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VOLUME 11.0 - CONCLUSIONS

Final Environmental Impact Statement (FEIS) – Meliadine Gold Project, Nunavut

REPORT



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EXECUTIVE SUMMARY

Volume 11 Conclusions of the Final Environmental Impact Statement (FEIS) for the Agnico Eagle Mines Limited (AEM) Meliadine Gold Project (the Project) summarizes the potential residual impacts, cumulative effects, transboundary effects, adaptive management strategies and conclusions of the impact assessment for the Project. This volume is intended as a high level summary of information presented in further detail throughout the FEIS, and mainly in Volumes 5 through 10.

Significant Residual Impacts

Potential significant residual impacts were identified solely within the socio-economic environment. Both positive and negative residual impacts were identified. While it is generally accepted that a project will have some negative socio-economic impacts on at least some people, it is also recognized that all elements of economic, social and cultural life integrate and contribute to overall individual, family and community quality of life. Overall, community level effects are expected to be positive, and both Inuit and non-Inuit will benefit. The most potentially negative impact at the individual and family level is rooted in the challenges of transitioning to the wage economy and in existing socio-economic health and education conditions for Inuit.

Non-significant Residual Impacts

Potential non-significant residual impacts from the Project were identified for the following valued components:

- Air Quality (mine site and All-weather Access Road only);
- Noise;
- Vegetation (including soil and terrain);
- Wildlife and Wildlife Habitat;
- Birds and Bird Habitat;
- Fish and Fish Habitat;
- Marine;
- Socio-Economics (Traditional Activities and Knowledge, Community Infrastructure and Public Services, and Non-Traditional Land Use only); and
- Environmental and Human Risk.

Cumulative Effects

Cumulative effects represent the sum of all natural and human-induced influences on the physical, biological, social, and economic components of the environment through time and across space. Some changes may be human-related, such as increasing industrial development, and some changes may be associated with natural phenomenon, such as extreme rainfall events, and periodic harsh and mild winters. The cumulative effects assessment is used to estimate the contribution of these types of effects, in addition to Project effects, on valued biophysical and socio-economic components.

Potential cumulative effects from previous, existing, and future developments including the Project were identified for the terrestrial, marine and socio-economic environments only. Terrestrial components with potential cumulative effects included Vegetation; Terrestrial Wildlife and Wildlife Habitat; and Bird and Bird Habitat.



Potential cumulative effects were also identified for marine water quality; marine fish and fish habitat; and marine mammals and birds. The socio-economic components with potential cumulative effects included Population Demographics; Traditional Activities and Knowledge; Economic Development and Opportunities; Education and Training; Individual, Family, and Community Wellbeing; Community Infrastructure and Public Services; Governance and Leadership; and Public and Worker Health and Safety.

Transboundary Effects

Transboundary effects are defined as effects from the Project that could extend outside of the Nunavut Territory. It is recognized that for select socio-economic parameters, there is some potential for transboundary effects related to the Project. These include potential economic benefits in the form of provincial and federal taxes, and employment, business and contracting opportunities not filled by Nunavummiut.

Marine shipping associated with the Project also has the potential for transboundary effects. Potential transboundary effects to marine water quality, fish and fish habitat, mammals and/or birds include accidental spills, underwater and in-air noise, and vessel strikes. The potential residual impacts of these effects were determined to be not significant.

Adaptive Management

The Environmental Management and Protection Plan (EMPP) describes the overarching direction for environmental and socio-economic management for the Project, and is supported by the suite of Project-specific mitigation, monitoring and/or management plans included in the FEIS.

The EMPP and associated plans describe the Project's standards and requirements for particular areas of environmental and socio-economic management. Each individual plan assesses the likely effectiveness of mitigation measures and associated follow-up mechanisms for adaptive management. The plans also outline how results from monitoring will be used to refine or modify the design and implementation of mitigation measures and management plans.

The EMPP and associated plans will be administered through an Environmental Management System to ensure that the conditions set at the time of the Project's authorization and requirements pertaining to the relevant laws, regulations and permits are met. Implementation of the EMS will allow adaptive management decisions to be made on an ongoing basis, and will lead to improvements to the environmental and socio-economic management system as necessary over time.

Conclusion

Agnico Eagle Mines Limited has prepared this FEIS to conform to the Guidelines for the Preparation of an Environmental Impact Statement provided by the Nunavut Impact Review Board. The FEIS provides a detailed evaluation of the potential biophysical and socio-economic effects of the Project, and includes extensive baseline data characterizing the Project area. It also provides descriptions of Project design features and mitigations, and management and monitoring plans that will be implemented to remove, minimize and monitor for potential adverse effects in the Project area.

AEM is committed to protect the environment, public health and safety, and natural resources by conducting operations in an environmentally sound manner while pursuing continuous improvement of our environmental performance. AEM adopted a precautionary approach in the preparation of the Project design and this FEIS. Sustainable development of the Project will contribute to the economic development of Nunavut in ways that



support self-reliant communities with reduced dependence on government without a compromise to the health of the people or the land. Through the creation of stable private sector employment, the Project will also contribute to a better standard of living for the residents of the region, thereby supporting the vision and goals of Inuit Beneficiaries of Nunavut, and for a more self-reliant Nunavut for all Nunavummiut.

Abbreviation and Acronym List

AEM	Agnico Eagle Mines Limited
AWAR	All-weather Access Road
FEIS	Final Environmental Impact Statement
EMPP	Environmental Management and Protection Plan
EMS	Environmental Management System
Golder	Golder Associates Ltd.
LSA	Local study area
n/a	Not applicable or not assessed
NIRB	Nunavut Impact Review Board
Project	Meliadine Gold Project
RSA	Regional study area
VC	Valued component



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11.0 CONCLUSIONS

Volume 11 of the Final Environmental Impact Statement (FEIS) for the Agnico Eagle Mines Limited (AEM) Meliadine Gold Project (the Project) summarizes the potential residual impacts, cumulative effects, transboundary effects, adaptive management strategies, and conclusions of the impact assessment for the Project. This volume is intended as a high level summary of information presented in further detail throughout the FEIS, mainly in Volumes 5 through 10.

The purpose of this Volume is to address the Guidelines issued by the Nunavut Impact Review Board (NIRB) for the Project (NIRB 2012), and specifically those relating to the FEIS Conclusions. The complete Guidelines for the Project, including FEIS section and page number referencing, are summarized in the main FEIS concordance table (FEIS Volume 1, Appendix 1.0-A).

11.1 Summary of Residual Impacts

As detailed in FEIS Volume 4, the approaches and methods for assessing potential effects from the Project on the biophysical and socio-economic environments include pathway analyses, effects analysis, and residual impact classification and significance.

Pathway analyses are used to identify and assess the linkages between Project components or activities and potential residual effects (i.e., effects after mitigation) to valued ecosystem or socio-economic components. Pathways are determined to be primary, minor, or as having no linkage using scientific and traditional knowledge, logic, and experience with similar developments and environmental design features.

Pathways with no linkage or that are considered minor are not predicted to result in environmentally significant effects and are not analyzed further. Alternatively, primary pathways undergo further effects analysis to determine the potential environmental significance of the residual effects on valued components (VCs). Effects statements are used to focus the analysis of changes to VCs that are associated with one or more pathways.

The residual impact classification describes the residual effects from the Project on VCs using a scale of common words rather than numbers and units. The use of common words or criteria is accepted practice in environmental assessment and follows those suggested in the Guidelines for the Project (NIRB 2012). The following criteria were used in the FEIS to assess the residual impacts from the Project:

- direction or nature of the impacts;
- magnitude (and complexity);
- geographic extent;
- duration;
- frequency;
- reversibility; and
- likelihood or probability of effects.

It should be noted that not all of the above criteria were applicable or necessarily used in the assessment of each residual impact.



Results from the effects analysis and residual impact classification of primary pathways were used in the evaluation of the significance of residual impacts from the Project on VCs.

