



Chapter 10 – Summary of Project Effects

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10. SUMMARY OF PROJECT EFFECTS

After a systematic review and assessment of all project interactions with valued ecological, social and cultural components of the Minago Project environment, it has been determined that the project will have no significant adverse environmental effects. The design and project development process includes measures for ongoing assessment and action to ensure Victory Nickel Inc. (VNI) can meet their commitments to environmental protection. Adaptive management, including monitoring and refinement of mitigation measures, in consultation with the Manitoba Government (MBG), the Communities of Interest (COI) and other stakeholders, as appropriate will ensure project success.

10.1 Key Findings

10.1.1 Aquatic Habitat

Project effects on instream flows will be limited to:

- Increased flow in Oakley Creek during construction and mine operations due to effluent discharge from the Polishing Pond (PP).
- Increased flow in the Minago River during construction and mine operations due to effluent discharge from the Polishing Pond (PP).

Summaries of project effects on the receiving environment and proposed mitigation measures are given in Tables 10.1-1, 10.1-2, 10.1-3 and 10.1-4 for the construction, operations, decommissioning and closure phases, respectively.

Overall, no significant adverse effects on instream fish habitat are expected.

Metals and nitrate levels will be elevated above baseline conditions for short sections of the Oakley Creek and the Minago River between the effluent discharge points and upstream of the mixing zones. Baseline metals levels for aluminum, iron and cadmium in the Minago River at times exceed *CCME Guidelines for the Protection of Aquatic Life*. Site-specific water quality criteria for the protection of aquatic life will be established at the baseline monitoring sites (OCW1 for the Oakley Creek and MRW1 for the Minago River), in consultation with the MBG. Accordingly, no toxic effects on aquatic biota or fisheries are expected.

Environmental effects monitoring (EEM) results will be used to track trends in metals levels in waters and stream sediments. Increasing trends will trigger additional monitoring of fish and plant tissue to assess the risk of bioaccumulation and to guide adaptive management (improved treatment), if necessary. No significant effects on water quality or fish in the Minago River and Oakley Creek are expected.

Table 10.1- 1 Summary of Project Effects on the Receiving Environment and Proposed Mitigation Measures and Monitoring Programs during Construction

VECCs	EFFECTS	COMMENTS	MITIGATION MEASURES	MONITORING PROGRAMS
1. CLIMATE				
Localized increases in snowpack depth, water content and melt rate	Not significant			Automated climate data collection with periodic downloads as required
Localized changes in wind speed and direction, precipitation deposition, and solar radiation due to site clearing and project structures	Not significant		There will be no significant effects of the project on climate parameters; therefore, no mitigation measures are proposed	Manual data collection on monthly or periodic basis for snowpack depth and snow water equivalent
2. AIR QUALITY				
Fugitive dust emissions from ground disturbance, heavy construction equipment, and vehicles with potential effects on human health, vegetation and wildlife	Not significant		Apply dust suppressant (such as water spray to unconsolidated working surfaces and development rock and ore stockpiles) to minimize fugitive dust during periods of heavy activity and/or dry periods Minimize activities that generate large quantities of fugitive dust when windy Reseed disturbed areas and topsoil stockpiles to prevent fugitive dust from wind erosion	There are no monitoring programs identified for project effects or cumulative effects.
Fugitive dust and emissions of CACs from mining equipment and auxiliary site vehicles	Not significant		Recover waste heat from the generators to heat the process building, assay lab and camp Use low sulphur fuels including diesel fuel with a sulphur content, 15 ppm and propane with negligible sulphur content Meet applicable criteria with respect to emission quality on all combustion-related equipment and provide maintenance according to manufactures specifications	
Particulates and VOC emissions from site clearing and burning of woody debris	Not significant		Apply best practices regarding clearing Do not use prohibited materials (waste oil, tires) as accelerants	
GHG emissions from combustion engines, diesel generators and land clearing burning	Not significant		Apply best practices regarding clearing Do not use prohibited materials (waste oil, tires) as accelerants	
3. TERRAIN, SURFICIAL DEPOSITS AND GEOLOGY				
Modification of surficial materials and reduction in soil capability	Not significant		Pre-site inspections will allow avoidance, where applicable, of sensitive, of sensitive soil types Site clearing will be timed to minimize soil compaction. To the extent possible, top soil will be removed and stored Where possible, borrow pit locations will be selected based on sites that can be easily reclaimed Where possible, disturbed sites will be promptly revegetated (progressive reclamation) with appropriate plant materials and fertilization During the decommissioning and closure phases, overburden (surficial materials) will be re-sloped and laid down to avoid the creation of impermeable material Site clearing will be minimized during all project phases	Seasonal terrain stability assessments will determine site specific stability issues Seasonal erosion assessments will determine site specific stability issues Soil sampling will determine if soils have been contaminated or not
Increased soil erosion	Not significant		Sites will be assessed for soil erosion potential and measures to minimize the effects of any such erosion will be employed Installation of the site water management system (Section 2.14) during construction and operation throughout the project will minimize drainage and erosion from disturbed areas Implementation of the Erosion and Sedimentation Control Plan (Section 9: Environmental Management Plan) throughout the life of the project will reduce soil erosion Immediate revegetation with appropriate plant materials and fertilization on all disturbed sites (except roads and mining sites) will minimize this effect Where possible, disturbed slopes will be re-sloped to a 2H:1V ratio Sites will be cleaned up and progressively revegetated with appropriate plant species when no longer in use	
Terrain stability concerns	Not significant		Most disturbances will be restricted to times when soils are dry Where possible, disturbed slopes will be re-sloped to a 2H:1V ratio Where possible, subsurface and surface drainage will be controlled to prevent slope instability. This includes re-establishing surface drainage as soon as possible Pre-site inspections will allow avoidance, where applicable, of unstable or potentially unstable sites	
Potential contamination of soils	Not significant		Develop appropriate contingency and response measures Develop appropriate transport, storage and handling procedures to control spills Track the volume of hydrocarbons on site (used versus supplied) Ensure that the oil transfer systems are contained appropriately Develop monitoring programs that will identify, if any, contaminated soils	

Table 10.1-1 (Cont.'d) Summary of Project Effects on the Receiving Environment and Proposed Mitigation Measures and Monitoring Programs during Construction

