type and quality (functionality) of wetlands that would be displaced or altered	N/A	N/A	N/A	
Maintenance of wetland connectivity	N/A	N/A	N/A	
Effect on terrestrial species and habitat	Area, type and quality of terrestrial habitat that would be displaced or altered	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - Limited disturbance depending on external source.
		Disadvantages: - Limited potential for habitat disruption.	Disadvantages: - Limited potential for habitat disruption.	Disadvantages: - Disturbances would occur due to off-site hauling activities.
	Effects of noise disturbance	Advantages: - None Apparent.	Advantages: - None Apparent.	Advantages: - Activity would be minor and temporary.



Aggregate Supply – Effects to the Physical and Biological Environments				
	Alternative	1	2	3
	Description	Overburden/Mine Rock	On-Site Aggregate pit	Commercial off-site aggregate pits
	generated by the project	Disadvantages: - Additional air, dust and noise emissions.	Disadvantages: - Additional air, dust and noise emissions.	Disadvantages: - Minor dust and noise emissions.
	Maintenance of wildlife movement corridors and plant dispersion	N/A	N/A	N/A
	Effect on overall wildlife population	N/A	N/A	N/A
Effect on Species at Risk (SAR)	Sensitively level of effected SAR (Endangered, Threatened, Special Concern)	Advantages: - No impediment to development due to a continued use of the existing pit(s).	Advantages: - None apparent.	Advantages: - Location of pit(s) likely sited away from the SAR habitat and managed by the supplier.
		Disadvantages: - Increased disturbance to SAR species that have been recorded near the site.	Disadvantages: - Increased disturbance to SAR species that have been recorded near the site.	Disadvantages: - None apparent.
	Area, type and quality of SAR that would be displaced or altered	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat
	Effects of noise disturbance generated by the project	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat
	Maintenance of wildlife movement corridors and plant dispersion	N/A	N/A	N/A
Effects to Physical and Biological Environments	Summary Evaluation and Rating	Additional air and dust emissions would be temporary and intermittent with blasting and crushing. Summary Rating: Acceptable	Additional air and dust emissions would be temporary and intermittent with blasting and crushing. There would be additional habitat disturbance from the use of blasting and crushing. Summary Rating: Acceptable	There is potential for temporary emissions from crushing and blasting if off-site source requires additional aggregate supply. GHG would temporarily increase during mine production for hauling. Summary Rating: Acceptable

Aggregate Supply – Potential ability for future closure/reclamation processes				
	Alternative	1	2	3
	Description	Overburden/Mine Rock	On-Site Aggregate pit	Commercial off-site aggregate pits
Criteria	Assessment			
Public Safety and Security	Effect on safety and security risks to the community and general public	Advantages: - Safety and security during all phases of the Project development,	Advantages: - Safety and security during all phases of the Project development, ensuring compliance	Advantages: - Safety and security during all phases of the Project development, ensuring



Aggregate Supply – Potential ability for future closure/reclamation processes				
	Alternative	1	2	3
	Description	Overburden/Mine Rock	On-Site Aggregate pit	Commercial off-site aggregate pits
		ensuring compliance with applicable regulations.	with applicable regulations.	compliance with applicable regulations.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
Environmental Health and Long Term Sustainability	Effect on long term air quality and the ability to meet point of impingement standards	N/A	N/A	N/A
	Effect on long term water quality and the ability to meet water quality guidelines	See equivalent indicator in Effect on fish and aquatic habitat.	See equivalent indicator in Effect on fish and aquatic habitat.	N/A
	Restoration of passive drainage systems	Advantages: - Alternative would allow for the development of passive drainage systems.	Advantages: - Alternative would allow for the development of passive drainage systems.	N/A
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	
	Effect on long term wildlife habitats including SARs	Advantages: - Terrestrial habitat for vegetation and wildlife species would be established at closure.	Advantages: - Terrestrial habitat for vegetation and wildlife species would be established at closure.	N/A
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	
Land Use	Effect on long term land uses	Advantages: - The use of Mine rock limits the Project footprint	Advantages: - Opportunities for productive land uses associated with all alternatives at closure are limited mainly to the development of terrestrial habitat for vegetation and wildlife.	Advantages: - Opportunities for productive land uses associated with all alternatives at closure are limited mainly to the development of terrestrial habitat for vegetation and wildlife.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
	Effect on long term visual appearance of Project Site	Advantages: - All alternatives are broadly similar in their potential to develop an aesthetically pleasing site at closure.	Advantages: - All alternatives are broadly similar in their potential to develop an aesthetically pleasing site at closure.	N/A
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	



Aggregate Supply – Potential ability for future closure/reclamation processes				
Alternative	1	2	3	
Description	Overburden/Mine Rock	On-Site Aggregate pit	Commercial off-site aggregate pits	
Closure and Reclamation	<p>This alternative has the potential to reduce remaining mine rock (PAG) wastes at the end of the mine life.</p> <p>Summary rating: Acceptable</p>	<p>The potential creation of on-site pit(s) could be rehabilitated to provide terrestrial and or aquatic habitats.</p> <p>Summary rating: Acceptable</p>	<p>Depending on the external source, the potential for such pit(s) could likely be rehabilitated for terrestrial and or aquatic habitats.</p> <p>Summary rating: Preferred</p>	
Overall Summary Rating	<p>The use of mine rock extracted to support mining activities, and construction is potentially viable, however providing suitable material to meet the needs for construction within the Project site is not likely due to the fact that majority of the mine rock is PAG. Furthermore, PAG material is unsuitable for environmental measures, creating and increasing more potential risks.</p> <p>Unacceptable</p>	<p>On-site aggregate pits provide a cost-effective alternative that can provide material for construction and Project development. However, no existing on-site aggregate pit(s) are present, creating high operational costs, and significant capital expenditure. Additional equipment, crushing, and blasting will be required which would increase the disturbance to local residents and wildlife. Increased air emissions would also be present to produce a sufficient supply for the Project's needs. This alternative has the potential to generate terrestrial and aquatic habitats upon closure.</p> <p>Acceptable</p>	<p>Suitable aggregate / construction material cannot be obtained from the Project property, therefore it is preferred. Using an off-site location would potential limit the Projects footprint from crushing and blasting required on-site, and air emissions. However, GHG emissions could potentially be increased. Hauling would increase local traffic and could potentially increase the risk of traffic accidents.</p> <p>Preferred</p>	



X.12 WASTE ROCK STORAGE AREA LOCATION

Alternatives Assessment – Waste Rock Storage Area Location				
Waste Rock Storage Area Location – Cost Effectiveness				
	Alternative	1	2	3
Criteria	Description	WRSA to North of Pit	WRSA to South of Pit	Combination of Surface storage North of Pit and In-pit storage
	Assessment			
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: None Apparent	Advantages: None Apparent	Advantages: None Apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent	Disadvantages: None Apparent
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: None Apparent	Advantages: None Apparent	Advantages: Lower overall haulage costs due to shorter hauls to outside of pit, less closure costs due to lower overall footprint of rock on surface
		Disadvantages: None Apparent	Disadvantages: None Apparent	Disadvantages: None Apparent
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: None Apparent	Advantages: None Apparent	Advantages: Maximized profitability over entire project mine life, minimized early mine life risk
		Disadvantages: None Apparent	Disadvantages: None Apparent	Disadvantages: None
Summary Rating		Acceptable	Acceptable	Preferred

Waste Rock Storage Area Location – Technical feasibility and technical reliability				
	Alternative	1	2	3
Criteria	Description	WRSA to North of Pit	WRSA to South of Pit	Combination of Surface storage North of Pit and In-pit storage
	Assessment			
Readily Available Technology	Has been successfully implemented in similar mining Projects and can be relied upon for sufficient performance over an extended period of time.	Advantages: Using readily available and proven technology	Advantages: Using readily available and proven technology	Advantages: Using readily available and proven technology
		Disadvantages: None	Disadvantages: Does not allow for vertical Underground ventilation raises to meet surface south of the open pit	Disadvantages: None
	New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	Advantages: Not Applicable	Advantages: Not Applicable	Advantages: Not Applicable
Disadvantages: Not Applicable		Disadvantages: Not Applicable	Disadvantages: Not Applicable	
Summary Rating		Acceptable	Acceptable	Preferred



