APPENDIX A

SUMMARY OF MULTIPLE ACCOUNTS ANALYSIS (MAA) FOR THE GAHCHO KUÉ PROJECT

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1.0 INTRODUCTION

EBA was requested by JDS Energy and Mining Inc. (JDS) to carry out an alternative fine PK disposal assessment for the Gahcho Kué project. The purpose of the assessment is to evaluate the potential fine PK disposal alternatives and identify and select the most suitable or advantageous fine PK disposal location and method. The overall objective of the alternative assessment process is to minimize the environmental effect of the disposal area as per Environment Canada guidelines (Environment Canada 2011).

A Multiple Accounts Analysis (MAA) was used to assess the fine PK disposal alternatives and to select the best fine PK disposal plan for the Gahcho Kué Project. A MAA workshop was held on July 6 and 7, 2011 at EBA's office in Edmonton. The overall process of an assessment of alternatives includes seven steps as discussed in the following sections. The attendees at the workshop are listed in Table A1.

Table A1: Attendees for the MAA Workshop (July 6 and 7, 2011)

Name	Association
Wayne Corso	JDS Energy & Mining Inc.
Daniel Johnson	JDS Energy & Mining Inc.
Andrew Williams	De Beers Canada Inc.
Brian Rausch	De Beers Canada Inc.
Paul Cobban	De Beers Canada Inc.
John Faithful	Golder Associates Ltd.
Bechtold, J.P.	Golder Associates Ltd
Kristine Mason	Golder Associates Ltd.
Amy Langhorne	Golder Associates Ltd.
Bill Horne	EBA, A Tetra Tech Company
Gordon Zhang	EBA, A Tetra Tech Company
Hongwei Xia	EBA, A Tetra Tech Company
Kimberly Turner-de Vries	EBA, A Tetra Tech Company

2.0 STEP 1: IDENTIFYING CANDIDATE ALTERNATIVES

Nine fine PK disposal candidate alternatives were identified, including Option 1(Base Case in EIS 2010), which is the proposed disposal plan presented in the Gahcho Kué Project Description (EIS 2010). The threshold criteria for identifying candidate alternatives considers the potential fine PK production plan, mine-site water management plan, water quality, the impact on fish habitat, dyke construction requirements, project economics, and contingency capacity and flexibility. The selected potential alternatives for fine PK disposal are listed in Table A2. Table A3 (in the Tables Section) summarizes the key parameters and criteria for each of the disposal alternatives. The site layout for each alternative is shown in Figures A1 through A9.

Table A2: Fine PK Disposal Candidate Alternatives

Candidate Alternatives	Fine PK Disposal Plan
Option 1: Base Case (the plan in the 2010 EIS)	Slurry deposition in Area 1 (3.06 Mt), Area 2 (2.44 Mt), and mined-out Hearne Pit (2.33 Mt)
Option 2: Area 2 and 5034 and Hearne Pits	Slurry deposition in Area 2 (3.32 Mt), mined-out 5034 Pit (1.50 Mt), and mined-out Hearne Pit (3.01 Mt)
Option 3: Co-disposal with Waste Rock in Area 5 and 5034 and Hearne Pits	Slurry deposition inside of West Waste Rock Pile in Area 5 (3.32 Mt), mined-out 5034 Pit (1.50 Mt), and mined-out Hearne Pit (3.01 Mt)
Option 4: On-land Fine PK Facility in Areas 1&4 and 5034 and Hearne Pits	Slurry deposition in On-land Fine PK Facility in Areas 1&4 (3.32 Mt), mined-out 5034 Pit (1.50 Mt), and mined-out Hearne Pit (3.01 Mt)
Option 5: Lake Bottom (greater than 5 m below 420.7 m) in Areas 3&5 and 5034 and Hearne Pits	Slurry deposition in lake bottom of Areas 3&5 (3.32 Mt), mined-out 5034 Pit (1.50 Mt) and mined-out Hearne Pit (3.01 Mt)
Option 6: Area 6, Area 7, and 5034 and Hearne Pits	Slurry deposition in Area 6 (2.32 Mt), Area 7 (1.0 Mt), mined-out 5034 Pit (1.50 Mt) and mined-out Hearne Pit (3.01 Mt)
Option 7: On-land Dry Stack Fine PK in Area 4 and 5034 and Hearne Pits	Dry Stack fine PK in an on-land Facility (3.32 Mt), mined-out 5034 Pit (1.50 Mt), and mined-out Hearne Pit (3.01 Mt)
Option 8: Area 2 and Hearne Pit	Slurry deposition in Area 2 (4.82 Mt) and mined-out Hearne Pit (3.01 Mt)
Option 9: Area 2 and Hearne Pit (early mining of Hearne Pit)	Slurry deposition in Area 2 (2.13 Mt) and mined-out Hearne Pit (5.70 Mt)

3.0 STEP 2: PRE-SCREENING ASSESSMENT

The pre-screening assessment is the first step in eliminating fine PK disposal alternatives. The elimination of the alternatives at this point is based on a basic set of criteria, selected by project team, which is intended to identify alternatives that are fatally flawed. The criteria adopted for the Gahcho Kué Project pre-screening assessment are as follows:

1. Will the expected long-term water quality be adequate;
2. Is the disposal method practical for the fine PK and site conditions;
3. Would the disposal alternative result in positive project economics; and
4. Would the disposal alternatives meet upper bound fine PK production limits?

Table A4 (in the Tables section) summarizes the results of the pre-screening assessment. In total four of the nine tailings disposal alternatives were eliminated from further evaluation. The alternatives that remained, and that were carried through assessment via the MAA are as follows;

Option 1 – Base Case

Option 2 – Area 2 and 5034 and Hearne Pits

Option 3 - Co-disposal with Waste Rock

Option 4 – On Land disposal Facility

Option 9 – Area 2 and Hearne Pit (early mining of Hearne Pit).

4.0 STEP 3: ALTERNATIVE CHARACTERIZATION

MAA requires selection of the most important criteria that allows for a relative comparison between the tailings disposal alternatives. For the Gahcho Kué Project, the site specific characterization criteria were grouped into three different categories (Accounts), which are technical characterization, environmental characterization, and project economic characterization. The criteria are selected to avoid "double accounting" of components within each of these categories. For example, although water management can be a criterion for both the environment and technical account, it was only evaluated in the technical account, since mine site water management would impact the technical feasibility.

For the candidate alternatives which passed the pre-screening assessment, a series of characterizations were assigned to each alternative. Technical characterization focuses on characterization of the engineered elements of each selected alternatives such as dyke requirement, total dyke construction volume, technical design challenge, non-performance consequence and risk, haul distance, fine PK discharge system and technology, mine-site water management, and so on. The alternative characterization for technical issues was completed by EBA. Environmental characterization focuses on local and regional environment surrounding the mine site such as caribou life, vegetation and soils, water flow and fish life in Kennedy Lake, water quality in Kennedy Lake, groundwater and downstream impacts, and so on. The environmental characterization was completed by Golder. Project economic characterization focuses on the project economics during life of mine and associated economic risk such as capital cost, operating and closure cost, additional fine PK contingency risk, and so on. This project economic characterization was completed by JDS.

The environmental factors considered the main environmental issues raised by the Review Board in the Terms of Reference for the Project issued Oct. 5, 2007. The environmental characterization was based on the Key Lines of Inquiry (KLOI) and related key subjects of note and disciplines (Table A5).

The difference between the characterization criteria (Step 3) and the sub-accounts (Step 4) is that the characterization criteria are factual and have been developed with no *a priori* knowledge of the alternatives being considered; whereas, the sub-accounts consider only the benefit or loss associated with any of the alternatives being evaluated (Environment Canada 2011). Characterization criteria are summarized in Table A6. In some cases, the characterization criteria summarized in Table A6 may include more than one indicator (e.g., road layout versus traffic details). Further, the criteria may address more than one characterization (e.g., total phosphorus concentration is relevant for water quality, fish, and waterfowl).

Some of the characterizations were not carried through to the characterization criteria table (Table A6) and the sub-accounting stage, in part, because the Environmental Impact Statement (EIS) concluded that there were no measureable residual effects for that component. The characterization criteria provided guidance in determining appropriate sub-accounts and indicators.

Table A5: Environmental Characterizations

Caribou Life (a KLOI)	The persistence of populations of caribou is important to traditional and non-traditional users. The effect on persistence is measured by changes to caribou habitat, behavior, and health. Key biophysical components that influence the persistence of caribou populations include direct changes in habitat quantity from the physical terrestrial footprint, and indirect changes in habitat quality from dust deposition and noise (e.g., traffic). For example, physical footprint, sensory disturbance.
Vegetation and Soils in Local Study Area	This feature of the environment includes the persistence of plant populations and communities that may include rare plants, plants important to traditional users, and may provide key habitat for wildlife (e.g., riparian habitat and wetlands). Key biophysical components influencing soils and vegetation include the physical footprint, the permanent physical footprint, and to a lesser extent, deposition of fugitive particulates. For example, physical footprint, permanent physical footprint, loss of riparian and wetland habitats.
Waterfowl Life in Kennady Lake	The persistence of populations of waterfowl is important to traditional and non-traditional users. The effect on waterfowl is measured by changes to waterfowl abundance, habitat, behavior, and health of the waterfowl in the Kennady Lake watershed. Key biophysical components that influence the persistence of waterfowl populations include the physical footprint, and water quality (specifically concentrations of substances of potential concern (SOPCs) through changes in concentrations of total phosphorus (TP) in Kennady Lake). For example, aquatic footprint, water quality, containment of seepage from subaqueous fine processed kimberlite (PK).
Fish Life in Kennady Lake (a KLOI)	The persistence of populations of fish is important to traditional and non-traditional users. The effect on fish is measured by changes to fish abundance, fish habitat, behavior, and health of fish in the Kennady Lake watershed. Key biophysical components that influence the persistence of fish populations include the physical footprint, and water quality (specifically the water column dissolved oxygen (DO) regime through changes in TP concentrations [i.e., trophic status]). For example, aquatic footprint, number of fish-bearing aquatic habitats affected, water quality, containment of seepage from subaqueous fine PK, species diversity in affected lakes.
Water Quality in Kennady Lake **(a KLOI)**	Water quality can be used to evaluate the health or condition of aquatics ecosystems and compared to drinking water standards. Key biophysical components that influence water quality (e.g., TP, DO) include surface water chemistry and loadings from upstream sources (e.g., containment of seepage from subaqueous fine PK). For example, risk of SOPCs exceeding site-specific thresholds, containment of seepage from subaqueous fine PK.
Hydrology (Water Quantity) in Kennady Lake	Hydrology includes surface water levels, flows and channel/bank stability, all of which are critical to understanding impacts on fish habitat and water quality. The hydrological assessment focuses on anticipated changes to Kennady Lake watershed configuration, changes to proportion of water to land in Kennady Lake watershed, and time for recovery of Kennady Lake (e.g., re-filling). For example, number of sub-watersheds affected, diversions, augmentations, recovery, ratio of water to land.

