DEPARTMENT OF NATURAL RESOURCES

RECORD OF DECISION

In the Matter of the Determination of the Need for an Environmental Impact Statement for the Northshore Mining Company Progression of the Ultimate Pit Limit in St. Louis County, Minnesota

FINDINGS OF FACT, CONCLUSIONS, AND ORDER

FINDINGS OF FACT

1. The Northshore Mining Company (Northshore) owns and operates the Peter Mitchell Mine, an open pit taconite mine near Babbitt, Minnesota. Lean ore, rock, and surface material are stripped and stockpiled onsite to access the underlying ore. The mined iron ore is loaded into rail cars and transported to Northshore's processing plant located at Silver Bay, Minnesota for the production of taconite pellets and management of tailings. The mine has all the facilities required to meet the processing plant's ore demands at full plant capacity. The Peter Mitchell Mine has been in operation since the 1950s and has sufficient iron ore reserves for operating the processing plant for about 70 years into the future.

2. The current Ultimate Pit Limit (UPL) that is identified in the current Minnesota Department of Natural Resources (DNR) Permit to Mine is proposed to be adjusted to allow the continued progression of mining in the Main Pit. The proposal is specifically identified in Northshore's Permit to Mine Amendment application. The proposed Northshore Mining Company Progression of the Ultimate Pit Limit Project (Project) is an incremental development that would extend mining consistent with Northshore's conceptual long term development plan.

3. The proposed Project would extend the width of the Main Pit (mined area) from 0.05 to 0.14 miles along its southern edge for a length of 1.5 miles. The proposed Project would result in the conversion of approximately 108 acres of undeveloped land to mine use. An additional 153 acres would be required for the proposed stockpile, which would be located entirely within the existing UPL on previously mined land.

4. Northshore proposes to progress the UPL within its Permit to Mine at its Peter Mitchell Mine to access additional economic taconite ore. In this 108 acre progression, the taconite ore is overlain by Type II Virginia Formation (VF) rock that would be mined and stockpiled to access the ore. Northshore would permanently stockpile Type II VF rock from the progression on-site following a stockpile plan that minimizes contact of groundwater and runoff with stockpiled rock.

5. Corrections to the EAW or changes in project information since the EAW was published:

   Langley Creek Watershed

   The EAW incorrectly states that the entire project is contained within the Langley Creek watershed that flows to the Dunka River watershed. In fact, approximately 58 acres of the 108 acre expansion is within the Langley Creek watershed and approximately 50 acres is within the adjacent Unnamed Creek watershed. Both Langley Creek and the adjacent Unnamed Creek flow to the Dunka River watershed. At least a portion of the proposed expansion within the Unnamed Creek watershed currently flows toward the existing mine pit and is currently being discharged at the existing mine pit sumps.

Langley Creek Impacts

The EAW incorrectly describes an estimated 100 gpm increase in flow in Langley Creek. This 100 gpm estimate was derived using an area that is larger than the 108 acre pit expansion (the pit expansion area plus 99 acres adjacent to the expansion area). This overestimates the impact to Langley Creek because it includes an additional 99 acres. The revised Langley Creek flow increase is 55 gpm, which is less than the 100 gpm increase referenced in the EAW. The 55 gpm increase is based solely on the 108 acre pit expansion area.

Two estimates of increased flow to Langley Creek were derived using different analytical approaches. Golder and Associates, Inc.'s (Golder) water balance approach estimated an increase of 100 gpm and the more recent watershed yield approach estimated an increase of 55 gpm. This range of estimated increase in flow to Langley Creek does not change the assessment of impact to Langley Creek. The range is small and within the expected reasonable variance to assess environmental effects.

6. The DNR published a public notice for the Northshore Permit Amendment Application on June 28, 2013. The deadline for submitting objections to the application was August 19, 2013. DNR received 16 objections during this period.

7. On August 22, 2013, the Environmental Quality Board (EQB) received a petition requesting that an Environmental Assessment Worksheet (EAW) be prepared for a mine progression as proposed in the Northshore Permit Amendment Application to the Northshore Mining Company Permit to Mine. The EQB determined that the petition met the criteria described in Minn. R. 4410.1100 subp. 1-4 (2013*)* and that the DNR was the appropriate governmental unit to determine the need for an EAW.

8. The notice of the petition and its assignment to the DNR was published in the EQB Monitor on September 2, 2013. Minn. R. 4410.1100, subp. 7 (2013) provides that upon receipt of a petition for an EAW, the Responsible Government unit (RGU) shall have 15 days from the receipt of the petition to decide the need for an EAW. The DNR requested an additional 15 days to decide on the need for an EAW pursuant to Minn. R. part 4410.1100, sub. 7 (2013). The EQB granted the DNR request for extension permitting DNR 30 days from receipt of the petition for making a need decision.

9. On September 30, 2013 the DNR received a letter from Northshore requesting that the DNR prepare a discretionary EAW for the Project pursuant to Minn. R. 4410.1000, subp. 3 (2013). On October 7, 2013, the DNR completed the Record of Decision on the Petitioner's request that an EAW be completed. The DNR denied the Petition for the completion of an EAW for the proposed Northshore Project, as identified in the draft Amendment to the Permit to Mine. The DNR's determination was based on its conclusion that the need to order an EAW pursuant to the petition became moot when the DNR accepted Northshore's request for a discretionary EAW.

10. The DNR prepared an EAW for the proposed Project according to guidance provided under Minn. R. 4410.1400 and 4410.1500 (2013). The EAW was filed with the Minnesota Environmental Quality Board (EQB) and a notice of its availability was published in the EQB Monitor on September 15, 2014. A copy of the EAW was sent to all persons on the EQB Distribution List, to those persons known by the DNR to be interested in the proposed Project, and to those persons requesting a copy. A press release announcing the availability of the EAW was sent to newspapers and radio and television stations statewide. Copies of the EAW were also made available for public review and inspection at the Minneapolis Public Library; the

Duluth Library; Babbitt Public Library; DNR Library (St. Paul); and the DNR Northeast Regional Office (Grand Rapids). The EAW was also made available to the public via posting on the DNR's website.

11. Pursuant to Minn. R. 4410.1600 (2013), the 30-day EAW public review and comment period began September 15, 2014 and ended October 15, 2014. The comment period closed at 4:30 pm. The opportunity was provided to submit written comments on the EAW to the DNR by U.S. Mail, by facsimile, or by email.

12. Additional electronic documents that were referenced in the EAW were provided to interested parties. Upon request, the information was assembled and made available on a publicly-shared folder through a file transfer protocol (ftp) link provided by the DNR.

13. The EAW is incorporated by reference into this Record of Decision on the determination of need for an environmental impact statement (EIS).

14. During the 30-day EAW public review and comment period, approximately 1000 comments on the EAW were received and are incorporated by reference into this Record of Decision. Comments have been organized into themes that represent the substantive content of the comment. A table that identifies the individual commenters and themes that were assigned to their comments is included as Attachment 1 to this Record of Decision.

15. The comment theme identifier, the summarized nature of the comment, and the response to the comment are included below:

A. **Project**

Comment PROJ1: Commenters are concerned that the removal of Type II VF rock to access taconite reserves may set precedents for future mining projects.

Response: The Ferrous Metallic Mineral Mining rules specifically address situations when stockpiled materials might create a water quality problem. Minnesota rules identify specific requirements depending on the nature and location of the problem pursuant to Minn. Rules 6130.2100 (F) (2013). The stockpile plan developed by Northshore for the Type II VF rock is intended to meet these requirements. All future mining activity associated with stockpiling of Type II VF rock must have a suitable waste rock management plan in compliance with the Ferrous Metallic Mineral Mining rules.

Comment PROJ2: Commenters are concerned about the durability of the stockpile's geomembrane integrity over time, including the potential of degradation of bentonite.

Response: Conditions that may degrade the performance of the geosynthetic clay liner (GCL) are freeze-thaw damage, differential settlement, cation exchange, and wet-dry cycling. Bentonite migration and root penetration may also affect the performance of the GCL. Factors that may affect both the long-term and short-term performance of GCL, including those that might degrade bentonite performance, are considered in Sections 2.3.2 through 2.3.4 of the *Type II Virginia Formation Stockpile Plan* (Golder 2013).

Measures have been incorporated into the stockpile design to minimize the effect of these potential degradation factors. For example, the geomembrane component of the GCL and the 6 feet of material on top of the GCL will limit change in the bentonite layer's moisture content,

thereby minimizing a potential increase in hydraulic conductivity of the bentonite layer due to cation exchange and wet-dry cycling. The geomembrane component is an HDPE (high-density polyethylene) membrane, which has chemical and ultraviolet resistance properties.

Comment PROJ3: The commenter asks how the six components designed (listed on page 27 of EAW) to prevent contamination will be verified.

Response: The six components to the strategy to mitigate possible, but unlikely, impacts from the proposed Project are listed below, followed by an explanation of how each item will be verified.

- *The Type II VF stockpile design will limit infiltration and thus water contact with Type II VF material, thereby limiting potential for seepage.*

This assertion will be verified by additional monitoring agreed to in the *Type II Virginia Formation Stockpile Plan* (Golder 2013), included as Appendix B to the draft application for amendment to the Permit to Mine for Northshore Mining Company, prepared in accordance with Minnesota's Mineland Reclamation Act, Minn. Stat §§ 93.44-93.51 (2014) Minn. R. Ch. 6130 (2013). The monitoring requirements are discussed further below.

- *A DNR-approved pilot test plot program will be implemented to demonstrate the hydrologic performance of the cover system. The goal of the DNR-approved test plot program is to replicate the Type II cover system on a field scale to evaluate whether it can meet performance specifications under site conditions.*

The test plot program will be conducted under DNR supervision. Refer to the response to Comment PTM3 for additional information about the test plot program.

- *All proposed Project mine water will flow to mine sumps for treatment by settling.*

Water from all sources will collect in the sump until it is necessary to pump the sump at which point the water will be discharged to Langley Creek or the Dunka River. While the water collects, suspended solids settle to the bottom of the sump. When the water is discharged, the settled solids are left behind. Significant levels of contaminants can be removed from mine water in this way. Settling times and chemical additions in the sump can be manually manipulated to achieve desired water quality in the discharge water. Mine water discharges are regulated by Minnesota Pollution Control Agency (MPCA) under the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) permit.

- *Type II VF contact mine water will mix with other water at the sumps (or within the pit lake).*

Waters from all sources within the pit are combined in the sumps before discharge. If dilution is necessary, operations staff can intentionally divert sump water from other parts of the mine to mix with the Type II VF contact mine water. The stockpile is located and designed so that any seepage will drain to the mine pit.

- *Supplemental water quality monitoring consisting of increased frequency and/or water quality parameters will be performed at locations SD004 and SD005 and at the in-pit sumps that could potentially be affected by the stockpile seepage, as well as any surface discharge locations receiving transfer water containing stockpile seepage. Water quality results for in-pit sumps will be reported with those from SD004 and SD005. Figure 11-2 provides the*

locations and nomenclature (150 sump, Blk9 Bn7 sump and SD004 and SD005) for the sumps affected by the Type II stockpile seepage.

The supplemental monitoring results will be reported to and tracked by MPCA in the same system as the NPDES/SDS permit monitoring data.

- *A mine water management contingency plan will be developed to respond to existing and supplemental water quality monitoring results and address conditions that may have the potential to affect effluent quality. This plan would include water transfers between sumps, sampling and, if necessary, treatment for specific parameters.*

Potential contingency actions are discussed in Section 2.6 of the *Type II Virginia Formation Stockpile Plan* (Golder 2013). Routine and supplemental monitoring will be used to identify potential problems that could impact water quality from stockpile seepage. Contingency actions will be taken to: 1) prevent potential exceedances of standards or limits based on established "alert triggers," 2) to repair performance deficiencies identified by the monitoring program, and 3) to respond to non-compliance, should it occur. Contingency actions will include notification of DNR and MPCA within 3 months of the alert trigger with a written response plan. The DNR expects notification from Northshore that a written response plan is being developed as soon as an alert trigger has been identified. All response actions will depend on the parameter of concern that triggered the need for a contingency action, the concentrations of effluent measured, location of the measured alert trigger, and the duration and rate of change for the parameter identified in the alert trigger.

Comment PROJ4: The commenter asks if the tailings basin at Milepost 7 has the capacity to handle increased tailings from expansion associated with the Project.

Response: Based on a review of the basin's five-year operating plan and historical data, the Milepost 7 Tailings Basin can accommodate the additional tailings produced from the ore uncovered from the movement of the Virginia Formation by the Project.

The final elevation of the fine tailings basin is 1312 feet. The projected basin elevation at the end of year 2013 was 1215 feet, a difference of 97 feet. The current Permit to Mine tonnage of 680 million long tons (MLT) plus the additional 70 MLT (750 MLT total) will be exhausted in 2057 (within 44 years). The basin rate of rise is predicted to be 2.0 to 2.3 feet per year. Assuming a steady rate of rise of 2.2 feet per year, it would take approximately 44 years to reach the 1312-foot basin elevation. Therefore, the tailings basin has sufficient capacity for the additional 70 MLT of crude ore.

B. Environmental Impact Statement (EIS)

Comment EIS1 through EIS8: Many commenters suggested that an EIS should be prepared for the Project. The rationale for EIS preparation included the following specific issues:

- Exposure of sulfur bearing rock and the need for alternatives analysis
- Collection of scientific data on pollution from sulfur bearing rock
- Length of time pollution would be generated on site
- Mining of high sulfur Type II VF rock
- Minn. R. 4410.1700 subp. 7c (2013) (extent to which environmental effects are subject to mitigation by ongoing public regulatory authority)

- Minn. R. 4410.1700 subp. 7d (2013) (extent to which environmental effects can be anticipated and controlled as a result of other available studies)
- Length of time Type II VF would remain a source of pollution
- Financial assurance for long-term maintenance/treatment
- Evaluation of safety of Milepost 7 tailings basin
- Reissuance of NPDES permit to ensure compliance with water quality standards
- Assessment of cumulative effects
- Review of Dunka is necessary prior to committing to additional exposure of sulfur bearing rock at the Northshore mine
- Provide more public disclosure and involvement
- Collect more information on fish and wildlife (surveys, species of greatest conservation need) to assess impacts.

Response: The purpose of the EAW process is to disclose information about potential environmental impacts of the proposed Project. Each issue addressed in the EAW and Record of Decision is considered in determining whether an EIS is needed. An RGU cannot order an EIS until after an EAW is completed. If the proposed Project is determined to have the potential for significant environmental effects, an EIS will be ordered.

Each of the specific issues identified as a rationale for the preparation of an EIS is discussed below in the response to comments section that addressed the specific environmental effect in question. All environmental effects of the proposed Project that could be reasonably expected to occur are discussed below in Finding of Fact No. 18. Environmental effects were evaluated against the criteria contained in Minn. R. 4410.1700 subp. 7 (2013), to determine if the Project has the potential for significant environmental effects. These criteria are:

A. type, extent, and reversibility of environmental effects;

B. cumulative potential effects. The RGU shall consider the following factors: whether the cumulative potential effect is significant; whether the contribution from the project is significant when viewed in connection with other contributions to the cumulative potential effect; the degree to which the project complies with approved mitigation measures specifically designed to address the cumulative potential effect; and the efforts of the proposer to minimize the contributions from the project;

C. the extent to which the environmental effects are subject to mitigation by ongoing public regulatory authority. The RGU may rely only on mitigation measures that are specific and that can be reasonably expected to effectively mitigate the identified environmental impacts of the project; and

D. the extent to which environmental effects can be anticipated and controlled as a result of other available environmental studies undertaken by public agencies or the project proposer, including other EISs.

C. <u>Environmental Assessment Worksheet (EAW)</u>

Comment EAW1: Commenters assert that the EAW was incomplete because it did not include sufficient information about the connected/phased actions of future mining expansions. Some commenters assumed that the EAW should consider the effects of the *existing Northshore mining operation* and the *proposed Project* when assessing connected/phased actions.

Response: The Environmental Review rules define connected and phased actions. Two projects are "connected actions" if an RGU determines they are related in any of the following ways:

A. one project would directly induce the other;

B. one project is a prerequisite for the other and the prerequisite project is not justified by itself; or

C. neither project is justified by itself.

Per Minn. R. 4410.0200, subp. 9c (2013), an action is a "phased action" when two or more projects are undertaken by the same proposer and an RGU determines, pursuant to Minn. R. 4410.0200, subp. 60 (2013), that the projects:

A. will have environmental effects on the same geographic area; and

B. are substantially certain to be undertaken sequentially over a limited period of time.

Minn. R. 4410.0200, subp. 9c (2013) requires the analysis of connected and/or phased actions that have occurred within the past three years for purposes of determining if EAW preparation is necessary and for determining if an EIS is needed. The DNR is unaware of any future mining expansions that would be considered a phased or connected action. Northshore has completed several Permit to Mine amendments over the last several years. Only one of these amendments has occurred within the three-year look-back period. In August 2012, Northshore received a Permit to Mine for a 25.46 acre expansion to the ultimate pit limit and a 56.81 acre expansion to closure stockpile limits. The EAW did not address this previous stage of mining. The potential environmental effects of this previous mining activity are the only existing mine features that must be considered as a phased action. This previous mining activity will also need to be considered as part of determining the need for an EIS and is included in Finding of Fact No. 17.

Comment EAW1: Commenters stated that the EAW was incomplete because it did not include sufficient information on various topics.

Response: Information that commenters believe was omitted from the EAW was either included in the EAW or is considered in this Record of Decision. All of the topics identified have been correlated with other comments and cross-references as indicated below.

