**TABLE 5-1**
**PERFORMANCE EVALUATION – WORK SCHEDULING ALTERNATIVES**

| | Alternatives | | | |
|---|---|---|---|---|
| **Performance Objective** | **Three Weeks at Site, One Week Off Site** | **Two Weeks at Site, Two Weeks Off Site** | **One Week at Site, One Week Off Site** | **Four Days at Site, Three Days Off Site** |
| Cost-effectiveness | Requires the least amount of flights to transport people to the site.<br><br>***Rating - Preferred*** | Requires the least amount of flights to transport people to the site.<br><br>***Rating - Preferred*** | Not financially supportable.<br><br>***Rating - Unacceptable*** | Not financially supportable.<br><br>***Rating - Unacceptable*** |
| Minimize impacts to the natural environment | Least amount of disruption from additional air flights.<br><br>***Rating - Preferred*** | Least amount of disruption from additional air flights.<br><br>***Rating - Preferred*** | Number of flights will not appreciably impact the natural environment.<br><br>***Rating - Acceptable*** | Number of flights will not appreciably impact the natural environment.<br><br>***Rating - Acceptable*** |
| Minimize impacts to the socio-economic environment | Found to be difficult by workers and their families.<br><br>***Rating - Acceptable*** | Allows workers increased time with family and community.<br><br>***Rating - Preferred*** | Allows workers increased time with family and community.<br><br>***Rating - Preferred*** | Allows workers increased time with family and community.<br><br>***Rating - Preferred*** |
| ***SUMMARY EVALUATION*** | ***RATING - ACCEPTABLE*** | ***RATING - PREFERRED*** | ***RATING - UNACCEPTABLE*** | ***RATING - UNACCEPTABLE*** |

**TABLE 5-2**
**PERFORMANCE EVALUATION - ALTERNATIVE MINING METHODS**

| | Alternatives | | |
|---|---|---|---|
| **Performance Objective** | **Underground Shaft** | **Underground Ramp** | **Open Pit** |
| Cost-effectiveness | Estimated mining costs $45/t of ore.<br><br>***Rating – Unacceptable*** | Estimated mining costs $45/t of ore.<br><br>***Rating - Unacceptable*** | Estimated mining costs $9/t of ore.<br><br>***Rating – Preferred*** |
| Technical applicability | Does not allow mining of the crown pillar, an estimated 30% to 40% of the ore resource would be lost.<br><br>***Rating – Unacceptable*** | Does not allow mining of the crown pillar, an estimated 30% to 40% of the ore resource would be lost.<br><br>***Rating - Unacceptable*** | Allows mining of the entire ore body.<br><br>***Rating - Preferred*** |
| Minimize impacts to the natural environment | Minimal impact on the natural environment without mitigation.<br><br>***Rating – Preferred*** | Minimal impact on the natural environment mitigation.<br><br>***Rating - Preferred*** | Requires diversion of South Granny Creek and the permanent loss of 80 ha of terrestrial habitat. Temporary loss of 270 ha of terrestrial habitat from stockpiles to be rehabilitated at closure.<br><br>***Rating - Acceptable*** |
| Minimize impacts to the socio-economic environment | Minimal adverse impact on the socio-economic environment without mitigation.<br><br>***Rating – Preferred*** | Minimal adverse impact on the socio-economic environment without mitigation.<br><br>***Rating - Preferred*** | Will impact on traditional land use because of area occupied by the open pit and stockpiles.<br><br>***Rating - Acceptable*** |
| Amenability to reclamation | Not expected to appreciably alter the existing environment.<br><br>***Rating – Preferred*** | Not expected to appreciably alter the existing environment.<br><br>***Rating - Preferred*** | Will result in land disturbance requiring mitigation at closure.<br><br>***Rating - Acceptable*** |
| ***SUMMARY EVALUATION*** | ***RATING – UNACCEPTABLE*** | ***RATING - UNACCEPTABLE*** | ***RATING - ACCEPTABLE*** |

**TABLE 5-3**
**PERFORMANCE EVALUATION – MINE PRODUCTION RATE ALTERNATIVES**

| | Alternatives | | |
|---|---|---|---|
| **Performance Objective** | **2.0 Mt/a** | **2.5 Mt/a** | **3.0 Mt/a** |
| Cost-effectiveness | Longer mine life; provides additional time to investigate other kimberlite deposits.<br><br>***Rating – Acceptable*** | Balance between longer mine life and economic return.<br><br>***Rating - Acceptable*** | Provides the greatest economical return.<br><br>***Rating – Preferred*** |
| Minimize impacts to the natural environment | Minimal impact on the natural environment with mitigation.<br><br>***Rating – Acceptable*** | Minimal impact on the natural environment with mitigation.<br><br>***Rating - Acceptable*** | Impact on the natural environment is minimized with shorter mine life.<br><br>***Rating – Acceptable*** |
| Minimize impacts to the socio-economic environment | Longer mine life provides greater opportunity to gain transferable skills.<br><br>***Rating - Preferred*** | Balance between opportunity to gain skills and greater regional employment opportunities.<br><br>***Rating - Acceptable*** | Requires a greater number of employees; but is unlikely to maximize employment of First Nations.<br><br>***Rating - Acceptable*** |
| ***SUMMARY EVALUATION*** | ***RATING – ACCEPTABLE*** | ***RATING – PREFERRED*** [1] | ***RATING - ACCEPTABLE*** |

1 This alternative is preferred because it provides a balance between maximizing return on investment and socio-economic benefits

