Minnesota Department of Natural Resources

500 Lafayette Road
St. Paul, Minnesota 55155-4010

Date: June 27, 2005

To: Parties on the EAW Distribution List
Other Interested Parties

From: Scott Ek
Principal Planner
Environmental Policy and Review

RE: Ispat Inland Mining, East Reserve Project
Environmental Impact Statement
Scoping EAW/Draft Scoping Decision Document

The Minnesota Department of Natural Resources (DNR) has prepared the attached Scoping Environmental Assessment Worksheet (EAW) and Draft Scoping Decision Document to assist in identifying the issues and analyses to be include in an Environmental Impact Statement (EIS) for a proposal to develop a new open-pit mine between the towns of Biwabik and McKinley.

The DNR invites comments on the proposed EIS scope during the 30-day scoping period that concludes Wednesday, August 3, 2005 at 4:30PM. Comments should address the accuracy and completeness of the information presented, and suggest issues for investigation in the EIS. The DNR will hold a public scoping meeting on Tuesday, July 26, 2005, beginning at 6:00PM, at the Biwabik City Hall Pavilion, 100 5th Avenue North, Biwabik, Minnesota.

The scoping EAW discloses information about the project and its setting and identifies potential impacts. The Draft Scoping Decision Document gives the public a preliminary view of the intended EIS scope and only reflects information available at this time. The DNR will revise the document based on the full scoping record, and will issue a Final Scoping Decision to serve as the "blueprint" for EIS preparation.

Please address any comments or inquiries to me at the address provided in the EAW, or send an email to Environmental.Review@dnr.state.mn.us with "East Reserve" in the subject line. If you use the email address, please include your name and mailing address, so you can be added to the mailing list. Thank you for your interest.

Enclosure: Scoping EAW/Draft Scoping Decision Document

Version 2/99 – editorial corrections May, 05

ENVIRONMENTAL ASSESSMENT WORKSHEET

Note to preparers: This form and EAW Guidelines are available at http://www.eqb.state.mn.us. The Environmental Assessment Worksheet provides information about a project that may have the potential for significant environmental effects. The EAW is prepared by the Responsible Governmental Unit or its agents to determine whether an Environmental Impact Statement should be prepared. The project proposer must supply any reasonably accessible data for — but should not complete — the final worksheet. If a complete answer does not fit in the space allotted, attach additional sheets as necessary. The complete question as well as the answer must be included if the EAW is prepared electronically.

Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the *EQB Monitor*. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an EIS.

1. **Project Title:** East Reserve Development

2. **Proposer:** Ispat Inland Mining
   Contact Person: Mr. Gus Josephson
   Title: Sr. Staff Safety and Environmental Engineer
   Address: 5950 Old Highway 53
   City, State, ZIP: Virginia, MN 55792
   Phone: (218) 749-5910 ext. 283
   Fax: (218) 749-5256
   E-mail: gjosephson@ispatinlandmining.com

3. **RGU:** Minnesota Department of Natural Resources
   Contact Person: Mr. Scott Ek
   Title: Principal Planner, Environmental Policy and Review
   Address: 500 Lafayette Road, Box 25
   City, State, ZIP: St. Paul, MN 55155-4025
   Phone: (651) 296-8396
   Fax: (651) 297-1500
   E-mail: scott.ek@dnr.state.mn.us

4. **Reason for EAW Preparation** (check one)

   ☒ EIS scoping ☒ Mandatory EAW ☐ Citizen petition ☐ RGU discretion ☒ Proposer Volunteered

   If EAW or EIS is mandatory give EQB rule category subpart number and subpart name.

   This is a Mandatory EAW in accordance with EQB Rules 4410.4300, subpart 11, Metallic Mineral Mining and Processing. The proposer and RGU have agreed to prepare an EIS for this project, so this EAW was prepared to assist in EIS Scoping. A Draft Scoping Decision Document has also been developed and accompanies this Scoping EAW.

5. **Project Location:** County: St. Louis City/Township: Biwabik Township

   Sections: 3, 4, 5, 7, 8, 9, 10 Township: 58 North Range: 16 West
   Sections: 12 Township: 58 North Range: 17 West

Attach each of the following to the EAW:

- County map showing the general location of the project;
- U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable);
- Site plan showing all significant project and natural features.

Tables, Figures, and Appendices attached to the Scoping EAW:

Figures
Figure 5-1: County Highway Map
Figure 5-2: Project Location
Figure 5-3: Site Plan
Figure 9-1: 1980's Land Use
Figure 9-2: Wetland Impacts
Figure 9-3: 1940's Land Use
Figure 9-4: 1960's Land Use
Figure 9-5: Cover Types
Figure 11-1: Species of Concern/Archaeological Sites
Figure 12-1: National Wetland Inventory
Figure 12-2: MNDNR Protected Waters Map
Figure 13-1: Well Use – County Well Index Data
Figure 13-2: Water Levels from County Well Index Data
Figure 14-1: Major Watersheds & Site Topology
Figure 24-1: Wind Rose Plot

Appendices
Appendix A: Minnesota Natural Heritage Inventory
Appendix B: Surface Water Study
Appendix C: Groundwater Study
Appendix D: State Historic Preservation Office Database

6. **Description**

a. Provide a project summary of 50 words or less to be published in the *EQB Monitor*.

Ispat Inland Mining proposes to open the East Reserve; a new open-pit mine area located between the towns of Biwabik and McKinley. Opening the East Reserve would extend the life of Ispat Inland's existing Minorca ore processing facility through the year 2024. (Figure 5-1).

b. Give a complete description of the proposed project and related new construction. Attach additional sheets as necessary. Emphasize construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes. Include modifications to existing equipment or industrial processes and significant demolition, removal or remodeling of existing structures. Indicate the timing and duration of construction activities.

Location

Ispat Inland Mining operates the Minorca taconite processing facility north of Virginia, Minnesota. The proposed East Reserve (formerly known as the J&L East Reserve) is located between the towns of Biwabik and McKinley and approximately six miles southeast of the Minorca taconite processing facility. The proposed mining area, dump area, and haul road are located in Sections 3, 4, 5, 7, 8, 9, and 10 of T58N, R16W and Section 12 of T58N, R17W (Figures 5-2 & 5-3). This location was chosen because of the quality and location of the ore which is compatible with the Minorca facility needs, including economic considerations.

Mining Methods/Operations

Prior to mining, overburden, waste rock, and lean taconite will be stripped and stockpiled. In the area that is expected to be mined, approximately 13,000,000 cubic yards of waste rock/lean taconite and 18,200,000 cubic yards of burden will be excavated to utilize 116,000,000 long tons of ore. Stripping is expected to commence in 2006.

Overburden material will be stripped using 20 cubic yard hydraulic excavators. The material will be loaded into 240 short ton trucks and hauled to waste stockpiles on the north side of the proposed pits. Overburden thickness in the proposed mining area ranges from five to 60 feet.

Waste rock and lean taconite will be drilled and blasted on a bench system. The benches will be between 18 and 50 feet in height, with an average bench height of 35 feet. All blast holes will be drilled using a 16 inch diameter rotary bit and patterns will be laid out on a 35.4 feet x 40.8 feet grid and will average 80 to 100 blast holes yielding an average of 400,000 long tons of broken material. Blasting will be done with a combination of emulsion and ANFO (Ammonium Nitrate Fuel Oil). Each hole will be set off individually using non-electric delays to minimize ground vibration and air shock. Blasting will reduce the size of the material into a range of several feet in diameter to dust.

Ispat Inland's blasting practices reduce the potential for water quality impacts by minimizing the amount of time that blasting materials are on site. Blast holes at Minorca are loaded with ANFO a blend of ammonium nitrate and fuel oil. To minimize the potential impact the nitrate might have on groundwater no ANFO is stored on the site. The product is delivered daily as it is needed. The amount of product that is augured into each blast hole is measured and controlled. The amount of time the holes sleep (are left loaded) is minimized to limit dissolution of the product into the groundwater. Upon detonation most of the nitrate is consumed. BMP's will be employed to control run-off from the mine and channel it into the pit sump. Blasting will be performed in accordance with MNDNR Rules.

Overburden, waste rock, and lean taconite, will be stockpiled north of the mining area. This area will be split into two separate stockpiles to maintain the watershed. Lean taconite will be stockpiled separately from overburden and waste rock. All stockpiles will be constructed according to standards identified in the Mineland Reclamation Rules, Minnesota Rules Chapter 6130.2400 and 6130.2500. The total stockpile area will cover approximately 375 acres.

Additional diamond drill hole data, avoidance of wetlands, future community land use considerations and the negotiation of in pit waste disposal may cause specific stockpile plans to be altered in the future.

In order to access the proposed East Reserve a new 1.9 mile spur will be connected to the existing Laurentian mine haul road. The existing Pike River crossing, for the Laurentian Mine haul road, will be utilized and wetland impact will be minimized.

The haul road will be constructed mainly of waste rock removed from the Laurentian Pit. The road will be approximately 180 feet wide. Rock construction material will be sloped at the angle of repose.

Mining in the East Reserve will be done by conventional methods. The basic tasks will include drilling, blasting, loading and hauling. Mining is expected to commence January 1, 2007.

The East Reserve will be developed by using two separate open pits. One will be located on each side of the area known as the Belgrade Sink. The pits will cover a combined 364 acres and will be mined to a final elevation of 1,197 feet.

Ore will be drilled and blasted on a bench system. The benches will be between 18 and 50 feet in height, with an average bench height of 35 feet. All blast holes will be drilled using a 16-inch diameter rotary bit. Ore patterns will be drilled on a 26 foot by 30 foot grid. Each pattern will consist of 80 to 100 holes and will yield an average of 220,000 long tons of broken ore. Blasting of ore will be done in the same way as blasting of waste rock and lean ore.

Ore will be loaded into 190-240 short ton production trucks using 19 cubic yard loaders. The material will be hauled approximately 1.9 miles on the newly constructed haul road spur and then an additional 5.5 miles on existing haul road to the Minorca taconite facility.

Tailing waste generated by the two East Pits will be disposed of in the existing Minorca and Upland tailings basins. Ispat Inland currently has the permitted capacity to accommodate tailings generated by the Laurentian and East Pit projects. By diverting deposition in the Minorca with interior dams and not pumping coarse tailings into the Minorca as originally planned for the past five years Ispat Inland has extended the life of that basin well beyond what was originally planned. In addition, the upland basin will have several years of capacity with the raising of the internal dike. Barr is currently doing a study on long-term tailings disposal capacity. Total tailings (fine and coarse) generated through 2023 by the East Reserve are estimated to be 66,573,765 cubic yards. Planned tailings generation from the existing Laurentian Pit and the proposed East Reserve Pit are projected in Table 6-1 below.

Table 6-1
Planned Tailings Generation

	Coarse Tailings (yd^3)	Fine Tailings (yd^3)	Total Tailings (yd^3)
East Reserve	19,972,130	46,601,636	66,573,765
Laurentian Pit	10,911,093	25,459,218	36,370,311
Total	30,883,223	72,060,853	102,944,076

Rainfall, snowmelt, and groundwater will be expected to accumulate in the East Reserve pits. This water will be pumped through pipes and/or channels into adjacent, abandoned McKinley and potentially the Mary Ellen mine pits. The McKinley Pit is on the southwest side of the proposed mining area. Excess water in the McKinley pit will flow through an existing drainage into the Embarrass River. Ispat is currently evaluating the pit dewatering route through the Mary Ellen Pit. Ispat Inland proposes a surface water study to evaluate mine dewatering impacts and alternatives. The proposed surface water study is attached as Appendix A. All proposed dewatering activities will discharge into the Lake Superior watershed. Depending on underground workings and the competency of the rock, water levels in the McKinley, Mary Ellen, and Canton pits will be lowered to keep the active mining area dry. Ditches will be modified if necessary to accommodate the increased drainage.

The current appropriations permit for the Laurentian mine pit dewatering activity allows 6,000 gallons per minute and the goal is to stay within this limit while also dewatering the East Reserve mine pits. Dewatering is expected to be minimal for the first three years of mining in each pit, as it will take place above the current water table.

Surface water hydraulic and hydrologic modeling will be conducted to determine the effects of the proposed dewatering on the alternative drainage systems being considered. The modeling will first establish an existing conditions model. The second step will be to apply the proposed project conditions and evaluate the alternatives. One option that will be explored is rate control using the existing mine pits (McKinley and Mary Ellen) as equalization basins. In this scenario pumping of the equalization basins would begin before dewatering of the new active mine pits. This would allow pumping at a lower more continuous rate over a longer period of time.

Closure / Post-Closure Actions

Stockpile design and reclamation will be done in the spirit of the Laurentian Vision and as required by Minnesota Rules, Chapter 6130. Areas disturbed by the development of the East Reserve will be reclaimed soon after they become inactive in an estimated 17 years. Stockpiles and roadbeds will be capped with a minimum of two feet of burden material. Grading and sloping will be done just prior to seeding to minimize erosion. All areas will be shaped as required. Fertilization will be done immediately before seeding to expedite vegetation and to minimize erosion. Herbaceous plants will be seeded using a hydro-seeder. Seed mixes will be designed to achieve early stabilization and long-term cover. When necessary to control dust, temporary seeding may be utilized. In areas where erosion is a concern, mulch will be used to hasten stabilization. In all cases, re-vegetation will be done to meet the requirements of Minnesota Rules, Chapter 6130.4100.

Development of the East Reserve is expected to impact 76 acres of wetlands. Ispat Inland Mining expects to replace them with existing banked wetlands in Aitkin County.

Surface overburden portions of pit walls shall be designed and constructed in accordance with Minnesota Rules, Chapter 6130.2900. Sloping will be done at a 2.5:1 ratio. The maximum height of a lift will not exceed 60 feet, with most sections being much lower. Benches will be designed to withstand the 100-year, 24-hour duration storm.

PROPOSED TREATMENT OF TOPIC IN EIS
The EIS will include additional details on proposed mining operations and methods, closure and post closure plans.

c. Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.

