APPENDIX X

ALTERNATIVES ASSESSMENT MATRIX

NOTE TO READER
APPENDIX X

In April 2015, Treasury Metals submitted an Environmental Impact Statement (EIS) for the proposed Goliath Gold Project (the Project) to the Canadian Environmental Assessment Agency (the Agency) for consideration under the Canadian Environmental Assessment Act (CEAA), 2012. The Agency reviewed the submission and informed Treasury Metals that the requirements of the EIS Guidelines for the Project were met and that the Agency would begin its technical review of the submission. In June 2015, the Agency issued a series of information requests to Treasury Metals regarding the EIS and supporting appendices (referred to herein as the Round 1 information requests). The Round 1 information requests included questions from the Agency, other federal and provincial reviewers, and members of Indigenous communities, as well as interested stakeholders. As part of the Round 1 information request process, the Agency requested that Treasury Metals consolidate the responses to the information requests into a revised EIS for the Project.

In response to Round 1 Information Request process, Treasury Metals has completed major revisions Appendix X (Alternatives Assessment). Appendix X was used in support of Section 2 (Alternatives Description) of the EIS.

As part of the process to revise the EIS, Treasury Metals has undertaken a review of the status for the various appendices. The status of each appendix to the revised EIS has been classified as one of the following:

- **Unchanged**: The appendix remains unchanged from the original EIS, and has been re-issued as part revised EIS.
- **Minor Changes:** The appendix remains relatively unchanged from the original EIS, and has been re-issued with relevant clarification.
- **Major Revisions**: The appendix has been substantially changed from the original EIS. A re-written appendix has been issued as part of the revised EIS.
- **Superseded:** The appendix is no longer required to support the EIS. The information in the original appendix has been replaced by information provided in a new appendix prepared to support the revised EIS.
- **New**: This is a new appendix prepared to support the revised EIS.

The following table provides a listing of the appendices to the revised EIS, along with a listing of the status of each appendix and their description.

List of Appendices to the Revised EIS		
Appendix	Status	Description
Appendix A	Major Revisions	Table of Concordance

List of Appendices to the Revised EIS		
Appendix	Status	Description
Appendix B	Unchanged	Optimization Study
Appendix C	Unchanged	Mining Study
Appendix D	Major Revisions	Tailings Storage Facility
Appendix E	Minor Changes	Traffic Study
Appendix F	Major Revisions	Water Management Plan
Appendix G	Superseded	Environmental Baseline
Appendix H	Minor Changes	Acoustic Environment Study
Appendix I	Unchanged	Light Environment Study
Appendix J	Minor Changes	Air Quality Study
Appendix K	Minor Changes	Geochemistry
Appendix L	Superseded	Geochemical Modelling
Appendix M	Minor Changes	Hydrogeology
Appendix N	Unchanged	Surface Hydrology
Appendix O	Superseded	Hydrologic Modeling
Appendix P	Unchanged	Aquatics DST
Appendix Q	Major Revisions	Fisheries and Habitat
Appendix R	Major Revisions	Terrestrial
Appendix S	Major Revisions	Wetlands
Appendix T	Unchanged	Socio-Economic
Appendix U	Minor Changes	Heritage Resources
Appendix V	Major Revisions	Public Engagement
Appendix W	Unchanged	Screening Level Risk Assessment
Appendix X	Major Revisions	Alternatives Assessment Matrix
Appendix Y	Unchanged	EIS Guidelines
Appendix Z	Unchanged	TML Corporate Policies
Appendix AA	Major Revisions	List of Mineral Claims
Appendix BB	Unchanged	Preliminary Economic Assessment
Appendix CC	Unchanged	Mining, Dynamic And Dependable For Ontario's Future
Appendix DD	Major Revisions	Indigenous Engagement Report
Appendix EE	Unchanged	Country Foods Assessment
Appendix FF	Unchanged	Photo Record Of The Goliath Gold Project
Appendix GG	Minor Changes	TSF Failure Modelling
Appendix HH	Unchanged	Failure Modes And Effects Analysis
Appendix II	Major Revisions	Draft Fisheries Compensation Strategy and Plans
Appendix JJ	New	Water Report
Appendix KK	New	Conceptual Closure Plan
Appendix LL	New	Impact Footprints and Effects

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1.0 INTRODUCTION

The EIS Guidelines (Appendix Y) for the Goliath Gold Project (Project) describe the requirements for considering the alternative means for carrying out the Project that are both technically and economically feasible. The objective of the alternatives assessment is to identify the "*preferred means*" for undertaking the Project based on the relative consideration of effects, technical feasibility and economic feasibility. An additional requirement under CEAA (2012) is the consideration of the possible alternatives to the Project. The evaluation of alternative means for undertaking the Project has been completed for the following Project components:

- mining method;
- tailings storage facility and minewater management;
- waste rock management;
- overburden management;
- processing method;
- cyanide containing effluent management;
- cyanide destruction;
- water supply;
- water discharge location;
- plant and infrastructure location;
- low-grade ore stockpile;
- aggregate supply;
- non-hazardous solid waste management;
- hazardous solid waste management;
- domestic waste management;
- explosives storage facility;
- electrical power supply;
- open pit closure;
- building closure;
- infrastructure closure; and
- minewater management and drainage closure.

Section 8.1 of the EIS Guidelines (Appendix X) includes specific requirements related to the evaluation of alternatives for mine waste disposal. This section of the EIS Guidelines describe the

process that will need to be followed to address situations where a need has been identified to use natural water bodies frequented by fish for the disposal of mine waste. Because both the mine water pond and the tailings storage facility (TSF) will likely require amendments to Schedule 2 of the Metal Mining Effluent Regulations (MMER), the evaluations of the alternatives means for these components will be assessed separately. A thorough assessment of the alternatives related to mine waste disposal, suitable for addressing the requirements of Section 8.1 of the EIS Guidelines and for supporting an amendment of Schedule 2 of the MMER has been provided in Appendix D-2 to the revised EIS.

A consistent approach has been applied for evaluating the alternative means for undertaking each of the various components considered, with the Project components evaluated using each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;
- Effects to the human environment;
- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

The results of the evaluation are presented in a tabular format, and includes a separate table that summarizes the results for the above categories and identified the preferred alternative for each component.

2.0 ALTERNATIVES TO THE PROJECT

As part of the alternatives assessment process, and in compliance with the CEAA (2012) EIS guidelines, Treasury Metals has assessed three alternatives to the Project. These alternatives to the Project have been identified as:

- Proceed with the Project development, as identified by Treasury Metals;
- Formally delay the Project planning and development until circumstances are more favourable; and
- The "do nothing" alternative (development of the Project is cancelled).

Table X2-1 provides the comparison of the alternatives to the Project.

Table X2-1: 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	**Level 3**	**Level 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	**Level 3**	**Level 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	**Level 3**	**Level 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),	Same as Alternative A	N/A

Table X2-1: Alternatives to the Project				
Environmental Component	**Information Requirements**	**A Proceed with the Project**	**B Delay the Project**	**C Do Nothing**
		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.		
	Significance	**Level 3**	**Level 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	**Level 1**	**Level 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	**Level 3**	**Level 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. • Compact site development. • Progressive reclamation of site.	Same as Alternative A	N/A
	Significance	**Level 3**	**Level 3**	**N/A**
SAR	Environmental Effects	• Displacement of non-specific terrestrial habitat, and disturbance to SAR.	Same as Alternative A	None

Table X2-1: Alternatives to the Project				
Environmental Component	**Information Requirements**	**A Proceed with the Project**	**B Delay the Project**	**C Do Nothing**
	Potential for mitigation	• 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	**Level 3**	**Level 3**	**N/A**
Fish and Aquatic Resources	Environmental Effects	• Treated effluent will be discharged though Blackwater Creek to Wabigoon Lake. • Potential for flow reduction/increases due to Project development.	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 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	**Level 3**	**Level 3**	**N/A**
Traffic	Environmental Effects	• Increased use of Highway 17, Anderson and Tree Nursery Road particularly during construction period.	Same as Alternative A	None
	Potential for mitigation	• Implementation of traffic management plan and promote carpooling. • Adherence to speed limits on roads. • Bus employees if appropriate.	Same as Alternative A	N/A
	Significance	**Level 2**	**Level 2**	**N/A**
Recreational Importance	Environmental Effects	• 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	• Maintain a compact site. • Noise monitoring and management plan.	Same as Alternative A	N/A
	Significance	**Level 1**	**Level 1**	**N/A**
Commitment of non-renewable resources (aggregates)	Environmental Effects	• Aggregates will be required for site development and TSF construction.	Same as Alternative A	None

Table X2-1: Alternatives to the Project				
Environmental Component	**Information Requirements**	**A Proceed with the Project**	**B Delay the Project**	**C Do Nothing**
	Potential for mitigation	• 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	**Level 3**	**Level 3**	**N/A**
Sound levels	Environmental Effects	• 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	• 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	**Level 3**	**Level 3**	**N/A**
Views and aesthetics	Environmental Effects	• Mine rock stockpiles may be partially visible from select locations at full development.	Same as Alternative A	None
	Potential for mitigation	• 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	**Level 2**	**Level 2**	**N/A**
Adjacent land users	Environmental Effects	• 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
	Potential for mitigation	• 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	**Level 2**	**Level 2**	**N/A**
Cultural heritage resources	Environmental Effects	• No cultural heritage resources have been identified on site.	Same as Alternative A	None
	Potential for mitigation	• Management and procedural plans will be put into place in the event that any resources are discovered though the development of the Goliath Gold Project.	Same as Alternative A	N/A
	Significance	**Level 1**	**Level 1**	**N/A**
Public health and safety	Environmental Effects	• Potential releases of excess parameters in discharged effluents. • Traffic accident potential.	Same as Alternative A	None
	Potential for mitigation	• Mitigation of excess parameters as detailed above and best management practices for spills, and all site procedures.	Same as Alternative A	N/A
	Significance	**Level 2**	**Level 2**	**N/A**
Local and regional business and economic development	Environmental Effects	• 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	• Maximize economic benefits.	Same as Alternative A	N/A

Table X2-1: Alternatives to the Project				
Environmental Component	**Information Requirements**	**A Proceed with the Project**	**B Delay the Project**	**C Do Nothing**
	Significance	**Level 4**	**Level 4**	**N/A**
Tourism	Environmental Effects	• Potential for public perception of discharge to Wabigoon 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	• Maximize economic benefits.	Same as Alternative A	N/A
	Significance	**Level 2**	**Level 2**	**N/A**
First Nation communities	Environmental Effects	• 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	• Continued efforts in engagement and opportunities for Impact Benefit Agreements (IBA) to optimize opportunities for First Nation communities.	Same as Alternative A	N/A
	Significance	**Level 3**	**Level 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 though the development of the Goliath Gold Project.	Same as Alternative A	N/A
	Significance	**Level 1**	**Level 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 though 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	**Level 2**	**Level 2**	**N/A**
Aboriginal and Treaty Rights	Environmental Effects	• There will be effects to Aboriginal and Treaty Rights in a relatively small portion of land in the vicinity of the Project due to mine operations.	Same as Alternative A	N/A
	Potential for mitigation	• Any adverse effects to Aboriginal and Treaty Rights will be addressed though 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	**Level 2**	**Level 2**	**N/A**

3.0 MINING METHOD

The Goliath gold deposit includes a near surface resource as well as a zone of deeper resources. The near surface resources would be suitable to mining using open pit methods, while the deeper mineralization is most suitably accessed using underground methods. The following alternative mining methods have been evaluated for exploiting the Goliath deposit:

- Open pit mining;
- Underground mining; and
- A combination of open pit and underground mining.

A summary of the assessment of alternatives for mining method is provided in Table X3-0. Both the “open pit only” and “combination of open pit and underground mining” were identified as being acceptable, but using a “combination of open pit and underground mining” was identified as the preferred alternative.

Table X3-0: Mining Method — Summary of Alternatives Assessment

Category	1	2	3
	Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
Cost Effectiveness	Acceptable	Unacceptable	Preferred
Technical Feasibility and Technical Reliability	Acceptable	Acceptable	Acceptable
Effects to the Human Environment	Acceptable	Acceptable	Acceptable
Effects to the Physical and Biological Environments	Acceptable	Preferred	Acceptable
Potential Ability for Future Closure/Reclamation Processes	Acceptable	Acceptable	Acceptable
Final Rating	**Acceptable**	**Unacceptable**	**Preferred**

The following tables provide the details for the assessment of alternative mining methods for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;
- Effects to the human environment;
- Effects to the physical and biological environments; and

- Potential ability for future closure/reclamation processes.

Table X3-1: Mining Method — Cost Effectiveness				
Criteria	Assessment	1	2	3
		Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
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
Mining Method Cost Effectiveness Overall Summary and Rating	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.	Large capital costs required along with high near surface mining costs. Furthermore, loss of unrecoverable gold would be applicable.	Minimal or low risks involved for financiers in creating both mining methods, which maximizes ROI.
	Summary Rating	**Acceptable**	**Unacceptable**	**Preferred**

Table X3-2: Mining Method —Technical Feasibility and Technical Reliability				
Criteria	Assessment	1	2	3
		Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
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	Advantages: Not Applicable	Advantages: Not Applicable	Advantages: Not Applicable

Table X3-2: Mining Method —Technical Feasibility and Technical Reliability				
Criteria	Assessment	1	2	3
		Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
	investigations and technical study to provide confidence in their performance abilities	Disadvantages: Not Applicable	Disadvantages: Not Applicable	Disadvantages: Not Applicable
Mining Method Technical Feasibility and Technical Reliability Overall Summary and Rating	Summary of Evaluation	Open pit mining is a proven technology in Northern Ontario	Underground mining is a proven technology in Northern Ontario	Projects using both open pit and underground mining methods are proven in Northern Ontario
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

Table X3-3: Mining Method — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
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
		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

Table X3-3: Mining Method — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
		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
	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	Disadvantages: None apparent

Table X3-3: Mining Method — Effects to the Human Environment				
Criteria	Assessment	1 Open Pit Only	2 Underground Only	3 Combination of Open Pit and Underground Mining Methods
			and would eliminate local economic benefits	
	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
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	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent

Table X3-3: Mining Method — Effects to the Human Environment				
Criteria	Assessment	1 Open Pit Only	2 Underground Only	3 Combination of Open Pit and Underground Mining Methods
	historic fabric and appearance of cultural heritage resources	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: 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 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: 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: Although an on-site archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, a smaller overall footprint would decrease the potential to impact any archaeological resources, if present.	Advantages: None apparent
		Disadvantages: Although an archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, a greater overall footprint would increase the potential to	Disadvantages: None apparent	Disadvantages: Although an archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, a greater overall footprint would increase the potential to

Table X3-3: Mining Method — Effects to the Human Environment				
Criteria	Assessment	1 Open Pit Only	2 Underground Only	3 Combination of Open Pit and Underground Mining Methods
		impact any archaeological resources, if present.		impact any archaeological resources, if present.
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: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a smaller overall footprint would decrease the potential to impacting a spiritual or ceremonial site, if present.	Advantages: None apparent
		Disadvantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a greater overall footprint would increase the potential to impacting a spiritual or ceremonial site, if present.	Disadvantages: None apparent	Disadvantages: Although no spiritual or ceremonial sites have been specifically identified in the Project area, a greater overall footprint would increase the potential to impacting a spiritual or ceremonial site, if present.
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 land around the Project for the practice of traditional land uses	Disadvantages: None apparent	Disadvantages: Greater overall footprint from mining operations result in minor loss of access to land around the Project for the practice of traditional land uses
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 result in minor loss of access to land around the Project	Disadvantages: None apparent	Disadvantages: Greater overall footprint from mining operations result in minor loss of access to land around the Project
Mining Method Effects to the Human Environment Overall Summary and Rating	Summary of Evaluation	Open pit mining will result in a greater footprint and a greater area of potential effects from the Project. The greater area potentially effected may affect both Indigenous and non-indigenous peoples who use the land in the vicinity of the Project	Underground mining will result in a smaller footprint and a smaller area of potential effects from the Project. The smaller area potentially affected will have less of an effect on both Indigenous and non-indigenous peoples who use the land in the vicinity of the Project.	Open pit and underground mining will result in a greater footprint and a greater area of potential effects from the Project. The greater area potentially effected may affect both Indigenous and non-indigenous peoples who use the land in the vicinity of the Project
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

Table X3-4: Mining Method — Effects to the Physical and Biological Environments				
Criteria	Assessment	1	2	3
		Open Pit Only	Underground Only	Combination of Open Pit and Underground Mining Methods
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,
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	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent

Table X3-4: Mining Method — Effects to the Physical and Biological Environments				
Criteria	Assessment	1 Open Pit Only	2 Underground Only	3 Combination of Open Pit and Underground Mining Methods
	wetlands that would be displaced or altered	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.
	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	Disadvantages: None apparent.	Disadvantages: Greater overall site size and open pit methodology will

Table X3-4: Mining Method — Effects to the Physical and Biological Environments				
Criteria	Assessment	1 Open Pit Only	2 Underground Only	3 Combination of Open Pit and Underground Mining Methods
		increase noise disturbance to potential SAR.		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.
Mining Method Effects to the Physical and Biological Environments Overall Summary and Rating	Summary of Evaluation	Greater environmental effects expected due to the larger overall footprint, and greater noise and dust effects.	Less environmental effects expected due to the small overall footprint and the containment of effects underground.	Greater environmental effects expected due to the larger overall footprint, and greater noise and dust effects.
	Summary Rating	**Acceptable**	**Preferred**	**Acceptable**

Table X3-5: Mining Method — Potential Ability for Future Closure/Reclamation Processes				
Criteria	Assessment	1 Open Pit Only	2 Underground Only	3 Combination of Open Pit and Underground Mining Methods
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

Table X3-5: Mining Method — Potential Ability for Future Closure/Reclamation Processes				
Criteria	**Assessment**	**1**	**2**	**3**
		Open Pit Only	**Underground Only**	**Combination of Open Pit and Underground Mining Methods**
	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
Mining Method Potential Ability for Future Closure/Reclamation Processes Overall Summary and Rating	Summary of Evaluation	Longer closure time which limits accessibility and permanent changes to the landscape	Short closure time allowing accessibility of the land sooner and no permanent changes to the landscape	Longer closure time which limits accessibility and permanent changes to the landscape
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

4.0 TAILINGS STORAGE FACILITY AND MINEWATER MANAGEMENT

The tailings storage facility (TSF) has the potential for overprinting potentially fish bearing waters. Therefore, a robust and thorough assessment of mine waste disposal alternatives, including the TSF location and deposition technology has been completed using the methodologies set out in Environment Canada and Climate Change's *Guidelines for the Assessment of Alternatives for Mine Waste Disposal.* This assessment can be found in Appendix D-2.

In order to create a safe work environment, the open pit and underground mine will need to be dewatered, and the water managed at the surface. The location of the minewater pond used to manage this water has the potential for overprinting potentially fish bearing waters. Therefore, a robust and thorough assessment of mine waste disposal alternatives, including the location of the minewater pond has been completed using the methodologies set out in Environment Canada and Climate Change's *Guidelines for the Assessment of Alternatives for Mine Waste Disposal.* This assessment can be found in Appendix D-2.

5.0 WASTE ROCK MANAGEMENT

The Project will generate an estimated 27 million tonnes of waste rock over the life of the mine. Almost all of this waste materials will be generated by open pit mining with underground mining generating just over 2 million tonnes of waste rock. The waste rock is anticipated to be PAG and will have to be managed for ARD during operations and following mine closure. Treasury Metals also wishes to maintain an overall compact footprint for the Project, with the Project elements located within the watershed of Blackwater Creek, to the extent possible. The three alternatives for the management of waste rock produced by the Project evaluated are:

- WRSA located to the north of the open pit
- WRSA located to the south of open pit
- WRSA to the north of the open pit with co-disposal with completed open pit

A summary of the alternatives for the waste rock management is provided in Table X5-0. All of the options considered were classified as “acceptable”, but the option using a “combination of surface storage north of the pit and in-pit storage was identified as being the preferred option.

Table X5-0: Waste Rock Management — Summary of Alternatives Assessment

Category	1	2	3
	WRSA to North of Pit	WRSA to South of Pit	Combination of Surface storage North of Pit and In-pit storage
Cost Effectiveness	Acceptable	Acceptable	Preferred
Technical Feasibility and Technical Reliability	Acceptable	Acceptable	Acceptable
Effects to the Human Environment	Acceptable	Acceptable	Preferred
Effects to the Physical and Biological Environments	Acceptable	Acceptable	Preferred
Potential Ability for Future Closure/Reclamation Processes	Acceptable	Acceptable	Preferred
Final	**Acceptable**	**Acceptable**	**Preferred**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;
- Effects to the human environment;
- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

Table X5-1: Waste Rock Management — Cost Effectiveness				
Criteria	Assessment	1	2	3
		WRSA to North of Pit	WRSA to South of Pit	Combination of Surface storage North of Pit and In-pit storage
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
Waste Rock Management Cost Effectiveness Overall Summary and Rating	Summary of Evaluation	There are no apparent advantages or disadvantages regarding cost effectiveness compared to the other alternatives	There are no apparent advantages or disadvantages regarding cost effectiveness compared to the other alternatives	Lower overall haulage cost, lower closure costs, minimize early mine life risk
	Summary Rating	**Acceptable**	**Acceptable**	**Preferred**

Table X5-2: Waste Rock Management — Technical Feasibility and Technical Reliability				
Criteria	Assessment	1	2	3
		WRSA to North of Pit	WRSA to South of Pit	Combination of Surface storage North of Pit and In-pit storage
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
Waste Rock Management Technical Feasibility and Technical Reliability Overall Summary and Rating	Summary of Evaluation	Uses readily available and proven technology	Uses readily available and proven technology, but does not allow for underground ventilation raises to the south of the open pit	Uses readily available and proven technology
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

Table X5-3: Waste Rock Management — Effects to the Human Environment				
Criteria	**Assessment**	**1**	**2**	**3**
		WRSA to North of Pit	**WRSA to South of Pit**	**Combination of Surface storage North of Pit and In-pit storage**
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
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
Public Health and Safety	Attainment of air quality point of impingement standards or	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

Table X5-3: Waste Rock Management — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		WRSA to North of Pit	WRSA to South of Pit	Combination of Surface storage North of Pit and In-pit storage
	scientifically defensible alternatives	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 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	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent

Table X5-3: Waste Rock Management — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		WRSA to North of Pit	WRSA to South of Pit	Combination of Surface storage North of Pit and In-pit storage
	resources or cultural heritage landscapes			
	A change in land use	Advantages: None apparent	Advantages: None apparent	Advantages: Smaller overall footprint
		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: None apparent	Advantages: Smaller overall footprint
		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: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a smaller overall footprint would decrease the potential to impacting a spiritual or ceremonial site, if present.
		Disadvantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a greater overall footprint would increase the potential to impacting a spiritual or ceremonial site, if present.	Disadvantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a greater overall footprint would increase the potential to impacting a spiritual or ceremonial site, if present.	Disadvantages: None apparent
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: None apparent	Advantages: None apparent	Advantages: Smaller overall footprint
		Disadvantages: Greater overall footprint from mining operations result in minor loss of access to	Disadvantages: Greater overall footprint from mining operations result in minor loss of access to	Disadvantages: None apparent

Table X5-3: Waste Rock Management — Effects to the Human Environment				
Criteria	**Assessment**	**1**	**2**	**3**
		WRSA to North of Pit	**WRSA to South of Pit**	**Combination of Surface storage North of Pit and In-pit storage**
		land around the Project for the practice of traditional land uses	land around the Project for the practice of traditional land uses	
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
Waste Rock Management Effects to the Human Environment Overall Summary and Rating	Summary of Evaluation	Greater overall footprint expected to cause more effects than Alternative 3. Greater material being deposited on surface increases likelihood the WRSA is visible off-site.	Greater overall footprint expected to cause more effects than Alternative 3. Greater material being deposited on surface increases likelihood the WRSA is visible off-site.	Smaller overall footprint expected to cause fewer effects than Alternatives 1 and 2. Less materials being deposited on surface decreases likelihood the WRSA is visible off-site.
	Summary Rating	**Acceptable**	**Acceptable**	**Preferred**

