Izok Corridor Project Proposal

SECTION 12

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12 ENVIRONMENT MANAGEMENT SYSTEM

This section provides an overview of the MMG's proposed Environmental Management System for the Izok Corridor Project, including key programs and management plans to support operational goals. MMG has considerable management and organizational experience from its operational mines, and will be adapting this experience to arctic conditions of Nunavut for operation of the Project.

Detailed management plans will be prepared during the Project licensing and permitting stage based on the feasibility study, further environmental studies, and consultation with federal and territorial agencies and other stakeholders.

12.1 Organizational Management and Operational Approach

12.1.1 Organization Management

Project management and administration will be based at MMG's Vancouver BC office, with on-site management located at the Izok and High Lake Mine sites. On-site management and administration will be the responsibility of each Mine Manager along with the following staff.

- Personnel officers
- Community liaison officer
- Security, health and safety and training staff
- Procurement and general administrative staff
- Off-site logistics and clerical staff

Mine managers will report directly to the Izok Corridor Project Manager, who will report to the Chief Operating Officer (COO) of MMG.

A community liaison office has been established in Kugluktuk for the purpose of communicating with local residents about the Project. For the construction and operation phases of the Project, MMG is considering a local office in Cambridge Bay and possibly a small office in Yellowknife. This will be determined in the next year based on the feasibility study.

12.1.2 Operating Policies

MMG is committed to the standards set by the International Council of Mining and Metals (ICMM), particularly in relation to biodiversity and sustainable development. Seven components of this framework are essential to the successful construction and operation of the Izok Corridor Project.

- Commitment to best practices in:
  - Corporate governance
  - Production standards
  - Health and safety
  - Operational excellence
  - Environmental protection
- Commitment to local economies and communities to support social licence to operate
- Economic viability of the Project

MMG is committed to applying these standards to the full cycle of mine life by requiring all employees and contractors to comply with corporate policies and directives, and all applicable environmental laws, regulations, and licence and permit conditions. Programs for each key area also will be implemented and evaluated for their efficiency in achieving set goals while ensuring individual safety and improving operations and environmental protection.

12.2 Key Environmental Management Programs

MMG aims to minimize the environmental footprint of all its projects by equipping its people with environmental standards to effectively manage the environmental aspects of mining operations. These standards are part of MMG's risk management practice that sets the internal benchmark for operations. Key environmental priorities include:

- Land and biodiversity management
- Water management
- Energy, greenhouse gas emissions and climate change
- Mineral waste management
- Closure planning

MMG is developing an integrated Safety, Health, Environment and Community (SHEC) Management System that incorporates ISO14001 environmental management system requirements. The system will include the formal, risk-based identification of environmental policies, standards and supporting assurance program to measure the operational performance against the environmental performance standards. MMG is working to ensure all operations maintain or receive ISO14001 certification and achieve zero non-compliance with operational licence and other legal requirements.

MMG will prepare Environmental Management Programs in accordance with its SHEC Management System for all phases of the Project (site preparation, construction, operation, maintenance, closure and post closure). These programs will be integrated into procedure documents for use by site management staff, occupational health, safety and environmental compliance staff, and government departments and agencies tasked with environmental and regulatory compliance monitoring. The following Environmental Management Programs will be developed for the Project. They will present specific monitoring and evaluations strategies to be implemented throughout the life of the Project, in accordance with requirements of the Nunavut Impact Review Board (NIRB) and applicable federal and

territorial regulatory acts and policies. Inuit organizations, federal and territorial regulatory agencies and communities will be consulted during development of these plans.

