

ENVIRONMENTAL ASSESSMENT WORKSHEET

Note to preparers: This form and EAW Guidelines are available at the Environmental Quality Board's website at: <http://www.eqb.state.mn.us/EnvRevGuidanceDocuments.htm>. 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. 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** Minntac Mine Extension
2. **Proposer** **United States Steel Corporation, Minnesota Ore Operations – Minntac**
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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: Minnesota Rules Part 4410.4300, subpart 11B (Expansion of stockpile, tailings basin, or mine by 320 or more acres).

The proposed project requires a mandatory EAW under Minnesota Rules, part 4410.4300, subpart 11 (metallic mineral mining and processing), because it is an extension of a mine by 320 or more acres (Minnesota Rules, part 4410.4300, subpart 11, item B). No expansion of the existing tailings basin boundary is anticipated and no increase in production rate is proposed.

5. **Project location** County: St. Louis City/Township: City of Mountain Iron
Township of Great Scott

GPS Coordinates Western limit: 5,263,045.11 N 520,830.16 E
Eastern Limit: 5,264,004.11 N 532,097.01 E

Tax Parcel Number(s): See **Table 5-1**

The project area includes all or parts of the following:

Table 5-1. Project Location and Tax Parcel Identification

Mine Extension Area			
Section	Township	Range	Tax Parcel ID
NE ¼ SW ¼ Section 11	58N	19W	150-30-99
N ½ SE ¼ Section 11	58N	19W	150-30-104, 150-30-100
N ½ of SW ¼ Section 12	58N	19W	385-10-120, 385-10-130
N ½ of SE ¼ Section 12	58N	19W	385-10-1230, 385-10-1240
S ½ of NW ¼ Section 12	58N	19W	385-10-109, 385-10-110
S ½ of NE ¼ Section 12	58N	19W	385-10-1215, 385-10-1220
S ½ of NW ¼ Section 7	58N	18W	175-71-570, 175-71-580
NW ¼ Section 8	58N	18W	175-71-680, 175-71-690, 175-71-700, 175-71-710
N ½ of SW ¼ Section 8	58N	18W	175-71-720, 175-71-730
SE ¼ Section 8	58N	18W	175-70-710, 175-70-770, 175-70-830
NE ¼ of SE ¼ Section 3	58N	18W	175-70-235, 175-70-365
S ½ Section 2	58N	18W	175-71-230, 175-71-240, 175-71-250, 175-71-260, 175-70-230, 175-70-234, 175-70-236, 175-70-240
NW ¼ of SW ¼ Section 1	58N	18W	175-71-160, 175-71-170, 175-71-149
Mine Access Road (South to North)			
SW ¼ of NE ¼ Section 10	58N	18W	175-70-1210
NW ¼ of NE ¼ Section 10	58N	18W	175-70-1200
SW ¼ of SE ¼ Section 3	58N	18W	175-70-380
NW ¼ of SE ¼ Section 3	58N	18W	175-70-365
County State Aid Highway 102 Relocation (West to East)			
NE ¼ of SW ¼ Section 10	58N	18W	175-70-1260
NW ¼ of SE ¼ Section 10	58N	18W	175-70-1300
NE ¼ of SE ¼ Section 10	58N	18W	175-70-1290
NW ¼ of SW ¼ Section 11	58N	18W	175-70-1420
NE ¼ of SW ¼ Section 11	58N	18W	175-71-860
NW ¼ of SE ¼ Section 11	58N	18W	175-71-890
NE ¼ of SE ¼ Section 11	58N	18W	175-71-880

Attach each of the following to the EAW:

- County map showing the general location of the project (see **Figure 1** – Project Location Map);
- U.S. Geological Survey 7.5-minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable) (see **Figure 2** – USGS Topographic Map); and,
- Site plan showing all significant project and natural features (see **Figure 3** – 2010 Aerial Photograph).

Additional Figures

- **Figure 4** – Surrounding Land Use
- **Figure 4a** – Surrounding Land Use – West Pit
- **Figure 4b** – Surrounding Land Use – East Pit
- **Figure 5** – Affected Land Cover
- **Figure 6** – Surface Water Resources
- **Figure 6a** – Watershed Map

- **Figure 6b** – Shoreland Zone Impacts
- **Figure 6c** – Existing Water Appropriation Installations and NPDES/SDS Outfalls
- **Figure 7** – Wetland Impacts
- **Figure 8** – County Well Index
- **Figure 9** – St. Louis County Soil Survey
- **Figure 10** – Reasonably Foreseeable Projects by Others

Additional Attachments

- **Attachment A** – Minntac Subwatershed and Stream Information (Liesch Associates, Inc., July 3, 2012)

6. *Description*

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

U. S. Steel – Minntac proposes a 483-acre extension of its existing open pit mining facilities in Mountain Iron. The extension will extend mine life and taconite production to 2031. Taconite produced from the extension will continue to be processed at the existing Minntac facility at the current levels of production.

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.

Introduction

United States Steel Corporation, Minnesota Ore Operations – Minntac Mine (Minntac) is a taconite mining and processing operation located near Mountain Iron, St. Louis County, Minnesota (see **Figure 1**). Taconite mining began at this location with the construction of the Pilotac mine and plant in 1952. The Minntac Plant became operative in 1967 and was expanded in two additional phases to increase production. The Minntac facility currently includes an open pit taconite mine, crushing plant, concentrating plant, agglomerating plant, tailings disposal basin, and associated equipment, repair, personnel, and administrative facilities (see **Figures 2 and 3**). Currently, there are up to five operational pellet producing lines with annual production capacity of approximately 15.8 million long tons per year (MLTY).

Mine Extension

The Minntac Mine Extension would continue development of an open pit taconite mine by extending the limits of current mining operations by approximately 483 acres. The proposed project would not affect operation of the ore processing facility or the annual rate of production, but would extend the operational life of the facility. Mining of the proposed extension would progress as economic needs dictate. Under current projections and at the current production rate, the mine extension would be expected to provide sufficient materials to continue operations through 2031. The current tailings basin would accommodate all tailings produced from processing the crude ore within the proposed extended pit limits. No expansion of tailings basin acreage or increase in annual volume of tailings would be expected as a result of the proposed project.

The area of the mine extension is generally defined as the increment change beyond what is allowed under the existing permit to mine established in 1983. The proposed extension would include a southerly extension of the East Pit by 235.8 acres and a southerly extension of the West Pit by 247.2 acres in four locations as shown on **Figure 3**. Detailed information about the schedule and implementation of the extension has not yet been developed. A detailed mine model and stockpiling plan will be included in the forthcoming application to the DNR for the Permit to Mine Amendment (expected in August 2012).

The contiguous extension of U. S. Steel's Minntac taconite ore body would be mined by open-pit methods. All waste rock and crude ore would require drilling and blasting. Normal mine activities could also include construction of production truck haul roads, service vehicle roads, and possibly railroad tracks and track grades, and power lines.

After overburden is removed, waste rock and taconite ore would be drilled, blasted, and loaded into mine trucks by electric or diesel-hydraulic shovels or front-end loaders. The crude ore would be hauled from the mine to the existing plants for crushing, processing, and pelletizing. Overburden and waste rock would either be used to construct dikes and haul roads or would be stockpiled. In an effort to minimize wetland impacts, existing stockpiles or other disturbed areas would continue to be utilized for stockpiling. Currently Minntac does not anticipate requiring any new out-of-pit stockpiles. Some of the existing stockpiles within the current permitted stockpile limits will be elevated by up to 170 feet to accommodate waste materials; in-pit stockpiling will continue to be utilized as much as possible. In-pit disposal of mine waste materials will continue to be maximized in order to limit the overall mining area footprint. In-pit disposal is used where the pits have reached the bottom of the ore body and where the mineral values at lower elevations are not considered economic. The location of any new stockpiles would be identified in the forthcoming application to the DNR for the Permit to Mine Amendment. During and following each phase of mining, reclamation of the overburden slopes and stockpiles will be completed according to DNR mineland reclamation requirements.

Existing haul roads would be used to transport stripping materials to stockpiles and taconite ore from the mine to the crusher wherever possible. As mining advances, modifications to existing roads would be required to develop and maintain access to stockpiles and mine areas. Existing out-of-pit stockpile roads will be extended to maintain elevated access to existing stockpiles. Currently, Minntac does not anticipate requiring additional out-of-pit haul roads; road extensions would be constructed within the mine pits and on existing stockpiles. Existing haul road corridors will continue to be utilized. If determined to be needed, the location of new haul roads would be identified in the forthcoming application to the DNR for the Permit to Mine Amendment.

Dewatering would continue to be used to control runoff and groundwater discharge into the mine and allow operations to continue below pre-mining ground water elevations.