Table A5: Environmental Characterizations

Sediment Quality	There is potential for exchange between the bed sediment, aquatic habitat, and overlying water column. The main concern is that physical alternations to lake and stream beds (e.g., direct loss of fish habitat in Kennady Lake) can lead to deposition of sediment, metals and nutrients, affecting water chemistry and aquatic health. For example, aquatic habitat footprint.
Permafrost	Changes to permafrost could potentially affect water quality and fish habitat in Kennady Lake. The dewatering of sub-watersheds of Kennady Lake will expose the lake bed to freezing temperatures and the development of permafrost in areas not normally subject to freezing. The establishment of mine rock piles may also influence permafrost. It is important to note that the EIS concluded that there will be no measureable residual effects to permafrost conditions. This characterization was not taken any further in the analysis.
Groundwater	The hydrogeology of the Kennady Lake watershed is interconnected with the surface water such that pit development may affect local groundwater regimes and seepage, affecting surface water. For example, the removal of saline groundwater inflow from the mine pits may cause changes to groundwater quantity and quality. It is important to note that the EIS concluded that there will be no measureable residual effects to groundwater and hydrogeology. This characterization was not taken any further in the assessment.
Downstream Effects (a KLOI)	Areas of concern include water quality and quantity, riparian vegetation (i.e., wildlife effects), and fish abundance and quality at downstream locations. This characterization is similar to 'water quality' and 'fish life' in Kennady Lake. In other words, downstream effects on surface waters are the direct result of changes in water quantity (hydrology) and water quality in the Kennady Lake watershed. It is important to note that the EIS predicts no measurable effects at Kirk Lake and beyond to Great Slave Lake.
Long-term Biophysical Effects, Closure and Reclamation (a KLOI)	Areas of concern include the long-term suitability of water quality to support aquatic life and the impacts to the persistence of key fish species. This characterization is similar to 'water quality' and 'fish life' in Kennady Lake. Long-term effects consider the location of mine rock and PK deposits and the degree to which PK and mine water is 'contained'.
Socioeconomics (a KLOI)	The characterization of socio-economics, although broadly defined, considers changes to the cultural landscape (e.g., proximity to culturally important areas) and effects of archaeological sites as part of the environmental characterization. The Project is located in an area that was used traditionally for hunting and fishing, and so impediments (e.g., spatial configuration of the footprint) related to those movements are an important issue. For example, proximity to "Old Lady of the Falls", width of Project footprint, number of archeological sites affected.

Table A6 (in the Tables section) presents a summary of selected characterization criteria for each account of the alternatives under consideration.

5.0 STEP 4: MULTIPLE ACCOUNTS LEDGER

In order to evaluate alternatives using the MAA decision making tool, it is necessary to develop a multiple accounts ledger. These ledgers were used to identify those elements that differentiate alternatives, and provide the basis for future scoring and weighting. The multiple account ledger consists of the following two elements: Sub-accounts (evaluation criteria) and indicators (measurement criteria). The selection of the sub-accounts complies with the following rules: Impact driven, differentiating, value relevance, understandability, non-redundancy, and judgmental independence (Environment Canada, 2011). Table A7 summarizes the developed account and sub-accounts for Gahcho Kué Project.

Table A7: Summary of MAA Accounts and Sub-accounts for Gahcho Kué Project

Account	Weight	Sub-Account	Weight
Technical Issue	3	Dyke Constructability and Complexity	3
		Dyke Design and Performance	5
		Diversion Structure Requirement and Reliability	2
		Fine PK Delivery and Deposition System	3
		Auxiliary Structure for Fine PK Deposition	1
		Fine PK Impoundment	4
		Water management	4
		Closure Design and Post Closure Strategy	4
Environmental Issue	5	Aquatic Footprint	5
		Hydrology	2
		Water Quality	5
Project Economic	2	Life of Mine	5
		Economic Risk	3

6.0 STEP 5: VALUE –BASED DECISION PROCESS

The Value-based decision process involves scoring, weighting, and quantitative analysis (Environment Canada, 2011). The scoring process is done by developing qualitative value scales for each indicator, including those which appear to be readily measureable. Table A8 (in the Tables section) presents the score system for Gahcho Kué Project. A six-point scale was employed in the score system. The score system provides a relative ranking between the alternative with the "best" option receiving a score of 6, and the "worst" option receiving a score of 1. Based on the score system, an initial score was assigned to each indicator; the final score for each indicator was determined by the agreement made by the project team during the MAA workshop.

For each account, sub-account, and indicator, a weighting factor was assigned to distinguish the relative "importance" of each account and sub-account. A scale of 1 to 5 is used whereby "5" marks issues of high importance and "1" marks issues of low relative importance. The weights for each account and sub-account are listed in Table A8 (in the Tables section).

The sub-account score was calculated by normalizing all the indicators within a single sub-account to the weight applied to that indicator. The account score was calculated by normalizing all the sub-account scores within that account to the weight applied to that sub-account. The overall score for each alternative was calculated by normalizing the account score to the weight applied to that account. Table A9 (in the Tables section) summarizes the score and weight for each account, sub-account, and indicator.

Table A10 lists the ranking and relative overall combined score for each of the options for the base case at the end of the MAA workshop.

Table A10: Summary of MAA Ranking for Fine PK Disposal Alternatives

Ranking	Fine PK Disposal Alternatives	Combined MAA Score
1	Option 2: Area 2 and Pits (5034 and Hearne)	4.68
1	Option 9: Area 2 and Hearne Pit (Early mining of Hearne Pit)	4.68
2	Option 1: Base Case	4.44
3	Option 3: Co-Disposal with Waste Rock in Area 3&5 and Pit (5034 and Hearne)	4.32
4	Option 4: On-Land Fine PK Facility in Area 1&4 and Pits (5034 and Hearne)	3.89

7.0 STEP 6: SENSITIVITY ANALYSIS

Sensitivity analyses were carried out to examine the sensitivity of weighting a specific account and to minimize bias and subjectivity. Four sensitivity cases were performed in the MAA workshop.

Sensitivity Case S1: set the weight of Project Economics to 0 to determine the best technical/environmental solution independent of cost.

Sensitivity Case S2: set the weight of Project Economics to 3 without changing the weight of technical issues and environmental effects comparing to Base Case.

Sensitivity Case S3: set the even weight ("5") to Project Economics, technical issues, and environmental effects.

Sensitivity Case S4: set the weight of technical issues to 0 without changing the weight of project economics and environmental effects comparing to Base Case.

The sensitivity analyses results are summarized in Table A11.

Table A11: Summary of Base Case and Sensitivity MAA Analyses

Case		Option 1:	Option 2:	Option 3:	Option 4:	Option 9:
		Base Case	Area 2 and Pits (5034 and Hearne)	Co-Disposal with Waste Rock in Area 5 and Pits (5034 and Hearne)	On-Land Fine PK Facility in Areas 1&4 and Pits(5034 and Hearne)	Area 2 and Hearne Pit (Early mining of Hearne Pit)
Base	Overall	4.44	4.68	4.32	3.89	4.68
	Technical=3	4.78	4.61	3.85	3.69	4.91
	Environmental=5	3.86	4.87	5.03	4.83	4.87
	Economic=2	5.40	4.30	3.20	1.80	3.90
S1: MAA with Economic Weight=0		4.21	4.77	4.59	4.41	4.89
S2: MAA with Economic Weight=3		4.53	4.65	4.20	3.70	4.62

Table A11: Summary of Base Case and Sensitivity MAA Analyses

Case	Option 1: Base Case	Option 2: Area 2 and Pits (5034 and Hearne)	Option 3: Co-Disposal with Waste Rock in Area 5 and Pits (5034 and Hearne)	Option 4: On-Land Fine PK Facility in Areas 1&4 and Pits(5034 and Hearne)	Option 9: Area 2 and Hearne Pit (Early mining of Hearne Pit)
S3: MAA With Even Weighting=5	4.67	4.60	4.04	3.45	4.56
S4: MAA with Technical Weight=0	4.29	4.72	4.51	3.97	4.60

Notes: [green] indicates the highest scored option; [blue] indicates second highest scored option.

The green shaded cells show the highest scored option and the blue shaded cells indicates the second highest score option. This enables a quick visual interpretation of the tabulated data.

8.0 STEP 7: SUMMARY AND CONCLUSION

Nine disposal alternatives were identified as the potential Fine PK disposal location including the Base Case which is presented in the 2010 Gahcho Kué Project Description. A pre-screening assessment was carried out to eliminate those options with fatal flaws and/or obvious disadvantages when compared to the remaining options. This screening assessment excluded four options and selected the remaining five Fine PK disposal options (Options 1, 2, 3, 4, and 9) for further assessment using a scoring, weighting, and quantities analysis technique known as the Multiple Accounts Analysis (MAA).