- History of mining sulfide bearing rock **[CE1]**
- Availability of taconite reserves for Northshore that do not require mining of Type II VF **[ALT1]**
- Cumulative effects **[CE1]**
- Water quality impacts **[WQ1 though WQ13]**
- Mercury methylation **[WQ6]**
- Financial assurance **[FA1 and FA2]**

- Wetlands (wetland delineation may not have identified the extent of all water resources on the site, including streams; the EAW ignores cumulative impacts from wetland destruction in the Langley Creek and Dunka River watersheds; there is no information on the number of acres or percentage of wetlands that have already been lost from mining nor foreseeable future losses due to mining the Peter Mitchell Mine.) **[WET1]**

- Date of wetland delineation needed **[WET1]**

- Lacking a basis for no impacts determination for Argo and Iron Lake **[WQ3]**

- Type 1 Virginia rock management (potential source for Acid Mine Drainage) **[WQ1]**

- Alternatives **[ALT1, ALT2, and ALT3]**

- Sulfur depletion rate of stockpile vague and not in EAW

  The estimated sulfur depletion rates of Type II VF waste rock were not incorporated into the chemical mass balance model. Constant and maximum release rates based on humidity cells data were used for predicting potential water quality impacts in the model. However, these rates were insensitive to the overall model results. The critical variable for water quality was how much water would likely seep through the stockpile cover and come into contact with waste rock.

- Length of time pollution is generated at site after closure **[WQ1]**

- There are potential effects of the Project outside of the Rainy River basin. **[CE1-e]**

- Need better identification of water resources within the project site (DNR maps show first order stream in proposed mine area) and re-delineation of water resources on the entire project site **[WET1]**

- Potential misrepresentation of hydrological impacts to Langley Creek **[WR2]**

- Long-term mine plan **[PTM7]**

- Rock characterization **[PTM2 and PTM5]**

- Hydrology **[WQ3, WR1 and WR2]**

- Salts and specific conductance issues and potential effects on drinking water are not included in EAW **[WQ2 and WQ7]**

- Potential effects on Biwabik Iron Formation (BIF) aquifer **[WQ3]**

- Seepage water quality from stockpile and from pit lake **[EAW2, WQ7, and WQ10]**

- Humidity Cell Testing from 2010 to 2013 are not provided **[WQ1]**

Comment EAW2: The commenter states that the EAW did not address all of the issues raised in the citizens' petition. The petition is described in Finding of Fact No. 7.

Response: The issues raised in the citizens' petition were reviewed. It was determined that the following issues identified in the petition were considered but not discussed in the EAW based on the degree of relevance to the proposed Project and to the extent that information was available to address them:

Consideration of water quality stratification in the pit lake. Although potential stratification is not addressed in the EAW, the effects of pit lake stratification on water quality are discussed in the *Type II Virginia Formation Stockpile Plan* (Golder 2013, Section 3.4.4, Figures 3-19 and 3-20). The result of the mixing volume analysis suggests that, while stratification may reduce the volume available for mixing, even under extreme conditions the pit lake contains much more than the minimum required volume for mixing.

Stockpile runoff (storm events). Stockpile runoff, as related to storm events, is not addressed in the EAW. However, Northshore discusses the climate data used in the water balance model in the *Type II Virginia Formation Stockpile Plan* (Golder 2013, Section 3.2.2). The climate data includes a 30-year climate normal period from 1971-2001. The climate data from this period provide a reasonable estimate of runoff conditions for water quality prediction purposes. Monitoring and inspections will assess the performance of the stockpile system under any extreme climate events.

D. **Minnesota Environmental Policy Act (MEPA)**

Comment MEPA1: Multiple commenters asked why an EIS was not ordered instead of an EAW.

Response: Refer to the response to EIS1.

Comment MEPA2: The commenter states that the Northshore mine was preexisting before MEPA and that there has not been a comprehensive review of the mining operation.

Response: The mine has been in operation since the 1950s. This was before MEPA and environmental review rules were established. Northshore currently has a Permit to Mine that was issued to Reserve Mining Company in 1981. That Permit to Mine was amended with the addition of pit expansions for 9.2 acres in 2004, 58.5 acres in 2006, 7.65 acres in 2008, and 33.9 acres in 2009. In 2012, a permit amendment was approved for a 25.64 acre expansion of the UPL and a 56.81 acre expansion of the closure stockpiles. The total area covered by the permit amendments is 196.7 acres.

The total area covered by the amendments since establishment of the environmental review program does not exceed the threshold for preparation of a mandatory EAW. A mandatory EAW is required for the expansion of a stockpile, tailings basin, or mine of 320 acres or more pursuant to Minn. R. 4410.4300, subp. 11B (2013). The commenter is correct that no formal environmental review of these previous actions has occurred. Although the permitted expansions are not considered as part of the proposed Project, they are considered under potential cumulative effects and are discussed in response to comment CE1.

The 2012 permit amendment occurred within 3 years of the proposed Project and is therefore considered a phased action, as described below in Finding of Fact No. 16 and Finding of Fact No. 17. The environmental effects of the 25.64 acre ultimate pit limit expansion and the 56.81 expansion of the closure stockpiles are addressed in Finding of Fact No. 18.

E. **Alternatives**

Comments ALT1 through ALT3: Commenters state that the DNR should evaluate alternative locations of mining and waste rock management methods to minimize exposure to Type II VF rock. Commenters suggest a possible pit wall cover, evaluation of seepage collection systems and treatment systems for the Type II VF stockpile, a liner under the stockpile, and the treatment and pump back of pit water. Commenters also suggest that the DNR evaluate alternative closure plans including subaqueous disposal.

Response: Alternatives evaluation by the DNR (the RGU) is not part of an EAW, Minn. R. 4410.1200 (2013). If the Project is determined to have the potential for significant environmental effects, an EIS would be ordered, and alternatives would then be evaluated.

Although subaqueous burial of Type II VF from the proposed pit progression was considered, it was determined not to be feasible for two principle reasons. First, dewatering of the mine pit is necessary during active mining operations to access permitted ore reserves. The pit lake that would theoretically submerge stockpiled Type II VF would not develop until active mining and dewatering ceases at mine closure, more than 60 years into the future. Second, because of the configuration of the pit and the overall mine development plan, a potential Type II VF stockpile cannot be located below the final pit lake elevation without covering future minable ore reserves.

F. **Water Quality**

Comment WQ1: Commenters offered comments, statements, and questions about multiple water quality concerns:

- Was mixing of pH (base layer and pit drainage with stockpile seepage) included in chemical mass balance model?
- Risks of long term Project impacts (uncertainty in modeling predictions and risk)
- Accuracy of water quality predictions
- Water quality predictions should assume worse case for stockpile cover system
- Humidity cell testing has not reached equilibrium and did not represent the Project's expansion into Type II VF rock
- Estimates of pollution concentrations at SD005
- Use of 7Q10 is incorrect for Unnamed Creek

Response:

Chemical Mass Balance Model. Alkalinity associated with Type I VF and BIF material in the pit was not accounted for in the chemical mass balance model (*Type II Virginia Formation Stockpile Plan*, Golder 2013, page 40). The higher pH of the conveyance layer and pit drainage were not used in the model to offset the lower pH from stockpile drainage. Although this potential buffering was identified in the EAW, it was not analyzed for the purpose of reducing water quality impact predictions.

Predictions of Water Quality Impacts. Impact analysis, including both a water balance model and a chemical mass balance model, was conducted by Golder at the request of Northshore for the *Type II Virginia Formation Stockpile Plan* (Golder 2013) and was performed in consultation with, and at the direction of, the DNR. Predictive modelling of this type is always conducted in the absence of perfect data to attempt to assess the range of impacts of the Project on water quality impacts. Assumptions are included in both the water balance model and chemical mass

balance model to "provide a tool to bracket viable engineering designs for the stockpile plan that will satisfy water quality criteria" (Golder's 2013 *Type II Virginia Formation Stockpile Plan* and Lines 961-962 of the EAW). They are not meant to represent actual conditions.

Uncertainties in the water balance model were reduced by calibrating model results to the measured pumping records for the pit for the period January 1999 to December 2007 (Golder 2013, Section 3.2.7). In addition, a sensitivity analysis was conducted (described in Section 3.2.8, Golder 2013) that concluded that the water balance model is highly sensitive to uncertainties in the hydraulic conductivity input parameter. Therefore, the model was conducted to bracket approximate end-member groundwater inflow. From Golder (2013):

> *Given the sensitivity of the water balance model to groundwater inflows, two different groundwater inflow models were used for the forward predictions during operations. Groundwater inflow was 1) allowed to increase with progression of the pit footprint and lowering of the sumps, and 2) with no change in groundwater inflow from the calibration period. This latter simulation provides conservative results in terms of predicted winter sump chemistry*.

Uncertainties in the chemical mass balance model were addressed by conducting predictive simulations that spanned a range of conditions, including (Golder 2013, Section 3.3.7).

- Net infiltration rates;
- Constant or varying groundwater inflows;
- Operations and closure; and
- Three different stockpile concentration limit scenarios.

The approach adopted to handle uncertainty in stockpile seepage water quality is described in Section 3.3.3.3 (Golder 2013):

> *Results for the mass balance model presented in this document are bracketed by end member leachate qualities from the humidity cell program. In addition, an approximate average chemistry is included. The end members are represented by a low-pH humidity cell with high metals concentrations, NSM-HC17, and by a low-metals, near-neutral-pH humidity cell, NSM-HC10. Approximate average conditions are represented by the composite chemistry, based on a weighted average to represent the stockpile, as discussed above. Given this, a large range of concentrations is predicted. For example, scenarios using the composite or NSM-HC17 based stockpile seepage chemistries assume all of the stockpile materials are acidic and no neutralization potential is present. The stockpile seepage chemistry based on NSM-HC10 assumes acidic conditions have been limited or prevented by the cover.*

In other words, the model considers not only likely potential conditions, but also more extreme conditions that represent the "upper bound" of potential impacts.

Humidity Cell Testing had not reached equilibrium. Humidity cell tests were used to model the geological processes of weathering at a laboratory scale. The *Type II Virginia Formation Stockpile Plan* (Golder 2013, Section 3.4.2.3) indicates that the increase of cobalt, copper, and zinc concentrations is relatively slow for an accelerated weathering test and trends in concentrations could begin to decrease as observed in other humidity cells (i.e. HC14, 15). In addition, it should be noted that Northshore used both average and maximum values from the humidity cells to determine weighted release rates for the chemical mass balance model. The water quality model predictions were not sensitive to release rates. The topic of humidity cell

representativeness relative to the expansion into the Type II VF is discussed in response to comment PTM8.

Estimates of pollution concentrations are lower than measured at point SD005 discharge. Predicted concentrations presented in Table 11-6 used average Type I stockpile seepage data from 2004, whereas predicted concentrations in Table 11-7 used 2013 SD005 monitoring data. Although different water quality monitoring data were used in the GoldSim model, the chemical mass balance model still demonstrates that the projected future water quality at SD005 would meet all applicable water quality standards even with the inclusion of the predicted Type II VF stockpile seepage. The response to WQ12 provides specific information on sulfate concentrations.

Unnamed Creek. The response to comment WR2 addresses low flow conditions (7Q10).

Comment Theme WQ2: Commenters were concerned about water quality impacting aquatic ecosystems and human health. Specific concerns included leaching of metals (copper, nickel, and cobalt), temperature, salts, and specific conductance.

Response: The results of the geochemical water quality modeling predicted that the water discharged from the mine pit during operation and the mine pit overflow during closure would meet applicable water quality standards. Standards protective of aquatic ecosystems and recreation (e.g., Class 2B standards for copper, nickel and cobalt, among others) were specifically considered in the model. Water quality standards applicable to salts and specific conductance (Class 4A standards protective of the use of water for irrigation) are also predicted to be met in the discharges. There are no discharges to waters regulated as cold water fisheries (i.e., Trout Waters) so consideration of temperature is not applicable. There are no discharges from the mine pit to waters used for domestic consumption, so comparison against drinking water standards is not applicable.

Comment Theme WQ3: Commenters are concerned about potential pollution to aquifers due to fractures and faults at the mine and stockpiles. Specific concerns include:

- Drinking water contamination including barium, chromium, vanadium, and others
- Impacts due to mining the BIF and pit lake contribution to aquifer pollution
- Highly fractured and fault areas, some extending to surface waters

Response: With one localized exception, groundwater will flow into the pit during operation and post-closure. For aquifers to become polluted, groundwater would have to flow out of the pit and pit lake. Because this would not occur, with the exception of one localized area, aquifer pollution and drinking water contamination is highly unlikely.

The one exception where groundwater is not expected to flow to the pit is in the immediate vicinity of the planned pit lake outlet. There surficial, non-bedrock deposits are below the post-closure pit lake elevation. In this area, localized groundwater flow may coincide with the surface water flow toward the Dunka River, with both the surface water and localized groundwater discharging to the Dunka River within approximately 500 feet of the pit lake outlet. However, in all other locations during operations and post-closure, groundwater will flow into the pit.

At closure, groundwater flow will contribute to pit flooding, resulting in an approximately 10-mile long, northeast-trending mine pit lake. As described in the EAW, the post-closure pit lake will continue to act as a groundwater sink. As a result, groundwater will flow toward the pit lake following closure. Based on this projected lack of groundwater outflow from the post-closure pit

lake, the potential effects expressed by commenters regarding drinking water contamination, aquifer pollution, or groundwater outflow through fractures and faults are not anticipated.

The post-closure water table within the pit area will be expressed as the final pit lake elevation that is approximately 1,500 above mean sea level (AMSL). The water table adjacent to the pit lake will have a hydraulic gradient *toward* the pit lake. This is because 1) ongoing recharge from precipitation will maintain groundwater elevations on all sides of the pit, and 2) the pit lake outlet northeast toward the Dunka River acts as a "pump" that maintains the cone of depression in the groundwater flow field. In the area of the Project, the post-closure pit lake elevation will be approximately 100 feet below the pre-mining water table elevation.

The "dimpled" condition of the regional groundwater flow field during post-closure is predicated on the maintenance of higher groundwater elevations on all sides of the pit. The approximate pre-mining water table elevations will be maintained in areas adjacent to the pit. In fact, the presence of surface water features surrounding the Peter Mitchell Mine suggests that this condition exists currently, during ongoing mine dewatering, and will continue to exist in post-closure. Surface water features are expressions of the surficial aquifer water table, which are connected to the water in the underlying bedrock (Siegel and Ericson 1980). Surface water features surrounding the pit have higher elevations than both the active pit sumps *and* the post-closure pit lake elevation. These include (listed, with elevations, in order of location, counter-clockwise around the mine pit, starting in Babbitt): Argo Lake (1,747 ft), Iron Lake (1,758 ft), unnamed wetlands northwest of the mine pit (approximately 1,730-1,760 ft), the headwaters of Ridge Creek (1,700 ft), the Cliffs Erie Area 5NE Pit (1,688 ft), the One Hundred Mile Swamp (approximately 1,610 ft), the wetlands making up the headwaters of Yelp Creek (approximately 1,600 ft), the wetlands making up the headwaters of the Partridge River (approximately 1,610 ft), the wetlands making up the headwaters of Langley Creek (approximately 1,600 ft), and the Dunka River (approximately 1,520 ft, until it drops relatively quickly to 1,500 ft within about 0.2 miles of the pit lake outlet location). The presence and elevation of these features is evidence that 1) the water table elevation in the regional aquifer has not been significantly reduced despite many years of dewatering from the nearby Peter Mitchell Mine, and 2) that the regional water table elevation is above the post-closure pit lake elevation, indicating that groundwater flow will be toward the pit during post-closure.

The deeper portions of the BIF are less fractured and therefore less permeable than the shallow portions. The competency of the bedrock in the project location and the predicted water quality within the pit is such that any potential leakage from the bottom of the pit is not anticipated to cause an adverse effect to deep aquifers.

Comment WQ4: Commenters are concerned about impacts to wild rice. Commenters suggest that there is a need for additional survey work, that the MPCA needs to determine the presence of wild rice waters downstream of Northshore, and that there is a need to consider impacts at a distance greater than one mile downstream. Commenters are concerned about increased sulfate discharge and the application of the wild rice standard (sulfate). Commenters are also concerned that the sulfate data in the 2008 annual update shows a steady increase in sulfate discharge and that the data set ends in March 2009. Commenters suggest that there is a relationship between sulfate levels in the Dunka River and the levels in Birch Lake. One commenter asserts that Birch Lake is used for the production of wild rice and that the Dunka River should also be considered a water used for the production of wild rice.

Response: A wild rice survey was conducted in 2013 for the waters immediately receiving waters from the Peter Mitchell Mine and the Dunka River and in 2011 for Dunka River and

portions of Birch Lake. The surveys did not identify any wild rice in the Dunka River but did identify the localized presence of some wild rice in Dunka Bay of Birch Lake. This information was available for and included in the EAW. However, as of the date of the EAW, no waters downstream of Project-related discharges were determined by MPCA to be waters used for production of wild rice and thus subject to the 10 mg/L water quality standard for sulfate.

The need for additional wild rice surveys, potentially including water bodies further downstream of the proposed Project, will be evaluated during future permit reissuance efforts.

The loading and concentration of sulfate in mine discharges resulting from the proposed movement of Type II VF rock is not expected to significantly increase from current conditions. Results from the GoldSim water quality modeling indicate that seepage from the proposed stockpile would represent an insignificant proportion of the total water volume discharged (<0.02%) and mass loading of sulfate (<1%) of the current (and future) discharge through the affected outfalls SD004 and/or SD005. A separate chemical mass balance analysis using the GoldSim model results combined with 2013 SD005 monitoring data predicted sulfate concentrations in the pit could increase by up to a maximum of 5 percent. Based on these analyses it is unlikely that the proposed Project would contribute to adverse impacts to wild rice resources.