Table X5-4: Waste Rock Management — Effects to the Physical and Biological Environments				
Criteria	**Assessment**	**1**	**2**	**3**
		WRSA to North of Pit	**WRSA to South of Pit**	**Combination of Surface storage North of Pit and In-pit storage**
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

Table X5-4: Waste Rock Management — Effects to the Physical and Biological Environments				
Criteria	**Assessment**	**1**	**2**	**3**
		WRSA to North of Pit	**WRSA to South of Pit**	**Combination of Surface storage North of Pit and In-pit storage**
	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 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: 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: None apparent	Advantages: None apparent	Advantages: Smaller overall footprint from mining operations result in smaller loss of habitat
		Disadvantages: Greater overall footprint from mining operations result in greater loss of habitat.	Disadvantages: Greater overall footprint from mining operations result in greater loss of habitat.	Disadvantages: None apparent
	Area, type and quality of SAR that would be displaced or altered	Advantages: None apparent	Advantages: None apparent	Advantages: Smaller overall footprint from mining operations result in smaller loss of habitat
		Disadvantages: Greater overall footprint from mining operations result in greater loss of habitat.	Disadvantages: Greater overall footprint from mining operations result in greater loss of habitat.	Disadvantages: None apparent
	Effects of noise disturbance generated by the project	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	Disadvantages: Closer to property boundary, attainment of provincial guidelines still probable,	Disadvantages: None apparent

Table X5-4: Waste Rock Management — Effects to the Physical and Biological Environments				
Criteria	**Assessment**	**1**	**2**	**3**
		WRSA to North of Pit	**WRSA to South of Pit**	**Combination of Surface storage North of Pit and In-pit storage**
		dumping within completed open pits		
	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
Waste Rock Management Effects to the Physical and Biophysical Environments Overall Summary and Rating	Summary of Evaluation	Greater overall footprint expected to cause more effects than Alternative 3. Greater potential for dust emissions with greater total haul km.	Greater overall footprint expected to cause more effects than Alternative 3. Greater potential for dust emissions with greater total haul km.	Smaller overall footprint expected to cause less effects than Alternatives 1 and 2. Less potential for dust emissions with lower total haul km.
	Summary Rating	**Acceptable**	**Acceptable**	**Preferred**

Table X5-5: Waste Rock Management — Potential Ability for Future Closure/Reclamation Processes				
Criteria	**Assessment**	**1**	**2**	**3**
		WRSA to North of Pit	**WRSA to South of Pit**	**Combination of Surface storage North of Pit and In-pit storage**
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: Smaller overall stockpile height reduces the potential it is visible off-site
		Disadvantages: Change in topography for reclaimed waste rock storage areas and partially visible from Thunder Lake	Disadvantages: Change in topography for reclaimed waste rock storage areas closer to property boundary	Disadvantages: None Apparent

Table X5-5: Waste Rock Management — Potential Ability for Future Closure/Reclamation Processes				
Criteria	Assessment	1	2	3
		WRSA to North of Pit	WRSA to South of Pit	Combination of Surface storage North of Pit and In-pit storage
Waste Rock Management Potential Ability for Future Closure / Reclamation Processes Overall Summary and Rating	Summary of Evaluation	Results in a change in topography with the WRSA being partially visible from Thunder Lake	Results in a change in topography with the WRSA being visible south of the Project	Less potential for the WRSA to be visible off-site and shorter time for the site to reach full closure
	Summary Rating	**Acceptable**	**Acceptable**	**Preferred**

6.0 OVERBURDEN MANAGEMENT

During the site preparation and construction phase, overburden material will be removed from the open pit to allow mining to occur. Additionally, overburden will be removed from selected areas to allow the construction of components such as the processing plant and the impoundment for the tailings storage facility (TSF). In total, the Project will generate an estimated 5.9 million tonnes of overburden, which will need to be securely stockpiled for the duration of operations to be available for use in the reclamation of the site following the end of mining. Given the relatively small footprint for the Project, the two viable options for locating the overburden stockpile(s) are the same as the options for the waste rock storage area (WRSA). Once the preferred alternative for the WRSA was identified, the remaining location was where the overburden storage pile needed to be placed. However, within the general area south of the open pit, the following two options for the stockpiling of overburden have been considered:

- Two stockpiles south of the open pit, with a stockpile located either side of the former creek bed of Blackwater Creek Tributary 1; and
- A single stockpile located south of the open pit.

A summary of the alternatives for the overburden management is provided in Table X6-0. Both of the options considered were classified as “acceptable”, but the option using a “two stockpiles south of the open pit” was identified as being the preferred option.

Table X6-0: Overburden Management — Summary of Alternatives Assessment

Category	1	2
	Two Stockpiles South of the Open Pit	Single Stockpile to the South of the Open Pit
Cost Effectiveness	Preferred	Acceptable
Technical Feasibility and Technical Reliability	Acceptable	Acceptable
Effects to the Human Environment	Preferred	Acceptable
Effects to the Physical and Biological Environments	Preferred	Acceptable
Potential Ability for Future Closure/Reclamation Processes	Acceptable	Acceptable
Final Rating	**Preferred**	**Acceptable**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;
- Effects to the human environment;

- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

Table X6-1: Overburden Management — Cost Effectiveness			
Criteria	**Assessment**	**1**	**2**
		Two Stockpiles South of the Open Pit	**Single Stockpile to the South of the Open Pit**
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: Lower overall haulage costs due to close proximity to the open pit and WRSA.	Advantages: None Apparent
		Disadvantages: None Apparent	Disadvantages: Greater overall haulage costs due to the greatest distance from the open pit and WRSA.
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: None Apparent	Advantages: None Apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
Overburden Management Cost Effectiveness Overall Summary and Rating	Summary of Evaluation	Lower overall cost due to the close proximity to the open pit and WRSA	Greater overall cost due to the greater distance from the open pit and WRSA.
	Summary Rating	**Preferred**	**Acceptable**

Table X6-2: Overburden Management — Technical Feasibility and Technical Reliability			
Criteria	**Assessment**	**1**	**2**
		Two Stockpiles South of the Open Pit	**Single Stockpile to the Southeast of the Open Pit**
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: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable
	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
Overburden Management Technical Feasibility and Technical Reliability Overall Summary and Rating	Summary of Evaluation	There are no apparent advantages or disadvantages from a technical feasibility and technical reliability standpoint	There are no apparent advantages or disadvantages from a technical feasibility and technical reliability standpoint
	Summary Rating	**Acceptable**	**Acceptable**

Table X6-3: Overburden Management — Effects to the Human Environment			
Criteria	Assessment	1	2
		Two Stockpiles South of the Open Pit	Single Stockpile to the Southeast of the Open Pit
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: Hauling a short distance in close proximity to the open pit. Limited noise effects to surrounding area.	Advantages: None apparent
		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: Located in close proximity to the open pit and will not be visible from off-site.	Advantages: None apparent
		Disadvantages:	Disadvantages: Located close to the property boundary and would likely be visible from off-site.
	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
		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: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
Local Economy	Effect on local businesses and economic opportunities	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable

Table X6-3: Overburden Management — Effects to the Human Environment			
Criteria	Assessment	1	2
		Two Stockpiles South of the Open Pit	Single Stockpile to the Southeast of the Open Pit
	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 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
		Advantages: None apparent	Advantages: None apparent

Table X6-3: Overburden Management — Effects to the Human Environment			
Criteria	Assessment	1	2
		Two Stockpiles South of the Open Pit	Single Stockpile to the Southeast of the Open Pit
Archaeological resources	Effect on land disturbances	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
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: Both stockpiles are located adjacent to the open pit in an area that would be inaccessible for traditional land uses.	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Stockpile requires a larger operations area and a larger area that is inaccessible to traditional land uses.
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: Both stockpiles are located adjacent to the open pit in an area that would already have Aboriginal and Treaty Rights affected.	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Stockpile requires a larger operations area and a larger area that would have the Aboriginal and Treaty Rights affected.
Overburden Management Effects to the Human Environment Overall Summary and Rating	Summary of Evaluation	Situated closely to the open pit which reduces off-site effects (i.e. air quality and noise effects).	Situated close to the property boundary, further away from the open pit and WRSA. Has greater potential to causes effects off-site (i.e. air quality and noise).
	Summary Rating	**Preferred**	**Acceptable**

Table X6-4: Overburden Management — Effects to the Physical and Biological Environments			
Criteria	Assessment	1	2
		Two Stockpiles South of the Open Pit	Single Stockpile to the Southeast of the Open Pit
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: Lower potential for increases dust emissions due to shorter haul routes needed.	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Greater potential for increased dust emissions due to longer haul routes needed
	Emission rates of greenhouse gases (GHGs)	Advantages: Less emissions due to shorter overall haulage routes	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Greater emissions due to longer overall haulage routes

Table X6-4: Overburden Management — Effects to the Physical and Biological Environments			
Criteria	Assessment	1 Two Stockpiles South of the Open Pit	2 Single Stockpile to the Southeast of the Open Pit
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: Located within the Blackwater Creek watershed and does not remove any catchment from adjacent sub-watersheds.	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Would overprint a portion of Little Creek and removes a portion of the Thunder Lake sub-watershed.
	Maintenance of fish population	Advantages: Does not remove any fish bearing watercourses	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Removes a portion of Little Creek that has been identified as fish bearing.
	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: 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	Advantages: 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
		Advantages: None apparent	Advantages: None apparent

Table X6-4: Overburden Management — Effects to the Physical and Biological Environments			
Criteria	**Assessment**	**1**	**2**
		Two Stockpiles South of the Open Pit	**Single Stockpile to the Southeast of the Open Pit**
	Effect on overall wildlife population	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: Hauling a short distance in close proximity to the open pit. Limited noise effects to surrounding area.	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Closer to property boundary, attainment of provincial guidelines still probable,
	Maintenance of wildlife movement corridors and plant dispersion	Advantages:	Advantages:
		Disadvantages:	Disadvantages:
Overburden Management Effects to the Physical and Biophysical Environments Overall Summary and Rating	Summary of Evaluation	Situated closely to the open pit which reduces off-site effects (i.e. air quality and noise effects). Stockpiles are located wholly in the Blackwater Creek watershed and does not overprint any watercourse or remove catchment area from adjacent sub-watersheds.	Situated close to the property boundary, further away from the open pit and WRSA. Has greater potential to causes effects off-site (i.e. air quality and noise). The single stockpile would overprint a portion of Little Creek which has been identified to be fish bearing. It would also remove catchment area from sub-watersheds outside of Blackwater Creek.
	Summary Rating	**Preferred**	**Acceptable**

Table X6-5: Overburden Management — Potential Ability for Future Closure/Reclamation Processes			
Criteria	**Assessment**	**1**	**2**
		Two Stockpiles South of the Open Pit	**Single Stockpile to the Southeast of the Open Pit**
Public Safety and Security	Effect on safety and security risks to the community and general public	Advantages: Not applicable	Advantages: Not applicable
		Disadvantages: Not applicable	Disadvantages: Not applicable
Environmental Health and Long Term Sustainability	Effect on long term air quality and the ability to meet point of impingement standards	Advantages: Not applicable	Advantages: Not applicable
		Disadvantages: Not applicable	Disadvantages: Not applicable
	Effect on long term water quality and the ability to meet water quality guidelines	Advantages: Not applicable	Advantages: Not applicable
		Disadvantages: Not applicable	Disadvantages: Not applicable
	Effect on long term wildlife habitats including SARs	Advantages: Not applicable	Advantages: Not applicable
		Disadvantages: Not applicable	Disadvantages: Not applicable
Land Use	Effect on long term land uses	Advantages: Not applicable	Advantages: Not applicable
		Disadvantages: Not applicable	Disadvantages: Not applicable

Table X6-5: Overburden Management — Potential Ability for Future Closure/Reclamation Processes			
Criteria	**Assessment**	**1**	**2**
		Two Stockpiles South of the Open Pit	**Single Stockpile to the Southeast of the Open Pit**
	Effect on long term visual appearance of Project Site	Advantages: Not applicable	Advantages: Not applicable
		Disadvantages: Not applicable	Disadvantages: Not applicable
Overburden Management Potential Ability for Future Closure / Reclamation Processes Overall Summary and Rating	Summary of Evaluation	The overburden stockpile will be removed during the closure phase. None of the criteria are applicable	The overburden stockpile will be removed during the closure phase. None of the criteria are applicable
	Summary Rating	**Acceptable**	**Acceptable**

7.0 PROCESSING METHOD

Three gold recovery processing options were assessed for the Project as part of a distinct study (Appendix B) completed in conjunction with the alternatives assessment. Each option has the same crushing and grinding circuit concept, which will consist of a jaw crusher and a single stage semi-autogenous grinding (SAG) mill. However, the grind size is reduced from P_{80} 106 µm in Option 1 to P_{80} 75 µm in Options 2 and 3. This will result in the need for a longer SAG mill and a larger motor to supply the increased power required to achieve the finer grind size.

Alternatives considered for the Project's ore processing are:

- Gravity and carbon-in-leach;
- Gravity and Floatation, with offsite concentration; and
- Gravity, Floatation and ILR.

A summary of the alternative assessment findings for the processing method is provided in Table X7-0. Both the "gravity carbon-in-leach" and "gravity, floatation and ILR" were identified as acceptable, with the "gravity carbon-in-leach" process identified as preferred. The "gravity, floatation with offsite concentration" was identified as unacceptable from an economic perspective.

Table X7-0: Processing Method — Summary of Alternatives Assessment

Category	1	2	3
	Gravity and C.I.L. Processing	Gravity and Floatation with Off-site Concentrate Processing	Gravity, Floatation and ILR
Cost Effectiveness	Preferred	Unacceptable	Acceptable
Technical Feasibility and Technical Reliability	Acceptable	Acceptable	Acceptable
Effects to the Human Environment	Acceptable	Acceptable	Acceptable
Effects to the Physical and Biological Environments	Acceptable	Acceptable	Acceptable
Potential Ability for Future Closure/Reclamation Processes	Acceptable	Acceptable	Acceptable
Final	**Preferred**	**Unacceptable**	**Acceptable**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;
- Effects to the human environment;

- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

Table X7-1: Processing Method — Cost Effectiveness

Criteria	Assessment	1	2	3
		Gravity and C.I.L. Processing	**Gravity and Floatation with Off-site Concentrate Processing**	**Gravity, Floatation and ILR**
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: 2nd 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
Processing Method Cost Effectiveness Overall Summary and Rating	Summary of Evaluation	Highest ROI with lowest risk alternative.	High risk due to loss of control over gold processing. High costs for off-site processing.	2nd best alternative only to Gravity with C.I.L. Processing due to lower gold recoveries.
	Summary Rating	**Preferred**	**Unacceptable**	**Acceptable**

Table X7-2: Processing Method — Technical Feasibility and Technical Reliability

Criteria	Assessment	1	2	3
		Gravity and C.I.L. Processing	**Gravity and Floatation with Off-site Concentrate Processing**	**Gravity, Floatation and ILR**
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	Advantages: Not Applicable	Advantages: Not Applicable	Advantages: Not Applicable

Table X7-2: Processing Method — Technical Feasibility and Technical Reliability				
Criteria	**Assessment**	**1**	**2**	**3**
		Gravity and C.I.L. Processing	**Gravity and Floatation with Off-site Concentrate Processing**	**Gravity, Floatation and ILR**
	investigations and technical study to provide confidence in their performance abilities	Disadvantages: Not Applicable	Disadvantages: Not Applicable	Disadvantages: Not Applicable
Processing Method Technical Feasibility and Technical Reliability Overall Summary and Rating	Summary of Evaluation	Uses readily available and proven technology	Uses readily available and proven technology	Uses readily available and proven technology
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

Table X7-3: Processing Method — Effects to the Human Environment				
Criteria	**Assessment**	**1**	**2**	**3**
		Gravity and C.I.L. Processing	**Gravity and Floatation with Off-site Concentrate Processing**	**Gravity, Floatation and ILR**
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: Greater risk of ARD potential with on-site processing of Sulphide containing mineralized rock.	Disadvantages: None apparent	Disadvantages: Greater risk of ARD potential with on-site processing of Sulphide containing mineralized rock.
	Effect on visual disturbance	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent

Table X7-3: Processing Method — Effects to the Human Environment				
Criteria	Assessment	1 Gravity and C.I.L. Processing	2 Gravity and Floatation with Off-site Concentrate Processing	3 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: Greater power consumption needed for the Project	Disadvantages: None apparent	Disadvantages: Greater power consumption needed for the Project
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	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent

Table X7-3: Processing Method — Effects to the Human Environment				
Criteria	Assessment	1 Gravity and C.I.L. Processing	2 Gravity and Floatation with Off-site Concentrate Processing	3 Gravity, Floatation and ILR
	and/or natural resource harvesters	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: 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	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent

Table X7-3: Processing Method — Effects to the Human Environment				
Criteria	Assessment	1 Gravity and C.I.L. Processing	2 Gravity and Floatation with Off-site Concentrate Processing	3 Gravity, Floatation and ILR
	vistas within, from or of built heritage resources or cultural heritage landscapes	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: 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

Table X7-3: Processing Method — Effects to the Human Environment				
Criteria	**Assessment**	**1**	**2**	**3**
		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
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
Processing Method Effects Overall Summary and Rating	Summary of Evaluation	Greater energy consumption and greater potential for ARD to affect water quality	Less energy consumption and less potential for ARD to affect water quality. Reduced labour required as processing will be done off-site.	Greater energy consumption and greater potential for ARD to affect water quality
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

Table X7-4: Processing Method — Effects to the Physical and Biological Environments				
Criteria	**Assessment**	**1**	**2**	**3**
		Gravity and C.I.L. Processing	**Gravity and Floatation with Off-site Concentrate Processing**	**Gravity, Floatation and ILR**
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: 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

Table X7-4: Processing Method — Effects to the Physical and Biological Environments				
Criteria	Assessment	1 Gravity and C.I.L. Processing	2 Gravity and Floatation with Off-site Concentrate Processing	3 Gravity, Floatation and ILR
	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
	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

Table X7-4: Processing Method — Effects to the Physical and Biological Environments				
		1	2	3
Criteria	**Assessment**	**Gravity and C.I.L. Processing**	**Gravity and Floatation with Off-site Concentrate Processing**	**Gravity, Floatation and ILR**
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
Processing Method Effects to the Physical and Biological Environments Overall Summary and Rating	Summary of Evaluation	May require highest cost for effluent discharge to meet water discharge requirements	Lowest probabilities for ARD potential as majority of sulphides are being sent off-site for processing.	Allows for better cyanide management as only gravity concentrate will be processed with cyanide.
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

Table X7-5: Processing Method — Potential Ability for Future Closure/Reclamation Processes				
		1	2	3
Criteria	**Assessment**	**Gravity and C.I.L. Processing**	**Gravity and Floatation with Off-site Concentrate Processing**	**Gravity, Floatation and ILR**
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: 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
		Advantages: None apparent	Advantages: None apparent	Advantages: None apparent

Table X7-5: Processing Method — Potential Ability for Future Closure/Reclamation Processes				
Criteria	**Assessment**	**1**	**2**	**3**
		Gravity and C.I.L. Processing	**Gravity and Floatation with Off-site Concentrate Processing**	**Gravity, Floatation and ILR**
	Effect on long term wildlife habitats including SARs	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
Processing Method Potential Ability for Future Closure / Reclamation Processes Overall Summary and Rating	Summary of Evaluation	There are no advantages or disadvantages apparent from a future closure/reclamation processes standpoint.	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	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.
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

8.0 CYANIDE CONTAINING EFFLUENT MANAGEMENT

Cyanide will be used to leach gold and silver from the ore at the Goliath Gold Project, which is a standard process used worldwide for the production of gold. The preferred option for gold recovery (Section 7 of this appendix) is carbon–in-leach (CIL), where, cyanide is added ground ore slurry to leach gold and silver. The leached metals, are removed from the slurry by activated carbon. The process was stream contains ore without the gold and silver, along with a solution containing free cyanide and cyanide complexed with metals that must be treated appropriately. The following cyanide management all include a cyanide recovery process to allow the reuse of cyanide and reduction of discharge cyanide concentrations:

- Wash the leach tails slurry through CCD (Counter Current Decantation) thickeners to reduce the cyanide concentration below 50 ppm and discharge it to the tailings storage facility for natural degradation of remaining cyanide and removal of metals. A cyanide concentration of 50 ppm cyanide is the maximum permissible for tailings storage under the International Cyanide Management Code. Washing the stream through the CCD thickeners recovers a portion of the cyanide back to the process.
- Wash the leach tails slurry through cyanide recovery thickener(s) to recover a portion of the cyanide and destroy the remaining cyanide in the plant prior to discharge of the stream to the tailings facility. Metals are also reduced in the cyanide destruction circuit. In the TSF, additional natural cyanide degradation will occur.
- A combination of the above whereby cyanide is partially recovered in CCD thickeners, the slurry is discharged to the tailings storage facility with cyanide <50 ppm, and an effluent treatment plant is constructed to destroy cyanide and remove metals contained in the tailings storage facility effluent (final effluent).
- Wash the leach tails slurry through cyanide recovery thickener(s) to recover a portion of the cyanide and destroy the remaining cyanide in the plant prior to discharge of the stream to the tailings facility. Metals are also reduced in the cyanide destruction circuit. In the TSF, additional natural cyanide degradation will occur. Further treat the tailings storage facility supernatant in an effluent treatment plant prior to discharge to the environment.

A summary of the findings for the alternatives assessment for the management of process effluent treatment is provided in Table X8-0. Only the “in-plant cyanide destruction followed by natural degradation followed by effluent treatment” option was identified as being acceptable. This was the preferred option.

Table X8-0: Cyanide Containing Effluent Management — Summary of Alternatives Assessment

Category	1	2	3	4
	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
Cost Effectiveness	Preferred	Acceptable	Acceptable	Acceptable

Table X8-0: Cyanide Containing Effluent Management — Summary of Alternatives Assessment				
Category	**1**	**2**	**3**	**4**
	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**
Technical Feasibility and Technical Reliability	Acceptable	Acceptable	Acceptable	Acceptable
Effects to the Human Environment	Acceptable	Acceptable	Acceptable	Acceptable
Effects to the Physical and Biological Environments	Unacceptable	Unacceptable	Unacceptable	Preferred
Potential Ability for Future Closure/Reclamation Processes	Acceptable	Acceptable	Acceptable	Acceptable
Final	**Unacceptable**	**Unacceptable**	**Unacceptable**	**Preferred**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;
- Effects to the human environment;
- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

Table X8-1: Cyanide Containing Effluent Management — Cost Effectiveness					
Criteria	**Assessment**	**1**	**2**	**3**	**4**
		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**
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

Table X8-1: Cyanide Containing Effluent Management — Cost Effectiveness					
		1	2	3	4
Criteria	**Assessment**	**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**
		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.
Process Effluent Treatment Cost Effectiveness Overall Summary and Rating	Summary of Evaluation	Most cost effective, highest overall return on investment, lowest financial risk.	Cost effective method and adequate return on investment.	Cost effective method and adequate return on investment.	Highest cost, lowest return on investment and highest financial risk due to highest capital and operating costs.
	Summary Rating	**Preferred**	**Acceptable**	**Acceptable**	**Acceptable**

Table X8-2: Cyanide Containing Effluent Management — Technical Feasibility and Technical Reliability					
		1	2	3	4
Criteria	**Assessment**	**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**
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: No technology needed. Natural degradation of cyanide is well understood.	Advantages: Readily Available technology.	Advantages: Readily Available technology	Advantages: Readily Available technology.
		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
Process Effluent Treatment Technical Feasibility and Technical Reliability Overall Summary and Rating	Summary of Evaluation	Readily available technology	Readily available technology	Readily available technology	Readily available technology
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**	**Acceptable**

Table X8-3: Cyanide Containing Effluent Management — Effects to the Human Environment					
		1	2	3	4
Criteria	Assessment	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
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 increasing risk to seepage.	Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.
	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.