11.1.1 Significant Residual Impacts

Table 11-1 summarizes the potential significant residual impacts of the Project on VCs. Potential significant residual impacts were identified solely within the socio-economic environment (FEIS Volume 9). Both positive and negative residual impacts were identified. While it is generally accepted that a project will have some negative socio-economic impacts on at least some people, it is also recognized that all elements of economic, social and cultural life integrate and contribute to overall individual, family and community quality of life. Overall, community level effects are expected to be positive, and both Inuit and non-Inuit will benefit. The most potentially negative impact at the individual and family level is rooted in the challenges of transitioning to the wage economy and in existing socio-economic health and education conditions for Inuit.

11.1.2 Non-significant Residual Impacts

Tables 11-1 to 11-6 summarize the potential non-significant residual impacts of the Project. It should be noted that the following components were found to have no or negligible residual impacts; hence, information for these is not presented in the following summary tables:

- Permafrost and Permafrost Terrain;
- Population Demographics;
- Cultural Archaeological and Paleontological Resources;
- Air Quality – Emissions – Rankin Inlet and Marine Shipping;
- Climate and Meteorology;
- Greenhouse Gases and Climate Change; and
- Hydrogeology and Groundwater.

The potential residual impacts of the Project on the following components were addressed under other related components as indicated; hence, information for these is also not presented in the following summary tables:

- Soil and Terrain was presented in the Hydrology, Vegetation, and Wildlife Habitat sections; and
- Surface Water and Sediment Quality was presented in the Fish and Fish Habitat, and Environmental Risk Assessment sections.



Table 11-1: Summary of the Projected Significant Residual Impacts of the Project on the Socio-Economic Environment

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance ¹
Traditional Activities and Knowledge: Traditional Harvesting	Project employment may increase time and resources available for harvesting nutritious country foods.	Positive	Moderate	Local	Medium-term	n/a	n/a	n/a	Moderate
Traditional Activities and Knowledge: Traditional Harvesting	Project may contribute to weakening of traditional culture.	Negative	High	Local	Long-term	n/a	n/a	n/a	Moderate
Traditional Activities and Knowledge: Traditional Harvesting	Perceptions of Project effects may lead to mental stress and changes in behaviour (i.e., diet).	Negative	Moderate	Local	Long-term	n/a	n/a	n/a	Low
Traditional Activities and Knowledge: Land Use and Mobility	Project impacts on use of culturally important areas.	Negative	Negligible to moderate	Regional	Long-term	Continuous	Reversible/ Irreversible	Highly Likely	Low
Traditional Activities and Knowledge: Land Use and Mobility	Project impacts on access to land use areas.	Positive	Moderate	Regional	Long-term	Continuous	Reversible/ Irreversible	Highly Likely	Moderate
Traditional Activities and Knowledge: Food Security	Perceptions of Project effects may lead to mental stress and changes in behaviour (i.e., diet).	Negative	Moderate	Local	Long-term	n/a	n/a	n/a	Low

¹ Assigning significance to socio-economic effects is dependent on the valued component (VC). For Socio-Economic VCs wherein effects are tangible and measureable (i.e., economic development and opportunities, education and training levels, community infrastructure and public services, and governance and leadership as a function of revenues, demand on services and regulatory capacity), significance is assigned on a 'significant – not significant' basis. For less tangible, more subjective VCs (i.e., traditional activities and knowledge and individual family and community wellbeing), all effects resulting in change are considered to be significant as they have the potential to alter the life of an individual or socio-cultural composition of a community. These effects are highly nuanced, and so are qualitatively assessed to have a low, moderate or high significance. Please refer to section 9.1.9 *Determination of Significance* for more information regarding the methods used to determine significance and in the prediction confidence for socio-economic assessment.



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Table 11-1: Summary of the Projected Significant Residual Impacts of the Project on the Socio-Economic Environment (continued)

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance ¹
Economic Development and Opportunities: Employment	Project would increase the demand for labour during construction and operational phases, which should lead to a considerable number of local jobs.	Positive	High	Local and Regional	Long-term	n/a	n/a	n/a	Significant
Economic Development and Opportunities: Gross Domestic Product and Economic Growth	Investment and expenditures of Project would temporarily expand the “size” of the economies of Nunavut and the Kivalliq region. Total effects during construction might be \$520 million. The annual effect during operations might be \$272 million.	Positive, although ramping down of the Project might result in negative effects	High	Local and Regional	Long-term	n/a	n/a	n/a	Significant
Economic Development and Opportunities: Investment	Expenditure would add to the economic activity in Nunavut, including investment.	Positive	Moderate	Mostly Local	Long-term	n/a	n/a	n/a	Significant
Economic Development and Opportunities: Government Fiscal Situation	Project would increase public revenues, e.g. through taxes and royalties. Total tax effects during construction might be \$27 million. The annual tax effect during operations might be \$21 million.	Positive	High	Regional	Long-term	n/a	n/a	n/a	Significant
Economic Development and Opportunities: Business Opportunities and Contracting	Project spending on goods and services would increase the demand locally, allowing local businesses (and new businesses) to grow and become more cost-effective.	Positive	High	Mostly Local	Long-term	n/a	n/a	n/a	Significant
Economic Development and Opportunities:	Project would increase demand for goods and services, which should lead	Positive and/or Negative	Moderate	Mostly Local	Long-term	n/a	n/a	n/a	Significant



MELIADINE FEIS – VOLUME 11 CONCLUSIONS

Table 11-1: Summary of the Projected Significant Residual Impacts of the Project on the Socio-Economic Environment (continued)

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance ¹
Economic Development	to growth in several sectors. Mining activities might also conflict with interests of other sectors (e.g. tourism and hunting) and elevate costs through increased demand for resources (e.g. labour).								
Economic Development and Opportunities: Income	Project would directly and indirectly contribute to disposable income of employees and other local people.	Positive	Moderate	Mostly Local, but a spill-over effect to Region	Long-term	n/a	n/a	n/a	Significant
Education and Training	Education achievement, drop- out rates, school attendance.	Positive	High	Local	Long-term, benefits will last longer	n/a	n/a	High	Significant
Education and Training	Available training in existing education system.	Positive	High	Local and Region	Long-term, benefits will last longer	n/a	n/a	High	Significant
Education and Training	Capacities of existing education system.	Positive	Medium	Local and Region	Long-term, benefits will last longer	n/a	n/a	High	Significant
Education and Training	Funding of existing education system.	Positive	Medium	Local and Region	Long-term	n/a	n/a	High	Significant
Education and Training	Education and skill levels of local labour force.	Positive	High	Local	Long-term, benefits will last longer	n/a	n/a	High	Significant
Education and Training	Retention of school teachers.	Positive	Low	Local	Long-term	n/a	n/a	Medium	Significant



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Table 11-1: Summary of the Projected Significant Residual Impacts of the Project on the Socio-Economic Environment (continued)

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance ¹
Individual, Family, and Community Wellbeing: Physical and Mental Health	Project may induce in-migration to Rankin Inlet leading to overcrowding of housing and detrimental public health effects.	Negative	Moderate	Local	Long-term	n/a	n/a	n/a	Moderate
Individual, Family, and Community Wellbeing: Housing	Long-term Project employment may enable people to rent/purchase private housing.	Positive	Low	Local	Medium-Term	n/a	n/a	n/a	Low
Individual, Family, and Community Wellbeing: Nutrition	Project employment may increase time and resources available for harvesting nutritious country foods.	Positive	Moderate	Local	Medium-term	n/a	n/a	n/a	Moderate
Individual, Family, and Community Wellbeing: Nutrition	Increased incomes from direct, indirect and induced Project employment may lead to changes in diet.	Positive and Negative	Low to Moderate	Local	Long-term	n/a	n/a	n/a	Low
Individual, Family, and Community Wellbeing: Substance Abuse	Increased incomes from direct, indirect and induced Project employment may lead to increased substance abuse.	Negative	High	Local	Long-term	n/a	n/a	n/a	Moderate to High
Individual, Family, and Community Wellbeing: Substance Abuse / Crime	Increased incomes from direct, indirect and induced Project employment may lead to illegal behaviours.	Negative	High	Local	Long-term	n/a	n/a	n/a	Moderate to High
Individual, Family, and Community Wellbeing: Sexually Transmitted Infections	Project induced in-migration may result in higher levels of sexually transmitted infections (such as HIV) in the region.	Negative	High	Regional	Long-term	n/a	n/a	n/a	Moderate to High