VECCs	EFFECTS	COMMENTS	MITIGATION MEASURES	MONITORING PROGRAMS
4. SURFACE WATER HYDROLOGY				
Increased flows in Oakley Creek and Minago River due to Polishing Pond Discharges	Not significant		An adaptative monitoring program will be implemented to monitor the effects of the final effluent on the receiving watercourses Implement the Erosion and Sediment Control Plan (Section 9.2: Environmental Protection Plan) and Site Water Management Plan (Section 2.14)	Install new manual monitoring stations Installation of automated monitoring equipment in Oakley Creek and the Minago River (both upstream and downstream of the Polishing Pond Discharge points) Develop stage/discharge relationship to assess effects on wetted stream habitat Ongoing operation of recording pressure transducers on Oakley Creek and Minago River Monthly summer manual monitoring at stations on Oakley Creek and Minago River (upstream and downstream of the Minago Project discharges) Manual discharge measurements in conjunction with water quality sampling Photos taken annually during similar flow periods or times of year
5. SURFACE WATER AND SEDIMENT QUALITY				
Changes in water sediment quality in Oakley Creek from contaminated construction site runoff, waste rock storage, ore and frac sand stockpile	Not significant		Implement the Erosion and Sediment Control Plan (Section 9.2: Environmental Protection Plan) and Site Water Management Plan (Section 2.14) to ensure no contaminated drainage water enters Oakley Creek	Monitor TSS at settling basins and in receiving waters according to permit schedule Concurrent with EEM program on three-year cycle Initiate fish tissue sampling based on results of sediment analysis
Minesite clearing of vegetation and increased sediment input to Oakley Creek	Not significant		Minimize vegetation removal and soil disturbance within the RSA Implement the Erosion and Sediment Control Plan and the Site Water Management Plan (Section 2.14) to ensure no sediment laden water enters Oakley Creek Revegetate disturbed areas as soon as possible	
Sediment inputs during the construction of transportation corridors in the Oakley Creek watershed basin	Not significant		Implement the Erosion and Sediment Control Plan (Section 9.2: Environmental Protection Plan) Adhere to appropriate guidance documents for work around watercourses Revegetate cleared areas with native flora	
6. GROUNDWATER AND HYDROGEOLOGY				
Pit dewatering resulting in groundwater table depression and reduced base flows in Oakley Creek	Not significant		Based on follow up studies of effects of reduced low flows on fish habitat, evaluate options to reduce groundwater pumping or return more water from the Polishing Pond to Oakley Creek	Recording of climate data such as precipitation and temperature Year-round (i.e., monthly) monitoring of flow, temperature and water quality in Oakley Creek Monitor water levels in mine area piezometers and record dewatering pumping rates Monitor pit water and surface water quality in Oakley Creek
7. BENTHOS AND PERIPHYTON				
Altered benthic communities resulting from changes in water and sediment quality in Oakley Creek from contaminated construction site runoff, waste rock storage, and ore stockpiles	Not significant		Implement Erosion and Sediment Control Plan (Section 9: Environmental Management Plan) and water management plan (Section 2.14: Site Water Management) to ensure no contaminated drainage water enters Oakley Creek; muskegs will act as filters	Monitor TSS at settling basins and in receiving waters according to the Environmental Protection Plan schedule Conduct an EEM program on 3-year cycle following EEM methods Concurrent with EEM program, periphyton collection from natural substrates (using same methods as were used during the baseline studies) Concurrent with EEM program on three-year cycle Initiate benthic invertebrate or fish tissue sampling based on results of sediment analysis Assess phytoplankton, invertebrates and plants in TWRMF pond at closure

Table 10.1-1 (Cont.'d) Summary of Project Effects on the Receiving Environment and Proposed Mitigation Measures and Monitoring Programs during Construction

VECCs	EFFECTS	COMMENTS	MITIGATION MEASURES	MONITORING PROGRAMS
8. FISHERIES				
Effects of site clearing, grubbing, grading and sedimentation of instream fish habitat	Not significant	NO WORK WILL BE DONE NEAR RIPARIAN MANAGEMENT AREAS	<p>Locate buildings, TWRMF and facilities outside of Riparian Management Areas</p> <p>There will be no infrastructure near of in the vicinity of the riparian zone</p> <p>Implement a Sediment Control Plan (Section 9: Environmental Protection Plan)</p> <p>Implement a Fish Habitat Protection Plan (Section 9: Environmental Protection Plan)</p> <p>Implement a Site Water Management Plan (Section 2.14: Site Water Management)</p> <p>Revegetate stream banks with native plants, grasses, shrubs and trees</p> <p>Obtain required DFO and MB Gov.'t Authorizations for instream and riparian works, if any such works were to be needed</p>	
Effects of culvert placement on fish and fish egg mortality and sedimentation of instream fish habitat	Not significant	THERE ARE NO CULVERT OR STREAM CROSSINGS CONTEMPLATED FOR THE PROJECT	<p>Adhere to Standards and Best Practices for Instream Works, if any such works were to be needed</p> <p>If any crossing construction will be needed, it will be completed in the dry during the summer low flow period or in winter when streams are frozen solid (surface to substrate), i.e. during the period of least risk to fish and fish habitat</p> <p>Implement a sediment and erosion control plan (Section 9: Environmental Management Plan)</p> <p>Implement a Fish Habitat Protection Plan (Section 9: Environmental Protection Plan)</p> <p>Where applicable, conduct blasting in accordance with Guidelines for Use of Explosives in Canadian Fisheries Waters</p> <p>Maintain all culverts in good working order; replace dysfunctional culverts as required in association with sedimentation control measures</p>	<p>Turbidity and TSS monitoring during construction as required by permit</p> <p>Post-construction evaluation of instream habitat in the vicinity of culvert installations (sedimentation, fish passage, bank erosion, culvert effectiveness)</p> <p>Complete remedial action for any failed culvert, bank protection measures, etc.</p> <p>Conduct EEM Monitoring (Section 7.5: Surface Water Quality)</p>
Changes in stream flow (Minago River and Oakley Creek) due to discharges from the Polishing Pond with potential effects on instream habitat	Not significant		Implement the Site Water Management Plan (Section 2.14: Site Water Management and Section 7.4: Surface Water Hydrology)	Set aside contingency to initiate fish tissue sampling & analysis
Potential introduction of contaminants to fish habitat from fuel spills and concrete mixing	Not significant		<p>Discharge all wastewater in accordance with MB Gov.'t regulations and more than 100 m from fish habitat</p> <p>Implement a Site Water Management Plan (Section 2.14: Site Water Management)</p> <p>Implement an Erosion and Sediment Control Plan</p> <p>Adhere to protocols for refueling and equipment inspection and maintenance</p> <p>Implement the Mine Closure Plan</p> <p>Ensure stabilization of water quality prior to closure</p> <p>Maintain a water cover on the TWRMF as designed</p> <p>Conduct regular/routine monitoring of the TWRMF water quality and for potential leaks</p>	Collect fish samples at identified monitoring sites, and analyze for metal levels
Potential increase in angling pressure from construction crews	Not significant		<p>Implement personnel environmental awareness training and environmental protection policy (Section 9: Environmental Management Plan)</p> <p>All personnel will abide by applicable MB Gov.'t fishing regulations</p> <p>Signage will be posted along access road / PTH6 intersection describing responsible angling techniques</p>	
9. VEGETATION				
New clearing or other vegetation disturbance over 1323.7 ha	Not significant	The only permanent vegetation losses will be the areas occupied by the waste rock and overburden dumps, TWRMF and the pit area	<p>Implement an Erosion and Sediment Control Plan</p> <p>Develop a Reclamation Plan (revegetation program)</p>	The revegetated areas will be subject to scheduled periodic inspections for the first five years in order to track the revegetation success and to make adjustments to the program as required