The Minntac tailings basin covers approximately 8,000 acres. When operating at full production capacity, Minntac produces tailings at an annual rate that requires approximately 3 feet of vertical storage volume over 3,000 acres. Mining within the extended reserve will require future storage capacity for approximately 550,000,000 cubic yards of tailings. In 2010, Minntac contracted an engineering firm to provide an estimate of storage capacity within the existing tailings basin footprint, using the upstream dike construction method. The resulting Minntac Tailings Basin Report (AECOM/GEI Consultants, February 7, 2012) evaluated two design options to accommodate the future tailings volume:

- Option 1: Construction using a straight 1 foot vertical to 2 foot horizontal slope will require elevating the inner basin approximately 70 feet higher than current elevation.
- Option 2: Construction using a 40 foot benched, 1 foot vertical to 2 foot horizontal slope design will require elevating the inner basin approximately 90 feet higher than current elevation.

The tailings basin report indicates its conclusions are “preliminary” and recommends further evaluation be completed when more detailed information is known. The report recommendations include the need for additional borings, soundings, testing, and an updated stability analysis to “demonstrate that adequate factors of safety will result.” DNR Dam Safety will need to review and approve the proposed raise in the interior dams.

The original permit to mine has a typical dike construction of outside slopes of 3:1 and inside slopes of 2:1, with an ultimate exterior dike elevation of 930 on the east, north and west sides, and interior dike elevations of 936, 972, 982, and 1032 (north to south). The current (2011) exterior dike elevation is ~910 on the east, north, and west sides. Interior dikes range from 895 to 1045.

Design plans for the tailings basin should be submitted to DNR during the permitting process for review by Lands and Minerals (LAM) and Dam Safety. At this time, increases in the heights of the exterior tailings basin dams are not proposed, nor are other changes proposed to exterior dams.

The Minntac tailings basin is currently classified by Dam Safety as a class iii, or “Low Hazard” Dam. This classification may no longer be appropriate and a hazard class review is needed. As part of that review, Minntac or its consultant will need to demonstrate, through completion of a dam breach analysis on the existing and proposed dams, that a failure of an interior dam will not cause a perimeter dam to be overtopped.

New Mine Access Road

A segment of County State Aid Highway 102 (CSAH 102) lies along the southern boundary of the East Pit and provides access to the Minntac Mine facilities (see **Figure 3**). Since the segment of CSAH 102 leading to the current mine entrance will be eliminated due to the mine extension project, a new mine access road is proposed to alleviate traffic flow through downtown Mountain Iron. The new mine access road would extend across the western arm of the Wacootah Pit and east of the Iroquois Pit (**Figure 3**). Final road alignment is pending wetland permitting.

The new mine access road would be constructed as a paved, four-lane roadway within an anticipated 100-foot right-of-way, similar to that roadway within the existing Minntac property. Roadway construction would include clearing of vegetation within the construction limits, road embankment and ditch grading, culvert installation, and paving and striping of the driving surface.

That segment of the mine access road that crosses the Wacootah Pit would be constructed on a land bridge made from available fill material from nearby stockpiles or Minntac waste rock. Depending on the materials used to construct the land bridge, water quality in the Wacootah Pit could be impacted through leaching of chemical constituents. The chemical composition of leachate that might be expected from the materials would vary depending on the type of rock used.

If 3:1 slopes are used for the land bridge, the approximate fill in the pit is 325,000 CY. If angle of repose of fill is used (assuming about 1:1), the approximate fill in the pit is 200,000 CY. Regarding fill material below the water surface, current external engineering recommendations are to fill with mine waste rock or a granular fill material with less than 20% passing the No. 200 sieve. The best material would most likely be mine waste rock. Above the water surface and up to within 3 feet of the top of final road grade, the overburden material from the stockpile just north of the land bridge crossing (in the current Hoover shop area) is planned to be used. The top 3 feet will include the road section of select granular borrow, Class V, and bituminous. As far as source of materials, it is currently under investigation if any rock stockpiles are available for filling below water surface of the Wacootah Pit. Use of taconite coarse tailings for fill is also being considered by the company as a potential option as it meets gradation. Plans for the land bridge construction (including materials to be used) will be provided to DNR Lands and Minerals for review.

County State Aid Highway 102 Relocation– Connected Action

As indicated above, a segment of CSAH 102 lies along the southern boundary of the East Pit. CSAH 102 serves as a connection between Trunk Highway 53 and Trunk Highway 169 through the city of Mountain Iron (see **Figure 3**). The proposed mine extension will eliminate approximately 1.5 miles of CSAH 102, resulting in the need to relocate the road. Relocation of the road is considered a “connected action” to the Minntac Extension project under Minn. R. 4410.1000, Subp.4.

Minn. Statute 160.10 provides a mechanism for the relocation of roads on mineral lands. Based on the statute, St. Louis County and U.S. Steel have negotiated a tentative (yet to be signed) agreement regarding responsibility for the relocation of CSAH 102. As it currently stands, the agreement stipulates that U.S. Steel will be responsible for construction of the road and associated permit submittals. Per Minn. Statute 160.10, the roadway must be constructed to at least the engineering standards of the old roadway. Due to roadway designation and funding, it must be designed to current CSAH standards. To that end, Minntac has coordinated with St. Louis County Public Works and the City of Mountain Iron to identify an alignment for CSAH 102 south of the current alignment as shown on **Figure 3**. This is the preferred alignment for the roadway relocation and will connect CSAH 109 and the existing CSAH 102 (Mineral Avenue) in Mountain Iron. It will reasonably replace the functionality of the existing CSAH 102 and provide local transportation connectivity independent of Trunk Highway 169. Final road alignment is pending wetland permitting.

Although the preferred alignment does not provide full replacement of the function of the existing CSAH 102, the proposed alignment minimizes wetland impact and will not likely be eliminated by future mining activities in the area. Other corridors/alternatives explored for the roadway relocation would likely be mined within the useful service life of the reconstructed roadway and would have resulted in a substantial impact to wetlands between existing CSAH 109 and Trunk Highway 53.

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 the proposed project is to extend the life of the Minntac mine and processing facility.

d. Are future stages of this development including development on any other property planned or likely to happen? Yes No

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

Although no extension beyond the proposed project is currently foreseeable, it is likely that there are additional ore reserves in the adjacent surrounding area that could be mined after mining of the proposed extension area is completed. The potential for additional extension of the mine pit would be subject to the economic feasibility of ore mining. The location and extent of future mining areas could be defined in the future based on the results of exploratory drilling. Any additional mining would be evaluated in accordance with applicable rules and regulations in place at that time, and may be subject to additional environmental review.

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.

The Minnesota Department of Natural Resources published an EAW for the last extension of the West Pit in May 1996. A negative declaration on the need for an Environmental Impact Statement (EIS) was published in June 1996. The area described in the May 1996 EAW has been mined since 1997 and continues to be mined currently. The proposed project would be the second significant amendment of U.S. Steel's Permit to Mine for the Minntac mine.

7. **Project magnitude data**

Total project acreage 483-acre mine extension

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):

Office: N/A

Manufacturing: N/A

Retail: N/A

Other industrial: N/A

Warehouse: N/A

Institutional: N/A

Light industrial: N/A

Agricultural: N/A

Other commercial (specify): N/A

Building height: N/A

If over 2 stories, compare to heights of nearby buildings

The mine model and stockpiling plan will include quantification of areas specific to the mine pit, stockpiles and haul roads in the forthcoming application to the DNR for the Permit to Mine Amendment.

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. All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules, Chapter 4410.3100.

Table 8-1. Permits and Approvals Required		
Unit of Government	Application/Approval	Status
Federal Approvals		
U.S. Army Corps of Engineers		
	Section 404 Permit	Application submitted
State Approvals		
Minnesota Pollution Control Agency		
	Construction Storm Water Permit (Access Road)	To be applied for
	Section 401 Water Quality Certification	Application submitted
Minnesota Department of Natural Resources		
	Permit to Mine Amendment	To be applied for
	Water Appropriations Permit	To be applied for, if necessary
	Public Waters Works Permit	To be applied for
	Wetland Conservation Act	Application submitted
	Natural Heritage Database Search	Complete
	Dam Safety Permit (potentially)	To be applied for, if necessary
State Historic Preservation Office		
	Historic Property and Cultural Resources Review	Requested
Local Government Approvals		
City of Mountain Iron		
	Building Permit (for pass control building on mine access road)	To be applied for

Permits and approvals required for the County State Aid Highway 102 Relocation:

- U. S. Army Corps of Engineers – Section 404 Permit
- Minnesota Pollution Control Agency –Section 401 Water Quality Certification, if U.S. Army Corps of Engineers issues an Individual Permit for Section 404
- Minnesota Pollution Control Agency – Construction Storm Water NPDES Permit
- Minnesota Department of Natural Resources – Public Waters Work Permit
- Board of Water and Soil Resources – Wetland Conservation Act, Minn. Rules 8420 Compliance
- Minnesota Department of Transportation – State Aid Plan and Specification Review and Approval
- Minnesota Department of Transportation – Final Roadway Construction Review and Approval
- St. Louis County Public Works Department – Plan, Specification, Right of Way, and Specification Review and Approval
- St. Louis County Public Works Department – Final Roadway Construction Review and Approval

Minntac plans to submit a separate permit application package as a connected permit action for the relocation of CSAH 102 pending final roadway design.