- Waste Management Program
  - Mineral Waste Management Plan
  - Non-Mineral Waste Management Plan
  - Landfill Management Plan
  - Hazardous Materials Management Plan
  - Incineration Management Plan
- Site Water Management Program
  - Surface Water Management Plan
  - Groundwater Management Plan
  - Waste Water Management Plan
- Risk Management Program
  - Risk Management and Emergency Response Plan
  - Spill Contingency Plan
- Shipping Management Program
- Roads Management Program
- Borrow Pit and Quarry Management Plan
- Explosives Management Plan
- Air Quality Monitoring and Management Plan
- Noise Abatement Plan
- Aquatic Effects Monitoring and Management Program
- Wildlife Mitigation and Monitoring Program
- No Net Loss Plan
- Closure Reclamation Plan

Adaptive strategies will be integrated into these programs to assess the effectiveness of mitigation and management, and enable improvements to be made throughout the life of the Project. This will include identification of thresholds/criteria and indicators that will be used to trigger management actions based on data collection and review of analytical results, and feedback from government, public and other stakeholders.

As per MMG's SHEC Management Framework, regular reviews of its Environmental Management Plans will be conducted to ensure that monitoring results are integrated and the necessary adjustments are implemented as required. These reviews also provide a formal mechanism to assess effectiveness of management in achieving company objectives and maintaining ongoing compliance with Project permits and authorizations.

12.2.1 Waste Management Program

Waste management is a major concern for most mining operations globally. MMG is committed to preventing and reducing the effects mineral and non-mineral wastes over the life of the Izok Corridor Project, and to minimizing post-mining rehabilitation and closure liability.

Mineral Waste Management Plan

Towards meeting the above objectives, MMG will develop a Mineral Waste Management Plan for the Izok and High Lake mines that will comprise standards for managing all mining and process waste generated at the Project, including waste rock, overburden and tailings. The plan will cover all stages of waste management from generation to final use and/or disposal. This will include:

- Predicted volumes/tonnage of waste rock, physical and chemical characteristics of the waste, and segregation criteria
- Analyses implemented in development of proposed pile design and runoff management plans
- Stockpile methods and procedures, including plans for mitigating the chemical and physical hazards of the waste
- Potential for rock heave phenomena and any resulting implications to ground stability
- Plans for accommodating projected volumes of materials at waste rock facilities, including contingency plans for situations in which the designed facility may not be adequate to accommodate waste
- Details regarding process for selecting preferred options for management of waste rock, including a discussion of alternative options
- Ongoing monitoring of waste disposal structures
- Regular monitoring of the geochemical properties of the waste piles

Non-Mineral Waste Management Plan

A management plan will also be developed to address all non-mineral wastes generated by operational activities at the Izok and High Lake Mine sites and at the Grays Bay Port. The plan will cover all wastes that are not residues directly derived from the mining or processing of rock, such as used oil, greases, batteries, solvents, spent reagents, contaminated soils and sewage residues. Key elements of the plan will comprise the following.

- Predicted quantities, characteristics, environmental hazards and risk associated with non-mineral wastes
- Operation of various waste management facilities including storage and disposal of domestic, industrial, or chemically contaminated wastes and hazardous substances
- Sorting of solid and liquid wastes into appropriate categories and storage sites
- Management of effluent treatment, recycling options, and discharge
- Discharge sites and water quality requirements

Landfill Management Plan

Pursuant to requirements for water licence application for the Project, a management plan will be developed for landfill facilities that will be constructed at the Izok and High Lake Mine sites and Grays Bay Port. The plan will describe the design of the landfills required for storage of non-hazardous wastes that cannot be recycled. This will include an inventory of the types and volumes of non-combustible, non-hazardous industrial wastes generated and land filled over the life of Project. The plan will detail operation of the landfills, as well as final reclamation.

Hazardous Materials Management Plan

A Hazardous Materials Management Plan will be prepared for the Izok and High Lake mines and the Grays Bay Port that will outline strategies specific to each particular waste generated at the Project. This plan will outline the information and protocols necessary for the safe handling, storage and transportation of hazardous materials that will be used at the Project based on best management practices. The plan will include:

- Waste and material inventories, including types and volumes of hazardous wastes generated by the Project
- Characterization of potential environmental hazards of these materials, and management of these hazards through the EMS
- Identification of storage and disposal methods
- Contingency and emergency response plans
- Type and delivery of training for those responsible for handling potentially hazardous materials
- Procedures for maintenance and review of records of hazardous material consumption and incidents
- Procedures to track and manage wastes generated through use of hazardous materials
- Responsibilities for managing hazardous materials

Incineration Management Plan

The Incineration Management Plan will describe the technologies, facilities and equipment that will be used to meet emission standards for incinerator operations. This will include plans for personnel training in incinerator management and operation, as well as procedures for collection and reporting of operational data and maintenance records.