Comment WQ5: Commenters are concerned about impacts to groundwater. Specific concerns are listed below:

- No background data on groundwater quality
- Tritium and unionized ammonia in groundwater sampling confirm a connection between Partridge River watershed groundwater and pollutant sources at Northshore's Peter Mitchell Mine
- Movement of pollutants from the Peter Mitchell Mine to groundwater in the Partridge River watershed
- Faults – connectivity to Birch Lake 1,417 feet and Colby Lake 1,440 feet with a pit lake at 1,500 feet
- Seepage from the pit to other surface waters below pit
- Surficial aquifer (increase in spread of pollutants through bedrock faults and fractures as well as through surficial groundwater)

Response: As discussed in the response to comment theme WQ3, groundwater flow during operations and during closure will be inward towards the pit lake. Therefore, impacts to groundwater quality are not anticipated. Therefore, no background water quality data were needed. Although unionized ammonia and tritium in water quality samples extracted from a borehole can be indicators of surface water interaction, the overriding question is whether or not foreign (young) water was introduced during the drilling process. Conclusions about the age of groundwater based on tritium and non-ionized ammonia are unreliable unless it can be verified that no foreign (makeup) water was introduced during the drilling process.

Subsurface connectivity via faults between the Main Pit and distant surface waters such as Birch Lake and Colby Lake would be evident in the dewatered pit as evidenced by a large amount of water seeping into the pit via these faults. Because this condition has not been observed, it is not anticipated that water quality impacts will occur at distance surface waters from faults.

Comment WQ6: Commenters are concerned about water quality impacts from mercury including methylation of mercury. Some commenters disagree with conclusions of the Berndt & Bavin article.

Response: The proposed Project is not anticipated to contribute to increased mercury methylation downstream of the discharge points. The proposed Project would result in only minor increases of sulfate in water discharges. Berndt and Bavin (2009) evaluated the relationship between sulfate and methyl mercury and did not find that sulfate and methyl mercury concentrations are correlated in the St. Louis watershed. As the St. Louis watershed is already heavily impacted by mining, the Berndt and Bavin findings indicate that increased sulfate may not be a direct cause of increased mercury methylation in watersheds with elevated sulfate concentrations. While there may be some disagreement on these findings, it is still the best information available and supports the conclusion that the Project is expected to have a limited effect on mercury methylation.

Comment WQ7: Commenters have various perspectives on water permitting and identified the following concerns.

- A need to conduct an anti-degradation analysis
- Question the sufficiency of water quality standards to protect water quality and wildlife
- Protection of aquatic organisms
- The need to reissue the NPDES permit
- Ongoing NPDES permit exceedances (the current NPDES permit lists sulfate as a monitor only parameter even though concentrations already exceed Minnesota water quality standards. Maximum concentrations of cobalt and nickel are predicted to increase 194 percent and 314 percent respectively.)
- The existing NPDES permit contains no effluent limits for multiple parameters, yet the EAW states that the existing NPDES limits would not be exceeded by the proposed Project
- Surficial groundwater monitoring is not required
- There are potential water quality impacts from mine-seepage to surface waters, which are not monitored
- Suspended solids
- Biochemical Oxygen Demand (BOD) at wastewater treatment plant
- The stockpile is a new point source discharge requiring a new permit
- MPCA needs to determine whether the discharge has the potential to exceed state water quality standards as part of NDPES permit process
- The EAW does not identify specific water quality concentrations after closure. The EAW indicates that constituent concentrations in discharge to Unnamed Creek after closure are expected to be less than during operations. This does not mean that there will not be impacts, because the discharge volume will be greater and the distance to Birch Lake will be shorter.
- Monitoring of stockpile and pit wall seepage
- Dissolved salts and specific conductance
- Use of recent water quality data

Response: Upon review of the water quality modeling results and consideration of the requirements of the existing NPDES/SDS permit, MPCA has determined that modification (or reissuance) of the existing permit is not necessary to authorize the proposed activities addressed in the EAW.

The current NPDES/SDS permit already covers the proposed movement of Type II VF rock. The permit states that Northshore is not authorized to move Type II VF material until a specific management plan for the stockpiling and reclamation of that material has been approved by DNR and MPCA. The *Type II Virginia Formation Stockpile Plan* (Golder 2013), described in the DNR Permit to Mine amendment, is the management plan required by the NPDES/SDS permit and describes in detail the management and stockpiling of VF rock.

The water quality modeling predicted concentrations for a wide range of parameters in: (a) the mine sump that would collect any leachate from the stockpiled Type II VF rock (representing operating conditions) and, (b) the ultimate mine pit lake upon filling of the mine pit with water during closure. The results of the modeling indicate that discharges from the facility (during operation) and the ultimate mine pit lake (during closure) would be unlikely to exceed effluent limits and applicable water quality standards. From a practical perspective, this water quality modeling serves - as applied to a feature that does not yet exist or contribute potential pollutants - a similar purpose and intent as a Reasonable Potential evaluation for an existing discharge.

As stated in the response to WQ2, the water quality standards used in the modeling exercise are protective of aquatic life and recreation. The results of the modeling were compared against applicable water quality standards for a wide variety of pollutants, whether or not the permit included limits for the same pollutants.

The predicted quality, volume, and rate of the discharges over the next 5-year NPDES/SDS permit cycle are not expected to change with the addition of the proposed Project beyond that already considered for the existing permit; thus a nondegradation analysis is not required and the proposed stockpile is not considered a new source for regulatory purposes at this time. These conditions will be reassessed as part of the permitting process for each subsequent 5-year NPDES/SDS permit reissuance.

The response to WQ4 above addresses the issue of the applicability of the 10 mg/L wild rice sulfate standard. In addition, results from the water quality modeling indicate that any seepage through the proposed stockpile would represent an insignificant proportion of water volume (<0.02%) and mass loading (<1% for sulfate) of the current (and future) discharge through the affected outfalls SD004 and/or SD005. Thus, recalculation of effluent limits or other attributes of the existing permit that would mandate a permit modification are not warranted.

During the period of mine operation (which is the operating status of the mine covered by the 5-year NPDES/SDS permit), the portion of the mine pit affected by the proposed Project is expected to be fully dewatered. Groundwater flow gradients will therefore be toward the mine pit. There will be no outward groundwater flow from the mine and no impact from mine seepage to the surface waters. The need for future groundwater monitoring can be addressed in future reissuances of the 5-year NPDES/SDS permit.

The proposed Project does not include any proposed changes to the sanitary wastewater treatment system, so no impacts related to BOD or total suspended solids (TSS) from the treatment system were included, or needed to be included, in the EAW. Future reissuances of the NPDES/SDS permit will continue to address requirements related to the wastewater treatment system.

Given the design of the proposed Type II VF stockpile, seepage in quantities that can be collected and monitored is not expected. The *Type II Virginia Formation Stockpile Plan* (Golder 2013), which will be incorporated as an integral and enforceable part of the existing NPDES/SDS permit, includes a required plan for baseline and future monitoring. This plan includes monitoring

of the affected outfalls prior to, during, and after stockpile development. Monitoring would be in addition to and complement the permit-specified monitoring already in place. Future reissuances of the NPDES/SDS permit will evaluate the need for any additional monitoring, including pit wall seepage, should it be observed.

Comment WQ8: Commenters made comparisons between the Project's potential environmental effects and that of other mining activities with sulfur bearing rock. Specific comparisons include:

- Inco (International Nickel Company of Canada, Ltd)
- Underground mining
- Predicted water quality at hard rock mines (Maest and Kuipers report/studies)
- Mining in Sydney Australia
- Zortman and Landusky mines in Montana

Response: The evaluation of the potential effects of the Type II VF stockpile was based on site specific data, which is more accurate than general comparisons with other projects. Previous experiences of other projects' water quality impacts have led to a more detailed analysis of this Project. The projects identified by commenters are sufficiently distant and different enough that they are not as useful as the site specific analysis that was conducted for the Northshore expansion.

Comment WQ8: Commenters compared Northshore to potential environmental effects to other mining activities with sulfur bearing rock. Specific comparisons included:

- Dunka (including January 2010 notice of lawsuit against Cliffs Erie LLC for water pollution violations, including violations of standards at the Dunka Mine and at the LTV Tailings Basin)
- Cover at Dunka Mine proved cover without liner was inadequate
- Wastewater treatment system at Dunka mine said to be too expensive to operate by Cliffs
- Reserve Mining Company's Blast #2393
- VF outcrops in 2002 and 2003 that resulted in aluminum and copper exceedances
- Allowing Northshore before PolyMet is permitted is an attempt to circumvent permitting process

Response: The projects/situations identified by commenters were not managed with the same engineering controls as the proposed Project. Potential for release of acid and/or metals from the Type II rock is the reason a cover is planned for the stockpile. The cover is designed to reduce the infiltration of water through the pile, thereby reducing leaching of constituents such that water quality standards are predicted to be met.

Dunka Mine. In the case of the Dunka Mine, Duluth Complex rock was stockpiled in creek headwaters and not managed to prevent water quality issues. There are still ongoing water quality issues associated with the Dunka Mine, but substantial progress has been made toward water quality improvements. The Dunka Mine is not an appropriate comparison to the Northshore expansion, because the Dunka site was not managed with appropriate engineering controls to prevent water quality issues. The Northshore expansion includes a detailed stockpile management plan to control water quality issues, which was not in place at the Dunka Mine.

Reserve Mining Company. The Reserve Blast #2393 (blasted in 1986) contained Duluth Gabbro that was relocated to provide an environmentally secure location for the potentially reactive rock

and to allow mining of the underlying ore. The Reserve Blast stockpile was covered with a geosynthetic clay liner as well as additional protective cover rock and soil layers, but did not include a geomembrane. The relocation project was completed when final cover was applied in 2006. Water quality monitoring after the stockpile was moved and reconstructed has not resulted in water quality degradation. The proposed Northshore stockpile relies on a more effective cover system that includes a geomembrane layer to minimize infiltration through the Type II VF stockpile.

VF outcrops. During 2002 – 2003, water samples were taken from within the Peter Mitchell Mine in locations where water had ponded, near VF rock that had been exposed by Reserve Mining Company's regular operations. These ponded areas are distinctly different from a pit-dewatering sump, which collects runoff and groundwater on a much larger scale. As stated in the EAW, the exceedances of total aluminum and total copper were limited to isolated discrete events occurring at certain specific sampling locations and were not representative of overall typical conditions.

One site, the Block 0 site, was sampled in a pit-dewatering sump directly below a Reserve Mining blast (Reserve Blast #2393) that included BIF rock, Duluth Complex rock, and VF rock. The Block 0 sampling location is representative of a typical discharge because it includes exposed rock with Type II sulfur levels along a significant exposure of pit wall, with water reporting to a sump then discharged. Water that was actually discharged from this Bock 0 pit-dewatering sump by way of an NPDES/SDS outfall shows no exceedances of copper or aluminum during this period of monitoring. The Block 0 pit-dewatering sump is in regular use at the Peter Mitchell Mine and the outfall is subject to routine regulatory sampling. To date, there have been no copper or aluminum issues in the discharge waters from this sump.

Comment WQ9: Commenters are concerned about water quality impacts from pit wall exposure. Some commenters made a comparison between the proposed Project and the PolyMet project.

Response: While the EAW does not explicitly state that the pit wall exposure was included in the modeling, there are several references to the "chemical mass balance model" in Item 11. See specifically in the section on "Composition of Mine Water" beginning at Line 955 and continuing through Line 1018. As noted below, inputs to this model included the pit wall exposure.

Section 3.3.4 of the *Type II Virginia Formation Stockpile Plan* (Golder 2013), *Pit Wall Type II Virginia Formation Materials*, verifies that the pit wall exposure was considered in the modeling:

> *Given the site stratigraphy and pit configuration, Type I VF, Type II VF, and BIF will be exposed in the southern pit wall. Type II VF materials will be exposed in the southern pit wall above the elevation of the pit lake at the conclusion of mining. Similar to the materials in the stockpile, the pit wall materials may contribute metals and/or low pH as water flows over the face of the exposure or seeps through the pit wall. As described in Section 3.3.1.3, the surface area of the exposure is 475,000 square feet (ft2) or 10.9 acres. The exposure will exist only on the south pit wall.*
>
> *Flow was assigned a percentage of the total predicted flow through the Damaged Rock Zone (DRZ) based on the percent exposure area relative to the total pit area (Section A1 on Figure 1-1, an area of 1,260 acres), or 0.9%. Use of the surface area rather than the planar area is conservative given the vertical nature of the exposure in the pit wall. Precipitation contacting the pit wall is expected to be small given its vertical exposure. Run-on to the exposure is also expected to be small because the southern pit wall is the edge of the watershed and flow on*

this edge will be away from the pit. The same chemistry assigned to the stockpile was also assigned to the exposure in the mass balance Model.

Comment WQ10: Commenters questioned whether the dilution approach included pH and what information was used to determine existing high pH water in sumps would counteract low pH seepage from stockpile. Another commenter noted that, although buffering may be achieved, this does not eliminate contaminates as there are more additives in total leaving the mine.

Response: The response to WQ1 discusses the pH of stockpile drainage and potential buffering.

Comment WQ11: Commenters are concerned about potential impacts to water quality at the Milepost 7 tailings basin.

Response: The Type II VF rock is waste rock with no recoverable iron content. Thus this material would not be processed at the Silver Bay processing plant. Without such processing of Type II VF rock, there will be no tailings of Type II VF to dispose of at the Milepost 7 tailings basin and no potential for related water quality impacts at this site.

It is possible, given the scale of mining involved at the Peter Mitchell Mine, that a *very* small amount of Type II VF rock could unintentionally be processed with the taconite ore. But any dilution of the taconite ore with Type II VF rock would be small and would not have any discernible effects at the Milepost 7 tailings basin. The "impact" of such an unintentional Type II VF rock would not be discernible; therefore the permit does not need to *directly* address this potential (for example, including specific permit requirements).

Comment WQ12: The commenter expressed concerns that the EAW was not clear about the data used to assess pit discharges.

Response: The GoldSim mass balance model used water quality sampling data from stockpile seeps from the Main Pit (BL8, BL10, B12) to represent seepage from the damaged rock zone (DRZ) outflow and groundwater and used data from the block 13 waterfall into bench 5 to represent direct overland flow to the sump/pit (see Table 3-15 in Golder's 2013 *Type II Virginia Formation Stockpile Plan*).

Predicted sulfate concentrations presented in Table 11-6 used average Type I VF stockpile seepage data from 2004 to represent existing conditions at the pit sump, whereas predicted sulfate concentrations in Table 11-7 used 2013 NPDES/SDS monitoring data to project future water quality at SD005. Although two types of water quality monitoring data were used in the GoldSim model, the chemical mass balance model shows that inclusion of the Type II VF stockpile seepage would only increase sulfate concentration in the pit by as much as 5 percent. Using recent monitoring data from SD005 and adjusting for a 5 percent increase would result in sulfate concentrations in the pit as high as 157 mg/L, which is below the secondary drinking water standard of 250 mg/L.

Comment WQ13: Commenters are concerned about the potential impact of the proposed Project to surface water quality that is used for drinking water.

Response: No surface waters immediately downstream of the Project discharges - including Langley Creek, Unnamed Creek, Dunka River and Birch Lake - are used as a drinking water source. The nearest surface water protected for use as a source of drinking water is Fall Lake in the BWCA, more than 25 miles downstream. Impacts to this water body, if any, would not be

perceptible. Thus the proposed Project will not have an effect on surface water used for drinking water.

See also response to WQ3, which discusses concerns related to potential pollution to aquifers due to fractures and faults at mine and stockpiles.

G. **Water Resources**

Comment WR1: Commenters are concerned about the interbasin transfer of water. Specific topics include impacts to Partridge River from the whole mine operation versus the proposed Project. One commenter stated, *The cumulative impact of this, past, and reasonably likely future mine activities will ultimately eliminate a good portion of the Partridge River watershed.…The loss of upstream water is likely to have a significant impact on both water quality and quantity in the Partridge River….it is entirely possible that the least environmentally harmful alternative would involve changes to the current project.*

Response: The footprint of the incremental pit expansion considered in the EAW is entirely located within the Rainy River Basin. Thus, this would not have an impact on Partridge River hydrology, or water quality. The portion of the existing Peter Mitchell pit currently dewatered to the Partridge River (about 7 square miles) will remain that way until the pit is filled, when it will become tributary to the Dunka River, which is part of the Rainy River Basin. This will result in a loss of flow to the Partridge River. The incremental pit expansion described in the EAW will not impact Partridge River conditions.

Comment WR2: Commenters are concerned about potential impacts from hydrological changes due to pit expansion. Commenters specifically cited low flow 7Q10 and 100-year events, head pressure from the pit lake, and effects on water quality for supporting aquatic life.

Response: The DNR uses plus or minus 20 percent of the average annual stream flow as a guide for potential significant impacts to stream geomorphology and instream habitat. The flow changes associated with the proposed Project are presented in the EAW and in this Record of Decision. The EAW is not intended to readdress impacts associated with previously approved changes to the watershed hydrology and associated management requirements. The EAW includes discussion of the historical approvals and associated changes to the hydrology during mine operation and at closure for the purpose of providing a hydrologic baseline for the reviewer.

Low Flows. Low flows in these watersheds typically occur in mid-winter (January-February) or late summer (August). Average annual 7-day low flows (7Q10) for Langley Creek and Unnamed Creek are not found in the *Long-Range Hydrology Study* for the Peter Mitchell pit (Barr 2008). Based on gage data (DNR Gage 72098001) from 2011 through 2014, the 7Q10 is zero cubic feet per second (cfs). This is plausible during periods when no dewatering is occurring, given the size of the watersheds.

During high flow events (e.g., 100-year event), the estimated impact to flow would be similar to the percent change in watershed area, as peak runoff will overwhelm dewatering rates. Continued dewatering to discharge accumulated water in the mine pit, however, may result in extended periods of above average flows.