A concurrence letter, archeological and historical resource reports and a draft Programmatic Agreement were submitted to the State Historic Preservation Office (SHPO) by the U.S. Army Corps of Engineers (USACE) on January 26, 2012 for Minntac's Western Progression, which is currently going through Section 404 permitting with the USACE. After Minntac submits the Section 404 permit application to the USACE for the Extension Project, the USACE will request that SHPO initiate its 30-day review of the Extension Project.

Minntac submitted a request to the DNR Division of Lands and Minerals for additional leases required for the new mine access road. The request is currently under review.

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 project area is located within the Laurentian Mixed Forest Province as identified by the Minnesota Department of Natural Resources (DNR) Ecological Classification System. The site is located within both the Northern Superior Uplands Section, Nashwauk Uplands subsection, and the Northern Minnesota Drift and Lake Plains Section, St. Louis Moraine and Tamarack Lowlands subsections (*Field Guide to the Native Plant Communities of Minnesota: the Laurentian Mixed Forest Province*, DNR, 2003).

Land use in the project area is dominated by the existing Minntac mine operations (see **Figure 4a** and **Figure 4b**). Highway 169 extends east and west approximately 1-½ miles south along the length of the existing East and West mine pits. The municipalities of Kinney, Mountain Iron, and Virginia with the associated residential and commercial development are located south and at the west end, midpoint, and east end of the pits, respectively. Other, more rural, development exists along County Road 708 between Kinney and Mountain Iron. The remainder of the area remains undeveloped, with expanses of wooded habitat with open agricultural areas, wetlands and both natural water bodies and man-made water bodies (*i.e.*, abandoned natural ore mine pits).

Land uses specifically in the areas of the mine extension, new mine access road, and CSAH 102 relocation are discussed below. In addition, sites with potential environmental hazards as identified by the MPCA database "What's in My Neighborhood" are also discussed. If contamination is encountered during proposed project activities, the activities would cease, proper notifications would be made (State Duty Officer), and appropriate response measures would be implemented.

Mine Extension

Land use within the proposed mine extension area consists of similar undeveloped land with land cover dominated by wooded habitat with some areas of old field, wetlands, and other openings. (See EAW Question #11 for description of wildlife habitat and Question #12 for a description of wetlands and other water resources within the mine extension area.) No residential or other development exists within the extension area. The easternmost portion of the extension area includes a 74-acre area south of CSAH 102 and on either side of Nichols Avenue that was formerly a portion of a residential development known as the Parkville Addition of the City of Mountain Iron (**Figure 4b**). The northern portion of that development was vacated through purchase of residential properties by U. S. Steel to provide a buffer from encroaching mining activities. The remainder of the Parkville Addition still exists south of the mine. The extension of mining southward does not result in a requirement that additional properties be purchased. However, as mining activity advances southward, U.S. Steel may decide to purchase and vacate additional properties to provide flexibility for a desired buffer.

Land use within the proposed mine extension area also includes all or portions of three abandoned natural ore mine pits that are currently isolated shallow or deep water filled pits. These include the Atkins Mine in the West Pit extension, and the Hanna and Pilot Mines in the East Pit extension. Overburden stockpiles associated with these abandoned pits are also present, many of which have become vegetated. These stockpiles would be removed and relocated to Minntac's permitted out-of-pit or in-pit stockpiles as part of the extension for both the East and West Pits. Portions of the extension area have been crossed with haul roads, or contain public roadways.

MPCA's "What's in My Neighborhood" website mapping tool identifies an old Amoco service station tank and leak site within the East Pit extension area. However, the mapped location for the old Amoco station appears to be incorrect. The point coordinates are incorrectly derived from the Amoco station address. The address listed is 216-218 Main Street in Aurora, MN. The location near the East Pit extension is on 2nd Street and is residential with no history of previously existing service stations.

The Atkins Mine in the West Pit extension area is identified by the MPCA database as an inactive CERCLIS/Superfund site. According to information on the EPA Superfund website, discovery occurred in 1981 and a preliminary assessment was completed in 1984. In 1990, another preliminary inspection is indicated to

have been completed. The site did not meet the criteria for inclusion on the National Priorities List (NPL) and it was archived in 1990. No additional information was provided and the site is listed as inactive, indicating there are no active investigation and cleanup activities ongoing at the site.

Other areas of historic contamination, crude oil, or gas pipelines are not known to be present within the mine extension area.

New Mine Access Road

Land use along the proposed new mine access roadway alignment is primarily undeveloped, dominated by forest, wetland, abandoned natural ore mine pits and mine dumps. The new mine access road will bisect the existing Hoover construction site. Hoover Construction has a surface lease with the State of Minnesota and Minntac has the mineral lease with the State of Minnesota. Hoover Construction has received notice from the State that future road development is planned and will require Hoover to vacate the premises. The new access road construction will not disturb the old cemetery located west of the Wacootah pit.

The Inland Steel – Iroquois Mine Site is identified by the MPCA database as an inactive CERCLIS/Superfund site near the alignment for the new mine access road. According to information on the EPA Superfund website, discovery occurred in 1981 and a preliminary assessment was completed in 1985. In 1988, a site inspection was conducted at the site. The site did not meet the criteria for inclusion on the National Priorities List (NPL) and it was archived in 1988. No additional information was provided and the site is listed as inactive, indicating there are no active investigation and cleanup activities ongoing at the site.

County State Aid Highway 102 Relocation – Connected Action

Land use along the proposed roadway alignment is primarily undeveloped, dominated by forest, wetland, abandoned natural ore mine pits and mine dumps. MPCA's "What's in My Neighborhood" website tool identifies three dump sites within the area proposed for relocation of CSAH 102. The northeast quadrant of the proposed intersection of the CSAH 102 relocation at the existing road alignment is the site of the former Mountain Iron dump site, shown on **Figure 4**. This site was previously owned by United States Steel Corporation but was sold to the City of Mountain Iron in 2006. It has been the subject of at least two Phase I Environmental Site Assessments (STS Consultants, 2000 and Wenck, 2001). The Mountain Iron dumpsite was operated by the City of Mountain Iron from 1959 to 1981. The site is currently gravel-surfaced and used by the City of Mountain Iron Public Works Department for utility equipment and aggregate storage. The site is approximately four acres in size, approximately 20 feet above former grade, and is estimated to contain approximately 27,000 cubic yards of materials. No further information about the contents of the dump site is available; however, it is under consideration by the City of Mountain Iron for reuse as a portion of an industrial park development.

The other two dump sites identified in the database are the Parkville Dump and the Park Ridge Road Landfill, both mapped close together at the eastern end of the proposed alignment. This area is reported to have been re-developed between 2006 and 2009; Rock Ridge Drive and associated building developments now exist in the area. The database indicates the Parkville Dump is classified as an unpermitted dump. "Unpermitted dumps" are usually old farm or municipal disposal sites that accepted household waste. Many of these dumps predate the existence of the MPCA. Additional information is not provided for the Parkville Dump.

The City of Mountain Iron entered the Park Ridge Road Landfill into the Voluntary Investigation and Cleanup (VIC) program March 30, 2009. A work plan was approved by the MPCA February 1, 2011. A Phase II investigation was completed in June of 2011. Two Phase II approval letters have been issued by the MPCA, one in January of 2012 and one in May of 2012. Information from MPCA staff indicates the approximate extent of the dump has been determined and lead contamination has been documented in the soil. Contamination in ground water is unknown; depth to ground water is at least 70 feet below grade. Remediation of the site has not begun. City of Mountain Iron representatives have been notified by the MPCA that the anticipated CSAH 102 alignment (and potential right of way acquisitions) may disturb a portion of the dump property; St. Louis County has also been notified. MPCA recommended that a construction contingency plan be submitted for MPCA review and approval prior to the planned roadwork activities.

The CSAH 102 relocation corridor will avoid historical dump sites to the extent possible. Given the proximity of the latter two dump sites to the eastern end of the proposed CSAH 102 relocation corridor and the MPCA

recommendation, it is anticipated that a contingency plan will be in place to address the potential encounter with contaminated soil during construction.

10. **Cover types.** Estimate the acreage of the site with each of the following cover types before and after development: If **Before** and **After** totals are not equal, explain why:

The following tables provide estimates of cover types in the mine extension area, the proposed new access roadway corridor, and the proposed corridor for the County State Aid Highway 102 relocation (a connected action) as depicted on **Figure 3**.