Table X8-3: Cyanide Containing Effluent Management — Effects to the Human Environment					
		1	2	3	4
Criteria	Assessment	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
		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 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.
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:	Disadvantages:	Disadvantages:	Disadvantages:

Table X8-3: Cyanide Containing Effluent Management — Effects to the Human Environment					
		1	2	3	4
Criteria	**Assessment**	**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**
		None apparent	None apparent	None apparent	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.	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: Although an on-site archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, a smaller TSF footprint would decrease the potential to impact any archaeological resources, if present.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: Although an archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, a greater TSF footprint would increase the potential to affect any archaeological resources, if present.	Disadvantages: None apparent	Disadvantages: Although an archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, a greater overall footprint would increase the potential to affect any archaeological resources, if present.	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: None apparent	Advantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project	Advantages: None apparent	Advantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project

Table X8-3: Cyanide Containing Effluent Management — Effects to the Human Environment					
		1	2	3	4
Criteria	**Assessment**	**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, a smaller overall footprint of the TSF would decrease the potential to impacting a spiritual or ceremonial site, if present.		area, a smaller overall footprint of the TSF would decrease the potential to impacting a spiritual or ceremonial site, if present.
		Disadvantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a greater overall footprint of the TSF would increase the potential of impacting a spiritual or ceremonial site, if present.	Disadvantages: None apparent	Disadvantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a greater overall footprint of the TSF would increase the potential of impacting a spiritual or ceremonial site, if present.	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 the alternatives 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
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.	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
Process Effluent Treatment Effects to the Human Environment Overall Summary and Rating	Summary of Evaluation	Water quality in the TSF is poorest compared to the other alternatives which increases the risk to seepage. Largest TSF footprint to allow for the increased natural degradation, which could affect Indigenous peoples use of the land.	Provides the best water quality in the TSF and reduces the risk of environmental effects from seepage. It would have the smallest TSF footprint, which reduces the potential effects on Indigenous peoples use of the land.	Water quality in the TSF is poorest compared to the other alternatives which increases the risk to seepage. Largest TSF footprint to allow for the increased natural degradation, which could affect Indigenous peoples use of the land.	Provides the best water quality to the TSF and reduces the risk of effects from seepage. Smallest TSF footprint, which reduces the potential effects on Indigenous peoples use of the land.
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**	**Acceptable**

Table X8-4: Cyanide Containing Effluent Management — Effects to the Physical and Biological Environments

Criteria	Assessment	1 Natural Cyanide Degradation in the Tailings Storage Facility	2 In-Plant Cyanide Destruction Followed by Natural Degradation	3 Natural Degradation Followed by Effluent Treatment	4 In-Plant Cyanide Destruction Followed by Natural Degradation Followed by Effluent Treatment
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
	Area, type and quality (functionality) of wetlands that would be displaced or altered	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 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

Table X8-4: Cyanide Containing Effluent Management — Effects to the Physical and Biological Environments

Criteria	Assessment	1 Natural Cyanide Degradation in the Tailings Storage Facility	2 In-Plant Cyanide Destruction Followed by Natural Degradation	3 Natural Degradation Followed by Effluent Treatment	4 In-Plant Cyanide Destruction Followed by Natural Degradation Followed by Effluent Treatment
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
Process Effluent Treatment Effects to the Physical and Biological Environments Overall Summary and Rating	Summary of Evaluation	Water quality in the TSF is poorest compared to the other alternatives which increases the risk to seepage. It would have the largest TSF footprint to allow for the increased natural degradation. Water quality would not meet effluent criteria at the discharge point into Blackwater Creek.	Provides the best water quality in the TSF and reduces the risk of environmental effects from seepage. It would have the smallest TSF footprint compared to the other alternatives. Water quality would not meet effluent criteria at the discharge point into Blackwater Creek.	Water quality in the TSF is poorest compared to the other alternatives which increases the risk to seepage. It would have the largest TSF footprint to allow for the increased natural degradation. Water quality would not meet effluent criteria at the discharge point into Blackwater Creek.	Provides the best water quality in the TSF and reduces the risk of environmental effects from seepage. It would have the smallest TSF footprint compared to the other alternatives. Water quality would meet effluent criteria at the discharge point into Blackwater Creek.
	Summary Rating	**Unacceptable**	**Unacceptable**	**Unacceptable**	**Preferred**

Table X8-5: Cyanide Containing Effluent Management — Potential Ability for Future Closure/Reclamation Processes					
		1	2	3	4
Criteria	**Assessment**	**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**
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
Process Effluent Treatment Effects to the Physical and Biological Environments Overall Summary and Rating	Summary of Evaluation	There are no advantages or disadvantages from a potential ability for future closure/reclamation processes standpoint	There are no advantages or disadvantages from a potential ability for future closure/reclamation processes standpoint	There are no advantages or disadvantages from a potential ability for future closure/reclamation processes standpoint	There are no advantages or disadvantages from a potential ability for future closure/reclamation processes standpoint
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**	**Acceptable**

9.0 CYANIDE DESTRUCTION

A number of proven and effective methods are available for treating cyanide. The selection of a particular process is based on the characteristics of the stream containing cyanide, the capabilities and cost of the process, and the applicable environmental regulations and guidelines. The most common cyanide removal processes in use in Canada today are the Inco SO_2-air process, natural degradation, hydrogen peroxide and alkaline chlorination. As Carbon-in-leach (CIL) has been selected as the preferred process for the Project, the discharge stream will be a slurry containing cyanide. A cyanide recovery thickener will recycle a portion of the cyanide back to the process and reduce the quantity of cyanide to be destroyed. The selected cyanide destruction process must be capable of treating the amount of cyanide present, and it must be capable of efficiently treating the slurry stream. The following four alternative methods for cyanide destruction for the Project were considered:

- Cyanide destruction
- Alkaline Chlorination
- Hydrogen Peroxide
- Inco SO_2-Air

A summary of the findings for the alternatives assessment for the cyanide destruction method is provided in Table X9-0. Only the "Inco SO_2-Air" method was identified as being acceptable. This was the preferred option.

Table X9-0: Cyanide Destruction — Summary of Alternatives Assessment

Category	1	2	3	4
	Alkaline Chlorination	Hydrogen Peroxide	Natural Degradation	Inco SO_2-Air
Cost Effectiveness	Unacceptable	Acceptable	Unacceptable	Preferred
Technical Feasibility and Technical Reliability	Acceptable	Acceptable	Acceptable	Preferred
Effects to the Human Environment	Acceptable	Acceptable	Unacceptable	Preferred
Effects to the Physical and Biological Environments	Unacceptable	Unacceptable	Unacceptable	Preferred
Potential Ability for Future Closure/Reclamation Processes	Acceptable	Acceptable	Acceptable	Acceptable
Final	**Unacceptable**	**Unacceptable**	**Unacceptable**	**Preferred**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;

- Effects to the human environment;
- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

Table X9-1: Cyanide Destruction — Cost Effectiveness

Criteria	Assessment	1	2	3	4
		Alkaline Chlorination	**Hydrogen Peroxide**	**Natural Degradation**	**Inco SO_2-Air**
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: None-apparent	Advantages: None apparent	Advantages: Lowest reagent costs	Advantages: Minimal environmental risk associated with a TSF failure, reduced EA and permitting delays, and reduced TSF dam storage requirements compared to the other alternatives
		Disadvantages: High reagent costs, greater environmental risk associated with TSF failure, and increased EA and permitting delays. Additional treatment is likely required.	Disadvantages: High reagent costs, greater environmental risk associated with TSF failure, and increased EA and permitting delays.	Disadvantages: Greater environmental risk associated with TSF failure, increased EA and permitting delays, and increased TSF dam storage requirements for longer storage times.	Disadvantages: Higher plant operating costs.
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent	Advantages: Higher reagent cost but most likely to meet effluent standards. Method used to remove cyanide from tailings slurry.
		Disadvantages: Higher reagent costs and additional treatment is likely required.	Disadvantages: Higher reagent costs and additional treatment is likely required.	Disadvantages: Much higher cost of increased dam containment costs.	Disadvantages: None apparent
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent.	Advantages: Reduced liability risk in the unlikely event of a TSF failure with better water quality in the TSF. Low risk of non-compliance with final effluent discharge and EA delays
		Disadvantages: Greater risk of non-compliance with final effluent standards, EA delays, and liability costs in the unlikely event of a TSF failure.	Disadvantages: Greater risk of non-compliance with final effluent standards, EA delays, and liability costs in the unlikely event of a TSF failure.	Disadvantages: Greatest risk of non-compliance with final effluent standards, EA delays, and liability costs in the unlikely event of a TSF failure.	Disadvantages: None apparent
Cyanide Destruction Cost Effectiveness	Summary of Evaluation	Expensive reagent costs with greater risk of non-compliance with final effluent standards,	Expensive reagent costs with greater risk of non-compliance with final effluent standards,	Much higher cost of increased dam containment costs with greatest risk of non-	Least amount of risk associated with this alternative with reduced liability risk in the event

Table X9-1: Cyanide Destruction — Cost Effectiveness					
Criteria	Assessment	1	2	3	4
		Alkaline Chlorination	Hydrogen Peroxide	Natural Degradation	Inco SO_2-Air
Overall Summary and Rating		EA delays, and liability costs in the unlikely event of a TSF failure	EA delays, and liability costs in the unlikely event of a TSF failure	compliance with final effluent standards, EA delays, and liability costs in the unlikely event of a TSF failure.	of a TSF failure, lower risk of non-compliance with final effluent discharge and EA delays.
	Summary Rating	**Unacceptable**	**Acceptable**	**Unacceptable**	**Preferred**

Table X9-2: Cyanide Destruction — Technical Feasibility and Technical Reliability					
Criteria	Assessment	1	2	3	4
		Alkaline Chlorination	Hydrogen Peroxide	Natural Degradation	Inco SO_2-Air
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: Readily available technology	Advantages: Readily available technology	Advantages: Readily available technology	Advantages: Widely used and preferred method in the gold mining industry
		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
Cyanide Destruction Technical Feasibility and Technical Reliability Overall Summary and Rating	Summary of Evaluation	Readily available technology	Readily available technology	Readily available technology	Widely used and preferred method in the gold mining industry
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**	**Preferred**

Table X9-3: Cyanide Destruction — Effects to the Human Environment					
Criteria	Assessment	1	2	3	4
		Alkaline Chlorination	Hydrogen Peroxide	Natural Degradation	Inco SO_2-Air
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

Table X9-3: Cyanide Destruction — Effects to the Human Environment					
Criteria	Assessment	1	2	3	4
		Alkaline Chlorination	Hydrogen Peroxide	Natural Degradation	Inco SO_2-Air
	Effect on water supply for both well water and drinking water	Advantages: None apparent	Advantages: None apparent	Advantages: None Apparent	Advantages: Provides best water quality to TSF which in turn will limit risk to seepage.
		Disadvantages: Greater risk of seepage from the TSF to exceed effluent standards	Disadvantages: Greater risk of seepage from the TSF to exceed effluent standards	Disadvantages: Greatest risk of seepage from the TSF to exceed effluent standards	Disadvantages: None apparent.
	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.	Advantages: Provides best water quality to TSF which in turn will limit risk to seepage.
		Disadvantage: Greater risk of seepage from the TSF to exceed effluent standards	Disadvantage: Greater risk of seepage from the TSF to exceed effluent standards	Disadvantage: Greater risk of seepage from the TSF to exceed effluent standards	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		Advantages: None Apparent	Advantages: None Apparent	Advantages: None apparent.	Advantages: None apparent.

Table X9-3: Cyanide Destruction — Effects to the Human Environment					
Criteria	Assessment	1	2	3	4
		Alkaline Chlorination	Hydrogen Peroxide	Natural Degradation	Inco SO_2-Air
	Effect on regional 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
	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: Smaller TSF footprint compared to natural degradation	Advantages: Smaller TSF footprint compared to natural degradation	Advantages: None apparent.	Advantages: Smaller TSF footprint compared to natural degradation
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: Would contain the largest footprint of TSF to allow increased natural degradation.	Disadvantages: None apparent

Table X9-3: Cyanide Destruction — Effects to the Human Environment					
Criteria	Assessment	1	2	3	4
		Alkaline Chlorination	Hydrogen Peroxide	Natural Degradation	Inco SO_2-Air
	Avoidance of archaeological sites or mitigation by excavation if avoidance is not possible, as per the Standards and Guidelines for Consultant Archaeologists (2010).	Advantages: Although an on-site archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, a smaller TSF footprint would decrease the potential to impact any archaeological resources, if present.	Advantages: Although an on-site archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, a smaller TSF footprint would decrease the potential to impact any archaeological resources, if present.	Advantages: None apparent.	Advantages: Although an on-site archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, a smaller TSF footprint would decrease the potential to impact any archaeological resources, if present.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: Although an archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, a greater overall footprint would increase the potential to affect any archaeological resources, if present.	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: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a smaller overall footprint of the TSF would decrease the potential to impacting a spiritual or ceremonial site, if present.	Advantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a smaller overall footprint of the TSF would decrease the potential to impacting a spiritual or ceremonial site, if present.	Advantages: None apparent	Advantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a smaller overall footprint of the TSF would decrease the potential to impacting a spiritual or ceremonial site, if present.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a greater overall footprint of the TSF would increase the potential of impacting a spiritual or ceremonial site, if present.	Disadvantages: None apparent
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: Smaller TSF footprint compared to natural degradation	Advantages: Smaller TSF footprint compared to natural degradation	Advantages: None apparent.	Advantages: Smaller TSF footprint compared to natural degradation
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: Would contain the largest footprint of TSF	Disadvantages: None apparent

Table X9-3: Cyanide Destruction — Effects to the Human Environment					
Criteria	Assessment	1	2	3	4
		Alkaline Chlorination	Hydrogen Peroxide	Natural Degradation	Inco SO_2-Air
				to allow increased natural degradation.	
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: Smaller TSF footprint compared to natural degradation	Advantages: Smaller TSF footprint compared to natural degradation	Advantages: None apparent.	Advantages: Smaller TSF footprint compared to natural degradation
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: Would contain the largest footprint of TSF to allow increased natural degradation.	Disadvantages: None apparent
Cyanide Destruction Effects to the Human Environment Overall Summary and Rating	Summary of Evaluation	There is a greater risk of seepage from the TSF affecting drinking water to surrounding wells. A smaller overall TSF footprint compared to natural degradation reduces the potential effects to Indigenous peoples	There is a greater risk of seepage from the TSF affecting drinking water to surrounding wells. A smaller overall TSF footprint compared to natural degradation reduces the potential effects to Indigenous peoples	There is a greatest risk of seepage from the TSF affecting drinking water to surrounding wells. A greater overall TSF footprint compared to the other alternatives would increase the potential effects to Indigenous peoples	Provides the best water quality in the TSF which in turn limits the risk of seepage to drinking water. A smaller overall TSF footprint compared to natural degradation reduces the potential effects to Indigenous peoples
	Summary Rating	**Acceptable**	**Acceptable**	**Unacceptable**	**Preferred**

Table X9-4: Cyanide Destruction — Effects to the Physical and Biological Environments					
Criteria	Assessment	1	2	3	4
		Alkaline Chlorination	Hydrogen Peroxide	Natural Degradation	Inco SO_2-Air
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: Removes any potential for free cyanide emissions to the atmosphere.
		Disadvantages: Results in minor releases of free cyanide to the atmosphere through volatilization	Disadvantages: Results in minor releases of free cyanide to the atmosphere through volatilization	Disadvantages: Results in minor releases of free cyanide to the atmosphere through volatilization	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: Much greater risk of not meeting effluent criteria for discharge into preferred location at Blackwater creek.	Disadvantages: Much greater risk of not meeting effluent criteria for discharge into preferred location at Blackwater creek.	Disadvantages: Much greater risk of not meeting effluent criteria for discharge into preferred location at Blackwater creek.	Disadvantages: None apparent.
	Management of water level in effected water	Advantages: None Apparent	Advantages: None Apparent	Advantages: None Apparent	Advantages: None apparent.

Table X9-4: Cyanide Destruction — Effects to the Physical and Biological Environments					
Criteria	Assessment	1	2	3	4
		Alkaline Chlorination	Hydrogen Peroxide	Natural Degradation	Inco SO_2-Air
	bodies and streams to maintain aquatic life	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	Advantages: None apparent.	Advantages: None apparent.	Provides best water quality to TSF which in turn will limit risk to seepage.
		Disadvantage: Water entering into TSF increases risk of seepage not meeting regulatory standards.	Disadvantage: Water entering into TSF increases risk of seepage not meeting regulatory standards.	Disadvantage: Water entering into TSF increases risk of seepage not meeting regulatory standards.	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
	Area, type and quality (functionality) of wetlands that would be displaced or altered	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 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: Smaller TSF footprint compared to natural degradation	Advantages: Smaller TSF footprint compared to natural degradation	Advantages: None apparent.	Advantages: Smaller TSF footprint compared to natural degradation
		Disadvantages: None apparent	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

Table X9-4: Cyanide Destruction — Effects to the Physical and Biological Environments					
Criteria	**Assessment**	**1**	**2**	**3**	**4**
		Alkaline Chlorination	**Hydrogen Peroxide**	**Natural Degradation**	**Inco SO_2-Air**
	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
Cyanide Destruction Effects to the Physical and Biological Environments Overall Summary and Rating	Summary of Evaluation	Alternative will result in minor releases of free cyanide to the atmosphere through volatilization and will have a greater risk of seepage not meeting regulatory standards.	Alternative will result in minor releases of free cyanide to the atmosphere through volatilization and will have a greater risk of seepage not meeting regulatory standards.	Alternative will result in minor releases of free cyanide to the atmosphere through volatilization and will have a greatest risk of seepage not meeting regulatory standards.	Alternative removes any potential for free cyanide emissions to the atmosphere and will have the lowest risk of seepage not meting regulatory standards.
	Summary Rating	**Unacceptable**	**Unacceptable**	**Unacceptable**	**Preferred**

Table X9-5: Cyanide Destruction — Potential Ability for Future Closure/Reclamation Processes					
Criteria	**Assessment**	**1**	**2**	**3**	**4**
		Alkaline Chlorination	**Hydrogen Peroxide**	**Natural Degradation**	**Inco SO_2-Air**
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
Process Effluent Treatment Effects to the Physical and Biological Environments Overall Summary and Rating	Summary of Evaluation	There are no advantages or disadvantages from a potential ability for future closure/reclamation processes standpoint	There are no advantages or disadvantages from a potential ability for future closure/reclamation processes standpoint	There are no advantages or disadvantages from a potential ability for future closure/reclamation processes standpoint	There are no advantages or disadvantages from a potential ability for future closure/reclamation processes standpoint
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**	**Acceptable**

10.0 WATER SUPPLY

The processing plant will consume an estimated average of 3,044 m^3/d during operations, most of which will come from water recovered from the tailings storage facility (TSF), runoff collected within the operations area, and water from the dewatering of the open pit and underground mine. It is expected that a nominal amount of fresh water will be required in the process, estimated on a normal year to be approximately 58 m^3/d (Appendix F to the revised EIS). This freshwater will be used for makeup of select reagents, various spray nozzles, carbon elution, plant wash down and cleanup, and potable water. Potable water will be produced to provincial standards by clarifying, removing harmful constituents, and disinfecting the raw freshwater as required by the source. The following four alternatives for the required freshwater supply for the Project were considered:

- Wabigoon Lake;
- Thunder Lake;
- Tree Nursery Ponds; and
- Groundwater.

A summary of the findings of the alternatives assessment for the fresh water supply is provided in Table X10-0. The “Wabigoon Lake”, “Thunder Lake” and “Tree Nursery Ponds” options were all considered to be acceptable, with groundwater identified as unacceptable for economic reasons. The “Tree Nursery Ponds” were identified as the preferred option.

Table X10-0: Process Effluent Treatment — Summary of Alternatives Assessment

Category	1	2	3	4
	Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
Cost Effectiveness	Acceptable	Acceptable	Preferred	Unacceptable
Technical Feasibility and Technical Reliability	Acceptable	Acceptable	Acceptable	Acceptable
Effects to the Human Environment	Acceptable	Acceptable	Preferred	Preferred
Effects to the Physical and Biological Environments	Acceptable	Acceptable	Acceptable	Acceptable
Potential Ability for Future Closure/Reclamation Processes	Acceptable	Acceptable	Acceptable	Acceptable
Final	**Acceptable**	**Acceptable**	**Preferred**	**Unacceptable**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;

- Effects to the human environment;
- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

Table X10-1: Water Supply — Cost Effectiveness

Criteria	Assessment	1 Wabigoon Lake	2 Thunder Lake	3 Tree Nursery Ponds	4 Groundwater
Goliath Gold Project Financing	Investor desirability and/or risk	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.	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.	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.	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.
		Disadvantages: Wabigoon Lake is a water-level controlled lake. Residents on Wabigoon Lake. Closure costs required.	Disadvantages: Thunder Lake is a water-level controlled lake. Residents on Thunder Lake. Closure costs required.	Disadvantages: None apparent.	Disadvantages: Groundwater supplies are limited to provide a major water source for Project operations.
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: Close proximity to the site limits infrastructure costs though less than the alternative.	Advantages: Close proximity to the site limits infrastructure costs though less than the alternative	Advantages: Tree Nursery Ponds will provide adequate water supply for the Project. Close proximity to site allows for low infrastructure costs.	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.
		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.	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.	Disadvantages: None apparent.	Disadvantages: Wells would have to be developed causing increased capital costs, as well as closure costs.
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: Alternative has ability to support water supply needs. Due to large volume of lake water uptake is not expected to have effect on water levels.	Advantages: Alternative has ability to support water supply needs. Due to large volume of lake water uptake is not expected to have effect on water levels.	Advantages: Alternative able to support the Projects needs when coupled with integrative management system (recycling, storage).	Advantages: None apparent.

Table X10-1: Water Supply — Cost Effectiveness					
Criteria	Assessment	1	2	3	4
		Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
				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.
Water Supply Cost Effectiveness Overall Summary and Rating	Summary of Evaluation	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.	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.	Tree Nursery Ponds are capable of supporting the Projects water supply needs. The Tree Nursery Ponds provide the lower cost opportunities for infrastructure.	Groundwater supplies are inadequate to provide mind water supply needs.
	Summary Rating	**Acceptable**	**Acceptable**	**Preferred**	**Unacceptable**

Table X10-2: Water Supply — Technical Feasibility and Technical Reliability					
Criteria	Assessment	1	2	3	4
		Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
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.
	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
Water Supply Technical Feasibility and Technical Reliability Overall	Summary of Evaluation	Use of lakes for water supply is an industry common practice.	Use of lakes for water supply is an industry common practice.	Use of creeks for water supply is an industry common practice.	Use of groundwater for water supply is an industry common practice.