The *Long Range Hydrology Study* (Barr 2008) presents impacts to high and low flows in ultimate pit closure, including:

- 7Q10 at several locations on the Partridge River
- Annual maximum 1-day flow in Langley Creek and at several locations in the Partridge River
- Average annual flow in Langley Creek, Dunka River, and several locations on the Partridge River

Head Pressure on Pit Lake. See the response to comment theme WQ3. As noted in the response to comment theme WQ3, with one localized exception, groundwater will flow into the pit during both Project operation and post-closure. Therefore, there is limited head pressure from the pit lake to the pit walls, and hence no outward groundwater flow to aquifers.

The one exception where post-closure groundwater movement toward the pit lake is not expected is in the immediate vicinity of the planned pit lake outlet. There surficial, non-bedrock deposits are below the post-closure pit lake elevation. In this area, localized groundwater flow may coincide with the surface water flow toward the Dunka River, with both the surface water and localized groundwater discharging to the Dunka River within approximately 500 feet of the pit lake outlet. However, to reiterate, in all other locations during operations and post-closure, groundwater will flow into the pit. As previously stated in comment theme WQ3, the deeper portions of the BIF are less fractured and therefore less permeable than the shallow portions. The competency of the bedrock in the Project location and the predicted water quality within the pit is such that any potential leakage from the bottom of the pit is not anticipated to cause an adverse effect to deep aquifers.

Effects on Water Quality in Water Supporting Aquatic Life. As noted in Section 13c of the EAW, the proposed Project will result in minimal changes to flow and temperatures in Langley Creek and will have minor adverse effects on native populations of resident fish. Hydrologic changes to Langley and Unnamed Creek are discussed in detail in EAW lines 1112-1138.

Water quality impacts to the Partridge River resulting from the diversion of approximately 7 square miles of tributary watershed in long-term closure are not assessed in the EAW. This is because the pit lake and its diversion of Partridge River watershed is not part of the proposed Project. The pit lake and its planned outfall is part of the closure plan in the original approved Permit to Mine. Closure is already permitted, and will occur regardless of whether the proposed Project proceeds.

H. Dam Safety

Comment DS1: The commenter states that the DNR should evaluate impacts of tailings dam failure due to increased tailings. (Letter from Northshore on June 13, 2013 projects an annual and total projected tonnage of tailings, but does not analyze the current stability and strength of the tailings basin, nor take into account the ability of the basin to withstand high precipitation weather events.) One commenter gave an example of the Mount Polley tailings basin dam failure. Another commenter stated that all dikes are constructed mainly of coarse rock particles and are thus subject to shifting and susceptible to extreme weather events.

Response: Northshore's Milepost 7 Tailings Basin, as planned and permitted, has sufficient capacity to hold the tailings from the ore from the proposed project.

Northshore's tailings basin is regulated by the DNR. The regulation includes the review of Northshore's long term tailings basin plan, 5-year operational plans, dam construction plans and ongoing performance. The stability of the tailings basin dam is included in these evaluations. The basin is designed based on a Probable Maximum Precipitation event of approximately 32 inches

in a 24 hour period. This measure of precipitation is more than five times greater than the 100-year event.

I. **Permit to Mine**

Comment PTM1: Commenters question if the non-ferrous rules should apply to stockpiling Type II VF rock.

Response: The applicable rules are driven by the type of metal mined. Because iron is the predominant metal extracted in the operation, it is not appropriate to apply non-ferrous rules to the Project. The Type II VF rock will be handled under the Taconite and Iron Ore Mineland Reclamation Rule Minn. R. 6130.2100 (2013).

> Minn. R. 6130.2100 provides: All stockpiles shall be designed and constructed according to the following standards:
>
> F. When a water quality problem has occurred or is likely to result from leaching of stockpiled material, the commissioner shall require one of more of the following based on the type of material and the nature and location of the problem:

The proposed methods to address the issue are:

> 1. the design of a monitoring system and the monitoring of water quality;
> 5. covering of stockpiles to minimize the infiltration of precipitation.

Comment PTM2: Commenters request a contingency plan for Type III VF and additional testing to locate pockets with higher sulfur content.

Response: Northshore does not propose to mine in an area where Type III VF material may be encountered. Northshore would mine in areas where economical ore resources have been identified by existing drilling. This existing drilling has only identified the presence of Type II VF above these resources. In those areas, if there is a small amount of higher sulfur content material that drilling did not identify, it would be moved to the designed stockpile and handled as Type II VF.

The demonstrated continuity of geologic units within the VF is modeled by the existing drilling. Northshore has completed exploration drilling on a nominal 320’ X 370’ grid spacing within the amendment area. Northshore commits to complete drilling to the 250’ grid in the vicinity of each blast pattern, assay the drill core, complete modeling to include the new drilling results, and provide the regulatory agencies with documentation of the 250’ grid spaced results prior to mining each of the Type II VF blast.

Comment PTM3: The commenter states that the results of test plot data, which would quantify percolation through the Type II VF stockpile cover, need to be made available prior to approval of the Permit to Mine amendment by DNR. The commenter is concerned that test plots results will not be able to mimic cover system failure.

Response: The EAW incorrectly states that the preliminary results of the test plot program are currently under review by the DNR. Test plot data is not yet available. The DNR has been working with Northshore to develop a test plot program as part of the Permit to Mine amendment

process. Construction of the test plots will be a condition of the proposed Permit to Mine amendment if approved.

The "field-scale" test plot program will demonstrate the hydrologic performance of the cover system proposed for the Type II VF stockpile. These "test stockpiles" will replicate the environmental conditions of the proposed Type II VF rock stockpile. The test plots will quantify percolation through a simulated cover system to measure the performance of the actual stockpile cover system.

Comment PTM4: The commenter is concerned about the resolution of tribal agency comments that were submitted as objections to the Permit to Mine notice and the comments that were provided on the prepublication review of the EAW.

Response: Objections to the Permit to Mine Notice were evaluated and discussed during earlier reviews of the Permit to Mine amendment. The opportunity to comment on the prepublication draft of the EAW was extended to tribal agencies as a courtesy. All relevant information provided by tribal agencies on the prepublication draft was considered in preparing the EAW. The formal resolution of objections to a Permit to Mine notice are beyond the scope of the environmental review process.

Comment PTM5: Commenters are concerned about the difficulty of segregating Type II VF from blast rock mixture and request specifics about how stockpiling will occur. The commenter states that *blasting creates inclusions of rock that cannot be easily segregated.*

Response: The "Type" of VF material is estimated based on an entire blast. The demonstrated continuity of geologic units within the VF is modeled by the existing drilling. The completed geological characterization of the proposed Project area is adequate to conclude that a blast including VF is either entirely Type I or Type II VF at the mined scale.

Categorization of blast patterns will determine how material will be stockpiled. If the average content of the material meets the criteria to be classified as Type II VF, it will be segregated and stockpiled on an engineered stockpile.

Additionally, the distinction between a Type I VF and a Type II VF includes both an estimate of the sulfur content for a blast as well as carbonate content (neutralization potential). Significant neutralization is only provided by the inclusion of the carbonate rich "A submember" of the BIF, within a blast. Therefore, only blasts that contain portions of the upper BIF can be classified as Type I VF. All blasts that do not include the upper BIF would be Type II VF and would be stockpiled in the approved designed stockpile.

Comment PTM6: Commenters are concerned about the potential for exposing Type III VF. There are VF predictions that the level of sulfur in Type III VF could be as high as 4.87 percent and 2004 sampling data showing that the sulfur content in the VF metasediments ranged as high as 6.10 percent.

Response: The most definitive course for distinguishing "bedded pyrrhotite" from typical VF is by diamond drilling and field observations of the exposed VF after the surface material has been removed. This would be done at the Project site. Surface stripping would precede the drilling and blasting of the underlying rock by approximately one year. This is adequate time to examine the exposed VF and to assure there are no significant occurrences of "bedded pyrrhotite" that did not

show up in diamond drilling (*Northshore Mining Virginia Formation Development Plan*. June 15, 2004). See response to comment PTM2.

The commenters' "specific references to prediction of percent sulfur" refers to sample assays taken outside of the proposed Project area. These samples included "bedded pyrrhotite" VF rock, and were delineated in the East Pit of the Peter Mitchell Mine. The "bedded pyrrhotite" rock identified by these assays in the East Pit of the Peter Mitchell Mine was avoided by not mining in the areas where the samples were taken.

Comment PTM7: Commenters request that the long term development plan for Northshore should be made available to the public.

Response: There is no written "long term development plan" for the Peter Mitchell Mine. The EAW reference to the long term development plan in Item 6a of the EAW refers to Northshore's general, conceptual plan for mining the deposit at the Peter Mitchell Mine in a logical, orderly manner as set forth in the Permit to Mine.

Comment PTM8: Commenters request that DNR require additional characterization of the expansion area. They are specifically concerned about the southern and eastern portion of the expansion area not yet analyzed in the humidity cell test and the need to ensure sampling is sufficient and representative of metal concentrations and sulfides. The commenter states: *A mine water quality prediction model can only reach its potential at any individual mine site if that site is correctly characterized (in terms of its hydrology and geochemistry) to the extent possible. Given the discrepancies that we have seen between predicted and actual concentrations of constituents in water at other mines, we believe that water at the sump could be several times the predicted levels.*

Response: Type II VF blast patterns are those containing VF rock, with a whole rock sulfur content greater than or equal to 0.2 weight percent and less than 1.0 weight percent sulfur, or with a neutralization potential ratio (NPR) of less than 3. Chemical characteristics of the 31 blasts that would make up the Type II VF stockpile have been identified using Northshore's block model and are listed in Table 3-11 of the *Type II Virginia Formation Stockpile Plan* (Golder 2013). The weighted sulfur content of these blast patterns ranges from 0.190-0.382 percent and NPR of 0.369-14.449.

In comparison, the chemical mass balance model (Golder 2013) uses data from a waste characterization program that includes 19 humidity cell tests (HCTs) on VF samples. These samples have a sulfur content of 0.06-0.42 percent and NPR of either 0.0-12.42 or 0.5-15, depending on the method of calculation (Table 3-9 in Golder 2013). Therefore, the HCT samples encompass the full range of anticipated sulfur concentration of the Type II VF blast patterns that are included in this application. The HCT samples encompass nearly the full range of NPR values anticipated in the Project's Type II VF blasts and include the possibility that the neutralization potential might be somewhat under-represented in the HCT samples. The underrepresentation of neutralization potential has resulted in an overestimate of the potential for acid generation as part of the evaluation for this Project.

Comment PTM9: The commenter is concerned about the ability of the stockpile to handle waste rock. The commenter notes that Golder's Financial Assurance Cost Estimate (GFACE) listed maximum Type II VF waste rock stockpiled within 30 months at 9.56 MLT, significantly lower than the EAW stockpiling figure of 16.3 MLT. The commenter asks how it can be assured that the stockpile can handle nearly twice the volume listed in GFACE?

Response: The total volume of exposed stockpiled rock (e.g., without the cover) is limited in volume to 9.56 MLT, which is the equivalent of 30 months. The whole pile will have 16.3 MLT. The cover will be built in sections. Any given section will be exposed no longer than 30 months over the life of construction of the pile.

J. **Cultural Resources**

Comment CR1: Commenters state that the DNR should consider input from indigenous communities because of potential Project impacts on ricing, hunting, fishing, and sustainable food systems.

Response: Opportunities for tribal input have occurred throughout the Permit to Mine and EAW process including the 30-day comment period for the EAW. The tribal agencies have taken advantage of these opportunities.

Comment CR2: The State Historic Preservation Office (SHPO) recommended a Phase I archaeological study for the expansion area. It was recommended that the survey meet the requirements of the Secretary of the Interior's Standards for Identification and Evaluation and include an evaluation of National Register eligibility for any identified properties of potential historic significance.

Response: The proposed Project is not near any *known* archaeological resources. However, due to the Project's proximity to wetlands and waterways, a Phase I archaeological study was recommended. This recommendation will be provided to permitting authorities and the Project proposer.

K. **Air Quality**

Comment AQ1: The commenter states that the DNR should evaluate health impacts to workers and residences associated with exposure to fine particles and silica.

Response: Potential impacts on workers are regulated under the Mine Safety and Health Administration (MSHA) regulations. The proposed Project will not cause a change in air emissions beyond that allowed nor will it cause any increase over historical annual ambient air quality. The mine is regulated by an air emissions permit issued by the MPCA. The proposed Project does involve activities that produce fugitive particulate matter, such as blasting, loading, hauling, dumping of mined materials, and wind erosion, but not greater than what is authorized by its air emissions permit. The air permit details the emissions sources and air pollution control equipment and includes emission limits, requirements, and recordkeeping to protect ambient air quality. Fugitive emissions are currently controlled on site using measures set out in the Peter Mitchell Mine's existing Fugitive Emissions Control Plan (FECP), required by the air emissions permit, including dust suppressant application and actions to minimize wind erosion. Emissions from crushing operations are controlled by a bag house, a highly effective control device. Emissions from the loading of ore into the railcars are mitigated during non-freezing months by spraying water onto the ore before it enters the bins. Emission rates from these sources will not change as a result of the proposed Project.

Although the proposed Project would extend the life of the mine, thereby increasing the total emissions over time, the rate of emissions will not increase. Emissions will continue to be regulated by Air Emissions Permit Number 13700032-001 issued and enforced by the MPCA**.**

Comment AQ2: Commenters state that the DNR should evaluate the human health impacts from mineral fibers (mesothelioma) and should consider:

- Extending the mineral fiber standard to the mine site
- The contribution of increased crushing of BIF rock from the proposed Project
- Environmental Protection Agency (EPA) testing from the Peter Mitchell pit (provided as an attachment)
- The expert affidavit of Steve Ring (provided as an attachment)

Response: A traditional health-based fiber standard for the health impacts of exposure to mineral fibers does not exist. For this reason, there is no current method to characterize the health impacts of a population exposed to fibers. Furthermore, the facility is required to control its particulate emissions by Air Emissions Permit Number 13700032-001 issued and enforced by the MPCA. By controlling particulate matter as required by its air permit, the Project proponent would also control the airborne emission of mineral fibers.

The proposed Project involves activities that produce fugitive particulate matter that may also contain fibers, such as blasting, loading, hauling, dumping of mined materials, and wind erosion. Fugitive emissions are controlled by measures identified in the Peter Mitchell Mine's existing Fugitive Emissions Control Plan (FECP), required by the air emissions permit, including dust suppressant application and actions to minimize wind erosion. Emissions from crushing operations are controlled by a bag house, a highly effective control device for fine particulates. Emissions from the loading of ore into the railcars are mitigated during non-freezing months by spraying water onto the ore before it enters the bins.

The Project will not cause an increase in air emission rates nor will it cause any increase over annual quantities of materials being processed, so the Project is not anticipated to result in additional mineral fibers emissions. The Project would, however, extend the life of the mine and therefore increase the total cumulative emissions over the lifetime of the mine.

Comment AQ3: The commenter states that the DNR should evaluate the project's contribution to climate change.

Response: The primary source of greenhouse gas (GHG) at the mine is fuel combustion. No increase in the rate of exhaust emissions is anticipated from onsite vehicles, including haul trucks, shovels, front-end loaders, backhoes, water trucks, dozers, fuel trucks, various maintenance vehicles, pickup trucks, and personal vehicles. Therefore, this action will not cause any increases in the rate of GHG air emissions. Total GHG emissions would increase due to the proposed Project extending the duration of mining.

L. Economics

Comment ECON1: Commenters are concerned that natural resources are being damaged for jobs and other economic considerations.

Comment ECON2: Commenters are concerned about impacts of the Project on tourism, local businesses, and residences (especially the Birch lake area, South Kawishiwi River, and Boundary Waters Canoe Area Wilderness).

Response: Although socioeconomic impacts are not specifically evaluated as part of an EAW, related topics are addressed under Item 9 (Land Use), Item 11 (Water Quality), Item 15 (Visual),

Item 16 (Dust and Odors), Item 17 (Noise), and Item 18 (Transportation). If a project is determined to have the potential for significant environmental effects, an EIS would be ordered and socioeconomic impacts would be evaluated at that time.

M. **Financial Assurance**

Comment FA1: Commenters are concerned about the adequacy of financial assurance and ongoing corporate responsibility for cleanup, contingencies, and accidents.

Response: Financial assurance can be required of a mining operation through the Permit to Mine, Minn. R. 6130.6000 (2013). The dollar amount of the financial assurance is required to equal the cost of accomplishing the required reclamation.

The amount of financial assurance is reviewed and updated annually. Financial assurance is required to remain in place until all necessary actions to correct the deficiency or noncompliance are met. The commissioner may revoke a Permit to Mine in case of any breach of the terms or conditions of the permit, including financial assurance, Minn. Stat. §93.481, subd.4(c) (2014). Additional information about financial assurance will be provided in the Permit to Mine.

Comment FA2: Commenters asserted that EAW did not address financial assurance and are concerned about, monitoring costs, and post-closure costs. Commenters observed that the commissioner can require a performance bond pursuant to Minn. R. 6130.6000 (2013) and that financial assurance should not be in the form of a corporate guarantee. Commenters also asked who is responsible for the care and protection of the Type II VF stockpile after the 30-year post-closure time period.

Response: Financial assurance can be required of a mining operation through the Permit to Mine, Minn. R. 6130.6000 (2013). The dollar amount of the financial assurance is equal to the cost of reclamation. Additional information about financial assurance will be provided in the Permit to Mine.

Pursuant to the terms of the Permit to Mine, financial assurance will be in place until the Project site is released. The Project site cannot be released unless there are no conditions that necessitate post-closure care. Thus, financial assurance may be kept in place beyond the 30-year post-closure period. As part of the Permit to Mine, financial assurance for the expansion and Type II stockpile would not be a corporate guarantee, and the company would be responsible for post-closure care.