The purpose of this project is to extend the production life of the Minorca taconite facility. Opening the East Reserve will extend the life of the Minorca facility from 2011 through 2024.

d. Are future stages of this development including development on any outlots planned or likely to happen?

☒ Yes ☐ No

If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

The Central Reserve, located beneath and near the town of McKinley, although not part of this environmental review, is considered the next development phase for future mining by Ispat Inland Mining Company. A separate environmental assessment will be conducted when appropriate.

e. Is this project a subsequent stage of an earlier project? ☐ Yes ☒ No

If yes, briefly describe the past development, timeline and any past environmental review.

7. **Project Magnitude Data**

Total project acreage:

Project Component	**Area (acres)**
Mine Pits	364
Stockpiles	375
Haul Roads	96
Total	835

Number of residential units: unattached: N/A attached: N/A maximum units per building: N/A
Commercial, industrial or institutional building area (gross floor space): total square feet: N/A

Indicate areas of specific uses (in square feet): N/A

Office	Manufacturing
Retail	Other industrial
Warehouse	Institutional
Light industrial	Agricultural
Other commercial (specify)	
Building height	If over 2 stories, compare to heights of nearby buildings

8. **Permits and Approvals Required.** List all known local, state and federal permits, approvals and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure.

Unit of government	Type of application	Status
McKinley (city & township)	Grading & Building Permits	To be applied for (if necessary)
Biwabik (city & township)	Grading & Building Permits	To be applied for (if necessary)
St. Louis County	Grading & Building Permits	To be applied for (if necessary)
MNDNR	Permit to Mine	To be updated
MNDNR	Wetland Conservation Act	To be applied for
MNDNR	Water Appropriation Permit	To be applied for
MNDNR	T&E Species Taking Permit	To be applied for (if necessary)
MNDNR	Public Waters Permit	To be applied for
MPCA	NPDES/SDS Industrial & Storm Water Discharge	To be applied for
MPCA	401 Certification	To be Submitted by MPCA at their discretion
MPCA	Title V Air Permit Modifications	To be applied for (if necessary)
USCOE	404 Permit	Application made (12/2004)

9. **Land Use.** Describe current and recent past land use and development on the site and on adjacent lands. Discuss project compatibility with adjacent and nearby land uses. Indicate whether any potential conflicts involve environmental matters. Identify any potential environmental hazards due to past site uses, such as soil contamination or abandoned storage tanks, or proximity to nearby hazardous liquid or gas pipelines.

The regional setting for the project is a landscape historically dedicated to mining and logging. The nearest communities (McKinley and Biwabik) were originally built to provide housing for workers at the mines and their associated processing plants. The East Reserve Site lies between the cities of McKinley and Biwabik.

Current Land Use of the Proposed East Reserve Site

The proposed East Reserve site is privately owned vacant land in which all roads and trails are gated or otherwise obstructed to limit public access to the site. The land is a mixture of uplands (including grasslands, shrub lands, and periodically logged forests), wetlands scattered throughout the site, and various natural ore mining features. The Belgrade Sink and Mary Ellen Pit lie on the south side of the project area. The McKinley Pit lies along the west side of the project area. An abandoned section of Highway 135 is still present on the site, however, the pavement is in poor condition and the road is not maintained, nor accessible to the public. The site abuts the Laurentian divide on the north side. County Road 715, Pike River Drive, runs along the east side of the project site and the haul road currently being used by Ispat Inland to haul taconite ore from the Laurentian Pit to the processing plant lies on the west side of the project area.

Previous Land Use of the Mine Site

The majority of the proposed East Reserve Pit #2 area was the site of the former town of Belgrade (Figure 5-3), from which, it appears that all of the structures were removed sometime between 1940 and 1953 (Figures 9-3 and 9-4). Highway 135 was routed through the town and the project site until sometime between 1969 and 1972, when it was rerouted approximately 1 mile south of the site (Figure 9-1). There was also a residential street that ran through the northern part of the town connecting County Road 715 to Highway 135.

The project site lies in an area where natural ore mining was conducted from some time in the early 1900's until the mid-1980's. Within the proposed project area itself, there is one small natural ore pit, located on the east side of the site and a northwest extension of the McKinley Pit extends into the footprint of the haul road (Figure 9-2). Historic stockpiling activities on the site started some time between 1940 and 1953 in the eastern portion of the proposed East Reserve Dump Area #2 and continued through about 1969. Stockpiling activities in the western portion of the proposed East Reserve Dump Area #1 started around 1960 to serve the McKinley Pit (located west of the project site) and appears to have continued through the end of the natural ore mining in the 1980's (Figure 9-1). There was a haul road that runs through the proposed dump areas that connected the historic east and west dump sites and a railroad that ran through the East Pit #1 area in support of the natural ore mining. It also appears that portions of the project site have been periodically logged. There are three natural ore workings adjacent to the project site: the Welton/Mary Ellen Mines (90 acres), the McKinley Pit (80 acres) and the Belgrade Sink (45 acres) (Figure 9-2). The Belgrade Sink was an underground mining location that has since subsided, creating a pit-like appearance. The Belgrade Sink and the eastern portion of the Mary Ellen Pit were mined prior to 1940 (Figure 9-3). Additional mining in the area between 1940 and 1980 connected the Mary Ellen Pit and the Belgrade Sink. According to recent air photos and the Mining Directory, the Belgrade (1908-1923), Welton (1976-1986), and Mary Ellen (1924-1962) mines are now one contiguous water-filled pit, although they are listed as separate mining properties that were mined at various times by different owners and operators. The McKinley Pit, located southwest of the proposed project, was first mined from 1907 to 1909, then restarted in 1960, and again from 1969 to 1979 (Figure 9-4). Stockpiling for the final development of the Welton/Mary Ellen Mine in the 1970's occurred to the west and southwest of the pit. The only active mining in the area after 1980 consisted of stockpile shipments from the McKinley Mine and from the Welton property until 1986.

No potential environmental hazards associated with past uses of the project site have been identified. It appears that such potential hazards would be associated primarily with the former home sites that existed in the town of Belgrade. An initial survey of the site indicated that all of the structures and most of the foundations and other infrastructure that was present at the town site were removed long ago. There are no known gas pipelines, abandoned storage tanks, or soil contamination present at the site.

Land Uses near the Mine Site

The Canton Pit and associated stockpiles are located east of County Road 715, Pike River Drive (Figure 9-2). This road will likely have to be rerouted to accommodate mining activities. Ispat has already begun discussions with local officials to determine the feasibility/impacts of realigning the road. The area north of the proposed site is forest land that runs along the Laurentian Divide, which does not appear to have been altered significantly in the past other than for logging. The Pike River lies about one mile north of the proposed site and flows from the southwest to the northeast. Two mine pits cover most of the area directly adjacent to the south and west boundaries of the proposed site. The nearest residences appear to be in the city of McKinley, which lies approximately one-half mile southwest of the proposed site. The city of Biwabik lies approximately one mile east of the proposed site (Figure 5-2). The haul road currently used by Ispat Inland to haul taconite from the Laurentian Pit to their processing facility near Virginia lies on the west side of the proposed haul road.

PROPOSED TREATMENT OF TOPIC IN EIS

The EIS will discuss potential land use conflicts in the section addressing impacts on infrastructure and public services.

10. **Cover Types.** Estimate the acreage of the site with each of the following cover types before and after development:

Table 10-1
Cover Types of the Proposed East Reserve Development Site

Cover Types	Number of Acres Before	After
Areas Not Disturbed by Previous Mining or Residential Activity		
Types 1 to 8 Wetlands	50	0
Wooded/Forest	180	0
Brush/Grassland	280	0
Crop Land	0	0
Lawn/Landscaping	0	0
Residential	0	0
Commercial/Industrial/Transportation	4	59
Mine Pits	0	244
Stockpiles	0	211
(Subtotal)	(514)	(514)
Areas Previously Disturbed by Mining or Residential Activity		
Types 1 to 8 Wetlands	26	0
Wooded/Forest	34	0
Brush/Grassland	225	0
Residential	0	0
Commercial/Industrial/Transportation	36	43
Mine Pits	8	122
Stockpiles	0	164
(Subtotal)	(329)	(329)
TOTAL	**843**	**843**

If **Before** and **After** totals are not equal, explain why:

Note: Acreages for cover types are approximate and are based on habitat and wetland mapping on 2003 FSA color aerial photography with field verification over the majority of the project site. All former mining areas, roads, and former residential areas are classified as disturbed land under existing conditions. The only impervious surfaces noted at the site are associated with the former Highway 135. The post-project conditions are divided into the three major project features: mine pits, dumps, and haul roads. Ispat Inland intends to incorporate the spirit of the Laurentian/Biwabik Vision into mineland planning and reclamation in accordance with MN Rules. Ch. 6130.

PROPOSED TREATMENT OF TOPIC IN EIS
No additional information on cover types will be provided in the EIS.

11. **Fish, Wildlife and Ecologically Sensitive Resources**

a. Identify fish and wildlife resources and habitats on or near the site and describe how they would be affected by the project. Describe any measures to be taken to minimize or avoid impacts.

Over 25 percent of the proposed East Reserve site has been disturbed by mining activities which have permanently altered the vegetative communities (Figure 9-5). Various portions of the proposed site were used nearly continuously for mining activities during much of the 20th century until the mid-1980's. The primary mining feature that remains on the site is the stockpiles that dominate the northwestern portion of the proposed site and are present within the northeast portion of the site. There are numerous former haul roads and abandoned railroad corridors present throughout the proposed site that are remnants of the former mining activities (Figure 9-5).

There are also small natural ore mine pits located within the proposed site and larger mine pits located adjacent to the proposed site. The stockpiles on the site generally contain sparse cover of grasses and trees. The numerous roads, trails, abandoned mining railroad grades, and stockpiles throughout the site, including the abandoned Highway 135, are frequently used by all-terrain vehicles, hikers, and bikers. The presence of frequent human use also limits the value of the site for certain wildlife species.

The area encompassing the former Belgrade town site has been significantly altered from its natural state (Figures 9-3 and 9-5). Most of the Belgrade town site has developed into grassland and shrub communities with a few scattered wetlands that have developed since the town was abandoned around 1950 (Figure 9-5). Grasslands make up approximately 10 percent of the proposed site, almost entirely in the area of the former Belgrade home sites. These areas provide habitat primarily for small mammals, song birds, and potentially fox, coyotes, snakes, owls, and other birds of prey such as sharptail hawks.

Approximately 30 percent of the proposed site is composed of upland shrub and sapling communities (Table 10-1). Many of these areas were recently logged and are currently dominated by regrowth aspen saplings or shrubs. The young aspen stands provide good habitat for ruffed grouse. A total of about 25 percent of the site is dominated by mature upland forest communities, typically with a mix of deciduous and coniferous trees. The forest communities provide likely habitat for white-tailed deer, coyote, wolves, red squirrel, snowshoe hare, pine marten (in areas associated with wetlands), owls, woodpeckers, ruffed grouse, black bear, and other non-game species. One coyote was observed in the area located south of East Pit #2 along the north side of the Mary Ellen Pit.

Wetlands make up 9 percent of the proposed East Reserve site including 32 separate wetlands or different wetland communities within larger wetland complexes. Nearly 40 percent of those wetlands are dominated by shrub communities, which are mostly composed of speckled alder. Slightly more than one-third of the wetland communities on the proposed site are dominated by shallow and deep water marshes and open water communities and 19 percent of the wetlands are dominated by wet meadow communities. Forested wetland communities make up a small percentage of the wetland communities at the proposed site.

Wildlife or wildlife sign observed in and around the wetland communities include: beaver, waterfowl, deer, moose, and some birds, although most of the wildlife observed using wetlands were in the larger wetland complexes located adjacent to the proposed site. The marsh and open water communities provide likely habitat for frogs and other amphibians, bats, beaver, waterfowl, and potentially shorebirds. Some of the wetland habitats may be used by mink and otter, although no evidence of their presence was observed.

A survey of fish and invertebrates within the stream being considered for dewatering discharge was conducted by the MPCA in 1998 near the point where the unnamed stream enters the Embarrass River downstream of Esquagama Lake. A total of 6 species of fish were identified in the survey including one game fish species, largemouth bass. None of the fish species identified are on the state list of endangered, threatened, or special concern species. There are no fisheries data readily available from the MNDNR or MPCA for any of the other water resources located directly on, or immediately adjacent to the project site. A fish sampling or survey will be conducted of the unnamed Public Water that enters the Embarrass River just downstream of Esquagama Lake and any other stream that may be used for dewatering, including the Embarrass River.

Measures to Avoid and Minimize Impacts

Several planning measures have been implemented to avoid and minimize impacts to valuable wildlife habitats to the extent practicable. First, several alignments were evaluated for the construction of the haul road connecting the existing haul road to the proposed mine site. The proposed haul road alignment was chosen because it utilizes previously disturbed areas to the greatest extent practicable; it avoids the larger shallow and deep marsh wetland communities, and crosses a large forested wetland complex at the narrowest point. The road was also designed to connect into the existing haul road south of the Pike River crossing to avoid further impacts to wildlife associated with the Pike River.

Second, the design of the proposed dump areas immediately to the north of the proposed mine pits was planned to utilize previously disturbed areas to the extent practicable (Figure 9-2). Approximately one-third of the planned dump areas are composed of existing stockpiles and a former haul road (Figure 9-5). The wetlands located within the proposed dump areas (Figure 9-2) have been significantly altered by former mining activities at the site and by beaver impoundments. The dump areas were planned to avoid large wetland complexes located south and west of East Pit #1 and Dump Area #1 (Figure 9-5).

Finally, the mine pits are planned where the economic ore reserves have been documented through diamond core drilling. Most of the planned East Pit #2 was a residential area during the first half of the 20th century. Since that time, mining activities were conducted in and adjacent to the area until the mid-1980's. There is very little natural habitat remaining within the proposed East Pit #2 area. The proposed East Pit #1 area is bisected by a former railroad grade and the abandoned Highway 135 corridor, which is still paved, but in disrepair. Much of the proposed East Pit #1 area has been recently logged and is primarily covered by aspen regrowth which provides different wildlife value compared to the native forest communities that would have been present. The mine areas have also been planned to allow the natural drainage to continue from the north to the south between the pits, thereby maintaining a wildlife travel corridor through the site.