Table 10-1. Cover Types in Mine Extension Area						
	Before		After		Before	After
Types 1-8 wetlands	65.8		0	Lawn/landscaping	0	0
Wooded/forest ¹	227.0		0	Impervious surfaces ²	94.4	0
Brush/grassland	76.3		0	Open Water	19.7	0
Cropland	0		0	Mining Areas ³	0	483.2
Mine Extension Area Subtotal					483.2	483.2
¹ Includes some inactive stockpiles that have been revegetated and are currently wooded. ² "Before" category includes roadways, haul roads, inactive mine pits, stockpiles, and Mesabi Bike Trail. ³ Areas of inactive mine pits, stockpiles, and haul roads have been included as impervious surfaces.						

Table 10-2. Cover Types in Mine Access Road Corridor¹						
	Before		After		Before	After
Types 1-8 wetlands	0.9		0	Lawn/landscaping ²	0	15.3
Wooded/forest	9.9		0	Impervious surfaces ³	7.4	11.3
Brush/grassland	6.5		0	Open Water	1.9	0
Cropland	0		0	Mined Areas ⁴	0	0
Mine Access Road Corridor Subtotal					26.6	26.6
¹ Calculations assume a 200-foot Mine Access Road Corridor. Actual impacts to native land covers will be reduced during the Mine Access Road planning and design process. ² This includes the area of revegetated sideslopes along the roadway after completion of the project. ³ Assumes a 78-foot paved surface (4-lanes) along the entire 1.1 mile corridor length and that existing highly compacted areas within the 200-foot wide corridor remain impervious. In reality, a portion of the road will have a pavement width of 48 feet. ⁴ Areas of inactive mine pits, stockpiles, and haul roads have been included as impervious surfaces.						

	Before		After		Before		After
Types 1-8 wetlands	2.0		0	Lawn/landscaping ²	7.0		27.8
Wooded/forest	11.9		0	Impervious surfaces ³	10.3		14.6
Brush/grassland	11.2		0	Open Water	0		0
Cropland	0		0	Mined Areas ⁴	0		0
County State Aid Highway 102 Corridor Subtotal					42.4		42.4

¹ Calculations assume a 200-foot CSAH 102 Corridor. Actual impacts to native land covers will be reduced during the CSAH 102 planning and design process.
² This includes the area of revegetated sideslopes along the roadway after completion of the project.
³ Assumes a 56-foot maximum paved surface along the entire 1.7 mile corridor length and that existing highly compacted areas within the 200-foot wide corridor remain impervious. In reality, some sections of the road will have pavement widths of 37 feet and 32 feet.
⁴ Areas of inactive mine pits, stockpiles, and haul roads have been included as impervious surfaces.

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.*

Mine Extension Area

Wildlife habitat in the project area includes a mixture of wetlands and uplands. Wooded habitat predominates with 227.0 acres of the total 483-acre extension being upland wooded habitat. The wetlands are also dominated by wooded habitat, with 39.4 acres out of the 66.2 wetland acres classified as hardwood swamps, typically black ash swamps. In total, the wooded portion covers more than 55% of the extension area, most of which is second-growth forest composed of aspen and birch. Grassland areas are also common, but are mostly areas that were previously landscaped yards, but are no longer maintained, or areas that have recently been cleared of trees. The grassland habitat is typically old field and pioneer species, not native grassland or prairie. Much of the habitat is fragmented by existing haul roads, CSAH 102, and older mine features, such as the inactive Pilot, Hanna, and Atkins Pits. Wildlife typically associated with this habitat includes white-tailed deer, black bear, ruffed grouse, small mammals, and migratory songbirds.

The project area is adjacent to the active Minntac Mine. Typical mining activities conducted include operation of excavators, mining trucks, and weekly blasting of material. Wildlife species accustomed to human disturbances and activities such as that in the adjacent mine area may use the existing habitat within the extension area. However, though habitat within the extension area may be present for these faunal species, their abundance and frequency may be limited due to habitat fragmentation and the type of adjacent human activities within the active mine.

The Proposed Action would result in the conversion of 483.2 acres of land to open mine, of which includes 369.1 acres of vegetated land (**Table 10-1**). The remaining 94.4 acres of impervious surfaces and 19.7 acres of open water will also be converted to open mine. Wildlife species using the habitat in the 483-acre extension area would be displaced as mining advances.

Two recent studies assessed cumulative effects to wildlife habitat and wildlife travel corridors in the region. The first was a report prepared for the DNR, “*Cumulative effects analysis on wildlife habitat loss/fragmentation and wildlife travel corridor obstruction/landscape barriers in the Mesabi Iron Range and Arrowhead Regions of Minnesota*” (Emmons & Olivier Resources, Inc., 2006), which identified north-south wildlife travel corridors between the mining operations along the length of the Mesabi Iron Range. That study did not identify any wildlife travel corridors near the Minntac Mine. The second study was completed for the U. S. Steel - Keetac expansion project, “*Cumulative effect Analysis of Wildlife Habitat and Threatened and Endangered Wildlife Species*” (Barr Engineering, 2009). This study identified wildlife corridors throughout the Iron Range, including a

large corridor to the west of Minntac's West Pit. As the mine proposes to extend to the south, there should be no effect on the wildlife corridor present to the west of the Minntac Mine West Pit. This is consistent with the findings of the more recent report completed for the Keetac expansion project (Barr Engineer, 2009), which states "Minntac's plan to expand their open pit mining southward will not affect the quality of these mini-corridors."

Several perennial and intermittent stream segments exist within the mine extension area (**Figure 6**). The West Pit extension area includes an unnamed tributary to Kinney Lake (referenced as Kinney Creek) and an unnamed headwater tributary of the West Two River, which flows into the West Two River Reservoir. These streams flow into either Kinney Lake or the West Two River Reservoir, and may support seasonal fish populations, particularly during spring spawning periods. The East Pit extension would reduce the length of Parkville Creek, and a short section on an unnamed stream. Parkville Creek flows into the West Two River Reservoir, and is a major tributary.

The West Two Rivers Reservoir fishery is managed primarily for northern pike and black crappie (DNR Lake Management Plan, revised in 2005). Tributary streams and adjacent flooded wetlands are critical spawning habitat for northern pike in the spring. Groundwater level changes, loss of wetlands, loss of headwater stream portions, and alteration of sediment transport contribute to hydrological and habitat change in tributaries such as the West Two Rivers and Parkville Creek. Decreased flow in the spring in particular can negatively impact northern pike spawning success. Changes in sediment transport, from either increased or decreased flow, can alter the geomorphology and stream habitat. Increased sedimentation usually results in a decrease in quality fish habitat.

Biological monitoring data obtained from the MPCA's environmental database includes data for tributaries of Manganika and Mashkenode Lakes (which flow into the East Two River), the East Two River below Manganika Lake, the East Two River, and stations on the West Two River above and below the West Two River Reservoir. Fisheries data from these stations indicate that the small streams within the mine extension area could contain brook stickleback, central mudminnow, creek chub, mottled sculpin, fathead minnows, golden shiner, Iowa darter, northern redbelly dace, tadpole madtom, white sucker, and yellow perch. The larger systems of the East and West Two Rivers had similar assemblages, but also included sunfish, northern pike, black bullhead, black crappie, and shorthead redhorse. Based on the small and intermittent nature of the impacted streams, it is anticipated that the fish assemblage would contain few species, and be dominated by minnows (Cyprinids).

Loss of habitat in the tributaries can impact the resident fish but also can negatively impact downstream fisheries. Northern pike and white sucker populations may be impacted as they likely move between the West Two Rivers Reservoir and the tributaries, particularly for spawning. Fish movement, i.e. immigration into the reservoir, is prevented by the reservoir dam so the upstream habitat is especially important for maintaining the population of these two species and others.

Macroinvertebrate data for the tributary to Manganika Lake, a tributary to the West Two River, and the East Two River show a diverse assemblage of macroinvertebrates, including many mayflies, stoneflies, and caddisflies, and a high Index of Biotic Integrity (IBI) scores (87 for unnamed tributary of West Two River, and 62 for the East Two River, out of a maximum score of 100). The tributary to Manganika Lake is a smaller stream, and is more like the streams within the extension areas of the East and West Pits. The macroinvertebrate assemblage in this tributary is dominated by midge larvae (95.3 percent of sample), and has an IBI score of 6.7. The impacted streams have physical characteristics more similar to the tributary to Manganika Lake, and would be expected to have typical macroinvertebrate assemblages for small northern Minnesota streams.

Stream habitat impacts will occur due to excavation of the extension area for mining activities. Avoidance is not feasible because of the location of the ore. In addition to the direct loss of stream habitat, impacts to downstream water bodies (including downstream public waters) will also occur as the natural hydrology of the area is changed. See Item 12 for detailed discussion of stream loss and loss of contributing watershed area.

While mine pit dewatering discharge will replace some of the natural flow that is lost, downstream water bodies may also be impacted by the "cone of depression" that results from pumping, particularly groundwater-fed streams and water bodies. All of these changes could impact fisheries in the streams to be removed as well as in downstream waters. Monitoring could be incorporated into the project to track and then respond to downstream

changes due to mining activities. Flow monitoring and/or geomorphology surveys downstream of the mine site prior to the extension could allow changes to be detected. The MPCA is requiring monitoring for potential secondary impacts on the West Two River due to Minntac's West Pit Progression Project. Information will be collected regarding stream flow and water chemistry. A similar process could be implemented for Minntac's proposed Extension Project.