Table 10.1-1 (Cont.'d) Summary of Project Effects on the Receiving Environment and Proposed Mitigation Measures and Monitoring Programs during Construction

VECCs	EFFECTS	COMMENTS	MITIGATION MEASURES	MONITORING PROGRAMS
10. WILDLIFE				
Increased mortality risk from collisions, hunting and poaching	Not significant		Implement a Wildlife Protection Plan (Section 9.5) Implement a Site Waste Management Plan (Section 9.5)	Conduct ongoing Manitoba regional moose and caribou population monitoring Record observations of bear signs and activities in the project area
Disruption to movement patterns from sensory disturbance, habitat fragmentation or Transportation Corridors	Not significant			Record and report incidents with problem wildlife, including vehicle collisions
Reduction to seasonal habitat availability from Transportation Corridors	Not significant			Consult with Manitoba First Nations, Norway House Resource Management Board and other interested parties relevant to the development of a wildlife protection plan for the Transportation Corridors at closure
11. LAND USE				
Transportation Infrastructure - increased traffic on PTH 6 during operations	Not significant		Consultation with the Manitoba Government, COI and other interest holders	Establish standard procedures, with appropriate avoidance windows in consultation with MBG and affected communities of interest
12. FIRST NATION AND TRADITIONAL KNOWLEDGE				
N/A	Not significant	Information provided during community engagement meetings with government and community members was also used to guide the development of baseline studies. In addition to the Communities of Interest, early input to baseline studies and information provided in subsequent meetings to VNI by members of the communities and Chiefs and Councils were used to guide project planning	Existing information on First Nations land use, water use, fish and terrestrial wildlife use was reviewed and compiled to assist in the identification and mitigation of the potential impacts from the project	N/A
13. ARCHAEOLOGY				
Based on their work, Quaternary Consultants Ltd. (2008) concluded that the proposed mine development will have no impact upon archaeological resources	Not significant	Quaternary Consultants Ltd. (2008) found that: • it is highly improbable that the area was used by inhabitants prior to the introduction of the fur trade, • the possibility of finding any evidence of Pre-contact utilization of the area is next to impossible, and • the likelihood of locating any evidence of Fur Trade or later use, other than prospecting and mining activities, is extremely minimal	N/A	N/A
14. SOCIO-ECONOMIC				
Effects on community health and amenities	Not significant	Employees will be housed the mine to avoid interaction with the locals		Utilization of the mine camp for the majority of the workers

Table 10.1- 2 Summary of Project Effects on the Receiving Environment and Proposed Mitigation Measures and Monitoring Programs during Operations

VECCs	EFFECTS	COMMENTS	MITIGATION MEASURES	MONITORING PROGRAMS
1. CLIMATE				
Localized increases in snowpack depth, water content and melt rate	Not significant		There will be no significant effects of the project on climate parameters; therefore, no mitigation measures are proposed	Automated climate data collection with periodic downloads as required
Localized changes in wind speed and direction, precipitation deposition, and solar radiation due to site clearing and project structures	Not significant			Manual data collection on monthly or periodic basis for snowpack depth and snow water equivalent
2. AIR QUALITY				
Fugitive dust emissions from ore crushing and vehicle use with potential effects on human health, vegetation and wildlife	Not significant		Apply dust suppressant (such as water spray to unconsolidated working surfaces and development rock and ore stockpiles) to minimize fugitive dust during periods of heavy activity and/or dry periods Minimize activities that generate large quantities of fugitive dust when windy Reseed disturbed areas and topsoil stockpiles to prevent fugitive dust from wind erosion	There are no monitoring programs identified for project effects or cumulative effects.
Fugitive dust and emissions of CACs from mining equipment and auxiliary site vehicles	Not significant		Recover waste heat from the generators to heat the process building, assay lab and camp Use low sulphur fuels including diesel fuel with a sulphur content, 15 ppm and propane with negligible sulphur content Meet applicable criteria with respect to emission quality on all combustion-related equipment and provide maintenance according to manufactures specifications	
3. TERRAIN, SURFICIAL DEPOSITS AND GEOLOGY				
Modification of surficial materials and recution in soil capability	Not significant		Pre-site inspections will allow avoidance, where applicable, of sensitive, of sensitive soil types Site clearing will be timed to minimize soil compaction. To the extent possible, top soil will by removed and stored Where possible, borrow pit locations will be selected based on sites that can be easily reclaimed Where possible, disturbed sites will be promptly revegetated (progressive reclamation) with appropriate plant materials and fertilization During the decommissioning and closure phases, overburden (surficial materials) will be re-sloped and laid down to avoid the creation of impermeable material Site clearing will be minimized during all project phases	Seasonal terrain stability assessments will determine site specific stability issues Seasonal erosion assessments will determine site specific stability issues Soil sampling will determine if soils have been contaminated or not
Increased soil erosion	Not significant		Sites will be assessed for soil erosion potential and measures to minimize the effects of any such erosion will be employed Installation of the site water management system (Section 2.14) during construction and operation throughout the project will minimize drainage and erosion from disturbed areas Implementation of the Erosion and Sedimentation Control Plan (Section 9: Environmental Management Plan) throughout the life of the project will reduce soil erosion Immediate revegetation with appropriate plant materials and fertilization on all disturbed sites (except roads and mining sites) will minimize this effect Where possible, disturbed slopes will be re-sloped to a 2H:1V ratio Sites will be cleaned up and progressively revegetated with appropriate plant species when no longer in use	
Terrain stability concerns	Not significant		Most disturbances will be restricted to times when soils are dry Where possible, disturbed slopes will be re-sloped to a 2H:1V ratio Where possible, subsurface and surface drainage will be controlled to prevent slope instability. This includes re-establishing surface drainage as soon as possible Pre-site inspections will allow avoidance, where applicable, of unstable or potentially unstable sites	
Potential contamination of soils	Not significant		Develop appropriate contingency and response measures Develop appropriate transport, storage and handling procedures to contol spills Track the volume of hydrocarbons on site (used versus supplied) Ensure that the oil transfer systems are contained appropriately Develop monitoring programs that will identify, if any, contaminated soils	