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Table 11-1: Summary of the Projected Significant Residual Impacts of the Project on the Socio-Economic Environment (continued)

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance ¹
Individual, Family, and Community Wellbeing: Safety	Project health and safety training may improve health and safety at mine site and outside of the workplace.	Positive	Moderate	Local	Long-term	n/a	n/a	n/a	Moderate
Individual, Family, and Community Wellbeing : Safety – Perceptions of Harm	Perceptions of Project effects may lead to mental stress and changes in behaviour (i.e., diet).	Negative	Moderate	Local	Long-term	n/a	n/a	n/a	Low
Individual, Family, and Community Wellbeing: Accidents - Traffic	A higher number of Project vehicles in Rankin Inlet may increase the risk of traffic accidents.	Negative	Moderate	Local	Long-term	n/a	n/a	n/a	Low
Individual, Family, and Community Wellbeing: Family and Community Cohesion	The Project may contribute to weakening of traditional culture.	Negative	High	Local	Long-term	n/a	n/a	n/a	Moderate
Individual, Family, and Community Wellbeing: Family and Community Cohesion	The Project may result in a reduction of cohesion due to higher levels of inequality in the family or community.	Negative	Moderate	Local	Long-term	n/a	n/a	n/a	Moderate
Individual, Family, and Community Wellbeing: Vulnerable Peoples	The Project may result in higher inequality which could result in increased vulnerability.	Negative	Moderate	Local	Long-term	n/a	n/a	n/a	Moderate
Individual, Family, and Community Wellbeing: Vulnerable Peoples	The Project may result in inflation which could increase vulnerability.	Negative	Low	Local	Short-term	n/a	n/a	n/a	Low
Individual, Family, and Community Wellbeing: Vulnerable Peoples	The Project may impact values around sharing, leading to increased vulnerability of elders and other vulnerable groups.	Negative	Moderate	Local	Long-term	n/a	n/a	n/a	Moderate



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Table 11-1: Summary of the Projected Significant Residual Impacts of the Project on the Socio-Economic Environment (continued)

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance ¹
Individual, Family, and Community Wellbeing: Family Function and Domestic Violence	Project may change gender roles, potentially resulting in increased family violence.	Negative	Moderate	Local	Long-term	n/a	n/a	n/a	Moderate
Individual, Family, and Community Wellbeing: Family Function and Domestic Violence	Project may lead to higher levels of substance abuse, resulting in increased family violence.	Negative	Moderate	Local	Long-term	n/a	n/a	n/a	Moderate
Individual, Family, and Community Wellbeing: Rotation/Family Function and Domestic Violence	Rotational employment may lead to a breakdown of family cohesion, including increased family violence.	Negative	High	Local	Long-term	n/a	n/a	n/a	Moderate
Individual, Family, and Community Wellbeing: Gambling	Increased incomes from direct, indirect and induced Project employment may potentially result in increased gambling.	Negative	Moderate	Local	Long-term	n/a	n/a	n/a	Moderate
Individual, Family, and Community Wellbeing: Crime	The Project may result in increased alcohol consumption leading to crime.	Negative	High	Local	Long-term	n/a	n/a	n/a	Moderate
Individual, Family, and Community Wellbeing: Crime	The Project may result in increased social inequality leading to higher crime rates.	Negative	High	Local	Long-term	n/a	n/a	n/a	Moderate
Individual, Family, and Community Wellbeing: Savings	The Project may result in increased percentage of Territorial savings being exported out of Nunavut by out of Territory employees.	Negative	Low	Regional	Long-term	n/a	n/a	n/a	Low



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Table 11-1: Summary of the Projected Significant Residual Impacts of the Project on the Socio-Economic Environment (continued)

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance ¹
Individual, Family, and Community Wellbeing: Household Savings	The Project will offer financial management training which may encourage better money management practices.	Positive	Moderate	Local	Long-term	n/a	n/a	n/a	Moderate
Community Infrastructure and Public Services: Housing	Project-induced in-migration may increase demand on local housing.	Negative	Moderate	Local	Long-term	n/a	n/a	n/a	Significant
Community Infrastructure and Public Services: Social Services	Project-induced in-migration may increase demand on social services.	Negative	Low	Local	Long-term	n/a	n/a	n/a	Significant
Community Infrastructure and Public Services: Protective Services	Project-induced in-migration may increase demand on protective services.	Negative	Low	Local	Long-term	n/a	n/a	n/a	Significant
Community Infrastructure and Public Services: Local and Regional Transportation	Project-induced in-migration may increase traffic on local roads.	Negative	Low	Local	Long-term	n/a	n/a	n/a	Significant
Community Infrastructure and Public Services: Local and Regional Transportation	Project-related traffic may increase traffic on local roads.	Negative	Low	Local	Long-term	n/a	n/a	n/a	Significant
Community Infrastructure and Public Services: Local and Regional Transportation	The construction of the All-weather Access Road (AWAR) may increase access to areas outside of Rankin Inlet by local residents.	Positive	Moderate	Local	Long-term	n/a	n/a	n/a	Significant
Community Infrastructure and Public Services: Communication	Project-induced in-migration may increase demand on local communication services.	Negative	Low	Local	Long-term	n/a	n/a	n/a	Significant



MELIADINE FEIS – VOLUME 11 CONCLUSIONS

Table 11-1: Summary of the Projected Significant Residual Impacts of the Project on the Socio-Economic Environment (continued)

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance ¹
Governance and Leadership: Fiscal Performance of Government	The Project would add substantially to the income of government, e.g. through taxes and royalties. However, it will also lead to increased costs, since demand for various services will go up. Given that its fiscal burden (costs) will be smaller than the public revenues it generates, the Project would lead to a better fiscal position of all levels of government.	Positive	High	Region and Local	Long-term	n/a	n/a	n/a	Significant
Governance and Leadership: Operational Capacity of Government	The Project will increase demand on various public services, putting additional pressure on resources, and human resources in particular. This would have a negative effect on users. However, increased training of labour force could have a beneficial effect on capacities in the long-term.	Negative and Positive	High	Region and Local	Long-term	n/a	n/a	n/a	Significant
Governance and Leadership: Regulatory and Monitoring Capacity of Government	As with any other economic activity, the Project would progress through a range of regulation processes and procedures. This could potentially expose shortcomings and flaws in regulations, leading to inefficiencies and possibly less than desirable outcomes.	Unknown	Moderate	Region and Local	Long-term	n/a	n/a	n/a	Significant

n/a = Not applicable or assessed



Table 11-2: Summary of Projected Non-significant Residual Impacts of the Project on the Atmospheric Environment (FEIS Volume 5)

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Air Quality/Emissions Mine Site	TSP – 24-hour	Negative	Negligible	Regional	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	TSP – 24-hour	Negative	High	Site-specific	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	TSP – Annual	Negative	Negligible	Local	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	TSP – Annual	Negative	Low	Site-specific	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	PM ₁₀ – 24-hour	Negative	Negligible	Regional	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	PM ₁₀ – 24-hour	Negative	Moderate	Local	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	PM ₁₀ – 24-hour	Negative	High	Site-specific	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	PM _{2.5} – 24-hour	Negative	Negligible	Regional	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	PM _{2.5} – 24-hour	Negative	High	Site-specific	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	NO ₂ – 1-hour	Negative	Low	Local	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	NO ₂ – 1-hour	Negative	Moderate	Site-specific	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	NO ₂ – 24-hour	Negative	Negligible	Regional	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	NO ₂ – 24-hour	Negative	Low	Site-specific	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	NO ₂ – Annual	Negative	Negligible	Regional	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	NO ₂ – Annual	Negative	Low	Site-specific	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	SO ₂ – 1-hour	Negative	Negligible	Local	n/a	n/a	n/a	n/a