Table X10-2: Water Supply — Technical Feasibility and Technical Reliability					
Criteria	**Assessment**	**1**	**2**	**3**	**4**
		Wabigoon Lake	**Thunder Lake**	**Tree Nursery Ponds**	**Groundwater**
Summary and Rating	**Summary Rating**	**Acceptable**	**Acceptable**	**Acceptable**	**Acceptable**

Table X10-3: Water Supply — Effects to the Human Environment					
Criteria	**Assessment**	**1**	**2**	**3**	**4**
		Alkaline Chlorination	**Hydrogen Peroxide**	**Natural Degradation**	**Inco SO_2-Air**
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 water and drinking water	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 Nursery Ponds or drainage tributaries. No known potential to interfere with area well users.	Advantages: 17 wells within draw down cone of the Project.
		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	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.

Table X10-3: Water Supply — Effects to the Human Environment					
Criteria	Assessment	1	2	3	4
		Alkaline Chlorination	Hydrogen Peroxide	Natural Degradation	Inco SO_2-Air
	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	Advantages: None Apparent	Advantages: None apparent.	Advantages: None apparent.
		Disadvantage: None apparent.	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: 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.	Advantages: None apparent.
		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.	Disadvantage: None apparent.
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	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: Water taking would be managed and controlled by regulatory	Advantages: Water taking would be managed and controlled by regulatory	Advantages: Water taking would be managed and controlled by regulatory	Advantages: None apparent.

Table X10-3: Water Supply — Effects to the Human Environment					
Criteria	Assessment	1	2	3	4
		Alkaline Chlorination	Hydrogen Peroxide	Natural Degradation	Inco SO_2-Air
		conditions set by the Province.	conditions set by the Province.	conditions set by the Province.	
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: 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
	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: Smaller TSF footprint compared to natural degradation	Advantages: Smaller TSF footprint compared to natural degradation	Advantages: None apparent.	Advantages: Smaller TSF footprint compared to natural degradation
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: Would contain the largest footprint of TSF to allow increased natural degradation.	Disadvantages: None apparent

Table X10-3: Water Supply — Effects to the Human Environment					
Criteria	Assessment	1	2	3	4
		Alkaline Chlorination	Hydrogen Peroxide	Natural Degradation	Inco SO_2-Air
	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: Although an archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, having a pipeline that extents to Wabigoon Lake would increase the potential to affect any archaeological resources, if present.	Disadvantages: Although an archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, having a pipeline that extents to Thunder Lake would increase the potential to affect any archaeological resources, if present.	Disadvantages: Although an archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, having a pipeline that extents to the Tree Nursery Ponds would increase the potential to affect any archaeological resources, if present.	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: None apparent	Advantages: None apparent	Advantages: None apparent	Advantages: Does not affect spiritual and ceremonial sites
		Disadvantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, having a pipeline that extents to Wabigoon Lake would increase the potential to affect any spiritual and ceremonial sites, if present.	Disadvantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, having a pipeline that extents to Thunder Lake would increase the potential to affect any spiritual and ceremonial sites, if present.	Disadvantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, having a pipeline that extents to the Tree Nursery Ponds would increase the potential to affect any spiritual and ceremonial sites, if present.	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: Does not affect traditional land uses
		Disadvantages: Having a pipeline that extents to Wabigoon Lake would increase the potential to affect traditional land use.	Disadvantages: Having a pipeline that extents to Thunder Lake would increase the potential to affect traditional land use.	Disadvantages: Having a pipeline that extents to Tree Nursery Ponds would increase the potential to affect traditional land use.	Disadvantages: None apparent
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: None apparent.	Advantages: None apparent.	Advantages: Does not affect Aboriginal and Treaty Rights.	Advantages: Does not affect Aboriginal and Treaty Rights.
		Disadvantages: Having a pipeline that extents to Wabigoon Lake would increase the potential to affect Aboriginal and Treaty Rights.	Disadvantages: Having a pipeline that extends to Thunder Lake would increase the potential to affect Aboriginal and Treaty Rights.	Disadvantages: None apparent	Disadvantages: None apparent

Table X10-3: Water Supply — Effects to the Human Environment					
Criteria	Assessment	1	2	3	4
		Alkaline Chlorination	Hydrogen Peroxide	Natural Degradation	Inco SO_2-Air
Water Supply Effects to the Human Environment Overall Summary and Rating	Summary of Evaluation	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.	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.	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.	No known potential for adverse effects.
	Summary Rating	**Acceptable**	**Acceptable**	**Preferred**	**Preferred**

Table X10-4: Water Supply — Effects to the Physical and Biological Environments					
Criteria	Assessment	1	2	3	4
		Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
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: Water taking from Tree Nursery Ponds would be confined to approximately 26%.	Advantages: None apparent.
		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.

Table X10-4: Water Supply — Effects to the Physical and Biological Environments					
Criteria	Assessment	1	2	3	4
		Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
		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
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
	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
Water Supply Effects to the	Summary of Evaluation	Water taking from Wabigoon Lake would	Water taking from Thunder Lake would	Water taking from Tree Nursery Ponds is not	Groundwater taking would not be expected

Table X10-4: Water Supply — Effects to the Physical and Biological Environments					
Criteria	Assessment	1	2	3	4
		Wabigoon Lake	Thunder Lake	Tree Nursery Ponds	Groundwater
Physical and Biological Environment Overall Summary and Rating		not be expected to affect level or alter aquatic and other habitat functions.	not be expected to affect level or alter aquatic and other habitat functions	anticipated to affect aquatic and habitat functions. Flow will be reduced though tributary system by 26%.	to adversely affect the natural environment.
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**	**Acceptable**

Table X10-5: Water Supply — Potential Ability for Future Closure/Reclamation Processes					
Criteria	Assessment	1	2	3	4
		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
Water Supply Potential Ability for Future Closure / Reclamation Processes Overall Summary and Rating	Summary of Evaluation	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**	**Acceptable**	**Acceptable**	**Acceptable**

11.0 WATER DISCHARGE LOCATION

There are several lakes and creeks capable of receiving the fully treated effluent from the Project. The three significantly sized bodies of water closest to the Project site in order of distance are: Thunder Lake (approximately 4.9 km), Wabigoon Lake (approximately 6.5 km), and Hartman Lake (approximately 14.4 km). These distances are estimated pipeline lengths, as opposed to straight-line distances. Each of these lakes is of sufficient capacity to assimilate the fully treated effluent from the Project. Secondary to this is the local system of creeks that is also capable of receiving fully treated effluent from the Project. These include the Thunder Lake Tributary 3 / Tree Nursery Ponds (approximately 2.2 km), and Blackwater Creek (approximately 1.5 km). The following alternative water discharge locations were considered:

- Wabigoon Lake;
- Thunder Lake;
- Hartman Lake;
- Tree Nursery Ponds; and
- Blackwater Creek.

A summary of the findings of the alternatives assessment for the fresh water supply is provided in Table X11-0. The “Wabigoon Lake”, “Thunder Lake”, “Tree Nursery Ponds” and “Blackwater Creek” options were all considered to be acceptable. The “Hartman Lake” option was classified as unacceptable for economic reasons. The “Blackwater Creek” option was identified as the preferred option.

Table X11-0: Water Discharge Location — Summary of Alternatives Assessment

Category	1	2	3	4	5
	Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
Cost Effectiveness	Acceptable	Acceptable	Unacceptable	Acceptable	Preferred
Technical Feasibility and Technical Reliability	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
Effects to the Human Environment	Acceptable	Acceptable	Acceptable	Acceptable	Preferred
Effect to the Physical and Biological Environment	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
Potential Ability for Future Closure/Reclamation Processes	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
Final	**Acceptable**	**Acceptable**	**Unacceptable**	**Acceptable**	**Preferred**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;

- Technical feasibility and technical reliability;
- Effects to the human environment;
- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

Table X11-1: Water Discharge Location — Cost Effectiveness

Criteria	Assessment	1	2	3	4	5
		Wabigoon Lake	**Thunder Lake**	**Hartman Lake**	**Tree Nursery Ponds**	**Blackwater Creek**
Goliath Gold Project Financing	Investor desirability and/or risk	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.	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.	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.	Advantages: Tree Nursery ponds have the potential to support the Project's water discharge needs. Close proximity to Project site.	Advantages: Blackwater Creek has the potential to support the Project's water discharge needs. Close proximity to Project site.
		Disadvantages: Wabigoon Lake is water level controlled lake. Residents on Wabigoon Lake. Closure costs required.	Disadvantages: Thunder Lake is a water-level controlled lake. Residents on Thunder Lake. Closure costs required.	Disadvantages: Greater capital costs due to infrastructure development. Residents on Hartman Lake. Closure costs required.	Disadvantages: None apparent.	Disadvantages: None apparent.
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: Close proximity to the site limits infrastructure costs though less than the alternative. -	Advantages: Close proximity to the site limits infrastructure costs though less than the alternative	Advantages: None apparent.	Advantages: Close proximity to the site limits infrastructure costs though less than the alternative.	Advantages: Close proximity to the site limits infrastructure costs for this alternative.
		Disadvantages: Potentially carries risk to ROI, as property purchase could be variable and potentially effect timeline of Project.	Disadvantages: Potentially carries risk to ROI.	Disadvantages: Greater operational and construction costs would affect ROI.	Disadvantages: None apparent.	Disadvantages: None apparent.
Financial Risk	Provides a manageable or	Advantages: Alternative able to support Project	Advantages: Alternative able to support Project	Advantages: Alternative able to support Project	Advantages: Alternative able to support Project	Advantages: Alternative able to support Project

Table X11-1: Water Discharge Location — Cost Effectiveness						
Criteria	Assessment	1	2	3	4	5
		Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
	acceptable financial risk	water discharge needs. Larger volume presents an advantage in the event of greater than expected water discharge.	water discharge needs. Larger volume presents an advantage in the event of greater than expected water discharge.	water discharge needs. Larger volume presents an advantage in the event of greater than expected water discharge.	water discharge needs. No residents or recreational facilities along Tree Nursery Ponds of tributaries, which reduces risk to EA/permitting timelines.	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.
Water Discharge Location Cost Effectiveness Overall Summary and Rating	Summary of Evaluation	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.	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.	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	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	**Acceptable**	**Acceptable**	**Unacceptable**	**Acceptable**	**Preferred**

Table X11-2: Water Discharge Location — Technical Feasibility and Technical Reliability						
Criteria	**Assessment**	**1**	**2**	**3**	**4**	**5**
		Wabigoon Lake	**Thunder Lake**	**Hartman Lake**	**Tree Nursery Ponds**	**Blackwater Creek**
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
Water Discharge Location Technical Feasibility and Technical Reliability Overall Summary and Rating	Summary of Evaluation	Use of lakes for water discharge is an industry common practice.	Use of lakes for water discharge is an industry common practice.	Use of lakes for water discharge is an industry common practice.	Use of creeks for water discharge is an industry common practice.	Use of creeks for water discharge is an industry common practice.
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**	**Acceptable**	**Acceptable**

Table X11-3: Water Discharge Location — Effects to the Human Environment						
Criteria	**Assessment**	**1**	**2**	**3**	**4**	**5**
		Wabigoon Lake	**Thunder Lake**	**Hartman Lake**	**Tree Nursery Ponds**	**Blackwater Creek**
Local residents and recreational users	Effect on property values	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 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	Advantages: None apparent
						Disadvantages: Potential inflow could potentially increase flow and therefore impact access on Blackwater Creek

Table X11-3: Water Discharge Location — Effects to the Human Environment						
Criteria	Assessment	1	2	3	4	5
		Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
	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 use Blackwater Creek as a source of drinking water. 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.	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.	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.	Disadvantages: Local residents and tourist operators may perceive industrial water discharge to lakes/creeks as an infringement/disturbance.	Disadvantages: Local residents and tourist operators may perceive industrial water discharge to lakes/creeks as an infringement/disturbance.
	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	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A

Table X11-3: Water Discharge Location — Effects to the Human Environment						
Criteria	Assessment	1 Wabigoon Lake	2 Thunder Lake	3 Hartman Lake	4 Tree Nursery Ponds	5 Blackwater Creek
	defensible alternatives					
	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 and/or natural resource harvesters	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A
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,	Disadvantages: If delays to the Project EA/permitting schedule were to occur due to a result of potential resident and tourism operator interests,	Disadvantages: If delays to the Project EA/permitting schedule were to occur due to a result of potential resident and tourism operator interests,	Disadvantages: If delays to the Project EA/permitting schedule were to occur due to a result of potential resident and tourism operator interests,	Disadvantages: If delays to the Project EA/permitting schedule were to occur due to a result of potential resident and tourism operator interests,

Table X11-3: Water Discharge Location — Effects to the Human Environment						
Criteria	Assessment	1	2	3	4	5
		Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
		there would be a corresponding delay in project related employment and business opportunities to the region.	there would be a corresponding delay in project related employment and business opportunities to the region.	there would be a corresponding delay in project related employment and business opportunities to the region.	there would be a corresponding delay in project related employment and business opportunities to the region.	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 heritage features	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
	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.
		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.
		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.
		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.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent

Table X11-3: Water Discharge Location — Effects to the Human Environment						
Criteria	Assessment	1	2	3	4	5
		Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
	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	Advantages: Blackwater Creek is the closest discharge point for the Project and would have the least potential to affect any archaeological resources, if present.
		Disadvantages: Although an archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, having a pipeline that extents to Wabigoon Lake would increase the potential to affect any archaeological resources, if present.	Disadvantages: Although an archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, having a pipeline that extents to Thunder Lake would increase the potential to affect any archaeological resources, if present.	Disadvantages: Although an archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, having a pipeline that extents to Hartman Lake would increase the potential to affect any archaeological resources, if present.	Disadvantages: Although an archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, having a pipeline that extents to Tree Nursery Ponds would increase the potential to affect any archaeological resources, if present.	Disadvantages: None apparent
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.
		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: None apparent	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent	Advantages: Blackwater Creek is the closest discharge point for the Project and would have the least potential to affect any spiritual and ceremonial sites, if present.

Table X11-3: Water Discharge Location — Effects to the Human Environment						
Criteria	Assessment	1	2	3	4	5
		Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
		Disadvantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, having a pipeline that extents to Wabigoon Lake would increase the potential to affect any spiritual and ceremonial sites, if present.	Disadvantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, having a pipeline that extents to Thunder Lake would increase the potential to affect any spiritual and ceremonial sites, if present.	Disadvantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, having a pipeline that extents to Hartman Lake would increase the potential to affect any spiritual and ceremonial sites, if present.	Disadvantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, having a pipeline that extents to Tree Nursery Ponds would increase the potential to affect any spiritual and ceremonial sites, if present.	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 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: Having a pipeline that extents to Wabigoon Lake would increase the potential to affect traditional land use.	Disadvantages: Having a pipeline that extents to Thunder Lake would increase the potential to affect traditional land use.	Disadvantages: Having a pipeline that extents to Hartman Lake would increase the potential to affect traditional land use.	Disadvantages: Having a pipeline that extents to Tree Nursery Ponds would increase the potential to affect traditional land use.	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: Having a pipeline that extends to Wabigoon Lake would increase the potential to affect Aboriginal and Treaty Rights.	Disadvantages: Having a pipeline that extends to Thunder Lake would increase the potential to affect Aboriginal and Treaty Rights.	Disadvantages: Having a pipeline that extends to Hartman Lake would increase the potential to affect Aboriginal and Treaty Rights.	Disadvantages: Having a pipeline that extends to Tree Nursery Lake would increase the potential to affect Aboriginal and Treaty Rights.	Disadvantages: None apparent
Water Discharge Location Effects to the Human Environment Overall Summary and Rating	Summary of Evaluation	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. Although residents live in close proximity to Blackwater Creek, there are no known users that use the creek as a drinking water source.
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**	**Acceptable**	**Preferred**

Table X11-4: Water Discharge Location — Effects to the Physical and Biological Environments						
Criteria	Assessment	1 Wabigoon Lake	2 Thunder Lake	3 Hartman Lake	4 Tree Nursery Ponds	5 Blackwater Creek
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 if current conditions do not match PWQO	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 aquatic life standards, or scientifically defensible alternatives.	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 aquatic life standards, or scientifically defensible alternatives.	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 aquatic life standards, or scientifically defensible alternatives.	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 aquatic life standards, or scientifically defensible alternatives.	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 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	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
	Impact to Fish Spawning Habitat	Water discharge during normal operation with Wabigoon Lake is not expected to alter associated aquatic or other habitats including spawning habitat	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 Thunder 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	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

Table X11-4: Water Discharge Location — Effects to the Physical and Biological Environments						
Criteria	Assessment	1	2	3	4	5
		Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
					be seasonally offset by avoiding or minimizing discharge during high flow periods. Therefore it is not anticipated that increased flow will impact spawning habitat with the Thunder Lake Tributaries/Tree Nursery Ponds.	be seasonally offset by avoiding or minimizing discharge during high flow periods. Therefore it is not anticipated that increased flow will impact spawning habitat with Blackwater Creek.
		Disadvantages: Construction of pipeline to Wabigoon Lake has the potential to impact spawning habitat.	Disadvantages: Construction of pipeline to Thunder Lake has the potential to impact spawning habitat.	Disadvantages: Construction of pipeline to Hartman Lake has the potential to impact spawning habitat.	Disadvantages: None apparent.	Disadvantages: None apparent.
	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 conditions do not match PWQO	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
	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	Area, type and quality of terrestrial	N/A	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A	N/A

Table X11-4: Water Discharge Location — Effects to the Physical and Biological Environments						
Criteria	**Assessment**	**1**	**2**	**3**	**4**	**5**
		Wabigoon Lake	**Thunder Lake**	**Hartman Lake**	**Tree Nursery Ponds**	**Blackwater Creek**
species and habitat	habitat that would be displaced or altered					
	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)	Sensitively 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 Overall Summary and Rating	Summary of Evaluation	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 case aquatic impacts compare to the alternative. Flow would be managed to comply with water level controls for Wabigoon Lake.	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 case aquatic impacts compare to the alternative. Flow would be managed to comply with water level controls for Thunder Lake.	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 case aquatic impacts compare to the alternative.	Water discharge to the Tree Nursery Ponds would not alter aquatic and other habitat functions during normal operation, and will meet applicable effluent standards.	Water discharge to Blackwater Creek would not alter aquatic and other habitat functions during normal operation, and will meet applicable effluent standards.

Table X11-4: Water Discharge Location — Effects to the Physical and Biological Environments						
Criteria	Assessment	1	2	3	4	5
		Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**	**Acceptable**	**Acceptable**

Table X11-5: Water Discharge Location — Potential Ability for Future Closure/Reclamation Processes						
Criteria	Assessment	1	2	3	4	5
		Wabigoon Lake	Thunder Lake	Hartman Lake	Tree Nursery Ponds	Blackwater Creek
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 ability to meet water quality guidelines	N/A	N/A	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	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
Water Discharge Location Potential Ability for Future Closure / Reclamation Processes Overall Summary and Rating	Summary of Evaluation	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.	There are no water discharge limitations or liabilities relating to site reclamation at closure.
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**	**Acceptable**	**Acceptable**

12.0 PLANT AND INFRASTRUCTURE LOCATION

The Project proposes to maximize the use of infrastructure that is already in place and does not assess alternatives for the following features:

- Site access will be via existing roads such as Tree Nursery Road and Anderson Road. The company sees no benefit to creating an additional access road.
- Administrative offices and warehousing facilities are readily available at the current Project offices (former tree nursery offices) and the company sees no additional benefit to creating supplementary facilities expanded from the original footprint. Offices and administrative space will be incorporated within the processing plant facility to support the operational needs of the Project. Office and warehousing facilities therefore have not been assessed.

Excluding the aforementioned existing facilities, the processing plant and remaining infrastructure was assessed as part of a greater facility that will be constructed within a specified footprint. Treasury Metals sees no benefit to having separate facilities in differing locations. The overall site topography, location and layout of the proposed Project lend to the ability for all built facilities to be placed in one singular location.

Each facility location is required to be located in close proximity to the existing power line to limit construction costs for transmission line. The plant must also be at a sufficient distance to not interfere with mining operations while at the same time being placed close enough to not create a burden for transport of mineralized material.

The following alternative plant and infrastructure locations were considered:

- Plant and infrastructure located northeast of the open pit area; and
- Plant and infrastructure located southeast of the open pit area.

A summary of the findings of the alternatives assessment for the plant and infrastructure location is provided in Table X12-0. Both of the options were identified as acceptable. The “plant and infrastructure located northeast of the open pit” was identified as the preferred option.

Table X12-0: Plant and Infrastructure Location — Summary of Alternatives Assessment

Category	1 Plant and Infrastructure Located Northeast of Open Pit area	2 Plant and Infrastructure Located Southeast of the Open Pit area
Cost Effectiveness	Acceptable	Acceptable
Technical Feasibility and Technical Reliability	Acceptable	Acceptable
Effects to the Human Environment	Preferred	Acceptable
Effects to the Physical and Biological Environments	Preferred	Accepted

Table X12-0: Plant and Infrastructure Location — Summary of Alternatives Assessment		
Category	1 Plant and Infrastructure Located Northeast of Open Pit area	2 Plant and Infrastructure Located Southeast of the Open Pit area
Potential Ability for Future Closure/Reclamation Processes	Acceptable	Acceptable
Final Rating	**Preferred**	**Acceptable**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;
- Effects to the human environment;
- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

Table X12-1: Plant and Infrastructure Location — Cost Effectiveness			
Criteria	Assessment	1 Plant and Infrastructure Located Northeast of Open Pit area	2 Plant and Infrastructure Located Southeast of the Open Pit area
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 land under a lease agreement by Treasury Metals	Advantages: Located on private land owned by the Treasury Metals
		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
Plant and Infrastructure Location Cost Effectiveness Overall Summary and Rating	Summary of Evaluation	Provides an acceptable ROI being located on land under a lease agreement	Provides an acceptable ROI being located on private land owned by Treasury Metals
	Summary Rating	**Acceptable**	**Acceptable**

Table X12-2: Plant and Infrastructure Location — Technical Feasibility and Technical Reliability			
Criteria	**Assessment**	**1**	**2**
		Plant and Infrastructure Located Northeast of Open Pit area	**Plant and Infrastructure Located Southeast of the Open Pit area**
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
Plant and Infrastructure Location Technical Feasibility and Technical Reliability Overall Summary and Rating	Summary of Evaluation	No advantages or disadvantages are apparent from a technical feasibility and technical reliability standpoint	No advantages or disadvantages are apparent from a technical feasibility and technical reliability standpoint
	Summary Rating	**Acceptable**	**Acceptable**

Table X12-3: Plant and Infrastructure Location — Effects to the Human Environment			
Criteria	**Assessment**	**1**	**2**
		Plant and Infrastructure Located Northeast of Open Pit area	**Plant and Infrastructure Located Southeast of the Open Pit area**
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: 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: Reduced access to Tree Nursery Road

Table X12-3: Plant and Infrastructure Location — Effects to the Human Environment			
Criteria	Assessment	1 Plant and Infrastructure Located Northeast of Open Pit area	2 Plant and Infrastructure Located Southeast of the Open Pit area
	Effect on power supply systems	Advantages: None apparent	Advantages: 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
		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
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 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	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent

Table X12-3: Plant and Infrastructure Location — Effects to the Human Environment			
Criteria	Assessment	1 Plant and Infrastructure Located Northeast of Open Pit area	2 Plant and Infrastructure Located Southeast of the Open Pit area
	resources or cultural heritage landscapes		
	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: The plant site and infrastructure are located closer to the open pit, which allows for a more compact Project footprint. Although an on-site archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, a smaller overall footprint would decrease the potential to impact any archaeological resources, if present.	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: The plant site and infrastructure are located closer to the open pit, which allows for a more compact Project footprint. Although an on-site archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, a smaller overall footprint would decrease the potential to impact any archaeological resources, if present.
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: The plant site and infrastructure are located closer to the open pit, which allows for a more compact Project footprint. Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a smaller overall footprint would decrease the potential to impacting a spiritual or ceremonial site, if present.	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: The plant site and infrastructure are located closer to the open pit, which allows for a more compact Project footprint. Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a greater overall footprint would