Table 10.1-2 (Cont.'d) Summary of Project Effects on the Receiving Environment and Proposed Mitigation Measures and Monitoring Programs during Operations

VECCs	EFFECTS	COMMENTS	MITIGATION MEASURES	MONITORING PROGRAMS
4. SURFACE WATER HYDROLOGY				
Increased flows in Oakley Creek and Minago River due to Polishing Pond Discharges	Not significant		An adaptive monitoring program will be implemented to monitor the effects of the final effluent on the receiving watercourses Implement the Erosion and Sediment Control Plan (Section 9.2: Environmental Protection Plan) and Site Water Management Plan (Section 2.14)	Install new manual monitoring stations Installation of automated monitoring equipment in Oakley Creek and the Minago River (both upstream and downstream of the Polishing Pond Discharge points) Develop stage/discharge relationship to assess effects on wetted stream habitat Ongoing operation of recording pressure transducers on Oakley Creek and Minago River Monthly summer manual monitoring at stations on Oakley Creek and Minago River (upstream and downstream of the Minago Project discharges) Manual discharge measurements in conjunction with water quality sampling Photos taken annually during similar flow periods or times of year
5. SURFACE WATER AND SEDIMENT QUALITY				
Changes in Oakley Creek flow regime related to Open pit dewatering and diversion, affecting dilution capacity	Not significant		Implement the Site Water Management Plan (Section 2.14: Site Water Management and Section 7.4: Surface Water Hydrology)	
Changes in water and sediment quality from TWRMF seepage to the Oakley Creek and the Minago River (metals, TSS, nutrients)	Not significant		Intercept seepage in collection ditches and recycle back to the TWRMF; ultimate discharge to the receiving environment will be via the Polishing Pond Monitor effluent and receiving water quality and initiate adaptive management as required	
Changes in water and sediment quality in Oakley Creek from various discharges (metals, TSS, nutrients)	Not significant		Ensure effluent quality meets CCME / Manitoba Tier II guidelines at Station OCAWR Discharge wastewater in accordance with Manitoba and federal regulations Monitor effluent and receiving water quality and initiate adaptive management as needed	Monitor TSS at settling basins and in receiving waters according to permit schedule
Changes in nitrate levels in Oakley Creek and Minago River from effluent discharges	Not significant		Ensure effluent quality meets CCME / Manitoba Tier II guidelines at Station OCAWR Discharge wastewater in accordance with Manitoba and federal regulations Monitor effluent and receiving water quality and initiate adaptive management as needed	Concurrent with EEM program on three-year cycle Initiate fish tissue sampling based on results of sediment analysis
Accumulation of metals in sediment of Oakley Creek and Minago River with a potential for bioaccumulation in benthic communities and higher trophic levels	Not significant		Monitor water and sediment concentrations in Oakley Creek and Minago River; if results indicate an increasing trend, collect benthic invertebrates and sculpin for tissue metals analysis Apply adaptive management measures, if necessary	
Introduction of sediment and other road runoff contaminants into Oakley Creek and Minago River	Not significant		Reclaim/revegetate disturbed areas that are no longer in use Implement the Erosion and Sediment Control Plan (Section 9: Environmental Protection Plan)	
6. GROUNDWATER AND HYDROGEOLOGY				
Pit dewatering resulting in groundwater table depression and reduced base flows in Oakley Creek	Not significant		Based on follow up studies of effects of reduced low flows on fish habitat, evaluate options to reduce groundwater pumping or return more water from the Polishing Pond to Oakley Creek	Recording of climate data such as precipitation and temperature Year-round (i.e., monthly) monitoring of flow, temperature and water quality in Oakley Creek Monitor water levels in mine area piezometers and record dewatering pumping rates Monitor pit water and surface water quality in Oakley Creek
7. BENTHOS AND PERIPHYTON				
Altered benthic communities in Oakley Creek and the Minago River from Polishing Pond discharges (metals, TSS)	Not significant		Implement Approved Water Management Plan based on approvals from federal and provincial governments regarding flow conditions in Minago River Intercept seepage in collection ditch, and recycle back to the TWRMF. Discharge to Minago River will be via the Polishing Pond (PP) Monitor effluent and receiving water quality and initiate adaptive management as required	Monitor TSS at settling basins and in receiving waters according to the Environmental Protection Plan schedule Conduct an EEM program on 3-year cycle following EEM methods Concurrent with EEM program, periphyton collection from natural substrates (using same methods as were used during the baseline studies)
Increased benthic productivity in Oakley Creek and the Minago River from nitrate and ammonia in effluent discharges	Not significant		Ensure effluent quality meets MMR objectives for the protection of aquatic life Discharge wastewater in accordance with Manitoba and Federal regulations Monitor water and sediment quality concentrations in Minago River; if results indicate (an) increasing trend(s), initiate collection of benthic invertebrates and fish for tissue metals analysis	Concurrent with EEM program on three-year cycle Initiate benthic invertebrate or fish tissue sampling based on results of sediment analysis Assess phytoplankton, invertebrates and plants in TWRMF pond at closure

Table 10.1-2 (Cont.'d) Summary of Project Effects on the Receiving Environment and Proposed Mitigation Measures and Monitoring Programs during Operations