N. **Wetlands**

Comment WET1: Commenters are concerned about impacts to wetlands and believe the EAW needs to include the date of wetland delineation. They also assert that a re-delineation of water resources on the entire project site is needed (noting the presence of a “first order stream”). One commenter asserts that the least environmentally damaging practicable alternative (LEDPA) for the Project must be identified before a Section 404 permit is issued.

Response: For wetlands delineated in 2003, wetland impacts within the expansion area were approved on August 10, 2006 and August 29, 2007. The wetland impacts were approved as part of a Permit to Mine amendment for the pit expansion, dated March 24, 2006. Mitigation has already been accomplished for 50.74 acres of the wetland acreage affected, through compensatory mitigation approved pursuant to the commissioner’s authority under Minn. Stat. §103G.222, subd. 1 (2014). The §103G.222 approval covered a portion of the proposed Project

excavation area impacts along the southern pit wall necessary to support current mining activity and related travel routes for equipment. Re-delineation of previously approved wetland impacts is not necessary.

An updated wetland delineation was conducted for potential unapproved wetland impacts in the expansion area. The delineation was conducted on July 19, 2013. DNR performed a site inspection on November 22, 2013. An onsite Technical Evaluation Panel (TEP) review was conducted on July 14, 2014. Final approval of the wetland delineation will occur in conjunction with the development of a wetland replacement plan through the Permit to Mine. This will occur after environmental review is complete.

Wetland replacement is required to replace lost wetland functions and values. The required wetland replacement ratio at the Embarrass River site is 1:1.

One of the comments included under EAW1 suggests there is a need for better water resource identification within the project site. The commenter believes that DNR maps show a first order stream in proposed mine area. The map indicates there is an emergent wetland (marsh) located in the extreme southeast corner of Section 19, Township 60, Range 12. Geographic Information Systems mapping layers are based on aerial interpretation and are therefore not as accurate as field delineation data.

The emergent marsh is one of a series of wetland cells that extend along the southern edge of the existing pit. During the 2005 wetland delineations, this site was designated "Wetland 8." Emergent vegetation is not as dense at the center of this wetland and there are small pockets of open water. There is no defined bed and bank that would indicate the presence of a stream. This has been confirmed by field delineation.

O. **Wildlife and Habitat**

Comment WILD1: Commenters have concerns about impacts to wildlife and threatened and endangered species. Commenters mentioned lynx, bats, and cliff-dwelling birds using the pit walls. Commenters are also concerned that polluted drainage from the pit walls or the stockpile would pass through proposed littoral area before mixing with the deeper waters of the pit lake, thereby affecting wildlife.

Response: Item 13c of the EAW states that the proposed loss of 108 acres at the Project site would result in minor adverse impacts to common wildlife species primarily through wildlife habitat fragmentation. The proposed Project is located in an actively-mined setting and thus is not likely to impact state-listed wildlife species. Based on a lack of preferred, suitable habitat for the piping plover and Canada lynx at the Peter Mitchell Mine, the proposed Project will have no effect on these federally-listed species. The Project is not expected to have a substantial effect on the pit wall habitat and its potential use by bats or cliff-dwelling birds.

Mitigation of potential impacts to fish and wildlife habitat from the mine pit will be achieved through implementation of Northshore's reclamation plan for the Peter Mitchell Mine pit, which requires littoral zones in at least 20 percent of the final pit lake area.

It is anticipated that native populations of resident fish would experience minor adverse effects. Discharge from the proposed Project is projected to meet the applicable NPDES/SDS permit limits and water quality standards. The results of the geochemical water quality modeling indicate that the water discharged from the mine pit during operation and the mine pit overflow

post closure will meet applicable water quality standards as set forth in the Project NPDES/SDS permit. Standards applied in the modeling were protective of aquatic ecosystems.

The only littoral zone in the pit lake post closure would be on the north side of the pit, opposite the pit wall. Because the pit wall not be adjacent the littoral zone, drainage from the pit wall would not pass through the littoral zone.

P. **Land Exchange**

Comment LE1: The commenter raised a question about the land exchange of state forest for old taconite land.

Response: No land exchange will occur as part of the Project.

Q. **Cumulative Effects**

Comment CE1-a: Commenters would like the DNR to evaluate the potential cumulative effects associated with water pollution and wetland impacts.

Response: The loss of wetland services and required mitigation for loss of wetland values and functions are addressed through the Permit to Mine process. A qualitative discussion of project specific impacts and cumulative effects is presented in Item 11 and Item 19 of the EAW.

Comment CE1-b: Commenters assert that the Dunka mine (waste water and stockpile seepage) should be evaluated for cumulative effects.

Response: The proposed Project is not going to have water quality impacts to the Dunka River because the water quality predictions indicated that the proposed expansion would meet water quality standards. Because the proposed Project would not contribute to water quality impacts in the Dunka River, there will not be any cumulative effects to water quality between the proposed Project and the Dunka mine.

Comment CE1-c: Commenters are concerned about potential cumulative effects of the numerous boreholes near Birch Lake and the Peter Mitchell Mine, which cumulatively may transport pollution. The commenter believes that some boreholes are not sealed properly to isolate aquifers).

Response: Borehole construction and decommissioning are subject to regulatory authority under the Minnesota Department of Health. This authority assures boreholes are properly sealed. Because boreholes are regulated and dispersed, it is unlikely that they will transfer pollution to aquifers.

Comment CE1-d: The commenter asserts that Duluth Metals (Twin Metals) is a reasonably foreseeable action and should be evaluated in a cumulative impact analysis in this EAW. In October 2014, Twin Metals filed a Technical Report on Pre-Feasibility Study (NI 43-101) with the System for Electronic Document Analysis and Retrieval (SEDAR), the electronic filing system for the disclosure documents of public companies and investment funds across Canada. Twin Metals' is exploring the possibility of developing a copper-nickel mine, concentrator, and tailings storage facility in the Rainy River and Lake Superior basins.

Response: The proposed Twin Metals Minnesota LLC (Twin Metals) Bulk Sample Project is discussed in Item 19 of the EAW.

Minnesota Rules 4410.0200, subp. 11a (2013), defines future projects as projects that are actually planned or reasonably foreseeable. In determining reasonable foreseeability, the RGU must determine whether sufficiently detailed information is available about the project to contribute to the understanding of cumulative potential effects. *Id*. This includes permit applications, detailed plans and specifications, etc. *Id*. A pre-feasibility study does not provide the detailed information needed for a cumulative impact analysis. Based on limited data available to the DNR on the Twin Metals project development timeline, the type of detailed plans needed for a cumulative effects analysis will not be available in the foreseeable future.

Comment CE1-e: Commenters state that the DNR should evaluate potential cumulative effects of the Project, iron mining and the PolyMet development, water quality, and wetlands in the environmentally relevant area.

Response: The EAW contains a cumulative effects analysis (Item 19) as required by Minn. R. 4410.1200 E (2013). This section explains the incremental contribution of the Project's environmental impacts compared to, and in conjunction with, the impacts of Northshore prior mining activities as well as other past and present iron mining activity (existing conditions).

Northshore expects to continue operations at the Project location for another 70 years, at which time permanent closure and final reclamation will occur. However, the Project proposer has no present plans for the reasonably foreseeable future other than the proposed Project. Any future expansion be subject to applicable environmental requirements at the time of the expansion, including water quality standards. Therefore, any potential cumulative effects would occur within prescribed limits of specific permit conditions.

When analyzing cumulative effects, the RGU looks to projects in the *environmentally relevant area*, Minn. R. 4410.0200, subp. 11a (2013). For purposes of water quality, this is a watershed or water basin. The PolyMet mine site is in the Partridge River watershed approximately 1.8 miles south-southwest of the proposed Project. Because the proposed Project and the PolyMet project are not in the same subwatershed or major basin, they are also not in the same environmentally relevant area for water quality effects and potential cumulative effects. Thus, no cumulative effects are anticipated.

R. **<u>Nonsubstantive</u>**

Comments NS1 through NS6: Commenters express general concern about toxins and destruction of natural resources from mining activities, identify issues related to projects other than the Project (PolyMet and Dunka), and express concern regarding an economic based natural resource development system that favors short term gain by foreign companies. Some comments submitted did not address completeness or accuracy of information in the EAW, nor did they address whether an EIS was needed.

Response: Many of the comments received were beyond the scope of the EAW. While an EIS has provisions for addressing socio-economic issues, there is no such parallel provision in the rules covering the content of an EAW. See generally Minn. R. 4410.1200 (2013). The general comments did not contain enough detail to allow for development of a meaningful response. No response is needed for those comments that did not address the completeness or accuracy of

information in the EAW or the need for an EIS. These comments will be provided to the project proposer and permitting authorities for their consideration.

16. Multiple projects and multiple stages of a single project that are connected or phased actions are required to be considered "in total" when determining the need for an EIS. Minn. R. 4410.1000, subp. 4 and Minn. R. 4410.1700, subp. 9 (2013) The purpose of this requirement is to prevent a proposer from segmenting a project into multiple parts to avoid environmental review. When determining whether a project is connected or phased, the RGU must consider whether two or more projects by the same proposer will impact the same geographic area; and are substantially certain to be undertaken sequentially over a limited period of time; are so interrelated that one project would induce the other project; are so interrelated that one project is a prerequisite for the other; or are so tied to each other that neither is justified on its own, Minn. R. 4410.0200, subp. 9c and 60 (2013). Additionally, if a project is an expansion of a previous project, the previous project will be considered in a current environmental review if construction of the previous project occurred within 3 years of the project currently under review, Minn. R. 4410.4100, subp. 1 (2013) (three-year look-back rule).

    In this instance, the Project is an expansion or a later phase of the entire Peter Mitchell Mine complex. The proposed Project would not be contemplated but for the existing Peter Mitchell Mine. The DNR reviewed Northshore's Permit to Mine and all amendments thereto. Northshore applied for and received an amendment to its Permit to Mine on August 2, 2012. Although this amendment was not identified in the EAW, this action is considered in this Record of Decision for determining the need for an EIS. All other previous amendments to Northshore's Permit to Mine fell outside the three-year look-back period and were therefore not considered a phased or connected action for purposes of this EAW.

    The proposed Project has sufficient ore to meet ore requirements for 5 to 10 years. Northshore believes that there is another 70 years of ore at the mine site. There is therefore a possibility of further mine expansion in the future at this site but there are presently no plans or reasonably foreseeable plans for mining at the site beyond those that are the subject of this EAW. It should be noted, however, that the existing mine is a relevant feature for consideration of potential cumulative effects. The potential cumulative effects of the proposed Project and the existing mine are addressed in the EAW and in Finding of Fact No. 18K.

17. On August 2, 2012 Northshore applied for and received an amendment to its Permit to Mine for the East Pit Progression. The amendment included a 25.46 acre expansion to the pit limit and a 56.81 acre expansion to the closure stockpile limits. The environmental effects of the 2012 expansion were not separately addressed in the EAW document. The environmental effects of the 2012 expansion were addressed by the U.S. Army Corps of Engineers (USACE) in a separate environmental assessment (EA) prepared for the 2012 East Pit Progression. The USACE EA describes the environmental effects of the 2012 East Pit Progression and is incorporated by reference and considered as part of this Record of Decision in determining the need for an EIS for the proposed project.

18. Based upon the information contained in the EAW, and in consideration comments received on the EAW, the DNR has identified the following potential environmental effects associated with the Project:

    A. Project Construction and Physical Effects
    Project Construction
    Physical Effects on Soils & Geology

Type II VF Stockpile Plan
Reclamation Plan

B. Hydrogeological Issues and Environmental Effects
Physical Effects on Watershed
Wetlands
Groundwater
Water Quantity
Water Quality
Wild Rice

C. Land Use Issues and Effects

D. Biological Resource Effects
Vegetation
Wildlife and Fisheries Resources
Rare Features

E. Traffic

F. Waste Effects-Wastes incl. Hazardous Wastes

G. Air Quality

H. Noise

I. Visual Effects

J. Archaeological, Historical, or Architectural Resources

K. Cumulative Potential Effects

A. Project Construction and Physical Effects

a. Project Construction

Proposed Progression of the UPL

The total excavation volume for the proposed Project is: 81 MLT of BIF and 94 MLT of waste rock. This includes lean BIF Rock (55 MLT), Type I VF rock (13.7 MLT), Type II VF rock (16.3 MLT), and surface overburden (9 MLT). The proposed Project would occur on the south flank of the Main Pit, which has sufficient ore to meet ore requirements for 5 to 10 years. This excavation rate would require 1 to 1.5 MLT of surface materials and 7.9 to 8.4 MLT of bedrock per year within the 108 acre UPL progression, or 9.9 MLT of surface materials and bedrock annually over the 10-year period Project life.

Previous East Pit Progression

The East Pit Progression authorized by the 2012 amendment to Northshore' s Permit to Mine increased the mining area at the very east end of the pit by approximately 25 acres. This area is located west of County State Aid Highway 70 (CSAH 70), formerly known as County Road 623, in Sections 9 and 10 in T60N, R12W. This progression includes 3.44 MLT of BIF ore and 2.48 MLT of waste rock, which includes lean BIF Rock (0.93 MLT), Type I VF Rock

(0.85 MLT), and surface overburden (0.7 MLT). The 2012 amendment also included approximately 56 acres of expanded stockpile area located on the north side of the pit in Sections 16, 17 and 9 in T60N, R12W.

b. Physical Effects on Soils and Geology

This topic was addressed in the EAW under Item No. 6b and Item No. 10.

Proposed Progression of the UPL

The mine currently operates and is being developed in accordance with a DNR Permit to Mine and associated amendments and approvals. The Permit to Mine is based on a conceptual long term development plan and includes a process for approval of incremental development plans for the mine in accordance with Minnesota statutes and rules.

The purpose of the UPL progression is to access additional ore reserves. The Project involves an incremental increase in mining along the southern edge of the Main Pit of the Peter Mitchell Mine. The Project is an extension of current mining activities originally initiated in the 1950s. The proposed 108 acre UPL progression is a 2 percent increase in size to the Main Pit (4,750 acres). The topography of the UPL progression is flat with little variability (<1% slope). The western portion of the UPL progression is characterized by peat land within topographic depressions and small ponds of surface waters. Land cover types in the proposed excavation area include wetlands (62.83 ac) and vegetated uplands (36.74 ac). In addition to work in the main pit, removal of overburden and ore would occur adjacent to the existing pit, effectively extending current mining activities.

The proposed stockpiles for BIF, Type I VF, and Type II VF rock would be located on previously mined areas of the active pit. The Type II VF stockpile materials would be153 acres. No bedded pyrrhotite rock that has a higher sulfide level (i.e., Type III VF) or Duluth Complex rock, which contains extensive low-grade copper-and nickel-sulfide deposits would be mined or uncovered.

Sulfate (SO_4) is of particular concern in mining. The source of sulfate is small amounts of sulfide mineralization at or near the surface that might be exposed during mining. When exposed to oxygen, sulfide minerals in tailings, stockpiles, and pit walls can be oxidized forming (SO_4), which can then be transported to surrounding watersheds in surface runoff, groundwater outflow, pit-overflow, and dewatering waters. Pyrite and pyrrhotite, when present in rock exposed to air, commonly dominate (SO_4) generation processes; however, other sulfides can also oxidize and generate (SO_4) when they are found in the host rock. Sulfides are a trace constituent of both the VF and the BIF; however, sulfides occur at a higher concentrations in the VF than in the BIF.

Sulfur content of the lean BIF Rock and the Type I VF rock is less than 0.2 weight percent. The sulfur content of the Type II VF rock is greater than 0.2 weight percent but less than 1.0 weight percent. Neutralization potential ratio (NPR) is also a factor for distinguishing Type I VF from Type II VF rock. NPR is defined as the ratio of acid neutralizing potential to the acid generating potential. Type I VF rock has a NPR of greater than 3:1 and Type II VF rock has a NPR of less than 3:1. Lean BIF Rock does not necessitate a NPR rating. The Type II VF rock proposed for stockpiling would have blast patterns containing VF rock with whole rock sulfur content of greater than or equal to 0.2 weight percent and less than 1.0 weight percent sulfur and with an NPR of less than 3.

Pursuant to the terms of its existing Permit to Mine and amendments thereto, Northshore is permitted to remove and stockpile Type I VF material in conformance with the *Northshore Mining Virginia Formation Development Plan* (June 15, 2004).

Major mining activities would include rock drilling, blasting, loading and hauling, stockpiling, and progressive reclamation of materials overlying the ore. Typically the lean BIF ore deposits are first placed in stockpiles, they are then crushed, placed in temporary storage, and subsequently loaded on rail cars for shipment to the processing facility.

The southward progression of the Main Pit would occur in stages. The site will first be cleared of vegetation and stripped of 20 to 50 plus feet of surficial overburden. The thickness of surficial materials is highly variable. The depth of overburden depends on local bedrock topography, the morphology of glacial landforms, and the associated deposit. Peat and glacial till are the constituent overburden materials.

The first bedrock layer that would be encountered is the VF rock formation. In general, the VF is comprised of a sequence of argillite, siltstone, and greywacke, and contains trace amounts of sulfides. Stripping and stockpiling VF rock would be necessary to access underlying BIF ore. The upper depths of the VF rock formation are mapped as Type II VF rock and the lower portion Type I VF rock. The Project would mark the first time Northshore has encountered *in situ* Type II VF materials as part of its own mining activities at the Peter Mitchell Mine. Type II VF materials will be managed according to the 2013 *Type II Virginia Formation Stockpile Plan* (Golder 2013).

The proposed stockpiles would be on previously mined land within the Main Pit. Northshore is currently permitted to remove and stockpile Type I VF material as part of the existing Permit to Mine. Surface stripping material will be placed in final stockpiles, which will be benched and reclaimed in accordance with current DNR reclamation standards.