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**Table 11-2: Summary of Projected Non-significant Residual Impacts of the Project on the Atmospheric Environment (FEIS Volume 5)
(continued)**

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Air Quality/Emissions Mine Site	SO ₂ – 1-hour	Negative	Low	Site-specific	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	SO ₂ – 24-hour	Negative	Negligible	Local	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	SO ₂ – 24-hour	Negative	Low	Site-specific	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	SO ₂ – Annual	Negative	Negligible	Site-specific	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	CO – 1-hour	Negative	Negligible	Regional	n/a	n/a	n/a	n/a
Air Quality/Emissions Mine Site	CO – 1-hour	Negative	Low	Site-specific	n/a	n/a	n/a	n/a
Air Quality/Emissions All-weather Access Road	TSP – 24-hour	Negative	Negligible	Regional	n/a	n/a	n/a	n/a
Air Quality/Emissions All-weather Access Road	TSP – 24-hour	Negative	Moderate	Local	n/a	n/a	n/a	n/a
Air Quality/Emissions All-weather Access Road	PM ₁₀ – 24-hour	Negative	Negligible	Regional	n/a	n/a	n/a	n/a
Air Quality/Emissions All-weather Access Road	PM ₁₀ – 24-hour	Negative	Moderate	Local	n/a	n/a	n/a	n/a
Noise-Mine Site	Project activities will result in noise emissions, which may cause changes in noise levels	Negative	Moderate	Site-specific and Local	Moderate	Moderate	Low	n/a
Noise-All-weather Access Road (AWAR) (operations)	Project vehicles along the AWAR will result in noise emissions, which may cause changes in noise levels	Negative	Moderate	Site-specific and Local	Moderate	Moderate	Low	n/a
Noise-Rankin Inlet	Activities associated with material receipt, storage and transfer to the Project will result in noise emissions, which may cause localized changes in noise levels	Negative	Moderate	Site-specific and Local	Moderate	Moderate	Low	n/a

TSP = total suspended particulates; CO = carbon monoxide; NO₂ = nitrogen dioxide; PM₁₀ = particulate matter nominally smaller than x µm in diameter; SO₂ = sulphur dioxide n/a = Not applicable or assessed



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Table 11-3: Summary of Projected Non-significant Residual Impacts of the Project on the Terrestrial Environment (FEIS Volume 6)

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Vegetation	Physical loss or alteration of vegetation from the Project footprint affecting plant populations and communities	Negative	Moderate	Local	Long-term	Periodic	Reversible	Highly Likely
Vegetation	Physical loss or alteration of vegetation from the Project footprint affecting listed plant species	Negative	Low	Local	Long-term	Periodic	Reversible	Highly Likely
Vegetation	Physical loss or alteration of vegetation from the Project footprint affecting availability of traditional use plant species	Negative	Moderate	Local	Long-term	Periodic	Reversible	Highly Likely
Vegetation	Residual ground disturbance can cause permanent loss and alteration of vegetation (including listed and traditional use plant species)	Negative	Moderate	Local	Unknown/ Permanent	Continuous	Irreversible/ Reversible	Highly Likely
Terrestrial Wildlife and Wildlife Habitat	Physical footprint decreases habitat quantity and causes fragmentation	Negative	Low	Regional	Long term	Continuous	Reversible	Highly likely
Terrestrial Wildlife and Wildlife Habitat	Sensory disturbance can change the amount of different quality habitats, and alter wildlife movement and behaviour (distribution)	Negative	Low	Regional	Medium term	Continuous	Reversible	Highly likely
Terrestrial Wildlife and Wildlife Habitat	Improved access for harvesting wildlife can affect wildlife population sizes	Negative	Low to Moderate	Local	Long term	Periodic	Reversible	Highly likely
Terrestrial Wildlife and Wildlife Habitat	Disruption or alteration of caribou migration routes from the presence of the mine or from mine-related activities	Negative	Low	Regional	Long term	Periodic	Reversible	Likely
Terrestrial Wildlife and Wildlife Habitat	Permanent changes in wildlife habitat following closure of the mine site	Negative	Low	Regional	Long-term	Continuous	Reversible	Highly likely



Table 11-3: Summary of Projected Non-significant Residual Impacts of the Project on the Terrestrial Environment (FEIS Volume 6) (continued)

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Terrestrial Wildlife and Wildlife Habitat	Effects on population size and distribution changes the availability of animals for traditional and non-traditional use	Positive	Low to Moderate	Regional	Medium-term	Periodic	Reversible	Highly likely
Bird and Bird Habitat: Raptors	Direct loss and fragmentation of bird habitat from the physical footprint of Project infrastructure from construction through active closure	Negative	Moderate	Regional	Long-term	Continuous	Reversible	Highly likely
Bird and Bird Habitat: Upland Birds and Waterbirds	Direct loss and fragmentation of bird habitat from the physical footprint of Project infrastructure from construction through active closure	Negative	Negligible to Low	Regional	Long-term	Continuous	Reversible	Highly likely
Bird and Bird Habitat: Raptors	Permanent changes in bird habitat following closure of the mine site and supporting infrastructure	Negative	Moderate	Regional	Long-term	Continuous	Reversible	Highly likely
Bird and Bird Habitat: Upland Birds and Waterbirds	Permanent changes in bird habitat following closure of the mine site and supporting infrastructure	Negative	Negligible	Regional	Long-term	Continuous	Reversible	Highly likely
Bird and Bird Habitat: Raptors	Sensory disturbance can change the amount of different quality habitats, and alter bird movement and avoidance behaviour (distribution)	Negative	High	Local	Long-term	Continuous	Reversible	Likely
Bird and Bird Habitat: Upland Birds	Sensory disturbance can change the amount of different quality habitats, and alter bird movement and avoidance behaviour (distribution)	Negative	Negligible to Low	Local	Long-term	Continuous	Reversible	Likely
Bird and Bird Habitat: Waterbirds	Sensory disturbance can change the amount of different quality habitats, and alter bird movement and avoidance behaviour (distribution)	Negative	Negligible to Low	Local	Long-term	Continuous	Reversible	Likely
Bird and Bird Habitat: Upland Birds, Waterbirds and Raptors	Effects on population size and distribution changes the availability of birds for traditional and non-traditional use	Negative	Negligible	Regional	Long-term	Continuous	Reversible	Likely



Table 11-4: Summary of Projected Non-Significant Residual Impacts of the Project on the Freshwater Environment (FEIS Volume 7)

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Fish and Fish Habitat	Physical footprint from the mine site and All-weather Access Road decreases habitat quantity	Negative	Moderate	Local	Medium to long-term	Continuous	Reversible to Irreversible	Highly likely
Fish and Fish Habitat	Permanent change in fish habitat following closure of the mine site and All-weather Access Road	Negative	Low	Local	Permanent	Continuous	Irreversible	Highly likely
Fish and Fish Habitat	Improved access for harvesting fish can affect harvest and mortality rates	Negative	Negligible to low	Local	Medium-term to long-term	Periodic	Reversible	Likely
Fish and Fish Habitat	Alteration of watershed areas and flow paths may reduce downstream flows (habitat quantity)	Negative	Low	Local	Medium-term	Continuous	Reversible to Irreversible	Highly likely
Fish and Fish Habitat	Permanent alteration of watershed areas and flow paths may reduce downstream habitat quantity	Negative	Negligible	Local	Medium-term	Continuous	Irreversible	Highly likely
Fish and Fish Habitat	Effluent discharge, air emissions, and changes to watershed area may affect downstream habitat quality	Negative	Negligible to low	Local	Medium-term	Continuous	Reversible	Likely
Fish and Fish Habitat	Permanent changes to watershed areas may affect downstream habitat quality	Negative	Low	Local	Permanent	Continuous	Irreversible	Likely
Fish and Fish Habitat	Reclaimed mine pit, flooded areas and downstream water (habitat) quality	Negative	Low	Local	Long-term	Continuous	Reversible	Likely
Fish and Fish Habitat	Effects on abundance and distribution may change availability of fish for traditional use	Negative	Low	Regional	Medium-term to long-term	Periodic	Reversible	Likely