Waste Rock Storage Area Location – Effects to the environment, including human, physical and biological environments				
Alternative	1	2	3	
Description	WRSA to North of Pit	WRSA to South of Pit	Combination of Surface storage North of Pit and In-pit storage	
Criteria	Assessment			
Local residents and recreational users	Effect on property values	Advantages: None apparent	Advantages: None apparent	Advantages: Smaller overall height and footprint will reduce visual effects of the WRSA
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on employment opportunities	Advantages: Not Applicable	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable	Disadvantages: Not Applicable
	Effect on local access points	Advantages: None apparent	Advantages: None apparent	Advantages: Smaller overall footprint
		Disadvantages: None apparent	Disadvantages: Reduced long term access to Norman's road west of Tree Nursery Road	Disadvantages: None apparent
	Effect on current noise levels	Advantages: Attainment of provincial guidelines is probable	Advantages: None apparent	Advantages: Shorter timeline for surface noise elevations
		Disadvantages: Elevated noise levels as trucks continue climbing WRSA for dump operations as opposed to dumping within completed open pits	Disadvantages: Closer to property boundary, attainment of provincial guidelines still probable,	Disadvantages: None apparent
	Effect on water supply for both well water and drinking water	Advantages: None apparent	Advantages: None apparent	Advantages: Reduced volume of water needed to fill final pit will reduce filling time and hence reduced possibility of neighboring well drawdown
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on visual disturbance	Advantages: None apparent	Advantages: None apparent	Advantages: Progressive reclamation/vegetation of open pit waste rock while mine continues operation, smaller overall rock piles
		Disadvantages: Waste rock visible from certain vantage points, higher volume stored on surface results in higher overall dump height	Disadvantages: Waste rock visible from certain vantage points, higher volume stored on surface results in higher overall dump height, close to southern property boundary hence greater possibility of visual effect from south	Disadvantages: None apparent
	Potential for adverse health effects	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Infrastructure	Effect on local access	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Reduced long term access to Norman's road west of Tree Nursery Road	Disadvantages: None apparent
	Effect on power supply systems	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent



Waste Rock Storage Area Location – Effects to the environment, including human, physical and biological environments				
	Alternative	1	2	3
	Description	WRSA to North of Pit	WRSA to South of Pit	Combination of Surface storage North of Pit and In-pit storage
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Public Health and Safety	Attainment of air quality point of impingement standards or scientifically defensible alternatives	Advantages: Further from southern property boundary	Advantages: None apparent	Advantages: Reduced overall volumes of rock hauled to surface will reduce possibility of dust from mining operations
		Disadvantages: None apparent	Disadvantages: Closer to southern property boundary, attainment of provincial guidelines still probable,	Disadvantages: None apparent
	Effect on drinking water supply	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on local health services	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
Disadvantages: None apparent		Disadvantages: None apparent	Disadvantages: None apparent	
Local Economy	Effect on local businesses and economic opportunities	Advantages: Not Applicable	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable	Disadvantages: Not Applicable
	Effect on access for tourism operators and/or natural resource harvesters	Advantages: None apparent	Advantages: None apparent	Advantages: Reduced overall footprint of mine rock storage
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Tourism	Effect on local tourism	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land	Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land	Disadvantages: None apparent
Regional Economy	Effect on regional businesses and economic opportunities	Advantages: Not Applicable	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable	Disadvantages: Not Applicable
Government Services	Effect on local government services and capacities	Advantages: Not Applicable	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable	Disadvantages: Not Applicable
Resource management objectives	Effect on established resource management plans	Advantages: None apparent	Advantages: None apparent	Advantages: Possible smaller overall footprint for WRSA
		Disadvantages: Minor reduction in forest management area for WRSA footprint	Disadvantages: Minor reduction in forest management area for WRSA footprint	Disadvantages: None apparent
Built heritage and cultural heritage	Effect on any built heritage resource or cultural heritage features	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Alteration that is not sympathetic or is incompatible with the historic fabric and appearance of cultural heritage resources	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Isolation of a built heritage resource or	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent



Waste Rock Storage Area Location – Effects to the environment, including human, physical and biological environments				
	Alternative	1	2	3
	Description	WRSA to North of Pit	WRSA to South of Pit	Combination of Surface storage North of Pit and In-pit storage
	heritage attribute from it surrounding environment, context or a significant relationship	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Direct or indirect obstruction of significant views or vistas within, from or of built heritage resources or cultural heritage landscapes	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
	A change in land use	Advantages: None apparent	Advantages: Smaller overall footprint	Advantages: None apparent
		Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land	Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land	Disadvantages: None apparent
	Avoidance of damage to built heritage resources or cultural heritage landscapes, or document cultural resources if damage or relocation cannot be reasonably avoided	Advantages: None apparent	Advantages: Smaller overall footprint	Advantages: None apparent
		Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land	Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land	Disadvantages: None apparent
Archaeological resources	Effect on land disturbances	Advantages: None apparent	Advantages: None apparent	Advantages: Possible smaller overall footprint for WRSA
		Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land	Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat on non-private land	Disadvantages: None apparent
	Avoidance of archaeological sites or mitigation by excavation if avoidance is not possible, as per the Standards and Guidelines for Consultant Archaeologists (2010).	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	Advantages: Not Applicable	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable	Disadvantages: Not Applicable
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Traditional Land use		Advantages: None apparent	Advantages: None apparent	Advantages: Smaller overall footprint



Waste Rock Storage Area Location – Effects to the environment, including human, physical and biological environments					
Alternative	1	2	3		
	Description	WRSA to North of Pit	WRSA to South of Pit	Combination of Surface storage North of Pit and In-pit storage	
	Effect on Traditional Land use as caused by the project	Disadvantages: Greater overall footprint from mining operations result in minor loss of access to non-private land	Disadvantages: Greater overall footprint from mining operations result in minor loss of access to non-private land	Disadvantages: None apparent	
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: None apparent	Advantages: None apparent	Advantages: Smaller overall footprint	
		Disadvantages: Greater overall footprint from mining operations result in minor loss of access to non-private land	Disadvantages: Greater overall footprint from mining operations result in minor loss of access to non-private land	Disadvantages: None apparent	
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: None apparent	Advantages: None apparent	Advantages: Reduced dust and emissions for reduced haulage routes	
		Disadvantages: Greater potential for increased dust emissions from surface operations due to longer haul routes needed	Disadvantages: Greater potential for increased dust emissions from surface operations due to longer haul routes needed	Disadvantages: None apparent	
	Emission rates of greenhouse gases (GHGs)	Advantages: None apparent	Advantages: None apparent	Advantages: Less GHGs emitted due to shorter overall haulage routes	
		Disadvantages: Greater emissions due to longer overall haulage routes	Disadvantages: Greater emissions due to longer overall haulage routes	Disadvantages: None apparent	
Effect on aquatic life and habitat	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Management of water level in effected water bodies and streams to maintain aquatic life	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Maintenance of fish population	Advantages: None apparent	Advantages: None apparent	Advantages: Reduced volume of water needed to fill final pit will reduce filling time and hence provide accelerated fish habitat creation	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Maintenance of groundwater levels for both flows and quality	Advantages: None apparent	Advantages: None apparent	Advantages: Reduced volume of water needed to fill final pit will reduce filling time and hence reduced time to return to steady state groundwater levels	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
	Effect on wetlands	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
			Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent



Waste Rock Storage Area Location – Effects to the environment, including human, physical and biological environments				
	Alternative	1	2	3
	Description	WRSA to North of Pit	WRSA to South of Pit	Combination of Surface storage North of Pit and In-pit storage
	further degradation of water quality if current conditions do not match PWQO			
	Area, type and quality (functionality) of wetlands that would be displaced or altered	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Maintenance of wetland connectivity	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Effect on terrestrial species and habitat	Area, type and quality of terrestrial habitat that would be displaced or altered	Advantages: None apparent	Advantages: None apparent	Advantages: Smaller overall footprint
		Disadvantages: Greater overall footprint from mining operations result in minor loss of habitat	Advantages: None apparent	Disadvantages: None apparent
	Effects of noise disturbance generated by the project	Advantages: None apparent	Advantages: None apparent	Advantages: Minimal reduction in noise effects due to shorter haulage routes
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Effect on overall wildlife population	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent	
	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	
Effect on Species at Risk (SAR)	Sensitivity level of effected SAR (Endangered, Threatened, Special Concern)	Advantages:	Advantages:	Advantages:
		Disadvantages:	Disadvantages:	Disadvantages:
	Area, type and quality of SAR that would be displaced or altered	Advantages:	Advantages:	Advantages:
		Disadvantages:	Disadvantages:	Disadvantages:
	Effects of noise disturbance generated by the project	Advantages:	Advantages:	Advantages:
		Disadvantages:	Disadvantages:	Disadvantages:
Maintenance of wildlife movement corridors and plant dispersion	Advantages:	Advantages:	Advantages:	
	Disadvantages:	Disadvantages:	Disadvantages:	
Summary Rating		Acceptable	Acceptable	Preferred