The results of the MAA process in Table A11 indicate that Options 2 and 9 have the highest overall score and Option 1 (Base Case) has the second highest score. However, taking the sensitivity analyses into account, Option 2 has the maximum of highest score points, and Option 9 has the maximum of second highest score points. Options 2 and 9 are variations of the Option 1 Base Case and provide for mining and fine PK disposal schedules to minimize disturbance to Lake A1/A2 otherwise not provided for as a trade off against contingency planning. Based on these results, Option 2 is ranked highest among the five viable alternatives and is recommended to be selected as the primary Fine PK disposal option for the project development.

Table A3: Summary Fine PK Disposal Alternatives

Fine PK Disposal Candidate Alternatives	Fine PK Disposal Plan	Water Management	Water Quality	Fish Habitat	Dyke Construction Requirements	Mine Operations and Economics	Contingency Capacity and Flexibility
Option 1: Base Case (the plan in the 2010 feasibility study)	Slurry deposition in Area 1 (3.06 Mt), Area 2 (2.44 Mt), and mined-out Hearne Pit (2.33 Mt)	Base Case	Base Case; Fine PK surface area above the post-closure water elevation of 420.7 m : 1.29 km^2; Catchment area where runoff would potentially flow through the fine PK : 1.81 km^2, high potential long-term P loading	Base Case; Fine PK in Fish bearing Lakes A1 and A2, potentially not allowed by Environment Canada / DFO	Base Case	Base Case	Base Case
Option 2: Area 2 and Pits (5034 and Hearne)	Slurry deposition in Area 2 (3.32 Mt), mined-out 5034 Pit (1.50 Mt), and mined-out Hearne Pit (3.01 Mt)	Need to raise Lakes A1 and A2 and pump water from Lakes A1 and A2 to K5; Overall water storage capacity (with annually pumping water from Lake A1 to K5) when compared to Option 1: net gain of 1.1 M m^3	Fine PK surface area above the post-closure water elevation of 420.7 m : 0.62 km^2; Catchment area where runoff would potentially flow through the fine PK : 1.07 km^2	No fine PK in Lakes A1 and A2 but larger fine PK area in the Area 2 basin; Fish habitat area when compared to Option 1: net gain of 0.21 km^2	Higher dyke elevations for Dyke D and Dyke L (possible); Need to relocate Dyke C to the boundary between Area 1 and Area 2 (Dyke A1); Do not need Dykes A3 and N10	3 Mt of waste rock to be placed in mined-out 5034 pit for Base Case will need to be placed in the waste rock piles; Longer fine PK discharge lines	Limited additional fine PK storage capacity in Area 2
Option 3: Co-disposal with Waste Rock in Area 5 and Pits (5034 and Hearne)	Slurry deposition inside of West Waste Rock Pile in Area 5 (3.32 Mt), mined-out 5034 Pit (1.50 Mt), and mined-out Hearne Pit (3.01 Mt)	May need to raise Lakes A1 and A2 and pump water from Lakes A1 and A2 to K5; Overall water storage capacity (with annually pumping water from Lake A1 to K5) when compared to Option 1: net gain of 5.1 M m^3	Fine PK surface area above the post-closure water elevation of 420.7 m : 0.26 km^2; Catchment area where runoff would potentially flow through the fine PK : 0.33 km^2	No fine PK in Areas 1 and 2, less requirements for fish habitat compensation; Fish habitat area when compared to Option 1: net gain of 0.87 km^2	Need to construct a ring filter zone inside the waste rock pile in Area 5; May need to relocate Dyke L to the south side of Area 5 (Dyke B1); Less dyke construction requirements due to expected lower water levels in water management basins; Need to relocate Dyke C to the boundary between Area 1 and Area 2 (Dyke A1); Do not need Dykes A3 and N10	3 Mt of waste rock to be placed in mined-out 5034 pit for Base Case will need to be placed in the waste rock piles; The final height of the West Waste Rock Pile need to increase to accommodate the fine PK volume of 4.3 Mm^3 placed inside of the pile and 3 Mt of waste rock displaced from 5034 Pit; Interference with waste rock placement in the West Waste Rock Pile in Area 5	Increased overall water storage capacity; Additional fine PK storage capacity can be obtained for the ring filter zone with a higher crest elevation
Option 4: On-land Fine PK Facility in Areas 1&4 and Pits (5034 and Hearne)	Slurry deposition in On-land Fine PK Facility in Areas 1&4 (3.32 Mt), mined-out 5034 Pit (1.50 Mt), and mined-out Hearne Pit (3.01 Mt)	May need to raise Lakes A1 and A2 and pump water from Lakes A1 and A2 to K5; Overall water storage capacity (with annually pumping water from Lake A1 to K5) when compared to Option 1: net gain of 4.5 M m^3; Possible longer discharge period during mine operation	Expected better water quality than Option 1 due to no slurry fine PK in Areas 1 and 2, which may result in additional years for water discharge; On-land fine PK surface area: 0.33 km^2; Catchment area where runoff would potentially flow through the fine PK : 0.36 km^2	No fine PK in Lakes A1 and A2 and Area 2, less requirements for fish habitat compensation; Fish habitat area when compared to Option 1: net gain of 0.87 km^2	Lined on-land facility with ring dyke; No need of the Filter Dyke (Dyke L); May need to relocate Dyke C to the boundary between Area 1 and Area 2 (Dyke A1); Need to construct water diversion ditches and collection ponds around the on-land fine	High construction cost for a lined on-land ring dyke; 3 Mt of waste rock to be placed in mined-out 5034 pit for Base Case will need to be placed in the waste rock piles;	Increased overall water storage capacity; Additional fine PK storage capacity can be obtained for the facility with a larger footprint or a higher final elevation

Table A3: Summary Fine PK Disposal Alternatives

Fine PK Disposal Candidate Alternatives	Fine PK Disposal Plan	Water Management	Water Quality	Fish Habitat	Dyke Construction Requirements	Mine Operations and Economics	Contingency Capacity and Flexibility
		due to expected better water quality in Areas 3&5; Need to pump water collected in the collection ponds around the on-land fine PK facility to Area 3			PK facility; Do not need Dykes A3 and N10		
Option 5: Lake Bottom (>= 5 m below 420.7 m) in Areas 3&5 and Pits (5034 and Hearne)	Slurry deposition in lake bottom of Areas 3&5 (3.32 Mt), mined-out 5034 Pit (1.50 Mt) and mined-out Hearne Pit (3.01 Mt)	Need to raise Lakes A1 and A2 and pump water from Lakes A1 and A2 to K5; Overall water storage capacity (with annually pumping water from Lake A1 to K5) when compared to Option 1: net gain of 1.9 M m^3	No exposed fine PK surface; Water quality in Areas 3&5 could be compromised due to direct discharge fine PK slurry in the lake bottom	No fine PK in Areas 1 and 2; Fish habitat area when compared to Option 1: net gain of 0.87 km^2 (if the submerged fine PK surface can be treated as fish habitat after mine closure) or net loss of more than 0.53 km^2 (if the submerged fine PK surface cannot be treated as fish habitat after mine closure)	A filter dyke similar to Dyke L may still be required in Area 2; Need to relocate Dyke C to the boundary between Area 1 and Area 2 (Dyke A1); Do not need Dykes A3 and N10	May not be practical to regularly move fine PK discharge spigots to obtain a relative even fine PK surface over the large lake bottom in Areas 3&5 where the water depth is relatively shallow; 3 Mt of waste rock to be placed in mined-out 5034 pit for Base Case will need to be placed in the waste rock piles;	Limited additional fine PK storage capacity in the lake bottom of Areas 3&5
Option 6: Area 6, Area 7, and Pits (5034 and Hearne)	Slurry deposition in Area 6 (2.32 Mt), Area 7 (1.0 Mt), mined-out 5034 Pit (1.50 Mt) and mined-out Hearne Pit (3.01 Mt)	May need to raise Lakes A1 and A2 and pump water from Lakes A1 and A2 to K5; Overall water storage capacity (with annually pumping water from Lake A1 to K5) when compared to Option 1: net gain of 3.9 M m^3; Need to pump water in Area 6 to Area 5 or from Area 6 to process plant to accommodate the limited water storage capacity in Area 6	Fine PK surface area: 0.91 km^2, high potential long-term P loading; Catchment area where runoff would potentially flow through the fine PK : 2.1 km^2, high potential long-term P loading; Water quality in Area 7 would be compromised due to fine PK to be placed in a portion of Area 7	Fish habitat area when compared to Option 1: net gain of 0.45 km^2	Need to construct a filter dyke on the east side of Area 7; May need to relocate Dyke L to the south side of Area 5 if pumping fine PK slurry water from Area 6 to Area 5; Need to relocate Dyke C to the boundary between Area 1 and Area 2 (Dyke A1); Do not need Dykes A3 and N10	Pumping fine PK to four different locations during mine operation; 3 Mt of waste rock to be placed in mined-out 5034 pit for Base Case will need to be placed in the waste rock piles; May need two filter dykes	Limited additional fine PK storage capacity in Areas 6 and 7
Option 7: On-land Dry Stack Fine PK in Area 4 and Pits (5034 and Hearne)	Dry Stack fine PK in an on-land Facility (3.32 Mt), mined-out 5034 Pit (1.50 Mt), and mined-out Hearne Pit (3.01 Mt)	May need to raise Lakes A1 and A2 and pump water from Lakes A1 and A2 to K5; Overall water storage capacity (with annually pumping water from Lake A1 to K5) when compared to Option 1: net gain of 5.1 M m^3	Expected better water quality than Option 1 due to no slurry fine PK in Areas 1 and 2, which may result in additional years for water discharge; On-land dry stacked fine PK surface area: 0.11 km^2; Catchment area where runoff would potentially flow through the fine PK : 0.19 km^2	No fine PK in Lakes A1 and A2 and Area 2, less requirements for fish habitat compensation; Fish habitat area compared to Option 1: net gain of 0.87 km^2	No need of the Filter Dyke (Dyke L); May need to relocate Dyke C to the boundary between Area 1 and Area 2 (Dyke A1); Do not need Dykes A3 and N10	High initial capital for equipment using for producing dry stack fine PK and high operation cost for dry stack fine PK disposal; Fine PK expected to be too fine and have too much clay for an effective dry stack operation; 3 Mt of waste rock to be placed in mined-out 5034 pit for Base Case will need to be placed in the waste rock piles;	High contingency capacity for fine PK disposal