Table 11-5 Summary of Potential Residual Non-significant Impacts of the Project on the Marine Environment (FEIS Volume 8)

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Marine Mammals	Change in habitat due to altered water quality from a minor spill	Negative	Low	Local	Medium-term	Isolated	Reversible	Unlikely
Marine Mammals	Change in habitat due to altered water quality from a major spill	Negative	High	Regional	Medium-term	Isolated	Reversible	Unlikely
Marine Fish and Fish Habitat	Change in habitat due to altered water quality from a minor spill	Negative	Low	Local	Medium-term	Isolated	Reversible	Unlikely
Marine Fish and Fish Habitat	Change in habitat due to altered water quality from a major spill	Negative	Moderate	Regional	Long-term	Isolated	Reversible	Unlikely
Marine Birds	Change in habitat due to altered water quality from a minor spill	Negative	Low	Local	Medium-term	Isolated	Reversible	Unlikely
Marine Birds	Change in habitat due to altered water quality from a major spill	Negative	High	Regional	Long-term	Isolated	Reversible	Unlikely
Marine Water Quality	Change in water quality due to minor spill	Negative	Low	Local	Medium-term	Isolated	Reversible	Unlikely
Marine Water Quality	Change in water quality due to major spill	Negative	High	Regional	Long-term	Isolated	Reversible	Unlikely



Table 11-6: Summary of Projected Non-significant Residual Impacts of the Project on the Socio-economic Environment (FEIS Volume 9)

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Traditional Activities and Knowledge: Traditional Harvesting	Effects on population size and distribution changes the availability of terrestrial animals for traditional harvesting	Positive	Low to moderate (incremental and cumulative)	Regional	Medium-term	Periodic	Reversible	Highly likely
Traditional Activities and Knowledge: Traditional Harvesting	Effects on population size and distribution changes the availability of birds for traditional use	Negative	Negligible (incremental); Low (cumulative)	Regional	Long-term	Continuous	Reversible	Likely
Traditional Activities and Knowledge: Traditional Harvesting	Residual ground disturbance can cause permanent loss and alteration of vegetation, including listed and traditional plant species	Negative	Moderate (incremental); negligible to low (cumulative)	Local	Unknown/permanent	Continuous	Irreversible/reversible	Highly likely
Traditional Activities and Knowledge: Traditional Harvesting	Change in marine mammal health and mortality risk due to vessel collisions	Negative	Low	Local	Long-term ²	Periodic	Reversible	Possible
Traditional Activities and Knowledge: Traditional Harvesting	Change in marine mammal behaviour due to underwater noise from Project vessels	Negative	Low	Local	Medium-term	Periodic	Reversible	Likely
Traditional Activities and Knowledge: Traditional Harvesting	Change in marine fish habitat due to spud barge grounding	Negative	Low	Local	Medium-term	Continuous	Reversible	Highly Likely
Traditional Activities and Knowledge: Traditional Harvesting	Change in marine fish behaviour due to in-water noise from marine transportation	Negative	Low	Local	Medium-term	Periodic	Reversible	Highly Likely

² Note that the duration of this potential socio-economic residual effect differs from the same potential residual effect assessed for the Marine Environment (Table 8.3-12) due to differences in the respective methodologies used to classify residual impacts for each component (see FEIS Volume 8 Section 8.3.7 for the Marine Environment and FEIS Volume 9 Section 9.3.4 for more details)



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**Table 11-6: Summary of Projected Non-significant Residual Impacts of the Project on the Socio-economic Environment (FEIS Volume 9)
(continued)**

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Traditional Activities and Knowledge: Traditional Harvesting	Change in marine bird mortality risk due to collisions with infrastructure	Negative	Low	Local	Medium-term ³	Periodic	Reversible	Likely
Traditional Activities and Knowledge: Traditional Harvesting	Change in marine bird behaviour due to in-air noise and artificial lighting	Negative	Low	Local	Medium-term	Periodic	Reversible	Likely
Community Infrastructure and Public Services: Schools	Project-induced in-migration may increase demand on educational facilities	Negative	Negligible	Local	Long-term	n/a	n/a	n/a
Community Infrastructure and Public Services: Health Services	Project-induced in-migration may increase demand on health services	Negative	Low	Local	Long-term	n/a	n/a	n/a
Community Infrastructure and Public Services: Health Services	Accidents involving Project workers may increase demand on health services	Negative	Low	Local	Long-term	n/a	n/a	n/a
Community Infrastructure and Public Services: Financial Services	Project-induced in-migration may increase demand on financial services	Negative	Negligible	Local	Long-term	n/a	n/a	n/a
Non-Traditional Land Use and Resources Use: Hunting and Fishing	The Project may increase access to non-traditional hunting and fishing opportunities, outfitting and guiding businesses in the RSA via the AWAR	Positive	Negligible to Low	Regional	Medium-term	n/a	n/a	n/a

³ Note that the duration of this potential socio-economic residual effect differs from the same potential residual effect assessed for the Marine Environment (Table 8.3-12) due to differences in the respective methodologies used to classify residual impacts for each component (see FEIS Volume 8 Section 8.3.7 for the Marine Environment and FEIS Volume 9 Section 9.3.4 for more details)



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**Table 11-6: Summary of Projected Non-significant Residual Impacts of the Project on the Socio-economic Environment (FEIS Volume 9)
(continued)**

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Non-Traditional Land Use and Resources Use: Hunting and Fishing	The Project may affect the availability of wildlife for hunting and fish for fishing in the RSA	Negative	Low to Moderate	Regional	Medium to Long-term	n/a	n/a	n/a
Non-Traditional Land Use and Resources Use: Hunting and Fishing	Project-related noise and changes to the visual environment may have an effect on hunting and fishing in the RSA	Negative	Negligible to Moderate	Regional	Long-term	n/a	n/a	n/a
Non-Traditional Land Use and Resources Use: Tourism, Recreation, Parks and Protected Areas	The Project may enhance access to Iqalugaarjuup Nunanga Territorial Park, the major tourist attraction and recreation area in the LSA, and surrounding areas via the AWAR	Positive	Negligible to Low	Regional	Medium-term	n/a	n/a	n/a
Non-Traditional Land Use and Resources Use: Tourism, Recreation, Parks and Protected Areas	Project-related noise and changes to the visual environment may have an effect on tourism in the RSA	Negative	Negligible to Moderate	Regional	Long-term	n/a	n/a	n/a

AWAR = All-weather Access Road; LSA = local study area; RSA = regional study area; n/a = Not applicable or assessed



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Table 11-7: Summary of Projected Non-significant Residual Impacts of the Project on Environmental and Human Health (FEIS Volume 10)