As part of the required mitigation for post 1996 impacts to the Kinney Creek, an aquatic enhancement "littoral zone" in-pit stockpiling plan was developed in accordance with conceptual plans developed by the DNR's former Division of Waters (see *Minntac_Inpit_Stockpile_Scenarios_DNR_3-25-10.pdf*). The project area is on mined-out State lands located on the west end of the West Pit. Approximately 13.2 million long tons of waste material will be stockpiled across a length of 4,500 feet to an elevation ranging from 840 to 1010 feet (referenced to a Lake Superior datum elevation of 602). The aquatic enhancement zone is designed to accommodate a range of final pit water runoff elevations between 848 and 888 feet (referenced to a Lake Superior datum elevation of 602). The current Minntac design assumes CR 25 is left in place. Details of the proposed plan were presented by Minntac and the current concept was approved by the DNR Division of Lands and Minerals and former Division of Waters in a meeting held on February 10, 2011. Electronic files for the aquatic enhancement plan were also submitted. A discussion of the plan and any updates to it are to be included each year in the Annual Operating Plan submitted to the DNR for its review.

Extension of the mine pits could result in an overall incremental increase in dewatering rates as the surface area of the mine increases, thereby increasing surface water flow in receiving surface water systems (*e.g.*, Parkville Creek, Kinney Creek). However, the incremental flow increases would be lost within the normal fluctuation in discharge as pumping rates are varied to match local meteorological events and runoff. Current limits within Minntac's water appropriation and NPDES discharge permits allow substantially more mine dewatering discharge than what is pumped on an average basis to provide for unusually large precipitation events. Any increases are expected to be within the volumes allowed by the DNR water appropriations permits and the discharge rates described by the NPDES/SDS permit for Minntac's Mining Area. Increased dewatering rates are not expected to be sufficient to alter in-stream habitat or the composition of a small stream fishery that may be present.

The current average rate of discharge for all dewatering installations in the East and West Mine Pits is 20.5 MGD (14,236 gpm), based on pumping records over the period January 2010 – December 2011. A review of pumping records over the period January 2001 – December 2011 showed that dewatering discharge rates have varied from a minimum of 7.5 MGD (5,200 gpm) to a maximum of 30 MGD (20,830 gpm) for all dewatering installations combined. The area subject to surface water runoff and groundwater inflow is estimated to increase by approximately 5% at the limit of the proposed extension. Therefore, there is a potential for increasing dewatering discharges by up to 5%.

The mine extension area contains all or portions of three abandoned natural ore mine pits that are currently deep, open water areas (see EAW Item 12, **Table 12-1**). Like most abandoned natural ore mines, the landscape surrounding the pits is composed of steep sided walls, and little transitional area. There is also little or no riparian fringe, and generally a lack of aquatic or hydrophytic vegetation. Hydrology is supported by groundwater, but could also be influenced by dewatering activities within the active mine area. Most mine pits are composed of deep, cold water, and are usually nutrient poor and have low productivity. Because of these characteristics, isolation, and lack of public access, the open water natural ore mine pits within the extension are not managed for fisheries.

The Statewide Wildlife Action Plan identifies several key habitats in the Tamarack Lowlands Ecological Subsection, a portion of which overlaps the East Pit Mine Extension. Specifically, Forest-Upland Coniferous (red-white pine), Forest-Lowland Coniferous, Wetland-Nonforest, and River-Headwater to Large habitats are listed as Key Habitats under the Plan. Minnesota Land Cover Classification System (MLCCS) data were reviewed for the mine extension area and the majority of the upland land cover consisted of Artificial surfaces with non-native long grasses and northern boreal hardwood-conifer forest, neither of which are key habitats. There are 11.82 acres of non-forested wetland within the East Pit Extension Area. Of this, the majority are previously disturbed forested wetlands that are now non-forested as a result of clearing for logging or road and utility rights-of-way. Alder thickets also exist, but this habitat is not one that is specifically listed in the Plan's

native plant community key habitat types. A 4.46 acre cattail marsh adjacent to Parkville Creek, a non-forested wetland, could potentially be considered key habitat.

New Mine Access Road

Wildlife habitat and use along the proposed roadway corridor is similar to that in the mine extension area. The proposed new mine access road would not include any stream crossings, but would include construction of a land bridge across the Wacootah Pit. The Wacootah Pit has no public boating access and is not a managed fishery. Consequently, no effects to managed fisheries in the deep, open water areas of the abandoned natural ore pits within the project area would be anticipated. However, although not managed for fisheries, fish may be present in the ore pits and may be impacted by the proposed project.

County State Aid Highway 102 Relocation – Connected Action

The proposed relocation of CSAH 102 would cross Parkville Creek approximately midway along the alignment between CSAH 109 and existing CSAH 102. The roadway crossing would accommodate the stream with a culvert or other appropriate conveyance.

The existing culvert is a four foot diameter concrete culvert, 62 feet in length. Though Parkville Creek still receives some flow from its remaining watershed, flow through the culvert is primarily from mine dewatering discharge equivalent to the volume discharged from the Prindle Sump through permitted outfall SD004. Minntac reports that over the past 10 years, the flow has varied from 0-8.2 MGD (5,694 gpm), with an average flow equal to 3.6 MGD (2,530 gpm). It appears the existing culvert placement may be at an elevation that is higher than ideal – water must rise two to three feet before it will flow through the culvert. DNR would not recommend the culvert be replaced at the same elevation. Typically culverts of this size would be buried 1 to 1.5 feet. DNR recommends that the new culvert be designed and placed following St. Louis County Public Works General Permit 1996-2091 conditions for proper sizing and placement. As is currently planned, the culvert should accommodate wildlife passage beneath the road surface.

U.S. Steel will work with the DNR, USACE, and MPCA regarding the design and placement of the culvert in a manner that minimizes impacts to the stream and the fish and wildlife it supports.

b. Are any state-listed (endangered, threatened or special concern) species, rare plant communities or other sensitive ecological resources on or near the site? Yes No

If yes, describe the resource and how it would be affected by the project. Describe any measures that will be taken to minimize or avoid adverse impacts. Provide the license agreement number (LA-____) and/or Division of Ecological Resources contact number (ERDB 20090306) from which the data were obtained and attach the response letter from the DNR Division of Ecological Resources. Indicate if any additional survey work has been conducted within the site and describe the results.

The project area is within the distributional ranges of Canada lynx (*Lynx canadensis* – federal status, Threatened; state status, unlisted), the gray wolf (*Canis lupus* – federal status, Threatened; state status, Special Concern), and the breeding range of the bald eagle (*Haliaeetus leucocephalus* – federal status, delisted Threatened; state status, Special Concern).

Canada Lynx

The project area lies outside of the current boundaries designated as critical habitat for Canada lynx. The results of a recent study did not identify any lynx or lynx sign, although lynx have been seen in the area in the past (AECOM, July 2011). The March 2011 survey included observation of snowshoe hare, ruffed grouse, and white-tailed deer. These are prey of lynx, suggesting that when prey densities are adequate, lynx occurrence is possible, if not probable, in the vicinity.

The proposed mine extension would remove 483 acres of land area, of which approximately 227 acres is forested upland and could have potential as lynx habitat. The remainder of the area that would be affected by the mine extension consists of wetlands or previously-impacted lands generally unsuitable for lynx. This represents a small fraction of the territory size (28 and 58 mi² for a female and male, respectively) of a resident lynx pair (should resident individuals even be present).

Based on preliminary survey, the proposed mine extension could affect lynx found in the vicinity of the project site, but would not adversely affect lynx populations or their critical habitat. Lynx likely do not reside in the project area. However, lynx could travel through the area and it is reasonably foreseeable that project activities could impact movements through the area or cause accidental mortality. Proposed conservation measures, including reclamation, would eventually restore lynx and other wildlife habitat to the site.

Gray Wolf

The proposed mine extension is within the designated critical habitat for the gray wolf and it is likely that wolves exist in the region. The Minnesota DNR's study of wolf distribution and abundance shows that the total wolf range has increased since 1988, the latest wolf surveys indicate that the broad distribution of wolves in Minnesota has not changed since the mid to late 1990s and that wolf distribution in Minnesota is now static (Erb, 2008). It is not likely that wolves frequent the area immediately south of the Minntac mine due to the residential nature of the area and the nearby mining activities.

Wolves are not habitat specialists; rather, they can live anywhere prey is sufficiently abundant because they can kill the largest of ungulates, such as white-tailed deer (*Odocoileus virginianus*) and moose (*Alces alces*), and supplement their diet with a variety of smaller animals, such as snowshoe hare (*Lepus americanus*) and beaver (*Castor canadensis*). Good wolf habitat includes areas where ungulate prey is abundant, where human related sources of mortality are low, and in areas that are sufficiently large and connected to maintain existing populations and ensure the continued exchange of dispersing unrelated wolves. Vegetation cover is important only as it relates to these other factors because wolves are habitat generalists (DNR, 2001).