**TABLE 5-4**
**PERFORMANCE EVALUATION - ALTERNATIVE GROUNDWATER CONTROL METHODS**

| | **Alternatives** | | | |
|---|---|---|---|---|
| **Performance Objective** | **Dewatering Using Perimeter Wells (Conventional Perimeter Well Dewatering)** | **Conventional Perimeter Well Dewatering with Slurry Wall** | **Conventional Perimeter Well Dewatering with Perimeter Grout Curtain** | **Conventional Perimeter Well Dewatering with Perimeter Freeze Wall** |
| Cost-effectiveness | Total life of mine cost estimate for conventional dewatering, is approximately $150 million, or $5.23/t of ore.<br><br>***Rating - Acceptable*** | Total life of mine cost estimate for slurry wall (including required dewatering wells) is $240 million to $915 million, or $8.36/t to $31.88/t of ore.<br><br>***Rating - Unacceptable*** | Total life of mine costs for grout curtain (including required dewatering wells) is $167 million, or $5.82/t of ore.<br><br>***Rating - Acceptable*** | Total life of mine costs for freeze wall (including required dewatering wells) is $161million, or $5.61/t of ore.<br><br>***Rating - Acceptable*** |
| Technical applicability | Conventional well dewatering is predictably effective and can be enhanced with additional pumping capacity as and when required; can be augmented by grouting.<br><br>***Rating - Preferred*** | Slurry wall technology is limited to applications of maximum depth of 80 m compared with the proposed open pit depth of more than 200 m. Not applicable without conventional dewatering wells.<br><br>***Rating - Unacceptable*** | Cannot reliably restrict exterior groundwater sources with grouting in the absence of other groundwater management techniques. Not applicable without conventional dewatering wells.<br><br>***Rating - Acceptable*** | The required depth of the installation, and the permeability of the surrounding limestone and associated groundwater velocities are not conducive to successful application. Not applicable without conventional dewatering wells.<br><br>***Rating - Unacceptable*** |
| Minimize impacts to the natural environment | Conventional dewatering will result in mitigatable impacts to the Nayshkootayaow River.<br><br>***Rating - Acceptable*** | Slurry wall development will limit aquatic impacts to the area occupied by the open pit footprint.<br><br>***Rating - Preferred*** | Grout curtain development will theoretically limit aquatic impacts to the area occupied by the open pit footprint.<br><br>***Rating - Preferred*** | Freeze wall development will limit aquatic impacts to the area occupied by the open pit footprint.<br><br>***Rating - Preferred*** |
| ***SUMMARY EVALUATION*** | ***RATING- ACCEPTABLE*** | ***RATING - UNACCEPTABLE*** | ***RATING - ACCEPTABLE*** | ***RATING - UNACCEPTABLE*** |

**TABLE 5-5**
**PERFORMANCE EVALUATION - WELL FIELD WATER MANAGEMENT AND DISPOSAL ALTERNATIVES**

| | Alternatives | | | |
|---|---|---|---|---|
| **Performance Objective** | **Direct Discharge to Attawapiskat River** | **Direct Discharge to James Bay** | **Water Treatment by Membrane Technology or Distillation Prior to Discharge to Attawapiskat River** | **Groundwater Injection** |
| Cost-effectiveness | Cost limited to maintaining 6.5 km discharge pipeline and pumping ($21 million over life of mine, or $0.736/t of ore).<br><br>***Rating - Preferred*** | Costs of construction of a 110 km pipeline along the same route as the fuel pipeline, and an approximately 10 km section over very difficult ground conditions (tidal flats); and construction of a robust outfall would be prohibitively expensive and not sustainable by the Project (estimated capital cost, if feasible, more than $80 million, or $2.79/t of ore).<br><br>***Rating – Unacceptable*** | Cost of treatment using available technologies to remove salinity (membrane and distillation) is prohibitively expensive and not sustainable by the Project (life of mine costs of greater than $630 million, or greater than $21.95/t of ore).<br><br>***Rating - Unacceptable*** | Cost of operating a groundwater injection system is prohibitively expensive and not sustainable by the Project (total costs would exceed $160 million, or greater than $5.57/t of ore).<br><br>***Rating - Unacceptable*** |
| Technical applicability | Construction and maintenance of the 6.5 km discharge line is readily feasible.<br><br>***Rating - Preferred*** | Construction and maintenance of the final 5 km of discharge line over tidal flats is not feasible; would be susceptible to ice and frost damage.<br><br>***Rating – Unacceptable*** | Desalination technologies are impractical because there is no viable method for disposing of large quantities of concentrated brine or dry salt that would result.<br><br>***Rating - Unacceptable*** | The high groundwater table conditions are widespread in the region and a suitable area for groundwater discharge nearby has not been identified.<br><br>***Rating - Unacceptable*** |
| Minimize impacts to the natural environment | The large size and high assimilative capacity of the Attawapiskat River is sufficient to easily accommodate the moderately saline discharge without adverse impact to aquatic life.<br><br>***Rating - Preferred*** | Discharge to James Bay is preferred in terms of being saline receiving water. However, there would be major impacts associated with construction of the last 10 km of pipeline over the tidal flats.<br><br>***Rating – Acceptable*** | No foreseeable surface water impacts are envisioned. There is no practical method of disposing of concentrated brine, or dry salt, by-products. Presents an environmental hazard.<br><br>***Rating - Unacceptable*** | No foreseeable surface water impacts are envisioned.<br><br>***Rating - Preferred*** |
| ***SUMMARY EVALUATION*** | ***RATING - ACCEPTABLE*** | ***RATING - UNACCEPTABLE*** | ***RATING - UNACCEPTABLE*** | ***RATING - UNACCEPTABLE*** |