VC	Effect Pathway	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Environmental Health Risk Assessment	Aquatic Health for Copper in Lake CH	Negative	Low	Local	Long-term	Continuous	Reversible	Unlikely
Environmental Health Risk Assessment	Aquatic Health for Copper in Tiriganiaq Pit Lake	Negative	Low	On-site	Long-term	Continuous	Reversible	Unlikely
Human Health Risk Assessment	Acute Health Effects for Workers: DPM	Negative	Moderate	Local	Long-term	Periodic	Reversible	Unlikely
Human Health Risk Assessment	Acute Health Effects for Workers: NO ₂	Negative	Low	On-Site	Long-term	Isolated	Reversible	Unlikely
Human Health Risk Assessment	Acute Health Effects for Workers: Cadmium	Negative	Low	On-Site	Long-term	Isolated	Reversible	Unlikely
Human Health Risk Assessment	Acute Health Effects for Workers: Acrolein	Negative	Low	On-Site	Long-term	Isolated	Reversible	Unlikely
Human Health Risk Assessment	Acute Health Effects for Workers: Aldehyde	Negative	Moderate	Local	Long-term	Isolated	Reversible	Unlikely
Human Health Risk Assessment	Acute health effects for recreational users: DPM	Negative	Low	Local	Long-term	Isolated	Reversible	Unlikely
Human Health Risk Assessment	Acute health effects for recreational users: Aldehyde	Negative	Low	Local	Long-term	Isolated	Reversible	Unlikely
Human Health Risk Assessment	Chronic health effects for workers: Acrolein	Negative	Low	On-Site	Long-Term	Periodic	Reversible	Unlikely
Human Health Risk Assessment	Chronic health effects for workers: DPM	Negative	Low	On-Site	Long-Term	Periodic	Irreversible	Unlikely
Human Health Risk Assessment	Health effects due to noise for recreational users: Noise	Negative	Low	Local	Long-Term	Continuous	Reversible	Possible

DPM = diesel particulate matter; NO₂ = nitrogen dioxide



11.2 Summary of Cumulative Effects

Cumulative effects represent the sum of all natural and human-induced influences on the physical, biological, socio-cultural, and economic components of the environment through time and across space. Some changes may be human-related, such as increasing industrial development, and some changes may be associated with natural phenomenon, such as extreme rainfall events, and periodic harsh and mild winters. The cumulative effects assessment is used to estimate the contribution of these types of effects, in addition to Project effects, on VECs.

A summary of those components that were found to have cumulative effects is provided below. A summary of Valued Ecosystem Components affected by Project cumulative effects can be seen in Figure 11.2-1. Further details on components that were found to have no or negligible cumulative effects can be found within FEIS Volumes 5 to 10, where applicable.

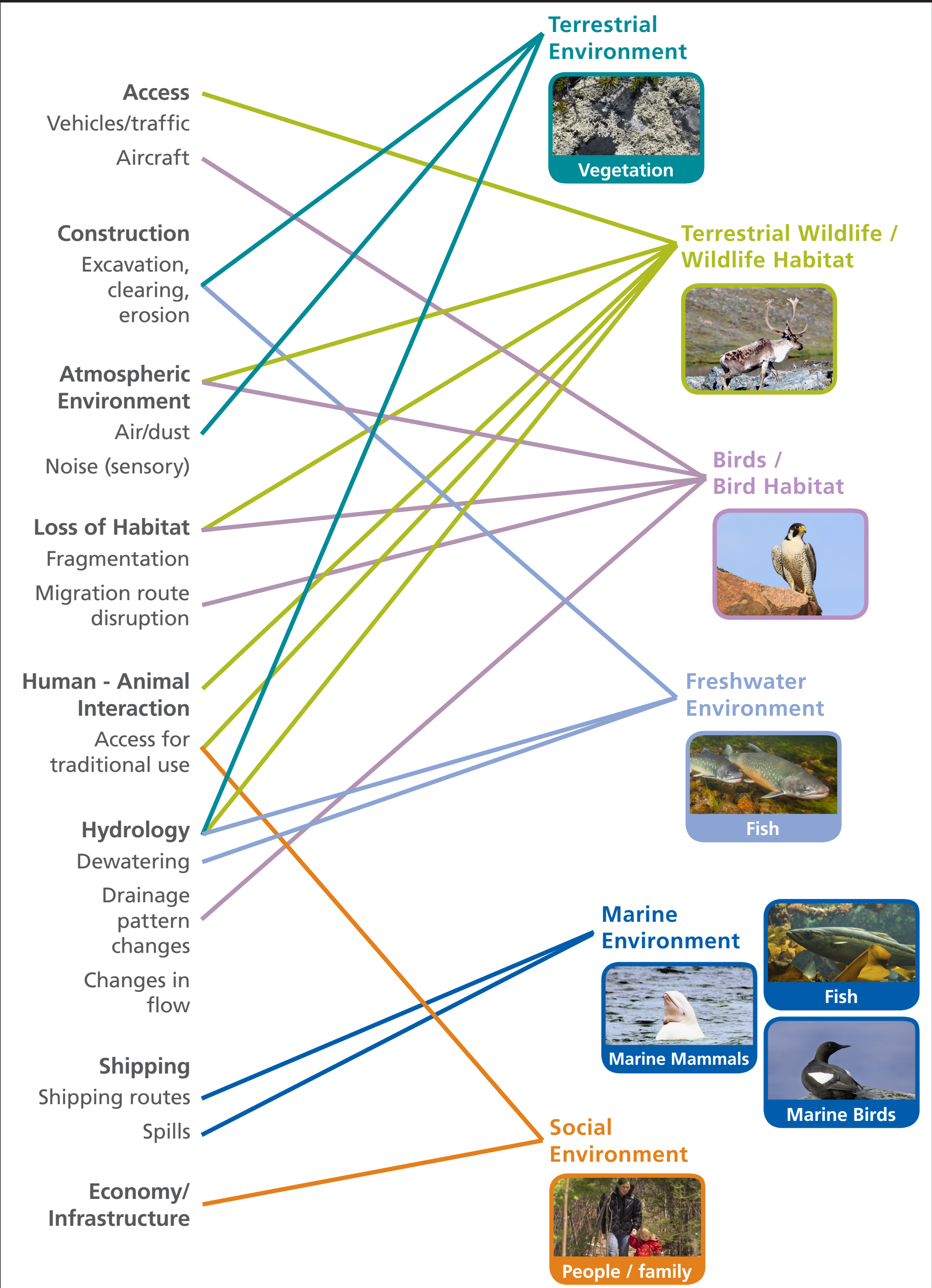
11.2.1 Vegetation

The cumulative incremental change of each regional land cover class in the regional study area (RSA) relative to reference conditions from previous, existing, and future developments is predicted to be between 0.05 and 6.76%. As there is limited development in the RSA in the future scenario, the overall cumulative direct and indirect effects to vegetation, including effects to listed plant species and traditional use plant species, are predicted to be negligible to low.

11.2.2 Terrestrial Wildlife and Wildlife Habitat

Cumulative wildlife habitat loss and fragmentation and changes in migration patterns of caribou from previous, existing, and future developments in the RSA are expected to be negative but low in magnitude. However, cumulative indirect sensory effects from previous, existing, and future developments are predicted to have high magnitude effects on wildlife populations. Sensory disturbance can change the amount of different quality habitats, and alter wildlife movement and behaviour. Sensory effects from the Project are predicted to be reversible within a few years following closure.

Improved access for harvesting wildlife from the development of the Project is expected to have low to moderate negative cumulative effects on wolf and caribou populations. Cumulative effects from changes in the availability of wildlife for human use are predicted to be positive and low to moderate in magnitude. The All-weather Access Road is planned to be scarified during closure, so effects are expected to be medium and reversible. Effects are expected to occur periodically during traditional and non-traditional hunting seasons.





The Project is anticipated to have virtually no impact on future global climate change as the predicted Project Greenhouse GAs emissions were determined to be globally insignificant (FEIS Volume 5, Section 5.4.5). Nevertheless, historic climate trends and climate modelling suggest that the Project region will experience a change in climate over the next several decades (FEIS, Volume 5). Climate warming is expected to increase the duration and intensity of insect harassment on caribou because of earlier insect emergence, greater insect abundance, and increased insect distribution. Climate change is also expected to increase the frequency and intensity of wildfire, and enable plants to expand their ranges northward. As fires increase and plants move north, moose and wolves may also increase their northern distribution, which may negatively impact caribou populations and distributions. As the climate becomes warmer, caribou migrations may become out of sync with plant emergence, which may lead to a decline in reproductive success, as has been shown in Greenland. Climate change can also influence the seasonal distribution of caribou by modifying food abundance, snow depth and hardness, predator numbers, and burns. It is expected that climate change may be a significant impact to caribou, because climate impacts will likely affect the entire Qamanirjuaq herd, whereas the Project will only impact a very small proportion of the Qamanirjuaq herd.