PROPOSED TREATMENT OF TOPIC IN EIS:
The EIS will include a qualitative assessment of fish and wildlife species present in the project area and describe potential impacts from the project. The EIS will discuss mitigation as warranted.

b. Are any state-listed (endangered, threatened or special concern) species, rare plant communities or other sensitive ecological resources such as native prairie habitat, colonial waterbird nesting colonies or regionally rare plant communities on or near the site? ☒ Yes ☐ No

If yes, describe the resource and how it would be affected by the project. Indicate if a site survey of the resources has been conducted and describe the results. If the DNR Natural Heritage and Nongame Research program has been contacted give the correspondence reference number: **ERDB 20050346**. Describe measures to minimize or avoid adverse impacts.

The Minnesota Natural Heritage Inventory database was reviewed to determine if any rare plant or animal species or other significant natural features are known to occur within an approximate one-mile radius of the proposed East Reserve site. An index summary of the database results and letter from the MNDNR is located in Appendix A. This summary provides documented rare feature locations to the nearest section. These sections are highlighted on Figure 11-1 and species found within the section are listed in Appendix A-2. None of the twelve species listed in this summary have been found within the proposed project area. The documented locations listed for the bald eagle (*Haliaeetus leucocephalus*) and woodland bluegrass (*Poa sylvestris*) is approximately 1½ miles southeast of East Pit #2. The documented locations listed for triangle moonwort (*Botrychium lanceolatum*), mingan moonwart (*Botrychium Minganense*), matricary grapefern (*Botrychium matricariifolium*), mingan moonwort (*Botrychium minganense*), necklace spike sedge (*Carex ormostachya*), goblin fern (*Botrychium mormo*), northern goshawk (*Accipiter gentilis*), and white baneberry (*Actaea pachypoda*) are all at least 1½ miles to the northwest of the proposed East Reserve dump area.

Because the information in the Minnesota Natural Heritage Inventory database is not based on a comprehensive inventory, there may be rare or otherwise significant natural features in the state that are not represented in the database. A county-by-county survey of rare natural features is now underway, and is in progress for St. Louis County. The MNDNR suggests, that since the proposed area appears to contain potential habitat for rare plant species, a botanical survey of the proposed area should be conducted.

PROPOSED TREATMENT OF TOPIC IN EIS:
The project site will be surveyed for the presence of endangered, threatened, special concern and tracked species. The EIS will include the results of the search, discuss potential impacts to any listed species identified, and suggest mitigation if warranted.

12. **Physical Impacts on Water Resources.** Will the project involve the physical or hydrologic alteration — dredging, filling, stream diversion, outfall structure, diking, and impoundment of any surface waters such as a lake, pond, wetland, stream or drainage ditch? ☒ Yes ☐ No

If yes, identify water resource affected and give the DNR Protected Waters Inventory number(s) if the water resources affected are on the PWI: **69-567W, 69-570W, 69-572W**. Describe alternatives considered and proposed mitigation measures to minimize impacts.

Surface and Ground Water Appropriations

Surface Water and Ground Water

Ground water and surface water runoff that collects in the proposed mine pits will be pumped to the adjacent, abandoned McKinley mine pit and potentially the Mary Ellen mine pit. Water from the McKinley Pit and Mary Ellen Pit may discharge naturally or may be pumped to naturally occurring surface drainage features beginning after about the third to fourth year of mining to minimize the seepage of groundwater into the active pit. Since these pit waters represent an expression of ground water, this will also result in the removal of ground water. Mine pit dewatering has the potential to affect water levels in the Canton Pit, which is located approximately one-quarter mile east of the project. The Canton Pit serves as the water supply for the city of Biwabik.

The mine pit dewatering may also affect the Corsica pit, which serves as the water supply for the city of McKinley. Water level elevation data will be gathered for both the Canton and Corsica Pits, in addition to adjacent natural ore pits and wells, both before and during dewatering at the East Reserve Development. A contingency plan will be developed by Ispat Inland Mining Company in conjunction with the cities of Biwabik and McKinley to address infrastructure changes that might be required to allow for continuous supply of drinking water for these communities if the water levels in either the Canton or Corsica pit fall as a result of dewatering associated with this project. The contingency plan specifies the roles and responsibilities of each party, and specifies the water level elevations, or changes from a baseline, which would trigger specific actions.

Stream Flow and Lake Level Alterations

Mine pit dewatering will be discharged south, via naturally occurring surface drainage features, to the Embarrass River at the downstream end of Esquagama Lake (see Question 17). Flows to the lakes and the creeks are proposed to be evaluated in the Surface Water Study (Appendix B), the results of which will be included in the EIS.

Wetland Delineation and Classification Methods

Barr Engineering Co. identified and field delineated the jurisdictional wetland boundaries within a 1,750 acres area encompassing the proposed mine pit, dump, and haul road areas on September 16-17, 2004. The wetland delineations within portions of the site were reviewed in the field with the MNDNR Division of Lands and Minerals on October 6, 2004. The delineations were typically established according to the Routine On-Site Determination Method specified in the *U.S. Army Corps of Engineers 1987 Wetlands Delineation Manual* (U.S. Army Corps, 1987). However, in numerous situations, it was not possible to characterize the soils adequately. In most of those instances, the soils were determined to meet Hydric Soil Criteria 3: "Soils that are frequently ponded for long duration or very long duration during the growing season." Detailed soil investigations were not determined to be necessary in areas that meet Hydric Soil Criteria 3.

The wetland delineations were conducted at the end of the 2004 water year (defined as October 1 through September 30) following a year of climatic extremes. Despite the climatic extremes, hydrologic conditions were judged to be within the normal range for the period of time in which the delineations were conducted.

Prior to conducting the field delineations, numerous sources of existing information were gathered and reviewed to assist in evaluating wetlands within the project site. Resources that were reviewed included: historic aerial photographs, 5-foot topographic contours, the National Wetlands Inventory (NWI) maps, and the USGS quadrangle maps. The goal of the delineations was to field evaluate all areas mapped as wetlands on the NWI along with areas that showed wetland signatures on any of the historic aerial photographs.

Areas with depressions and areas with flat slopes were also evaluated to determine if wetlands were present. Attempts were made to travel all trails and roads and areas along those routes were closely scrutinized for the presence of wetlands.

The wetland boundaries were mapped in the field on large-scale (1-inch = 600 feet) 2003 Farm Service Agency color aerial photographs. Numerous wetland boundary data points were collected with a Global Positioning System to verify wetland delineation locations, particularly in areas where aerial photo signatures were not distinct (Figure 9-2). Soil borings were placed in and around the wetlands when possible, to a depth of 12-18 inches below the ground surface. Representative soil samples from each boring were examined for hydric soil indicators. Soil colors (e.g., 7.5YR 4/2, etc.) were determined with the aid of a Munsell® soil color chart and were noted on Wetland Data Forms which were included in the application for the 404 permit, *East Pit Project Wetland Permit Application, December 2004*. The hydrologic conditions were evaluated at each soil boring and were recorded on the Wetland Data Forms.

The delineated wetlands (Figure 9-2) were classified using both the U.S. Fish and Wildlife Service Circular 39 System (Shaw and Fredine, 1956) and the U.S. Fish and Wildlife Service Cowardin System (Cowardin et al., 1979). Table 12-1 provides the classifications for each delineated wetland. The dominant plant species in each wetland type were identified and the corresponding wetland indicator status of each plant species was then determined and recorded on Wetland Data Forms (*East Pit Project Wetland Permit Application, December 2004*).

Public Water wetlands and streams that have been designated as such on the Minnesota Department of Natural Resources (MNDNR) Protected Waters Inventory (PWI) map for the surrounding area are shown on Figure 12-2. Public Water 69-567W, sometimes referred to as Mud Lake is located southeast of the Mary Ellen Pit area. McKinley Lake is identified as Public Water 69-570W and is located approximately 1¼ miles southwest of the East Reserve project area on the south edge of the city of McKinley. The Pike River, a Public Water stream, crosses Ispat Inland's existing haul road approximately 400 feet north of the proposed haul road connection and comes as close as 3,400 feet from the proposed pit and dump areas. Once the drainage channel from the McKinley Pit reaches the DM&IR railroad track (upstream of Highway 135), it then becomes a Public Water. In addition, the stream and ditch that drain from Mud Lake (sometimes known as Belgrade Cave Lake) and the stream that comes from Forge Lake (69-572W) are both public waters and may be receiving pit dewatering, depending on the drainage alternative. Impacts to these waters will be assessed in the EIS.

Wetland Descriptions

Descriptions of the delineated wetlands and the rationale for each wetland determination were included in the *East Pit Project Wetland Permit Application, December 2004*. Area wetlands identified on the National Wetland Inventory (NWI) map are shown on Figure 12-1, however due to the dated nature of the NWI, the wetlands at the site are not accurately depicted on this map.

Wetland Delineation Summary

A total of 49 wetlands were delineated within the 1,750 acre wetland evaluation area (Figure 9-2) covering 352 acres (Table 12-1). Within the project site, there are a total of 31 wetlands covering 76 acres. Shrub swamp, wet meadow, and shallow marsh are the most common wetland communities present followed by forested swamps.

Wetland Summary by Watershed

There are a total of 5 wetlands identified that are located in the Vermilion River Watershed, #20; Wetlands 1, 2, 40, 48, and 49 (Figure 9-2 and Table 12-1). The remainder of the wetlands are located within the hydrologic boundaries of the St. Louis River Watershed, #3.

Summary of Wetland Impacts

The wetlands identified and delineated in the mine site are shown on Figure 9-2. Potential impacts to the mine site wetlands were determined based on the projected limits of mining activities, including stripping and stockpiling as described previously in Question 4. A summary of all projected wetland impacts within the mine site is provided in Table 12-1. This table includes the watershed, general project area, the wetland type, and the amount of wetland impact area.

A detailed mine plan showing the phasing within each pit has not yet been completed, so the timing of wetland impacts can only be determined in a more general sense. A total of 8.9 acres of unavoidable wetland impacts will result from overburden stripping and mining in the East Reserve Pit #1. Stockpiling activities in the stockpile area are expected to impact 6.5 acres of wetlands. A total of 12.8 acres of wetland impacts are anticipated as a result of haul road construction. The remaining proposed wetland impacts include: 7.4 acres of impacts within the East Reserve Pit #2, 39.2 acres within Dump Area #2, and 0.7 acres for the haul road connecting East Reserve Pits #1 and #2.

The stockpile impact areas shown on Figure 9-2 assume that all stockpiling will occur on the surface. During the permitting process, Ispat Inland and the permitting agencies will continue evaluation of the potential for stockpiling in mined-out pits. Currently Ispat Inland anticipates that in-pit stockpiling may begin after 5 to 10 years of operation.

It is anticipated that a total of 75.7 acres of wetlands may be impacted by development of the East Reserve mine, rock and overburden stockpiling, and haul road requirements during the life of the project. The majority of the impact will take place in the northeastern section of the East Reserve Dump Area. The East Reserve Dump Area was modified from the original proposal to minimize wetland impacts. The revised Dump Area is split into two sections to allow for natural drainage from the north to continue south through the site. It is unknown if, or to what degree, the wetlands between the new stockpiles and pits will be affected. The wetlands located between the two new pits are considered perched wetlands, so it is not anticipated that intersecting the wetland with the pit will result in drainage of the wetland through groundwater flow. Monitoring could be conducted during mining operations to determine if pit dewatering has a drainage effect on the wetlands. If monitoring shows a drainage effect, subsurface cutoffs could potentially be constructed to prevent seepage losses from the wetlands. However, a monitoring and contingency plan will be developed to account for this potential, and if impacts become evident, mitigation will be accomplished.

Two proposed haul road alignments were evaluated. The south haul route will have the least wetland impacts and is the preferred option. It is estimated that the south haul route will require a total of 12.3 acres of wetland impact. Table 12-2 summarizes the wetland impacts by type and project area for each watershed.

Alternatives Analysis

Mining Activities

Economically mineable ore reserves in the Laurentian Pit are expected to be completely mined within the next 7 years without the development of the East Reserve. The high proportion of high silica (upper cherty) ore and the high stripping ratio at the Laurentian Pit limit plant performance and raise mining costs. In order to continue production of taconite beyond 2011, a new mine must be developed. Due to the variability of ore quality and taconite pellet production requirements, long-term mine planning is needed to continually provide the proper mixture of ore qualities to the processing facility. To maintain an economically viable taconite production facility, beyond the next 7 years, a new mine pit must be developed.

The taconite ore bodies of the East Reserve can be utilized only where the mineral resource exists in economically mineable quantities. Extensive exploration programs have been conducted, collecting and analyzing ore samples from many depths across the deposit. Such sampling provides information for proper planning and sequencing of the mining operation. The research and investigations indicate that the East Reserve ore reserves identified as East Reserve Pit #1 and East Reserve Pit #2 are the only areas having ore that is economically feasible to mine and process within economically feasible haul distances to the Minorca taconite facility.

Portions of the ore body on the north edge of the Biwabik Iron Formation are too thin to be mined economically. The high stripping ratio for taconite located down dip of the proposed mine makes that material uneconomical to mine at the present time.

To extract the ore efficiently, Ispat Inland relies on the advantages obtained by operating large-scale mining equipment. Utilizing large-scale mining equipment minimizes costs, but also requires that adequately sized working areas be maintained for loading faces, haul roads, and stockpile sites. In most cases, the operation of large-scale mining equipment makes it impossible to avoid small, selected areas of land.

To maintain a viable taconite production operation, Ispat Inland must extract the best of the taconite ore from the deposit. Mining operations are controlled to a large extent by the geology of the ore deposit, ore quality and distribution, amount of stripping materials to be removed, and operating efficiencies and economic conditions. These factors dictate the specific location of the mine pits and stockpiles, as well as the sequence of the mining activities. There are no practicable or feasible alternatives for avoiding impacts to wetlands that occur within the limits of the economically mineable East Reserve ore reserves.