VECCs	EFFECTS	COMMENTS	MITIGATION MEASURES	MONITORING PROGRAMS
8. FISHERIES				
Effects of vegetation management on the mine site and transportation corridors right-of-way on sedimentation of instream fish habitat	Not significant	NO WORK WILL BE DONE NEAR RIPARIAN MANAGEMENT AREAS	<p>Locate buildings, TWRMF and facilities outside of Riparian Management Areas</p> <p>There will be no infrastructure near of in the vicinity of the riparian zone</p> <p>Implement a Sediment Control Plan (Section 9: Environmental Protection Plan)</p> <p>Implement a Fish Habitat Protection Plan (Section 9: Environmental Protection Plan)</p> <p>Implement a Site Water Management Plan (Section 2.14: Site Water Management)</p> <p>Revegetate stream banks with native plants, grasses, shrubs and trees</p> <p>Obtain required DFO and MB Gov.'t Authorizations for instream and riparian works, if any such works were to be needed</p> <p>Adhere to Standards and Best Practices for Instream Works, if any such works were to be needed</p> <p>If any crossing construction will be needed, it will be completed in the dry during the summer low flow period or in winter when streams are frozen solid (surface to substrate), i.e. during the period of least risk to fish and fish habitat</p> <p>Where applicable, conduct blasting in accordance with Guidelines for Use of Explosives in Canadian Fisheries Waters</p> <p>Maintain all culverts in good working order; replace dysfunctional culverts as required in association with sedimentation control measures</p>	<p>Turbidity and TSS monitoring during construction as required by permit</p> <p>Post-construction evaluation of instream habitat in the vicinity of culvert installations (sedimentation, fish passage, bank erosion, culvert effectiveness)</p> <p>Complete remedial action for any failed culvert, bank protection measures, etc.</p> <p>Conduct EEM Monitoring (Section 7.5: Surface Water Quality)</p> <p>Set aside contingency to initiate fish tissue sampling & analysis</p> <p>Collect fish samples at identified monitoring sites, and analyze for metal levels</p>
Changes in stream flow and habitat capability due to pit dewatering in Oakley Creek and from the TWRMF	Not significant	THERE ARE NO CULVERT OR STREAM CROSSINGS CONTEMPLATED FOR THE PROJECT	Implement the Site Water Management Plan (Section 2.14: Site Water Management and Section 7.4: Surface Water Hydrology)	
Potential increase in angling pressure from project personnel	Not significant		<p>Implement personnel environmental awareness training and environmental protection policy (Section 9: Environmental Management Plan)</p> <p>All personnel will abide by applicable MB Gov.'t fishing regulations</p> <p>Signage will be posted along access road / PTH6 intersection describing responsible angling techniques</p>	
9. VEGETATION				
Progressive land reclamation as areas are abandoned and revegetated-	Not significant	The only permanent vegetation losses will be the areas occupied by the waste rock and overburden dumps, TWRMF and the pit area	<p>Implement an Erosion and Sediment Control Plan</p> <p>Develop a Reclamation Plan (revegetation program)</p>	The revegetated areas will be subject to scheduled periodic inspections for the first five years in order to track the revegetation success and to make adjustments to the program as required
10. WILDLIFE				
Increased mortality risk from collisions, hunting and poaching	Not significant		Implement a Wildlife Protection Plan (Section 9.5)	<p>Conduct ongoing Manitoba regional moose and caribou population monitoring</p> <p>Record observations of bear signs and activities in the project area</p>
Disruption to movement patterns from sensory disturbance, habitat fragmentation or Transportation Corridors	Not significant		Implement a Site Waste Management Plan (Section 9.5)	Record and report incidents with problem wildlife, including vehicle collisions
Reduction to seasonal habitat availability from Transportation Corridors	Not significant			Consult with Manitoba First Nations, Norway House Resource Management Board and other interested parties relevant to the development of a wildlife protection plan for the Transportation Corridors at closure
11. LAND USE				
Transportation Infrastructure - increased traffic on PTH 6 during operations	Not significant		Consultation with the Manitoba Government, COI and other interest holders	Establish standard procedures, with appropriate avoidance windows in consultation with MBG and affected communities of interest
12. FIRST NATION AND TRADITIONAL KNOWLEDGE				
N/A	Not significant	Information provided during community engagement meetings with government and community members was also used to guide the development of baseline studies. In addition to the Communities of Interest, early input to baseline studies and information provided in subsequent meetings to VNI by members of the communities and Chiefs and Councils were used to guide project planning	Existing information on First Nations land use, water use, fish and terrestrial wildlife use was reviewed and compiled to assist in the identification and mitigation of the potential impacts from the project	N/A
13. ARCHAEOLOGY				
Based on their work, Quaternary Consultants Ltd. (2008) concluded that the proposed mine development will have no impact upon archaeological resources	Not significant	Quaternary Consultants Ltd. (2008) found that: <ul style="list-style-type: none"> • it is highly improbable that the area was used by inhabitants prior to the introduction of the fur trade, • the possibility of finding any evidence of Pre-contact utilization of the area is next to impossible, and • the likelihood of locating any evidence of Fur Trade or later use, other than prospecting and mining activities, is extremely minimal 	N/A	N/A
14. SOCIO-ECONOMIC				
Effects on community health and amenities	Not significant	Employees will be housed the mine to avoid interaction with the locals		Utilization of the mine camp for the majority of the workers

Table 10.1- 3 Summary of Project Effects on the Receiving Environment and Proposed Mitigation Measures and Monitoring Programs during Decommissioning