Table X12-3: Plant and Infrastructure Location — Effects to the Human Environment			
Criteria	**Assessment**	**1**	**2**
		Plant and Infrastructure Located Northeast of Open Pit area	**Plant and Infrastructure Located Southeast of the Open Pit area**
			increase the potential to impacting a spiritual or ceremonial site, if present.
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: The plant site and infrastructure are located closer to the open pit, which allows for a more compact Project footprint. A more compact footprint will have less potential affects to traditional land use.	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: The plant site and infrastructure are located closer to the open pit, which allows for a more compact Project footprint. A larger footprint will have greater potential affects to traditional land use.
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: The plant site and infrastructure are located closer to the open pit, which allows for a more compact Project footprint. A more compact footprint will have less potential affects to Aboriginal and Treaty Rights.	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: The plant site and infrastructure are located closer to the open pit, which allows for a more compact Project footprint. A larger footprint will have greater potential affects to Aboriginal and Treaty Rights.
Plant and Infrastructure Location Effects to the Human Environment Overall Summary and Rating	Summary of Evaluation	A more compact site footprint reduces the potential effects to the human environment including access to the surrounding area and Indigenous peoples traditional land uses	A larger site footprint site footprint increases the potential effects to the human environment including access to the surrounding area and Indigenous peoples traditional land uses
	Summary Rating	**Preferred**	**Acceptable**

Table X12-4: Plant and Infrastructure Location — Effects to the Physical and Biological Environments			
Criteria	**Assessment**	**1**	**2**
		Plant and Infrastructure Located Northeast of Open Pit area	**Plant and Infrastructure Located Southeast of the Open Pit area**
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

Table X12-4: Plant and Infrastructure Location — Effects to the Physical and Biological Environments			
Criteria	Assessment	1 Plant and Infrastructure Located Northeast of Open Pit area	2 Plant and Infrastructure Located Southeast of the Open Pit area
	Management of water level in effected water bodies and streams to maintain aquatic life	Advantages: Does not require any watercourse realignments.	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Possible realignment of Blackwater Creek Tributary 2 in close proximity to plant location
	Maintenance of fish population	Advantages: Does not overprint any fish bearing watercourses	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Overprints a portion of Blackwater Creek Tributary 2, which has been identified as fish bearing.
	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: 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

Table X12-4: Plant and Infrastructure Location — Effects to the Physical and Biological Environments			
Criteria	**Assessment**	**1**	**2**
		Plant and Infrastructure Located Northeast of Open Pit area	**Plant and Infrastructure Located Southeast of the Open Pit area**
		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
		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
Plant and Infrastructure Location Effects to the Physical and Biological Environments Overall Summary and Rating	Summary of Evaluation	Alternative does not require any watercourse realignments. The location is distant from the property boundary which reduces air quality effects off-site.	Alternative may require a watercourse realignment of Blackwater Creek Tributary 2, which has been identified as a fish bearing watercourse. The location is close the south property boundary which increase air quality effects off-site.
	Summary Rating	**Preferred**	**Accepted**

Table X12-5: Plant and Infrastructure Location — Potential Ability for Future Closure/Reclamation Processes			
Criteria	**Assessment**	**1**	**2**
		Plant and Infrastructure Located Northeast of Open Pit area	**Plant and Infrastructure Located Southeast of the Open Pit area**
Public Safety and Security	Effect on safety and security risks to the	Advantages: None Apparent	Advantages: None apparent

Table X12-5: Plant and Infrastructure Location — Potential Ability for Future Closure/Reclamation Processes			
Criteria	**Assessment**	**1** **Plant and Infrastructure Located Northeast of Open Pit area**	**2** **Plant and Infrastructure Located Southeast of the Open Pit area**
	community and general public	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
		Disadvantages: None Apparent	Disadvantages: None Apparent
Plant and Infrastructure Location Potential Ability for Future Closure / Reclamation Processes Overall Summary and Rating	Summary of Evaluation	There are no advantages or disadvantages are apparent from a potential ability for future closure/reclamation processes standpoint.	There are no advantages or disadvantages are apparent from a potential ability for future closure/reclamation processes standpoint.
	Summary Rating	**Acceptable**	**Acceptable**

13.0 LOW-GRADE ORE STOCKPILE

During the open pit phase of operations, a low-grade ore stockpile will be constructed to allow the low-grade ore to be blended with the higher-grade underground ore to provide a consistent grade and rate of feed to the mill during the underground mining phase. This stockpile is anticipated to contain approximately 2.2 million tonnes of low-grade ore and will be fully exhausted by the end of the mine life. The location for the low-grade stockpile needs to minimize the travel for mine haulage equipment from the open pit while providing ease of access to the main crusher.

No alternative locations for the low-grade ore (LGO) stockpile were considered in the revised EIS given its temporary nature (will be fed to the mill and depleted by the end of mine life) and the critical need to be located proximate to the crushing facilities. There is only one location adjacent to the crushing facility that does not conflict with the preferred alternatives of other site infrastructure, which is to the east of the crusher. The underground portal and a ventilation raise are located just north of the crusher, where positioning a stockpile north of the crusher would interfere with underground operations and plant infrastructure. Any alternative locations for the LGO stockpile would have been immediately ruled out as being uneconomic if not located directly adjacent to the crushing facilities.

14.0 AGGREGATE SUPPLY

Geochemical characterization of the deposit and rock at the mine site has indicated that the majority of the rock tested to data could be classified as being potentially acid generating (PAG). However, the drilling to date used to define the PAG nature of the development rock has been largely focused toward mineralized areas of the future open pit and there has been less sampling in peripheral areas of the pit. If a suitable on-site aggregate source of non-PAG material can be identified with low metal leaching (ML) potential (especially within peripheral open pit limits), this material could provide some or all of the aggregate material for the Project. The three options selected for the Project include:

- Mine rock that is non-PAG;
- Dedicated on-site aggregate pit(s); and
- Commercial off-site aggregate source.

A summary of the findings of the alternatives assessment for the aggregate supply is provided in Table X14-0. All three options were identified as being acceptable, with the use of "non-PAG mine rock" identified as the preferred option, should sufficient volumes of non-PAG material be identified. If a suitable on-site source of non-PAG aggregate with low metal leaching (ML) potential cannot be located onsite, obtaining the required aggregate materials from a "commercial off-site aggregate source" becomes the preferred option.

Table X14-0: Aggregate Supply — Summary of Alternatives Assessment

Category	1	2	3
	Non-PAG Mine Rock	On-Site Aggregate Pit(s)	Commercial Off-site Aggregate Source
Cost Effectiveness	Preferred	Acceptable	Acceptable
Technical Feasibility and Technical Reliability	Acceptable	Acceptable	Acceptable
Effects to the Human Environment	Acceptable	Acceptable	Acceptable
Effects to the Physical and Biological Environments	Acceptable	Acceptable	Preferred
Potential Ability for Future Closure/Reclamation Processes	Preferred	Acceptable	Acceptable
Final Rating	**Preferred**	**Acceptable**	**Acceptable**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;

- Effects to the human environment;
- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

Table X14-1: Aggregate Supply — Cost Effectiveness

Criteria	Assessment	1	2	3
		Non-PAG Mine Rock	On-Site Aggregate Pit(s)	Commercial Off-site Aggregate Source
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: No additional closure costs, no costs for third part aggregate, and lower haul costs.	Advantages: No costs for third part aggregate, and lower haul costs.	Advantages: No additional closure costs, and no need for additional crushing and extraction costs.
		Disadvantages: Need for on-site crushing.	Disadvantages: There will be the need for on-site extraction and crushing. There will also be the need for closure costs associated with the additional pit(s).	Disadvantages: The cost of aggregate, and the haulage to the site represent additional operating costs.
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: Use of non-PAG mine rock would avoid the need to develop and close additional pits. This would also reduce the volume of waste rock to be managed.	Advantages: None apparent.	Advantages: No closure costs.
		Disadvantages: Additional crushing required.	Disadvantages: Additional crushing and extraction required.	Disadvantages: Potentially high hauling costs, along with the cost of aggregate.
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: Aggregate supply is within the control of Treasury.	Advantages: Aggregate supply is within the control of Treasury.	Advantages: No closure costs or liabilities.
		Disadvantages: Potentially risks to aggregate supply if adequate volumes of non-PAG materials cannot be identified.	Disadvantages: Increased closure costs and liabilities.	Disadvantages: Dependent on a third party supply of aggregate. In addition, there are risks associated with fluctuation in the purchase and hauling costs.
Aggregate Supply Cost Effectiveness Overall Summary and Rating	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 additional if pit(s) are comprised of glacial deposits and till.	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	**Preferred**	**Acceptable**	**Acceptable**

Table X14-2: Aggregate Supply — Technical Feasibility and Technical Reliability

Criteria	Assessment	1	2	3
		Non-PAG Mine Rock	On-Site Aggregate Pit(s)	Commercial Off-site Aggregate Source
Readily Available Technology	Has been successfully implemented in similar mining Projects and	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages:	Disadvantages:	Disadvantages:

Table X14-2: Aggregate Supply — Technical Feasibility and Technical Reliability				
Criteria	Assessment	1	2	3
		Non-PAG Mine Rock	On-Site Aggregate Pit(s)	Commercial Off-site Aggregate Source
	can be relied upon for sufficient performance over an extended period of time.	None apparent.	None apparent.	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
Aggregate Supply Technical Feasibility and Technical Reliability Overall Summary and Rating	Summary of Evaluation	This alternative is acceptable, given there is sufficient supply of non-PAG materials available.	This alternative is acceptable from a technical perspective.	This alternative is acceptable from a technical perspective. There are currently a number of aggregate vendors in the region.
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

Table X14-3: Aggregate Supply — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		Non-PAG Mine Rock	On-Site Aggregate Pit(s)	Commercial Off-site Aggregate Source
Local residents and recreational users	Effect on property values	Advantages: None apparent.	Advantages: None apparent.	Advantages: Off-site aggregate would come from an existing approved facility
		Disadvantages: None apparent	Disadvantages: Would require the development of additional pit(s).	Disadvantages: None apparent
	Effect on employment opportunities	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on local access points	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: Additional traffic volumes to and from the site.
	Effect on current noise levels	Advantages: None apparent.	Advantages: None apparent.	Advantages: Off-site aggregate would come from an existing approved facility
		Disadvantages: Noise from additional on-site crushing.	Disadvantages: Noise from additional on-site extraction and crushing.	Disadvantages: Increased traffic could affect noise levels along Highway 17.
	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: On-site aggregate may require additional dewatering.	Disadvantages: None apparent.
	Potential for adverse health effects	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages:	Disadvantages:	Disadvantages:

Table X14-3: Aggregate Supply — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		Non-PAG Mine Rock	On-Site Aggregate Pit(s)	Commercial Off-site Aggregate Source
		Increased noise and. These effects could be managed within applicable regulatory limits.	Increased noise and dust. These effects could be managed within applicable regulatory limits.	None apparent.
Infrastructure	Effect on local access	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: Additional traffic volumes to and from the site.
	Effect on power supply systems	Advantages: None apparent.	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: None apparent.	Advantages: Off-site aggregate would come from an existing approved facility
		Disadvantages: Increased noise and dust from on-site crushing. These effects could be managed within applicable regulatory limits.	Disadvantages: Increased noise and dust from on-site extraction and crushing. These effects could be managed within applicable regulatory limits.	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: Potential for employment opportunities.	Advantages: Potential for employment opportunities.	Advantages: Economic and 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	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: Additional traffic volumes to and from the site.
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.
		Advantages:	Advantages:	Advantages:

Table X14-3: Aggregate Supply — Effects to the Human Environment				
Criteria	Assessment	1 Non-PAG Mine Rock	2 On-Site Aggregate Pit(s)	3 Commercial Off-site Aggregate Source
	Alteration that is not sympathetic or is incompatible with the historic fabric and appearance of cultural heritage resources	None apparent. Disadvantages: None apparent	None apparent. Disadvantages: None apparent	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. Disadvantages: None apparent	Advantages: None apparent. Disadvantages: None apparent	Advantages: 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. Disadvantages: None apparent	Advantages: None apparent. Disadvantages: None apparent	Advantages: 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 Disadvantages: None apparent.	Advantages: None apparent Disadvantages: None apparent.	Advantages: None apparent. Disadvantages: None apparent.
Archaeological resources	Effect on land disturbances	Advantages: None apparent. Disadvantages: None apparent.	Advantages: None apparent. Disadvantages: None apparent.	Advantages: 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: Alternative does not create any new land disturbances and has less potential to affect archaeological sites, if present. Disadvantages: None apparent.	Advantages: None apparent. Disadvantages: Although an archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, creating new land disturbances increases the potential to affect archaeological sites, if present.	Advantages: Alternative does not create any new land disturbances and has less potential to affect archaeological sites, if present. Disadvantages: None apparent.
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	Advantages: None apparent. Disadvantages: None apparent.	Advantages: None apparent. Disadvantages: None apparent.	Advantages: None apparent. Disadvantages: None apparent.
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	Advantages: Alternative does not create any new land disturbances and has less potential to affect spiritual and ceremonial sites, if present.	Advantages: None apparent	Advantages: Alternative does not create any new land disturbances and has less potential to affect spiritual and ceremonial sites, if present.

Table X14-3: Aggregate Supply — Effects to the Human Environment				
Criteria	Assessment	1 Non-PAG Mine Rock	2 On-Site Aggregate Pit(s)	3 Commercial Off-site Aggregate Source
		Disadvantages: None apparent.	Disadvantages: Although an archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, creating new land disturbances increases the potential to affect spiritual and ceremonial sites, if present.	Disadvantages: None apparent.
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: Alternative does not create any new land disturbances.	Advantages: None apparent.	Advantages: Alternative does not create any new land disturbances.
		Disadvantages: Increased noise and dust from on-site crushing could affect the experience of those practicing traditional uses of the land.	Disadvantages: Alternative would require new land disturbances. However, increased noise and dust from on-site extraction crushing could affect the experience of those practicing traditional uses of the land.	Disadvantages: None apparent.
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: Alternative does not create any new land disturbances.	Advantages: None apparent.	Advantages: Alternative does not create any new land disturbances.
		Disadvantages: Increased noise and dust from on-site crushing could affect the experience of those practicing traditional uses of the land.	Disadvantages: Alternative would require new land disturbances. However, increased noise and dust from on-site extraction crushing could affect the experience of those practicing traditional uses of the land.	Disadvantages: None apparent.
Aggregate Supply Effects to the Human Environment Overall Summary and Rating	Summary of Evaluation	Alternative does not create new land disturbance. However; this alternative would result in additional noise and dust associated with crushing. These effects could be managed within applicable regulatory limits.	Alternative would create new land disturbance which could potential affect uses of the land by Indigenous peoples, as well and non-Indigenous people. This alternative would also result in additional noise and dust associated with on-site extraction and crushing. These effects could be managed within applicable regulatory limits.	The use of an off-site aggregate supply would not result in new land disturbances, nor would there be any increased noise and dust associated with on-site extraction of crushing. Off-site aggregate would come from an existing approved facility. The use of an offsite aggregate source would result in increased traffic along Highway 17, affecting noise levels along the highway and increasing burden on local access. There would also be an increase in local business opportunities.
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

Table X14-4: Aggregate Supply — Effects to the Physical and Biological Environments				
Criteria	Assessment	1 Non-PAG Mine Rock	2 On-Site Aggregate Pit(s)	3 Commercial Off-site Aggregate Source
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: None apparent.	Advantages: None apparent.	Advantages: Emissions associated with extraction and crushing occur at an approved off-site facility

Table X14-4: Aggregate Supply — Effects to the Physical and Biological Environments				
Criteria	Assessment	1	2	3
		Non-PAG Mine Rock	On-Site Aggregate Pit(s)	Commercial Off-site Aggregate Source
		Disadvantages: Emissions associated with additional crushing will need to be managed	Disadvantages: Emissions associated with extraction and crushing will need to be managed	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: Hauling distance would increase 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: 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: Additional footprint could affect other watercourses and fish populations	Disadvantages: None apparent
	Maintenance of fish population	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Additional footprint could affect other watercourses and fish populations	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: Additional dewatering may be required	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: 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: Additional footprint could affect other wetlands	Disadvantages: None apparent
	Maintenance of wetland connectivity	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Additional footprint could affect other wetlands	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: Off-site aggregate would come from an existing approved facility
		Disadvantages: None apparent	Disadvantages: Additional footprint could affect terrestrial habitat	Disadvantages: None apparent

Table X14-4: Aggregate Supply — Effects to the Physical and Biological Environments				
Criteria	**Assessment**	**1**	**2**	**3**
		Non-PAG Mine Rock	**On-Site Aggregate Pit(s)**	**Commercial Off-site Aggregate Source**
	Effects of noise disturbance generated by the project	Advantages: None Apparent.	Advantages: None Apparent.	Advantages: Off-site aggregate would come from an existing approved facility
		Disadvantages: Noise from the additional on-site crushing	Disadvantages: Noise from the additional on-site extraction and crushing	Disadvantages: Additional noise along highway due to increased traffic
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Additional footprint could affect wildlife movement and plant dispersion	Disadvantages: None apparent
	Effect on overall wildlife population	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Additional footprint could affect wildlife population	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
		Disadvantages: None apparent	Disadvantages: Additional footprint could affect SAR	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: Additional footprint could affect SAR	Disadvantages: None apparent
	Effects of noise disturbance generated by the project	Advantages: None Apparent.	Advantages: None Apparent.	Advantages: Off-site aggregate would come from an existing approved facility
		Disadvantages: Noise from the additional on-site crushing	Disadvantages: Noise from the additional on-site extraction and crushing	Disadvantages: Additional noise along highway due to increased traffic
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Additional footprint could affect wildlife movement and plant dispersion	Disadvantages: None apparent
Aggregate Supply Effects to the Physical and Biological Environment Overall Summary and Rating	Summary of Evaluation	This alternative would result in additional noise and dust associated with crushing. These effects could be managed within applicable regulatory limits.	This alternative would have an increased footprint, as well as additional noise and dust associated with on-site extraction and crushing. These effects could be managed within applicable regulatory limits.	Off-site aggregate would come from an existing approved facility. Increased traffic on the highways would result in higher GHG emissions and could affect noise levels along the highway.
	Summary Rating	**Acceptable**	**Acceptable**	**Preferred**

Table X14-5: Aggregate Supply — Potential Ability for Future Closure/Reclamation Processes				
Criteria	**Assessment**	**1**	**2**	**3**
		Non-PAG Mine Rock	**On-Site Aggregate Pit(s)**	**Commercial Off-site Aggregate Source**
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

Table X14-5: Aggregate Supply — Potential Ability for Future Closure/Reclamation Processes				
		1	2	3
Criteria	**Assessment**	**Non-PAG Mine Rock**	**On-Site Aggregate Pit(s)**	**Commercial Off-site Aggregate Source**
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
	Restoration of passive drainage systems	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Additional restoration required	Disadvantages: None apparent
	Effect on long term wildlife habitats including SARs	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent.	Disadvantages: Would result in additional site disturbances to reclaim	Disadvantages: None apparent
Land Use	Effect on long term land uses	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent.	Disadvantages: Would result in additional site disturbances to reclaim	Disadvantages: None apparent.
	Effect on long term visual appearance of Project Site	Advantages: Use of nan-PAG waste rock would lower WRSA height	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent.	Disadvantages: Would result in additional site disturbances	Disadvantages: None apparent
Aggregate Supply Potential Ability for Future Closure / Reclamation Processes Overall Summary and Rating	Summary of Evaluation	This alternative has the potential to reduce the height of the WRSA and therefore would lessen visual effects.	The creation of on-site pit(s) would result in larger areas requiring rehabilitated.	The use of commercial off-site aggregate has no disadvantages, but would likely have a WRSA that would be more visible that alternative 1.
	Summary Rating	**Preferred**	**Acceptable**	**Acceptable**

15.0 NON-HAZARDOUS SOLID WASTE MANAGEMENT

Solid, non-hazardous waste will be generated by the Project throughout its life and will need to be managed and disposed of appropriately to avoid environmental impacts. Treasury Metals can either dispose of this waste in a third party facility, or to dispose of the waste in their own facility. The latter option would require Treasury Metals to either obtain an existing facility or develop a facility on site. In the case of disposal at an existing facility, the most suitable location would be the municipal facility in Dryden. Treasury Metals has confirmed with the City of Dryden (personal communication, Colin Hawkins, Operations Manager) that the City of Dryden has the capacity, and is willing to provide landfill services for non-hazardous solid waste. The following alternative non-hazardous solid waste disposal scenarios were considered:

- Acquire an off-site landfill;
- Develop an on-site landfill; and
- Truck waste to an existing off-site facility.

A summary of the alternative assessment findings for non-hazardous solid waste management is provided in Table X15-0. All of the options were identified as being acceptable, with the “truck waste to an existing off-site landfill” being identified as the preferred option.

Table X15-0: Non-hazardous Solid Waste Management — Summary of Alternatives Assessment

Category	1	2	3
	Acquire an off-site landfill	**Develop an on-site landfill**	**Truck waste to an existing off site landfill**
Cost Effectiveness	Acceptable	Acceptable	Preferred
Technical Feasibility and Technical Reliability	Acceptable	Acceptable	Preferred
Effects to the Human Environment	Acceptable	Acceptable	Acceptable
Effects to the Physical and Biological Environments	Acceptable	Acceptable	Preferred
Potential Ability for Future Closure/Reclamation Processes	Acceptable	Acceptable	Preferred
Final Rating	**Acceptable**	**Acceptable**	**Preferred**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;
- Effects to the human environment;
- Effects to the physical and biological environments; and

- Potential ability for future closure/reclamation processes.

Table X15-1: Non-hazardous Solid Waste Management — Cost Effectiveness				
Criteria	**Assessment**	**1**	**2**	**3**
		Acquire an off-site landfill	**Develop an on-site landfill**	**Truck waste to an existing off site landfill**
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: Operated by Treasury Metals, eliminating the risk of operation delays. Low operation cost (short haul)	Advantages: Operated by Treasury Metals, eliminating the risk of operation delays. Low operation cost (short haul)	Advantages: 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: 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: 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: Haul distances, depending on location, could be costly. Dependent on external services.
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: Low operating costs.	Advantages: Low operating costs.	Advantages: No closure costs. Some capital required.
		Disadvantages: Capital required for landfill acquisition. Potential expansion may be required.	Disadvantages: Capital required for landfill development.	Disadvantages: Potentially high hauling costs.
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: None Apparent.	Advantages: None Apparent.	Advantages: Some capital required.
		Disadvantages: High capital costs. Closer costs. Risk of seepage with elevated concentrations.	Disadvantages: High capital costs. Closer costs. Risk of seepage with elevated concentrations.	Disadvantages: Dependent on out-source. Potentially high hauling costs. Risk of delayed, reliant on landfill provider.
Non-hazardous Solid Waste Management Cost Effectiveness Overall Summary and Rating	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.	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.	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	**Acceptable**	**Acceptable**	**Preferred**

Table X15-2: Non-hazardous Solid Waste Management — Technical Feasibility and Technical Reliability				
Criteria	**Assessment**	**1**	**2**	**3**

		Acquire an off-site landfill	Develop an on-site landfill	Truck waste to an existing off site landfill
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	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.
Non-hazardous Solid Waste Management Technical Feasibility and Technical Reliability Overall Summary and Rating	Summary Evaluation and Rating	All alternatives are applicable and acceptable.	All alternatives are applicable and acceptable.	All alternatives are applicable and acceptable. Reliance on external service.
	Summary Rating	**Acceptable**	**Acceptable**	**Preferred**

Table X15-3: Non-hazardous Solid Waste Management — Effects to the Human Environment				
Criteria	**Assessment**	**1**	**2**	**3**
		Acquire an off-site landfill	**Develop an on-site landfill**	**Truck waste to an existing off site landfill**
Local residents and recreational users	Effect on property values	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent.	Disadvantages: Development of landfill(s).	Disadvantages: None apparent.
	Effect on employment 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 local access points	Advantages: None apparent.	Advantages: None apparent.	Advantages: Increased activity.
		Disadvantages: None apparent.	Disadvantages: None apparent.	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.	Disadvantages: Increased activity as a result from crushing and blasting.	Disadvantages: Potential noise levels from landfill activity managed by others.
	Effect on water supply for both well water and drinking water	Advantages: None apparent.	Advantages: None Apparent.	Advantages: None apparent.
		Disadvantages: None apparent.	Disadvantages: Greater potential for interference with high groundwater table on the Project site.	Disadvantages: None apparent.
	Effect on visual disturbance	Advantages: None apparent.	Advantages: None apparent.	Advantages: Away from Project site.
		Disadvantages:	Disadvantages:	Disadvantages:

Table X15-3: Non-hazardous Solid Waste Management — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		Acquire an off-site landfill	Develop an on-site landfill	Truck waste to an existing off site landfill
		None apparent.	None apparent.	None apparent.
	Potential for adverse health effects	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: 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	Advantages: None apparent.	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: 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.
	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: 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	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: 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.	Advantages: None apparent.
		Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.
		Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.