Table A3: Summary Fine PK Disposal Alternatives

Fine PK Disposal Candidate Alternatives	Fine PK Disposal Plan	Water Management	Water Quality	Fish Habitat	Dyke Construction Requirements	Mine Operations and Economics	Contingency Capacity and Flexibility
Option 8: Area 2 and Hearne Pit	Slurry deposition in Area 2 (4.82 Mt) and mined-out Hearne Pit (3.01 Mt)	Need to raise Lakes A1 and A2 and pump water from Lakes A1 and A2 to K5; Overall water storage capacity (with annually pumping water from Lake A1 to K5) when compared to Option 1: net loss of 0.8 M m^3; Need a longer pipeline for water discharge to Lake N11	Fine PK surface area above the post-closure water elevation of 420.7 m : 0.83 km^2; Catchment area where runoff would potentially flow through the fine PK : 1.33 km^2, , high potential long-term P loading	No fine PK in Lakes A1 and A2 but larger fine PK area in the Area 2 basin; Fish habitat area when compared to Option 1: net loss of 0.05 km^2	Need to relocate Dyke L further south into the Area 3 Basin; Higher dyke elevations for Dyke D and Dyke L (possible); Need to relocate Dyke C to the boundary between Area 1 and Area 2 (Dyke A1); Do not need Dykes A3 and N10	Longer fine PK discharge lines; Longer pumping distance from Area 3 to Lake N11 for water discharge	Minimum additional fine PK storage capacity in Area 2
Option 9: Area 2 and Hearne Pit (early mining of Hearne Pit)	Slurry deposition in Area 2 (2.13 Mt) and mined-out Hearne Pit (5.70 Mt)	Need to raise Lakes A1 and A2 and pump water from Lakes A1 and A2 to K5; Overall water storage capacity (with annually pumping water from Lake A1 to K5) when compared to Option 1: net gain of 0.15 M m^3	Fine PK surface area above the post-closure water elevation of 420.7 m : 0.44 km^2; Catchment area where runoff would potentially flow through the fine PK : 0.51 km^2	No fine PK in Area 1 (Lakes A1 and A2); Slightly smaller fine PK area in the Area 2 basin; Fish habitat area when compared to Option 1: net gain of 0.3 km^2	Need to relocate Dyke C to the boundary between Area 1 and Area 2 (Dyke A1); Higher dykes between Area 1 and Area 2; Do not need Dykes A3 and N10	Early mining of Hearne Pit may reduce the overall economics of the mine due to lower diamond values when compared to those in 5034 Pit	Limited additional fine PK storage capacity in Area 2 before Hearne Pit is available for fine PK disposal

Table A4: Pre-Screening Assessment of Candidate Alternatives

Fine PK Disposal Candidate Alternatives	Will the expected long-term (post closure) water quality (P concentration) be below the specified limit for this option?	Is the tailings disposal method of this option practical for the tailing (fine PK) and site conditions?	Would this option result in positive life of the project total economics?	Would the disposal alternatives meet upper bound fine PK production limits?	Will this option be included for further assessment?
Option 1: Base Case (the plan in the 2010 feasibility study)	May not meet criteria without mitigation Fine PK surface area above the post-closure water elevation of 420.7 m : 1.29 km^2; Catchment area where runoff would potentially flow through the fine PK : 1.81 km^2	Yes.	Yes.	Yes Additional fine PK can be placed in Areas 1 and 2, some material can be placed in 5034 pit.	Yes – (carry through the assessment for comparison).
Option 2: Area 2 and Pits (5034 and Hearne)	Will meet water quality criteria. Fine PK surface area above the post-closure water elevation of 420.7 m : 0.62 km^2; Catchment area where runoff would potentially flow through the fine PK : 1.07 km^2	Yes.	Yes.	Yes Significant additional perimeter berms required, or Dyke L moved to the location as shown in Option 8.	Yes (possible that it will not need WQ criteria).
Option 3: Co-disposal with Waste Rock in Area 5 and Pits (5034 and Hearne)	Yes.	Yes.	Yes.	Yes Footprint of dyke must be expanded.	Yes.
Option 4: On-land Fine PK Facility in Areas 1&4 and Pits (5034 and Hearne)	Yes.	Yes.	To be determined.	Yes Dyke height must be increased.	Yes.
Option 5: Lake Bottom (>= 5 m below 420.7 m) in Areas 3&5 and Pits (5034 and Hearne)	Expected to meet water quality criteria.	No. Not practical to regularly move fine PK discharge spigots to obtain a relative even fine PK surface over the large lake bottom in Areas 3&5 where the water depth is relatively shallow.	Yes.	No	No. Not practical.
Option 6: Area 6, Area 7, and Pits (5034 and Hearne)	No. Fine PK surface area: 0.91 km^2, high potential long-term P loading; Catchment area where runoff would potentially flow through the fine PK: 2.1 km^2, high potential long-term P loading. Four different locations for fine PK disposal: one in Area 6, one in Area 7, and two in mined-out pits.	Yes. Water management will be difficult due to the proximity of Hearne Pit to the disposal area.	Yes.	Likely not. (Further studies required to verify)	No. Poor water quality.
Option 7: On-land Dry Stack Fine PK in Area 4 and Pits (5034 and Hearne)	Yes.	No. Fine PK may be too fine to use dry stack technology; two sets of equipment: one for dry stack fine PK and another for slurry fine PK to be placed in mined-out pits	To be determined. (possible No.)	Possible, but will have very high slopes and dry stack. May not be practical.	No. Not practical.
Option 8: Area 2 and Hearne Pit	Not expected to meet water quality criteria. Fine PK surface area above the post-closure water elevation of 420.7 m : 0.83 km^2; Catchment area where runoff would potentially flow through the fine PK : 1.33 km^2	Yes.	Yes.	No Significant additional dykes required.	No. Similar to Option 2 but greater fine PK surface area.

Table A4: Pre-Screening Assessment of Candidate Alternatives

Fine PK Disposal Candidate Alternatives	Will the expected long-term (post closure) water quality (P concentration) be below the specified limit for this option?	Is the tailings disposal method of this option practical for the tailing (fine PK) and site conditions?	Would this option result in positive life of the project total economics?	Would the disposal alternatives meet upper bound fine PK production limits?	Will this option be included for further assessment?
Option 9: Area 2 and Hearne Pit (early mining of Hearne Pit)	Yes.	Yes.	Yes	Yes	Yes.