Waste Rock Storage Area Location – Potential ability for future closure/reclamation processes				
	Alternative	1	2	3
	Description	WRSA to North of Pit	WRSA to South of Pit	Combination of Surface storage North of Pit and In-pit storage
Criteria	Assessment			
Public Safety and Security	Effect on safety and security risks to the community and general public	Advantages: None Apparent	Advantages: None apparent	Advantages: Reduced volume of final Open pit to be filled with water will be reduced, allowing for shorter time period to fill and reach full closure
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Environmental Health and Long Term Sustainability	Effect on long term air quality and the ability to meet point of impingement standards	Advantages: None Apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent	Disadvantages: None Apparent
	Effect on long term water quality and the ability to meet water quality guidelines	Advantages: None Apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent	Disadvantages: None Apparent
	Effect on long term wildlife habitats including SARs	Advantages: None Apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent	Disadvantages: None Apparent
Land Use	Effect on long term land uses	Advantages: None Apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent	Disadvantages: None Apparent
	Effect on long term visual appearance of Project Site	Advantages: None Apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: Change in topography for reclaimed waste rock storage areas closer to property boundary	Disadvantages: None Apparent
Summary Rating		Acceptable	Acceptable	Preferred



X.13 OPEN PIT CLOSURE

Alternative Assessment – Open Pit Closure			
Open Pit Closure – Cost Effectiveness			
	Alternative	1	2
	Description	Natural Flooding	Enhanced Flooding
Criteria	Assessment		
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: Reduced site management needed for water management systems while open pit floods with water.	Advantages: Shorter time for confirmation of closure to point where no financial liability remains for company is reduced. Reduces overall risk to project
		Disadvantages: Slower overall closure timelines increase risk timelines.	Disadvantages: Delayed cost and financial liability for the removal of any enhanced flooding systems needed after the majority of mine closure has been completed
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: None Apparent	Advantages: None Apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: None Apparent	Advantages: None Apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
Summary Rating		Acceptable	Preferred

<u>Open Pit Closure - Technical feasibility and technical reliability</u>			
	Alternative	1	2
	Description	Natural Flooding	Enhanced Flooding
Criteria	Assessment		
Readily Available Technology	Has been successfully implemented in similar mining Projects and can be relied upon for sufficient performance over an extended period of time.	Advantages: None Apparent	Advantages: None Apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
	New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable
Summary Rating		Acceptable	Acceptable



<u>Open Pit Closure - Effects to the environment, including human, physical and biological environments</u>			
	Alternative	1	2
	Description	Natural Flooding	Enhanced Flooding
Criteria	Assessment		
Local residents and recreational users	Effect on property values	Advantages: None apparent	Advantages: Reduced time to reach a stable, reclaimed environment which could have a marginal effect on surrounding property values.
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on employment opportunities	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on local access points	Advantages: None apparent	Advantages: Reduced time to reach a stable reclaimed environment to which public would regain full access to crown lands
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on current noise levels	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on water supply for both well water and drinking water	Advantages: None apparent	Advantages: Reduced time for pit flooding to occur will reduce time period which there is risk to surrounding water users from drawdown cone of influence from surrounding ground water.
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on visual disturbance	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Potential for adverse health effects	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Infrastructure	Effect on local access	Advantages: None apparent	Advantages: None apparent
		Disadvantages: Increased time that open pit will take to fill during which access will be limited.	Disadvantages: Reduced access to site area as water management systems will remain in place.
	Effect on power supply systems	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent



<u>Open Pit Closure - Effects to the environment, including human, physical and biological environments</u>			
	Alternative	1	2
	Description	Natural Flooding	Enhanced Flooding
Public Health and Safety	Attainment of air quality point of impingement standards or scientifically defensible alternatives	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on drinking water supply	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on local health services	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable
Local Economy	Effect on local businesses and economic opportunities	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable
	Effect on access for tourism operators and/or natural resource harvesters	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Tourism	Effect on local tourism	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Regional Economy	Effect on regional businesses and economic opportunities	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable
Government Services	Effect on local government services and capacities	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable
Resource management objectives	Effect on established resource management plans	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Built heritage and cultural heritage	Effect on any built heritage resource or	Advantages: None apparent	Advantages: None apparent



<u>Open Pit Closure - Effects to the environment, including human, physical and biological environments</u>			
	Alternative	1	2
	Description	Natural Flooding	Enhanced Flooding
	cultural heritage features	Disadvantages: None apparent	Disadvantages: None apparent
	Alteration that is not sympathetic or is incompatible with the historic fabric and appearance of cultural heritage resources	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Isolation of a built heritage resource or heritage attribute from it surrounding environment, context or a significant relationship	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Direct or indirect obstruction of significant views or vistas within, from or of built heritage resources or cultural heritage landscapes	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	A change in land use	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Avoidance of damage to built heritage resources or cultural heritage landscapes, or document cultural resources if damage or relocation cannot be reasonably avoided	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Archaeological resources	Effect on land disturbances	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Avoidance of archaeological sites or mitigation by excavation if avoidance is not possible, as per the Standards and Guidelines for Consultant Archaeologists (2010).	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable



<u>Open Pit Closure - Effects to the environment, including human, physical and biological environments</u>			
	Alternative	1	2
	Description	Natural Flooding	Enhanced Flooding
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Emission rates of greenhouse gases (GHGs)	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Effect on aquatic life and habitat	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Advantages: None apparent	Advantages: Allows open pit to reach a chemically stable environment in a shorter time period.
		Disadvantages: None apparent	Disadvantages: Directs water from the Blackwater creek watershed to the open pit area.
	Management of water level in effected water bodies and streams to maintain aquatic life	Advantages: None apparent	Advantages: Allows open pit to reach a chemically stable environment in a shorter time period. Will provide fish habitat in a shorter time period
		Disadvantages: None apparent	Disadvantages: Directs water from the Blackwater creek watershed to the open pit area during flooding process.
	Maintenance of fish population	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Maintenance of groundwater levels for both flows and quality	Advantages: None apparent	Advantages: Reduced time for pit flooding to occur will reduce time period which there is risk to surrounding water users from drawdown cone of influence from surrounding ground water.
			Will reach a steady environmental state over reduced timelines



<u>Open Pit Closure - Effects to the environment, including human, physical and biological environments</u>				
	Alternative	1	2	
	Description	Natural Flooding	Enhanced Flooding	
		Disadvantages: None apparent	Disadvantages: None apparent	
Effect on wetlands	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Area, type and quality (functionality) of wetlands that would be displaced or altered	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Maintenance of wetland connectivity	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
Effect on terrestrial species and habitat	Area, type and quality of terrestrial habitat that would be displaced or altered	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Effects of noise disturbance generated by the project	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Effect on overall wildlife population	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: None apparent	Disadvantages: None apparent	
	Effect on Species at Risk (SAR)	Sensitivity level of effected SAR (Endangered, Threatened, Special Concern)	Advantages: None apparent	Advantages: None apparent
			Disadvantages: None apparent	Disadvantages: None apparent
		Area, type and quality of SAR that would be displaced or altered	Advantages: None apparent	Advantages: None apparent



<u>Open Pit Closure - Effects to the environment, including human, physical and biological environments</u>			
	Alternative	1	2
	Description	Natural Flooding	Enhanced Flooding
		Disadvantages: None apparent	Disadvantages: None apparent
	Effects of noise disturbance generated by the project	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Summary Rating		Acceptable	Preferred

<u>Open Pit Closure - Potential ability for future closure/reclamation processes</u>			
	Alternative	1	2
	Description	Natural Flooding	Enhanced Flooding
Criteria	Assessment		
Public Safety and Security	Effect on safety and security risks to the community and general public	Advantages: None Apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Environmental Health and Long Term Sustainability	Effect on long term air quality and the ability to meet point of impingement standards	Advantages: None Apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
	Effect on long term water quality and the ability to meet water quality guidelines	Advantages: None Apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
	Effect on long term wildlife habitats including SARs	Advantages: None Apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
Land Use	Effect on long term land uses	Advantages: None Apparent	Advantages: None apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
	Effect on long term visual appearance of Project Site	Advantages: None Apparent	Advantages: None apparent