Table X15-3: Non-hazardous Solid Waste Management — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		Acquire an off-site landfill	Develop an on-site landfill	Truck waste to an existing off site landfill
Resource management objectives	Effect on established resource management plans	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: None apparent.	Advantages: None apparent	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: 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: Although an on-site archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, a smaller overall footprint would decrease the potential to impact any archaeological resources, if present.	Advantages: None apparent.	Advantages: Although an on-site archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, a smaller overall footprint would decrease the potential to impact any archaeological resources, if present.
		Disadvantages: None apparent.	Disadvantages: Although an archaeological field survey indicated that there is low	Disadvantages: None apparent.

Table X15-3: Non-hazardous Solid Waste Management — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		Acquire an off-site landfill	Develop an on-site landfill	Truck waste to an existing off site landfill
			potential for archaeological resources to be present at the site, a greater overall footprint would increase the potential to impact any archaeological resources, if present.	
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: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a smaller overall footprint would decrease the potential to impacting a spiritual or ceremonial site, if present.	Advantages:	Advantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a smaller overall footprint would decrease the potential to impacting a spiritual or ceremonial site, if present.
		Disadvantages: None apparent.	Disadvantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a greater overall footprint would increase the potential to impacting a spiritual or ceremonial site, if present.	Disadvantages: None apparent.
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: Alternative does not create any new land disturbances and has less potential to affect traditional land use.	Advantages: None apparent.	Advantages: Alternative does not create any new land disturbances and has less potential to affect traditional land use.
		Disadvantages: None apparent.	Disadvantages: Greater overall footprint from mining operations result in minor loss of access to land around the Project for the practice of traditional land uses	Disadvantages: None apparent.
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: Alternative does not create any new land disturbances and has less potential to affect traditional land use.	Advantages: None apparent.	Advantages: Alternative does not create any new land disturbances and has less potential to affect traditional land use.
		Disadvantages: None apparent.	Disadvantages: Greater overall footprint from mining operations result in greater affects to Aboriginal and Treaty Rights.	Disadvantages: None apparent.
Non-hazardous Solid Waste Management Effects to the Human Environment Overall Summary and Rating	Summary Evaluation and Rating	There is no appreciable or predicted effect or benefit to the human environment.	There is no appreciable or predicted effect or benefit to the human environment.	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**	**Acceptable**	**Acceptable**

Table X15-4: Non-hazardous Solid Waste Management — Effects to the Physical and Biological Environments

Criteria	Assessment	1	2	3
		Acquire an off-site landfill	Develop an on-site landfill	Truck waste to an existing off site landfill
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 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 leachate or seepage concerns, which can be mitigated through proper design and monitoring.	Disadvantages: Potential leachate or seepage concerns, which can be mitigated through proper design and monitoring.	Disadvantages: 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	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 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	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: 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:	Advantages: Minimal additional noise due to off-site.

Table X15-4: Non-hazardous Solid Waste Management — Effects to the Physical and Biological Environments				
Criteria	**Assessment**	**1**	**2**	**3**
		Acquire an off-site landfill	**Develop an on-site landfill**	**Truck waste to an existing off site landfill**
			Minimal noise would be generated from landfill operations.	
		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	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)	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	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.
Non-hazardous Solid Waste Management Effects to the Physical and Biological Environments Overall Summary and Rating	Summary Evaluation and Rating	GHG would temporarily increase during mine production for hauling. Minimal noise would be evident.	No off-site trucking would be required limiting GHG emissions, however with the creation of landfill(s) could increase the attraction of unwanted wildlife.	GHG would temporarily increase during mine production for hauling. Minimal noise would be evident.
	Summary Rating	**Acceptable**	**Acceptable**	**Preferred**

Table X15-5: Non-hazardous Solid Waste Management — Potential Ability for Future Closure/Reclamation Processes				
Criteria	**Assessment**	**1**	**2**	**3**
		Acquire an off-site landfill	**Develop an on-site landfill**	**Truck waste to an existing off site landfill**
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: Increase of local traffic.	Disadvantages: None apparent.	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:	Disadvantages: None apparent.

Table X15-5: Non-hazardous Solid Waste Management — Potential Ability for Future Closure/Reclamation Processes				
Criteria	**Assessment**	**1**	**2**	**3**
		Acquire an off-site landfill	**Develop an on-site landfill**	**Truck waste to an existing off site landfill**
			Negligible odor effects, which can be mitigated upon closure.	
	Effect on long term water quality and the ability to meet water quality guidelines	Advantages: None apparent.	See equivalent indicator in Effect on fish and aquatic habitat.	Advantages: None apparent.
		Disadvantages: None apparent.		Disadvantages: None apparent.
	Effect on long term wildlife habitats including SARs	Advantages: None apparent.	Advantages: Terrestrial habitat for vegetation and wildlife species would be established at closure.	Advantages: None apparent.
		Disadvantages: Potential disturbance if expansion is required.	Disadvantages: Disturbance of a new site.	Disadvantages: None apparent.
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.	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.	Advantages: None apparent.
		Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.
Non-hazardous Solid Waste Management Potential Ability for Future Closure / Reclamation Processes Overall Summary and Rating	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.	No off-site property leachate migration or closure required. The site can be returned to a productive vegetation habitat for terrestrial wildlife upon closure.	No off-site property leachate migration or closure required. The site can be returned to a productive vegetation habitat for terrestrial wildlife, though is managed by independent source and is subject to the service providers regulations.
	Summary Rating	**Acceptable**	**Acceptable**	**Preferred**

16.0 HAZARDOUS SOLID WASTE MANAGEMENT

Although volumes are expected to be small, there will be hazardous wastes generated by the Project throughout its life that will need to be managed and disposed of appropriately to avoid environmental impacts. Treasury Metals can use one of the following options for managing the relatively small volume of hazardous wastes generated:

- Acquire an off-site hazardous waste management facility;
- Develop an on-site hazardous waste disposal management; and
- Truck hazardous waste to an existing off-site management facility.

A summary of the alternative assessment findings for hazardous solid waste management is provided in Table X16-0. Only the "truck waste to an existing off-site facility" was identified as an acceptable option. This was also the preferred option.

Table X16-0: Hazardous Solid Waste Management — Summary of Alternatives Assessment

Category	1	2	3
	Acquire an Off-site Hazardous Waste Management Facility	Develop an On-site Hazardous Waste Management Facility	Truck Hazardous Waste to an Existing Off-site Management Facility
Cost Effectiveness	Unacceptable	Unacceptable	Preferred
Technical Feasibility and Technical Reliability	Acceptable	Acceptable	Acceptable
Effects to the Human Environment	Acceptable	Unacceptable	Preferred
Effects to the Physical and Biological Environments	Acceptable	Acceptable	Acceptable
Potential Ability for Future Closure/Reclamation Processes	Acceptable	Unacceptable	Acceptable
Final Rating	**Unacceptable**	**Unacceptable**	**Preferred**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;
- Effects to the human environment;
- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

Table X16-1: Hazardous Solid Waste Management — Cost Effectiveness				
Criteria	Assessment	1 Acquire an Off-site Hazardous Waste Management Facility	2 Develop an On-site Hazardous Waste Management Facility	3 Truck Hazardous Waste to an Existing Off-site Management Facility
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: Operated by Treasury Metals, eliminating the risk of operation delays.	Advantages: Operated by Treasury Metals, eliminating the risk of operation delays.	Advantages: 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: High capital cost to construct and permit a hazardous solid waste disposal facility. Access roads would be required. Closure costs required. Potential liability risk which would require long term management and monitoring, requiring more capital.	Disadvantages: High capital cost to construct and permit a hazardous solid waste disposal facility. Access roads would be required. Closure costs required. Potential liability risk which would require long term management and monitoring, requiring more capital.	Disadvantages: Haul distances, depending on location, could be costly. Dependent on external services.
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: None apparent	Advantages: None apparent	Advantages: No closure costs. Some capital required.
		Disadvantages: High capital cost required for hazardous solid waste disposal facility acquisition. Potential expansion may be required.	Disadvantages: High capital cost required for hazardous solid waste disposal facility development. High closure costs	Disadvantages: Potentially high hauling costs.
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: None Apparent.	Advantages: None Apparent.	Advantages: Less capital. No closure costs.
		Disadvantages: High capital costs. Closer costs. Could postpone the operations phase as it could take over a year to be permitted for a hazardous waste disposal facility.	Disadvantages: High capital costs. Closer costs. Could postpone the operations phase as it could take over a year to be permitted for a hazardous waste disposal facility.	Disadvantages: Dependent on out-source. Potentially high hauling costs.
Hazardous Solid Waste Disposal Cost Effectiveness Overall Summary and Rating	Summary Evaluation and Rating	Acquiring and operating an off-site hazardous waste disposal facility would add to the capital and operational costs of the Project. Getting the facility permitted could postpone the operations phase as the process could take over a year. Furthermore, there is a potential liability risk which would require long-term management and monitoring.	This option would be the highest cost alternative providing additional costs upon closure. Getting the facility permitted could postpone the operations phase as the process could take over a year. Furthermore, there is a potential liability risk which would require long-term management and monitoring.	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 hazardous solid waste disposal facility requires less capital compared to the other alternatives.
	Summary Rating	**Unacceptable**	**Unacceptable**	**Preferred**

Table X16-2: Hazardous Solid Waste Management — Technical Feasibility and Technical Reliability				
Criteria	Assessment	1 Acquire an Off-site Hazardous Waste Management Facility	2 Develop an On-site Hazardous Waste Management Facility	3 Truck Hazardous Waste to an Existing Off-site Management Facility
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	Advantages: 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	Advantages: Not Applicable	Advantages: Not Applicable	Advantages: Not Applicable
		Disadvantages: Not Applicable	Disadvantages: Not Applicable	Disadvantages: Not Applicable
Hazardous Solid Waste Disposal Technical Feasibility and Technical Reliability Overall Summary and Rating	Summary Evaluation and Rating	There are no advantages or disadvantages from a technical feasibility and technical reliability standpoint.	There are no advantages or disadvantages from a technical feasibility and technical reliability standpoint.	There are no advantages or disadvantages from a technical feasibility and technical reliability standpoint.
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

Table X16-3: Hazardous Solid Waste Management — Effects to the Human Environment				
Criteria	Assessment	1 Acquire an Off-site Hazardous Waste Management Facility	2 Develop an On-site Hazardous Waste Management Facility	3 Truck Hazardous Waste to an Existing Off-site Management Facility
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: Potential for employment opportunities.	Advantages: Potential for employment opportunities.	Advantages: Employment opportunities for third party.
		Disadvantages: Not Applicable	Disadvantages: Not Applicable	Disadvantages: Not Applicable
	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: No increased traffic with hazardous waste staying on site.	Advantages: None apparent
		Disadvantages: Increase in traffic for transporting hazardous waste off-site	Disadvantages: None apparent	Disadvantages: Increase in traffic for transporting hazardous waste off-site

Table X16-3: Hazardous Solid Waste Management — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		Acquire an Off-site Hazardous Waste Management Facility	Develop an On-site Hazardous Waste Management Facility	Truck Hazardous Waste to an Existing Off-site Management Facility
	Effect on water supply for both well water and drinking water	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: Increase risk to groundwater wells surrounding the Project	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
Infrastructure	Effect on local access	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: Would add additional areas that would be inaccessible to the public for safety and security reasons	Disadvantages: Would add additional areas that would be inaccessible to the public for safety and security reasons	Disadvantages: None apparent
	Effect on power supply systems	Advantages: None apparent	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: 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: Increase risk to groundwater wells surrounding the Project	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: Increase business to the hazardous solid waste disposal facility hired to handle the hazardous solid waste produced by the Project.

Table X16-3: Hazardous Solid Waste Management — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		Acquire an Off-site Hazardous Waste Management Facility	Develop an On-site Hazardous Waste Management Facility	Truck Hazardous Waste to an Existing Off-site Management Facility
		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: Increase the area that would be lost to forestry due to the storage of hazardous waste on-site.	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: 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

Table X16-3: Hazardous Solid Waste Management — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		Acquire an Off-site Hazardous Waste Management Facility	Develop an On-site Hazardous Waste Management Facility	Truck Hazardous Waste to an Existing Off-site Management Facility
	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: 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: No new land disturbance would be needed for this alternative, reducing the potential to affect archaeological resources.	Advantages: None apparent	Advantages: No new land disturbance would be needed for this alternative, reducing the potential to affect archaeological resources.
		Disadvantages: None apparent	Disadvantages: Although an archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, a greater overall footprint would increase the potential to impact any archaeological resources, if present.	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: No new land disturbance would be needed for this alternative, reducing the potential to affect spiritual and ceremonial sites.	Advantages: None apparent	Advantages: No new land disturbance would be needed for this alternative, reducing the potential to affect spiritual and ceremonial sites.
		Disadvantages: None apparent	Disadvantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, a greater overall footprint	Disadvantages: None apparent

Table X16-3: Hazardous Solid Waste Management — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		Acquire an Off-site Hazardous Waste Management Facility	Develop an On-site Hazardous Waste Management Facility	Truck Hazardous Waste to an Existing Off-site Management Facility
			would increase the potential to impacting a spiritual or ceremonial site, if present.	
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: No new land disturbance would be needed for this alternative, reducing the potential to affect spiritual and ceremonial sites.	Advantages: None apparent	Advantages: No new land disturbance would be needed for this alternative, reducing the potential to affect spiritual and ceremonial sites.
		Disadvantages: None apparent	Disadvantages: Greater overall footprint from mining operations result in minor loss of access to land around the Project for the practice of traditional land uses	Disadvantages: None apparent
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: No new land disturbance would be needed for this alternative, reducing the potential to affect spiritual and ceremonial sites.	Advantages: None apparent	Advantages: No new land disturbance would be needed for this alternative, reducing the potential to affect spiritual and ceremonial sites.
		Disadvantages: None apparent	Disadvantages: Greater overall footprint from mining operations result in greater effects to Aboriginal and Treaty Rights.	Disadvantages: None apparent
Hazardous Solid Waste Disposal Effects to the Human Environment Overall Summary and Rating	Summary Evaluation and Rating	This alternative would result in the creation of additional jobs at Treasury Metals for the operations of a hazardous solid waste disposal facility. Furthermore, there would be no new affects to land use around the Project.	This alternative would result in the creation of additional jobs at Treasury Metals for the operations of a hazardous solid waste disposal facility. It would have the greatest effects to current land uses around the Project with the addition of the facility.	This alternative may result in the creation of third party jobs at the facility chose to handle hazardous solid waste from the Project. There would be no new affects to land use around the Project.
	Summary Rating	**Acceptable**	**Unacceptable**	**Preferred**

Table X16-4: Hazardous Solid Waste Management — Effects to the Physical and Biological Environments				
Criteria	Assessment	1	2	3
		Acquire an Off-site Hazardous Waste Management Facility	Develop an On-site Hazardous Waste Management Facility	Truck Hazardous Waste to an Existing Off-site Management Facility
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: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Emission rates of greenhouse gases (GHGs)	Advantages: None apparent	Advantages: None apparent	Advantages: None apparent
		Disadvantages: Increase emissions of GHG from the transportation of hazardous solid waste off-site.	Disadvantages: None apparent	Disadvantages: Increase emissions of GHG from the transportation of hazardous solid waste off-site.

Table X16-4: Hazardous Solid Waste Management — Effects to the Physical and Biological Environments				
Criteria	Assessment	1	2	3
		Acquire an Off-site Hazardous Waste Management Facility	Develop an On-site Hazardous Waste Management Facility	Truck Hazardous Waste to an Existing Off-site Management Facility
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: Greater potential for spills to occur off-site during hazardous solid waste transport to the off-site facility.	Disadvantages: Greater risk for water quality leaving the site to exceed PWQO.	Disadvantages: Greater potential for spills to occur off-site during hazardous solid waste transport to the off-site facility.
	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 not match PWQO	Advantages: None apparent	Advantages: None apparent	
		Disadvantages: Greater potential for spills to occur off-site during hazardous solid waste transport to the off-site facility.	Disadvantages: Greater risk for water quality leaving the site to exceed PWQO.	Disadvantages: Greater potential for spills to occur off-site during hazardous solid waste transport to the off-site facility.
	Area, type and quality (functionality) of wetlands that would be displaced or altered	Advantages: Maintains	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: None apparent
		Disadvantages: None apparent	Disadvantages: The construction of a hazardous solid waste storage facility on-site would require that habitat be removed.	Disadvantages: None apparent

Table X16-4: Hazardous Solid Waste Management — Effects to the Physical and Biological Environments				
Criteria	Assessment	1 Acquire an Off-site Hazardous Waste Management Facility	2 Develop an On-site Hazardous Waste Management Facility	3 Truck Hazardous Waste to an Existing Off-site Management Facility
	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
Hazardous Solid Waste Disposal Effects to the Physical and Biological Environments Overall Summary and Rating	Summary Evaluation and Rating	Increased emissions from transportation and greater risk of spills off-sire during transportation.	Increase in habitat reduction with the construction of a new facility on site. Greater risk of water leaving the site to exceed PWQO with seepage from the hazardous waste disposal facility.	Increased emissions from transportation and greater risk of spills off-sire during transportation.
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

Table X16-5: Hazardous Solid Waste Management — Potential Ability for Future Closure/Reclamation Processes

Criteria	Assessment	1	2	3
		Acquire an Off-site Hazardous Waste Management Facility	**Develop an On-site Hazardous Waste Management Facility**	**Truck Hazardous Waste to an Existing Off-site Management Facility**
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: Greater risk of seepage from the hazardous waste disposal facility in the post-closure.	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: Greater risk of long term water quality exceeding PWQO with the long term storage of hazardous solid waste at the site.	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: Current uses of the land would not be able to continue at the hazardous solid waste disposal facility on site.	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
Hazardous Solid Waste Disposal Potential Ability for Future Closure / Reclamation Processes Overall Summary and Rating	Summary Evaluation and Rating	There are no advantages or disadvantages apparent in regard to the potential ability for future closure/reclamation processes.	The hazardous waste facility would remain in the post-closure and increases the risk of seepage exceeding PWQO. Current uses of the land would not be able to continue at the hazardous waste disposal facility site.	There are no advantages or disadvantages apparent in regard to the potential ability for future closure/reclamation processes.
	Summary Rating	**Acceptable**	**Unacceptable**	**Acceptable**

17.0 DOMESTIC WASTE MANAGEMENT

During operations, the Project processing plant is expected to support the sanitary requirements of approximately 50 persons during the day shift. During construction, the requirement expands to around 400 persons. Due to the immediate proximity of the city of Dryden, neither a long-term construction camp nor permanent residences will be constructed for the Project. Given the large discrepancy in waste treatment demand for the construction versus operating phases, it is proposed that all sanitary waste generated during the construction phase be handled by an approved third party contractor and processed offsite. During the operating phase of the Project, the following methods of treatment were reviewed and will be considered further in later stages of the Project:

- Sewage treatment plant;
- Septic system(s); and
- Offsite treatment.

A summary of the findings of the alternatives assessment for domestic waste management is provided in Table X17-0. All of the options were identified as acceptable. The “trucking domestic sewage waste offsite to a licenced facility” was identified as the preferred option.

Table X17-0: Domestic Waste Management — Summary of Alternatives Assessment

Category	1	2	3
	Septic tanks and tile fields	Package sewage treatment plant	Trucking domestic sewage waste off-site to licensed facility
Cost Effectiveness	Acceptable	Preferred	Acceptable
Technical Feasibility and Technical Reliability	Acceptable	Acceptable	Preferred
Effects to the Human Environment	Acceptable	Acceptable	Acceptable
Effects to the Physical and Biological Environments	Acceptable	Acceptable	Acceptable
Potential Ability for Future Closure/Reclamation Processes	Acceptable	Acceptable	Preferred
Final Rating	**Acceptable**	**Acceptable**	**Preferred**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;
- Effects to the human environment;
- Effects to the physical and biological environments; and

- Potential ability for future closure/reclamation processes.