Table A6: Fine PK Disposal Alternatives Characterization, Gahcho Kue, NWT

	Characterization Criteria	Rationale/Concerns	Fine PK Disposal Alternative				
			Option 1-Base Case	Option 2: Area 2 and Pits (5034 and Hearne)	Option 3: Co-disposal with waste rock in Area 5 and Pits (5034 and Hearne)	Option 4: On-Land Fine PK Facility in Areas 1 &4 and Pits (5034 and Hearne)	Option 9: Area 2 and Hearne Pit (early mining of Hearne Pit)
Technical Issues	Dyke Constructability and Complexity	Alternatives that require large, long, complex dyke implied more capital costs and greater risk of failure	Five dykes required (Dykes C, D, L, A3, and N10) around Area 2, Area 1, and Lake A3 area. Dyke C: 500 m long, up to 6.0 m high, footprint 20,000 m^2; Dyke D: 220 m long, up to 4.5 m high, footprint 7,300 m^2; Dyke L: 1070 m long, up to 11.0 m high, footprint 52,000 m^2; Dyke A3: 180 m long, up to 4.0 m high, footprint 5,500 m^2; Dyke N10: 120 m long, up to 4.0 m high, footprint 4,000 m^2. Total Length: 2090 m. Dyke C: Frozen ground; typical overburden thickness of 2 to 3 m with a maximum of 6 m (from geophysical surveys); Dyke D: Frozen ground; Typical overburden thickness of 2 to 5 m (from geophysical surveys); Dyke L: Up to 6.5 m deep water ; typical overburden thickness of 3 to 7 m with a maximum of 10 m (including 0 to 2 m thick lake bed sediments over till) (from geophysical surveys); Dykes A3 and N10: No site condition information available	Three dykes (Dykes D, L, and A1) required: Dyke D: 220 m long, up to 4.5 m high, footprint 7,300 m^2 (assumed to be the same as Option 1); Dyke L: 1240 m long, up to 11.0 m high, footprint 55,000 m^2; Dyke A1: 600 m long, up to 4.0 m high, footprint 20,800 m^2; Total Length: 2060 m. No need of Dykes C, A3, and N10 The same site conditions for Dykes D and L as those for Option 1 Dyke A1: No site condition information available	Three dykes (Dykes A1, B1, and D) and one co-disposal facility with a ring dyke required): Dyke A1: 600 m long, up to 4.0 m high, footprint 20,800 m^2 (assumed to be the same as Option 2); Dyke B1 (instead of Dyke L): 650 m long, up to 12 m high, footprint: 25,000 m^2; Dyke D: 220 m long, up to 4.5 m high, footprint 7,300 m2 (assumed to be the same as Option 1; this dyke could be lower); Co-disposal Facility: 2200 m long, up to 40 m high, total footprint: 511,300 m^2 Total Length: 3670 m. No need of Dykes L, C, A3, and N10 The same site conditions for Dykes D as those for Option 1; Dyke A1: No site condition information available; Dyke B1: Up to 9.5 m deep water; Co-disposal Facility: Approximately 40% of footprint in the lake. Unfrozen zone identified beneath the lake ice (from geophysical surveys)	Two Dykes (Dykes A1 and D) and one on-land facility required: Dyke A1: 600 m long, up to 4.0 m high, footprint 20,800 m^2 (assumed to be the same as Option 2); Dyke D: 220 m long, up to 4.5 m high, footprint 7,300 m^2 (assumed to be the same as Option 1; this dyke could be lower) On-Land Fine PK Facility: 2500 m long, up to 30 m high, total footprint: 563,300 m^2 No need of Dykes L, C, A3, and N10 Total Length: 3320 m. The same site conditions for Dykes D as those for Option 1; Dyke A1: No site condition information available; On-Land Fine PK Facility: Dominated by moraine blanket and moraine veneer; isolated areas of peat bogs overlying glaciofluvial deposits, covered two small lakes, potential presence of shallow taliks	Three Dykes (Dykes D, L, and A1) required: Dyke D: 220 m long, up to 4.5 m high, footprint 7,300 m^2 (assumed to be the same as Option 1); Dyke L: 1240 m long, up to 11.0 m high, footprint 52,000 m^2 Dyke A1: 900 m long, up to 5.0 m high, footprint 25,000 m^2; Total Length: 2360 m. No need of Dykes C, A3 and N10 The same site conditions for Dykes D and L as those for Option 1; Dyke A1: No site condition information available
	Dyke Design and Performance	Complex design poses more risk of failure and more technical challenges	Dyke design based on past experience for similar structures at Ekati and Jericho Mines. Significant dyke class, deterioration of fish habitat in Areas 3 &5 if failure occurs. Total construction quantities for all required dykes and berms: 699,000 m^3.	Similar dyke design concepts as for Option 1. Significant dyke class, deterioration of fish habitat in Areas 3 &5 if failure occurs. Total construction quantities for all required dykes and berms: 711, 000 m^3.	Similar dyke design concepts as for Option 1, except for the co-disposal facility. Approximately 40% of footprint of Co-disposal facility seats in the lake, maximum height up to 40 m. Significant dyke class, deterioration of fish habitat in Areas 3 &5 if failure occurs. Totally construction quantities for Co-Disposal Facility: 6,425,700 m^3	Similar dyke design concepts as for Option 1, except for the on-land fine PK facility. On-Land Fine PK Facility seats two sub-catchment boundaries. A structure with a geomembrane liner keyed into overburden or bedrock; maximum height up to 30 m. Significant dyke class, deterioration/loss of fish habitat in Lake A1 if failure occurs. Totally construction quantities for On-Land Fine PK Facility: 5,497,700 m^3	Similar dyke design concepts as for Option 1. Significant dyke class, deterioration of fish habitat in Areas 3 &5 if failure occurs. Total construction quantities: 471, 000 m^3
	Diversion Structure Requirement and Reliability	More supporting structures require more disturbance area, and pose more risk on water management	No diversion structure required	No diversion structure required	No diversion structure required	Seepage collection/diversion system is required around the on-land fine PK facility to prevent the contact water from flowing into Lake A1 and other nearby lakes. Approximately 1.3 km long diversion structure is required.	No diversion structure required
	Fine PK Delivery and Deposition System	Complex delivery and deposition system requires more capital cost and poses more risk to operations such as pipeline freezing etc.	Approximately 3.0 km from mill to Area 1 discharge points; 3.0 km from mill to Hearne Pit; 1.0 km from mill to 5034 Pit. Need to construct two additional discharge berms and relocate discharge pipeline accordingly. Most common disposal method both in Canada and internationally.	Approximately 4.4 km from mill to Area 2 discharge points; 3.0 km from mill to Hearne Pit; 1.0 km from mill to 5034 Pit. Need to construction one discharge berm along the center of Area 2. Might need raise the berm and relocate the pipeline accordingly. Most common disposal method both in Canada and internationally.	Approximately 3.5 km from mill to co-disposal facility; 3.0 km from mill to Hearne Pit; 1.0 km from mill to 5034 Pit. No need for waste rock discharge berm. Tailings will be discharged along the crest of the ring berm of the co-disposal facility. Need to relocate the pipeline accordingly. Relatively new concept to co-dispose tailings with waste rock but the tailings deposition technology is commonly used in Arctic region.	Approximately 2.0 km from mill to on-land facility; 3.0 km from mill to Hearne Pit; 1.0 km from mill to 5034 Pit. No need for waste rock discharge berm. Tailings will be discharged along the crest of the ring dyke of the On-Land Fine PK Facility. Need to relocate the pipeline accordingly. Relatively new concept to dispose tailings in a lined on-land facility over permafrost but the tailings deposition technology is commonly used in Arctic region.	Approximately 4.5 km from mill to area 2 discharge points; 3.0 km from mill to Hearne Pit; 1.0 km from mill to 5034 Pit. Need to construct one additional discharge berms and relocate discharge pipeline accordingly. Most common disposal method both in Canada and internationally.
	Auxiliary Structure for Fine PK Deposition	More supporting structures, more capital cost for construction and maintenance	Length of fine PK discharge berm: 2.1 km. Length of access road: 5.2 km.	Length of discharge berm: 0.8 km. Length of access road: 5.2 km.	Length of discharge berm: 0.0 km. Length of access road: 3.5 km.	Length of discharge berm: 0.0 km. Length of access road: 2.0 km.	Length of discharge berm: 1.1 km. Length of access road: 5.2 km.
	Fine PK Impoundment	Alternatives that have more flexibility, smaller footprint would be significantly more feasible and reliable, less environmental impact, and ease for water management. Less Volume of Fine PK on Surface are desirable.	Approximately 30% of excess ice entrainment assumed for Fine PK stored on surface. 70% of Fine PK stored on Surface; 30% in Pits. Total sub-catchment Area: 2.6 km^2; Catchment area where runoff flows over or through Fine PK: 1.81 km^2 Maximum Fine PK Surface Area: 1.43 km^2. Fine PK Surface Area above Post Closure Water Elevation of 420.7 m: 1.29 km^2. No Interference with Waste Rock Placement.	Approximately 30% of excess ice entrainment assumed for Fine PK stored on surface. 42% of Fine PK stored on Surface; 58% in Pits. Total sub-catchment Area: 1.24 km^2, Catchment area where runoff flows over or through Fine PK: 1.07 km^2 Maximum Fine PK Surface Area: 0.71 km^2. Fine PK Surface Area above Post Closure Water Elevation: 0.62 km^2. No Interference with Waste Rock Placement. Limited additional Fine PK storage capacity in Area 2 under the current plan; additional capacity can be obtained by relocating Dyke L towards south to increase the capacity.	Approximately 30% of excess ice entrainment assumed for Fine PK stored on surface. 42% of Fine PK stored on Surface; 58% in Pits. Total sub-catchment Area: 1.0 km^2 Catchment area where runoff flows over or through Fine PK: 0.33 km^2 Maximum Fine PK Surface Area: 0.28 km^2. Fine PK Surface Area above Post Closure Water Elevation: 0.26 km^2. Interference with Waste Rock Placement. Final height of waste rock pile will increase. Additional Fine PK storage capacity can be obtained for the Co-disposal Facility with a larger footprint of the facility or higher crest elevation.	Approximately 30% of excess ice entrainment assumed for Fine PK stored on surface. 42% of Fine PK stored on Surface; 58% in Pits. Total sub-catchment Area: 0.68 km^2 Catchment area where runoff flows over or through Fine PK: 0.36 km^2 Maximum Fine PK Surface Area: 0.33 km^2. Fine PK Surface Area above Post Closure Water Elevation: none. No Interference with Waste Rock Placement. Additional Fine PK storage capacity can be obtained for the On-Land Fine Pk Facility with a higher crest elevation or larger footprint.	Approximately 30% of excess ice entrainment assumed for Fine PK stored on surface. 27% of Fine PK stored on Surface; 73% in Pits. Total sub-catchment Area: 1.24 km^2 Catchment area where runoff flows over or through Fine PK: 0.51km^2 Maximum Fine PK Surface Area: 0.65 km^2. Fine PK Surface Area above Post Closure Water Elevation: 0.44 km^2. No Interference with Waste Rock Placement. Limited additional Fine PK storage capacity in Area 2 under the current plan before Hearne Pit is available for Fine PK disposal; additional capacity can be obtained by depositing fine PK in the center of Area 2 in the way similar to Option 2.