The proposed project would result in removal of suitable habitat for the gray wolf and its prey. However, loss of habitat and prey habitat will more likely result in reduction of pack range and not necessarily loss of individuals. Erb's 2008 survey calculated average territory size for radio-marked packs to be approximately 104 km² (25,699 acres). The proposed mine extension would remove 483 acres of land area, of which approximately 227 acres is forested upland and could have potential as wolf habitat. The proposed mine extension as a whole represents less than two percent of an average pack range and the forested portion of the extension represents less than one percent of an average wolf territory. Therefore, loss of habitat is not expected to adversely affect the gray wolf. Further, accidental mortality is not believed to significantly affect wolf population dynamics in Minnesota and the DNR's 2001 Wolf Management Plan deems efforts to reduce accidental mortality unnecessary (DNR, 2001).

Bald Eagle

The bald eagle population has experienced similar success as the gray wolf and recent surveys show that more recent growth has resulted in expansion of range as opposed to increases in nests leading to the conclusion that available habitat, particularly in the northern (forested) portions of Minnesota, has reached capacity, (Baker, Galli, and Nelson, 2000). The bald eagle was removed from the federal threatened species list, but remains federally protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

No known bald eagle nests are located within one mile of the proposed mine extension limits. Further, recent research has shown eagles to be tolerant of human presence, so the proposed project would not adversely affect nests should they exist in adjacent areas (DNR, 2005). Therefore the proposed project is not likely to adversely affect bald eagles.

State-listed Plant Species

Several state-listed botanical species (particularly *Botrychium* spp.) have been found in northern Minnesota in association with historic mine stockpiles. A review of the DNR Natural Heritage Information System (NHIS) database identified three species of *Botrychium* and one colonial waterbird nesting area within one mile of the proposed mine extension limits (see **Table 11-1**). None of these species are federally-listed.

Common Name	Scientific Name	Resource Type	Minnesota Protection Status
Michigan grapefern	<i>Botrychium michiganense</i>	Plant	Non-status
Pale moonwort	<i>Botrychium pallidum</i>	Plant	State-listed Endangered
Least moonwort	<i>Botrychium simplex</i>	Plant	State-listed Special Concern
Colonial Waterbird Nesting Area	N/A	Ecological feature	N/A

Notes:
A species is considered endangered in Minnesota if the species is threatened with extinction throughout all or a significant portion of its range within Minnesota for species listed under the Minnesota Endangered Species Statute.
A species is considered threatened in Minnesota if the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range within Minnesota for species listed under the Minnesota Endangered Species Statute.
A species is considered a species of special concern in Minnesota if, although the species is not endangered or threatened, it is extremely uncommon in Minnesota, or has unique or highly specific habitat requirements and deserves careful monitoring of its status. Species on the periphery of their range that are not listed as threatened may be included in this category along with those species that were once threatened or endangered but now have increasing or protected, stable populations; for species listed under the Minnesota Endangered Species Statute.
N/A or Not Applicable is assigned to ecological features that do not have scientific names or have state or federal protection status.
Non-status implies that the species does not have any state protection status, but the species and/or its habitat are tracked by the DNR, and/or the species could be a candidate for state listing in the future.

Because suitable habitat for *Botrychium* spp. is present within the mine extension area, a botanical survey for these rare plant species was conducted in 2011, which covered the proposed extension, CSAH 102 relocation, and mine access road (Barr, 2011). The field survey did not identify any *Botrychium* spp. in the project area. Minntac is coordinating the reporting of these survey results to the Minnesota DNR Division of Ecological and Water Resources for their records and concurrence on the findings. The proposed project would avoid impact to the colonial waterbird nesting area.

New Mine Access Road

The new mine access road would affect similar habitat as the proposed mine extension, but would not adversely impact lynx, wolves, bald eagles, or *Botrychium* spp. for the same reasons stated above regarding the proposed mine extension.

County State Aid Highway 102 Relocation – Connected Action

The proposed relocation of CSAH 102 would affect similar habitat as the proposed mine extension, but would not adversely impact lynx, wolves, bald eagles, or *Botrychium* spp. for the same reasons stated regarding the proposed mine extension.

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 Public Waters Inventory number(s) if the water resources affected are on the PWI: Describe alternatives considered and proposed mitigation measures to minimize impacts.

The Minntac Mine is located along the Laurentian Divide, and lies along two major watersheds. The East Pit, West Pit and the new mine access road are located within the St. Louis River watershed, which drains to Lake Superior. The tailings basin is located within the Little Fork River watershed (major watershed No. 76), which drains north to the Rainy River. The area immediately northeast of the mine and tailings basin is within the Vermilion River watershed, which is also part of the Rainy River drainage, but is a separate major watershed (No. 73).

The proposed project is located within the St. Louis River watershed, with the active mining operations located within the Mountain Iron Mine minor watershed (HUC 040102010501). The East Pit Extension, the mine access and the CSAH 102 relocation are also located within this minor watershed. The West Pit Extension is located within the Kinney Lake (HUC 040102010503) and West Two River (HUC 040102010502) minor watersheds. These watersheds flow away from the existing mine, and into the St. Louis River approximately 15 miles south of the Minntac Mine.

The 2010 Impaired Waters List was reviewed for impaired waters in and downstream of the project area. The only receiving water downstream of the proposed mine extension that has been listed as impaired, other than the St. Louis River, is the West Two River Reservoir. The West Two River Reservoir was listed as impaired for fish tissue mercury in 1998 and is shown in the 2006 Impaired Waters List, but is not listed in the 2008 or 2010 Impaired Waters lists. The only discharges from the proposed mine extension that enter the West Two River Reservoir are associated with SD004 (Prindle Sump discharges). Mercury discharges from SD004 have been monitored on a quarterly basis over the past several years, as per requirements of NPDES/SDS Permit MN0052493. Mercury concentrations in the SD004 discharges are typically just over the 0.5 ng/L detection limit for low-level mercury analysis by EPA Method 1631. As such, mercury inputs to the West Two River Reservoir are considered minimal.

Several water resources are located within the proposed project limits. These include portions of five streams, and natural and former mine pit lakes including the Atkins Pit and Kinney and Yates Lakes (see **Figure 6**). The streams have been mapped by the DNR through the Public Waters Inventory (PWI) or the state stream database (24k stream coverage, available as a GIS shapefile through the DNR Data Deli).

The mine extension area contains all or portions of three abandoned natural ore mine pits that are currently deep, open water areas. These open water areas were not delineated as wetlands, as they exceed the depth to be considered wetland, which is typically a depth of 6.5 feet or less. The three deep, open water natural ore mine pits within the mine extension are summarized in **Table 12-1**. The total area of open water in these three natural ore mine pits is estimated to be 19.7 acres within the extension area. In addition, the proposed mine entrance road relocation will require the crossing of a portion of the Wacootah Pit. The area within the Wacootah Pit that would be affected by the mine access road includes approximately 1.9 acres, including the 200-foot corridor that would encompass the road and right-of-way.

Pit Name	Approximate Area (acres)
Pilot Mine	9.3
Hanna Mine	2.90
Atkins Mine	7.5
Total	19.7

No public waters or waterways exist within the extension area. Public waters and watercourses in the vicinity of the project include: Yates Lake (69-780), Kinney Lake (69-781), Kinney Creek, West Two River Reservoir (69-994), Parkville Creek, McQuade Creek and unnamed waters. Non-public waters such as drainage ditches and multiple mine pits are also present in the vicinity and/or the extension area. The relocation of CSAH 102 will require the crossing of Parkville Creek, which is a public watercourse in the area of the crossing. McQuade Creek is also a public watercourse located near the West Pit Extension. Although McQuade Creek is not planned to be directly impacted by the Extension, it is located within 300 feet of the project limits. **Figure 6** depicts the locations of these resources.

Wetland delineations of the project area were completed by Northeast Technical Services, Inc. (NTS) between June 26 and September 9, 2008 to identify jurisdictional wetland habitat within the existing permit to mine limits, the proposed extension limits, and into the adjacent areas not proposed for mining as part of the extension. One small area on the south side of the East Pit was re-delineated during the 2011 growing season (NTS, 2011). Within the proposed extension area, the wetland delineation identified 85 wetlands comprising 65.8 acres of habitat. The delineation has been approved by the USACE and DNR, along with the Minnesota Wetland Conservation Act (WCA) Technical Evaluation Panel (TEP) members from St. Louis County and the

Board of Water and Soil Resources. Many of the wetlands extend beyond the proposed mine extension limits, but only the areas within the extension have been quantified. The type, number, and size of the wetlands within the proposed mine extension are summarized in **Table 12-2**.