**TABLE 5-6**
**PERFORMANCE EVALUATION - PIT SUMP WATER MANAGEMENT AND DISPOSAL ALTERNATIVES**

**(A) PHASE 1 - YEAR 0 TO YEAR 6**

| | Alternatives | |
|---|---|---|
| **Performance Objective** | **Settling Pond with Passive Wetland Treatment** | **Mechanical Treatment with Passive Wetland Treatment** |
| Cost-effectiveness | Primary construction costs for below grade design relate to excavation of overburden and transport of excavated material to the overburden stockpile ($1.7 million, or $0.06/t of ore).<br><br>***Rating – Preferred*** | Available technologies for removal of suspended solids have both expensive capital and operating costs<br><br>***Rating – Acceptable*** |
| Technical applicability | Proven technology; suitable in cold climates. Minimal maintenance; increase capacity by excavating a larger pond.<br><br>***Rating – Preferred*** | Requires technical expertise to operate and a high level of maintenance.<br><br>***Rating – Acceptable*** |
| Minimize impacts to the natural environment | Will provide excellent removal of suspected solids including clay-sized particles.<br><br>***Rating – Preferred*** | Can provide superior treatment of mine water prior to discharge, provided that technical support is continuous. Malfunctions and plant shutdown will have to be considered. Reduced spatial requirements.<br><br>***Rating – Preferred*** |
| ***SUMMARY EVALUATION*** | ***RATING – PREFERRED*** | ***RATING - ACCEPTABLE*** |

**(B) PHASE 2 - YEAR 6+**

| | Alternatives | |
|---|---|---|
| **Performance Objective** | **Above Grade Settling Pond (with Discharge to Attawapiskat River)** | **Mechanical Treatment (with Discharge to Attawapiskat River)** |
| Cost-effectiveness | Lowest cost alternative; unit costs for rock placement low as mine rock is readily available. Reduced associated infrastructure costs ($2.9 million, or $0.10/t of ore).<br><br>***Rating – Preferred*** | Available technologies for removal of suspended solids have both expensive capital and operating costs.<br><br>***Rating - Acceptable*** |
| Technical applicability | Proven technology; suitable in cold climates. Minimal maintenance; increase capacity by constructing additional cells.<br><br>***Rating – Preferred*** | Requires technical expertise to operate and a high level of maintenance relative to the other alternatives.<br><br>***Rating - Acceptable*** |
| Minimize impacts to the natural environment | Sufficient primary settling in the settling pond. Attawapiskat River has very high assimilative capacity to accept flows of treated water.<br><br>***Rating – Acceptable*** | With experienced operators, will consistently provide high quality treatment. Not affected by seasonal changes.<br><br>***Rating – Preferred*** |
| ***SUMMARY EVALUATION*** | ***RATING – PREFERRED*** | ***RATING – ACCEPTABLE*** |

**TABLE 5-7**
**PERFORMANCE EVALUATION – PROCESS WASTEWATER MANAGEMENT ALTERNATIVES**

| | Alternatives | | |
|---|---|---|---|
| **Performance Objective** | **30% Solids** | **50% Solids** | **70% Solids** |
| Cost-effectiveness | A cost has not been developed for this alternative. It would require, however, higher costs associated with drawing a larger volume of water from the Attawapiskat River and handling larger volumes of water at the PKC facility.<br><br>***Rating - Acceptable*** | This alternative is the lowest cost (capital cost $9 million, power portion of operating cost is $700,000 annually).<br><br>***Rating - Preferred*** | Higher capital cost ($2 million) and higher operating cost (electricity portion $1.5 million) due to use of thickening equipment and higher rated pumps.<br><br>***Rating - Acceptable*** |
| System integrity and reliability | Higher volumes of water will increase storage requirements and present water management problems during winter.<br><br>***Rating - Acceptable*** | Provides a balance between generation of high volumes of water and operational ease.<br><br>***Rating - Preferred*** | Presents operational difficulties; the slurry discharge pipeline would need to be moved on an on-going basis.<br><br>***Rating - Acceptable*** |
| Minimize impacts to the natural environment | Greater volume of water both drawn from Attawapiskat River, to be managed in the PKC facility and discharged to the environment. Marginal to negligible additional impacts over alternatives.<br><br>***Rating - Acceptable*** | Produces moderate volumes of water to be discharged from the PKC facility compared with the alternatives.<br><br>***Rating - Acceptable*** | Produces the smallest quantity of water for discharge.<br><br>***Rating - Preferred*** |
| ***SUMMARY EVALUATION*** | ***RATING - ACCEPTABLE*** | ***RATING - PREFERRED*** | ***RATING - ACCEPTABLE*** |

**TABLE 5-8**
**PERFORMANCE EVALUATION – PKC FACILITY DESIGN ALTERNATIVES (INITIAL PHASE)**

| | Alternatives | | |
|---|---|---|---|
| **Performance Objective** | **Central Quarry** | **North Quarry** | **Above Ground Storage Facility** |
| Cost-effectiveness | Defers the requirement for significant quantities of construction materials to support fine PK containment.<br><br>***Rating - Preferred*** | Defers the requirement for significant quantities of construction materials to support fine PK containment.<br><br>***Rating - Preferred*** | Requires the extraction of additional aggregate solely for PKC dam construction, and is excessively costly.<br><br>***Rating – Acceptable*** |
| Technical applicability | Expected to operate with predictably good effectiveness.<br><br>***Rating – Acceptable*** | Expected to operate with predictably good effectiveness.<br><br>***Rating - Acceptable*** | Provides added benefit of use of adjacent central quarry as a polishing pond during the early production period.<br><br>***Rating - Preferred*** |
| Minimize impacts to the natural environment | No infringement on forested corridors and aquatic resources.<br><br>***Rating – Preferred*** | May allow creation of aquatic habitat during the operation phase.<br><br>***Rating - Preferred*** | Could necessitate the development of a larger or additional quarry.<br><br>***Rating – Acceptable*** |
| ***SUMMARY EVALUATION*** | ***RATING – PREFERRED*** | ***RATING - ACCEPTABLE*** | ***RATING - ACCEPTABLE*** |