12.2.2 Site Water Management Program

The efficient use of water and management of waste water discharges are important aspects of MMG's operations. MMG is developing a Water Management Strategy and detailed Water Management Plan for that will apply to all Project components. As part of its commitment to water, MMG is working towards having a functional Water Balance Model completed for all its operations. This will be a key aspect of designing the Izok Corridor Project.

Surface Water Management Plan

A Surface Water Management Plan will be developed to describe the overall strategies that will be applied at each Project site to intercept, collect, treat and monitor contact and non-contact water. This will include:

- Surface runoff, snowmelt and rainwater that might come in contact with contaminated areas
- Runoff from overburden stockpiles, waste rock stockpile areas and quarry sites, in particular stockpiles with ARD and ML potential
- Runoff from lined fuel tank farms, fuel transfer stations and landfill facilities
- Stormwater/freshet from roads, borrow areas and airstrips

The plan will describe the water management structures, wastewater treatment technologies and facilities, including estimated volumes and treatment targets of effluent, and applicable discharge standards. Further, it will describe the methods for any water conservation and recycling to maximize water reuse and minimize use of freshwater sources, and discuss how climate change has been considered in its design.

Specific to the Izok Mine site, the management plan will discuss plans for draining of Izok Lake and the design of the water diversion system to maintain hydraulic connectivity between Iznogoudh Lake to Itchen Lake, including the diversion channel, berm/ditch systems, and dams. This will include plans for closure and post-closure water quality monitoring and water treatment.

Groundwater Management Plan

A Groundwater Management Plan will be developed for the Izok and High Lake mines to provide strategies for controlling and collecting groundwater inflows into the open pit and underground mines, and methods for treatment, recycling and use of groundwater at the mine facilities or discharge to the receiving environments.

Waste Water Management Plan

A sewage and grey water management plan will be developed for the Project. This will include a description of the proposed treatment technologies and facilities, and estimated volumes and treatment targets of effluent, as well as applicable discharge standards. The plan will cover management of waste water generated during the full cycle of mine life, including treatment/disposal methods, options for sewage sludge, and contingency measures for sewage plant malfunction and/or disturbances, and associated spill response measures.

12.2.3 Risk Management Program

Risk Management and Emergency Response Plan

A Risk Management and Emergency Response Plan will be developed to assess and manage potential natural hazards associated with the Project, including the marine shipping routes. This will include an analysis of the potential for malfunctions and accidents associated with project facilities and activities, occurring independent of, or associated with natural hazards, as well as a sensitivity analysis.

The plan will include:

- Notification and reporting procedures, and associated responsible organizations and personnel
- Contingency procedures for each risk, and associated security systems and prevention measures
- Options for medical transport of injured staff or persons both within and beyond the project area
- Constraints resulting from logistics and time frames for prompt response
- Description of how relevant government agencies, Inuit organizations and local communities will be involved in development of plans
- Any other contemplated loss prevention practices

Spill Contingency Plan

MMG will develop Spill Contingency plans to deal with unforeseen petroleum and chemical accidents that may occur during construction and operation of the Izok Corridor Project. These will include a land-based spill contingency plan, oil handling facility contingency plan, and shipboard oil pollution emergency plan.

A preliminary land-based spill contingency plan has been prepared for the Izok Corridor Project, and is included as part of the KIA Inuit Land Use License Application (Appendix D of this document).