Ore Processing Facility

Because the proposed project will make use of, and extend the working life of the existing Minorca taconite facility, analysis of alternatives for taconite pellet production is not needed. The Minorca Plant and tailings disposal facility are already fully permitted; wetlands issues have already been addressed and no additional impacts will result from the development of the East Reserves.

Dump Areas

Mining economics dictate that the stripping and stockpiling of surface overburden, lean ore, and waste rock materials be done in the proper sequence to allow efficient access to the underlying ore. In order to minimize haulage costs and maintain operating efficiencies, surface overburden, waste rock, and lean ore stockpiles must be located in or adjacent to the mining area. The areas located east, south, and west of the East Reserve are predominantly covered by mine pits and wetlands. The use of any of these areas for stockpiling would result in significant adverse effects to extensive water resources and thus, were determined to not be practicable alternatives. Therefore, the stockpile areas represent the most reasonable locations for placement of these materials.

Section 404 of the Clean Water Act requires that impacts to wetlands be avoided and minimized to the extent practicable. Three provisions of the Mineland Reclamation rules are also pertinent to determining stockpile locations:

1. Existing stockpiles shall be incorporated or extended to the extent possible (Minnesota Rules, Chapter 6130.2100(A)).
2. Mining shall be conducted to maximize use of past, present and future mining areas so as to minimize the amount of land disturbed by mining and reduce the loss of non-mineral resources (Minnesota Rules, Chapter 6130.1400, Subp. 1).
3. Former mining areas are used in preference to areas undisturbed by mining (Minnesota Rules, Chapter 6130.1100, Item F.)

The proposed dump areas comply with MNDNR's preference to use disturbed lands wherever possible, since nearly one-half of the dump areas contain existing dumps from past operations and much of the land has been disturbed by those former activities. The stockpile plans have also been modified from their original extent to minimize both direct and indirect impacts to wetlands. The original plan included a single stockpile connecting the East Reserve Dump Areas #1 and #2 into a single stockpile. The proposed stockpile plan has separated the dump area into two areas, thereby avoiding approximately 14 acres of wetlands. In addition, this plan will allow the natural drainage from approximately 260 acres of land located north of, and between the dumps to continue to drain south and support hydrology in Wetlands 8-11 and 44.

In-Pit Stockpiling

Stockpiling lean ore, waste rock, and possibly surface overburden in mined-out pits has benefits in that it involves short haul distances and minimizes impacts to undisturbed lands and wetlands. This method is also favorable with respect to the requirements of the CWA and portions of the MDNR reclamation rules. Additional benefits accrue if pits can be filled to within 6.6 feet (2 meters) of the eventual water level; in such cases lacustrine wetland habitat can be created, providing mitigation for unavoidable wetland impacts elsewhere. However, several additional factors must be considered in determining the feasibility of stockpiling in mined-out pits:

- The MNDNR has authorized in-pit stockpiling in the past, but not over existing or future mineral resources.
- The Commissioner may require in-mine disposal of mine waste (Minnesota Rules, Chapter 6130.1400, Item A.).
- The sequence of mining will restrict the use of mined-out areas for stockpiling until no future work is scheduled in those areas.
- Potential surface and ground water impacts must be evaluated.
- Stockpiling of certain grades of lean ore may not be allowed below the ultimate water line of the pit.
- Mineral rights provisions may not allow in-pit stockpiling in certain areas.

It is anticipated that in-pit stockpiling opportunities will be limited at the East Reserve site. Because mining activity is restricted to two relatively small areas, and mining activities are expected to be conducted throughout portions of each pit, it may not be possible to make use of mined-out areas for stockpiling. Since the mine plan includes the completion of mining in East Reserve Pit #1 prior to mining in East Reserve Pit #2, in-pit stockpiling will be evaluated with the fee owners and regulatory agencies as the ore reserves are depleted. The long-range stockpiling plan will include utilizing in-pit stockpiling to the maximum extent practicable.

Minimization Strategies

Where pit boundaries intersect existing wetlands, the pits will be diked to avoid indirect wetland impacts due to seepage from the wetland to the pit.

The extensive amount of stripping material that must be removed at the East Reserve in order to expose the underlying ore requires the development of fairly large stockpile areas. Since the East Reserve project area contains numerous wetlands, it is not possible to construct these large stockpiles without impacting some wetlands.

For several reasons, hauling the stripping materials long distances to avoid wetlands is neither practical nor feasible. Northeastern Minnesota in general has very few large tracts of land that do not contain wetlands. The large-capacity trucks used to move the stripping materials from the mine to the stockpile sites require large and substantial haul roads, constructed with a substantial rock base to support the heavy loads. Haul roads are required to be built to a minimum width of 150 feet to ensure adequate travel lanes and provide for edge-of-road safety berms. Excessive haul distances increase truck haulage and haul road construction costs and directly impact the overall viability of the mining operation. Because of their size, the mine's haulage trucks are restricted to travel within the mine property, so stockpiling materials outside of the mine property is not feasible.

Another approach to minimize wetland impacts would involve placing stockpiles away from wetlands, or distributing the stockpiles around the wetlands. This would result in significant loss of stockpile capacity at the stockpile location. Additional stockpile capacity would have to be sought elsewhere – but other locations within the mine site have similar concentrations of wetlands.

If sufficient stockpile capacity is not provided for, the economic viability of the mining area would be adversely affected. It is also worth noting that the ecological value of a wetland would be greatly diminished if it were to be completely encircled by stockpiled material.

Tailings Disposal

No additional tailings basin area is expected to be needed during the duration of the project. Project plans call for the use of the existing tailings disposal facility in a mined-out pit, and no new disposal facility or expansion is currently planned. Therefore, no alternatives analysis is currently needed for the tailings disposal. Should ore processing activities result in the necessity for tailings basin expansion at some point in the future, a permit will be acquired, and wetland impact avoidance and alternatives analysis will be addressed at that time.

Haul Roads and Rail Lines

The mine plans include the construction of three haul roads; 1) the main haul road will connect the pits to the existing haul road to transport ore to the Minorca taconite facility, 2) one to connect East Reserve Pits #1 and #2, and 3) one to connect the East Dump #1 to the main haul road (Figure 9-2). Two routes were evaluated for the main pit haul road to minimize wetland impacts to the greatest extent practicable. The south haul route was chosen and modified slightly to avoid wetlands to the greatest extent. The final design of the haul road will be developed to minimize the width of the road to avoid wetlands as much as possible. The other two haul roads were designed to cross wetlands at narrow points in the wetlands to minimize wetland impacts. Each haul road will be constructed with culverts to allow the natural drainage to continue pass through, with the goal of minimizing impacts to downstream wetlands.

Wetland Mitigation Measures

During the projected 17-year life of the project, it is anticipated that approximately 75.7 acres of wetlands and waters will be impacted by filling and removal by excavation (Table 12-1). A total of 28.2 acres are expected to occur during the first 8 years and the remaining 47.5 acres will occur during years 11 through 16.

To comply with the no-net-loss provisions of Section 404 of the Clean Water Act and the no net loss provisions of the Wetland Conservation Act (WCA), Ispat Inland will compensate for the unavoidable wetland impacts resulting from the proposed mining activities. The U.S. Army Corps of Engineers is in the process of establishing mitigation ratio guidelines for administration of the WCA that are expected to be based primarily on timing of mitigation, wetland mitigation type compared to impacted wetlands, risk of mitigation failure, and the location of mitigation. It is our understanding that a mitigation ratio of 1:1 will be required for unavoidable wetland impacts that are mitigated by existing, sustainable wetland banking resources that are substantially of a similar wetland type.

During permitting of the Laurentian mine, Ispat Inland developed a wetland bank in Aitkin County, Minnesota within the Mississippi River – Brainerd Watershed to compensate for unavoidable impacts resulting from development of the Laurentian mine and for impacts resulting from future activities. At that time, special state legislation was passed by the State Legislature to allow wetland mitigation outside of the county and watershed in which the activities were conducted. The wetland bank was developed in about 1997, and has been accepted by the Corps as a suitable wetland mitigation bank. Ispat Inland currently retains approximately 108 acres of wetland banking credits in that wetland bank including Type 2/3 wet meadow and shallow marsh wetlands. Since that wetland bank has been accepted as a functioning Type 2/3 wetland and over half of the proposed impacts will occur in wetlands that are currently or were historically Type 2/3 wetlands; Ispat Inland proposes to withdraw 28.2 acres of credits from that wetland bank in 2007 and an additional 47.5 acres of credits in 2018 to provide 1:1 compensatory wetland mitigation for the proposed East Reserve mine expansion. The withdrawals will be conducted by submitting an *Application for Withdrawal of Wetland Banking Credits* to the Corps and MNDNR for signatures approving the use of credits. The MNDNR will then debit the credits from Ispat Inland's account and send a notice to the Corps and Ispat Inland indicating completion of the withdrawal.

PROPOSED TREATMENT OF TOPIC IN EIS

The proposed project has the potential to significantly affect surface water resources in the project area. The EIS will include a study of the surface water hydrology of the affected area, potential changes to surface water hydrology, and possible methods for mitigating such changes.

Geomorphic analysis of receiving streams will be included in the EIS. This information combined with the results of the Surface Water Study will be used to identify any areas that are sensitive to changes in magnitude, duration, rate, and time of flow. If any sensitive areas are identified, there will be additional investigation of these areas. If this additional investigation identifies any significant adverse impacts from the project, mitigation and monitoring will be evaluated.

The EIS will include additional detail on the wetland delineation and mitigation. Potential indirect impacts to wetlands due to changes in hydrology will also be evaluated.

The EIS will include watershed landscape alterations, as well as mine pit dewatering discharges. Potentially affected water bodies will be identified and predictions will be made as to the extent of impacts. Mitigation measures will also be identified and evaluated.

13. **Water Use.** Will the project involve installation or abandonment of any water wells, connection to or changes in any public water supply or appropriation of any ground or surface water (including dewatering)?
☒ Yes ☐ No

If yes, as applicable, give location and purpose of any new wells; public supply affected, changes to be made, and water quantities to be used; the source, duration, quantity and purpose of any appropriations; and unique well numbers and DNR appropriation permit numbers, if known. Identify any existing and new wells on the site map. If there are no wells known on site, explain methodology used to determine.

Wells and Public Water Supply

No new wells will be required and abandonment of existing wells is not anticipated. If any wells are located in the project area, they will be abandoned in accordance with the State Well Code. Potable water supply will not be needed for the mine area. All other water appropriations will be satisfied through mine pit dewatering.

Based on the Minnesota Geologic Survey *County Well Index*, known wells in the vicinity of the project are shown on Figure 13-1, and groundwater levels are shown in Figure 13-2. The City of Biwabik has two municipal wells located approximately 1.25 miles east of the proposed mining area. However, according to the City of Biwabik, these municipal wells have not been used for approximately 20 years and are not be likely to be a viable component of the City's municipal water supply. One additional municipal well is located approximately 3.25 miles east of the project, northeast of Embarrass Lake. The Biwabik municipal wells have depths ranging from 262 feet to 278 feet with bottom elevations ranging from 1,149 to 1,165 feet. The water elevation in the Biwabik Well #1 was 1,332 feet on February 18, 2002 and the water level in Well #2 in 1953 was 1,332 feet. This compares to anticipated mining depth to approximately elevation 1,197 feet. The City of Biwabik relies on the Canton Pit for all of its water supply needs. The water level in the Canton Pit appears to be about 1,420 feet and is located approximately 500 feet east of the proposed project. Numerous residential wells are located approximately 1.75 miles and farther south of the project. Water level in those wells range from 1,390 to 1,400 feet along the south side of Highway 135 and water levels decrease to the south (Figure 13-2).

The potential for impacts to the Corsica Pit will be studied in the ground water study (Appendix C) that is currently being proposed by Ispat Inland.

PROPOSED TOPIC OF TREATMENT IN EIS

The proposed surface water and groundwater studies will be used to identify impacts from changes in hydrology caused by the project. Specifically, the potential effects the dewatering will have on the groundwater resource and water levels in the Canton and Corsica pits (Biwabik's and McKinley's water supplies). Mitigation and monitoring will be evaluated as warranted.

14. **Water-Related Land Use Management District.** Does any part of the project involve a shoreland zoning district, a delineated 100-year flood plain, or a state or federally designated wild or scenic river land use district? ☐ Yes ☒ No

    If yes, identify the district and discuss project compatibility with district land use restrictions.

15. **Water Surface Use.** Will the project change the number or type of watercraft on any water body?
    ☐ Yes ☒ No

    If yes, indicate the current and projected watercraft usage and discuss any potential overcrowding or conflicts with other uses.

    This is not applicable to the project.

16. **Erosion and Sedimentation.** Give the acreage to be graded or excavated and the cubic yards of soil to be moved:

Table 16-1
Area and Volume of Grading and Excavation

Location	Acres	Units	Quantity
Mine pit	364	long tons	116,000,000
Stockpiles	375	yd^3	31,200,000
Haul Road Construction Site	96	yd^3	625,000

Describe any steep slopes or highly erodible soils and identify them on the site map. Describe any erosion and sedimentation control measures to be used during and after project construction.

Mine Pit

The natural areas of the site are steepest in the northern part and generally flatten out to the south. The ground slopes north of the existing north haul road generally range from 6 to 7 percent. Slopes within the central portion of the site range from 3.5 to 5 percent and ground slopes in the southern part of the site are generally less than 2 percent. Slopes on the dumps and pits are the steepest on the site, ranging from 25 to 50 percent. However, since these slopes are composed of waste rock or pit walls, they are stable and not subject to erosion. Approximately 200 acres of undisturbed land located north of the project site drains south through the central portion of the site through a series of relatively flat wetland complexes (Figure 14-1). The central natural drainage network will not be disturbed by the project.