<u>Open Pit Closure - Potential ability for future closure/reclamation processes</u>			
	Alternative	1	2
	Description	Natural Flooding	Enhanced Flooding
		Disadvantages: None Apparent	Disadvantages: None Apparent
Summary Rating		Acceptable	Acceptable



X.14 BUILDING CLOSURE

Alternatives Assessment - Building Closure			
Building Closure – Cost Effectiveness			
	Alternative	1	2
	Description	Disassembly and Removal	Re-use of acceptable buildings
Criteria	Assessment		
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: - No buildings or associated infrastructure will remain in place post-closure.	Advantages: - Closure costs may be reduced due to leaving buildings and structures intact in addition to retention of access roads and associated infrastructure.
		Disadvantages: - Closure costs required.	Disadvantages: - None apparent. - Any buildings remaining for alternate use will need to be secured for public safety.
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - Closure costs.
Financial Risk	Provides a manageable or acceptable financial risk	All alternatives carry an equivalent (low) level financial risk.	All alternatives carry an equivalent (low) level financial risk.
Cost Effectiveness	Summary Evaluation and Rating	Disassembly and removal of all Project buildings is a common practice and requires closure to be consistent with the land use determined through closure planning. This alternative requires additional capital. Summary Rating: Acceptable	Some buildings associated such as the OMNR Tree Nursery facility may be maintained for extended and alternative future use either by Treasury Metals. The re-use of such facilities will lower closure costs associated with the Project. Summary Rating: Preferred

Building Closure – Technical feasibility and technical reliability			
	Alternative	1	2
	Description	Disassembly and Removal	Re-use of acceptable buildings
Criteria	Assessment		
Readily Available Technology	Has been successfully implemented in similar mining Projects and can be relied upon for sufficient performance over an extended period of time.	N/A	N/A
		N/A	N/A
	New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	N/A	N/A
		N/A	N/A
Technical feasibility and technical reliability	Summary Evaluation and Rating	N/A	N/A



Building Closure – Effects to the Human Environment			
	Alternative	1	2
	Description	Disassembly and Removal	Re-use of acceptable buildings
Criteria	Assessment		
Local residents and recreational users	Effect on property values	Advantages: - None apparent	Advantages: - Property value may be improved by maintain some buildings for alternative use such as OMNR Tree Nursery.
		Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on employment opportunities	Advantages: - None apparent.	Advantages: - If buildings are maintained for use by local residents or communities, some employment opportunities may arise.
		Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on local access points	Advantages: - None apparent.	Advantages: - Area would be reclaimed akin to pre-Project conditions which necessitates the need for the maintenance of some access roads.
		Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on current noise levels	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on water supply for both well water and drinking water	Advantages: - No known potential interference with area well users.	Advantages: - No known potential interference with area well users.
		Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on visual disturbance	Advantages: - None apparent.	Advantages: - Area would be reclaimed akin to pre-Project conditions, thereby some of the buildings may be perceived as a visual disturbance.
		Disadvantages: - None apparent	Disadvantages: - None apparent
	Potential for adverse health effects	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent
Infrastructure	Effect on local access	Advantages: - None apparent.	Advantages: - Area would be reclaimed akin to pre-Project conditions.
		Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on power supply systems	N/A	Advantages; - Of some buildings are left in place, such as the Project Office the power line can be left in place, thereby reducing closure costs.
			Disadvantages: - None apparent.
Public Health and Safety	Attainment of air quality point of impingement standards or scientifically defensible alternatives	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on drinking water supply	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent



Building Closure – Effects to the Human Environment			
Alternative	1	2	
	Description	Disassembly and Removal	Re-use of acceptable buildings
	Effect on local health services	Advantages: - None apparent. Disadvantages: - None apparent	Advantages: - None apparent. Disadvantages: - None apparent
Local Economy	Effect on local businesses and economic opportunities	Advantages: - If drainages are maintained, some employment opportunities may arise (monitoring/maintenance). Disadvantages: - None apparent	Advantages: - Area would be reclaimed akin to pre-Project conditions, allowing for recreational and traditional land use. - Employment opportunities may be generated for closure and removal activities. Disadvantages: - None apparent
	Effect on access for tourism operators and/or natural resource harvesters	Advantages: - None apparent. Disadvantages: - None apparent	Advantages: - Area would be reclaimed akin to pre-Project conditions. Disadvantages: - None apparent
Tourism	Effect on local tourism	N/A	N/A
		N/A	N/A
Regional Economy	Effect on regional businesses and economic opportunities	Advantages: - None apparent. Disadvantages: - None apparent	Advantages: - Employment opportunities may be generated if opportunities arise in buildings that are maintained. Disadvantages: - None apparent
Government Services	Effect on local government services and capacities	N/A	N/A
		N/A	N/A
Resource management objectives	Effect on established resource management plans	N/A	N/A
		N/A	N/A
Built heritage and cultural heritage	Effect on any built heritage resource or cultural heritage features	N/A	N/A
		N/A	N/A
	Alteration that is not sympathetic or is incompatible with the historic fabric and appearance of cultural heritage resources	N/A	N/A
		N/A	N/A
	Isolation of a built heritage resource or heritage attribute from its surrounding environment, context or a significant relationship	N/A	N/A
		N/A	N/A
	Direct or indirect obstruction of significant views or vistas within, from or of built heritage resources or cultural heritage landscapes	N/A	N/A
		N/A	N/A
	A change in land use	N/A	N/A
		N/A	N/A
N/A		N/A	



Building Closure – Effects to the Human Environment			
	Alternative	1	2
	Description	Disassembly and Removal	Re-use of acceptable buildings
	Avoidance of damage to built heritage resources or cultural heritage landscapes, or document cultural resources if damage or relocation cannot be reasonably avoided	N/A	N/A
Archaeological resources	Effect on land disturbances	N/A	N/A
		N/A	N/A
Archaeological resources	Avoidance of archaeological sites or mitigation by excavation if avoidance is not possible, as per the Standards and Guidelines for Consultant Archaeologists (2010).	N/A	N/A
		N/A	N/A
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	N/A	N/A
		N/A	N/A
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	N/A	N/A
		N/A	N/A
Traditional Land use	Effect on Traditional Land use as caused by the project	N/A	N/A
		N/A	N/A
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	N/A	N/A
		N/A	N/A
Effects to Human Environment	Summary Evaluation and Rating	There are no notable affects to the human environment with this alternative. Summary Rating: Acceptable	This alternative may provide opportunities for alternate use of buildings by First Nation, or public enterprises. Additionally the re-use of the buildings will allow for lower closure costs. Summary Rating: Preferred

Building Closure – Effects to the Physical and Biological Environments			
	Alternative	1	2
	Description	Disassembly and Removal	Re-use of acceptable buildings
Criteria	Assessment		
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: - Mitigation measures can be put into place to ensure compliance with applicable air quality standards and impingement standards.	Advantages: - Mitigation measures can be put into place to ensure compliance with applicable air quality standards and impingement standards.
		Disadvantages: - None apparent	Disadvantages: - None apparent
	Emission rates of greenhouse gases (GHGs)	Advantages: - None apparent	Advantages: - None apparent



Building Closure – Effects to the Physical and Biological Environments			
	Alternative	1	2
	Description	Disassembly and Removal	Re-use of acceptable buildings
		Disadvantages: - Disassembly of buildings will require equipment resulting in GHG emissions.	Disadvantages: - Disassembly of buildings will require equipment resulting in GHG emissions.
Effect on aquatic life and habitat	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	N/A	N/A
		N/A	N/A
	Management of water level in effected water bodies and streams to maintain aquatic life	N/A	N/A
		N/A	N/A
	Maintenance of fish population	N/A	N/A
		N/A	N/A
Maintenance of groundwater levels for both flows and quality	N/A	N/A	
	N/A	N/A	
Effect on wetlands	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	N/A	N/A
		N/A	N/A
	Area, type and quality (functionality) of wetlands that would be displaced or altered	N/A	N/A
		N/A	N/A
	Maintenance of wetland connectivity	N/A	N/A
		N/A	N/A
Effect on terrestrial species and habitat	Area, type and quality of terrestrial habitat that would be displaced or altered	N/A	N/A
		N/A	N/A
	Effects of noise disturbance generated by the project	N/A	N/A
		N/A	N/A
	Maintenance of wildlife movement corridors and plant dispersion	N/A	N/A
		N/A	N/A
	Effect on overall wildlife population	N/A	N/A
		N/A	N/A
Effect on Species at Risk (SAR)	Sensitively level of effected SAR (Endangered, Threatened, Special Concern)	N/A	Advantages: - Leaving buildings in place does not preclude the development of terrestrial habitat closure in other capacities.
		N/A	Disadvantages: - Reduced area for terrestrial habitat post-closure.