The BIF rock between 225 to 350 feet thick within the UPL progression is a thick-bedded, layered, sedimentary sequence. The gross mineralogy in the Eastern Mesabi Range (in which the Peter Mitchell Mine is located) largely consists of magnetite, quartz and iron-rich silicates. Iron content in the BIF ranges from 0 percent to greater than 30 percent. Analysis of iron content grades and processing characteristics are measured by a grid of exploration drill holes to determine which portions of the BIF can be economically mined as ore and processed. BIF with low iron grades, or other poor processing characteristics, are stripped and placed in on-site stockpiles to allow access to underlying higher grade ore material.

Previous East Pit Progression

The earlier East Pit Progression project had similar effects to soils and geology as the proposed 108 acre expansion, except that the East Pit Progression did not encounter any VF Type II waste rock.

c. Type II VF Stockpile Plan

This topic was addressed in the EAW in Item No. 6a, Item No. 6b, Item No. 6f, and Item No.11.

The *Type II Virginia Formation Stockpile Plan* (Golder 2013) sets forth the procedures for excavation of ore including mining and reclamation practices that minimize spatial and temporal exposure of Type II VF material to air, groundwater, and surface runoff during

processing and transport to the stockpile. These procedures include: 1) bench design along the UPL mining operation to minimize horizontal surface exposure of Type II VF material; 2) use of appropriate blasting techniques to limit generation of Type II VF fines and minimize fracturing of rock zones at the ultimate pit boundary; and 3) placement of blasted Type II VF rock in the Type II VF stockpile in an efficient and timely manner. These measures are specifically addressed in the Permit to Mine Amendment application and its attachments.

Northshore has developed and submitted a Type II VF Stockpile Plan. The *Type II Virginia Formation Stockpile Plan* was completed in May 2013 and was made available to the public as part of Northshore's Permit to Mine amendment application.

Northshore proposes to permanently stockpile Type II VF rock waste on-site pursuant to the technical design following design concepts developed by Golder. The Type II VF stockpile would be approximately 153 acres and is located entirely within the existing UPL mined lands. As designed, seepage from the Type II VF stockpile will flow to the pit sumps, where it will mix with pit stormwater runoff, groundwater inflows, and seepage from other stockpiles. The mixture of runoff, groundwater and seeps that currently collect in the sumps is mildly alkaline. This is likely due to the interaction of current runoff from stockpiled Type I VF and BIF rock already existing in the pit, groundwater, seeps, and surface runoff.

The minimum elevation for all stockpiled Type II VF material would be 1,600 feet AMSL. At closure, the maximum predicted pit lake level as set forth in the restoration plan is approximately 1,500 feet AMSL, which is the approximate minimum elevation at the east end of the pit. This level is also the level of the outfall from the future pit lake that will discharge to the Dunka River via the Unnamed Creek tributary. The Type II VF stockpile would be above the final water elevation at pit closure.

The stockpile's base layer of BIF and Type I VF rock will act as a water conveyance layer to minimize or eliminate contact of groundwater and stormwater with Type II VF materials. The base layer will enable horizontal flow of groundwater under the Type II VF materials from areas near the stockpile. The BIF rock will also contribute alkalinity to help neutralize potential stockpile seepage.

The Type II VF stockpile final cover will be a geomembrane-backed geosynthetic clay liner (GCL) membrane. The membrane will be progressively placed on stockpile as it is created. The cover will be inspected and surveyed during construction and on an annual basis thereafter to verify cover performance. One foot of GCL bedding will be placed on top of the GCL, followed by 2 feet of a drainage layer and 3 feet of glacial till. The final cover will be reclaimed with top soil and an approved grass mix to control erosion. Using shallow-rooted grass species will avoid root penetration into the stockpile cover. In addition, a coarse drainage layer of Type I VF or BIF will inhibit root penetration. DNR-approved control test plots for leakage will be monitored to assess GCL performance. These test plots will be constructed and monitored during the stockpile cover construction.

The placement of the cover system over the Type II VF rock stockpile will occur within 30 months after the rock is placed in the stockpile. The 30-month criterion is based on the observed humidity test cell reports that suggest at 30 months exposed Type II VF rock begins to create low pH conditions or leach metals. Thirty months is a conservative estimate, as the ASTM standards (ASTM D5744-96) of humidity cell testing tends to accelerate metal-mine rock weathering rates.

The final stockpile exterior slope lift height and bench width will be configured to satisfy applicable DNR Reclamation Standards, Minn. R. 6130.2400A (1) - (6) (2013). Specifically: the final lift height for Type I VF or BIF rock on the outer slope will be limited to 30 feet; the minimum bench width will be limited to no less than 30 feet measured from the crest of the lower lift to the toe of the next lift; the sloped area between benches will be no steeper than the angle of repose; benches shall be designed and constructed to control runoff; the sloped areas between benches shall support vegetation; and if the sloped area between the benches is covered with surface overburden and vegetated, lifts may be raised to a maximum 40 feet.

Ultimately, the commingled waters from the stockpile and the mine pit at large will discharge from the pit through the designated discharge points identified in the NPDES/SDS permit, to assure the water quality standards are met.

d. Reclamation Plan

This topic was addressed in the EAW under Item No. 6b, Item No. 10, Item No. 11, Item No. 13a, and Item No. 15.

Reclamation obligations and mitigation responsibilities will be required as part of the Permit to Mine amendment. The proposed 108 acre expansion and the previously authorized 25 acre progression will both contribute to the increase in mine pit area and therefore would be subject to a proportionate degree of reclamation development as described in the reclamation plan. The proposed stockpiling of Type II VF would be subject to the enhanced reclamation described in the *Type II Virginia Formation Stockpile Plan* (Golder 2013).

B. Hydrogeological Issues and Environmental Effects

a. Physical Effects on Watershed.

This topic was addressed in the EAW under Item No. 6b and Item No. 11.

Proposed Progression of the UPL

The Project site is part of the Langley Creek and Unnamed Creek watersheds. The Dunka River (warm-water stream) is a 17.4-mile long small river that at its closest approach is approximately 0.25 mile northeast of the east end of the Peter Mitchell Mine. It would be the sole recipient of waters exiting the Project area, from either Langley Creek or pit flow through an Unnamed Creek.

Approximately 58 acres of the 108 acre expansion is within the Langley Creek watershed and approximately 50 acres is within the Unnamed Creek watershed. The Project removes approximately 2.6 to 5 percent of the watershed surface area that flows directly to Langley Creek. Water from this area would flow into the mine pit and contribute to mine pit dewatering discharges. Cutoff of the Langley Creek headwatershed during excavation would be offset by increased pit runout (dewatering). Hydrologic impacts to Langley Creek during mine operations are estimated to consist of a flow increase of approximately 55 gpm, resulting in negligible impacts on water levels and associated riparian wetlands.

During active mining, water at the Project site would drain to existing sumps and be pumped back to Langley Creek. Runoff and seepage may be moved to a sump that discharges to Unnamed Creek or SD-002 to occasionally supplement flows for purposes of meeting water

quality standards in Unnamed Creek that drain the eastern part of the Peter Mitchell Mine. The proposed progression of the UPL would contribute minimally to the post closure effects described below.

At closure, water discharge to Langley Creek will cease, resulting in a 46 percent decrease in watershed area relative to the current condition, and a 60 percent decrease in average annual flow in the watershed relative to the current condition.

No substantial hydrologic changes to Unnamed Creek are anticipated until final pit closure. Unnamed Creek refers to a water course near the east end of the pit. Unnamed Creek originates at SD-002 and discharges into Dunka River after flowing through a series of wetlands. Unnamed Creek watershed area will increase by approximately 450 percent at final pit closure. Flow in Unnamed Creek will increase at closure by six to seven times the current flow, as the entire pit lake will drain to the Dunka River through Unnamed Creek. The proposed Project accounts for an approximate 3 percent change in the Unnamed Creek watershed and, by extension, a similar increase in flow.

Post closure, the pit lake will become a tributary to Unnamed Creek. Surface watersheds for the proposed Project differ from the watersheds anticipated at pit closure. The entire Project excavation area will be subsumed within the footprint of the pit lake post closure. After closure, the current stream characteristics of Langley Creek are likely to change, because discharge from the pit sump to the creek will end.

Hydrologic impacts to Langley Creek and Unnamed Creek post closure are set forth in the *Long Range Hydrology Study* (Barr 2008). Post closure, estimated impacts to average annual flows will include a 60 percent reduction in Langley Creek, a 600-700 percent increase for Unnamed Creek, and a 30 percent increase for Dunka River. At closure, the average annual flow in the Dunka River will increase by approximately 11 cfs, a 30 percent increase over the existing condition. Based on watershed area (measured relative to existing conditions), the proposed Project accounts for approximately 6 percent of the reduction in Langley Creek flow and approximately 3 percent of the increase in Unnamed Creek flow.

Previous East Pit Progression

The East Pit Progression is located within an Unnamed Creek watershed that flows to the Dunka River. The majority of the flow in Unnamed Creek prior to the East Pit Progression was from pit dewatering discharge location SD-001. Most of Unnamed Creek and SD-001 discharge location were eliminated as part of the East Pit Progression, with the exception of about 400 feet of stream. The 26 acre portion of the watershed consumed by the East Pit Progression now flows to an in pit sump and is discharged at a location (SD-002) through a series of wetlands and eventually to the Dunka River just upstream of the Unnamed Creek confluence with the Dunka River.

b. Wetlands.

This topic was addressed in the EAW under Item No. 6b and Item No. 11.

Proposed Progression of the UPL

A total of 62.83 acres of wetlands will be eliminated within the Project area during project operations: shallow marsh (20.40 ac), alder thicket (1.21 ac), shrub-carr (19.69 ac), and coniferous swamp (21.53 ac).

Northshore has previously mitigated 50.74 acres of the wetland acreage affected through compensatory mitigation permit agreements and amendments issued pursuant to a wetland replacement plan issued pursuant to a mining reclamation plan approved by the commissioner pursuant to Northshore's Permit to Mine, Minn Stat. §1036.222, subd. 1 (2014). This wetland replacement plan covered wetland losses associated with the proposed excavation, operation of mining activities along the southern pit wall, and associated establishment of travel routes for mining equipment.

There are an additional 12.09 acres of wetland requiring mitigation that will be affected by the Project: shallow marsh (10.15 ac), alder thicket (1.21 ac), and shrub-carr (0.73 ac). These impacts will be addressed in accordance with the requirements of Minn. Stat. §1036.222, subd. 1 (2014) as they relate to wetland replacement plans for Permits to Mine. In reviewing and approving said plan, the DNR will coordinate with the U.S. Army Corps of Engineers (USACE) for permitting under Section 404 of the Clean Water Act (CWA), as well as the MPCA water quality certification under Section 401 of the CWA.

Likewise, the compensatory mitigation for wetland losses would be described in an amendment to the existing Wetland Replacement Plan for the Northshore Mine and Northshore's Section 404 Permit #2005-1500-TWP.

Northshore has filed a joint request to USACE and the DNR to allow for the removal of the 12.09 acres under its existing Section 404 permit and State Wetland Replacement Plan. Wetland mitigation credits for the 12.09 acres of impacts are proposed to be obtained from the Cliffs Erie Embarrass Wetland Project, Minn. R. 8420.0930 (2013). The Embarrass River Wetland Project was approved in 1997 by the USACE and DNR for use on Cliffs' projects, including the Peter Mitchell Mine, on a 1:1 basis.

Previous East Pit Progression

The East Pit Progression eliminated 20.83 acres of wetlands, specifically 4.89 acres of wet meadow, 0.35 acres of shallow marsh, 7.3 acres of shrub carr/alder thicket, and 8.29 acres of hardwood swamp. These wetlands have received the necessary Section 404 permit from the USACE. The wetland impacts have been mitigated with impacts credits from the Embarrass River Wetland Project located about 12 miles west of the Babbitt mine area in the adjacent St. Louis River watershed and in Wetland Bank Service Area #1.

The East Pit Progression brought the edge of the pit approximately 400 feet from the Dunka River, eliminating 1,160 linear feet of an unknown stream. The USACE issued a Section 404 permit for this loss in June 2012. The loss was mitigated in 2013 through the restoration of the historic meanders of the previously channelized Gilmore Creek in St. Louis County. An EAW was prepared for the Gilmore Creek restoration. The restoration is subject to ongoing monitoring.

c. Groundwater.

This topic was addressed in the EAW under Item No. 6b, Item No. 10, and Item No. 11.

Groundwater is present in unconfined conditions in surficial deposits in the western portion of the proposed UPL where surface waters are present. Groundwater drainage is locally directed along relatively short flow paths toward nearby surface water features. Flow through surficial deposits is disrupted by mine features, bedrock, low permeability till, and lake deposits. Groundwater from the UPL progression and the area immediately adjacent to the UPL generates localized flows into the mine pit. In this region, flow is constrained by the hydraulic conductivity of the materials. Flow mixes with runoff and seepage, collects in sumps, and is then discharged into the Langley Creek watershed. Groundwater will continue to flow toward the pit post closure.

Groundwater also occurs in bedrock, primarily within fractures or weathered zones, typically near the upper surface of the bedrock. The bedrock has extremely low primary hydraulic conductivity. Thus, there is little to no yield of water unless secondary openings exist.

The bedrock groundwater level in the UPL progression is influenced by the elevation of water in the mine sumps. The fact that the mine is actively dewatering those sumps also influences groundwater levels. Groundwater in the bedrock adjacent to the mine flows into the mine pit because the sumps depress the static water level in the mine's immediate vicinity.

The mine progression would cause some loss of aquifer storage over the 108 acre area. As dictated by the slope of the geologic strata, which is dipping away from the mine's southern edge, the groundwater loss would extend only a short distance from the edge of the pit.

Lowering the dewatering level in the pit is not expected to cause substantial increases in groundwater inflows because the deeper portions of the BIF are less fractured and therefore less permeable than the shallow portions. Groundwater inflows from the Pokegama quartzite (to the north) and the VF (to the south) will be negligible because these units have a substantially lower permeability than the BIF and thus hold less groundwater.

There are no residential wells identified in the Minnesota County Well Index in the immediate vicinity of the proposed Project. The nearest BIF well identified in the Minnesota County Well Index is approximately 15 miles from the UPL progression.

Wetlands located near the current southern pit wall in the area of the proposed Project maintain water levels similar to pre-mining conditions. This likely indicates that the surficial aquifer system is perched above the bedrock aquifer system by low-permeability sediments and/or low-permeability bedrock and is not adversely affected by pit dewatering. Therefore, it is likely that the zone of influence from mining activity on groundwater flow does not generally extend a significant distance from the pit wall.

Based on elevations of existing wetlands, lakes, and streams, the entire post-closure pit lake will be surrounded by surface water features with elevations greater than the proposed pit lake elevation, and the pit lake will act as a groundwater sink. With the exception of the Dunka River north-northeast of the pit (to which the pit lake surface outlet will flow), these waters are approximately 100 feet higher than the pit lake elevation post closure and are

likely perched above the regional potentiometric surface by low-permeability bottom sediments and low-permeability bedrock.

Under the proposed Project, groundwater would flow into the existing pit, both during operations and post closure. The zone of influence (i.e., "cone of depression" of the water table) created by the mine pit during mining and post closure would undergo a southward shift associated with the proposed Project. This change would be limited to the immediate vicinity of the proposed Project. The change in location in the zone of influence would be the approximate equivalent of the horizontal distance between the current pit wall and the future pit wall location associated with the proposed Project. In general, the cone of depression would be limited to the area of the BIF and would not extend substantially into the much lower permeability bedrock of the VF (to the south) and the Pokegama quartzite (to the north).

d. Water Quantity.

This topic was addressed in the EAW under Item No. 6b, Item No. 10, Item No. 11, Item No. 13, and Item No. 19.

Proposed Progression of the UPL

The current water discharge from the Block 9 Bn7 and Block 15 Bn5 mine pit sumps was calculated as part of the water quality evaluation study for the Type II VF stockpile. Mine pumping records were used to estimate annual average discharge at 2,629 gpm (Golder 2013). The approximate water yield change in Langley Creek due to both surface water drainage changes and groundwater flow associated with the pit development was estimated based on actual flow monitoring of Langley Creek while mine discharges were occurring in combination with modeling to estimate contributions from various sources.

The results of this water balance calculation indicates that the project would increase annual average flow at the sumps by approximately 200 gpm, for a total discharge of 2,829 gpm after the Project is commenced. This is an approximate 8 percent increase in pumping rates. However, this increase is offset by a reduction in the natural flow to Langley Creek as a result of mining the proposed UPL progression. Accounting for the elimination of the natural watershed area caused by the Project, the net change in flow to Langley Creek is estimated to be an average annual increase of 80 gpm, yielding a 2 percent increase in total flow in Langley Creek during mining operations. This estimated change in flow to Langley Creek is similar to the 55 gpm that was estimated using the watershed yield approach.

A minor increase in runoff and groundwater inflow into the mine pit is expected due to the Project. Most of the groundwater inflow into the existing pit is from the unconsolidated surficial deposits that lie on top of bedrock. This is consistent with other pits in the area, such as the Dunka pit, where analyses of pumping records and pit water levels demonstrate that nearly all of the groundwater inflows into the pit are from surficial deposits.

Mine water discharged from the proposed Project will flow to the Block 9 Bn7 and the Block 15 Bn5 sumps. The quantity of water received at these sumps due to the proposed Project would primarily be from increased precipitation and runoff as a result of an increase in the mined area draining to the sumps. The increase in groundwater flowing into the proposed Project mine area would be a secondary source of increased water volume at the sumps.