Circular 39 Classification	Eggers and Reed Classification	Number of Basins	Area (acres)
Type 2	Fresh (Wet) Meadow	9	1.4
Type 3	Shallow Marsh	4	5.0
Type 6	Shrub-Carr	37	19.9
Type 7	Hardwood Swamp	35	39.4
Total		85	65.8

Mine Extension Area

The proposed mine extension south of the East Pit would necessitate the relocation of the outfall for the Prindle Sump. However, water from the Prindle Sump would ultimately flow to Parkville Creek, as under current conditions, and no changes are proposed to the permitted flow rate through the outfall SD004. Project impacts to other water bodies due to dewatering and other flow changes are discussed in response to EAW Question 17 and Question 18.

Wetland Loss

All of the 65.8 acres of delineated wetland habitat would be directly impacted by the proposed mine extension. However, one of the wetlands in the extension area was previously permitted in association with ongoing mining activities. U. S. Steel received permit 2007-01868-TWP from the USACE for the impact of 20.78 acres of wetlands on April 20, 2009, 5.1 acres of Type 6 (shrub-carr) habitat that are included in the permitted wetlands are located within the Extension area. Therefore, the total area of direct wetland impact that would require permit approval for the extension is 60.7 acres.

In addition to direct impacts of pit development, there is the potential that mine pit dewatering could indirectly impact wetlands as the cone of depression from mine dewatering extends further to the south and lowers groundwater levels. However, wetlands delineated near the proposed pit extension areas may not be directly connected to groundwater and may be supported primarily by precipitation and surface water run-off. Several wetlands span both the proposed extension area and the area not proposed for mining. While some of these basins are large complexes, and have a large immediate watershed, there are portions of eight wetlands that would be small remnants when the majority of the wetland is removed by mining. These basins would be predicted to be indirectly lost, and are quantified as a potential impact. These eight basins have a total area of 5.4 acres, and are identified in **Figure 7**. Indirect impacts associated with the Extension will be addressed by the USACE Section 404 Wetlands Permit for the project. If it is determined that wetlands adjacent to the Extension area are being detrimentally impacted by the activity, U.S. Steel – Minntac shall provide corrective measures and/or compensatory mitigation as determined by the Minnesota DNR and/or USACE at that time. No studies of the indirect wetland impacts from the current mine have been completed.

Impacts to wetlands would require a permit from the USACE under Section 404 of the Clean Water Act and from the DNR under the requirements of the Wetland Conservation Act (WCA). The Section 404 Clean Water Act permit would also include Section 401 Clean Water Act Water Quality Certification, which is authorized by the MPCA. Both the state and federal wetland permits would require mitigation for direct and indirect loss of wetland habitat. According to the WCA, in order to qualify for a 1:1 compensatory mitigation ratio, the wetland replacement must meet one of the two following criteria: replacement must consist of the withdrawal of available credits from an approved wetland bank site within the same bank service area as the impacted wetland (8420.0522 Subp.4 A. (1)), or be within the same major watershed or county as the impacted wetland, a majority of which is in-kind (8420.0522 Subp.4 A. (2)). Using the Palisade replacement site in Aitkin County, these criteria are not met; thus the project is subject to a 1.5:1 replacement under WCA. Under this rule, a minimum of 98.7 acres of wetland mitigation credit (to achieve 1.5:1 replacement) would be required to compensate for direct wetland impacts. An additional area of 5.4 acres is anticipated to be needed as compensation for indirect wetland impacts per USACE requirements, but this value must be further defined during permitting. Under USACE requirements, the project is subject to 1:1 replacement.

As described above, mitigation for wetland loss would be provided through use of the new U.S. Steel project-specific wetland replacement site that is currently being established as of spring 2011 in Aitkin County, Minnesota. Creation of this Aitkin County project-specific replacement site (the Palisade site) will be in advance and/or concurrent with the mine extension project. The Aitkin County Palisade site contains approximately 4,400 acres of farmed and/or drained wetland that would, once it is approved, qualify for wetland restoration to achieve the required compensatory mitigation for the mine extension project, and future projects at U.S. Steel's Minnesota Ore Operations facilities. As of July 2012, USACE review of the Palisade site is in progress and no wetland credits have been released for use to date.

Watershed and Stream Loss

Stream impacts will occur due to excavation of the extension area for mining activities. Avoidance is not feasible because of the location of the ore. In order to better understand the effects of mining on streams in the project area, DNR requested U.S. Steel to quantify previous and proposed impacts to streams and their contributing watershed areas. According to a memorandum prepared for U.S. Steel by Liesch Associates, Inc., July 3, 2012 (see **Attachment A**), past mining activities have previously removed 17,983 linear feet (3.4 miles) of stream within the West Pit, and 25,811 linear feet (4.9 miles) within the East Pit, based on the publically-available DNR 24k stream coverage (1:24,000 scale). The proposed Extension Project would remove an additional 4,002 linear feet within the East Pit. East Pit stream impacts from the Extension Project will be to Parkville Creek and its tributaries. Parkville Creek will also be impacted by the relocation of CSAH 102, as discussed below in that section.

In addition to the direct loss of stream habitat, impacts to downstream water bodies (including downstream public waters) will also occur as the natural hydrology of the area is changed. Contributing watershed areas can be severed or completely removed due to mining activity, directly affecting runoff from precipitation and resultant streamflow. According to information presented in the Liesch memorandum, 90% (6,802 acres) of the total contributing subwatershed in the West Pit area has been impacted by past mining, with an additional 476 acres to be impacted under the current permit to mine. Consequently, past and currently permitted mining in the West Pit results in a reduction of natural mean annual streamflow to McQuade (Kinney) Creek, Kinross Creek and the West and East Branches of West Two River by 7.97 cubic feet per second (3,577 gallons per minute). In the East Pit area, 93% (2,774 acres) of the total contributing subwatershed has been impacted. Past mining in the East Pit has resulted in a reduction of natural mean annual streamflow to Parkville Creek by 3.03 cubic feet per second (1,360 gallons per minute) and East Two River by 0.36 cubic feet per second (161 gallons per minute). The proposed Extension Project would impact an additional 265 acres in the West Pit and 205 acres in the East Pit, resulting in an additional reduction of natural mean annual flow of 0.29 cubic feet per second (130 gallons per minute) and 0.22 cubic feet per second (99 gallons per minute), respectively, due to loss of contributing subwatershed area. Past, present and proposed stream and watershed impacts are presented in **Tables 12-3 and 12-4**.

While mine pit dewatering discharge will replace some of the natural flow that is lost, dewatering flows do not mimic the natural hydrologic processes, chemically or physically (including high flows and low flows), that occurred prior to mining. In addition, downstream water bodies may also be impacted by the "cone of depression" that results from pumping, particularly groundwater-fed streams and water bodies. Specifically with regard to Parkville Creek, the flow through this stream is primarily from the dewatering of Minntac's East Pit through the Prindle Sump, though it still receives some flow from its remaining watershed. Excavation in the mine extension area will remove a section of Parkville Creek and require that the location of the Prindle Sump discharge point be moved southward, further downstream on Parkville Creek. The sump will continue to discharge to the creek, as its discharge point is moved further south as mining activity proceeds. McQuade (Kinney) Creek will also continue to receive augmentation flows from West Pit mine dewatering. See Item 13 for additional discussion of dewatering discharges.

As indicated previously, the MPCA is requiring monitoring for potential secondary impacts on the West Two River due to Minntac's West Pit Progression Project. Information will be collected regarding stream flow and water chemistry. A similar process could be implemented for Minntac's proposed Extension Project. Monitoring could be incorporated into the project to track and then respond to downstream changes due to mining activities. Flow monitoring and/or geomorphology surveys downstream of the mine site prior to the extension could allow changes to be detected. U.S. Steel will work with the DNR, USACE, and MPCA to

address stream impacts and mitigation during the wetland permitting process. Impacts proposed to areas considered “streams” by an agency will require a stream mitigation plan and proposal be submitted by the company for review and approval by the agency. As discussed below, it appears that only Parkville Creek is considered a stream at this time.

A site visit was completed by USACE staff in May 2012 to investigate watercourses identified within the project area on the National Hydrographic Dataset (NHD) to determine the extent of jurisdictional streams under the Section 404 program. Observations in the field indicate that only Parkville Creek meets the criteria for consideration as a “stream” by the USACE. No preliminary or approved jurisdictional determination has been completed to date; the jurisdictional determination will be completed prior to the issuance of the Section 404 permit.

The USACE is requiring a comprehensive stream assessment of Parkville Creek as part of its environmental impact assessment (EIA) for the proposed project. The work plan proposed to meet the USACE’s requirements includes the following:

- Aquatic Biota Evaluation: pre-survey planning to ensure MPCA standard operating procedures are followed; site visit for macroinvertebrates and habitat; fish survey; water chemistry assessment.
- Stream Morphology Assessment: stream field survey; evaluation of morphologic impacts.