Surface water from the majority of the central and north portions of the East Pit and dump areas, encompassing an area of approximately 600 acres, drains southward past the Mary Ellen Pit through a series of wetlands and a channel along the west side of the Belgrade Sink (Figure 14-1). The remainder of the site lying west of the central drainage area encompasses approximately 400 acres and drains to the southeast into a series of three large wetlands located in the southern corner of the site. The drainage from both of these areas drains into the channel that carries the overflow from the McKinley Pit south about 5 miles entering the Embarrass River at the downstream end of Esquagama Lake. The extreme northeast corner of the site drains east to the Canton Pit, which discharges south around the east side of the city of Biwabik to Embarrass Lake. The 5-foot topography developed during the Mesabi Elevation Project in 1999 suggests that the southeast portion of the project site drains to the Mary Ellen Pit (Figure 14-1). However, based on observations during field visits, it does appear that an approximately 20 acres of land located in the southeast corner of the proposed East Pit #2 drains to a roadside ditch along the west side of County Road 715, then south in a ditch that runs along the east side of the Mary Ellen Pit and into Mud Lake (Figure 14-1).

All work will be conducted under the MPCA's NPDES requirements for construction stormwater management. This will include preparation of a construction Stormwater Pollution Prevention Plan, which will specify construction sequencing and installation, maintenance and inspection of construction best management practices for erosion and sediment control. The construction practices will be specified during final design but those most likely to be applied include:

- prompt revegetation of distributed surfaces,
- interim erosion protection of disturbed areas that will be re-graded at a later date, including interim seeding and/or mulching,
- use of silt fences on short slopes during grading,
- provisions for berms and channels to intercept sheet flow and convey sediment to sediment basins, and
- energy dissipation devices installed at same time as installation of culverts and steep ditch sections.

The pits will cover approximately 364 acres at their maximum extent and stockpiles will cover another 375 acres. Steep slopes will be created on stockpiles and on the edges of the pits. MNDNR rules define practices for pits and stockpile construction.

The surface overburden portions of the pit wall above bedrock will be designed and constructed in accordance with Minnesota Rules, Chapter 6130.2900 including the following design criteria:

- The toe of the surface overburden portion will be set back at least 20 feet from the crest of the rock portion of the pit wall.
- Lift heights will be no higher than 60 feet and will be selected based on the need to protect public safety, the location of the pit wall in relation to the surrounding land uses, the soil types and their erosion characteristics, the variability of overburden thickness, and the potential uses of the pit following mining. Most sections will be much lower.
- The sloped area between benches will be no steeper than 2.5:1.
- The benches will be designed to withstand the runoff from the 100-year return period, 24-hour duration storm event.
- The edge of the mine pit will be set back at least 100 feet from any public roads.
- Areas disturbed by mining activities will be required to be vegetated when the area(s) is no longer scheduled to be disturbed, or as necessary, to control erosion.

Runoff from the overburden portion of the pit wall will be a very small part of the overall runoff and will be co-mingled with the pit runoff. Direct runoff onto the rock walls and floor of the pit will be directed to sumps located at intervals along the footwall of the pit. These sump and associated pumps will be sized to detain water and trap sediment before the accumulated water is pumped out of the pit.

Details of the pit design and methods of reclamation will be described in the application for the Permit to Mine. Mine design and reclamation will be done in the spirit of the Laurentian Vision.

Stockpiles

The stockpiles will be constructed and managed in accordance with the requirements of the MNDNR Mineland Reclamation Rules for Ferrous Metallic Mineral Mining (Minn. Rules Chapter 6130). These requirements include:

- Incorporating and extending existing stockpiles.
- All runoff and drainage control measures will be designed to withstand the 100-year frequency, 24-hour duration storm.
- Lifts will not exceed 30 feet in height for rock stockpiles and 40 feet in height for overburden stockpiles. Rock slopes sheathed with overburden may be 40 feet high.
- Benches will be 60 feet wide between lifts.
- The sloped area between benches will be no steeper than 2.5:1 for overburden stockpiles and no steeper than the angle of repose for rock stockpiles.

- Runoff water will either be temporarily stored on benches and allowed to infiltrate, or will be removed by drainage control systems.

Details of the stockpile design, location, construction and reclamation will be described in the application for the Permit to Mine. Stockpile design and reclamation will be done in the spirit of the Laurentian Vision.

A National Pollutant Discharge Elimination Permit (NPDES) will be required for the project to address storm water discharges from the site and to control erosion and sedimentation.

PROPOSED TREATMENT OF TOPIC IN EIS:
The EIS will address runoff from erosion-prone areas of the site as part of the larger issue of surface water runoff and overall water quality impacts of the project.

Potential increased sedimentation into the Canton Pit due to decreased water levels from mine pit dewatering will be evaluated in the EIS.

17. **Water Quality: Surface Water Runoff**

a. Compare the quantity and quality of site runoff before and after the project. Describe permanent controls to manage or treat runoff. Describe any stormwater pollution prevention plans.

For the purpose of answering this question Ispat will address surface water run-on and runoff that does not come in contact with active mining, hauling, or stockpiling areas. Runoff from these areas will likely be addressed in the site NPDES permit and will be discussed in Ispat's response to Question #18.

Water Quantity

The central watershed within the project site is expected to only be altered primarily by the loss of about 25 percent of the drainage area to the development of the mine pits. Surface water generated within the approximately 100 acres of forested land located north of the project site will continue to flow through the central portion of the site around the west side of the Belgrade Sink (Figure 14-1). The stockpiles are expected to continue to drain generally in the same direction, thereby maintaining much of the watershed area draining to the large wetlands located adjacent to the Mary Ellen Pit (Figure 14-1). Runoff from nearly three-fourths of the western project site watershed will be captured by the mine pit, thereby significantly reducing surface and surficial ground water input to Wetland 8 (Figure 14-1) The eastern and southeastern drainage area characteristics are not expected to change significantly.

Water Quality

The MPCA characterized the watershed and stream characteristics and conducted a survey of water quality parameters in 1998 within the stream being studied as a dewatering discharge route just upstream of where the unnamed stream enters the Embarrass River downstream of Embarrass Lake. Surface water runoff that does not come into contact with mining activity also uses this same discharge route. The unnamed stream drains an area of 18.9 square miles in which forested land cover makes up 42 percent of the watershed, wetlands and waters make up 25 percent of the watershed and the remaining 33 percent is a mix of agriculture, range land, urban and other land uses. The stream has a mean depth of 10 inches and a mean width of 10.5 feet. The water quality monitoring results for the stream is provided in Table 17-1.

Table 17-1
Unnamed Stream – Dewatering Discharge Route
Analytical Results Upstream of Esquagama Lake, MPCA
Sampled Date: 7/13/1998

Analyte	Result	Units
pH	7.9	SU
Water Temperature	23.3	^{o}C
Flow	0.052	m^3/sec
Conductivity	346	µmhos/cm
Turbidity	2.1	NTU
Dissolved Oxygen	6.7	mg/l
Solids, Total Suspended	1.2	mg/l
Nitrogen	0.05	mg/l
Ammonia	0.06	mg/l
Total Phosphorus	0.036*	mg/l

*Total phosphorus levels are above the level of concern (0.03 mg/L). Water samples of pit water (Laurentian 1999) reported phosphorus at <0.1 mg/L. There are other land uses (i.e. residential lawns and a golf course) within the Embarrass River/Esquagama Lake drainage area that may attribute to the elevated phosphorous levels.

Canton Pit

The Canton Mine Pit is classified as a 1C, 2Bd, and 3B water by the MPCA due to its use by the city of Biwabik for their public water supply, industrial water supply, and recreation. No current information is available on the presence of a direct hydraulic connection to the Canton Pit. At this point there are no plans to discharge into the Canton Pit. Pumping into the Canton to maintain water elevation for the public water supply was mentioned briefly but at this point there is no way to positively know what impact pumping down adjacent pits will have on the Canton. This will be one of the issues for the EIS and ground water study currently proposed.

Storm Water Management and Pollution Prevention

Surface water runoff within the project boundaries will be both managed to meet the water needs of the mine site and to meet the hydrologic and water quality needs of waters of the state that are downstream of the project site. Runoff water will also be managed with respect to impacts on aquatic organisms and their habitats. Water as a resource in the project area will be managed through best management practices to control suspended sediments accumulation, erosion, and pollutants associated with mining operations (e.g. pollutants associated with maintenance and fueling), and to minimize the effects of mining operations on the quality of waters downstream of the project area.

b. Identify routes and receiving water bodies for runoff from the site; include major downstream water bodies as well as the immediate receiving waters. Estimate impact runoff on the quality of receiving waters.

Runoff Routes and Water Bodies

Surface water from the majority of the central and north portions of the proposed East Pit and dump areas, encompassing an area of approximately 600 acres, drains southward past the Mary Ellen Pit through a series of wetlands and a channel along the west side of the Belgrade Sink. The remainder of the site lying west of the central drainage area encompasses approximately 400 acres and drains to the southeast into a series of three large wetlands located in the southern corner of the site. The drainage from both of these areas makes it to the channel that carries the overflow from the McKinley Pit south to the Embarrass River. The extreme northeast corner of the site appears to drain into Holland Mine, a former mine pit (see Figure 9-2) and the southeast corner of the site appears to drain into the Mary Ellen Pit and Belgrade Sink.

PROPOSED TREATMENT OF TOPIC IN EIS:
Long-term storm water management issues (longer term BMPs, SWPPP, etc.) associated with the continued operation of the mine, and the individual NPDES permit for the mine dewatering discharges will be evaluated for the management of storm water generated during the course of normal mine operation and will be included in the EIS.

18. **Water Quality: Wastewaters**

a. Describe sources, composition and quantities of all sanitary, municipal and industrial wastewater produced or treated at the site.

The East Reserve mining activities, as proposed, will not generate any sanitary or municipal wastewater discharges. The only source of industrial wastewater discharge associated with the mining and stockpiling activities will be mine pit dewatering activities during active mining.

Rainfall, snowmelt and groundwater are expected to accumulate in the proposed mine pits. During mining activities, water in the pits will be directed to sumps. These sumps and associated pumps will be sized to detain water and trap sediment before the accumulated water is pumped out of the pit. The water will then be pumped through pipes and/or open channels into the McKinley Pit and/or the Mary Ellen Pit where the water will have additional opportunity for suspended sediments to settle out. The McKinley and Mary Ellen Pits are abandoned, water-filled mine pits on the southwest and southeast sides of the proposed mining area. Excess water in the McKinley Pit will flow south through an existing drainage channel under Trunk Highway 135 about one mile south of the McKinley Pit. From Highway 135, a public waters course will carry water approximately three miles south-southeast to the Embarrass River just downstream of Esquagama Lake and then another five miles south to the St. Louis River. The discharge channel drops approximately 50 feet over the three miles from Highway 135 to the Embarrass River with an average slope of about 0.3 %. This discharge route also crosses six public roads after discharging across Highway 135 and before reaching the Embarrass River. It is anticipated that channel capacity and winter discharges will be studied to assess the capacity of the system to accommodate additional discharge. The discharge volume will also be studied with respect to changes in the geomorphology.

Ispat is also evaluating an additional pit dewatering route through the Mary Ellen Pit. There is a discharge point at the south end of the pit that drains to the south through a wetland complex to Forge Lake. From Forge Lake the discharge would flow south through a public water course to the same discharge point (same as the McKinley discharge) just downstream from Esquagama Lake. This drainage route crosses only four public roads after discharging across Highway 135 and before reaching the Embarrass River covering about 3.5 miles. The average slope of the channel downstream of Highway 135 is about 0.26%. Channel capacity and the potential for winter icing conditions will also be evaluated for this route. The discharge volume will also be studied with respect to changes in the geomorphology.

During the first three to four years of mining, it is expected that mine pit dewatering will be comprised mostly of surface runoff collecting in the pit. From about the fourth year on, Ispat anticipates that the pits will intersect groundwater at which time dewatering of the adjacent mine pits may be needed. Ispat has not modeled the volume of runoff or pit dewatering discharge that will be generated during development of the East Reserve. However, Ispat has been operating the Laurentian pit, less than two miles away, since 1990 and has been dewatering that pit for some time. Ispat's experience with the Laurentian pit suggests that pumping rates in the three to five thousand gallons per minute range (6.7 – 11 cfs) should be expected for the proposed East Reserve pits. At this time the Laurentian pit NPDES permit includes a 6,000 gallon per minute discharge limit. The actual pumping rates will depend on the sequencing of mine development. It is expected that the discharges from the project site will be increased during periods when the McKinley and Mary Ellen Pits are dewatered and after ground water is intercepted in the mine pits. Prior to that time, the existing discharges from the site will likely be maintained. Any mine dewatering discharges to the McKinley Pit will meet water quality standards and effluent limits at the point of discharge into the pit. A study will be conducted for the EIS to quantify flow rates, volumes, and timing resulting from the project.

The quality of dewatering discharge from the proposed East Reserve should also closely resemble the discharge from the Laurentian pit. Currently, dewatering discharge from the Laurentian pit is sampled and analyzed according to the requirements in an NPDES permit. Typical analytical results are presented in Table 18-1.

Table 18-1
Laurentian Pit Analytical Results
Sampled Date: 11/12/2004

Analyte	Result	Units
pH	8.3	SU
Solids, Total Suspended	9.6	mg/l
Turbidity	16	NTU
Iron	0.4	mg/l
Mercury	1.4	ng/l

In November of 2004, Ispat took grab samples of water in McKinley, Mary Ellen, and Canton Pits in order to begin collecting water quality data for future EIS and permitting investigations. The analytical data from monitoring the McKinley, Canton and Mary Ellen Pits is presented in Table 18-2.

Table 18-2
McKinley, Mary Ellen and Canton Pits Analytical Results
Sample Date: 11/10/2004

Analyte	McKinley Result	Mary Ellen Result	Canton Result	Units
pH	8	7.9	8	SU
Solids, Total Suspended	8.8	<1	<1	mg/l
Iron	1.57*	0.03	0.08*	mg/l
Mercury	1.1	0.9	0.7	ng/l

* Laboratory quality control issue noted in report.