Dewatering from the mine pit is currently permitted under DNR water appropriations permit #1982-2097. The maximum discharge rate permitted is 36,000 gpm (Dunka River – 11,000 gpm, Langley Creek – 12,000 gpm, and the Partridge River – 13,000 gpm). The Project would necessitate an increase in the volume of water that would need to be pumped and that volume would be roughly proportional to the size of the proposed 108-acre UPL progression relative to the existing 4,642-acre UPL (or approximately 2 percent additional volume). This increase is within the volume authorized under the existing appropriation permit. No new appropriation permit or permit amendment is required. The existing water appropriation allows 36,000 gpm of water to be appropriated but existing records have indicated appropriations of approximately 2,629 gpm. The approximate 2 percent increase in water appropriation due to the Project is within the currently authorized appropriation volume.

Previous East Pit Progression

The previous East Pit Progression project is within a portion of the mine pit that is discharged from sump SD-002 to Unnamed Creek through a series of wetlands. The 25 acre pit progression is approximately 8 percent of the area of the mine pit. Thus, the discharge from SD-002 was expected to increase by 8 percent (approximately 0.2 cfs or 90 gpm). This volume of increase to the existing discharge is within the amount currently authorized by the DNR water appropriation permit and MPCA NPDES/SDS permit.

e. Water Quality.

This topic was addressed in the EAW under Item No. 6b, Item No. 10, Item No. 11, Item No. 13, and Item No. 19.

Proposed Progression of the UPL

The existing mine dewatering discharge is regulated by the MPCA under an NPDES/SDS permit. The proposed 108 acre expansion requires the removal, exposure, and stockpiling of Type II VF that when exposed to air and water, can produce runoff characteristics that are different from the existing runoff. The main differences would be potential increases in sulfate and metal constituents such as cobalt, copper, nickel, and zinc. Northshore has proposed measures to address potential water quality changes that are incorporated in the *Type II Virginia Formation Stockpile Plan* (Golder 2013). These measures include managed blasting and removal of VF Type II rock with all rock being covered in a specially designed stockpile within 30 months.

The *Type II Virginia Formation Stockpile Plan* (Golder 2013) used a water and chemical mass balance model to determine the percent change in constituent concentrations of water discharges attributed to the Project. Inputs to the model were defined on the basis of an experimental test program, data from existing surface water chemistry, and established geochemical principles. The current project designs, the deepening of the pit in the future, and the post-closure conditions were all evaluated. All scenarios were evaluated with six different sets of assumptions, resulting in 18 model runs.

The evaluation of potential water quality effects of the proposed Project is based on a chemical mass balance scenario designed to provide an upper bound on Project impacts by compounding multiple assumptions, each representing upper bound conditions. This is a during-operations scenario that assigned the highest concentration limits (derived from the highest percent sulfur humidity cell #17), infiltration of 0.45 percent of annual precipitation,

and a constant volume of groundwater flowing into the pit. Under this scenario, the assumed percent sulfur, infiltration and groundwater flow are all upper bound conditions. The maximum concentration for this scenario would correspond to a period in winter when precipitation is at a minimum.

For sulfate, arsenic, and hardness, the maximum potential increase in concentration resulting from the proposed Project is less than 5 percent. Concentrations of aluminum, iron, nickel, cobalt, copper, and zinc are also projected to increase in surface waters. The resulting concentrations are projected to remain substantially below applicable water quality standards. The largest percentage increases were associated with cobalt (max. 194%), copper (max. 80%) and nickel (max. 314%). For cobalt, the predicted increase would result in a concentration of 2.9 µL, while the most stringent water quality standard is 5.0 µL. For copper, the predicted increase would result in a concentration of 4.5 µL, while the most stringent water quality standard is 9.8 µL. For nickel, the predicted increase would result in a concentration of 10.4 µL, while the most stringent water quality standard is 158 µL.

Projections of the amount of seepage from the Type II VF stockpile ranged from 0.21 - 0.45 percent of annual precipitation. This percentage is applied to the most current water quality measurements observed at the active permitted discharge location (SD005).

A reclamation plan will be implemented during stockpile construction so that exposure of the Type II VF rock is limited. Limiting the exposure of Type II VF rock will reduce the potential for the onset of low pH drainage and metals leaching. A worst case scenario was used as the baseline for determining effects on water quality. There are six components to the strategy to mitigate possible but unlikely stockpile seepage impacts from the proposed Project:

1) The Type II VF stockpile design will limit infiltration and thus water contact with Type II VF material, thereby limiting potential for seepage.

2) A DNR-approved pilot test plot program will be implemented to test and demonstrate the hydrologic performance of the cover system. The goal of the test plot program is to replicate the Type II cover system on a field scale to evaluate whether it can meet performance specifications under site conditions.

3) All proposed Project mine water will flow to mine sumps for treatment by settling prior to discharge.

4) Type II VF contact mine water will be diluted. It will mix with other water at the sumps (or within the pit lake).

5) Supplemental water quality monitoring consisting of increased frequency and/or additional water quality parameters will be performed at locations SD004 and SD005 and at the in-pit sumps that could potentially be affected by the stockpile seepage, as well as any surface discharge locations receiving transfer water containing stockpile seepage. Water quality results for in-pit sumps will be reported with those from SD004 and SD005.

6) A mine water management contingency plan will be developed to respond to existing and supplemental water quality monitoring results and to address conditions that may have the potential to affect effluent quality. The contingency plan will be based on existing and supplemental water quality monitoring results. This plan will include water transfers

between sumps, sampling and, if necessary, treatment for specific parameters. Such a strategy is currently employed to meet existing effluent limits.

Once mining ceases, all of the mine pit sumps will stop operating. The Peter Mitchell pit will drain to the pit lake and outflow to Unnamed Creek and then to Dunka River.

As part of the *Type II Virginia Formation Stockpile Plan* (Golder 2013), water quality evaluations upper and lower bound water balance conditions were included in the design evaluations for the closed mine. These water balances assumed a pit lake watershed area on the order of one half the total pit area planned at closure, which approximates the current state of mine development. It also assumed that only a fraction of the water in the assumed pit lake would mix with the Type II VF stockpile seepage. The water quality evaluations assumed a minimum amount of pit lake water available for dilution. Flow values used in the water quality impact evaluations represent a lower than expected amount of water available for dilution.

The proposed Project does not have a high potential to contribute to mercury methylation and is not anticipated to increase the amount of methyl mercury in receiving waters. Increases in mercury methylation would require increased discharges of mercury, which is not anticipated by the proposed Project.

The 2013 mercury monitoring results for the Peter Mitchell Mine showed very low mercury in the pit discharges (<1 ng/L). The 2013 mercury monitoring results are significantly less than the 6.9 ng/L standard for the Rainy River Basin. The proposed Project will not contribute notably to mercury concentrations downstream of the discharge points during operations or during post-closure. Mercury discharges from the project will not have an effect on the regional total maximum daily load (TMDL) for mercury.

There are no anticipated impacts resulting from the proposed Project activities to other surface waters. No impaired waters or special designations listed on the current MPCA 303(d) Impaired Waters List will be affected.

Groundwater Quality. During operations, the proposed Project will not affect groundwater quality. Because of the depression of the local water table caused by dewatering, all groundwater flows during operations will be towards the mine pit and will be collected in the sumps located in the pit. There will be no post-closure effects to groundwater quality. Based on elevations of existing wetlands, lakes, and streams, the entire post-closure pit lake will be surrounded by surface water features with elevations greater than the proposed pit lake elevation, and the pit lake will act as a groundwater sink.

Monitoring Protocols. Supplemental monitoring of water quality will be conducted prior to Type II VF stockpile development, as well as following reclamation, at the established NPDES/SDS outfalls. Future supplemental monitoring will complement current monitoring performed by Northshore in accordance with the *Type II Virginia Formation Stockpile Plan* (Golder 2013) and the existing NPDES/SDS Permit MN0046981 and any future permits. This supplemental monitoring will provide the basis for the mine water management strategy to ensure compliance with the NPDES/SDS permit effluent limits.

Stormwater. All stormwater runoff from the proposed Project would continue to flow to the mine pit sumps. It would then be discharged pursuant to Northshore's NPDES/SDS permit outfalls. Therefore, the proposed Project will not result in any changes to stormwater

management practices at the Peter Mitchell Mine. Current stormwater management practices are detailed in the existing Stormwater Pollution Prevention Plan (SWPPP).

Previous East Pit Progression

The previous East Pit Progression is a relatively small portion of water discharged to the Dunka River from the Peter Mitchell Mine. The East Pit Progression does not encounter any Type II VF rock, so it is anticipated the water quality from runoff of this portion of the pit will be similar to existing water quality conditions. A mass balance approach was used in the USACE's EA to assess water quality impacts. Changes in water quality were anticipated to be very small and in compliance with NPDES/SDS permit limits. Since mining began in this area, water quality monitoring has been in compliance with NPDES/SDS permit limits.

f. Wild Rice.

Wild rice has not been identified in recent surveys of the Dunka River, including a 2013 survey conducted by Barr Engineering. The Dunka River has not been designated as a water used for the production of wild rice. Therefore, the Class 4B wild rice sulfate standard of 10 mg/L does not apply.

C. Land Use Issues and Effects

a. Land Use Issues-Land Use and Zoning.

This topic was addressed in the EAW under Item No. 9.

Proposed Progression of the UPL

The Project area and surrounding lands within Northshore's existing Permit to Mine are zoned for mining use. The Project would result in the conversion of land use from natural environment to mine land.

There are no parks, trails, or prime or unique farmlands within or adjacent to the proposed Project. No land use incompatibilities were identified in the EAW. The proposed Project is entirely within the City Limits of the City of Babbitt and is zoned as "Minerals Mining." The Project is compatible with current zoning ordinances.

Previous East Pit Progression

The East Pit Progression included the relocation of CSAH 70. Realignment of the roadway has resulted in a minor land use change.

D. Biological Resource Effects

a. Vegetation.

This topic was addressed in the EAW under Item No. 7 and Item No. 13a.

Some of the excavation area of the Project was recently disturbed by mining-related activities, including the prior development of access trails, vegetation clearing, and overburden removal along the mine pit edge. The Project would cause a loss of wetlands (62.83 ac), wooded/forest (7.62 ac), and brush/grassland (29.12 ac) in the proposed

excavation area (108 ac). The area designated for the Type II VF Stockpile (153.00 ac) is located on mined land within the Main Pit of the Peter Mitchell Mine. There is no vegetation in this area.

The 108 acre expansion area will not be re-vegetated. The area will be converted to open water at mine closure. Vegetation will be established as part of the stockpile final cover.

b. Wildlife and Fisheries Resources.

This topic was addressed in the EAW under Item No. 13a.

Proposed Progression of the UPL

A variety of large and small mammals, birds, and other animals are found in upper St. Louis County, including in the vicinity of the proposed Project. Some species in greatest conservation need (SGCN) may use the wetland areas near the proposed Project.

Most of the Project is within or immediately adjacent to an active mining area. The potential wildlife habitat within the UPL progression boundary is fragmented by mine access roads.

Common species are better able to use edge and disturbed habitats. SGCNs generally require habitats that are less disturbed than the Project area, although some are likely present in the vicinity of the Project. The Project area's wetlands are also near human disturbance, which tends to reduce SGCN presence. Many of the SGCN species may be active nearby, away from the road and disturbed areas, and may occasionally use parts of the Project area. But collectively, these areas are of limited quality for SGCN species.

The proposed Project would result in minor adverse impacts to common wildlife species associated with the loss of 108 acres of already fragmented wildlife habitat. For common wildlife species, this loss is considered minor because there is abundant similar habitat adjacent to the proposed Project. Furthermore, most common species are habitat generalists with a relatively high tolerance of disturbance and human presence.

Previous East Pit Progression

The East Pit Progression and the relocation of CSAH 70 have resulted in the permanent loss of already fragmented wildlife habitat. The total impact area of the East Pit Progression and the road relocation is approximately 46 acres. None of the habitat is unique or uncommon in the area and loss of this habitat has not resulted in significant impacts on local wildlife.

<u>Wildlife Movement Corridors</u>

Proposed Progression of the UPL

Barr Engineering prepared a *Cumulative Effects Analysis of Wildlife Habitat and Threatened and Endangered Wildlife Species* in 2009 for U.S. Steel as part of the Keetac Expansion Project (Barr 2009). Barr's report (2009) was reviewed and approved by DNR. Barr's study (2009) evaluated opportunities for long-distance wildlife movement across the Iron Range corridor from its western limits near Grand Rapids to its eastern limit near Babbitt. The study identified 18 wildlife corridors that provide opportunities for long distance wildlife movement across the length of the Iron Range (Barr 2009).

The proposed Project area does not lie within or intersect any of the identified wildlife corridors set out in the Barr report (2009). The nearest identified wildlife corridors are 5.5 miles to the southwest, and 2.2 miles to the northeast. Both of these corridors were rated as "moderate quality" in the Barr report (2009), meaning that both corridors are currently degraded by existing human-related activities (i.e., logging and road construction). Wildlife attempting to make northwest-southeast movements through the general area can continue to use the two nearest corridors without interference from the proposed Project. Moreover, the northeast extent of the Iron Range, and the barriers to wildlife movement that it presents, end approximately 5.3 miles north-northeast of the proposed Project, at the northeast end of the Dunka Pit.

Previous East Pit Progression

The East Pit Progression and the relocation of CSAH 70 have reduced the width of the wildlife corridor located 2.2 miles northeast of the proposed Project. The relocated roadway is approximately 30 feet south of the Dunka River, and has reduced the functional width of the wildlife corridor to approximately 550 feet. The East Pit Progression and roadway relocation have not completely removed or blocked the existing wildlife corridor and it is likely that wildlife continue to use this reduced-width corridor. However, the relocation of CSAH 70 has narrowed the wildlife corridor and brought wildlife movement closer to roadway traffic.

Aquatic habitat and fisheries of receiving waters

Proposed Progression of the UPL

The receiving waters of the pit discharge are representative of healthy streams and have exhibited a diversity of non-game species during routine fisheries sampling for determining fisheries characteristics and abundance. The small stream resources near the Project provide spawning habitat and support gamefish populations in interconnected waters. The Dunka River and Langley Creek are the only fisheries resources near the Project area. It is anticipated that the native populations of resident fish would experience minor adverse effects due to changes in hydrology.

Increased flow to Langley Creek is estimated to be approximately 55 gpm during mining operations, resulting in a minimal increase to water levels and the effect on riparian habitats. Hydrologic impacts are diminished further downstream, as the tributary watershed area increases. There are no anticipated impacts to Unnamed Creek hydrology during mining operations. At closure, there will be changes to average annual flows in Langley Creek, Unnamed Creek, and the Dunka River. Approximately 6 percent of the estimated reduction in Langley Creek flow in post pit closure is due to the Project (as estimated by watershed area). Similarly, about 3 percent of the increase in flow to Unnamed Creek is due to the Project. The section of Dunka River from the confluence of Langley Creek down to the confluence of Unnamed Creek will experience a small reduction in flow due to the decreased flow from Langley Creek at closure. The proposed UPL progression would cause minimal changes to the watersheds, flows, and temperatures of the receiving waters. Discharges from the proposed Project are projected to meet applicable permit limits and water quality standards.

The Permit to Mine, as part of reclamation for the existing mining operation, requires the creation of littoral zones within the pit lake. Littoral zones are shallow portions of a lake that support most of the plant and animal life in a lake. The Permit to Mine stipulates a minimum

of 20 percent of the final pit lake by surface area comprise littoral zones. Littoral zones will be created by depositing part of the waste rock back into the pit after the ore has been mined, thereby controlling the shape and depth of the final shoreline, including the near-shore areas. The littoral zone reclamation feature was developed as a mitigation measure for hydrologic changes that would occur at mine closure due to mining through the watershed divide.

Wetland mitigation requirements under the Permit to Mine and the Clean Water Act Sections 404/401 will assist in mitigating impacts to fish and wildlife resources that would be affected due to loss of wetland features.

Previous East Pit Progression

The East Pit Progression removed most of the unnamed tributary to the Dunka River, resulting in a permanent loss of that channel. Dewatering of the pit continues to be routed to what is identified as Unnamed Creek. Unnamed Creek has no defined channel or known fishery. Impacts from dewatering the mine pit due to the East Pit Progression are not notably different from the prior conditions because the water quality and quantity of the discharge has remained the same. The East Pit Progression did not result in impacts to the Birch Lake fishery because the water quality and quantity of the discharge have remained unchanged.

The East Pit Progression did not result in impacts to the Dunka River and there was no discharge to Langley Creek. Appropriate Best Management Practices (BMPs) were installed and maintained to control construction sediment from entering the Dunka River during the relocation of CSAH 70. Impacts to Dunka River fish populations resulting from the East Pit Progression and the relocation of CSAH 70 traffic have remained unchanged.

c. Rare Features.

This topic was addressed in the EAW under Item No. 13b.

Barr Engineering contacted the DNR in October 2013 to report the results of the Natural Heritage Information System (NHIS) search, and to get DNR concurrence on a finding that no effects on rare features were anticipated. The NHIS database indicated that no state-listed species have been recorded within one mile of the proposed Project area. The DNR provided a letter of concurrence stating that only minimal effects on state listed rare features are anticipated.

The United States Fish and Wildlife Service (USFWS) lists three federally-threatened species in St. Louis County, and has designated critical habitats for each (USFWS 2015). They are the Canada lynx (*Lynx canadensis*), the gray wolf (*Canis lupus*), and the piping plover (*Charadrius melodu*s). In addition, the USFWS has published a final rule to list the northern long-eared bat as a threatened species effective May 4, 2015.