Table X17-1: Domestic Waste Management — Cost Effectiveness				
		1	2	3
Criteria	**Assessment**	**Septic tanks and tile fields**	**Package sewage treatment plant**	**Trucking domestic sewage waste off-site to licensed facility**
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.
Domestic Waste Management Cost Effectiveness Overall Summary and Rating	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.	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.	Reliable technology cost associated with trucking domestic waste is highest, making alternative less desirable.
	Summary Rating	**Acceptable**	**Preferred**	**Acceptable**

Table X17-2: Domestic Waste Management — Technical Feasibility and Technical Reliability				
		1	2	3
Criteria	**Assessment**	**Septic tanks and tile fields**	**Package sewage treatment plant**	**Trucking domestic sewage waste off-site to licensed facility**
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 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.
		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
Domestic Waste Management Technical	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

Table X17-2: Domestic Waste Management — Technical Feasibility and Technical Reliability				
Criteria	Assessment	1	2	3
		Septic tanks and tile fields	Package sewage treatment plant	Trucking domestic sewage waste off-site to licensed facility
Feasibility and Technical Reliability Overall Summary and Rating	**Summary Rating**	**Acceptable**	**Acceptable**	**Preferred**

Table X17-3: Domestic Waste Management — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		Septic tanks and tile fields	Package sewage treatment plant	Trucking domestic sewage waste off-site to licensed facility
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
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.
		Advantages:	Advantages:	Advantages:

Table X17-3: Domestic Waste Management — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		Septic tanks and tile fields	Package sewage treatment plant	Trucking domestic sewage waste off-site to licensed facility
	Effect on drinking water supply	None apparent.	None apparent.	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
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	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent

Table X17-3: Domestic Waste Management — Effects to the Human Environment				
Criteria	**Assessment**	**1**	**2**	**3**
		Septic tanks and tile fields	**Package sewage treatment plant**	**Trucking domestic sewage waste off-site to licensed facility**
	resources or cultural heritage landscapes			
	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: 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: Although an on-site archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, land disturbance on site would increase the potential to impact any archaeological resources, if present.	Disadvantages: Although an on-site archaeological field survey indicated that there is low potential for archaeological resources to be present at the site, land disturbance on site would increase the potential to impact any archaeological resources, if present.	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: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, land disturbance on site would increase the potential to impact any archaeological resources, if present.	Disadvantages: Although no spiritual or ceremonial sites have been specifically identified by Indigenous peoples in the Project area, land disturbance on site would increase the potential to impact any archaeological resources, if present.	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

Table X17-3: Domestic Waste Management — Effects to the Human Environment				
Criteria	**Assessment**	**1**	**2**	**3**
		Septic tanks and tile fields	**Package sewage treatment plant**	**Trucking domestic sewage waste off-site to licensed facility**
Domestic Waste Management Effects to the Human Environment Overall Summary and Rating	Summary Evaluation and Rating	Land disturbance would increase the potential effects to the human environment	Land disturbance would increase the potential effects to the human environment	Handling of the sewage by a third party allows for local business opportunities.
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

Table X17-4: Domestic Waste Management — Effects to the Physical and Biological Environments				
Criteria	**Assessment**	**1**	**2**	**3**
		Septic tanks and tile fields	**Package sewage treatment plant**	**Trucking domestic sewage waste off-site to licensed facility**
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	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent

Table X17-4: Domestic Waste Management — Effects to the Physical and Biological Environments				
Criteria	**Assessment**	**1**	**2**	**3**
		Septic tanks and tile fields	**Package sewage treatment plant**	**Trucking domestic sewage waste off-site to licensed facility**
	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: Limited disturbance over small area for the holding tank.
		Disadvantages: None apparent. Limited potential for habitat disruption, however it would be located to minimize any effect.	Disadvantages: None apparent. 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)	Sensitively 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 Overall Summary and Rating	Summary Evaluation and Rating	With proper design, effects on the physical and biological environment will be minimal.	With proper design, effects on the physical and biological environment are not anticipated.	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**	**Acceptable**	**Acceptable**

Table X17-5: Domestic Waste Management — Potential Ability for Future Closure/Reclamation Processes

Criteria	Assessment	1	2	3
		Septic tanks and tile fields	**Package sewage treatment plant**	**Trucking domestic sewage waste off-site to licensed facility**
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: 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.	Advantages: None apparent.
		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.	
Domestic Waste Management Effects to the Physical and Biological Environments Overall Summary and Rating	Summary Evaluation and Rating	Full removal of package sewage treatment plant from the Project site at closure and remediation of site.	Full removal of package sewage treatment plant from the Project site at closure and remediation of site.	Minor effort in the removal of storage tanks from the Project site at closure and remediation of site.
	Summary Rating	**Acceptable**	**Acceptable**	**Preferred**

18.0 EXPLOSIVES STORAGE FACILITY

To facilitate the mining operations, blasting will be used at the Goliath Gold Project. Although Treasury Metals plan to keep the volume of explosives stored on-site to a minimum, there will be a need to store some explosives on-site to ensure operations are not delayed. The following alternative locations for the storage of explosives were considered:

- Northwest end of the former tree nursery; and
- North of the deposit, east of the Tree Nursery Road.

A summary of the findings for the alternatives assessment for the explosives storage facility location is provided in Table X18-0. Both options were identified as acceptable, with the "northwest end of the tree nursery" being identified as the preferred option.

Table X18-0: Explosives Storage Facility Location — Summary of Alternatives Assessment

Category	1	2
	Northwest End of the Former Tree Nursery	North of the Deposit, East of the Tree Nursery Road
Cost Effectiveness	Preferred	Acceptable
Technical Feasibility and Technical Reliability	Acceptable	Acceptable
Effects to the Human Environment	Preferred	Acceptable
Effects to the Physical and Biological Environments	Acceptable	Acceptable
Potential Ability for Future Closure/Reclamation Processes	Acceptable	Acceptable
Final Rating	**Preferred**	**Acceptable**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;
- Effects to the human environment;
- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

Table X18-1: Explosives Storage Facility Location — Cost Effectiveness			
Criteria	**Assessment**	**1**	**2**
		North-west End of the Former Tree Nursery	**North of the Deposit, East of the Tree Nursery Road**
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: Due to the greater distance from employees or infrastructure, the facility can hold a greater volume of explosives. This will require that explosives are transported less frequently to site.	Advantages:
		Disadvantages: None Apparent	Disadvantages: Due to the proximity of the facility to employees and infrastructure, the facility would not be able to hold the same volume of explosives as the other alternative. This will require that explosives are transported more frequently to site.
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: None Apparent	Advantages: None Apparent
		Disadvantages: None Apparent	Disadvantages: None Apparent
Explosives Storage Facility Cost Effectiveness Overall Summary and Rating	Summary Evaluation and Rating	Can hold a greater volume of explosives which requires less frequent transport to site.	Holds less volume of explosives which requires more frequent transport to site
	Summary Rating	**Preferred**	**Acceptable**

Table X18-2: Explosives Storage Facility Location — Technical Feasibility and Technical Reliability			
Criteria	**Assessment**	**1**	**2**
		North-west End of the Former Tree Nursery	**North of the Deposit, East of the Tree Nursery Road**
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
Explosives Storage Facility Technical Feasibility and Technical Reliability Overall Summary and Rating	Summary Evaluation and Rating	There are no advantages or disadvantages from a technical feasibility and technical reliability standpoint.	There are no advantages or disadvantages from a technical feasibility and technical reliability standpoint.
	Summary Rating	**Acceptable**	**Acceptable**

Table X18-3: Explosives Storage Facility Location — Effects to the Human Environment			
Criteria	Assessment	1 North-west End of the Former Tree Nursery	2 North of the Deposit, East of the Tree Nursery Road
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: Area currently fenced off which limits access	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages:
	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: Area currently fenced off which limits access	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent
	Effect on power supply systems	Advantages: None apparent	Advantages: 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
		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
		Disadvantages: None apparent	Disadvantages: None apparent
Built heritage and cultural heritage	Effect on any built heritage resource or cultural heritage features	Advantages: Located on previously disturbed land	Advantages: Located on previously disturbed land
		Disadvantages: None apparent	Disadvantages: None apparent
	Alteration that is not sympathetic or is incompatible with the historic fabric and	Advantages: None apparent	Advantages: None apparent
		Disadvantages: None apparent	Disadvantages: None apparent

Table X18-3: Explosives Storage Facility Location — Effects to the Human Environment			
Criteria	Assessment	1 North-west End of the Former Tree Nursery	2 North of the Deposit, East of the Tree Nursery Road
	appearance of cultural heritage resources		
	Isolation of a built heritage resource or heritage attribute from it surrounding environment, context or a significant relationship	Advantages: None apparent Disadvantages: None apparent	Advantages: 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
	A change in land use	Advantages: Located on previously disturbed land Disadvantages: None apparent	Advantages: Located on previously disturbed 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: Located on previously disturbed land Disadvantages: None apparent	Advantages: Located on previously disturbed land Disadvantages: None apparent
Archaeological resources	Effect on land disturbances	Advantages: Located on previously disturbed land Disadvantages: None apparent	Advantages: Located on previously disturbed 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: Located on previously disturbed land Disadvantages: None apparent	Advantages: Located on previously disturbed land Disadvantages: None apparent
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	Advantages: Not Applicable Disadvantages: Not Applicable	Advantages: Not Applicable Disadvantages: Not Applicable
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	Advantages: Located on previously disturbed land Disadvantages: None apparent	Advantages: Located on previously disturbed land Disadvantages: None apparent
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: Located on previously disturbed land Disadvantages: None apparent	Advantages: Located on previously disturbed land Disadvantages: None apparent
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: Located on previously disturbed land Disadvantages: None apparent	Advantages: Located on previously disturbed land Disadvantages: None apparent
Explosives Storage Facility Effect to the Human Environment Overall Summary and Rating	Summary Evaluation and Rating	Alternative is located on previous disturbed land and is close to an existing fence which limits access to the area.	Alternative is located on previously disturbed land.
	Summary Rating	**Preferred**	**Acceptable**

Table X18-4: Explosives Storage Facility Location — Effects to the Physical and Biological Environments			
Criteria	Assessment	1 North-west End of the Former Tree Nursery	2 North of the Deposit, East of the Tree Nursery Road
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
	Emission rates of greenhouse gases (GHGs)	Advantages: None apparent Disadvantages: None apparent	Advantages: 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 Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
	Management of water level in effected water bodies and streams to maintain aquatic life	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
	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 Disadvantages: None apparent	Advantages: 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 Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
	Area, type and quality (functionality) of wetlands that would be displaced or altered	Advantages: Maintains Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
	Maintenance of wetland connectivity	Advantages: None apparent Disadvantages: None apparent	Advantages: 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 Disadvantages: Advantages: Alternative would require road upgrades which could potentially affect terrestrial habitat.	Advantages: None apparent Disadvantages: None apparent
	Effects of noise disturbance generated by the project	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
	Effect on overall wildlife population	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
Effect on Species at Risk (SAR)	Sensitivity level of effected SAR (Endangered,	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent

Table X18-4: Explosives Storage Facility Location — Effects to the Physical and Biological Environments			
Criteria	**Assessment**	**1**	**2**
		North-west End of the Former Tree Nursery	**North of the Deposit, East of the Tree Nursery Road**
	Threatened, Special Concern)		
	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
Explosives Storage Facility Effect to the Physical and Biological Environment Overall Summary and Rating	Summary Evaluation and Rating	Alternative would require road upgrades which could potentially impact terrestrial habitat.	There are no advantages or disadvantages apparent in regard to physical and biological environmental effects.
	Summary Rating	**Acceptable**	**Acceptable**

Table X18-5: Explosives Storage Facility Location — Potential Ability for Future Closure/Reclamation Processes			
Criteria	**Assessment**	**1**	**2**
		North-west End of the Former Tree Nursery	**North of the Deposit, East of the Tree Nursery Road**
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
		Disadvantages: None Apparent	Disadvantages: None Apparent
Explosives Storage Facility Potential Ability for Future Closure / Reclamation Processes Overall Summary and Rating	Summary Evaluation and Rating	There are no advantages or disadvantages apparent in regard to the potential ability for future closure/reclamation processes.	There are no advantages or disadvantages apparent in regard to the potential ability for future closure/reclamation processes.
	Summary Rating	**Acceptable**	**Acceptable**

19.0 ELECTRICAL POWER SUPPLY

One of the key utilities required to support the Project is electricity. The following alternative electrical power supply scenarios were considered:

- Use of existing Hydro One power infrastructure;
- Develop an on-site Natural Gas power generation facility; and
- Develop Alternative means of power generation such as wind or solar.

A summary of the findings for the alternative assessment for the electrical power supply is provided in Table X19-0. The “use of existing Hydro One power infrastructure” and “develop an on-site natural gas power facility” were identified as acceptable. The “develop alternative means of power generation” was identified as an unacceptable option. The preferred option was the “use of existing Hydro One power infrastructure”.

Table X19-0: Electrical Power Supply Management — Summary of Alternatives Assessment

Category	1	2	3
	Use of Existing Hydro One power infrastructure	Develop an on-site Natural Gas power generation facility	Develop Alternative means of power generation such as wind or solar
Cost Effectiveness	Preferred	Acceptable	Unacceptable
Technical Feasibility and Technical Reliability	Preferred	Acceptable	Unacceptable
Effects to the Human Environment	Acceptable	Acceptable	Unacceptable
Effects to the Physical and Biological Environments	Preferred	Acceptable	Acceptable
Potential Ability for Future Closure/Reclamation Processes	Preferred	Acceptable	Acceptable
Final Rating	**Preferred**	**Acceptable**	**Unacceptable**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;
- Effects to the human environment;
- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

Table X19-1: Electrical Power Supply — Cost Effectiveness				
		1	2	3
Criteria	**Assessment**	**Use of Existing Hydro One power infrastructure**	**Develop an on-site Natural Gas power generation facility**	**Develop Alternative means of power generation such as wind or solar**
Goliath Gold Project Financing	Investor desirability and/or risk	Advantages: Lowest cost option for both Capital cost and operating cost	Advantages: Owned, operated and controlled by Treasury Metals	Advantages: None Apparent
		Disadvantages: None Apparent	Disadvantages: Capital required for development. Additional Project footprint required. Additional Closure costs required.	Disadvantages: Extremely Capital intensive for initial construction. Extremely high footprint needed for power generation.
Return on Investment (ROI)	Provides a competitive and acceptable ROI	Advantages: Long term stability in purchase price/contract	Advantages: None Apparent	Advantages: Low operating cost once in production.
		Disadvantages: None Apparent	Disadvantages: None Apparent	Disadvantages: Extremely high payback period and low ROI
Financial Risk	Provides a manageable or acceptable financial risk	Advantages: Long term stability in purchase price/contract	Advantages: None Apparent.	Advantages: Large capital investment required.
		Disadvantages: None Apparent	Disadvantages: None Apparent.	Disadvantages: Large capital investment required and associated long term payback period.
Electrical Power Supply Cost Effectiveness Overall Summary and Rating	Summary Evaluation and Rating	Option 1 creates the lowest cost over the life of mine of the project with the lowest capital outlay.	On site electrical generation provides reliable electrical power at a reasonable cost.	Alternative energy sources do not provide a reliable electrical power source at a reasonable cost for the project.
	Summary Rating	**Preferred**	**Acceptable**	**Unacceptable**

Table X19-2: Electrical Power Supply — Technical Feasibility and Technical Reliability				
		1	2	3
Criteria	**Assessment**	**Use of Existing Hydro One power infrastructure**	**Develop an on-site Natural Gas power generation facility**	**Develop Alternative means of power generation such as wind or solar**
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. Infrastructure in place and currently operating.	Advantages: Proven technology used at other mine locations, albeit at mines in remote operations.	Advantages: None apparent
		Disadvantages: None Apparent.	Disadvantages: None apparent.	Disadvantages: Has not been applied to a known mining operation as the sole source of power.
	New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	N/A	N/A	N/A
Service	Provides a guaranteed supply to the site with	Advantages:	Advantages:	Advantages: None apparent.

Table X19-2: Electrical Power Supply — Technical Feasibility and Technical Reliability				
		1	2	3
Criteria	**Assessment**	**Use of Existing Hydro One power infrastructure**	**Develop an on-site Natural Gas power generation facility**	**Develop Alternative means of power generation such as wind or solar**
	manageable potential for supply disruption, and contingencies available.	Transformer infrastructure is operated by Treasury Metals, eliminating service disruption risks Using major electrical power line with very high mechanical availability	Operated by Treasury Metals, eliminating service disruption risks	
		Disadvantages: None apparent.	Disadvantages: Lower availability of power generators with a higher probability of downtime.	Disadvantages: Dependent on external environmental factors not with the company's control.
Accessibility	Accessible land base or infrastructure needed to support component development and operation.	Advantages: Smallest footprint needed.	Advantages: Some additional footprint needed for power generating stations.	Advantages: None Apparent.
		Disadvantages: None Apparent.	Disadvantages: None Apparent.	Disadvantages: Very large footprint needed for sufficient power generation.
Electrical Power Supply Technical Power Supply Technical Feasibility and Technical Reliability Overall Summary and Rating	Summary Evaluation and Rating	Alternative is applicable and acceptable. It provides a reliable supply with limited disruption risks.	Alternative is applicable and acceptable. A reliable option with limited disruption risks, however additional construction and potential permits required.	Not a proven technology for similar mine project. Dependent on external service, however accessible.
	Summary Rating	**Preferred**	**Acceptable**	**Unacceptable**

Table X19-3: Electrical Power Supply — Effects to the Human Environment				
		1	2	3
Criteria	**Assessment**	**Use of Existing Hydro One power infrastructure**	**Develop an on-site Natural Gas power generation facility**	**Develop Alternative means of power generation such as wind or solar**
Local residents and recreational users	Effect on property values	Advantages: None apparent. Disadvantages: None apparent.	Advantages: None apparent. Disadvantages: None apparent	Advantages: None apparent. Disadvantages: None apparent.
	Effect on employment opportunities	Advantages: None apparent.	Advantages: Potential for employment opportunities.	Advantages: Employment opportunities for third party.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on local access points	N/A	N/A	Advantages: None apparent
				Disadvantages: Greater footprint needed for project.
	Effect on current noise levels	Advantages: Quietest option available.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent.	Disadvantages: Loudest option.	Disadvantages: Reasonable concern for high pitched noise living near windmills.

Table X19-3: Electrical Power Supply — Effects to the Human Environment				
Criteria	Assessment	1 Use of Existing Hydro One power infrastructure	2 Develop an on-site Natural Gas power generation facility	3 Develop Alternative means of power generation such as wind or solar
	Effect on water supply for both well water and drinking water	N/A	N/A	N/A
	Effect on visual disturbance	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: Large visual disturbance using windmills.
	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: None apparent.	Disadvantages: None apparent.
	Effect on power supply systems	Using load as approved and purchased from existing power supply.	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: None Apparent.	Disadvantages: Increased greenhouse gas emissions from burning fossil fuels.	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: 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	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: 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.

Table X19-3: Electrical Power Supply — Effects to the Human Environment				
Criteria	Assessment	1 Use of Existing Hydro One power infrastructure	2 Develop an on-site Natural Gas power generation facility	3 Develop Alternative means of power generation such as wind or solar
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.
	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: Large visual change by installation of windmills.
	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: None apparent.	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.
		Advantages:	Advantages:	Advantages:

Table X19-3: Electrical Power Supply — Effects to the Human Environment				
		1	2	3
Criteria	**Assessment**	**Use of Existing Hydro One power infrastructure**	**Develop an on-site Natural Gas power generation facility**	**Develop Alternative means of power generation such as wind or solar**
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	None apparent.	None apparent.	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.
Electrical Power Supply Technical Power Supply Effects to the Human Environment Overall Summary and Rating	Summary Evaluation and Rating	There is no appreciable or predicted effect or benefit to the human environment.	There is no appreciable or predicted effect or benefit to the human environment.	There is no appreciable or predicted effect or benefit to the human environment.
	Summary Rating	**Acceptable**	**Acceptable**	**Unacceptable**

Table X19-4: Electrical Power Supply — Effects to the Physical and Biological Environments				
		1	2	3
Criteria	**Assessment**	**Use of Existing Hydro One power infrastructure**	**Develop an on-site Natural Gas power generation facility**	**Develop Alternative means of power generation such as wind or solar**
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	Advantages: No effect on local air quality.	Advantages: None apparent.	Advantages: No effect on local air quality.
		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: Highest emissions option.	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	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

Table X19-4: Electrical Power Supply — Effects to the Physical and Biological Environments				
		1	2	3
Criteria	**Assessment**	**Use of Existing Hydro One power infrastructure**	**Develop an on-site Natural Gas power generation facility**	**Develop Alternative means of power generation such as wind or solar**
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
	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: 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: Minimal noise from generating station.	Disadvantages: Unknown effects of high pitched noise of wind turbines.
	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: 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.
	Effects of noise disturbance generated by the project	Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.
	Maintenance of wildlife movement corridors and plant dispersion	N/A	N/A	N/A
Electrical Power Supply Technical Power Supply Effects to the Physical and Biological Environments Overall Summary and Rating	Summary Evaluation and Rating	No significant effects.	Some minimal effects.	Some minimal effects.
	Summary Rating	**Preferred**	**Acceptable**	**Acceptable**

Table X19-5: Electrical Power Supply — Potential Ability for Future Closure/Reclamation Processes				
Criteria	**Assessment**	**1**	**2**	**3**
		Acquire an off-site landfill	**Develop an on-site landfill(s)**	**Truck waste to an existing off site landfill**
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: 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	N/A	N/A	N/A
	Restoration of passive drainage systems	N/A	N/A	N/A
	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.
Electrical Power Supply Technical Power Supply Potential Ability for Future Closure / Reclamation Processes Overall Summary and Rating	Summary Evaluation and Rating	Least obtrusive option in regard to closure and reclamation.	Minimal work for closure and reclamation.	Largest amount of work to create closure and reclamation at the end of the project life.
	Summary Rating	**Preferred**	**Acceptable**	**Acceptable**

20.0 OPEN PIT CLOSURE

The main objective for closure of the open pit is to bring the open pit area to a state that is both chemically stable and physically safe in regards to the human environment. The closure of the open pit will follow the Mine Reclamation Code of Ontario (the Code) pursuant to the Ontario *Mining Act*. Section 21 of the Code provides for the following approaches for reclamation and closure of open pits in the order of their preference:

- Backfilling (with mineral waste; preferred if feasible);
- Flooding;
- Sloping (if flooding or backfilling are not appropriate);
- Boulder fencing or berming (if all of the above are impractical); and
- Chain link fencing (if none of the above is practicable).

The code also acknowledges that the process of closure may include various methodologies before the final closure and reclamation of the open is completed.

The following alternatives have been assessed for open pit closure:

- Natural flooding; and
- Enhanced flooding.

A summary of the findings of the alternatives assessment for the open pit closure is provided in Table X20-0. Both options were identified as acceptable, with “enhanced flooding” selected as the preferred option.

Table X20-0: Open Pit Closure — Summary of Alternatives Assessment

Category	1	2
	Natural Flooding	**Enhanced Flooding**
Cost Effectiveness	Acceptable	Preferred
Technical Feasibility and Technical Reliability	Acceptable	Acceptable
Effects to the Human Environment	Acceptable	Preferred
Effects to the Physical and Biological Environments	Acceptable	Preferred
Potential Ability for Future Closure/Reclamation Processes	Acceptable	Acceptable
Final Rating	**Acceptable**	**Preferred**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;
- Effects to the human environment;
- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

Table X20-1: Open Pit Closure — Cost Effectiveness

Criteria	Assessment	1 Natural Flooding	2 Enhanced Flooding
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
Open Pit Closure Cost Effectiveness Overall Summary and Rating	Summary Evaluation and Rating	Reduced site management needed during closure, but slower overall closure timelines.	Shorter time for closure to point where no financial liability remains for Treasury Metals.
	Summary Rating	**Acceptable**	**Preferred**

Table X20-2: Open Pit Closure — Technical Feasibility and Technical Reliability

Criteria	Assessment	1 Natural Flooding	2 Enhanced Flooding
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
Open Pit Closure Technical Feasibility and Technical Reliability Overall Summary and Rating	Summary Evaluation and Rating	There are no advantages or disadvantages apparent in regard to technical feasibility and technical reliability.	There are no advantages or disadvantages apparent in regard to technical feasibility and technical reliability.
	Summary Rating	**Acceptable**	**Acceptable**

Table X20-3: Open Pit Closure — Effects to the Human Environment			
Criteria	Assessment	1 Natural Flooding	2 Enhanced Flooding
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
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

Table X20-3: Open Pit Closure — Effects to the Human Environment			
Criteria	**Assessment**	**1**	**2**
		Natural Flooding	**Enhanced Flooding**
Built heritage and cultural heritage	Effect on any built heritage resource or cultural heritage features	Advantages: None apparent Disadvantages: None apparent	Advantages: 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 Disadvantages: None apparent	Advantages: 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 Disadvantages: None apparent	Advantages: 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
	A change in land use	Advantages: None apparent Disadvantages: None apparent	Advantages: 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 Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
Archaeological resources	Effect on land disturbances	Advantages: None apparent Disadvantages: None apparent	Advantages: 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 Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
First Nation Reserves and communities	Effect on conditions of community on First Nation reserves	Advantages: Not Applicable Disadvantages: Not Applicable	Advantages: Not Applicable Disadvantages: Not Applicable
Spiritual and ceremonial sites	Avoidance of damage or disturbance to known spiritual and/or ceremonial sites	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
Traditional Land use	Effect on Traditional Land use as caused by the project	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
Open Pit Closure Effects to the Human	Summary Evaluation and Rating	Increased time until open pit has filled	Reduced time until open pit is filled and public regains access to land around the Project.
	Summary Rating	**Acceptable**	**Preferred**

Table X20-3: Open Pit Closure — Effects to the Human Environment			
Criteria	Assessment	1 Natural Flooding	2 Enhanced Flooding
Environment Overall Summary and Rating			

Table X20-4: Open Pit Closure — Effects to the Physical and Biological Environments			
Criteria	Assessment	1 Natural Flooding	2 Enhanced Flooding
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
		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

Table X20-4: Open Pit Closure — Effects to the Physical and Biological Environments			
Criteria	**Assessment**	**1**	**2**
		Natural Flooding	**Enhanced Flooding**
	Effects of noise disturbance generated by the project	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
	Effect on overall wildlife population	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
Effect on Species at Risk (SAR)	Sensitivity level of effected SAR (Endangered, Threatened, Special Concern)	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
	Area, type and quality of SAR that would be displaced or altered	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
	Effects of noise disturbance generated by the project	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
	Maintenance of wildlife movement corridors and plant dispersion	Advantages: None apparent Disadvantages: None apparent	Advantages: None apparent Disadvantages: None apparent
Open Pit Closure Effects to the Physical and Biological Environments Overall Summary and Rating	Summary Evaluation and Rating	This alternative requires more time for the groundwater levels to return to pre-development levels and allows for more oxidation of the PAG pit walls.	This alternative allows for the groundwater level to return to near pre-development levels in a shorter time as well as isolates the PAG pit walls from oxidation.
	Summary Rating	**Acceptable**	**Preferred**

Table X20-5: Open Pit Closure — Potential Ability for Future Closure/Reclamation Processes			
Criteria	**Assessment**	**1**	**2**
		Natural Flooding	**Enhanced Flooding**
Public Safety and Security	Effect on safety and security risks to the community and general public	Advantages: None Apparent Disadvantages: None apparent	Advantages: 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 Disadvantages: None Apparent	Advantages: None apparent Disadvantages: None Apparent
	Effect on long term water quality and the ability to meet water quality guidelines	Advantages: None Apparent Disadvantages: None Apparent	Advantages: None apparent Disadvantages: None Apparent
	Effect on long term wildlife habitats including SARs	Advantages: None Apparent Disadvantages: None Apparent	Advantages: None apparent Disadvantages: None Apparent
Land Use	Effect on long term land uses	Advantages: None Apparent Disadvantages: None Apparent	Advantages: None apparent Disadvantages: None Apparent
	Effect on long term visual appearance of Project Site	Advantages: None Apparent Disadvantages: None Apparent	Advantages: None apparent Disadvantages: None Apparent
Open Pit Closure Potential Ability for Future Closure / Reclamation Processes Overall Summary and Rating	Summary Evaluation and Rating	There are no advantages or disadvantages apparent regarding the potential ability for future closure/reclamation processes.	There are no advantages or disadvantages apparent regarding the potential ability for future closure/reclamation processes.
	Summary Rating	**Acceptable**	**Acceptable**

21.0 BUILDING CLOSURE

In accordance with, Ontario Regulation 240/0, amended O.Reg. 307/12, and the Code of the Ontario *Mining Act*, buildings must be dismantled and removed. Subsection 24(2) of O.Reg. 307/12 of the Ontario *Mining Act* states the following:

> *All buildings, power transmission lines, pipelines, waterlines, railways, airstrips and other structures shall be dismantled and removed from the site to an extent that is consistent with the specified future land use.*

It is generally assumed that buildings and equipment that are not suitable for re-sale or re-use off-site can be disposed of in a licenced landfill site. Hazardous materials such as gear boxes containing petroleum products must be shipped to a licenced landfill capable of receiving such materials. The two alternatives listed above are not exclusive in that off-site shipment of buildings and equipment can only occur if a market exists to obtain them. There is no guarantee that such a market will exist at the time of closure.