Based on the information we have on the Laurentian discharge (Table 18-1), there is very little difference between quality of the Laurentian discharge and the existing quality in naturally occurring water in McKinley, Mary Ellen and Canton pits as shown in Table 18-2. Therefore, water quality is not considered an issue except for Mercury as discussed below.

The East Reserve site is located within the Lake Superior Watershed, which has a mercury water quality standard of 1.3 ng/L. Precipitation has a mercury concentration that is higher than the water quality standard. Mercury in pit dewatering will be an important issue to consider for this reason and will be addressed in the EIS and permitting process. Ispat has begun to collect samples from the Laurentian dewatering discharge and analyzing them for mercury. Analysis conducted to date is presented in Table 18-3.

Table 18-3
Laurentian Pit Mercury Results (ng/l)

Sample Date	Result
3/17/03	1.7
5/21/03	0.8
6/19/04	1.9
11/12/04	1.4
11/26/04	0.8
12/16/04	0.7
12/28/04	1.8
1/14/05	0.9
1/28/05	2.4

A National Pollutant Discharge Elimination Permit (NPDES) will be required for the mine dewatering discharge. This permit will also address storm water discharges from the site. Pit dewatering has been identified as an issue that will be explored in more detail in the EIS and concurrent NPDES permitting process.

The Canton Mine Pit is classified as a 1C, 2Bd, and 3B water by the MPCA due to its use by the city of Biwabik for their public water supply, industrial water supply, and recreation. There is a possibility that the mine dewatering could reduce water levels in the Canton Pit. The mine dewatering is expected to reduce water levels to elevation 1,197 feet MSL. The bottom of the Canton Pit is at elevation 1,115 feet MSL on the west end of the pit and 1,197 feet MSL on the east side of the pit with a rock separation running across the pit from south to north at an elevation of 1,354 feet MSL. This higher elevation from south to north across the pit should allow the east lobe of the Canton to maintain adequate water for the City of Biwabik even during dewatering activities. The potential effects of the project on the Canton Pit will be studied in the EIS, including a contingency plan looking at present and potential uses of the Biwabik municipal water supply.

b. Describe waste treatment methods or pollution prevention efforts and give estimates of composition after treatment. Identify receiving waters, including major downstream water bodies, and estimate the discharge impact on the quality of receiving waters. If the project involves on-site sewage systems, discuss the suitability of site conditions for such systems.

Sumps in active mine pits serve as settling basins to reduce suspended solids prior to discharge from the pits. The pit dewatering discharge from the active East Reserve is expected to be of similar quality as the Laurentian discharge (see Table 18-1). The discharge water from the East Reserve will be pumped to the McKinley and/or Mary Ellen pits. These existing mine pits (i.e. McKinley and possibly Mary Ellen) will help to further remove any remaining suspended solids discharged to the natural drainage system.

Additional studies will be conducted during the EIS and permitting process to quantify the quality and quantity of dewatering discharge and impacts on receiving waters.

PROPOSED TREATMENT OF TOPIC IN EIS:
Mercury from active pit dewatering of the East Reserve will be addressed in the EIS and permitting process. Ispat Inland currently proposes to meet the 1.3 ng/L standard for Mercury discharges into the Lake Superior watershed. The feasibility of meeting this standard will be evaluated in the EIS. If it is determined that it may not be feasible to meet this standard, the EIS will include information and impacts related to a potential variance from the standard.

The proposed project has the potential to significantly affect surface and groundwater resources in the project area. The EIS will include a detailed description of the rates, volumes, and timing of dewatering based on the final mine plan. In addition, the EIS will evaluate alternative downstream drainage systems from the mine site including the capacity of the downstream conveyance systems to handle additional discharge and improvements to minimize potential problems. An assessment of potential fluvial geomorphic changes, including sedimentation and stream bank erosion will be thoroughly evaluated as part of the EIS.

c. If wastes will be discharged into a publicly owned treatment facility, identify the facility, describe any pretreatment provisions and discuss the facility's ability to handle the volume and composition of wastes, identifying any improvements necessary.

Not Applicable

d. If the project requires disposal of liquid animal manure, describe disposal technique and location and discuss capacity to handle the volume and composition of manure. Identify any improvements necessary. Describe any required setbacks for land disposal systems.

Not Applicable

19. **Geologic Hazards and Soil Conditions**

a. Approximate depth (in feet) to ground water: **25 feet** minimum **75 feet** average
Approximate depth (in feet) to bedrock: **14 feet** minimum **32 feet** average

Describe any of the following geologic site hazards to ground water and also identify them on the site map: sinkholes, shallow limestone formations or karst conditions. Describe measures to avoid or minimize environmental problems due to any of these hazards.

Geology and Hydrogeology

The glacial deposits on the site are mapped as discontinuous thin drift overlying bedrock (Lindholm et al., 1979). The drift deposits are characterized by Lindholm et al., (1979) as fine-grained glacial lake deposits of sand, silt, and clay with extensive postglacial peat deposits. However, extensive exploratory drilling has been conducted at the mine site during which, the unconsolidated glacial (quaternary) deposits were characterized. The quaternary deposits range from 5 feet to 60 feet in depth and are consistently characterized as relatively impermeable, brown clayey till. The unconsolidated deposits average 24 feet in depth in the northern part of East Pit #1 and 37 feet in depth in the southern part. The till in the northern part of East Pit #2 is approximately 20 feet thick.

Lower cherty magnetite is present below the glacial till in the northern part of East Pit #1 underlain by quartzite at depths ranging from 79 feet to 200 feet with an average of 133 feet. In the southern part of East Pit #1 is lower slaty taconite over lower cherty magnetite. Quartzite is present at depths ranging from 204 feet to 281 feet with an average of 244 feet. Ground water elevations at the East Mine site were determined based on the approximate water levels in the surrounding mine pits. It appears that the water level in the McKinley Pit is approximately 1,425 feet MSL, at about 1,420 feet MSL in the Mary Ellen Pit, and about 1,420 feet MSL in the Canton Pit. The water levels in the McKinley Pit have apparently stabilized since the pit has reached it’s overflow point several times in the recent past. Based on this surficial expression of ground water, it appears that the ground water in the upper bedrock is at an elevation of approximately 1,425 feet MSL on the site ranging from 25 feet to 135 feet below the ground surface in the proposed pit areas.

There are no natural geologic hazards of concern related to groundwater in this area. Previous surface mining activities have occurred in this area that could create local fractured rock connections between nearby pits. In addition, underground mining did occur on the Mesabi range and the location of all these areas is not known. Underground mine tunnels and fractured rock can serve as water conduits. If such a condition were to occur, it could potentially affect the water levels in the Canton Pit which also serves as the City of Biwabik's water supply. Therefore, this potential issue will be addressed in the EIS.

The Belgrade Sink is an approximately 45 acre area where apparently some underground mining features collapsed which resulted in this sinkhole forming (Figure 9-2). Based on a review of historic aerial photos, the collapse occurred and the sinkhole partially filled with water sometime before 1940 (Figure 9-3).

b. Describe the soils on the site, giving NRCS (SCS) classifications, if known. Discuss soil granularity and potential for groundwater contamination from wastes or chemicals spread or spilled onto the soils. Discuss any mitigation measures to prevent such contamination.

Soils

The soil survey mapping for the site is shown on Figure 19-1 and a list of the soil series shown on the soil survey is provided in Table 19-2. The texture of the majority of the soils at the site is mapped as loam by the St. Louis County Soil Survey (currently unpublished), which make up 72 percent of the proposed project area (Table 19-1). Nearly one-quarter of the project area (23 percent) is mapped as mine features such as dumps and pits or associated cut and fill areas on the soil survey. Approximately 2.5 percent of the project site (~20 acres) is mapped with sandy soils. The remaining 2.5 percent of the site is mapped as mucky peat and water.

Table 19-1: Project Area Soil Summary

Soil Texture	Area (acres)	%
Loam	600.2	72%
Disturbed	194.4	23%
Sand	19.7	2%
Water	16.9	2%
Mucky Peat	4.4	1%
Total	835.7	100%

The proposed mine pits are predominantly mapped as Hibbing-Buhl complex (19-2B) soils as shown on Figure 19-1 and as summarized in Table 19-2. The Buhl loam soil is classified as a hydric soil (primarily because it is found on flatter slopes) and the Hibbing loam is classified as a non-hydric soil. These soils are described as somewhat poorly (Buhl) to moderately well drained (Hibbing) soils that formed in a thin mantle of loess over the underlying fine, dense glacial till. Slopes generally range from 1 to 5 percent for the Buhl and 1 to 8 percent for the Hibbing soils. The undisturbed portions of the proposed dump areas are predominantly mapped as Hibbing-Buhl complex (19-2B) with some Eaglesnest stony loam (4-1C) mapped on the northern and western parts (Figure 19-1). The disturbed portions of the proposed dumps are primarily mapped as iron mine dumps (1042) and iron mine pits (1041).

Many of the wetland areas on the site are mapped as McQuade-Fayal, depressional complex (19-5A), a hydric soil series. A few wetlands are mapped within the Hibbing-Buhl complex (non-hydric and hydric, respectively), 1 to 8 percent slopes (19-2B) and the McQuade-Buhl complex (both hydric), 0 to 3 percent slopes (19-1A). Some of the larger wetland complexes are mapped as Dora mucky peat (1333), a hydric soil or as water (3401). The mapping of the hydric soils corresponds reasonably well with the wetland delineations. However, due to the significant past disturbances on the site, there are areas of existing wetland mapped over non-hydric soils and upland areas mapped over hydric soils. Soil textures within the surficial soil horizons investigated on-site ranged from loams to clay loams with some peat deposits in more extensive wetlands. The underlying glacial deposits are generally characterized as tight clayey glacial till which provides good protection to ground water resources.

Refueling and maintenance of mining equipment (excavators, trucks, etc) represents the largest potential for soil and groundwater contamination from spills. A majority of site soils are loam and are not particularly sensitive to contamination from spills.

Accidental spills during refueling, operation, and maintenance of mining equipment (excavators, trucks, etc.) does not present a significant potential for soil and ground water contamination. The majority of site soils are loam and are not particularly sensitive to contamination from spills. Sand and wetland soils in the area the most sensitive soil types at the site. Ispat has several measures in place to prevent spills:

- On-site refueling operations are performed only by mechanics with two mobile fueling trucks. These individuals are trained regarding spill prevention and are present during the entire refueling operation.
- Ispat is constructing a state of the art refueling station at the Minorca processing facility to handle fueling on the plant site and to fill the mobile fueling trucks.
- Routine maintenance on the haul trucks is performed at the Minorca processing facility. Excavators and loaders will continue to be maintained in the pit and malfunctioning equipment will be fixed but under controlled conditions and using general maintenance practices (i.e. all liquids are collected and properly managed).
- No bulk fuels or lubricants are stored in the pit or along the haul route.

Blasting rock creates a minor potential for ground water contamination. Ispat's blasting practices reduce the potential for water quality impacts by minimizing the amount of time that blasting materials are on site. Blast holes at Minorca are loaded with ANFO; a blend of ammonium nitrate and fuel oil. To minimize the potential impact the nitrate might have on groundwater no ANFO is stored on the site. The product is delivered daily as it is needed. The amount of product that is augured into each blast hole is measured and controlled. The amount of time the holes sleep (are left loaded) is minimized to limit dissolution of the product into the groundwater. Upon detonation most of the nitrate is consumed.

Table 19-2: Soils Series Summary

Soil Survey	NAME	Area (acres)	Hydric Status	Slope
7-6A	Babbitt	7.3	not hydric	0 to 3 percent slopes
7-1B	Biwabik-Graycalm	12.9	not hydric	1 to 8 percent slopes
7-1D	Biwabik-Graycalm-Friendship	6.8	not hydric	8 to 18 percent slopes
4-3G	Conic-Insula	16.0	not hydric	20 to 70 percent slopes
550	Dora	3.6	hydric	0 to 1 percent slopes
4-1C	Eaglesnest	43.9	not hydric	2 to 8 percent slopes
6-1B	Eaglesnest-Wahlsten	2.7	not hydric	2 to 8 percent slopes
6-2D	Eveleth-Eaglesnest-Conic	3.8	not hydric	6 to 18 percent slopes
19-3D	Hibbing	15.0	not hydric	8 to 18 percent slopes
19-2B	Hibbing-Buhl	471.0	not hydric/hydric	1 to 8 percent slopes
19-5A	McQuade-Fayal	40.5	hydric	0 to 2 percent slopes
532	Sago	0.5	hydric	0 to 1 percent slopes
1314	Tacoosh	0.3	hydric	0 to 1 percent slopes
1043	Udorthents, cut and fill	38.9		
1356	Water	16.9		
1042	dumps, iron mine	138.7		
1041	pits, iron mine	11.7		
1028	pits, sand and gravel	5.1		
	Total	**835.7**		

PROPOSED TREATMENT OF TOPIC IN EIS
The topic is minor; it will be discussed briefly in the EIS using the same information as in the EAW.

20. **Solid Wastes, Hazardous Wastes, Storage Tanks**

a. Describe types, amounts and compositions of solid or hazardous wastes, including solid animal manure, sludge and ash, produced during construction and operation. Identify method and location of disposal. For projects generating municipal solid waste, indicate if there is a source separation plan; describe how the project will be modified for recycling. If hazardous waste is generated, indicate if there is a hazardous waste minimization plan and routine hazardous waste reduction assessments.

As the new mine pits are developed, overburden, waste rock and lean taconite will be stripped and stockpiled on the site. This material will have the same characteristics as the overburden stockpiles associated with the Laurentian pit. Ispat has calculated (based on exploratory borings conducted at the proposed East Reserve site) that approximately 31 million cubic yards of overburden will be stripped and stockpiled on the site over the predicted economic life of the East Reserve development. These materials will be managed pursuant to the Minnesota Department of Natural Resources Permit to Mine requirements.