VECCs	EFFECTS	COMMENTS	MITIGATION MEASURES	MONITORING PROGRAMS
1. CLIMATE				
Localized increases in snowpack depth, water content and melt rate	Not significant		There will be no significant effects of the project on climate parameters; therefore, no mitigation measures are proposed	Automated climate data collection with periodic downloads as required
Localized changes in wind speed and direction, precipitation deposition, and solar radiation due to site clearing and project structures	Not significant			Manual data collection on monthly or periodic basis for snowpack depth and snow water equivalent
2. AIR QUALITY				
No effect				
3. TERRAIN, SURFICIAL DEPOSITS AND GEOLOGY				
Modification of surficial materials and recution in soil capability	Not significant		<p>Pre-site inspections will allow avoidance, where applicable, of sensitive, of sensitive soil types</p> <p>Site clearing will be timed to minimize soil compaction. To the extent possible, top soil will by removed and stored</p> <p>Where possible, borrow pit locations will be selected based on sites that can be easily reclaimed</p> <p>Where possible, disturbed sites will be promptly revegetated (progressive reclamation) with appropriate plant materials and fertilization</p> <p>During the decommissioning and closure phases, overburden (surficial materials) will be re-sloped and laid down to avoid the creation of impermeable material</p> <p>Site clearing will be minimized during all project phases</p>	<p>Seasonal terrain stability assessments will determine site specific stability issues</p> <p>Seasonal erosion assessments will determine site specific stability issues</p> <p>Soil sampling will determine if soils have been contaminated or not</p>
Increased soil erosion	Not significant		<p>Sites will be assessed for soil erosion potential and measures to minimize the effects of any such erosion will be employed</p> <p>Installation of the site water management system (Section 2.14) during construction and operation throughout the project will minimize drainage and erosion from disturbed areas</p> <p>Implementation of the Erosion and Sedimentation Control Plan (Section 9: Environmental Management Plan) throughout the life of the project will reduce soil erosion</p> <p>Immediate revegetation with appropriate plant materials and fertilization on all disturbed sites (except roads and mining sites) will minimize this effect</p> <p>Where possible, disturbed slopes will be re-sloped to a 2H:1V ratio</p> <p>Sites will be cleaned up and progressively revegetated with appropriate plant species when no longer in use</p>	
Terrain stability concerns	Not significant		<p>Most disturbances will be restricted to times when soils are dry</p> <p>Where possible, disturbed slopes will be re-sloped to a 2H:1V ratio</p> <p>Where possible, subsurface and surface drainage will be controlled to prevent slope instability. This includes re-establishing surface drainage as soon as possible</p> <p>Pre-site inspections will allow avoidance, where applicable, of unstable or potentially unstable sites</p>	
4. SURFACE WATER HYDROLOGY				
Increased flows in Oakley Creek and Minago River due to Polishing Pond Discharges	Not significant		<p>An adaptative monitoring program will be implemented to monitor the effects of the final effluent on the receiving watercourses</p> <p>Implement the Erosion and Sediment Control Plan (Section 9.2: Environmental Protection Plan) and Site Water Management Plan (Section 2.14)</p>	<p>Install new manual monitoring stations</p> <p>Installation of automated monitoring equipment in Oakley Creek and the Minago River (both upstream and downstream of the Polishing Pond Discharge points)</p> <p>Develop stage/discharge relationship to assess effects on wetted stream habitat</p> <p>Ongoing operation of recording pressure transducers on Oakley Creek and Minago River</p> <p>Monthly summer manual monitoring at stations on Oakley Creek and Minago River (upstream and downstream of the Minago Project discharges)</p> <p>Manual discharge measurements in conjunction with water quality sampling</p> <p>Photos taken annually during similar flow periods or times of year</p>

Table 10.1-3 (Cont.'d) Summary of Project Effects on the Receiving Environment and Proposed Mitigation Measures and Monitoring Programs during Decommissioning

VECCs	EFFECTS	COMMENTS	MITIGATION MEASURES	MONITORING PROGRAMS
5. SURFACE WATER AND SEDIMENT QUALITY				
Changes in water and sediment quality in Oakley Creek from site runoff where facilities have been removed and/or the ground has been recontoured	Not significant		Implement the Erosion and Sediment Control Plan (Section 9: Environmental Protection Plan) and the Site Water Management Plan (Section 2.14) to ensure no contaminated drainage water enters Oakley Creek Reseed recontoured areas as soon as possible	Monitor TSS at settling basins and in receiving waters according to permit schedule
Changes in water and sediment quality in Oakley Creek from the Polishing Pond effluent discharges (metals, TSS, nutrients)	Not significant		Discharge wastewater in accordance with Manitoba and federal regulations Ensure all discharges meet or exceed permit requirements Monitor effluent and receiving water quality and initiate adaptive management as required	Concurrent with EEM program on three-year cycle
6. GROUNDWATER AND HYDROGEOLOGY				
Pit dewatering resulting in groundwater table depression and reduced base flows in Oakley Creek	Not significant		Based on follow up studies of effects of reduced low flows on fish habitat, evaluate options to reduce groundwater pumping or return more water from the Polishing Pond to Oakley Creek	Recording of climate data such as precipitation and temperature Year-round (i.e., monthly) monitoring of flow, temperature and water quality in Oakley Creek Monitor water levels in mine area piezometers and record dewatering pumping rates Monitor pit water and surface water quality in Oakley Creek
7. BENTHOS AND PERIPHYTON				
Reduced benthic productivity in Oakley Creek resulting from changes in water quality from site runoff where facilities have been removed and/or the ground has been recontoured	Not significant		Implement the Erosion and Sediment Control Plan and water management plan to ensure no contaminated drainage water enters Oakley Creek or the Minago River Reseed recontoured areas as soon as possible Ensure effluent quality meets MMER objectives for the protection of aquatic life	Monitor TSS at settling basins and in receiving waters according to the Environmental Protection Plan schedule Conduct an EEM program on 3-year cycle following EEM methods Concurrent with EEM program, periphyton collection from natural substrates (using same methods as were used during the baseline studies)
Reduced benthic productivity in Oakley Creek resulting from changes in water quality related to Polishing Pond effluent treatment and discharges (metals, nutrients)	Not significant		Discharge wastewater in accordance with Manitoba and Federal regulations Monitor effluent and receiving water quality and initiate adaptive management as required	Concurrent with EEM program on three-year cycle Initiate benthic invertebrate or fish tissue sampling based on results of sediment analysis Assess phytoplankton, invertebrates and plants in TWRMF pond at closure
8. FISHERIES				
Effects of mine infrastructure removal on riparian and instream fish habitat in Oakley Creek (sedimentation)	Not significant	NO WORK WILL BE DONE NEAR RIPARIAN MANAGEMENT AREAS		
Effects of Polishing Pond decant on instream fish habitat (water quality) and fish tissue metals levels in Oakley Creek and Minago River	Not significant	THERE ARE NO CULVERT OR STREAM CROSSINGS CONTEMPLATED FOR THE PROJECT	Implement the Site Water Management Plan (Section 2.14: Site Water Management and Section 7.4: Surface Water Hydrology)	Post-construction evaluation of instream habitat in the vicinity of culvert installations (sedimentation, fish passage, bank erosion, culvert effectiveness)
Changes in stream flow and habitat capability due to the recovery of the groundwater table in the Oakley Creek basin	Not significant		Implement the Site Water Management Plan (Section 2.14: Site Water Management and Section 7.4: Surface Water Hydrology)	Complete remedial action for any failed culvert, bank protection measures, etc. Conduct EEM Monitoring (Section 7.5: Surface Water Quality)
Potential increase in angling pressure from project personnel	Not significant		Implement personnel environmental awareness training and environmental protection policy (Section 9: Environmental Management Plan) All personnel will abide by applicable MB Gov.'t fishing regulations Signage will be posted along access road / PTH6 intersection describing responsible angling techniques	