Table A6: Fine PK Disposal Alternatives Characterization, Gahcho Kue, NWT

	Characterization Criteria	Rationale/Concerns	Fine PK Disposal Alternative				
			Option 1-Base Case	Option 2: Area 2 and Pits (5034 and Hearne)	Option 3: Co-disposal with waste rock in Area 5 and Pits (5034 and Hearne)	Option 4: On-Land Fine PK Facility in Areas 1 &4 and Pits (5034 and Hearne)	Option 9: Area 2 and Hearne Pit (early mining of Hearne Pit)
	Water Management and Water Quality	Ideal water management plan would be that water quality meets discharge criteria without treatment, and supernatant water can be managed easily	Long-term P concentration is predicted to be higher than the specific limit. No need to pump water from Lakes A1 and A2 to K5.	Long-term P concentration is expected to be below the specific limit (to be confirmed). Need to raise lakes A1 and A2 and pump water from Lake A1 and A2 to K5. Overall water storage capacity (with annually pumping water from Lake A1 to K5) when compared to Option 1: net gain of 1.1 Mm^3. No water treatment is planned for contact water management. Need to annually pump water from Lake A1 to K5 during mine operation	Long-term P concentration will be below the specific limit (to be confirmed). Need to raise lakes A1 and A2 and pump water from Lake A1 and A2 to K5. Overall water storage capacity (with annually pumping water from Lake A1 to K5) when compared to Option 1: net gain of 5.1 Mm^3. No water treatment is planned for contact water management. Need to annually pump water from Lake A1 to K5 during mine operation	Long-term P concentration will be below the specific limit (to be confirmed). Need to raise lakes A1 and A2 and pump water from Lake A1 and A2 to K5. Overall water storage capacity (with annually pumping water from Lake A1 to K5) when compared to Option 1: net gain of 4.5 Mm^3 Possible longer discharge period during mine operation due to expected better water quality in Areas 3&5; need to pump water collected in the collection pond around the On-land Fine PK Facility to Area 3. No water treatment is planned for contact water management. Need to annually pump water from Lake A1 to K5 during mine operation. Need to pump the supernatant water within the On-Land Fine PK Facility to the Process plant, which might need water treatment plant.	Long-term P concentration will be below the specific limit (to be confirmed). Need to raise lakes A1 and A2 and pump water from Lake A1 and A2 to K5. Overall water storage capacity (with annually pumping water from Lake A1 to K5) when compared to Option 1: net gain of 0.15 Mm^3. No water treatment is planned for contact water management. Need to annually pump water from Lake A1 to K5 during mine operation
	Closure Design and Post Closure Strategy	Ideal closure plan demands less construction material, no need perpetual maintenance, and a true "walk-away" strategy	Sub-aerial Fine PK covered by Coarse PK and Waste Rock No need for long-term monitoring and maintenance	Sub-aerial Fine PK covered by Waste Rock only No need for long-term monitoring and maintenance	Sub-aerial Fine PK covered by Waste Rock only No need for long-term monitoring and maintenance	Sub-aerial Fine PK covered by Waste Rock only Might need long-term monitoring and maintenance until the quality of the seepage water from the facility meets the discharge criteria	Sub-aerial Fine PK covered by Waste Rock only No need for long-term monitoring and maintenance
Environmental Issues	Aquatic Footprint	Larger aquatic footprint means a reduction in carrying capacity of Kennady Lake basin for fish. The number of fish-bearing lakes in the Fine PKC Facility footprint has implications for the severity of impacts to fish.	1 fish-bearing lake - A1	0 fish-bearing lakes only Kennady Lake	0 fish-bearing lakes Lake Ka1 is non fish-bearing	0 fish-bearing lakes Lakes Kb1, Kb2, A8, and A9 are non fish-bearing	0 fish-bearing lakes only Kennady Lake
	Hydrology	The larger the spatial extent of effects (operation and closure), the larger the impacts to hydrology. Large changes to annual water yield, through changes in the configuration of the landscape, means that impacts to hydrology are larger in magnitude.	4 sub-watersheds (A, K, N, and L). 5.4% change in water yeild from baseline.	2 sub-watersheds (K and L). 3.0% change in water yeild from baseline.	2 sub-watersheds (K and L). 0.7% change in water yeild from baseline.	2 sub-watersheds (K and L). 0.9% change in water yeild from baseline.	2 sub-watersheds (K and L). 2.6% change in water yeild from baseline.
	Water Qaulity	Spatial extent of seepage flow from saturated fine PK (operations and closure) has implications for water quality and fish life. Increases in the subaqueous fine PK footprint area and increases in annual seepage flow from saturated fine PK have implication for the risk of substances of potential concern (SOPCs) exceeding thresholds. Impacts are larger if concentrations of total phosphorus are elevated over the long-term in Kennady Lake.	1 Lake receiving seepage from Fine PK, Low to medium level of risk of SOPCs exceeding site specific thresholds. Long-term steady state water chemisty 26 to 30 µg/L.	1 Lake receiving seepage from Fine PK, Low level of risk of SOPCs exceeding site specific thresholds. Long-term steady state water chemisty 16 to 20 µg/L.	1 Lake receiving seepage from Fine PK, Low level of risk of SOPCs exceeding site specific thresholds. Long-term steady state water chemisty 16 to 20 µg/L.	3 Lake receiving seepage from Fine PK, Low level of risk of SOPCs exceeding site specific thresholds. Long-term steady state water chemisty 11 to 15 µg/L.	1 Lake receiving seepage from Fine PK, Low level of risk of SOPCs exceeding site specific thresholds. Long-term steady state water chemisty 16 to 20 µg/L.
Project Economic	Life of Mine	Ideal alternative has less capital cost, and post closrue cost	Capital cost: Base Case Operating cost: Base Case Closure Cost (during operations): Base Case Post Closure Cost: Base Case	Capital cost: More crushing and liner cost; excess water pumping cost (A1 to K5) compared to Base Case ($ +400,000) Operating cost: Additional hualage cost for waste rock in Production year 8, less fine PK pumping cost compared to Base Case ($ +400,000) Closure Cost (during operations): Less volume of waste rock cover required compared to Base Case. Waste rock will be hauled to West waste dump, shorter haul distance ($ -600,000) Post Closure Cost: The same post closure cost as base case	Capital cost: More crushing and liner cost, excess water pumping cost (A1 to K5) ($+16,000,000) Operating cost: Additional hualage cost for waste rock in Production year 8, more fine PK pumping cost due to pumping head difference to Base Case ($+3,000,000) Closure Cost (during operations): Less volume of waste rock cover required compared to Base Case. Waste rock will be hauled to West waste dump, shorter haul distance ($ -2,000,000) Post Closure Cost: The same post closure cost as base case	Capital cost: More crushing, liner, construction fleet cost, one more year of fixed G&A ($+54,000,000) Operating cost: Additional hualage cost for waste rock in Production year 8, more fine PK pumping cost due to pumping head difference to Base Case ($+1,000,000) Closure Cost (during operations Less volume of waste rock cover required compared to Base Case. Waste rock will be hauled to West waste dump, shorter haul distance ($ -1,000,000) Post Closure Cost: Additional monitoring cost for On-Land Facility after closrue ($+1,000,000)	Capital cost: More crushing and liner cost, early mining of Hearne Pit, lower value ore to the mill (NPV@8%) ($+14,000,000) Operating cost: Cost for hauling waste rock from Tuzo to dump due to early mining of Hearne Pit. Less fine PK pumping cost, additional required stripping capacity due to early mining of Hearne Pit. ($+6,000,000) Closure Cost (during operations): Less volume of waste rock cover required compared to Base Case. Waste rock will be hauled to West waste dump, shorter haul distance ($ -1,000,000) Post Closure Cost: The same post closure cost as base case
	Economic Risk	Ideal alternative would have less economic risk and more flexibility for Fine PK production	Contingency Risk (additional Fine PK): There is additional capacity, minimal additional structures required Delay in Pits available for fine PK disposal: 5034 Available if Hearn not available	Contingency Risk (additional Fine PK): Extra Dams or Dykes for extra capacity Delay in Pits available for fine PK disposal: Additional dykes in Area 2 and additional filter dyke required if pits not available	Contingency Risk (additional Fine PK): Larger Footprint Required for additional fine PK Delay in Pits available for fine PK disposal: Additional dyke raises required.	Contingency Risk (additional Fine PK): Higher berms requried for additional fine PK, plus other risks, Fill, excavation,quantities may be greater than available, construction delays, risk of cost excalation Delay in Pits available for fine PK disposal: Additional dyke raises required.	Contingency Risk (additional Fine PK): Extra capacity in Area 2 available if there is additional fine PK Delay in Pits available for fine PK disposal: Need to put more fine PK in area 2 if Hearne delayed some time. Delays less than 1 year require no additional berms.

Table A8: Score System for MAA-Fine PK Disposal Alternatives Assessment at Gahcho Kue, NWT

Account	Sub-account	Rationale/ Concerns	Potential indicators	Score						Note
				6.0 (Best)	5	4	3	2	1.0 (Worst)	
Technical Issue	Dyke Constructability and Complexity	Alternatives that require large, long, complex dyke implied possible construction difficulties and greater risk of failure	Total Dyke Length (km)	< 1.0 km	1.0 k m to 1.5 km	1.5 km to 2.0 km	2.0 km to 2.5 km	2.5 km to 3.0 km	>3.0 km	
			Maximum Dyke Height (m)	< 5 m	5 m to 10 m	10 m to 15 m	15 m to 20 m	20 m to 25 m	> 25 m	
			Number of Independent Dykes (#)	0	< 2	2 and 4	4 and 6	6 and 8	> 8	
			Foundation Condition	Good site condition	-	-	-	-	Very poor site conditions	Unforeseen geotechnical condition may require design modification, pose more risks and challenges
			Construction Complexity	No dyke	Very low complexity	Low complexity	Moderate complexity	High complexity	Very high complexity	complex construction may be delayed due to the weather condition, more difficult in material placement, may require additional equipment and labour
			Availability of Suitable Construction Material	Totally available on site, no processing required	Some processing required	Moderate processing required	Significant processing required	Significant processing and some off site materail required	Not available need to ship to site	This includes crushing material, overburden material, and geosynthetics material
			Permafrost Effects	No reliance on permafrost	-	-	-	-	Fully rely on permafrost	Relying on permafrost to minimize seepage poses more challenges
	Dyke Design and Performance	Complex design poses more risk of failure and more technical challenges	Design Complexity	Very low	Low	Low to medium	Medium to high	High	Very high	Complex design poses more risks of failure and more technical challenges
			Design Precedents	Common design-good experience	-	-	-	-	New design-no precedent	Alternatives that have design precedent in arctic region are more reliable and predictable
			Non Performance Risk and Consequences	Very low level	Low level	Low to medium	Medium to High	High	Very high	This includes the risk to local environment and population if failure occurs
	Diversion Structure Requirement and Reliability	More supporting structures require more disturbance area, and pose more risk on water management	Total Length of Diversion Structure (km)	0 km	0 km to 1 km	1 km to 2 km	2 km to 3 km	3km to 4 km	>4 km	i.e. Total diversion footprint
			Constructability	No construction	-	-	-	-	Very difficult	This includes overburden excavation and bedrock blasting
			Maintenance Difficulty	Very easy	-	-	-	-	Very frequent	Maintenance for erosion and blocking
			Non Performance Risk and Consequence	Very low level	Low level	Low to medium	Medium to high	High	Very high	This includes the risk to water management if blocking or erosion occurs
	Fine PK Delivery and Deposition System	Complex delivery and deposition system pose more risk to operations such freezing, operation delay, and maintenance	Fine PK Pumping Distance (km)	< 1.0 km	1.0 km to 2.0 km	2.0 km to 3.0 km	3.0 km to 4.0 km	4.0 km to 5.0 km	> 5.0 km	The pumping distance is from mill to fine PK discharge point
			Maximum Pumping Head (m)	< 10 m	10 m to 20 m	20 m to 30 m	30 m to 40 m	40 m to 50 m	> 50 m	Pumping head is the elevation different between mill location and fine PK discharge point. Higher pumping head may requier more pumping stations
			Fine PK Deposition Flexibility and Reliability	Very high level	-	-	-	-	Very low level	i.e. relocating the discharge location including pipeline over time
			Precedent of Disposal System	Very common disposal method	-	-	-	-	New disposal method	i.e. slurry depostion, dry stacked, co-disposal with waste rock, or underground backfilling
			Pipe freezing risk	No freezing risk	-	-	-	-	High level risk	i.e. depending on the total distance of the pumping pipeline
			Failure Risk and Consequence	Very low level	Low level	Low to medium	Medium to High	High	Very high	This includes the risk to the fish habitat, mining operation,and population