No waste materials will be stored or managed in the pits. Vehicle maintenance wastes include fuels, lubricants, coolants, batteries, and miscellaneous spent parts. Ispat maintains haul trucks at the Minorca facility. Routine maintenance to loaders and drilling equipment is performed in the pit. Wastes generated as a result of vehicle maintenance will be managed according to applicable waste management regulations by Ispat maintenance staff.

PROPOSED TREATMENT OF TOPIC IN THE EIS:
The EIS will include additional data/information on materials handling balances as they pertain to waste stockpiling including stockpile heights and footprints.

b. Identify any toxic or hazardous materials to be used or present at the site and identify measures to be used to prevent them from contaminating groundwater. If the use of toxic or hazardous materials will lead to a regulated waste, discharge or emission, discuss any alternatives considered to minimize or eliminate the waste, discharge or emission.

The only toxic or hazardous materials associated with the proposed East Reserve development are heavy equipment fluids and explosives. Fueling will be done at the Minorca site or by tanker truck in a similar manner to what is currently being done. Blasting materials (caps, etc.) are stored at the Minorca facility and are brought to the mining site when needed. Blasting powder is transported and handled by a blasting contractor. Blasting powder is not stored at the mine site during mining. These management practices for handling explosives will be extended to the new mining area.

c. Indicate the number, location, size and use of any above or below ground tanks to store petroleum products or other materials, except water. Describe any emergency response containment plans.

There are no tanks planned for the East Reserve development.

21. **Traffic**

Parking spaces added: None

Existing spaces (if project involves expansion): None

Estimated total average daily traffic generated:
For the proposed East Reserve development employees will drive to the Minorca facility and park in existing employee parking. No new employees will be added so traffic on public roads is not expected to increase. Employees will be driven to the mine site for their shift via the private haul road in company owned vehicles.

Traffic on the private haul road will consist of the existing eight to nine trucks making 27 to 30 round trips per day. This trip count will vary depending on whether the trucks are hauling ore or overburden/waste rock as the stockpiles for overburden/waste rock are closer to the proposed mine site.

Estimated maximum peak hour traffic generated (if known) and time of occurrence: Not Applicable

Provide an estimate of the impact on traffic congestion on affected roads and describe any traffic improvements necessary. If the project is within the Twin Cities metropolitan area, discuss its impact on the regional transportation system.

Pike River Drive, County Road 715, may need to be temporarily closed or rerouted to accommodate mining activities. Discussions have begun with local officials to determine the feasibility and impacts of realigning the road.

Ore trucks will be confined to the haul road, which is closed to public traffic.

PROPOSED TREATMENT OF TOPIC IN EIS
The EIS will discuss potential traffic conflicts in the section addressing impacts on infrastructure and public services.

22. **Vehicle-Related Air Emissions.** Estimate the effect of the project's traffic generation on air quality, including carbon monoxide levels. Discuss the effect of traffic improvements or other mitigation measures on air quality impacts. Note: If the project involves 500 or more parking spaces, consult *EAW Guidelines* about whether a detailed air quality analysis is needed.

    The proposed project will use mining equipment that runs on diesel engines. In considering the potential impacts of the exhaust from these sources, it is important to keep in mind that there will be no net increase over existing conditions because the activities which cause them will be shifted from the existing Laurentian operation to the new East Reserve operation.

    Overall, the change in impacts will be primarily a change in location rather than in degree. The marginal impacts on air quality resulting from engine exhaust emissions are expected to be minor and will not be addressed further.

    PROPOSED TREATMENT OF TOPIC IN EIS
    The EIS will not include a discussion of vehicle-related air emissions.

23. **Stationary Source Air Emissions.** Describe the type, sources, quantities and compositions of any emissions from stationary sources of air emissions such as boilers, exhaust stacks or fugitive dust sources. Include any hazardous air pollutants (consult *EAW Guidelines* for a listing) and any greenhouse gases (such as carbon dioxide, methane, nitrous oxide) and ozone-depleting chemicals (chloro-fluorocarbons, hydrofluorocarbons, perfluorocarbons or sulfur hexafluoride). Also describe any proposed pollution prevention techniques and proposed air pollution control devices. Describe the impacts on air quality.

    The proposed project will generate particulate emissions in the form of dust as a result of blasting, materials handling, and equipment movement on non-paved roads. In considering the potential impacts of these sources, it is important to keep in mind that there will be no net increase in most of these effects over existing conditions because the activities which cause them will be shifted from the existing Laurentian operation to the new East Reserve operation.

Overall, the change in impacts will be primarily a change in location rather than in degree. The nearest receptors are the residences in Biwabik and McKinley.

Fugitive dust could be generated from stockpiling of overburden and waste rock, haul road traffic, and blasting. Mitigation includes applying dust suppressants to road and stockpile surfaces and covering the haul road with crushed rock. Blast-generated dust is controlled primarily by the blast technique and observing weather conditions so that wind does not carry dust over inhabited areas.

PROPOSED TREATMENT OF TOPIC IN EIS
The EIS will not include a discussion of stationary source air emissions, although potential dust related issues will be addressed in the odors, noise and dust section of the EIS.

24. **Odors, Noise and Dust.** Will the project generate odors, noise or dust during construction or during operation?
☒ Yes ☐ No

If yes, describe sources, characteristics, duration, quantities or intensity and any proposed measures to mitigate adverse impacts. Also identify locations of nearby sensitive receptors and estimate impacts on them. Discuss potential impacts on human health or quality of life. (Note: fugitive dust generated by operations may be discussed at item 23 instead of here.)

The proposed project will not generate odors but will generate dust and noise. Dust is addressed in EAW item 23. Dust from trucks and heavy equipment will be minimized by applying dust suppressants to road and stockpile surfaces and covering the haul road with crushed rock. Blast-generated dust is controlled primarily by the blast technique and observing weather conditions so that wind does not carry dust over inhabited areas or to the Canton and Corsica pits, thereby limiting additional suspended sediment that may affect turbidity levels. Turbidity issues also discussed in Items 16 and 17.

Noise is generated as a result of blasting and heavy equipment engine noise. In considering the potential impacts of these sources, it is important to keep in mind that there will be no net increase in most of these effects over existing conditions because the activities which cause them will be shifted from the existing Laurentian operation to the new East Reserve operation.

Overall, the change in impacts will be primarily a change in location rather than in degree. The nearest sensitive receptors are the residences in Biwabik and McKinley.

Noise from blasting and equipment engines will be controlled in a variety of ways. Blasts on average may occur every one or two weeks and must not exceed air shock and ground movement standards established in DNR and MPCA rules. These standards have been designed to keep blasting effects well below the thresholds that could cause structural damage or health effects. Blasting is scheduled to take advantage of weather conditions that further serve to reduce adverse effects. Monitoring both before and during blasting will insure that the applicable standards are not exceeded.

The mine may operate up to twenty-four hours per day for seven days a week. Mining equipment noise will be blocked in a variety of ways. The new haul road spur is several miles from human habitation. Mining noises from the open pit will largely be blocked by the pit walls as pit depth increases. The shallowest mining during initial development will be on the far side of the mine pits with respect to residences in McKinley and Biwabik. Initial development stockpiling will be at least one mile from McKinley. The stockpiles will be graded so that equipment noises will occur on the opposite side of the stockpile slope from McKinely and Biwabik to provide some noise attenuation.

PROPOSED TREATMENT OF TOPIC IN EIS
The treatment of noise and dust in the Laurentian EIS will be reviewed with consideration of applicability to the East Reserve mine pit. If the analyses are suitable they will be referenced in the East Reserve EIS. The EIS will include any additional analysis due to differences in receptors at the East Reserve mine pit.

25. **Nearby Resources.** Are any of the following resources on or in proximity to the site?
Archaeological, historical or architectural resources? ☐ Yes ☒ No
Prime or unique farmlands or land within an agricultural preserve? ☐ Yes ☒ No
Designated parks, recreation areas or trails? ☐ Yes ☒ No
Scenic views and vistas? ☒ Yes ☐ No
Other unique resources? ☐ Yes ☒ No

If yes, describe the resource and identify any project-related impacts on the resource. Describe any measures to minimize or avoid adverse impacts.

A search of the State Historic Preservation Office (SHPO) database was requested for an area within approximately one mile of the proposed East Reserve development site. Archaeological sites and historic properties were identified in a search of the Minnesota Archaeological Inventory and Historic Structures Inventory within the one mile search area was requested. The results of this database search provide a listing of recorded archaeological sites and historic architectural properties that are included in the current SHPO databases. Reports containing the results of the search are included in Appendix D.

There are no listed archaeological, historical, or architectural resources within the proposed East Reserve development site or in close proximity to the site. Figure 11-1 shows the section locations of documented historic and archaeological features found in the database search. One archaeological site was reported within the developed portion of the city of McKinley which is located at least one-half mile from any proposed project activities. A total of four historical/architectural resources are listed in the database search (Appendix C). All of these resources are located within the developed portion of the city of McKinley, over one-half mile from the proposed project. The proposed project will not impact the listed resources.

There are no prime farmlands or lands within an agricultural preserve on the project site and there does not appear to be any agricultural history. The property is owned by Ispat Inland Mining Company so there are no designated parks, recreation areas, or recreation trails on the site. Scenic views or vistas may actually be created by the development. The tops of the stockpiles, that are located in the northwest corner of the site, may provide scenic views of the Pike River valley to the north and the McKinley and Biwabik area to the south and east. These created scenic views will still be present after completion of the project and will be extended across the northern part of the site. No other unique resources have been identified at the site.

PROPOSED TREATMENT OF TOPIC IN EIS
The EIS will not include a discussion of nearby resources.

26. **Visual Impacts.** Will the project create adverse visual impacts during construction or operation? Such as glare from intense lights, lights visible in wilderness areas and large visible plumes from cooling towers or exhaust stacks? ☐ Yes ☒ No If yes, explain.

Mining activities will occur 24 hours per day. At night the working areas are lighted by the trucks and excavators. Additional stationary or mobile light sources are not normally used. Given the locations of the proposed East Reserve mine pits and haul road and the distance to Biwabik and McKinley it is unlikely that residents will be able to see the lights from the moving equipment.

PROPOSED TREATMENT OF TOPIC IN EIS
The EIS will not include a discussion of visual impacts.

27. **Compatibility with Plans and Land Use Regulations.** Is the project subject to an adopted local comprehensive plan, land use plan or regulation, or other applicable land use, water, or resource management plan of a local, regional, state or federal agency? ☒ Yes ☐ No

If yes, describe the plan, discuss its compatibility with the project and explain how any conflicts will be resolved. If no, explain.

The East Reserve Development area is located such that approximately one half of the mine/stockpile development is located within the Biwabik city boundary and the new haul road connection transects the northern portion of the McKinley city boundary (Figure 5-3). The entire site is within Biwabik Township and St. Louis County.

Ispat has begun discussions with local landowners and City and County officials to determine how existing zoning/land use requirements will be met or modified to accommodate the proposed East Reserve development project. This project represents a typical mine development for this region of Minnesota. The local residents are familiar with this type of development and in particular the proposed East Reserve location has been the site of mining activities since the 1940s. Using the proposed East Reserve location for mining appears to fit the local community's expectations for that area and serve the regions economic development needs. Ispat will continue to work with local landowners and governmental entities to ensure that the proposed East Reserve project is compatible with local land use expectations. Ispat Inland intends to incorporate the spirit of the Laurentian/Biwabik Vision into mineland planning and reclamation.

PROPOSED TREATMENT OF TOPIC IN EIS
The EIS will not include a discussion of the compatibility with plans and local regulations.

28. **Impact on Iinfrastructure and Public Services.** Will new or expanded utilities, roads, other infrastructure or public services be required to serve the project? ☒ Yes ☐ No

    If yes, describe the new or additional infrastructure or services needed. (Note: any infrastructure that is a connected action with respect to the project must be assessed in the EAW; see *EAW Guidelines* for details.)

    Complete development of Pit #2 of the proposed East Reserve mine will most likely require rerouting of County Road 715, Pike River Drive, which runs between proposed Pit #2 and the Canton Pit. Ispat has begun discussions with the St. Louis County and the City of Biwabik to determine their requirements and issues related to rerouting this road.

    Water level changes in the Canton and Corsica Pits resulting from the East Reserve mining activity may require infrastructure changes for the cities of Biwabik and McKinely in order to continue to provide water to their communities. Mitigation alternatives will be developed and an acceptable alternative will be employed to provide a safe, clean adequate supply of potable water should the current system be negatively impacted. Gradual ratable pumping should allow time to implement the changes without negative impact to the cities water supply. Barges or intake structures that are used to pump water, along with any other related pumping equipment, piping or electrical services may need to be relocated or an alternative drinking water supply may need to be found.

    PROPOSED TREATMENT OF TOPIC IN THE EIS
    The EIS will describe the process the County and fee holders will go through to realign County Road 715.

    The EIS will address potential impacts to the Canton and Corsica Pits resulting from the East Reserve mining activity. The EIS will include measures to ensure the water supplies for the cities of Biwabik and McKinley will not be interrupted and will remain clean and adequate.

29. **Cumulative impacts.** Minnesota Rule part 4410.1700, subpart 7, item B requires that the RGU consider the "cumulative potential effects of related or anticipated future projects" when determining the need for an environmental impact statement. Identify any past, present or reasonably foreseeable future projects that may interact with the project described in this EAW in such a way as to cause cumulative impacts. Describe the nature of the cumulative impacts and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to cumulative impacts *(or discuss each cumulative impact under appropriate item(s) elsewhere on this form).*

Cumulative Impacts

Cumulative impacts analysis addresses the combined effects of the proposed project and the effects of past, present and reasonably foreseeable future actions. These effects are analyzed by evaluating whether the affected resource, ecosystem or human community has the capacity to accommodate additional effects. These include both direct and indirect effects on a given resource, ecosystem and human community and include actions by private and governmental bodies. Cumulative impacts may occur when similar impacts accumulate or when diverse impacts have a synergistic effect. Cumulative impacts should be analyzed over the entire life of the potential project impact and not just the life of the project. Finally, cumulative impacts analysis should focus on truly meaningful effects.