**TABLE 5-9**
**PERFORMANCE EVALUATION – PKC FACILITY DESIGN ALTERNATIVES (STAGE 1A)**

| | Alternatives | |
|---|---|---|
| **Performance Objective** | **Cone Deposition** | **Perimeter Deposition** |
| Cost-effectiveness | Defers the requirement for construction materials until mine rock and coarse PK are available; does not require additional aggregate extraction.<br><br>***Rating – Preferred*** | Requires the extraction of additional aggregate solely for PKC dam construction, and is excessively costly ($15 million).<br><br>***Rating – Acceptable*** |
| Technical applicability | Acceptable deposition method, equivalent to perimeter deposition.<br><br>***Rating – Preferred*** | Acceptable deposition method, equivalent to cone deposition.<br><br>***Rating - Preferred*** |
| Minimize impacts to the natural environment | Berms surrounding the cone will allow solids to settle out. The polishing pond will provide additional effluent treatment<br><br>***Rating – Acceptable*** | Beach deposition on perimeter will provide increased stability and decreased permeability of the dams (reduces the rate of seepage passing under the dams). Needs additional quarried material.<br><br>***Rating - Acceptable*** |
| ***SUMMARY EVALUATION*** | ***RATING – PREFERRED*** | ***RATING - ACCEPTABLE*** |

**TABLE 5-10**
**PERFORMANCE EVALUATION – PKC FACILITY DESIGN ALTERNATIVES (POST STAGE 1A)**

| | Alternatives | |
|---|---|---|
| **Performance Objective** | **Cone Deposition** | **Perimeter Deposition** |
| Cost-effectiveness | Equivalent to perimeter deposition; may have reduced dam requirements.<br><br>***Rating – Preferred*** | Equivalent to cone deposition; may have greater dam and pipeline requirements.<br><br>***Rating – Preferred*** |
| Technical applicability | Acceptable deposition method, equivalent to perimeter deposition.<br><br>***Rating – Preferred*** | Acceptable deposition method, equivalent to cone deposition.<br><br>***Rating - Preferred*** |
| Minimize impacts to the natural environment | Berms surrounding the cone will allow solids to settle out. The polishing pond will provide additional effluent treatment.<br><br>***Rating – Acceptable*** | Beach deposition on perimeter will provide increased stability and decreased permeability of the dams (reduces the rate of seepage passing under the dams).<br><br>***Rating - Acceptable*** |
| ***SUMMARY EVALUATION*** | ***RATING – ACCEPTABLE*** | ***RATING – PREFERRED*** [1] |

1 This alternative is preferred but could be used in conjunction with cone deposition if operational advantages are found during Stage 1A

**TABLE 5-11**
**PERFORMANCE EVALUATION – PKC EFFLUENT MANAGEMENT ALTERNATIVES**

| | Alternatives | | |
|---|---|---|---|
| **Performance Objective** | **Overland Flow to North Granny Creek** | **Pump to Attawapiskat River** | **Recycle to Process Plant (Overland Flow of Excess Water to North Granny Creek)** |
| Cost-effectiveness | Lowest cost alternative with least infrastructure requirements<br><br>***Rating - Preferred*** | Approximately equivalent cost to Alternative 3.<br><br>***Rating - Acceptable*** | Approximately equivalent cost to Alternative 2.<br><br>***Rating - Acceptable*** |
| Technical applicability | Least infrastructure to maintain. Contingencies available to re-direct flows if necessary.<br><br>***Rating - Preferred*** | Technically applicable. Increased operational requirements. Contingency for overland flow possible.<br><br>***Rating - Acceptable*** | Technically applicable. Increased operational requirements. No contingencies required.<br><br>***Rating - Acceptable*** |
| Minimize impacts to the natural environment | Acceptable water quality and volumes discharged.<br><br>***Rating - Acceptable*** | Marginal increase in volume of water discharged from well field pipeline.<br><br>***Rating - Acceptable*** | Produces the smallest quantity of water for discharge.<br><br>***Rating - Preferred*** |
| ***SUMMARY EVALUATION*** | ***RATING - PREFERRED*** | ***RATING - ACCEPTABLE*** | ***RATING - ACCEPTABLE*** |

**TABLE 5-12**
**PERFORMANCE EVALUATION – ON-SITE INFRASTRUCTURE ALTERNATIVES**

| Infrastructure Element | Alternatives | Performance Objectives | | | | Selected Alternative |
|---|---|---|---|---|---|---|
| | | Cost-effectiveness | Technical Applicability | Minimize Disturbance to Natural Environment | Amenability to Reclamation | |
| Aggregates | (1) Limestone from bioherms at site<br>(2) Limestone extracted below surface at site<br>(3) Aggregate trucked to site | Preferred<br>Acceptable<br>Unacceptable | n/a | Acceptable<br>Acceptable<br>Acceptable | Preferred<br>Preferred<br>Preferred | (1) |
| Buildings and yard areas | (1) West of the open pit<br>(2) Near existing advanced exploration sample processing plant | Preferred<br>Unacceptable[1] | Preferred<br>Preferred | Preferred<br>Unacceptable | Preferred<br>Acceptable | (1) |
| Access roads | No alternatives | n/a | n/a | n/a | n/a | n/a |
| Airstrip | (1) North of the PKC facility<br>(2) At or near Attawapiskat | Preferred<br>Unacceptable[2] | Preferred<br>Unacceptable | Preferred<br>Acceptable | Preferred<br>Acceptable | (1) |
| Drainage works | See Table 5-13 | | | | | |
| Fuel storage and management | No alternatives | n/a | n/a | n/a | n/a | n/a |
| Water supply systems (early construction phase) | (1) Attawapiskat River<br>(2) Groundwater from the well field<br>(3) Nayshkootayaow River | Unacceptable[3]<br>Acceptable<br>Unacceptable | Preferred<br>Unacceptable<br>Unacceptable | Preferred<br>Unacceptable<br>Unacceptable | Preferred<br>Preferred<br>Preferred | (2) |
| Water supply systems | (1) Attawapiskat River<br>(2) Groundwater from the well field<br>(3) Nayshkootayaow River | Preferred<br>Acceptable<br>Acceptable | Preferred<br>Unacceptable<br>Unacceptable | Preferred<br>Unacceptable<br>Unacceptable | Preferred<br>Preferred<br>Preferred | (1) |
| Reagent storage and handling | No alternatives | n/a | n/a | n/a | n/a | n/a |
| Domestic sewage handling | (1) Sequencing batch reactor<br>(2) Rotating biological contractor<br>(3) Above ground lagoon | Preferred<br>Acceptable<br>Unacceptable[4] | n/a | Preferred<br>Preferred<br>Acceptable | Preferred<br>Preferred<br>Acceptable | (1) |
| Solid waste disposal | See Table 5-14 | | | | | |