The Canada lynx is a solitary species with a large range, preferring mature coniferous forest habitat and tending to avoid areas of human activity. Small quantities of marginal Canada lynx habitat may be found near the proposed Project. However, the areas receive frequent disturbance and are not anticipated to be preferred habitat. While land cover in the vicinity of the proposed Project lacks high quality Canada lynx habitat, several sightings of lynx have been reported near the Peter Mitchell Mine, most recently in February 2011. Though designated critical habitat for both the Canada lynx has been established in St. Louis County, none is located within one mile of the proposed Project area.

Documentation of lynx sightings by Northshore employees is part of a reporting policy implemented by Northshore in July 2006. It is also required by the USACE wetland permit for the site. The Peter Mitchell Mine's current lynx policy follows Northshore's Section 404 permit requirement to document and report all lynx sightings.

Due to a Federal court decision, wolves in the western Great Lakes area, including Minnesota, were relisted under the Endangered Species Act, effective December 19, 2014. The 108 acre expansion is not anticipated to adversely affect wolves due to the relatively small loss of habitat that would result from the Project.

Piping plovers require sandy beaches to meet their habitat needs. There are no sandy beaches at or near the Peter Mitchell Mine. Therefore, it is unlikely that the piping plover will be impacted by this Project.

No evaluation for northern long-eared bat presence has been completed. During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. They roost in cooler places, such as caves and underground mines in the winter and sometimes during the summer. The proposed 108 acre expansion area include approximately 8 acres of wooded/forest cover type that could provide suitable habitat for northern long-eared bats.

Based on a lack of preferred, suitable habitat for the Canada lynx, piping plover and gray wolf at the Peter Mitchell Mine, the proposed Project will have no effect on these federally-listed species. The risk of vehicle collisions with these species would remain similar to the existing conditions.

E. **Traffic.**

This topic was addressed in the EAW under Item No. 18.

The proposed Project would not generate increases in traffic above existing levels of employee or vendor traffic to and from the site. This is because the proposed Project would not result in an increase in the work force, nor would it result in increased vendor visits to the site. The proposed Project would require no improvements to existing traffic controls. The proposed Project would not result in a change in existing transportation conditions. Therefore, there is no need to develop measures to minimize or mitigate proposed Project-related transportation effects.

F. **Waste Effects-Wastes including Hazardous Wastes.**

This topic was addressed in the EAW under Item No. 12.

There are no known existing sources of contamination. There would be no new types of state-defined solid waste generated as part of the proposed Project. Current operations, including the maintenance of mining-related equipment, require certain hazardous materials to be used and stored at the Peter Mitchell Mine equipment maintenance facility. As with current mining activities, fuel spills could occur during the refueling and maintenance of mining equipment. Fuel tanks and oil barrels that are stored on site could develop leaks. MPCA's "What's in My Neighborhood" (WIMN) website identified two 1990s fuel leak/spills at the processing facility. Both of the spills were verified, addressed, remediated, and their MPCA incident tracking records were subsequently closed.

The proposed Project would not result in changes to these current practices. Fuel spills that could occur will be handled in accordance with Northshore's Spill Prevention Control and Countermeasure Plan (SPCC). Fuel tanks and oil barrels stored on site will also be managed according to the SPCC. No hazardous waste will be generated by the proposed Project.

G. **Air Quality**.

This topic was addressed in the EAW under Item No. 16.

The Peter Mitchell Mine is a stationary source of air emissions regulated by the MPCA under the existing Air Emissions Permit Number 13700032-001. The proposed Project would involve activities that produce fugitive particulate matter. The emissions generated by the proposed Project activities are associated with blasting, loading, hauling and dumping of mined materials, as well as wind erosion from active stockpiles. Particulate emissions also occur from ore crushing and loading of rail cars. Trucks operating on unpaved roads increases fugitive dust generation. Mine-related fugitive emissions are controlled by measures identified in the Peter Mitchell Mine's existing Fugitive Emissions Control Plan (FECP).

Vehicle air emissions are associated with the combustion of #2 fuel oil and/or gasoline, and include: carbon monoxide (CO), nitrogen oxides (NOx), particulate matter (PM), particulate matter with a diameter of 10 micrometers or less (PM10), particulate matter with a diameter of 2.5 micrometers or less (PM2.5), sulfur dioxide (SO2), volatile organic compounds (VOC), greenhouse gases (GHGs) and, hazardous air pollutants (HAPs). The only odors anticipated from the proposed Project would be those associated with diesel engine exhaust from equipment used for mining-related operations.

Good stockpiling practices, including proper settling of materials by compaction, will be implemented to minimize wind erosion. Protocols for suppressing dust generation are addressed in MPCA's air quality permit.

Emissions from crushing operations are controlled by a bag house at the crushing facility. Emissions from loading ore into railcars are mitigated during non-freezing months by spraying water onto the ore before it enters the bins. Emissions from these sources will not change as a result of the proposed Project. The proposed Project will not cause any increase over historical rate of materials being processed. Further, because the proposed expansion area is located closer to the crushing plant and rock stockpiles than areas mined historically, distances for hauling rock to the stockpile(s) and for hauling ore to the crushing plant will decrease from current operations. The proposed Project will not involve any increase in the rate of diesel exhaust emission odors above those associated with the existing mining activities. There are no off-site odor impacts anticipated from the proposed activities.

H. **Noise**.

This topic was addressed in the EAW under Item No. 17.

Proposed activities within the progression area and at the Type II VF stockpile are similar to ongoing, existing mining-related activities at the mine facility. The proposed excavation activities within the UPL progression would be at the south edge of the Main Pit.

The Project is further away from the City of Babbitt, the nearest noise receptor site, than previous mining operations. The proposed Project would result in a continuation, not an increase, in existing mining-related activities and associated noise conditions.

I. **Visual Effects**.

This topic was addressed in the EAW under Item No. 15.

The proposed Type II VF stockpile will be constructed north of the UPL progression area within the existing mine area. The Type II VF stockpile will be created within the constraints established in the current DNR Mineland Reclamation rules. It is designed to have a maximum upper elevation of 1,720 feet AMSL. The natural ridge located between the proposed Type II VF stockpile and the City of Babbitt rises to an elevation of 1,850 feet AMSL.

With elevations around the City of Babbitt at approximately 1,500 feet AMSL, the proposed Type II VF stockpile would not be visible from populated areas. Mining activities within the UPL progression would include lighting during nighttime operations, consistent with current ongoing mining activities. Therefore, there will be no increase in visual effects associated with lighting.

J. Archaeological, Historical, or Architectural Resources

a. Archaeological, historical, or architectural resources.

This topic was addressed in the EAW under Item No. 14.

A cultural resources data request was made to the SHPO on October 21, 2013. The request encompassed all land within the proposed Project footprint, and a one-section buffer in all directions. The SHPO responded on November 12, 2013 with information reporting two archaeological sites documented in Township 60 North, Range 12 West, Section 20.

One of the two recorded sites is in the southeast quarter of the northwest quarter section, which would place it within the same quarter as the UPL progression. However, this site no longer exists because the entire area was mined by Reserve Mining Company prior to 1986. The other archaeological site is outside of the proposed Project. The SHPO report also included one historical site, a demolished crusher building, off CSAH 70, in Township 60 North, Range 12 West, Section 18. This site is also outside of the proposed Project.

During the EAW public review, SHPO requested that a Phase 1 archaeological survey be completed for the proposed 108 acre excavation area. The need for the survey may be waived if it can be documented that the project area was previously surveyed or disturbed.

K. Cumulative Potential Effects.

This topic was addressed in the EAW under Item No. 19.

Cumulative potential effects are the combined effects of the proposed Project and past, present, and reasonably foreseeable future projects Minn. R. 4410.0200, subp. 11a (2013). The first step in identifying cumulative potential effects is to identify the geographic and temporal scope of environmental effects from the proposed Project. *Id.* This environmentally

relevant area and timeframe can then be used to identify other projects and environmental effects that could interact with environmental effects from the project. As a practical matter, environmental effects from past and present projects represent the existing environmental conditions and are always evaluated in the EAW. Predictions of environmental effects are limited to the project pending before the RGU and those projects that are reasonably likely to occur. *Id*. With regard to future projects, there must be sufficient detail about the proposed Project such that the RGU may develop an understanding of the project' potential environmental impacts. *Id.* Environmental effects from the proposed Project that could combine with effects from other projects have been considered for water resources, visual effects, noise, and wildlife corridors. Consideration of each of these cumulative potential effects is discussed below.

Reclamation of the existing mining operation is a future condition that is reasonably foreseeable. Pursuant to the existing Permit to Mine, there is a basis of expectation for reclamation of the existing mining operation.

The proposed Project is an expansion of an existing taconite mining operation. There are no additional expansions proposed or contemplated nor are there plans or specifications for an expansion other than the project at the Peter Mitchell Mine within the foreseeable future (5 to 10 years). Nor are there any other reasonably foreseeable projects within the environmentally relevant area with the degree of certainty required for a cumulative impact analysis as set forth in Minn. R. 4410.0200, subp. 11a (2013).

Water Resources

The proposed expansion is within the Langley Creek and Unnamed Creek watersheds that flow to the Dunka River as part of the Rainy River watershed. Water resource related environmental effects from the proposed Project are limited to this geographic area. It is important to note that portions of the existing mining operation flow to the Partridge River in the St. Louis River watershed, but none of the water from the proposed expansion and stockpile will enter that watershed. In fact, the proposed reclamation plan identifies that, at closure, those portions of the mine pit will discharge to the Dunka River at the lowest elevation outlet at the east end of the mine pit. This will occur because the watershed pillar separating the Rainy River–Lake Superior Watersheds has been removed as authorized under Northshore's existing Permit to Mine. The portion of the mine pit within the Partridge River watershed is still separate from the portion of the mine pit within the Dunka River watershed. That portion within the Partridge River watershed is still discharging to the Partridge River, but at closure the final pit elevation will result in pit water being discharged to the Dunka River.

The largest cumulative potential effect within the Dunka River watershed is the change in hydrology after mine closure when the pit will refill and flow through Unnamed Creek to the Dunka River. The flow at Unnamed Creek after closure is estimated to increase by six to seven times over the existing conditions. Flow in the Dunka River after closure is estimated to increase by 30 percent. The proposed 108 acre expansion will yield an estimated 3 percent change in flow within Unnamed Creek. There will be no change in flow in the Dunka River because the proposed expansion is within the Dunka River watershed.

The mitigation for change in hydrology at mine closure includes development of a pit lake with aquatic habitat enhancement. The depression at the base of the mine pit will be developed into a deep linear lake designed and configured to contain at least 20 percent

littoral (shallow) habitat. Northshore will be required to deposit part of its mined material back into the pit after the ore has been mined. This will allow a degree of control over the shape and depth of the final shoreline and enable the mine to build the large littoral zones. Other reclamation requirements include the construction of islands that will provide bird habitat, artificial fish spawning areas, and public access to the lake following mine closure. Organic debris from overburden stockpiles will be placed in the littoral areas of the lake to aid in initiating and progressing biological productivity.

Other projects in the environmentally relevant area include the existing discharges from the Dunka Mine and any potential discharges from the Twin Metals bulk sample at the existing Inco shaft. The Twin Metals Bulk Sample has not begun. But the DNR has received a submittal from Twin Metals for eventual EAW preparation. The DNR has determined the Twin Metals Bulk Sampling Project is reasonably foreseeable within the meaning of Minn. R. 4410.0200, subp. 11a (2013). The existing Dunka Mine discharges are in compliance with NPDES/SDS effluent limits and combining these discharges with Northshore discharges, which are also subject to NPDES/SDS requirements, is not anticipated to adversely affect surface water quality. The specific location of discharges from the Twin Metals bulk sample has not been identified. However, any discharges from the project would need to meet water quality standards.

During operation and post-closure, local groundwater will flow into the mine pit. This prevents any groundwater interaction from the proposed Project with activities at the Dunka Mine and the Twin Metals Bulk Sample site.

Visual Effects

The proposed stockpile is the most visible feature of the proposed Project. As stated in the EAW, project activities would not be visible from the nearest community of Babbitt nor any other residences in the area. Visual effects from the proposed Project would only interact with the existing mining operations and are outside the visible range of other projects.

Noise

The proposed expansion is further away from the nearest noise receptor than current mining operations. The magnitude of noise impacts from the proposed Project would not be greater than current mining operations. Noise impacts from other projects are far enough away from the proposed Project that cumulative potential effects are not anticipated.

Wildlife Corridors

Wildlife corridors have been evaluated as part of cumulative potential effect analysis for other mining projects on the Iron Range. The nature of mineral deposition and mining on the Iron Range has created a linear impact zone that limits the ability of wildlife move north and south across the Iron Range. As part of this evaluation, Barr Engineering prepared a *Cumulative Effects Analysis of Wildlife Habitat and Threatened and Endangered Wildlife Species* (Barr 2009) that identified remaining wildlife corridors. The proposed Project does not impact any of the remaining wildlife corridors.

19. The following permits and approvals are needed for the project:

Government	Type of Application	Status
DNR	Permit to Mine	Current Permit /Amendment Pending
USACE	Clean Water Act Sec. 404	Current Permit /Addendum Pending
DNR	Water Appropriations	Current Permit Sufficient
MPCA	NPDES/SDS	Current Permit Sufficient
MPCA	Clean Water Act Sec. 401	Certification Pending for Project
MPCA	Air Emissions Permit	Current Permit Sufficient

CONCLUSIONS

1. The following standards and criteria are applied by the RGU to determine whether the proposed Project has the potential for significant environmental effects and requires the preparation of an EIS.

   In deciding whether a project has the potential for significant environmental effects, the following factors shall be considered:

   a. *type, extent, and reversibility of environmental effects;*
   b. *cumulative potential effects;*
   c. *extent to which the environmental effects are subject to mitigation by on-going regulatory authority; and*
   d. *the extent to which environmental effects can be anticipated and controlled as a result of other environmental studies undertaken by agencies or the project proposer, including other EISs.*

   Minn. R. 4410.1700, subp. 6-7 (2013).

2. *Type, extent, and reversibility of environmental effects*

   Based on the Findings of Fact above, the DNR concludes that the following potential environmental effects, as described in Finding of Fact No. 18, will be limited in extent, temporary, or reversible:

   Project Construction
   Physical Effects on Soils & Geology
   Physical Effects on Watersheds
   Wetlands
   Groundwater
   Water Quantity
   Water Quality
   Wild Rice
   Vegetation
   Wildlife and Fisheries Resources
   Rare Features
   Traffic
   Waste Effects – Wastes incl. Hazardous Wastes
   Air Quality
   Noise
   Visual Effects
   Archaeological, Historical or Architectural Resources

3. *Cumulative potential effects.*

   Based on the Finding of Fact above, the DNR concludes that the following cumulative potential effects do not have the potential to be significant environmental effects:

   Visual Effects
   Noise
   Wildlife Corridors

   The proposed Project's contribution to cumulative potential effects on water resources is limited when viewed in connection with other contributions. The proposed Project will comply with existing water appropriation and water discharge permit requirements that are designed to address potential cumulative effects to water resources. The project proposer has made efforts as part of the mine site reclamation to minimize cumulative potential effects.

   No additional cumulative potential effects were identified.

4. *Extent to which environmental effects are subject to mitigation by on-going public regulatory authority.*

   The following environmental effects are subject to mitigation by DNR regulatory authority:

   Project Construction
   Physical Effects on Soils & Geology
   Physical Effects on Watersheds
   Wetlands
   Groundwater
   Water Quantity
   Water Quality
   Vegetation
   Wildlife and Fisheries Resources
   Rare Features
   Waste Effects – Wastes incl. Hazardous Wastes
   Noise
   Visual Effects

   The following environmental effects are subject to mitigation by MPCA regulatory authority:

   Wetlands
   Groundwater
   Water Quality
   Wild Rice
   Waste Effects – Wastes incl. Hazardous Wastes
   Air Quality
   Noise

The following environmental effects are subject to mitigation by USACE regulatory authority:
Project Construction

Wetlands
Rare Features
Archaeological, Historical or Architectural Resources

5. *Extent to which environmental effects can be anticipated and controlled as a result of other environmental studies undertaken by public agencies or the project proposer, or other EISs.*

   The following environmental studies assist in the anticipation and controlling of potential environmental effects:

   Type II Virginia Formation Stockpile Plan (Golder 2013)

   East Pit Progression – Environmental Assessment (USACE 2011)

   Sulfate and Mercury Chemistry of the St. Louis River in Northeastern Minnesota (Berndt and Bavin 2009)

   Cumulative Effects Analysis of Wildlife Habitat and Threatened and Endangered Wildlife Species (Barr 2009)

   Long Range Hydrology Study (Barr 2008)

   Northshore Mining Virginia Formation Development Plan (Northshore 2004)

   Hydrology and water quality of the Copper-Nickel Study Region, Northeastern Minnesota (Siegel and Ericson 1980)

6. The DNR has fulfilled all the procedural requirements of law and rule applicable to determining the need for an environmental impact statement on the proposed Northshore Mining Company Progression of the Ultimate Pit Limit Project.

7. Based on considerations of the criteria and factors specified in Minn. R. 4410.170, subp. 6 and 7 (2013) to determine whether a project has the potential for significant environmental effects, and on the Findings and Record in this matter, the DNR determines that the proposed Northshore Mining Company Progression of the Ultimate Pit Limit Project does not have the potential for significant environmental effects.

ORDER

Based on the above Findings of Fact and Conclusions:

The Minnesota Department of Natural Resources determines that an Environmental Impact Statement is not required for the Northshore Mining Company Progression of the Ultimate Pit Limit Project in St. Louis County, Minnesota.

Any Findings that might properly be termed Conclusions and any Conclusions that might properly be termed Findings are hereby adopted as such.

Dated this 22nd day of April, 2015.

STATE OF MINNESOTA
DEPARTMENT OF NATURAL RESOURCES

Barb Naramore

Barb Naramore
Assistant Commissioner