Table 10.1-3 (Cont.'d) Summary of Project Effects on the Receiving Environment and Proposed Mitigation Measures and Monitoring Programs during Decommissioning

VECCs	EFFECTS	COMMENTS	MITIGATION MEASURES	MONITORING PROGRAMS
9. VEGETATION				
Progressive land reclamation as areas are abandoned and revegetated	Not significant	The only permanent vegetation losses will be the areas occupied by the waste rock and overburden dumps, TWRFM and the pit area	Implement an Erosion and Sediment Control Plan Develop a Reclamation Plan (revegetation program)	The revegetated areas will be subject to scheduled periodic inspections for the first five years in order to track the revegetation success and to make adjustments to the program as required
10. WILDLIFE				
Increased mortality risk from collisions, hunting and poaching	Not significant		Implement a Wildlife Protection Plan (Section 9.5) Implement a Site Waste Management Plan (Section 9.5)	Conduct ongoing Manitoba regional moose and caribou population monitoring Record observations of bear signs and activities in the project area
Disruption to movement patterns from sensory disturbance, habitat fragmentation or Transportation Corridors	Not significant			Record and report incidents with problem wildlife, including vehicle collisions
Reduction to seasonal habitat availability from Transportation Corridors	Not significant			Consult with Manitoba First Nations, Norway House Resource Management Board and other interested parties relevant to the development of a wildlife protection plan for the Transportation Corridors at closure
11. LAND USE				
Transportation Infrastructure - increased traffic on PTH 6 during operations	Not significant		Consultation with the Manitoba Government, COI and other interest holders	Establish standard procedures, with appropriate avoidance windows in consultation with MBG and affected communities of interest
12. FIRST NATION AND TRADITIONAL KNOWLEDGE				
N/A				
13. ARCHAEOLOGY				
N/A				
14. SOCIO-ECONOMIC				
Effects on community health and amenities	Not significant	Employees will be housed the mine to avoid interaction with the locals		Utilization of the mine camp for the majority of the workers

Table 10.1- 4 Summary of Project Effects on the Receiving Environment and Proposed Mitigation Measures and Monitoring Programs at Closure

VECCs	EFFECTS	COMMENTS	MITIGATION MEASURES	MONITORING PROGRAMS
1. CLIMATE				
Ongoing localized effects of clearing and snow plowing on wind, solar radiation and snowpack	Not significant		There will be no significant effects of the project on climate parameters; therefore, no mitigation measures are proposed	N/A
2. AIR QUALITY				
No effect				
3. TERRAIN, SURFICIAL DEPOSITS AND GEOLOGY				
No effect				
4. SURFACE WATER HYDROLOGY				
Reduced low flows in Oakley Creek and Minago River to base flow due to discontinued discharges to the watersheds	Not significant		Implement the Site Water Management Plan (Section 2.14: Site Water Management and Section 7.4: Surface Water Hydrology)	Conduct EEM Monitoring (Section 7.5: Surface Water Quality)
5. SURFACE WATER AND SEDIMENT QUALITY				
Changes in water and sediment quality of Oakley Creek from ongoing TWRMF supernatant discharge	Not significant		Adhere to the Mine Closure Plan Monitor water and sediment quality during decommissioning to confirm the effectiveness of management Maintain a water cover on top of the TWRMF as designed to minimize ARD/ML concerns	Conduct EEM Monitoring (Section 7.5: Surface Water Quality)
6. GROUNDWATER AND HYDROGEOLOGY				
Flooding of Pit and gradual recovery of groundwater levels and base flows in Oakley Creek	Not significant		N/A	N/A
Contaminated Pit water from flooded Pit discharging to Oakley Creek basin and ultimately to Oakley Creek	Not significant		Monitor pit water quality. Based on results, initiate enhanced surface water quality monitoring in Oakley Creek as required. Evaluate contingency measures for enhanced management of groundwater quality at closure	Conduct EEM Monitoring (Section 7.5: Surface Water Quality)
7. BENTHOS AND PERIPHYTON				
Uptake of metals by invertebrates in the TWRMF, and their consumption by birds and other wildlife	Not significant		Adhere to the Mine Closure Plan requirements Test of water quality during decommissioning to confirm effectiveness of adaptive management	Monitor TSS at settling basins and in receiving waters according to the Environmental Protection Plan schedule Conduct an EEM program on 3-year cycle following EEM methods Concurrent with EEM program, periphyton collection from natural substrates (using same methods as were used during the baseline studies)
Reduced wetted habitat and benthic productivity in Oakley Creek and the Minago River resulting from flow changes related to discontinued discharge of Polishing Pond effluent at closure	Not significant		Maintain water cover over the disposed tailings and ultramafic waste rock as designed	Concurrent with EEM program on three-year cycle Initiate benthic invertebrate or fish tissue sampling based on results of sediment analysis Assess phytoplankton, invertebrates and plants in TWRMF pond at closure

Table 10.1-4 (Cont.'d) Summary of Project Effects on the Receiving Environment and Proposed Mitigation Measures and Monitoring Programs at Closure