n/a not applicable

1 Additional costs are related to transport of ore an additional kilometre, and construction of the plant site on poor ground conditions.
2 Estimated cost of $180 M to $200 M for airstrip at Attawapiskat due to requirement for an all-season road to the Victor site.
3 Potable water is required immediately at the start of operation, and cannot wait until a pipeline is constructed.
4 Construction of a lagoon of suitable size during early stages when mine rock will be unavailable, will be expensive and quarried construction materials will be needed for other project components.

**TABLE 5-13**
**PERFORMANCE EVALUATION – DRAINAGE ALTERNATIVES**

| | Alternatives | | |
|---|---|---|---|
| **Performance Objective** | **Realignment of South Granny Creek** | **Divert Directly to the Nayshkootayaow River** | **Restricting Mining Operations** |
| Cost-effectiveness | Preferred option from a cost perspective as the excavated volume of channel construction would be less than the alternative. No additional construction requirements at mine closure.<br><br>***Rating – Preferred*** | Higher cost than realignment alternative because of increased construction volumes. In addition, re-establishment of the original downstream flow of South Granny Creek will likely be required at closure.<br><br>***Rating - Acceptable*** | Would result in insufficient ore available to support Project development.<br><br>***Rating - Unacceptable*** |
| Technical applicability | Provides effective drainage to the area.<br><br>***Rating – Acceptable*** | Provides preferred level of drainage at a slightly higher gradient.<br><br>***Rating - Preferred*** | Restricting mining operations, so that no alternation of drainage patterns is necessary, is the most favourable alternative.<br><br>***Rating - Preferred*** |
| Minimize impacts to the natural environment | Provides like-for-like fish habitat compensation as per DFO policy preferences. Aquatic habitat will develop in the diversion channel prior to closure and the diversion can be left as is following closure, as downstream flows will be maintained.<br><br>***Rating – Preferred*** | Permanently diverts downstream flow of South Granny Creek into Nayshkootayaow River, unless original alignment is restored at closure. Downstream flows to Granny Creek will be substantially reduced.<br><br>***Rating - Unacceptable*** | Would result in no impacts to natural environment.<br><br>***Rating - Preferred*** |
| Amenability to reclamation | No reclamation requirements envisioned.<br><br>***Rating – Preferred*** | The diversion channel will be sealed and the former channel (or equivalent) rehabilitated to restore original downstream flows.<br><br>***Rating - Acceptable*** | No reclamation requirements envisioned.<br><br>***Rating - Preferred*** |
| ***SUMMARY EVALUATION*** | ***RATING – PREFERRED*** | ***RATING - ACCEPTABLE*** | ***RATING - UNACCEPTABLE*** |

**TABLE 5-14**
**PERFORMANCE EVALUATION – SOLID WASTE DISPOSAL ALTERNATIVES**

| | Alternatives | |
|---|---|---|
| **Performance Objective** | **Incineration** | **Landfill (Above Grade)[1]** |
| Cost-effectiveness | The cost of the incineration option is in the range of $1.60 million (or $0.06/t of ore). The cost can be supported by the project.<br><br>***Rating – Preferred*** | The cost of the landfill option over the mine life is $0.3 million (or $0.01/t of ore) – excluding any monitoring costs which are anticipated to be significant (in the range of $2.6 million).<br><br>***Rating - Acceptable*** |
| Minimize impacts to the natural environment | Minimal impacts to the environment. Ash will be disposed of in PKC facility (or another acceptable location on-site), or transported off-site if determined to be hazardous waste. No leachate generation anticipated or potential long-term liabilities associated with waste following mine closure.<br><br>***Rating – Preferred*** | Leachate will be generated; associated impacts are mitigatable. Muskeg has proven effective in attenuating dissolved metals as well as organic wastes. Landfill will remain following mine closure, potentially representing a long-term liability that can be managed. Wind control of rubbish and nuisance animals may be a concern.<br><br>***Rating - Acceptable*** |
| Amenability to reclamation | Incinerator will be dismantled during decommissioning. Bottom ash will remain in reclaimed PKC facility. Inert landfill not expected to generate leachate and represent a long-term liability.<br><br>***Rating – Preferred*** | The exposure of an above grade landfill to wind could cause scattering of the waste. Landfill would require capping with clay/clay till at mine closure. Potential long-term liability for management of the landfill site following closure.<br><br>***Rating - Acceptable*** |
| ***SUMMARY EVALUATION*** | ***RATING – PREFERRED*** | ***RATING - ACCEPTABLE*** |

[1] This option assumes all wastes would be landfilled, not just inert material.