11.2.3 Bird and Bird Habitat

Cumulative direct habitat loss and fragmentation from previous, existing, and future developments in the RSA are expected to have negative effects on bird populations that are negligible to moderate in magnitude.

Cumulative indirect effects of sensory disturbance from previous, existing, and future developments are predicted to have low to moderate magnitude effects on upland bird and waterbird populations, and low magnitude effects on raptor populations. Sensory disturbance can change the amount of different quality habitats, and alter bird movement and avoidance behaviour. Sensory effects from the Project are predicted to be reversible within a few years following closure.

Cumulative effects to bird populations from changes in the availability of birds for human use are predicted to be negative and low in magnitude. Effects are expected to be reversible in the long-term. Effects are expected to occur periodically during traditional and non-traditional hunting seasons.

Climate change is expected to decrease raptor productivity because of increased precipitation during spring storms. Altricial young, such as raptor chicks, have poor thermoregulatory abilities and so have increased risk of mortality when they become cold and wet. Therefore, changes in the timing and the amount of precipitation from climate change could have negative effects on raptor productivity. Changes in the timing and amount of rainfall may also negatively affect the productivity of upland bird and waterbird species, especially those species that have altricial young.

Adult peregrine falcon survival during fall migration can be negatively affected by increased rainfall and decreased temperature. It has been suggested that changes in local weather patterns have the greatest potential to influence peregrine falcon nest occupancy and survival. Climate change is likely to have a greater effect on raptor populations in the Arctic than effects from the Project, but Project-effects are likely to be additive to effects from climate change (A. Franke, 2012, University of Alberta, pers. comm.).

Climate change is also expected to increase the frequency and intensity of wildfire and enable plants to expand their ranges northward. As fires increase and plants move north, bird species that have historically nested in



more southern environments may also expand their ranges. These range expansions may increase competition for nesting sites and forage resources with bird species that have historically nested in Arctic areas.

Increased temperatures may lead to earlier plant and insect emergence. Bird migrations are thought to be mainly cued by changes in day length. Therefore, as the climate becomes warmer, bird migrations may become out of sync with plant and insect emergence, which may lead to a decline in reproductive success. Conversely, climate change is expected to increase the abundance and distribution of insects. Therefore, insectivorous birds may not be as negatively affected by climate change as herbivorous species.

11.2.4 Marine Environment

The cumulative impacts from the Project are predicted to not significantly influence the maintenance of the abundance and distribution of marine wildlife populations. The scale of impacts from the Project pathways, independently or combined, should not be large enough to cause irreversible changes at the population level, nor decrease the resilience of the marine VECs. Therefore, the Project is not expected to have a significant adverse impact on the continued opportunity for traditional and non-traditional use of marine resources in the region.

Global climate change is expected to result in warming temperatures, and in the Arctic, an increase in sea levels from the melting snow and ice (IPC 2007). With increased melting, it is reasonable to anticipate a longer open-water season along the shipping route over the long term. The expected number of vessels required for the Project has been determined based on what is needed to supply construction, operation, and closure activities of the proposed mine and associated marine infrastructure. The frequency of vessel traffic is not expected to increase over the life of the Project. If the open-water season is extended, the net frequency of transiting vessels per ice-free day would be reduced, and therefore the frequency of exposure of marine fauna to vessel-related impacts, and notably underwater noise effects, would be reduced.

11.2.5 Population Demographics

The cumulative effects of the Meliadine, Kiggavik, and Meadowbank projects on in-migration might be less than the effects of each project individually, considering for example the dampening effects on the volume of in-migration to the region caused by the variation in the current progress of each project, presumed interdependence of certain projects, and resulting estimated labour force growth. Even so, the cumulative effects on migration and population may be significant. Also, the timing of the projects could change, which could considerably impact the overall effects.

11.2.6 Traditional Activities and Knowledge

Cumulative effects from changes in the availability of vegetation, wildlife and birds for human use are described 11.2.1 to 11.2.3, respectively.



11.2.7 Economic Development and Opportunities

The major conclusions with respect to the cumulative effects on economic development and opportunities in Nunavut are:

- Although in the shorter term there is some potential for competition for labour, over the longer term labour demand will not exceed Nunavut's capacity to supply;
- The mining industry currently holds out the most promise in creating the jobs that a rapidly growing workforce will need, but currently foreseeable projects will not provide all the jobs Nunavut will need to create over the coming decades;
- The capacity of labour to respond to mining industry workforce requirements is a critical component; with the exception of many induced jobs, skilled and productive workers will be needed to achieve and exceed the employment demand; and
- Provided there are several mining projects in Nunavut, development of the industry can smooth out 'bumps' in unemployment – as projects open and close, alternative employment opportunities are opened for retrenched employees.

Territorial cumulative economic effects are significant benefits, and do not require either mitigation or monitoring by AEM. It is noted however that government planning for enhancing capacity of labour and businesses, and for sequencing of mining projects, can enhance cumulative benefits.

11.2.8 Education and Training

The cumulative effects of previous, existing, and future projects on training and employment will be beneficial to the Kivalliq region. Not only will there be more opportunities to access training but, given the potential competition for workers by different projects, the opportunities to benefit from the training will be better.

11.2.9 Individual, Family, and Community Wellbeing

The expected rapid expansion of the mining sector could accelerate the various and largely additive effects foreseen on individual, family and community wellbeing. However, it is arguable that at some undetermined point, a critical mass of healthy and well-functioning individuals and families may provide a shift in the understanding of possibilities and aspirations of the balance of the population. As more economic opportunities open up, people will have more choices available to them with respect to career opportunities, and people will adapt to the results of these choices. As such, fewer people will be left out, and in the long run, the negative effects of inequities on, for example, crime and social conflict may be curbed.

11.2.10 Community Infrastructure and Public Services

The expected rapid expansion of the mining sector has the potential to accelerate and exacerbate the largely additive effects on public infrastructure and services, and irrespective of where the mining projects are located, the competitive advantage of Rankin Inlet will continue to mean that most effects will be seen in the hamlet.



Cumulative increase on demand for services in the local study area (LSA) communities is considered to be a significant negative effect in the event that the capacity of service provision does not grow. It is arguable, however, that at some point, populations in the LSA communities, most notably Rankin Inlet, could cross thresholds that would warrant not only an expansion of existing services, but addition of services not seen before. This would be a significant cumulative benefit.

11.2.11 Governance and Leadership

The cumulative effects on governance due to the largely additive effects of the reasonable foreseeable projects will be large. The Kiggavik, Meadowbank, and Meliadine projects will all have substantial effects on local hamlet and territorial governments.

As all the foreseeable projects would have fiscal benefits, constraints are likely to be on the government expenditure side; increased competition for labour in particular. Therefore, cumulative effects would likely have to lead to considerable streamlining of various operations and processes. Training initiatives and decreasing certain hiring goals might also be a temporary solution. On the positive side, increased experience of staff and operational cost-effectiveness might mitigate some of this effect.

11.2.12 Public and Worker Health and Safety

The reinforcement of health and safety principles from projects such as Meliadine, Meadowbank and Kiggavik, for instance, will be a driver for a health and safety culture to take hold amongst Inuit and non-Inuit populations in Kivalliq. It is expected that project employees, their families and communities at large will benefit from accrued health and safety training from these projects.

Combined, the past, present, and potential future industrial developments could have a cumulative effect on human health should they result in significant changes to environmental quality. Cumulative effects to air quality, noise, and surface water and sediment quality are expected to be negligible. Therefore, the subsequent effects to human health are also expected to be negligible.