Building Closure – Effects to the Physical and Biological Environments			
	Alternative	1	2
	Description	Disassembly and Removal	Re-use of acceptable buildings
	Area, type and quality of SAR that would be displaced or altered	N/A	N/A
	Effects of noise disturbance generated by the project	Advantages: - None apparent.	N/A
		Disadvantages: - Potential for noise disturbances dues to closure operations.	N/A
	Maintenance of wildlife movement corridors and plant dispersion	N/A	N/A
N/A		N/A	
Effects to Physical and Biological Environments	Summary Evaluation and Rating	<p>Terrestrial habitat would be reclaimed and left undisturbed by buildings. Closure would result in noise disturbance potentially to terrestrial species.</p> <p>Summary Rating: Acceptable</p>	<p>Any air emission would be associated with buildings that are disassembled. Terrestrial habitat would be reclaimed where buildings are removed. Buildings such as the Project Office that have the potential for re-use do not preclude the development of terrestrial habitat in other means around the Project Office and its land package.</p> <p>Summary Rating: Preferred</p>

Building Closure – Potential ability for future closure/reclamation processes			
	Alternative	1	2
	Description	Disassembly and Removal	Re-use of acceptable buildings
Criteria	Assessment		
Public Safety and Security	Effect on safety and security risks to the community and general public	Advantages: - None apparent.	Advantages: - Any buildings left for alternate use would be prepared for public safety and security.
		Disadvantages: - None apparent	Disadvantages: - None apparent
Environmental Health and Long Term Sustainability	Effect on long term air quality and the ability to meet point of impingement standards	N/A	N/A
		N/A	N/A
	Effect on long term water quality and the ability to meet water quality guidelines	N/A	N/A
		N/A	N/A
	Effect on long term wildlife habitats including SARs	N/A	N/A
		N/A	N/A
Land Use	Effect on long term land uses	Advantages: - Removal of buildings from site followed by closure activities would provide terrestrial habitat for vegetation and wildlife.	Advantages: - Any buildings left for alternate use would be available for other land uses and opportunities.
		Disadvantages: - None apparent	Disadvantages: - This option does not preclude the opportunities of generation of other habitat for wildlife and vegetation.
	Effect on long term visual appearance of Project Site	Advantages: - Generation of wildlife and vegetation habitat	Advantages: - None apparent.



Building Closure – Potential ability for future closure/reclamation processes			
	Alternative	1	2
	Description	Disassembly and Removal	Re-use of acceptable buildings
		not impeded by human development.	
		Disadvantages: - None apparent	Disadvantages: - None apparent
Closure and Reclamation	Summary Rating	Removal of all buildings upon site closure would generate habitat that is unobstructed by human development and needs. Summary Rating: Acceptable	Re-use of buildings could provide alternative land uses for the Project area. Reclamation and generation of habitat would be reduced with this option. Summary Rating; Acceptable
Overall	Summary Rating	Removal and disassembly of is a common industry practice and a requirement of closure planning, to be consistent with future use of the land. This alternative requires increased capital costs associated with closure costs; however it would provide an unobstructed terrestrial environment. Summary Rating: Acceptable	This alternative allows for the use of some buildings in an alternative capacity by First Nations or public use. This option would reduce costs of closure by leaving associated infrastructure in place such the power line to the Project Office. This could potentially add to the value of property in the area. The generation of habitat is not precluded in this alternative but would be reduced compared to the alternative. Summary Rating; Preferred



X.15 INFRASTRUCTURE CLOSURE

Alternatives Assessment - Infrastructure Closure				
Infrastructure Closure – Cost Effectiveness				
		Alternative		
	Alternative	1	2	3
	Description	Decontamination and Removal	Leave in place for future use	Reclaim in Place
Criteria	Assessment			
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: - No infrastructure will remain in place post-closure. - All environmental effects will be decontaminated and cleaned up according to applicable guidelines.	Advantages: - Closure costs may be reduced due to leaving infrastructure for alternative use. - All environmental effects will be decontaminated and cleaned up according to applicable guidelines.	Advantages: - Closure costs may be reduced due to leaving infrastructure for alternative use and reclaimed in place. - All environmental effects will be decontaminated and cleaned up according to applicable guidelines.
		Disadvantages: - Closure costs required.	Disadvantages: - Closure costs required.	Disadvantages: - Closure costs required. - May require ongoing environmental monitoring and maintenance.
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - Closure costs.	Disadvantages:
Financial Risk	Provides a manageable or acceptable financial risk	N/A	N/A	N/A
Cost Effectiveness	Summary Evaluation and Rating	Disassembly and removal of all infrastructure is a common practice and requires closure to be consistent with the land use determined through closure planning. This alternative requires additional capital. Summary Rating: Acceptable	Some buildings infrastructure may be maintained for extend or alternate uses. This will reduce closure costs associated with the Project. Summary Rating: Acceptable	In-place reclamation of infrastructure is common, but may add additional costs associated with on-going monitoring. Summary Rating: Acceptable

Infrastructure Closure – Technical feasibility and technical reliability				
	Alternative	1	2	3
	Description	Decontamination and Removal	Leave in place for future use	Reclaim in Place
Criteria	Assessment			
Readily Available Technology	Has been successfully implemented in similar mining	N/A	N/A	N/A
		N/A	N/A	N/A



Infrastructure Closure – Technical feasibility and technical reliability				
Alternative	1	2	3	
Description	Decontamination and Removal	Leave in place for future use	Reclaim in Place	
Projects and can be relied upon for sufficient performance over an extended period of time.				
New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	N/A	N/A	N/A	
	N/A	N/A	N/A	
Technical feasibility and technical reliability	Summary Evaluation and Rating	N/A	N/A	N/A

Infrastructure Closure – Effects to the Human Environment				
Alternative	1	2	3	
Description	Decontamination and Removal	Leave in place for future use	Reclaim in Place	
Criteria	Assessment			
Local residents and recreational users	Effect on property values	Advantages: - None apparent.	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Advantages: - None apparent.
	Effect on employment opportunities	Advantages: - Local business may benefit from employment opportunities during closure activities.	Advantages: - If infrastructure is maintained for use by local residents or communities, some employment opportunities may arise.	Advantages: - Local business may benefit from employment opportunities during closure activities.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on local access points	Advantages: - None apparent.	Advantages: - Area would be reclaimed akin to pre-Project conditions which necessitates the need for the maintenance of some access roads.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on current noise levels	N/A	N/A	N/A
		N/A	N/A	N/A
	Effect on water supply for both well water and drinking water	N/A	N/A	N/A
		N/A	N/A	N/A
	N/A	Advantages:	N/A	



Infrastructure Closure – Effects to the Human Environment				
	Alternative	1	2	3
	Description	Decontamination and Removal	Leave in place for future use	Reclaim in Place
	Effect on visual disturbance		- Area would be reclaimed akin to pre-Project conditions, thereby some of the buildings may be perceived as a visual disturbance.	
		Disadvantages: - None apparent	Disadvantages: - None apparent	
	Potential for adverse health effects	N/A N/A	N/A N/A	N/A N/A
Infrastructure	Effect on local access	N/A	N/A	N/A
		N/A	N/A	N/A
	Effect on power supply systems	N/A	N/A	N/A
		N/A	N/A	N/A
Public Health and Safety	Attainment of air quality point of impingement standards or scientifically defensible alternatives	N/A	N/A	N/A
		N/A	N/A	N/A
	Effect on drinking water supply	N/A	N/A	N/A
		N/A	N/A	N/A
	Effect on local health services	N/A	N/A	N/A
		N/A	N/A	N/A
Local Economy	Effect on local businesses and economic opportunities	Advantages: - Local business may benefit from employment opportunities during closure activities.	Advantages: - If infrastructure is maintained for use by local residents or communities, some employment opportunities may arise.	Advantages: - Local business may benefit from employment opportunities during closure activities.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on access for tourism operators and/or natural resource harvesters	N/A	N/A	N/A
		N/A	N/A	N/A
Tourism	Effect on local tourism	N/A	N/A	N/A
		N/A	N/A	N/A
Regional Economy	Effect on regional businesses and economic opportunities	Advantages: - Local business may benefit from employment opportunities during closure activities.	Advantages: - If infrastructure is maintained for use by local residents or communities, some employment opportunities may arise.	Advantages: - Local business may benefit from employment opportunities during closure activities.