VECCs	EFFECTS	COMMENTS	MITIGATION MEASURES	MONITORING PROGRAMS
8. FISHERIES				
Effects of Polishing Pond decant on instream fish habitat (water quality) and fish tissue metals levels in Oakley Creek and Minago River	Not significant		Implement the Site Water Management Plan (Section 2.14: Site Water Management and Section 7.4: Surface Water Hydrology)	Conduct EEM Monitoring (Section 7.5: Surface Water Quality)
Potential increase in angling pressure from public access	Not significant		Implement personnel environmental awareness training and environmental protection policy (Section 9: Environmental Management Plan) All personnel will abide by applicable MB Gov't fishing regulations Signage will be posted along access road / PTH6 intersection describing responsible angling techniques	
9. VEGETATION				
Progressive land reclamation as areas are abandoned and revegetated	Not significant	The only permanent vegetation losses will be the areas occupied by the waste rock and overburden dumps, TWRMF and the pit area	Implement an Erosion and Sediment Control Plan Develop a Reclamation Plan (revegetation program)	The revegetated areas will be subject to scheduled periodic inspections for the first five years in order to track the revegetation success and to make adjustments to the program as required
10. WILDLIFE				
Increased mortality risk from collisions, hunting and poaching	Not significant		Implement a Wildlife Protection Plan (Section 9.5) Implement a Site Waste Management Plan (Section 9.5)	Conduct ongoing Manitoba regional moose and caribou population monitoring
Disruption to movement patterns from sensory disturbance, habitat fragmentation or Transportation Corridors	Not significant			Record observations of bear signs and activities in the project area
Reduction to seasonal habitat availability from Transportation Corridors	Not significant			Record and report incidents with problem wildlife, including vehicle collisions Consult with Manitoba First Nations, Norway House Resource Management Board and other interested parties relevant to the development of a wildlife protection plan for the Transportation Corridors at closure
11. LAND USE				
N/A				
12. FIRST NATION AND TRADITIONAL KNOWLEDGE				
N/A				
13. ARCHAEOLOGY				
N/A				
14. SOCIO-ECONOMIC				
N/A				

Summaries of project effects on the receiving environment and proposed mitigation measures are given in Tables 10.1-1, 10.1-2, 10.1-3 and 10.1-4 for the construction, operations, decommissioning and closure phases, respectively.

10.1.2 Wildlife

The project results in disturbance of a relatively small area within a region that is poor in wildlife habitat and some existing disturbances from quarrying operations within the RSA and the PTH 6. Using conservative assumptions about the size of the project disturbance footprint and low wildlife levels, effects on habitat availability for all valued species assessed are expected to be low in magnitude and therefore not significant.

Barrier effects to wildlife movement are predicted to be low. The project is outside of the perimeter of the William Caribou Herd. Frac sand and concentrate haul south to Winnipeg will avoid potential effects on utilized caribou range to the north. The relatively confined area for the industrial area and controlled level of traffic will allow wildlife to cross with little impediment. Accordingly, effects on wildlife movement patterns are expected to be not significant.

Potential wildlife mortality due to wildlife collisions and hunting on the LSA and RSA may be a concern due to increased traffic. However, due to the low levels of wildlife present in the LSA and RSA, wildlife collisions will be minimal. Mitigation measures to manage hunting/collision mortality will be implemented as part of the Environmental Protection Plan. Mitigation will include:

- Access to the private mine transportation corridors will be restricted by a locked gate during the construction, operations, and decommissioning and closure phases of the project.
- Firearms will not be permitted.
- Hunting and fishing will be prohibited at all times on or in the vicinity of the project site. This restriction will apply to all mine employees, managers and contractors. It will be in effect throughout the life of the project from construction through to closure and reclamation. Infringement of this policy is to be reported.
- The maximum speed limit on all access roads will be set at 60 km/hr.
- Posted speed limits on PTH 6 will be adhered to any observed wildlife corridors will be signed to alert drivers to potential wildlife crossings.
- Any wildlife mortality on the transportation corridors will be recorded and reported and any modifications to the mitigation measures will be considered in consultation with MBG, as required. Based on the effectiveness of these mitigation measures, effects of the access road on wildlife mortality during construction, operations and decommissioning are expected to be of low magnitude and not significant.
- Summaries of project effects on the receiving environment and proposed mitigation measures are given in Tables 10.1-1, 10.1-2, 10.1-3 and 10.1-4 for the construction, operations, decommissioning and closure phases, respectively.

10.1.3 Socio-Economic Conditions

The Minago Project will be under construction between 2011 and 2013, at a capital cost of approximately \$596 million. Construction will require more than 600 people that will be housed in a camp, located near the mine. Construction workers will be sourced locally as much as possible.

The direct impact in Manitoba of the construction of the mine will directly increase the GDP by \$202.6 million. When purchases in Manitoba are accounted for, the province's GDP will be increased to \$268.2 million total. Manitoba's GDP in the year 2008 was approximately \$51,000,000,000 (Stats Canada). The \$268.2 million total (direct + indirect, excluding \$51 Billion reported in 2008) impact in Manitoba will therefore, likely account for a 0.5% boost in GDP.

The company will employ 422 workers to operate and maintain the project, in addition to approximately 220 contract truckers and related maintenance workers.

Overall, construction of the project is estimated to yield \$6.3 million in personal income taxes to governments in Canada and about \$4.3 million in personal income taxes to governments in Manitoba.

VNI is committed to sourcing workers and providers of goods and services for the Minago Project in Manitoba, wherever that is commercially feasible. In addition, the company is committed to ensuring the modest increase in road traffic resulting from frac sand and concentrate haul and incidental travel has little or no effect on orderly traffic flow and traffic safety.

Lastly, although many Manitoba residents will be employed at the mine, the company will work to ensure that First Nations and Metis employees in particular will have opportunities to balance traditional pursuit on the land with participation in the wage economy.

Summaries of project effects on the receiving environment and proposed mitigation measures are given in Tables 10.1-1, 10.1-2, 10.1-3 and 10.1-4 for the construction, operations, decommissioning and closure phases respectively.

10.1.4 The Communities of Interest

The COI (Grand Rapids, Moose Lake and Cross Lake (Norway House is expected to participate)) are currently working on a Socio-Economic Participation Agreement (SEPA) with VNI. The SEPA will provide a basis for participation by all COI in: 1) project exploration and development activities; 2) the review of environmental, social and economic matters related to these activities; and, 3) the environmental assessment and permitting of the Minago Project. The SEPA provides the COI with the following during exploration and development activities:

- Employment and service contract opportunities;
- The establishment of a management committee to deal with all matters related to the Project; and

- Funding for education, training and local economic development initiatives.

VNI will benefit from access to the local work force and from their support for responsible exploration and development for the Minago Project. In recognition of the achievement of reaching the mutually beneficial SEPA, VNI is open to the idea of COI to become potential shareholders of the Company.