11.3 Transboundary Effects

As noted in Section 11.1 above, the geographic extent was a criterion used in the assessment of potential residual impacts from the Project on VCs. Geographic extent refers to the spatial extent of potential direct or indirect impact, and was generally categorized into 4 scales; local, regional, beyond regional, and transboundary. Local-scale impacts mostly represent localized changes that are directly related to the Project footprint and activities, but may also include small-scale indirect impacts. The environmental and human risk assessments also considered an on-site scale to differentiate between impacts localized to the immediate Project footprint versus local-scale impacts that extend into the LSA. Changes at the regional scale are largely associated with indirect impacts from the Project, and represent the maximum predicted spatial extent of impacts from the Project (zone of influence). Impacts beyond the regional scale are mostly associated with VCs that have large spatial distributions and are influenced by cumulative effects from the Project and other developments. Transboundary is defined as effects from the Project that extend outside of the Nunavut Territory. In the case of



the socio-economic assessment, Nunavut was used to define regional extent, and as such any beyond regional residual impacts to socio-economic VCs are also transboundary.

It is recognized that for select socio-economic parameters, there is some potential for transboundary effects related to the Project. These include potential economic benefits elsewhere in Canada in the form of employment, business and contracting opportunities (and associated provincial and federal tax revenue) not filled by Nunavummiut. Transboundary cumulative effects include cumulative economic benefits from resource development Projects in Nunavut.

Marine shipping associated with the Project also has the potential for transboundary effects. Potential transboundary effects to marine water quality, fish and fish habitat, mammals and/or birds include accidental spills, underwater and in-air noise, and vessel strikes. The potential residual impacts of these effects were determined to be not significant. Changes in the migration patterns of caribou are to occur due to the Project and cumulative cases (Volume 6, Table 6.6-29). The extent of the effect may be transboundary occurring at the home range scale, but were determined to be not significant. Residual impacts to migratory birds are negligible due to the small impact of the Project.

11.4 Adaptive Management

The Environmental Management and Protection Plan (EMPP) describes the overarching direction for environmental and socio-economic management for the Project, and is supported by the following suite of Project-specific mitigation, monitoring and/or management plans included in the FEIS:

- SD 2-5 Environmental Management and Protection Plan (including Environmental Protection and Follow-up and Adaptive Management)
- SD 2-6 Surface Water Management Plan (including Conceptual Mine Water Quality Monitoring)
- SD 2-7 Ore Storage Management Plan
- SD 2-8 Mine Waste Management Plan
- SD 2-9 Roads Management Plan
- SD 2-10 Borrow Pits and Quarries Management Plan
- SD 2-11 Landfill and Waste Management Plan
- SD 2-12 Incineration Management Plan
- SD 2-13 Hazardous Materials Management Plan (including Fuel Management)
- SD 2-14 Explosive Management Plan
- SD 2-15 Risk Management and Emergency Response Plan (including Risk Assessment and Management, and Accidents and Malfunctions, and Emergency Response)
- SD 2-16 Spill Contingency Plan
- SD 2-17 Mine Closure and Reclamation Plan (including Care and Maintenance)
- SD 5-1 Air Quality Monitoring and Management Plan
- SD 5-2 Noise Abatement Plan
- SD 6-4 Terrestrial Environment Management and Monitoring Plan (TEMMP)
- SD 7-3 Aquatic Effects Monitoring Plan (AEMP)
- SD 7-4 No Net Loss Plan
- SD 8-1 Shipping Management Plan
- SD 8-2 Oil Pollution Prevention Plan
- SD 9-1 Cultural and Heritage Resources Protection Plan
- SD 9-2 Socio-economic Management Plan



- SD 9-3 Business Development Plan
- SD 9-4 Human Resources Plan
- SD 9-5 Community Involvement Plan
- SD 9-6 Occupational Health and Safety Plan

The EMPP and associated plans describe the Project's standards and requirements for particular areas of environmental and socio-economic management. Each individual plan assesses the likely effectiveness of mitigation measures and associated follow-up mechanisms for adaptive management, including, where appropriate, a risk assessment of those economic or other conditions that might impair the implementation or effectiveness of proposed mitigation or management strategies. The plans also outline how results from monitoring will be used to refine or modify the design and implementation of mitigation measures and management plans, and potentially improve various components of the Project. Threshold and indicators to trigger management actions will be provided in each sub plan embedded in the EMPP, along with a system of accountability.

The EMPP and associated plans will be administered through an Environmental Management System (EMS) to ensure that the conditions set at the time of the Project's authorization and requirements pertaining to the relevant laws, regulations and permits are met. The use of the EMS will also ensure that a systematic adaptive management approach to decision making is used whereby operational practices are adapted and adjusted as required in response to monitoring results so to reduce or eliminate any observed negative impacts throughout the life of the Project. Implementation of the EMS will allow adaptive management decisions to be made on an ongoing basis, and will lead to improvements to the environmental and socio-economic management system as necessary over time.

11.5 Conclusion

Agnico Eagle Mines Limited has prepared this FEIS for the development of the Project located 25 kilometres north of the hamlet of Rankin Inlet, Nunavut. The FEIS was developed to conform to the Guidelines for the Preparation of an Environmental Impact Statement (the Guidelines) provided by the Nunavut Impact Review Board (NIRB 2012). Also considered were the requirements of the Nunavut Land Claims Agreement, NIRB's minimal EIS requirements, and the general EIS principles as described in the NIRB's *Guide 7: Guide to the Preparation of Environmental Impact Statements* (NIRB 2006).

In accordance with the Guidelines, the FEIS provides a detailed evaluation of the potential biophysical and socio-economic effects of the Project. It includes extensive baseline data characterizing Project area, and provides descriptions of Project design features and mitigations that will be implemented to remove or minimize potential adverse effects to VCs in the Project area. Management and monitoring plans are also provided to assess the validity of the impact predictions made and to provide a systematic adaptive management approach to decision making whereby operational practices can be adapted and adjusted as required to reduce or eliminate any unforeseen negative impacts throughout the life of the Project.

Agnico Eagle Mines Limited is committed to protect the environment, public health and safety, and natural resources by conducting operations in an environmentally sound manner while pursuing continuous improvement of its environmental performance. In the preparation of this FEIS, AEM adopted the following precautionary principle: if an action has a suspected risk of causing harm to the public or to the environment, in the absence of scientific consensus, then that action should be considered harmful. This principle implies that



there is a social responsibility to protect the public from exposure to harm. These protections can be relaxed only if further scientific findings emerge that provide sound evidence that no harm will result. AEM's approach can be summarized as follows:

- Priority 1 – Collect the baseline and scientific data required to allow scientific consensus to be achieved.
- Priority 2 – Consult with local stakeholders to incorporate local and traditional knowledge into the data to help reach consensus.
- Priority 3 – Design all facilities and activities with adaptive management in mind. In cases where uncertainty remains, look for applicable data from similar settings elsewhere so that other experience can be brought into consideration. Build in appropriate safety factors in the design of the facility or in the proposed action and incorporate flexibility so that the activity or design can be actively adapted to accommodate possible future change.
- Priority 4 – Design and implement monitoring programs to address all areas of uncertainty so that data is being generated to: a) allow for scientific consensus to be achieved; and b) to allow activities where some uncertainty exists to be adaptively managed in a timely manner.

Sustainable development of the Project will contribute to the economic development of Nunavut in ways that support self-reliant communities with reduced dependence on government without a compromise to the health of the people or the land. Through the creation of stable private sector employment, the Project will also contribute to a better standard of living for the residents of the region as well as reducing dependence on social assistance programs. The Project will lend support to the vision and contribute to the goals of Inuit Beneficiaries of Nunavut, and for a more self-reliant Nunavut for all Nunavummiut. The Project will also contribute to the economic vision of a more self-reliant Nunavut as a key contributor to the future economic well-being of Canada. Finally, the Project will provide potential economic benefits to the rest of Canada as a whole in the form of employment, business and contracting opportunities not filled by Nunavummiut.

11.6 References

11.6.1 Literature Cited

IPCC (Intergovernmental Panel on Climate Change). 2007. Synthesis Report. An assessment of the intergovernmental panel on climate change. International Panel on Climate Change. Valencia, Spain. 73 pp.

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11.6.2 Personal Communications

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