**TABLE 5-15**
**PERFORMANCE EVALUATION – TRANSPORT ALTERNATIVES**

| | Alternatives | | |
|---|---|---|---|
| **Performance Objective** | **Barge from Moosonee Railhead** | **Ocean-going Vessel** | **Truck Transport from Moosonee Railhead** |
| Cost-effectiveness | The unit cost of shipping is greater than that of an ocean going vessel, but less than overland transport by truck<br><br>***Rating - Acceptable*** | The economy of scale of ocean going vessels and reduced handling/transfer, result in cost savings over alternatives that involve transfer from rail.<br><br>***Rating - Preferred*** | Poor economy of scale with a significantly large number of trucks result in a very high per unit cost for shipping.<br><br>***Rating – Acceptable*** |
| Ability to service the site effectively | Provides preferred level of service, equivalent to the ocean going vessel alternative. Low risk of interruption of supply.<br><br>***Rating - Preferred*** | Provides preferred level of service equivalent to barge from Moosonee alternative. Low risk of interruption of supply.<br><br>***Rating - Preferred*** | A risk of transporting insufficient fuel to the site over the winter road season in warm winters. A very large number of trucks will be required to transport the fuel (in addition to other supplies) over a short winter road season). May not be technically possible over a winter road.<br><br>***Rating - Unacceptable (Acceptable [1])*** |
| Minimize impacts to the natural environment | Potential risk of major spill in the James Bay coastal zone. Risks can be managed through proper design and operation of vessels with appropriate contingency plans in place.<br><br>***Rating - Acceptable*** | Potential risk of major spill in the James Bay coastal zone as well as in existing shipping lanes. Risks can be managed through proper design and operation of vessels with appropriate contingency plans in place.<br><br>***Rating - Acceptable*** | Potential risk of spills on land and at water crossings. Risk of a spill increases over marine shipment but the potential severity of an individual spill decreases.<br><br>***Rating - Acceptable*** |
| Minimize impacts to the socio-economic environment | No adverse socio-economic impacts foreseen. This mode of transport is currently utilized by the community of Attawapiskat.<br><br>***Rating - Preferred*** | No adverse socio-economic impacts foreseen.<br><br>***Rating - Preferred*** | The increased truck traffic on the winter road may interfere with other traffic and communities getting supplies.<br><br>***Rating - Unacceptable (Acceptable) [1]*** |
| ***SUMMARY EVALUATION*** | ***RATING - ACCEPTABLE*** | ***RATING - PREFERRED*** | ***RATING – ACCEPTABLE*** |

1 Truck transport is acceptable for providing a portion of the Victor transport requirements, both from the ability to service the site effectively and impacts to the socio-economic environment, but is unacceptable for providing all transport requirements, particularly fuel transport during operation.

**TABLE 5-16**
**PERFORMANCE EVALUATION – BARGE BERTH ALTERNATIVES**

| | Alternatives | |
|---|---|---|
| **Performance Objective** | **Upstream Location** | **Downstream Location** |
| Cost-effectiveness | Cost is equivalent to the alternative.<br><br>***Rating - Preferred*** | Cost is equivalent to the alternative.<br><br>***Rating - Preferred*** |
| Technical applicability | Considered preferred and equivalent to the alternative. Sufficient space is available for all components and operations.<br><br>***Rating - Preferred*** | Considered preferred and equivalent to the alternative. Location is constrained to the west by community sewage lagoons but space is available to the north and east.<br><br>***Rating - Preferred*** |
| Minimize impacts to the natural environment | Equivalent disturbance to the natural environment compared with the alternative.<br><br>***Rating - Acceptable*** | Equivalent disturbance to the natural environment although in a somewhat more developed area. Located downstream of community and therefore potential spills pose less risk to the community.<br><br>***Rating - Preferred*** |
| Minimize impacts to the socio-economic environment | This location is not preferred by the AttFN.<br><br>***Rating - Unacceptable*** | This location is preferred by the AttFN.<br><br>***Rating - Preferred*** |
| Amenability to reclamation | Equivalent reclamation requirements.<br><br>***Rating - Preferred*** | Equivalent reclamation requirements.<br><br>***Rating - Preferred*** |
| ***SUMMARY EVALUATION*** | ***RATING - UNACCEPTABLE*** | ***RATING - PREFERRED*** |

**TABLE 5-17**
**PERFORMANCE EVALUATION – SITE ACCESS (ROAD) ALTERNATIVES**

| | Alternatives | | |
|---|---|---|---|
| **Performance Objective** | **Winter Road** | **Two-season Road** | **All-season Road** |
| Cost-effectiveness | Cost of winter road can be supported by the project ($7.6 million, or $0.30/t of ore).<br><br>***Rating - Preferred*** | Cost of two-season road cannot be supported by the project ($95 million to $140 million, or $3.80/t - $5.60/t of ore).<br><br>***Rating - Unacceptable*** | Cost of all-season road cannot be supported by the project ($115 million to $160 million, or $4.60/t - $6.40/t of ore).<br><br>***Rating - Unacceptable*** |
| Ability to service the site effectively | Provides acceptable level of service, contingent on a sufficiently sized all-season airstrip. Subject to warm winters.<br><br>***Rating - Acceptable*** | Provides preferred level of service with interruption during break up and freeze up.<br><br>***Rating - Preferred*** | Provides slightly higher level of service than two-season road.<br><br>***Rating - Preferred*** |
| Minimize impacts to the natural environment | Fewer disturbances to the natural landscape (no quarrying or placement of fill, less intrusive construction).<br><br>***Rating - Preferred*** | Requires quarrying and placement of granular materials and intensive construction.<br><br>***Rating - Acceptable*** | Same as two-season road, as well as transport of bridge materials and bridge construction over the Attawapiskat River.<br><br>***Rating - Acceptable*** |
| Minimize impacts to the socio-economic environment | No adverse impacts foreseen; also no socio-economic benefits.<br><br>***Rating - Acceptable*** | No adverse impacts foreseen. AttFN view this alternative as a potential escape route from the community during flooding, as well as providing easier all-season access up river.<br><br>***Rating - Preferred*** | No adverse impacts foreseen. AttFN view this alternative as providing easier access up-river.<br><br>***Rating - Preferred*** |
| Amenability to reclamation | Limited environmental impacts. If reclamation is required at closure, the alignment is easily restored and crossings restored.<br><br>***Rating - Preferred*** | Closure will be relatively modest involving Bailey bridge and culvert removal, and ripping the road surface to allow for improved vegetation re-growth.<br><br>***Rating - Acceptable*** | Closure will require the same as the two-season road, and removal of the Attawapiskat River bridge.<br><br>***Rating - Acceptable*** |
| ***SUMMARY EVALUATION*** | ***RATING - PREFERRED*** | ***RATING - UNACCEPTABLE*** | ***RATING - UNACCEPTABLE*** |