Infrastructure Closure – Effects to the Human Environment				
	Alternative	1	2	3
	Description	Decontamination and Removal	Leave in place for future use	Reclaim in Place
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
Government Services	Effect on local government services and capacities	N/A	N/A	N/A
		N/A	N/A	N/A
Resource management objectives	Effect on established resource management plans	N/A	N/A	N/A
		N/A	N/A	N/A
Built heritage and cultural heritage	Effect on any built heritage resource or cultural heritage features	N/A	N/A	N/A
		N/A	N/A	N/A
	Alteration that is not sympathetic or is incompatible with the historic fabric and appearance of cultural heritage resources	N/A	N/A	N/A
		N/A	N/A	N/A
	Isolation of a built heritage resource or heritage attribute from its surrounding environment, context or a significant relationship	N/A	N/A	N/A
		N/A	N/A	N/A
	Direct or indirect obstruction of significant views or vistas within, from or of built heritage resources or cultural heritage landscapes	N/A	N/A	N/A
		N/A	N/A	N/A
	A change in land use	N/A	N/A	N/A
		N/A	N/A	N/A
	Avoidance of damage to built heritage resources or cultural heritage landscapes, or document cultural resources if damage or relocation cannot be reasonably avoided	N/A	N/A	N/A
		N/A	N/A	N/A
Archaeological resources	Effect on land disturbances	N/A	N/A	N/A
		N/A	N/A	N/A
	Avoidance of archaeological sites or mitigation by excavation if avoidance is not possible, as per the Standards and Guidelines for Consultant Archaeologists (2010).	N/A	N/A	N/A
		N/A	N/A	N/A



Infrastructure Closure – Effects to the Human Environment				
	Alternative	1	2	3
	Description	Decontamination and Removal	Leave in place for future use	Reclaim in Place
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	N/A	N/A	N/A
		N/A	N/A	N/A
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	N/A	N/A	N/A
		N/A	N/A	N/A
Traditional Land use	Effect on Traditional Land use as caused by the project	N/A	N/A	N/A
		N/A	N/A	N/A
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	N/A	N/A	N/A
		N/A	N/A	N/A
Effects to Human Environment	Summary Evaluation and Rating	There are no notable human effects of this alternative. Closure activities may generate temporary employment opportunities in the local and regional area. Summary Rating: Acceptable	If infrastructure is maintain for alternative use by local or First Nation communities the amount of waste generated would be reduced. Use of infrastructure may result in employment opportunities. Summary Rating: Acceptable	Closure activities may generate temporary employment opportunities in the local and regional area. Summary Rating: Acceptable

Infrastructure Closure – Effects to the Physical and Biological Environments				
	Alternative	1	2	3
	Description	Decontamination and Removal	Leave in place for future use	Reclaim in Place
Criteria	Assessment			
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: - Mitigation measures can be put into place to ensure compliance with applicable air quality standards and impingement standards.	Advantages: - Mitigation measures can be put into place to ensure compliance with applicable air quality standards and impingement standards.	Advantages: - Mitigation measures can be put into place to ensure compliance with applicable air quality standards and impingement standards.
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent
	Emission rates of greenhouse gases (GHGs)	Advantages: - None apparent	Advantages: - None apparent	Advantages: - None apparent
		Disadvantages: - Disassembly of buildings will require equipment resulting in GHG emissions.	Disadvantages: - None apparent.	Disadvantages: - Disassembly of some buildings will require equipment resulting in GHG emissions.
Effect on aquatic life and habitat	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation	Advantages: - Infrastructure that is associated with The Project and environmental effects will be	Advantages: - Infrastructure that is associated with The Project and environmental effects will be	Advantages: - Infrastructure that is associated with The Project and environmental effects will be



Infrastructure Closure – Effects to the Physical and Biological Environments					
Alternative	1	2	3		
	Description	Decontamination and Removal	Leave in place for future use	Reclaim in Place	
of water quality if current conditions do not match PWQO		cleaned and decontaminated up to compliance standards. These standards will be met to maintain receiving water protection of aquatic life stands, or scientifically defensible alternatives.	cleaned and decontaminated up to compliance standards. These standards will be met to maintain receiving water protection of aquatic life stands, or scientifically defensible alternatives.	cleaned and decontaminated up to compliance standards. These standards will be met to maintain receiving water protection of aquatic life stands, or scientifically defensible alternatives.	
		Disadvantages: - Spills during closure phase could affect water quality and in turn effect fish population. - The use of industry best practices during construction can avoid or mitigate these potential effects.	Disadvantages: - Spills during closure phase could affect water quality and in turn effect fish population. - The use of industry best practices during construction can avoid or mitigate these potential effects.	Disadvantages: - Spills during closure phase could affect water quality and in turn effect fish population. - The use of industry best practices during construction can avoid or mitigate these potential effects.	
	Management of water level in effected water bodies and streams to maintain aquatic life	N/A	N/A	N/A	
		N/A	N/A	N/A	
	Maintenance of fish population	N/A	N/A	N/A	
		N/A	N/A	N/A	
	Maintenance of groundwater levels for both flows and quality	N/A	N/A	N/A	
		N/A	N/A	N/A	
	Effect on wetlands	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	N/A	N/A	N/A
			N/A	N/A	N/A
Area, type and quality (functionality) of wetlands that would be displaced or altered		N/A	N/A	N/A	
		N/A	N/A	N/A	
Maintenance of wetland connectivity		N/A	N/A	N/A	
		N/A	N/A	N/A	
Effect on terrestrial species and habitat	Area, type and quality of terrestrial habitat that would	Advantages: - This alternative would provide	Advantages: - Does not preclude the use of area by terrestrial species.	Advantages: - Provides mostly unobstructed terrestrial habitat.	



Infrastructure Closure – Effects to the Physical and Biological Environments				
Alternative	1	2	3	
Description	Decontamination and Removal	Leave in place for future use	Reclaim in Place	
be displaced or altered	unobstructed terrestrial habitat.			
	Disadvantage: - None apparent.	Disadvantages: - Terrestrial habitat will be obstructed.	Disadvantage: - None apparent.	
	Effects of noise disturbance generated by the project	Advantages: - Effects limited to closure phase.	Advantages: - None apparent.	Advantages: - Effects limited to closure phase.
		Disadvantages: - Potential disturbances due to noise during closure phase.	Disadvantages: - None apparent.	Disadvantages: - Potential disturbances due to noise during closure phase.
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: - Removal of infrastructure will provide unobstructed wildlife corridors.	Advantages: - None apparent.	Advantages: - Removal of infrastructure will provide unobstructed wildlife corridors.
		Disadvantages: - None apparent.	Disadvantages: - None apparent.	Disadvantages: - None apparent.
Effect on overall wildlife population	N/A	N/A	N/A	
	N/A	N/A	N/A	
Effect on Species at Risk (SAR)	Sensitively level of effected SAR (Endangered, Threatened, Special Concern)	Common Nighthawks have been heard in the area and may persist though closure; Bat species have been recorded and may persist though closure.		
	Area, type and quality of SAR that would be displaced or altered	See equivalent indicator in Effects on terrestrial species and habitat.	See equivalent indicator in Effects on terrestrial species and habitat.	See equivalent indicator in Effects on terrestrial species and habitat.
	Effects of noise disturbance generated by the project	See equivalent indicator in Effects on terrestrial species and habitat.	See equivalent indicator in Effects on terrestrial species and habitat.	See equivalent indicator in Effects on terrestrial species and habitat.
	Maintenance of wildlife movement corridors and plant dispersion	See equivalent indicator in Effects on terrestrial species and habitat.	See equivalent indicator in Effects on terrestrial species and habitat.	See equivalent indicator in Effects on terrestrial species and habitat.
Effects to Physical and Biological Environments	Summary Evaluation and Rating	Primary effects to the physical and biological environment would occur at closure phase. Terrestrial habitat will be generated and create unobstructed wildlife corridors for species. Summary Rating; Acceptable	Minimal impacts to physical and biological components would occur during closure phase. Habitat fragmentation may occur due to infrastructure in place, but may benefit some species. Summary Rating: Acceptable	Closure disruption would be lessened by avoiding the removal of infrastructure. Limited habitat fragmentation may remain. On-going monitoring would be required. Summary Rating: Acceptable