Table A8: Score System for MAA-Fine PK Disposal Alternatives Assessment at Gahcho Kue, NWT

Account	Sub-account	Rationale/ Concerns	Potential indicators	Score						Note
				6.0 (Best)	5	4	3	2	1.0 (Worst)	
	Auxiliary structures for Fine PK Deposition	More supporting structures pose more construction difficulties and technical challenges	Length of Discharge Berm (km)	< 0.5 km	0.5 km to 1 km	1.0 km to 1.5 km	1.5 km to 2.0 km	2.0 km to 2.5 km	> 2.5 km	Longer discharge berm required more construction and has less flexibility
			Volume of Discharge Berm (m^3)	< 0.1 Mm^3	0.1 Mm^3 and 0.2 Mm^3	0.1 Mm^3 and 0.2 Mm^3	0.3 Mm^3 and 0.4 Mm^3	0.4 Mm^3 and 0.5 Mm^3	> 0.5 Mm^3	Total volumes of waste rock require for discharge berm
			Flexibility of Discharge Berm	Very high level	-	-	-	-	Very low level	i.e. stage construction or relocating discharge berm
			Length of Access Road (km)	< 2.0 km	2.0 km to 4.0 km	4.0 km to 6.0 km	6.0 km to 8.0 km	5.0 km to 10 km	> 10 km	The total length of access road from process plant to fine PK discharge area
			Maintenance	No Maintenance	-	-	-	-	Very frequent and costly	
	Fine PK Impoundment	Alternatives that have more flexibility, smaller footprint would be significantly more feasible and reliable, less environmental impact, and ease for water management. Less volume of fine PK on surface are desirable.	Fine PK Density	High	-	-	-	-	Low	
			Ice Incorporation	No Ice	Low	Low to medium	Medium to High	High	Significant Ice	Formation of ice in Fine PK may impact the water management and performance of filter dykes
			Ratio of Volume of Fine PK Stored on Surface to Volume of Fine PK in Pits (%)	< 20% on surface	20% to 40% on surface	40% to 60% on surface	60% to 80% on surface	80% to 100% on surface	100% on surface	More fine PK disposted on surface poses more risks to local environment and difficulties on water management
			Expandability for additional fine PK	Expansion capacity meets upper bound requirement	-	Expansion capacity, but additional structure required	-	Additional alternative disposal area required for expansion	No expansion capacity	Potential for the increased fine PK production
			Interference with Waste Rock Placement	No interference	-	-	-	-	Completely restricted WR Placement	More construction difficulties and risks if interference
	Water Management and Quality	Ideal water management plan: water quality meets discharge criteria without treatment, and easily manages supernatant water	Total Catchment Area of fine PK Area (km^2)	< 1.0 km^2	1 km^2 and 1.5 km^2	1.5 km^2 and 2.0 km^2	2.0 km^2 and 2.5 km^2	2.5 km^2 and 3.0 km^2	> 3.0 km^2	larger catchment area pose more difficulties on water management
			Minimum Excess Water Storage Capacity compared to Base Case (Mm^3)	> 6 Mm^3	3 Mm^3 and 6 Mm^3	3 Mm^3 and 0 Mm^3	0 Mm^3 and -3 Mm^3	-3 Mm^3 and -6 Mm^3	< -6 Mm^3	More excess water storage capacity, easier water management
			Pumping Requirement	No pumping	-	-	-	-	Very high level pumping requirement	i.e. Pumping for supernatant water, and clean water from Lake A1 for discharge
			Ease of Supernatant water management	Very easy	Easy	Easy to medium	Medium to difficult	Difficult	Very difficult	i.e. seepage water, supernatant water
			Extra Requirement for relcaim	No treatment	-	-	-	-	High level requirement for treatment	i.e. reclaim supernatant water to process plant
	Closure Design and Post Closure Strategy	Ideal closure plan demands less construction material, no need perpetual maintenance, and a true "walk-away" strategy	Precedent of Closure Design	Very common closure design	-	-	-	-	Brand new closure deign	
			Long-term Monitoring and Maintenance	No requirement	-	-	-	-	High level requirement	i.e. water quality, faclity stability and erosion
			Ease of Closure of Water Management	Very easy	Easy	Easy to medium	Medium to difficult	Difficult	Very difficult	i.e. Seepage water through fine PK and foundation

Table A8: Score System for MAA-Fine PK Disposal Alternatives Assessment at Gahcho Kue, NWT

Account	Sub-account	Rationale/ Concerns	Potential indicators	Score						Note
				6.0 (Best)	5	4	3	2	1.0 (Worst)	
Environmental Issue	Aquatic Footprint	Alternatives with smaller aquatic footprint area, and affecting fewer lakes are more desirable	Aquatic footprint area (% of Kennady Lake Watershed)	less than 1%	1 to 5%	5.1 to 10%	10.1 to 20%	20.1 to 30%	higher than 30%	
			Number of fish-bearing lakes in the Fine PKC Facility footprint (excluding Kennady Lake)	0	1	2	3	4	more than 4	
			Species diversity in fish-bearing lakes affected	0 to 2	3 to 4	5 to 6	7 to 8	9 to 10	11	indicator of the value of aquatic life affected by the option (excludes Kennady Lake) - species numbers to be confirmed
			Number of lakes receiving elevated dust emissions that could negatively affect aquatic habitat quality	less than 20	20 to 29	30 to 39	40 to 49	50 to 59	60 or more	
	Hydrology	Alternatives with fewer/less complex configurations are more desirable	Number of sub-watersheds affected (excluding Kennady Lake)	0	1	2	3	4	5	
			Long term change in hydrological regime (mean annual water yield and mean annual discharge) relative to baseline (%)	less than 1%	1 to 5%	5.1 to 10%	10.1 to 15%	15.1 to 20%	more than 20%	
	Water Quality	Alternatives that reduce geochemical loadings from the Fine PKC Facility are more desirable	Number of lakes receiving runoff or seepage from the Fine PKC Facility (operations and closure)	0	1	2	3	4	5	
			Risk of SOPCs exceeding site-specific thresholds or guidelines	Very low	Low	Low to medium	Medium to high	High	Very high	
			Maximum potential long-term steady state total phosphorous concentration in Kennady Lake (ug/L) (in the absense of permafrost)	0 to 10	11 to 15	16 to 20	21 to 25	26 to 30	higher than 30	
Project Economic	Life of Mine	Ideal alternatives would have less capital cost, provide positive economic.	Capital Cost	< 5 Million of Base Case	$-5 to 5 million	$5 to 15 million	$15 to 25 million	$25 TO 50 million	> $50 million	Compare to Base Case
			Operating Cost	< 5 Million of Base Case	$-5 to 5 million	$5 to 15 million	$15 to 25 million	$25 TO 50 million	> $50 million	Compare to Base Case
			Closure Cost (during operation)	< 5 Million of Base Case	$-5 to 5 million	$5 to 15 million	$15 to 25 million	$25 TO 50 million	> $50 million	Compare to Base Case
			Post Closure Cost	< 5 Million of Base Case	$-5 to 5 million	$5 to 15 million	$15 to 25 million	$25 TO 50 million	> $50 million	Compare to Base Case
	Economic Risk	Ideal alternatives would have less ecnomic risk and more flexibility for additional fine PK Production	Contingency Risk (Additional fine PK)	< 5 Million of Base Case	$-5 to 5 million	$5 to 15 million	$15 to 25 million	$25 TO 50 million	> $50 million	Compare to Base Case
			Delay in pits available for fine PK disposal	< 5 Million of Base Case	$-5 to 5 million	$5 to 15 million	$15 to 25 million	$25 TO 50 million	> $50 million	Compare to Base Case

Table A9: Multiple Accounts Analysis (MAA) For Fine PK Disposal Alternatives Assessment, Gahcho Kue, NWT