**TABLE 5-18**
**PERFORMANCE EVALUATION - POWER SUPPLY ALTERNATIVES**

| | Alternatives | | | |
|---|---|---|---|---|
| **Performance Objective** | **On Site Diesel Power Plant** | **Diesel Power Generation at Attawapiskat** | **New 115 kV Transmission Line Otter Rapids to Victor Site** | **New 230 kV Transmission Line from Otter Rapids to Moosonee, New Line to Site** |
| Cost-effectiveness | Lowest cost (capital cost $89.7 million; annual operating cost $19.6 million, equalling $11.90/t of ore).<br>***Rating – Preferred*** | Lower cost (capital cost $79.1 million; annual operating cost $27.2 million, equalling $12.64/t of ore); including additional costs associated with heat generation at site.<br>***Rating - Preferred*** | High cost alternative (capital cost $140.3 million; annual operating cost $18.3 million, equating to $13.17/t of ore).<br>***Rating - Unacceptable*** | High cost alternative (capital cost $140.3 million; annual operating cost $18.3 million, equating to $12.22/t of ore).<br>***Rating - Unacceptable*** |
| Ability to service the site effectively | Provides superior reliability and redundancy; proven technology.<br>***Rating – Preferred*** | Provides superior reliability and redundancy; proven technology. Requires on-site standby diesel power.<br>***Rating - Preferred*** | Provides sufficient power to considerably reduce fuel consumption. Subject to interruptions and potentially lengthy repairs. Requires on-site standby diesel power.<br>***Rating - Acceptable*** | Provides sufficient power to considerably reduce fuel consumption. Subject to interruptions and potentially lengthy repairs. Requires on-site standby diesel power.<br>***Rating - Acceptable*** |
| Minimize impacts to the natural environment | Potential risk of spills. Local emissions of greenhouse gases.<br>***Rating – Acceptable*** | Potential risk of spills. Local emissions of greenhouse gases. There may be air quality / noise issues related to positioning of a generator in close proximity to a community.<br>***Rating - Acceptable*** | Requires less transport of fuel to site. Reduction of local greenhouse gas emissions. Significant land disturbance required.<br>***Rating - Preferred*** | Requires less transport of fuel to site. Reduction of local greenhouse gas emissions. Significant land disturbance required.<br>***Rating - Preferred*** |
| Minimize impacts to the socio-economic environment | Negative socio-economic impacts not foreseen.<br>***Rating – Acceptable*** | There may be air quality / noise issues related to positioning of a generator in close proximity to a community.<br>***Rating - Unacceptable*** | Potential benefits through FNEI.<br>***Rating - Preferred*** | Potential benefits through FNEI.<br>***Rating – Preferred*** |
| Amenability to reclamation | No substantial reclamation required.<br>***Rating - Preferred*** | No substantial reclamation required.<br>***Rating - Preferred*** | Requires decommissioning of transmission line.<br>***Rating - Acceptable*** | Requires decommissioning of transmission line.<br>***Rating - Acceptable*** |
| ***SUMMARY EVALUATION*** | ***RATING - PREFERRED*** | ***RATING - UNACCEPTABLE*** | ***RATING - UNACCEPTABLE*** | ***RATING - UNACCEPTABLE*** |