The final spill contingency plans will identify the lines of authority and responsibility, describe reporting and communication procedures, and describe the action plan that will be implemented in the event of a spill. The plan will include all information necessary to effectively control and cleanup a spill, reflecting current state-of-the art containment and cleanup procedures. Specifically, the plans will include:

- Measures for prevention of hazardous material spills
- Monitoring protocols
- Spill response and reporting procedures
  - Spill notification
  - Event criteria and trans-boundary considerations
  - Incident management team and roles
  - Contacts for government agencies, industry, and international organizations
  - Response escalation response support
  - Containment and clean up protocols for handling large and small spills
- Mandatory spill response equipment
- Employee and contractor spill training program

12.2.4 Shipping Management Program

A management program will be developed for the marine transportation component of the Project to ensure that MMG's shipping contractor meet or exceed environmental legislation, regulations and guidelines for barging and shipping operations. The plan will incorporate lessons learned from other

marine operations in the region into safety measures and operating procedures for all marine equipment. This will include

- A hazard identification analysis and a preliminary risk analysis for the western and eastern shipping routes, including measures to mitigate marine transportation risks
- Onboard waste management policies and guidelines for handling solid waste, sewage and other domestic waste generated by the ships
- Ballast Water Management Plan
- Proposed measures to reduce the risk of introduction of invasive aquatic and non-aquatic species
- Marine wildlife mitigation plan
- Procedures for managing and reporting potential accidents and malfunctions
- Smuggling prevention measures
- Identified third party liabilities
- Mitigation for potential socio-economic effects of shipping
- Ice Management Plan

12.2.5 Roads Management Program

The Izok Corridor Project will involve the development of a road network comprising service roads around the Izok and High Lake mine facilities and the Grays Bay Port, temporary winter roads, and the all-season access road linking the mine sites and port. MMG will develop a roads management plan that will be in effect throughout the duration of the Project to minimize effects of road construction and operation on air quality, waterbodies, wildlife interactions, and sensitive landforms.

The roads management program will outline road use policies (such as speed limits, closure, use of monitor and convoys), procedures for daily operation and maintenance, communication systems and protocols, emergency shelters, safety procedures, emergency reporting and procedures for fuel/chemical spills and other emergency events, and site reclamation plans.

A primary consideration in developing the roads management program will be safety of road users, as reduced visibility due to light conditions and weather could pose a serious safety issue. Protection of the environment will also be a key component of this program. As such, it will include:

- Traffic Management Plans
- Dust Management Plans
- Sediment and Erosion Control Plans
- Caribou Management Plans

The Caribou Management Plans will specifically address potential conflicts with the Bathurst and Dolphin and Union caribou herds during the migration, calving and post-calving periods.

12.2.6 Borrow Pit and Quarry Management Plan

Aggregate requirements for Project development works will be supplied by quarry and borrow sites located at the Izok and High Lake Mine sites, near the port, and along the Izok Road corridor. MMG will prepare a management plan that will guide site preparation, development and closure of these sites to mitigate potential environment effects associated with their use. This will include aggregate extraction and quarry methods, transportation and storage, including proposed methods for handling ice and managing water released by thawing of permafrost and ground ice. The plan will also outline mitigation measures to reduce ARD and ML potential for quarried materials and management strategies for dealing with drainage and erosion control, air quality and fish and wildlife issues. Project monitoring will evaluate consistency with the plan and operational compliance with regulations, leases and permits.

A detailed reclamation plan will be developed as required by the land use permit. Reclamation objectives will be developed in accordance with regulatory authorities.

12.2.7 Explosives Management Plan

The Izok Corridor Project will require ammonium nitrate and fuel oil (ANFO) and emulsion explosives for controlled blasting during mining of the Izok and High Mine deposits. In advance of mine construction, an Explosives Management Plan will be developed to manage the manufacture, transport, storage, handling and use of explosives for the Project. This plan will describe best management practices and safe handling procedures to minimize the loss of ammonia to mine rock and ore, and control leaching and runoff from explosive storage areas as per existing federal and territorial regulations relating to explosives manufacture, storage and use. The plan will also include spill containment prevention methods, personnel training and security measures.