Primary buildings and related structures on the Project site will include the following:

- Ore processing plant (including primary crusher, and control room);
- Administrative building;
- Project office (former MNRF Tree Nursery facility);
- Maintenance shop, warehousing;
- Security hub;
- Explosives storage;
- Truck wash; and
- Fuel bay.

Two alternatives for the disposal of buildings and equipment have been determined:

- Disassembly and removal; and
- Re-use of acceptable buildings and equipment.

A summary of the findings of the alternatives assessment for the building closure is provided in Table X21-0. Both options were identified as acceptable, with “re-use of acceptable buildings” selected as the preferred option.

Table X21-0: Building Closure — Summary of Alternatives Assessment		
Category	**1**	**2**
	Disassembly and Removal	**Re-use of Acceptable Buildings**
Cost Effectiveness	Acceptable	Preferred
Technical Feasibility and Technical Reliability	Acceptable	Acceptable
Effects to the Human Environment	Acceptable	Preferred
Effects to the Physical and Biological Environments	Acceptable	Preferred
Potential Ability for Future Closure/Reclamation Processes	Acceptable	Acceptable
Final Rating	**Acceptable**	**Preferred**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;
- Effects to the human environment;
- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

Table X21-1: Building Closure — Cost Effectiveness			
Criteria	**Assessment**	**1**	**2**
		Disassembly and Removal	**Re-use of Acceptable Buildings**
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 intake in addition to retention of access roads and associated infrastructure.
		Disadvantages: Additional closure costs to the Project compared to re-using the acceptable buildings.	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.
Building Closure Cost Effectiveness Overall Summary and Rating	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 though closure planning. This alternative requires additional closure costs to the Project	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	**Acceptable**	**Preferred**

Table X21-2: Building Closure — Technical Feasibility and Technical Reliability			
Criteria	**Assessment**	**1**	**2**
		Disassembly and Removal	**Re-use of Acceptable Buildings**
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
Building Closure Technical Feasibility and Technical Reliability Overall Summary and Rating	Summary Evaluation and Rating	There are no advantages or disadvantages apparent regarding the technical feasibility and technical reliability.	There are no advantages or disadvantages apparent regarding the technical feasibility and technical reliability.
	Summary Rating	**Acceptable**	**Acceptable**

Table X21-3: Building Closure — Effects to the Human Environment			
Criteria	**Assessment**	**1**	**2**
		Disassembly and Removal	**Re-use of Acceptable Buildings**
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

Table X21-3: Building Closure — Effects to the Human Environment			
Criteria	**Assessment**	**1**	**2**
		Disassembly and Removal	**Re-use of Acceptable Buildings**
	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
	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: None apparent.	Advantages: Employment opportunities may be generated if opportunities arise in buildings that are maintained.
		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
		N/A	N/A

Table X21-3: Building Closure — Effects to the Human Environment			
Criteria	Assessment	1	2
		Disassembly and Removal	Re-use of Acceptable Buildings
Built heritage and cultural heritage	Effect on any built heritage resource or cultural heritage features	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 it 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
	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
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
		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
		N/A	N/A

Table X21-3: Building Closure — Effects to the Human Environment			
Criteria	**Assessment**	**1**	**2**
		Disassembly and Removal	**Re-use of Acceptable Buildings**
Aboriginal and Treaty Rights	Effect on Aboriginal and Treaty rights	N/A	N/A
Building Closure Effects to the Human Environment Overall Summary and Rating	Summary Evaluation and Rating	There are no notable affects to the human environment with this alternative.	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	**Acceptable**	**Preferred**

Table X21-4: Building Closure — Effects to the Physical and Biological Environments			
Criteria	**Assessment**	**1**	**2**
		Disassembly and Removal	**Re-use of Acceptable Buildings**
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
		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
		N/A	N/A

Table X21-4: Building Closure — Effects to the Physical and Biological Environments			
Criteria	**Assessment**	**1**	**2**
		Disassembly and Removal	**Re-use of Acceptable Buildings**
	Maintenance of wetland connectivity	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.
	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
Building Closure Effects to the Physical and Biological Environments Overall Summary and Rating	Summary Evaluation and Rating	Terrestrial habitat would be reclaimed and left undisturbed by buildings. Closure would result in noise disturbance potentially to terrestrial species.	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.
	Summary Rating	**Acceptable**	**Preferred**

Table X21-5: Building Closure — Potential Ability for Future Closure/Reclamation Processes			
Criteria	**Assessment**	**1**	**2**
		Disassembly and Removal	**Re-use of acceptable buildings**
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

Table X21-5: Building Closure — Potential Ability for Future Closure/Reclamation Processes			
Criteria	**Assessment**	**1**	**2**
		Disassembly and Removal	**Re-use of acceptable buildings**
	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 not impeded by human development.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent
Building Closure Potential Ability for Future Closure / Reclamation Processes Overall Summary and Rating	Summary Evaluation and Rating	Removal of all buildings upon site closure would generate habitat that is unobstructed by human development and needs.	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**	**Acceptable**

22.0 INFRASTRUCTURE CLOSURE

In accordance with, Ontario Regulation 240/0, amended O.Reg. 307/12, and the Code of the Ontario *Mining Act*, buildings must be dismantled and removed. Subsection 24(2) of O.Reg. 307/12 of the Ontario *Mining Act* states the following:

> *All buildings, power transmission lines, pipelines, waterlines, railways, airstrips and other structures shall be dismantled and removed from the site to an extent that is consistent with the specified future land use.*
>
> *All transportation corridors shall be closed off and revegetated to an extent that is consistent with the specified future use of the land.*
>
> *All machinery, equipment and storage tanks shall be removed from the site to an extent that is consistent with the specified future use of the land.*

That stated, given potential future land use of the Project and use of infrastructure by others, a combination of the proposed alternatives may be implemented. Alternatives relating to the decommissioning of these items include:

- Decontamination and removal;
- Leave in place for future use; and
- Reclaim in place.

A summary of the findings of the alternatives assessment for the infrastructure closure is provided in Table X22-0. All of the options were identified as acceptable, with “decontamination and removal” selected as the preferred option.

Table X22-0: Infrastructure Closure — Summary of Alternatives Assessment

Category	1	2	3
	Decontamination and Removal	Leave in Place for Future Use	Reclaim in Place
Cost Effectiveness	Acceptable	Acceptable	Acceptable
Technical Feasibility and Technical Reliability	Acceptable	Acceptable	Acceptable
Effects to the Human Environment	Acceptable	Acceptable	Acceptable
Effects to the Physical and Biological Environments	Acceptable	Acceptable	Acceptable
Potential Ability for Future Closure/Reclamation Processes	Preferred	Acceptable	Acceptable
Final Rating	**Preferred**	**Acceptable**	**Acceptable**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;
- Effects to the human environment;
- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

Table X22-1: Infrastructure Closure — Cost Effectiveness

Criteria	Assessment	1	2	3
		Decontamination and Removal	**Leave in Place for Future Use**	**Reclaim in Place**
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 alterative 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 alterative 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: None apparent.
Financial Risk	Provides a manageable or acceptable financial risk	N/A	N/A	N/A
Infrastructure Closure Cost Effectiveness Overall Summary and Rating	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 though closure planning. This alternative requires additional closure costs to the Project	Some buildings infrastructure may be maintained for extend or alternate uses. This will reduce closure costs associated with the Project.	In-place reclamation of infrastructure is common, but may add additional costs associated with on-going monitoring.
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

Table X22-2: Infrastructure Closure — Technical Feasibility and Technical Reliability

Criteria	Assessment	1	2	3
		Decontamination and Removal	**Leave in Place for Future Use**	**Reclaim in Place**
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	N/A	N/A
		N/A	N/A	N/A

Table X22-2: Infrastructure Closure — Technical Feasibility and Technical Reliability				
Criteria	**Assessment**	**1**	**2**	**3**
		Decontamination and Removal	**Leave in Place for Future Use**	**Reclaim in Place**
	New technologies must be supported by sufficient investigations and technical study to provide confidence in their performance abilities	N/A	N/A	N/A
Infrastructure Closure Technical Feasibility and Technical Reliability Overall Summary and Rating	Summary Evaluation and Rating	There are no advantages or disadvantages apparent regarding the technical feasibility and technical reliability.	There are no advantages or disadvantages apparent regarding the technical feasibility and technical reliability.	There are no advantages or disadvantages apparent regarding the technical feasibility and technical reliability.
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

Table X22-3: Infrastructure Closure — Effects to the Human Environment				
Criteria	**Assessment**	**1**	**2**	**3**
		Decontamination and Removal	**Leave in Place for Future Use**	**Reclaim in Place**
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
	Effect on visual disturbance	N/A	Advantages: Area would be reclaimed akin to pre-Project conditions, thereby some of the buildings may be perceived as a visual disturbance.	N/A
		Disadvantages: None apparent	Disadvantages: None apparent	
		N/A	N/A	N/A

Table X22-3: Infrastructure Closure — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		Decontamination and Removal	Leave in Place for Future Use	Reclaim in Place
	Potential for adverse health effects	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.
		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	N/A	N/A	N/A
		N/A	N/A	N/A

Table X22-3: Infrastructure Closure — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		Decontamination and Removal	Leave in Place for Future Use	Reclaim in Place
	appearance of cultural heritage resources			
	Isolation of a built heritage resource or heritage attribute from it 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
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
Infrastructure Closure Effects to the Human Environment Overall Summary and Rating	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.	If infrastructure is maintained for alternative use by local or First Nation communities the amount of waste generated would be reduced. Use of	Closure activities may generate temporary employment opportunities in the local and regional area.

Table X22-3: Infrastructure Closure — Effects to the Human Environment				
Criteria	Assessment	1 Decontamination and Removal	2 Leave in Place for Future Use	3 Reclaim in Place
			infrastructure may result in employment opportunities.	
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

Table X22-4: Infrastructure Closure — Effects to the Physical and Biological Environments				
Criteria	Assessment	1 Decontamination and Removal	2 Leave in Place for Future Use	3 Reclaim in Place
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 of water quality if current conditions do not match PWQO	Advantages: Infrastructure that is associated with The Project and environmental effects will be 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.	Advantages: Infrastructure that is associated with The Project and environmental effects will be 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.	Advantages: Infrastructure that is associated with The Project and environmental effects will be 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	N/A	N/A	N/A
		N/A	N/A	N/A

Table X22-4: Infrastructure Closure — Effects to the Physical and Biological Environments				
Criteria	Assessment	1 Decontamination and Removal	2 Leave in Place for Future Use	3 Reclaim in Place
	life or ensuring no 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	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 be displaced or altered	Advantages: This alternative would provide unobstructed terrestrial habitat.	Advantages: Does not preclude the use of area by terrestrial species.	Advantages: Provides mostly 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 obstructed 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 through 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.
Infrastructure Closure Effects to the Human Environment Overall Summary and Rating	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.	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.	Closure disruption would be lessened by avoiding the removal of infrastructure. Limited habitat fragmentation may remain. On-going monitoring would be required.

Table X22-4: Infrastructure Closure — Effects to the Physical and Biological Environments				
Criteria	Assessment	1 Decontamination and Removal	2 Leave in Place for Future Use	3 Reclaim in Place
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

Table X22-5: Infrastructure Closure — Potential Ability for Future Closure/Reclamation Processes				
Criteria	Assessment	1 Decontamination and Removal	2 Leave in Place for Future Use	3 Reclaim in Place
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
Infrastructure Closure Effects to the Human Environment Overall Summary and Rating	Summary Evaluation and 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**	**Acceptable**	**Acceptable**

23.0 MINEWATER MANAGEMENT AND DRAINAGE CLOSURE

The Project site drainage modifications, as part of the water management system, include a number of modifications directly affecting the Blackwater Creek watershed and drainage pattern. Alternatives relating to surface draining restoration at closure include:

- Stabilize and leave in place; and
- Removal (and restoration).

A summary of the findings for the alternatives assessment for drainage closure is provided in Table X23-0. Both options were identified as acceptable, with “stabilize and leave in place” selected as the preferred option.

Table X23-0: Minewater Management and Drainage Closure — Summary of Alternatives Assessment

Category	1	2	3
	Stabilize and Leave in Place	Partial Removal (and restoration)	Removal (and restoration)
Cost Effectiveness	Acceptable	Preferred	Acceptable
Technical Feasibility and Technical Reliability	Acceptable	Acceptable	Acceptable
Effects to the Human Environment	Acceptable	Preferred	Acceptable
Effects to the Physical and Biological Environments	Acceptable	Preferred	Acceptable
Potential Ability for Future Closure/Reclamation Processes	Acceptable	Preferred	Acceptable
Final Rating	**Acceptable**	**Preferred**	**Acceptable**

The following tables provide the details for the assessment of alternatives for each of the following categories:

- Cost effectiveness;
- Technical feasibility and technical reliability;
- Effects to the human environment;
- Effects to the physical and biological environments; and
- Potential ability for future closure/reclamation processes.

Table X23-1: Minewater Management and Drainage Closure — Cost Effectiveness

Criteria	Assessment	1	2	3
		Stabilize and Leave in Place	Partial Removal (and restoration)	Removal (and restoration)
		Advantages:	Advantages:	Advantages:

Table X23-1: Minewater Management and Drainage Closure — Cost Effectiveness				
Criteria	**Assessment**	**1**	**2**	**3**
		Stabilize and Leave in Place	**Partial Removal (and restoration)**	**Removal (and restoration)**
Goliath Gold Project Financing	Investor desirability and/or risk	Leaving drainage in place greatly reduces capital for closure costs. Generation of new aquatic habitat (open pit lake) and water features.	Less capital for maintenance costs or the site and closure cost for those components that are removed with the added benefit of generating new aquatic habitat and water features.	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: May require capital for maintenance costs or the site and closure cost for those components that are removed.	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: Reduced closure costs translate to a higher ROI.	Advantages: None apparent.
		Disadvantages: 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.	All alternatives carry an equivalent (low) level financial risk.
Drainage Closure Cost Effectiveness Overall Summary and Rating	Summary Evaluation and Rating	Leaving drainage systems in place is the most cost-effective alternative.	Leaving some minewater management and drainage systems in place is more cost effective than removal of the entire system and has less overall maintenance compared to the stabilize and leave in place alternative.	Removal of drainage systems requires capital for closure costs, but removes all related land-disturbances. This however may be unnecessarily expensive.
	Summary Rating	**Acceptable**	**Preferred**	**Acceptable**

Table X23-2: Minewater Management and Drainage Closure — Technical Feasibility and Technical Reliability				
Criteria	**Assessment**	**1**	**2**	**3**
		Stabilize and Leave in Place	**Partial Removal (and restoration)**	**Removal (and restoration)**
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	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
Drainage Closure Technical Feasibility	Summary Evaluation and Rating	There are no advantages or disadvantages apparent	There are no advantages or disadvantages apparent	There are no advantages or disadvantages apparent

Table X23-2: Minewater Management and Drainage Closure — Technical Feasibility and Technical Reliability				
Criteria	**Assessment**	**1**	**2**	**3**
		Stabilize and Leave in Place	**Partial Removal (and restoration)**	**Removal (and restoration)**
and Technical Reliability Overall Summary and Rating		regarding the technical feasibility and technical reliability.	regarding the technical feasibility and technical reliability.	regarding the technical feasibility and technical reliability.
	Summary Rating	**Acceptable**	**Acceptable**	**Acceptable**

Table X23-3: Minewater Management and Drainage Closure — Effects to the Human Environment				
Criteria	**Assessment**	**1**	**2**	**3**
		Stabilize and Leave in Place	**Partial Removal (and restoration)**	**Removal (and restoration)**
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: If drainages are maintained, some employment opportunities may arise (monitoring/maintenance).	Advantages: If drainages are maintained, some employment opportunities may arise (monitoring/maintenance).	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: No employment opportunities follow closure.
	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: No known potential interference with area well users.	Advantages: No known potential interference with area well users.	Advantages: No known potential interference with area well users.
		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
Infrastructure	Effect on local access	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent
	Effect on power supply systems	N/A	N/A	N/A
Public Health and Safety	Attainment of air quality point of impingement standards or	Advantages: None apparent.	Advantages: None apparent.	Advantages: None apparent.
		Disadvantages: None apparent	Disadvantages: None apparent	Disadvantages: None apparent

Table X23-3: Minewater Management and Drainage Closure — Effects to the Human Environment				
Criteria	Assessment	1 Stabilize and Leave in Place	2 Partial Removal (and restoration)	3 Removal (and restoration)
	scientifically defensible alternatives			
	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: If drainages are maintained, some employment opportunities may arise (monitoring/maintenance).	Advantages: If drainages are maintained, some employment opportunities may arise (monitoring/maintenance). Other areas would be reclaimed akin to pre-Project conditions allowing for recreational and traditional land use.	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	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	N/A	N/A	N/A
		N/A	N/A	N/A
Regional Economy	Effect on regional businesses and economic opportunities	Advantages: Ongoing monitoring/maintenance employment.	Advantages: Ongoing monitoring/maintenance and closure removal activities employment.	Advantages: Employment opportunities may be generated for closure and removal activities.
		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 it surrounding environment, context	N/A	N/A	N/A
		N/A	N/A	N/A

Table X23-3: Minewater Management and Drainage Closure — Effects to the Human Environment				
Criteria	Assessment	1	2	3
		Stabilize and Leave in Place	Partial Removal (and restoration)	Removal (and restoration)
	or a significant relationship			
	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
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
Drainage Closure Effects to the Human Environment Overall Summary and Rating	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 local residents for monitoring and maintenance and closure and removal activities. Part of 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.
	Summary Rating	**Acceptable**	**Preferred**	**Acceptable**

Table X23-4: Minewater Management and Drainage Closure — Effects to the Physical and Biological Environments				
Criteria	Assessment	1 Stabilize and Leave in Place	2 Partial Removal (and restoration)	3 Removal (and restoration)
Effect on Air Quality and Climate	Maintain air quality point of impingement standards or defensible alternatives	N/A	N/A	N/A
		N/A	N/A	N/A
	Emission rates of greenhouse gases (GHGs)	N/A	N/A	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.	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	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.	Some areas that are removed of drainage systems may re-establish passive drainage to pre-mining conditions. The portions stabilized and left in place may generate aquatic habitat or provide alternative 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	Disadvantages: None apparent
	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	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 conditions do not match PWQO	See equivalent indicator in Effect on fish and aquatic habitat.		See equivalent indicator in Effect on fish and aquatic habitat.
	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
		N/A		N/A

Table X23-4: Minewater Management and Drainage Closure — Effects to the Physical and Biological Environments				
Criteria	**Assessment**	**1**	**2**	**3**
		Stabilize and Leave in Place	**Partial Removal (and restoration)**	**Removal (and restoration)**
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
	Effects of noise disturbance generated by the project	N/A	N/A	N/A
		N/A	N/A	N/A
	Maintenance of wildlife movement corridors and plant dispersion	N/A	N/A	Advantages: Removal of drainage systems would restore small terrestrial habitat sections present prior to drainage system development.
		N/A	N/A	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)	Sensitively 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	N/A	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	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
Drainage Closure Effects to the Physical and Biological Environment Overall Summary and Rating	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.	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. Sections that are removed will allow pre-mining conditions to return.	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**	**Preferred**	**Acceptable**

Table X23-5: Minewater Management and Drainage Closure — Potential Ability for Future Closure/Reclamation Processes				
Criteria	**Assessment**	**1**	**2**	**3**
		Stabilize and Leave in Place	**Partial Removal (and restoration)**	**Removal (and restoration)**
		N/A	N/A	N/A

Table X23-5: Minewater Management and Drainage Closure — Potential Ability for Future Closure/Reclamation Processes				
Criteria	**Assessment**	**1**	**2**	**3**
		Stabilize and Leave in Place	**Partial Removal (and restoration)**	**Removal (and restoration)**
Public Safety and Security	Effect on safety and security risks to the community and general public	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
	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.	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: 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.	Disadvantages: Some active restoration may be required after removal.
	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	N/A	N/A	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.	Advantages: All alternatives are broadly similar in their potential to develop an aesthetically pleasing site at closure.
		Disadvantages: None apparent.	Disadvantages: None apparent.	Disadvantages: None apparent.
Drainage Closure Potential Ability for Future Closure / Reclamation Processes Overall Summary and Rating	Summary Evaluation and Rating	Drainage systems would provide suitable fish and aquatic habitat in the area, allowing for passive drainage.	Partial removal of drainage systems would allow some portions of the site to be restored to pre-mining conditions while allowing the water at the site to be somewhat controlled in the post-closure	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**	**Preferred**	**Acceptable**