Infrastructure Closure – Potential ability for future closure/reclamation processes					
	Alternative	1	2	3	
	Description	Decontamination and Removal	Leave in place for future use	Reclaim in Place	
Criteria	Assessment				
Public Safety and Security	Effect on safety and security risks to the community and general public	Advantages: - None apparent.	Advantages: - Any infrastructure left for alternate use would be prepared for public safety and security.	Advantages: - None apparent.	
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent	
Environmental Health and Long Term Sustainability	Effect on long term air quality and the ability to meet point of impingement standards	N/A	N/A	N/A	
		N/A	N/A	N/A	
	Effect on long term water quality and the ability to meet water quality guidelines	N/A	N/A	N/A	
		N/A	N/A	N/A	
	Effect on long term wildlife habitats including SARs	N/A	N/A	N/A	
		N/A	N/A	N/A	
Land Use	Effect on long term land uses	Advantages: - Removal of infrastructure from site followed by closure activities would provide terrestrial habitat for vegetation and wildlife.	Advantages: - Any infrastructure left for alternate use would be available for other land uses and opportunities.	Advantages: - Removal of infrastructure from site followed by closure activities would provide terrestrial habitat for vegetation and wildlife.	
		Disadvantages: - None apparent	Disadvantages: - This option does not preclude the opportunities of generation of other habitat for wildlife and vegetation.	Disadvantages: - None apparent	
	Effect on long term visual appearance of Project Site	Advantages: - Potential of generation of an aesthetically pleasing site at closure.	Advantages: - None apparent.	Advantages: - Potential of generation of an aesthetically pleasing site at closure.	
		Disadvantages: - None apparent	Disadvantages: - None apparent	Disadvantages: - None apparent	
	Closure and Reclamation	Summary Rating	Removal of infrastructure at site would generate unobstructed terrestrial habitat.	Infrastructure may be used for alternative uses, this does not preclude the generation of terrestrial habitat.	Reclamation of infrastructure at site would generate terrestrial habitat. On-going monitoring may be required.
			Summary Rating: Acceptable	Summary Rating: Acceptable	Summary Rating: Acceptable
Overall	Summary Rating	Decontamination and removal of Project infrastructure is a common industry proactive and requires capital for closure	Leaving infrastructure in place for alternate use reduces closure costs. There is potential for some disruption during closure	In-place reclamation of infrastructure is common industry practice that will require additional capital for closure and monitoring costs.	



		<p>costs as per the specified future land use. All potential effects are limited to the closure phase; habitat generation would be unobstructed in nature.</p> <p>Summary Rating: Preferred</p>	<p>phase as some infrastructure decontamination and clean up would have to occur. Leaving infrastructure in place does not preclude the generation of terrestrial habitat.</p> <p>Summary Rating: Acceptable</p>	<p>Summary Rating: Acceptable</p>
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X.16 DRAINAGE CLOSURE

Alternatives Assessment – Drainage Closure			
Drainage Closure – Cost Effectiveness			
	Alternative	1	2
	Description	Stabilize and Leave in Place	Removal
Criteria	Assessment		
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: - Leaving drainage in place greatly reduces capital for closure costs. - Generation of new aquatic habitat (open pit lake) and water features.	Advantages: - Area will likely return to pre-Project conditions over time, which may be seen positively by local cottagers, tourism operators and authorities.
		Disadvantages: - May require capital for maintenance costs.	Disadvantages: - Full removal of the drainage will require capital for closure costs.
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: - Reduced closure costs translate to a higher ROI.	Advantages: - None apparent.
		Disadvantages: - None apparent.	Disadvantages: - Closure costs.
Financial Risk	Provides a manageable or acceptable financial risk	All alternatives carry an equivalent (low) level financial risk.	All alternatives carry an equivalent (low) level financial risk.
Cost Effectiveness	Summary Evaluation and Rating	Leaving drainage systems in place is the most cost-effective alternative. Summary Rating: Preferred	Removal of drainage systems requires capital for closure costs, but removes all related land-disturbances. This however may be unnecessarily expensive. Summary Rating: Acceptable

Drainage Closure – Technical feasibility and technical reliability			
	Alternative	1	2
	Description	Stabilize and Leave in Place	Removal
Criteria	Assessment		
Readily Available Technology	Has been successfully implemented in similar mining Projects and can be relied upon for sufficient performance over an extended period of time. New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	N/A	N/A
		N/A	N/A
		N/A	N/A



Drainage Closure – Technical feasibility and technical reliability			
	Alternative	1	2
	Description	Stabilize and Leave in Place	Removal
Technical feasibility and technical reliability	Summary Evaluation and Rating	N/A	N/A

Drainage Closure – Effects to the Human Environment				
	Alternative	1	2	
	Description	Stabilize and Leave in Place	Removal	
Criteria	Assessment			
Local residents and recreational users	Effect on property values	Advantages: - None apparent	Advantages: - Area would be reclaimed akin to pre-Project conditions.	
		Disadvantages: - None apparent	Disadvantages: - None apparent	
	Effect on employment opportunities	Advantages: - If drainages are maintained, some employment opportunities may arise (monitoring/maintenance).	Advantages: - None apparent.	
		Disadvantages: - None apparent	Disadvantages: - None apparent	
	Effect on local access points	Advantages: - None apparent.	Advantages: - Area would be reclaimed akin to pre-Project conditions.	
		Disadvantages: - None apparent	Disadvantages: - None apparent	
	Effect on current noise levels	Advantages: - None apparent.	Advantages: - None apparent.	
		Disadvantages: - None apparent	Disadvantages: - None apparent	
	Effect on water supply for both well water and drinking water	Advantages: - No known potential interference with area well users.	Advantages: - No known potential interference with area well users.	
		Disadvantages: - None apparent	Disadvantages: - None apparent	
	Effect on visual disturbance	Advantages: - None apparent.	Advantages: - Area would be reclaimed akin to pre-Project conditions.	
		Disadvantages: - None apparent	Disadvantages: - None apparent	
	Potential for adverse health effects	Advantages: - None apparent.	Advantages: - None apparent.	
		Disadvantages: - None apparent	Disadvantages: - None apparent	
	Infrastructure	Effect on local access	Advantages: - None apparent.	Advantages: - Area would be reclaimed akin to pre-Project conditions.
			Disadvantages: - None apparent	Disadvantages: - None apparent
		Effect on power supply systems	N/A	N/A
	Public Health and Safety	Attainment of air quality point of impingement standards or scientifically	Advantages: - None apparent.	Advantages: - None apparent.
Disadvantages: - None apparent			Disadvantages: - None apparent	



Drainage Closure – Effects to the Human Environment			
	Alternative	1	2
	Description	Stabilize and Leave in Place	Removal
	defensible alternatives		
	Effect on drinking water supply	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on local health services	Advantages: - None apparent.	Advantages: - None apparent.
Disadvantages: - None apparent		Disadvantages: - None apparent	
Local Economy	Effect on local businesses and economic opportunities	Advantages: - If drainages are maintained, some employment opportunities may arise (monitoring/maintenance).	Advantages: - Area would be reclaimed akin to pre-Project conditions, allowing for recreational and traditional land use. - Employment opportunities may be generated for closure and removal activities.
		Disadvantages: - None apparent	Disadvantages: - None apparent
	Effect on access for tourism operators and/or natural resource harvesters	Advantages: - None apparent.	Advantages: - Area would be reclaimed akin to pre-Project conditions.
		Disadvantages: - None apparent	Disadvantages: - None apparent
Tourism	Effect on local tourism	N/A	N/A
		N/A	N/A
Regional Economy	Effect on regional businesses and economic opportunities	Advantages: - Ongoing monitoring/maintenance employment.	Advantages: - Employment opportunities may be generated for closure and removal activities.
		Disadvantages: - None apparent	Disadvantages: - None apparent
Government Services	Effect on local government services and capacities	N/A	N/A
		N/A	N/A
Resource management objectives	Effect on established resource management plans	N/A	N/A
		N/A	N/A
Built heritage and cultural heritage	Effect on any built heritage resource or cultural heritage features	N/A	N/A
		N/A	N/A
	Alteration that is not sympathetic or is incompatible with the historic fabric and appearance of cultural heritage resources	N/A	N/A
		N/A	N/A
	Isolation of a built heritage resource or heritage attribute from its surrounding environment, context or a significant relationship	N/A	N/A
		N/A	N/A