12.2.8 Air Quality Monitoring and Management Plan

An Air Quality Monitoring and Management Plan will be developed to ensure compliance with applicable guidelines and regulations during construction and operation of the Project. The purpose of the plan will be to monitor and mitigate exhaust and fugitive dust emissions generated by Project facilities and activities to manage air quality effects on human health, the terrestrial environment and aquatic/marine environments. Specifically, the plan will include strategies to reduce and control air emissions, methods for air quality monitoring and related adaptive management measures, and procedures for management plan auditing and reporting of monitoring results.

As part of the Air Quality Management Plan, plans will be developed for minimizing greenhouse gas emissions from Project activities and infrastructure. An Energy Management Program will be key part of the Project, and energy efficiency targets will be a part of mine planning.

12.2.9 Noise Abatement Plan

MMG will develop a Noise Abatement Management Plan to mitigate potential noise emissions generated by Project facilities and activities at the port, mine sites and marine transportation routes. The plan will outline noise control methods, noise reduction through Project design, and occupational noise management and monitoring programs, including procedures for management plan auditing and reporting of monitoring results.

12.2.10 Aquatic Effects Monitoring and Management Program

As per requirements for water licence application for the Project, MMG will develop an Aquatic Effects Monitoring and Management Program. The objectives of this program will be to determine the short- and long-term effects of the Project on the aquatic environment, evaluate the accuracy of effect predictions, assess the effectiveness of the planned mitigation measures, and identify any additional measures that are required to reduce these effects. Key to this program will be the inclusion of adaptive strategies to trigger management actions based on monitoring results and feedback from regulators and other stakeholders. The program will outline the study design in terms of spatial and temporal sampling plan, and the monitoring schedule and methods. It will also describe the procedures for reporting of program results.

12.2.11 Wildlife Mitigation and Monitoring Program

A Wildlife Mitigation and Monitoring Program will be developed for the Izok Corridor Project, which will provide internal work procedures and best management practices for all activities at site to reduce Project-related effects on wildlife and wildlife habitat. The program will comprise the following.

- Selection criteria and rationale for wildlife species selected for monitoring and mitigation programs
- A description of how TK has been integrated into the development of mitigation and monitoring programs
- Details regarding plans for involvement of local hunters in wildlife monitoring program design and implementation
- Plans for coordinating wildlife studies/monitoring activities with other organizations, institutions, government departments and/or individual researchers conducting wildlife studies
- Discussion of how terrestrial wildlife surveys and monitoring protocols will be designed
- Description of monitoring study design and field methods
- Description of how indicators, sampling design, methodology and analysis will be appropriate and adequate to detect spatial and temporal project-related effects on wildlife
- Measures to avoid or reduce disturbance, harassment, injury or mortality of terrestrial and marine wildlife due to the Project
- Description of data analysis methods, including triggers/thresholds for adaptive management
- Mechanism for evaluation of mitigation effectiveness and adaptive management
- Quality assurance and quality control measures
- Procedures for reporting and plan updates
- Awareness training and education

12.2.12 No Net Loss Plan

MMG will develop a No Net Loss Plan that will describe potential Project effects on fish habitat, and a compensation plan to achieve “No Net Loss” of fish habitat productive capacity as it relates to the DFO

policy for the management of fish habitat. The plan will provide estimates of total fish habitat loss, and describe procedures and structures that will be designed to compensate for potential residual effects of the Project on fish and fish habitat. The no net loss plan will apply to fish habitat losses associated with draining of Izok Lake, road construction and any fish habitat losses associated with development of Grays Bay Port and associated infrastructure.

12.2.13 Closure and Reclamation Plan

MMG is currently developing guidance material for integrated closure planning across its operations, including a tool to formally quantify closure risks, closure costs and assess the quality of closure plans.