**TABLE 5-19**
**PERFORMANCE EVALUATION – FUEL TRANSPORT ALTERNATIVES (ATTAWAPISKAT TO SITE)**

| | Alternatives | | |
|---|---|---|---|
| **Performance Objective** | **Pipeline** | **Tanker Trucks Via Winter Road** | **Air Transport** |
| Cost-effectiveness | The estimated life of Project costs is $53 million, or $1.85/t of ore.<br><br>***Rating - Acceptable*** | Cost of hauling fuel on the winter road is approximately $16.4 million, or $0.57/t of ore.<br><br>***Rating - Preferred*** | Cost prohibitive (>$200 million, or >$8/t of ore). Could be utilized in emergency situations if required.<br><br>***Rating - Unacceptable*** |
| Ability to service the site effectively | Provides preferred level of service (benefit would decrease if an all-season road is constructed).<br><br>***Rating - Preferred*** | Provides risk to supply of fuel to the site, with air transport contingency. Subject to vagaries of warm winters.<br><br>***Rating - Acceptable*** | Fuel delivery could take place all year round.<br><br>***Rating - Preferred*** |
| Minimize impacts to the natural environment | Requires construction of the pipeline along the winter road route and is the most physically intrusive alternative. Proper design and operation will reduce potential for fuel spills.<br><br>***Rating – Acceptable*** | No physical disturbance to the natural environment foreseen as winter road will be in place. Potential for fuel spills on the winter road. Potential for greater wildlife impacts.<br><br>***Rating - Acceptable*** | Limited additional physical disturbances to the natural environment.<br><br>***Rating - Acceptable*** |
| Minimize impacts to the socio-economic environment | No socio-economic impacts, positive or negative, foreseen.<br><br>***Rating – Preferred*** | No socio-economic impacts, positive or negative, foreseen. Potential for greater disruption.<br><br>***Rating - Acceptable*** | No socio-economic impacts, positive or negative, foreseen.<br><br>***Rating - Preferred*** |
| Amenability to reclamation | Minimal reclamation requirements and disturbance to landscape, assuming the pipeline will not require removal at closure.<br><br>***Rating – Preferred*** | Minimal reclamation requirements, beyond demolition/disposal of larger fuel storage tanks at the site that are required with this option.<br><br>***Rating - Preferred*** | Minimal reclamation requirements involve demolition/disposal of fuel transfer infrastructure associated with unloading of fuel at the airstrip.<br><br>***Rating - Preferred*** |
| ***SUMMARY EVALUATION*** | ***RATING – PREFERRED*** | ***RATING - ACCEPTABLE*** | ***RATING - UNACCEPTABLE*** |

**TABLE 5-20**
**PERFORMANCE EVALUATION – VFP ROUTE AND MAJOR CHANNEL CROSSINGS ALTERNATIVES**

**(A) VFP ROUTE**

| | Alternatives | | |
|---|---|---|---|
| **Performance Objective** | **North Route** | **South Route** | **North Alternate Route** |
| Cost-effectiveness | Construction costs are comparable to North Alternate Route.<br><br>***Rating – Preferred*** | Anticipated to be more costly because of the additional major water crossing; may require on-going operation of the south winter road.<br><br>***Rating - Acceptable*** | Construction costs are comparable to North Route.<br><br>***Rating – Preferred*** |
| Ability to service the site effectively | Proven technology and equivalent to the North Alternative Route.<br><br>***Rating – Preferred*** | Poses a greater construction risk due to poorer terrain.<br><br>***Rating - Acceptable*** | Proven technology and equivalent to the North Route.<br><br>***Rating - Preferred*** |
| Minimize impacts to the natural environment | Fewer major river crossings.<br><br>***Rating – Preferred*** | Has one more major river crossing.<br><br>***Rating - Acceptable*** | Requires additional land disturbance during construction.<br><br>***Rating - Acceptable*** |
| ***SUMMARY EVALUATION*** | ***RATING – PREFERRED*** | ***RATING - ACCEPTABLE*** | ***RATING - ACCEPTABLE*** |

**(B) MAJOR CHANNEL CROSSINGS**

| | Alternatives | |
|---|---|---|
| **Performance Objective** | **Horizontal Directional Drilling** | **Suspended Pipe Crossing** |
| Cost-effectiveness | Lower capital and operating costs than suspended crossing (assuming geotechnical conditions are appropriate).<br><br>***Rating - Preferred*** | Higher capital and operating costs than horizontal directional drilling.<br><br>***Rating - Acceptable*** |
| Ability to service the site effectively | Proven technology; suitable in cold climates and muskeg terrain. Minimal maintenance.<br><br>***Rating - Preferred*** | Proven technology; suitable in cold climates. Greater risk from natural damage and vandalism.<br><br>***Rating - Acceptable*** |
| Minimize impacts to the natural environment | Construction-related impacts only, that will be mitigated using applicable technology.<br><br>***Rating - Preferred*** | Will have significant aesthetic impacts on the river during operation; will be removed at closure.<br><br>***Rating - Acceptable*** |
| ***SUMMARY EVALUATION*** | ***RATING – PREFERRED*** | ***RATING - ACCEPTABLE*** |

**TABLE 5-21**
**PERFORMANCE EVALUATION – RECLAMATION ALTERNATIVES**

| Infrastructure Compound | Alternatives | Performance Objectives | | Preferred Alternative |
|---|---|---|---|---|
| | | Cost-effectiveness | Amenability to Reclamation / Minimize Impacts to the Natural Environment | |
| Open pit | (1) Develop a pit lake<br>(2) Fill the pit workings with mineral waste | Preferred [1]<br>Unacceptable [2] | Acceptable<br>Preferred | (1) |
| Demolition wastes | (1) Dispose within the mine rock and/or processed kimberlite stockpiles<br>(2) Dispose of within an above grade landfill<br>(3) Fill the open pit with demolition wastes | Preferred<br>Acceptable<br>Unacceptable | Preferred<br>Acceptable<br>Unacceptable | (1) |
| Fine PKC facility | No alternatives | n/a | n/a | n/a |
| Stockpiles | No alternatives | n/a | n/a | n/a |
| Infrastructure | (1) Reclaim<br>(2) Transfer to AttFN or other organization | Acceptable<br>Preferred | Preferred<br>Acceptable | n/a – to be assessed in closure plan |
| Site drainage | No alternatives | n/a | n/a | |
| Victor fuel pipeline | (1) Clean, remove any surface infrastructure and leave in place<br>(2) Excavate and dispose of demolition wastes in stockpile on site<br>(3) Excavate and dispose of demolition wastes at a landfill<br>(4) Excavate and ship recyclable materials off site | Preferred<br>Unacceptable<br>Unacceptable<br>Unacceptable | Preferred/preferred<br>Acceptable/unacceptable<br>Acceptable/unacceptable<br>Acceptable/unacceptable | (1) |

n/a not applicable
1 The estimated cost to actively fill the open pit with water from the Attawapiskat River is $3 million.
2 The estimated cost to backfill the open pit with waste mineral material is $90 million.