ACCOUNTS	Weight	SUB-ACCOUNTS	Weight	INDICATORS	Weight	Option 1 Base Case	Option 2 Area 2 and Pits (5034 and Hearne)	Option 3 Co-disposal with Wast Rock in Area 5 and Pits (5034 and Hearne)	Option 4 On-Land Fine PK Facility in Areas 1&4 and Pits (5034 and Hearne)	Option 9 Area 2 and Hearne Pit (early mining of Hearne Pit)	Note
Technical Issues	3	Dyke Constructability and Complexity	5	Total Dyke Length	4	3.0	3.0	1.0	1.0	3.0	Long ring dyke requires for options 3 and 4
				Maximum Dyke Height	5	4.0	4.0	1.0	1.0	4.0	Maximum height of dyke for options 3 and 4 ranging 30 m to 40 m
				Number of Independent Dykes	2	3.0	4.0	4.0	4.0	4.0	Dykes A3 and N10 not require except for option 1
				Foundation Condition	4	4.0	4.0	3.0	3.0	4.0	40% of footprint for Co-disposal facility in Lake; Peat bogs, small lake, and shallow taliks appear within On-land Facility footprint
				Construction Complexity	5	4.0	4.0	3.0	2.0	4.0	Liner makes construction more complex
				Availability of Suitable Construction Material	3	5.0	5.0	3.0	2.0	5.0	Need liner and crush material for Options 3 and 4
				Permafrost Effects	3	5.0	5.0	5.0	3.0	5.0	Option 4 relying on permafrost to minimize seepage
		sub-account score				4.00	4.08	2.62	2.08	4.08	
		Dyke Design and Performance	5	Design Complexity	3	4.0	4.0	4.0	3.0	4.0	Liner and permafrost effects make design more complex for Option 4.
				Design Precedents	4	6.0	6.0	2.0	4.0	6.0	Few design example for Option 3 Co-disposal
				Non Performance Risk and Consequences	5	5.0	5.0	3.0	3.0	5.0	Risk - Option 3 Co disposal dyke freezing, Option 3 and 4 On-Land high consequence risk
		sub-account score				5.08	5.08	2.92	3.33	5.08	
		Diversion Structure Requirement and Reliability	2	Total Length of Diversion Structure	2	6.0	6.0	6.0	4.0	6.0	Diversions only required for Option 4
				Constructability	4	6.0	6.0	6.0	5.0	6.0	
				Maintenance Difficulty	3	6.0	6.0	6.0	4.0	6.0	
		sub-account score				6.00	6.00	6.00	4.44	6.00	
		Fine PK Delivery and Deposition System	3	Fine PK Pumping Distance	5	3.0	2.0	3.0	4.0	3.0	Opiton 2 requires longer pumping pipeline
				Maximum Pumping Head	3	6.0	6.0	3.0	3.0	6.0	Higher pumping head for Options 3 and 4
				Fine PK Deposition Flexibility and Reliability	3	6.0	5.0	5.0	5.0	6.0	
				Precedent of Disposal System	5	6.0	6.0	5.0	6.0	6.0	Co-disposal few example in arctic region
				Pipe freezing risk	3	5.0	4.0	5.0	5.0	6.0	Longer pumping pipeline; higher risk
				Non Performance Risk and Consequence	4	5.0	3.0	3.0	3.0	3.0	Higher consequence if pipeline breaks next to A1, or Area 5
		sub-account score				5.04	4.22	3.96	4.39	4.83	
		Auxiliary structures for Fine PK Deposition	1	Length of Discharge Berm	2	2.0	5.0	6.0	6.0	4.0	Longer discharge berm requires for option 1
				Volume of Discharge Berm	3	3.0	3.0	6.0	6.0	6.0	
				Flexibility of Discharge Berm	4	4.0	4.0	5.0	5.0	4.0	Stage construction of discharge berms requires for Options 1, 2, and 9. No additional discharge berm requires for Options 3 and 4
				Length of Access Road	2	4.0	4.0	5.0	5.0	4.0	Shorter access road for Options 3 and 4
				Maintenance	3	5.0	5.0	6.0	6.0	5.0	
		sub-account score				3.71	4.14	5.57	5.57	4.64	
		Fine PK Impoundment	4	Fine PK Density	1	6.0	6.0	6.0	6.0	6.0	
				Ice Incorporation	3	4.0	4.0	3.0	3.0	4.0	Ice formation poses more risk and challenges to water management for Options 3 and 4
				Ratio of Volume of Fine PK Stored on Surface to Volume of Fine PK in Pits	3	3.0	4.0	4.0	4.0	5.0	More fine PK deposits on surface for Option 1 (i.e. 70%)
				Expandability for additional fine PK	5	5.0	2.0	3.0	3.0	6.0	Require raising berm for additional fine PK. More difficulties and challenges for Option 2
				Interference with Waste Rock Placement	3	6.0	6.0	4.0	6.0	6.0	Co-disposal interference with waste rock placement.
		sub-account score				4.67	3.87	3.60	4.00	5.40	

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ACCOUNTS	Weight	SUB-ACCOUNTS	Weight	INDICATORS	Weight	Option 1 Base Case	Option 2 Area 2 and Pits (5034 and Hearne)	Option 3 Co-disposal with Wast Rock in Area 5 and Pits (5034 and Hearne)	Option 4 On-Land Fine PK Facility in Areas 1&4 and Pits (5034 and Hearne)	Option 9 Area 2 and Hearne Pit (early mining of Hearne Pit)	Note
		Water Management	4	Total Catchment Area of fine PK Area	2	2.0	5.0	5.0	6.0	5.0	Total catchment area of fine PK includes Lake A1 for Option 1
				Minimum Excess Water Storage Capacity Compared to Base Case	5	4.0	4.0	5.0	5.0	4.0	More water storage capacity for Options 3 and 4 (Area 2 is not occupied by fine PK)
				Pumping Requirement	2	6.0	3.0	3.0	3.0	3.0	A1 Pumping to K5
				Ease of Supernatant water management	5	5.0	5.0	3.0	2.0	5.0	Difficult to manage water from Option 4 On Land
				Extra Requirements for Reclaim	4	6.0	6.0	6.0	4.0	6.0	Second reclaim for On-Land, and possible treatment for Option 4
		sub-account score				4.72	4.72	4.44	3.83	4.72	
		Closure Design and Post Closure Strategy	4	Precedent of Closure Design	5	5.0	5.0	4.0	5.0	5.0	
				Long-term Monitoring and Maintenance	4	5.0	5.0	5.0	4.0	5.0	On-Land requires long-term monitoring after closure.
				Ease of Closure of Water Management	5	5.0	5.0	5.0	4.0	5.0	On-Land requires managing water after closure until meets discharge criteria
		sub-account score				5.00	5.00	4.64	4.36	5.00	
TECHNICAL ISSUES ACCOUNT SCORE						4.78	4.61	3.85	3.69	4.91	
Environmental Issues	5	Aquatic Footprint	5	Number of fish-bearing lakes in the fine PKC Facility footprint (excluding Kennady Lake)	4	5	6	6	6	6	
				Number of lakes receiving elevated dust emissions that could negatively affect aquatic habitat	1	2	2	3	2	2	
		sub-account score				4.40	5.20	5.40	5.20	5.20	
		Hydrology	2	Number of sub-watersheds affected (excluding Kennady Lake)	4	2	4	4	4	4	
				Long term change in hydrological regime (mean annual water yield and mean annual discharge) relative to baseline (%)	3	4	5	6	6	5	
		sub-account score				2.86	4.43	4.86	4.86	4.43	
		Water Quality	5	Number of lakes receiving runoff or seepage (operations and closure)	3	5	5	5	3	5	
				Risk of SOPCs exceeding site-specific thresholds or guidelines	5	4	5	5	5	5	
				Maximum potential long-term steady state WQ in Kennady Lake (TP concentrations) (in the absence of permafrost)	3	2	4	4	5	4	
		sub-account score				3.73	4.73	4.73	4.45	4.73	
ENVIRONMENTAL ISSUES ACCOUNT SCORE						3.86	4.87	5.03	4.83	4.87	

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ACCOUNTS	Weight	SUB-ACCOUNTS	Weight	INDICATORS	Weight	Option 1 Base Case	Option 2 Area 2 and Pits (5034 and Hearne)	Option 3 Co-disposal with Wast Rock in Area 5 and Pits (5034 and Hearne)	Option 4 On-Land Fine PK Facility in Areas 1&4 and Pits (5034 and Hearne)	Option 9 Area 2 and Hearne Pit (early mining of Hearne Pit)	Note
Economic	2	Life of Mine	5	Capital Cost	5	5.0	5.0	3.0	1.0	4.0	Option 4: More crushing, liner, construction fleet cost, one more year of fixed G&A
				Operating and Closure Cost	3	5.0	5.0	5.0	5.0	4.0	Option 9: More cost for hauling waste rock from Tuzo to Dump, additional required stripping capacity due to to early mining of Hearne Pit
				Closure Cost (during opertions)	2	5.0	5.0	5.0	5.0	5.0	
				Post Closure Cost	2	5.0	5.0	5.0	5.0	5.0	Post Cost - based on NPV first day of monitoring
		sub-account score		Weighted Average		5.00	5.00	4.17	3.33	4.33	
		sub-account score		Based on Total Cost		5.00	5.00	3.00	1.00	3.00	
		Econmic Risk	3	Contingency Risk (Additional fine PK)	2	6.0	2.0	3.0	2.0	6.0	Additional dyke and/or raise the berm required for options 2, 3, and 4
				Delay in pits available for fine PK disposal	3	6.0	4.0	4.0	4.0	5.0	
		sub-account score		Weighted Average		6.00	3.20	3.60	3.20	5.40	
ECONOMIC ACCOUNT SCORE - Based on total score						5.4	4.3	3.2	1.8	3.9	
OVERALL SCORE						4.4	4.7	4.3	3.9	4.7	