The affected resource of interest for cumulative effects analysis is important in determining the geographic and temporal boundaries of the analysis. This in turn helps identify the past, present and reasonably foreseeable actions that will also be included in the analysis. For example, cumulative effects related to water quality would be limited to the watershed of interest and would not consider the effect of a nearby action in a different watershed.

Inventory of Potentially Affected Resources

To avoid vagueness, cumulative impacts should be analyzed in terms of the specific resource, ecosystem and human community being affected. In addition, the cumulative impacts analysis should focus on those impacts that are significant enough to be meaningful. The following is a general inventory of resources that are proposed for cumulative effects analysis as part of the East Reserve project and the extent of those resources beyond the zone of direct impact:

- Wildlife habitat loss at the mine site and surrounding area; and
- Water flow in unnamed streams and the Embarrass River to the Confluence of the St. Louis River.

These resources have been identified as those most likely to suffer from cumulative effects from which the East Reserve project would be a contributor.

Obstruction to Travel Corridors and Habitat Loss/Fragmentation

Background

Since the state was established (1858), Minnesota's ecosystems have all been affected by both anthropic and natural disturbances. The drastic reduction in native prairie, which has been converted to row-crop agriculture, is a well-known example of anthropic disturbances. Much of the forested areas of the state are still forested and appear to have been less impacted by disturbance in that they remain forested with native species. However, both anthropic activities (e.g., mining, urbanization and logging) and natural disturbances (e.g., fire, windstorms, and insect infestation) have altered the character of the original ecosystems in the Arrowhead Region.

Assessment of the cumulative impacts of any single anthropic activity such as mining in the forested northern areas of the state is therefore difficult because that specific impact must be separated from all the other anthropic and natural disturbances that have occurred. An assessment of cumulative impacts to travel corridors and wildlife habitats is not only constrained by the available data, as are all such analyses, but by the interacting effects of anthropic and natural disturbances.

Mining activity in the Iron Range has created a unique impact on wildlife habitat in the Arrowhead Region. The locations of mineralized deposits, and thus the mining activities are oriented in a largely northeast to southwest perspective from Ely to Grand Rapids. The length and extent of mining activity in this area could potentially be obstructing natural travel corridors, thereby preventing or hindering the immigration and emigration of large and small mammals, reptiles, and amphibians that historically travel between northern and southern habitats in the region.

Approach to Evaluation

The approach to evaluation of habitat fragmentation will be to choose an appropriate analysis area, a baseline time and condition and then: 1) assess the cumulative disturbance of past and current mining and associated infrastructure development on that baseline condition; and 2) assess the cumulative disturbance of past, current and proposed future actions on that baseline condition. Using other available information, a qualitative description of the habitat in areas disturbed by mining and habitat changes that were not associated with mining (e.g., logging, fire, windstorms, and insect infestation) will also be provided.

Marschner's map of the original vegetation of Minnesota (see Heinselman, 1975) will be used to define the baseline vegetation condition. This map was compiled from the U.S. General Land Office Survey Notes (GLO). This map is based on field notes of the GLO surveyors, who conducted the original land surveys of Minnesota during the period 1850 to 1905. It was drafted at a 1:500,000 scale. Marshner mapped 16 vegetative/ecosystem categories, ranging from marshes to pine groves. The map therefore is the best representation of the original ecosystems of Minnesota before the impact of European man.

Generally, the quality of historical records is directly proportional to the area considered (i.e., the average of small-scale errors tends toward zero as increasingly large areas are considered). The geographic boundary for impact analysis will therefore be necessarily large: the Arrowhead Region including the counties Cook, Lake, St. Louis, Carleton, Aitkin, Itasca, and Koochiching. For finer discrimination, albeit with more potential error, cumulative impacts in two subsections of Minnesota landscape, the Laurentian Uplands and the Nashwauk Uplands Subsections of the Northern Superior Uplands Ecological Section will be tabulated. These two subsections encompass most of the mining activity that has occurred in northern Minnesota. In addition, analysis of this large area ensures that affects to migration of wide-ranging species, such as wolf, lynx, bear, and deer, and species groups that require large habitat areas (e.g., interior forest-dwelling birds and medium- to large-size mammals), are adequately considered in the analysis.

The actual acres of the various ecosystems mapped by Marshner (16 categories, ranging from marshes to pine groves) that have been disturbed by past and current mining and infrastructure development will be tabulated as will the relative loss by ecosystem category. These tabulations will also be summarized by ecological subsection. The area disturbed will be derived either from the "Forested Areas" map from the Manitoba Remote Sensing Centre (16 classes, including Urban/Industrial, Gravel Pits and Open Mines, and Roads and Improved Trails and Rail Lines), 2003 Mine Features GIS mapping layer available from MDNR, or if those map layers are not suitable, then from the "1990 Census of the Land" (9 categories including Urban and rural development and Mining). A similar assessment will be carried out overlaying a GIS layer of the projected cumulative disturbance 30 years in the future (total time of construction, operation and closure of current mining proposals) as related to the following proposed future actions:

- Proposed PolyMet Mine
- Proposed Mesabi Nugget Plant
- Proposed Cliffs Erie Railroad Pellet Transfer Facility
- Proposed MSI DRI/Steel Plant
- Future mining plans for existing taconite operations

An interpretation of the extent of ecosystem loss will be performed for the following categories of Minnesota wildlife: small-and-medium sized mammals, large mammals, reptiles, and amphibians. In addition, an interpretation of habitat loss will be performed for populations of gray wolf, Canada lynx and bald eagle (species listed as threatened by U.S. Department of the Interior). All of these assessments will be qualitative and will be informed by previously completed studies in northern Minnesota (see below).

The assessment will include impacts of habitat loss/fragmentation. Existing travel corridors will be identified and impacts of reasonably foreseeable actions to these corridors will be assessed.

Previous assessments will be used to provide perspective on those changes in ecosystems that are associated with the cumulative effects of mining in contrast to those associated with other anthropic and natural disturbances (e.g., logging, fire, windstorms, and insect infestations). These assessments were not specifically targeted on the mining areas of the state, but instead considered either the entire forested area of the state or some sub-area in northern Minnesota. The following assessments will be reviewed to provide a brief qualitative perspective on ecosystem changes not related to mining:

- Friedman, S. K. 2001. Landscape scale forest composition and spatial structure: A comparison of the presettlement General Land Office Survey and the 1990 forest inventory in northeastern Minnesota. Ph.D. thesis, University of Minnesota, St. Paul. Friedman reconstructed the presettlement forest vegetation in northeastern Minnesota using General Land Office Survey Records and assessed change in this forest following the introduction of logging and the suppression of fire.
- Heinselman, M.L. 1975. Interpretation of Francis J. Marschner's Map of the Original Vegetation of Minnesota. USDA Forest Service, North Central Forest Experiment Station, St. Paul, MN. Available from: MDNR - Division of Forestry's digitized GIS layer of Marschner's map.
- Minnesota Generic Environmental Impact Statement Study on Timber Harvesting and Forest Management in Minnesota (GEIS). The GEIS analyzed impacts resulting from timber harvesting and associated management activities in Minnesota, such as logging, reforestation, and forest road construction. Four sections of the GEIS may be useful in describing forest change not related to mining, including: Section 5.2.1 Forest Area and Cover Type Abundance, Section 5.2.4 Forest Fragmentation, Section 5.6.1 Forest Resources - Extent, Composition, and Condition, and Section 5.7.4 Cumulative Unmitigated Significant Impacts.
- Minnesota Forest Resource Council (MFRC) Landscape Project. The MFRC Landscape Project is a landscape level program and coordination effort. As part of the Project, a number of reports have been generated that may be used in this evaluation of cumulative impacts. All reports are available from the MFRC website http://www.frc.state.mn.us/Info/MFRCdocs.html, and include:

    - Changes in disturbance frequency, age and patch structure from pre-European settlement to the present in north central and northeastern Minnesota. LT-1203a
    - Contemporary forest composition and spatial patterns of north central and northeastern Minnesota: An Assessment using 1990s LANDSAT data (accompanying maps/plates). LT-1203b
    - Changes in forest spatial patterns from the 1930s to the present in north central and northeastern Minnesota: An analysis of historic and recent air photos (accompanying maps/plates). LT-1203c
    - Potential future landscape change on the Nashwauk Uplands in northeastern Minnesota: an examination of alternative management scenarios using LANDIS. LT-1203d
    - Background paper: relationships between forest spatial patterns and plant and animal species in northern Minnesota (Report) (Appendices). LT-1203f
    - Forest Plan Revision Final Environmental Impact Statement for Chippewa and Superior National Forests. As part of their comprehensive planning process, the U.S. Forest Service developed an Environmental Impact Statement that discussed changes in forest conditions with time. Appendix H is a cumulative review that is most relevant. This document can be found at http://www.superiornationalforest.org/analyses/2004Plan/feis/index.shtml.

Data Needs for Analysis of Cumulative Impacts

- Historical and present aerial photographs of the iron range
- Marschner's map of the original vegetation of Minnesota – available from the DDNR Data Deli (http://maps.dnr.state.mn.us/deli/).
- The land cover map "Forested areas" from the Manitoba Remote Sensing Centre – available from the Minnesota Land Management Information Center (http://www.lmic.state.mn.us/chouse/land_use_comparison.html)
- The land cover map "1990s Census of the Land" – available from the Minnesota Land Management Information Center
- The map: "Ecological Subsections of Minnesota" – – available from the DDNR Data Deli
- 2003 Mine Features GIS mapping layer available from MDNR

- In addition, the reports cited above (Friedman, GIES, MFRC, and U.S. Forest Service) are necessary and available as noted.

Streamflow and Lake Level Changes

Background

Cumulative impacts to the physical character of streams and lakes can occur from increases or decreases in flow or changes in the pattern of flow. The causes can include both point discharges (e.g., mine dewatering discharges) and changes in watershed runoff caused by land use changes. The impacts of flow changes can include erosion, sedimentation, drought, and high velocities resulting in flushing of aquatic life. Changes in frequency of bankfull flow can cause stream degradation. Changes to streams may accumulate over time, even for non-contemporaneous impacts if, for example, a stream is eroded and degraded by one event and then further eroded by a second event.

Ispat Inland proposes for mine dewatering discharge to travel by one of two unnamed streams to the Embarrass River just below Esquagama Lake. Ispat Inlands existing mine dewatering discharge from the Laurentian Pit travels down a portion the same unnamed stream before entering the Embarrass River at the same point as proposed for the East Reserve Pit. Discharges from a proposed future Polymet Mining tailings basin will also travel down the Embarrass River.

Approach to Evaluation

A semi-quantitative assessment of cumulative impacts due to changes in flow will be performed for the Emabarrass River and the unnamed stream that enters the Embarrass River just below Esquagama Lake.

A surface water study that will be conducted to determine the potential for project specific impact (Appendix B) will also be used in the cumulative evaluation. The study will include the drainage network extending down stream from the McKinley Pit to the Embarrass River, the drainage network extending from the Mary Ellen Pit to the Embarrass River, and the drainage system downstream of Mud Lake.

The following present and future actions have been identified as potential cumulative impacts to the receiving waters:

- Mine discharges from Ispat Inlands Laurentian pit mine.
- Estimated flows from the future Polymet Mining tailings basin.

Cumulative impacts analysis will address the combined effects of past, present, and reasonably foreseeable future actions with regards to these receiving waters. The following data will be incorporated into the project specific surface water study to evaluate the potential cumulative impacts:

- Flow data for Embarrass River
- Flow data for the unnamed stream
- Discharge data for Ispat Inland's Laurentian Pit
- Estimates of future PolyMet Tailings Basin discharges
- Estimates of future Ispat Inland East Reserve Pit dewatering discharges

PROPOSED TREATMENT OF TOPIC IN EIS

The EIS will address cumulative impacts to wildlife habitat loss and increased water flow/volume in unnamed streams and the Embarrass River. Cumulative impacts analysis will address the combined effects of past, present, and reasonably foreseeable future actions with regards to these resources.

30. **Other Potential Environmental Impacts.** If the project may cause any adverse environmental impacts not addressed by items 1 to 28, identify and discuss them here, along with any proposed mitigation.

    Reclamation of the mining area will begin as portions of the mine become inactive. Stockpiles and haul roads will be vegetated and the mine pit will be allowed to fill with water. Ispat Inland intends to incorporate the spirit of the Laurentian/Biwabik Vision into mineland planning and reclamation.

    The Laurentian Vision is a process where mining companies work with local communities to plan and design for reclamation land forms that are compatible with long-term land use objectives of the communities. The construction of a pit lake will cause changes in watershed hydrology. Post-mining watershed reclamation will be conducted according to state regulations.

    PROPOSED TREATMENT OF TOPIC IN EIS
    The EIS will include potential stockpile designs and use of in pit stockpiling to create shallow lake zones for aquatic habitat. The EIS will also address post-mining watershed hydrology with respect to decreased flows to water courses when dewatering ends and the pits are filling. The post-mining deactivation and reclamation process will be discussed in the EIS.

31. **Summary of Issues.** *Do not complete this section if the EAW is being done for EIS scoping; instead, address relevant issues in the draft Scoping Decision document, which must accompany the EAW.* List any impacts and issues identified above that may require further investigation before the project is begun. Discuss any alternatives or mitigative measures that have been or may be considered for these impacts and issues, including those that have been or may be ordered as permit conditions.

RGU CERTIFICATION. The Environmental Quality Board will only accept **SIGNED** Environmental Assessment Worksheets for public notice in the EQB Monitor.

I hereby certify that:

- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions, as defined at Minnesota Rules, parts 4410.0200, subparts 9b and 60, respectively.
- Copies of this EAW are being sent to the entire EQB distribution list.

Signature:  Date: June 27, 2005

Title: Principal Planner

Environmental Assessment Worksheet was prepared by the staff of the Environmental Quality Board at the Administration Department. For additional information, worksheets or for *EAW Guidelines*, contact: Environmental Quality Board, 658 Cedar St., St. Paul, MN 55155, 651-296-8253, or http://www.eqb.state.mn.us