Drainage Closure – Effects to the Human Environment			
	Alternative	1	2
	Description	Stabilize and Leave in Place	Removal
	Direct or indirect obstruction of significant views or vistas within, from or of built heritage resources or cultural heritage landscapes	N/A	N/A
		N/A	N/A
	A change in land use	N/A	N/A
		N/A	N/A
	Avoidance of damage to built heritage resources or cultural heritage landscapes, or document cultural resources if damage or relocation cannot be reasonably avoided	N/A	N/A
Archaeological resources	Effect on land disturbances	N/A	N/A
		N/A	N/A
	Avoidance of archaeological sites or mitigation by excavation if avoidance is not possible, as per the Standards and Guidelines for Consultant Archaeologists (2010).	N/A	N/A
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	N/A	N/A
		N/A	N/A
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	N/A	N/A
		N/A	N/A
Traditional Land use	Effect on Traditional Land use as caused by the project	N/A	N/A
		N/A	N/A
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	N/A	N/A
		N/A	N/A
Effects to Human Environment	Summary Evaluation and Rating	This alternative may provide employment opportunities for local residents for monitoring and maintenance, and the land could be used for recreational and traditional purposes.	This alternative may provide employment opportunities for closure and removal activities. The land could be used for recreation and traditional purposes.



Drainage Closure – Effects to the Human Environment			
	Alternative	1	2
	Description	Stabilize and Leave in Place	Removal
		Summary Rating: Preferable	Summary Rating: Acceptable

Drainage Closure – Effects to the Physical and Biological Environments			
	Alternative	1	2
	Description	Stabilize and Leave in Place	Removal
Criteria	Assessment		
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	N/A	N/A
	Emission rates of greenhouse gases (GHGs)	N/A	N/A
		N/A	N/A
Effect on aquatic life and habitat	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current conditions do not match PWQO	Advantages: - Integrated and well-designed drainages are capable of complying with final effluent standards required to attain or maintain receiving water protection of aquatic life standards, or scientifically defensible alternatives.	Advantages: - Removal of the drainages would have no adverse effects on compliance with final effluent standards required to attain or maintain receiving water protection or aquatic life standards, or scientifically defensible alternatives.
		Disadvantages: - None apparent	Disadvantages: - None apparent
	Management of water level in effected water bodies and streams to maintain aquatic life	Advantages: - Generated aquatic habitat with potential for added fish habitat. - Leaving drainage systems in place does not preclude the establishment of passive drainage systems. - Some drainage systems may provide alternate fish passage.	Advantages: - Removal of drainage systems may re-establish passive drainage to conditions akin to pre-mining conditions.
		Disadvantages: - None apparent	Disadvantages: - None apparent
	Maintenance of fish population	N/A	N/A
		N/A	N/A
	Maintenance of groundwater levels for both flows and quality	Local surface water and groundwater systems are not functionally connected as far as fish habitat is concerned.	
Effect on wetlands	Fulfilment of water quality standards and guidelines for protection of aquatic life or ensuring no further degradation of water quality if current	See equivalent indicator in Effect on fish and aquatic habitat.	See equivalent indicator in Effect on fish and aquatic habitat.



Drainage Closure – Effects to the Physical and Biological Environments			
	Alternative	1	2
	Description	Stabilize and Leave in Place	Removal
	conditions do not match PWQO		
	Area, type and quality (functionality) of wetlands that would be displaced or altered	N/A	N/A
		N/A	N/A
	Maintenance of wetland connectivity	N/A	N/A
		N/A	N/A
Effect on terrestrial species and habitat	Area, type and quality of terrestrial habitat that would be displaced or altered	N/A	N/A
		N/A	N/A
	Effects of noise disturbance generated by the project	N/A	N/A
		N/A	N/A
	Maintenance of wildlife movement corridors and plant dispersion	N/A	Advantages: - Removal of drainage systems would restore small terrestrial habitat sections present prior to drainage system development.
		N/A	Disadvantages: - None apparent
Effect on overall wildlife population	Advantages: - None apparent.	Advantages: - None apparent.	
	Disadvantages: - None apparent	Disadvantages: - None apparent	
Effect on Species at Risk (SAR)	Sensitivity level of effected SAR (Endangered, Threatened, Special Concern)	Advantages: - None apparent.	Advantages: - None apparent.
		Disadvantages: - None apparent	Disadvantages: - None apparent
	Area, type and quality of SAR that would be displaced or altered	N/A	N/A
	Effects of noise disturbance generated by the project	See equivalent indicator in Effects on Terrestrial and Species Habitat	See equivalent indicator in Effects on Terrestrial and Species Habitat
	Maintenance of wildlife movement corridors and plant dispersion	N/A	See equivalent indicator in Effects on Terrestrial and Species Habitat
N/A			
Effects to Physical and Biological Environments	Summary Evaluation and Rating	Aquatic and other habitat functions would be maintained, with the potential for added fish habitat. Leaving drainage systems in place does not preclude the establishment of passive drainage systems, and sections that may provide alternate fish passage. Summary Rating: Acceptable	Aquatic and other habitat functions would be maintained, akin to pre-Project conditions over time. Small terrestrial habitat sections present prior to drainage system development may be restored, in turn re-establishing pass drainage. Summary Rating: Acceptable



Drainage Closure – Effects to the Physical and Biological Environments			
	Alternative	1	2
	Description	Stabilize and Leave in Place	Removal
Drainage Closure – Potential ability for future closure/reclamation processes			
	Alternative	1	2
	Description	Stabilize and Leave in Place	Removal
Criteria	Assessment		
Public Safety and Security	Effect on safety and security risks to the community and general public	N/A	N/A
		N/A	N/A
Environmental Health and Long Term Sustainability	Effect on long term air quality and the ability to meet point of impingement standards	N/A	N/A
		N/A	N/A
	Effect on long term water quality and the ability to meet water quality guidelines	See equivalent indicator in Effect on fish and aquatic habitat.	See equivalent indicator in Effect on fish and aquatic habitat.
	Restoration of passive drainage systems	Advantages: - Watercourse realignments do not impede passive drainage systems and/or provide new passive drainage systems.	Advantages: - Passive drainage systems would be re-established akin to pre-Project conditions over time.
		Disadvantages: - None apparent.	Disadvantages: - Some active restoration may be required after removal.
	Effect on long term wildlife habitats including SARs	N/A	See equivalent indicator in Effects on terrestrial species and habitat.
N/A		N/A	
Land Use	Effect on long term land uses	N/A	N/A
		N/A	N/A
	Effect on long term visual appearance of Project Site	Advantages: - All alternatives are broadly similar in their potential to develop an aesthetically pleasing site at closure.	Advantages: - All alternatives are broadly similar in their potential to develop an aesthetically pleasing site at closure.
Disadvantages: - None apparent.		Disadvantages: - None apparent.	
Closure and Reclamation	Summary Rating	Drainage systems would provide suitable fish and aquatic habitat in the area, allowing for passive drainage.	Removal of drainage system will allow for the area to be reclaimed similarly to its pre-Project condition. Some active restoration may be required.
		Summary Rating: Acceptable	Summary Rating: Acceptable
Overall	Summary Rating	Stabilizing and leaving drainage systems in place upon closure is the most cost-effective alternative, potentially providing employment opportunities for extended monitoring and maintenance. Aquatic and other habitat functions would be maintained, while allowing for passive drainage and potentially providing fish habitat and passage.	Removal of drainage systems upon closure requires capital for closure costs, and allows for aquatic and other habitat functions to be maintained and small terrestrial habitat sections present prior to drainage system development to be restore. This alternative also may provide employment opportunities for closure activities.



Drainage Closure - Effects to the Physical and Biological Environments			
	Alternative	1	2
	Description	Stabilize and Leave in Place	Removal
		Summary Rating: Preferred	Summary Rating: Acceptable