Closure is a foremost consideration in the planning of the Izok Corridor Project to ensure that environmental issues are taken into consideration early in mine design. A comprehensive Closure and Reclamation Plan will be developed for the Project to ensure minimal post-closure environmental effects, and public health and safety. The plan will outline how the various Project components (including the mines, port and all-season road) will be decommissioned, reclaimed and closed following mine closure. The plan will include a description of progressive reclamation measures and closure reclamation objectives and proposed monitoring that will be conducted during the closure and post-closure phases. Reclamation will be consistent with the Mine Site Reclamation Policy for Nunavut (AANDC 2002), and reclamation of IOL portions of the Project will follow the NTI reclamation policy. End land use objectives that guide these reclamation plans will be defined based on consultation with government agencies and local communities.

12.3 Key Socio-Economic Effects Management Program

MMG plans to take the necessary steps to properly manage socio-economic changes that might result from the Izok Corridor Project. The overall goal of Socio-economic Effects Management Program is to ensure that workers, community members and government organizations adversely affected by the Project have the capacity to cope with change and that MMG's effects management and benefits enhancement facilitate the ability to cope.

To manage the direct socio-economic effects of the Project, MMG will develop management plans in collaboration with various stakeholders. These plans will be grounded in MMG's corporate standards, the lessons learned elsewhere in Nunavut and northern Canada, positive precedents set in Inuit Impact and Benefits Agreements (IIBAs), Development Partnership Agreements and the results of consultation and collaboration with stakeholders. The following outlines some of the plans that MMG is considering. For each plan, MMG also expects to monitor and report on the implementation of these plans and programs.

12.3.1 Occupational Health and Safety Plan

Employee safety is one of MMG's four core values. Its SHEC Management System is used to drive a consistent approach across the company by providing overall strategies, policies and standards, performance management support, and building capability of employees. MMG's Injury Prevention Principles help to guide thoughts, behaviours and decisions relating to health and safety amongst its employees.

MMG will develop an Occupational Health and Safety Plan for the Izok Corridor Project in accordance with its SHEC Management System that will focus on accident prevention and risk management. The plan will cover such topics as:

- Best safety practices and safety awareness programs
- Employee training programs
- Procedures for emergency incidence reporting and action

12.3.2 Local Employment Plan

MMG is committed to identifying local skills and capabilities, and identifying opportunities for Project employment, and available benefits. MMG expects to work with Inuit organizations, affected communities and Government of Nunavut to develop strategic plans and programs that deliver on local employment commitments. This information is generally consolidated into a Human Resources Management Plan. These plans describe among other things:

- Fly-in fly-out arrangements
- Recruitment
- Education and skills opportunities
- Skills and accepted skill equivalency
- Counseling and support arrangements on site
- Banking and financial arrangements and training
- Employee benefits package
- On-site opportunities for recreation, sports and learning

12.3.3 Education and Skill Development Plan

Education and skill development will be a core part of MMG's local employment initiatives. This plan provides MMG's intentions for providing its workforce and others education and skill development opportunities. The plan may include:

- Apprenticeship programs
- Scholarship and funding programs for employees as well as community members
- Employee training and advancement
- Support job-related skills development in collaboration with Nunavut educational institutions

12.3.4 Local Procurement Plan

MMG will prepare a plan for promoting local contracting opportunities at the earliest possible stage of the Project. The Business Development Plan will include:

- Company policies and targets towards supporting local business procurement and development
- Specific arrangements for local businesses such as advanced notification, contract splitting to accommodate capacity of local businesses, etc.
- Terms and conditions for basic contract and service providers

12.3.5 Cultural Awareness and Heritage Resource Management Plan

MMG will develop a Cultural Awareness and Heritage Resource Management Plan that will describe general and site-specific measures to protect cultural and heritage resources and promote cultural awareness through training (e.g., cross cultural training). A core part of the plan will be a process for identifying, managing and responding to complaints and grievances in relation to any issues, including cultural heritage, and for recording and investigating incidents and disturbances.

MMG will prepare the Cultural Awareness and Heritage Resource Management Plan as per the legislative requirements of the Government of Nunavut.