Information gathered during these studies will be used to characterize the stream and evaluate mitigation alternatives that would best replace the stream functions and values lost due to the extension project. Compensatory mitigation for stream impacts will be addressed during permitting. Ideally, it is preferred that mitigation be completed in watersheds as close to the impacted watershed as practical and correct/restore aspects of the stream that contribute to overall stream health. Based on a detailed assessment of the St. Louis River watershed in 2009 & 2012, there may be a number of potential mitigation opportunities within the same watersheds as those being impacted by the project.

U.S. Steel has been notified by the USACE that appropriate stream mitigation will be a condition of their permit and should be proposed to mitigate for the potential loss of Parkville Creek. Based on existing conditions and quality of Parkville Creek (to be determined during the comprehensive stream assessment), the compensatory mitigation ratio would fall between 2:1 to 3:1, resulting in stream mitigation consisting of the restoration or enhancement of approximately 8,000 to 12,000 linear feet of a stream with a similar flow regime and watershed size as Parkville Creek.

	Parkville Creek – Tributary 1	Parkville Creek – Tributary 2	Parkville Creek – Tributary 3	Parkville Creek – Main	Parkville Creek – Total*	East Two River – Tributary 1
Watershed Contributing Area						
Pre-mining (ac)	460	165	338	1,685	2,648	331
Already impacted by past mining (ac)	360	145	338	1,600	2,443	331
Current under Permit to Mine (ac)	0	0	0	0	0	0
Proposed Extension (ac)	100	20	0	85	205	0
Stream Segment Channel Length						
Pre-mining (ft)	4,706	3,447	4,452	17,208	29,813	1,329
Already impacted by past mining (ft)	4,706**	3,447**	4,452	13,206	25,811	1,329
Current under Permit to Mine (ft)	0	0	0	0	0	0
Proposed Extension (ft)	0	0	0	4,002	4,002	0

Streamflow						
Pre-mining (cfs)	0.50	0.18	0.37	1.84	2.90	0.36
Already impacted by past mining (cfs)	0.39	0.16	0.37	1.75	2.67	0.36
Current under Permit to Mine (cfs)	0	0	0	0	0	0
Proposed Extension (cfs)	0.11	0.02	0.00	0.09	0.22	0.00

*TOTAL Parkville Creek subwatershed represents information from Tributaries 1 (P1), 2 (P2), and 3 (P3), along with one other area (P4), which represent the main reach of Parkville Creek (see figure included in EAW **Attachment A**).

The USACE has indicated that the MN DNR 24k Stream Segments shown in the P1 and P2 subwatersheds may have been streams at one time, but would no longer be considered jurisdictional under existing USACE regulations (see figure included in EAW **Attachment A).

Table 12-4 Minntac West Pit: Evaluation of Past, Present and Proposed Impacts to Watersheds

	McQuade Creek (aka Kinney Creek) – Tributary 1	Kinross Creek – Tributary 1	Kinross Creek – Tributary 2	Kinross Creek – Tributary 3	West Branch - West Two River - Tributary 1	West Branch - West Two River - Tributary 2	West Branch - West Two River - Tributary 3	East Branch - West Two River - Tributary 1
Watershed Contributing Area								
Pre-mining (ac)	2,657	50	220	606	47	638	293	3,032
Already impacted by past mining (ac)	2,513	10	99	600	0	490	58	3,032
Current under Permit to Mine (ac)	62	11	29	0	0	139	235	0
Proposed Extension (ac)	82	29	92	6	47	9	0	0
Stream Segment Channel Length	<i>NA – MPCA/USACE determined no definable stream channel present within proposed Progression area, wetlands only. The same determination is anticipated for the proposed East Pit Extension area.</i>							
Pre-mining (ft)	17,983							
Already impacted by past mining (ft)	17,983							
Current under Permit to Mine (ft)	0							
Proposed Extension (ft)	0							
Streamflow								
Pre-mining (cfs)	2.91	0.05	0.24	0.67	0.05	0.70	0.32	3.32
Already impacted by past mining (cfs)	2.75	0.01	0.11	0.66	0.00	0.54	0.06	3.32
Current under Permit to Mine (cfs)	0.07	0.01	0.03	0.00	0.00	0.15	0.26	0.00
Proposed Extension (cfs)	0.09	0.03	0.10	0.01	0.05	0.01	0.00	0.00

Mine Pits

Deep, open water areas within the mine extension include 19.7 acres over three abandoned natural ore pits. The abandoned pits will be dewatered through existing NPDES/SDS outfalls before the pits are breached by stripping or other activities. U.S. Steel will obtain approval from the DNR and MPCA prior to any dewatering activities. Impacts to these deep, open water areas may require additional permitting depending on the jurisdictional extent of the USACE under the Clean Water Act and the MPCA under Minnesota Rules 7050. Following a jurisdictional determination, U.S. Steel will address appropriate requirements related to mitigation during permitting.

On-going pit reclamation, as described in the annual Operating Plan submitted on January 31, 2012 will continue to address future pit reclamation activities. The mine closure plan will be submitted to the DNR for approval two years prior to deactivation of the Minntac Mine and will provide specific details on the closure of the mine, including the tailings basin. When pit limits are reached, the associated surface banks will be reclaimed in accordance with Chapter 6130 DNR Mineland Reclamation standards. Runoff from the mine will be managed to comply with the conditions in Minnesota Rules 6130.2200. Once mining is completed and pit dewatering has ceased, inactive reclaimed mine pits will fill with water. During this time, stream flow augmentation will likely be required in order to maintain the health of the system. After the mine pits have filled and reached the point at which they naturally overflow, stream augmentation would no longer be required and the system would revert to a natural cycle dependent on precipitation, snowmelt, and other climatic events.

Expected East Pit outflow is at approximately 853 elevation (602 Lake Superior datum). The eventual discharge from the East Pit would be to Parkville Creek, which would be in accordance with MR 6130.2200 – returning post-mining flows to the original watershed. Expected West Pit outflow is at approximately 886 (referenced to a Lake Superior datum elevation of 602), based on the current proposed extension pit limits; the runout would be to the West Branch of West Two Rivers. As discussed in EAW Item 11, a future littoral zone in the West Pit is designed to accommodate a range of elevations (848 to 888) and is part of the required mitigation for the post 1996 impacts to Kinney Creek. Upon mine closure, it is likely that Kinney Creek will receive little flow, only that ensuing from the watershed area remaining after mining ceases.

New Mine Access Road

The proposed Mine Access Road corridor contains wetlands that were previously delineated but the delineation has been updated during the summer of 2011 to ensure that all areas of the proposed alignment have been reviewed (NTS, 2011). Based on a 200-foot corridor along the proposed centerline of the mine access road, a total of 0.9 acres of wetland would be impacted. **Table 12-5** provides a summary of wetlands within the road corridor.

Circular 39 Classification	Eggers and Reed Classification	Number of Basins	Area (acres)
Type 2	Fresh (Wet) Meadow	4	0.3
Type 7	Hardwood Swamp	2	0.6
Total		6	0.9
¹ Calculations assume a 200-foot Mine Access Road corridor. Actual impacts to wetlands will be reduced during the Mine Access Road planning and design process.			

These impacts would be permitted in association with the mine extension and mitigation, at an anticipated replacement ratio of 1.5:1. Mitigation is proposed through using U.S. Steel's private project-specific wetland bank (Palisade) that is currently under development in Aitkin County, Minnesota. It is anticipated that credits established within this private wetland bank, once approved, will be used for project-specific replacement at U.S. Steel's Minnesota Ore Operations facilities (Minntac and Keetac), and the bank would be in advance and/or concurrent with construction of the new mine access road.

The proposed alignment would require the filling of a portion of the Wacootah Pit. The Wacootah Pit is not a wetland or a DNR Public Water, but may be considered by the USACE to be a Water of the United States if it is determined that it is not isolated and can be connected to a navigable water. Impacts from the proposed pit crossing would be determined as the roadway design is finalized. Any potential compensatory mitigation that

may be required therein would be determined during the permitting phase of the project. No impacts to streams or other watercourses are anticipated.

County State Aid Highway 102 Relocation – Connected Action

Wetlands within the CSAH 102 relocation corridor were delineated by NTS, Inc. in the summer of 2011 and have been approved by the USACE and DNR, along with the WCA Technical Evaluation Panel members from St. Louis County and the Board of Water and Soil Resources. Based on a 200-foot corridor along the proposed centerline, approximately 2.0 acres of wetland will be impacted for the CSAH 102 relocation, as shown in **Table 12-6**.

Circular 39 Classification	Eggers and Reed Classification	Number of Basins	Area (acres)
Type 2	Fresh (Wet) Meadow	3	0.2
Type 5	Shallow Open Water	1	0.1
Type 6	Shrub-Carr	5	1.0
Type 7	Hardwood Swamp	4	0.6
Total		13	2.0
¹ Calculations assume a 200-foot CSAH 102 corridor. Actual impacts to wetlands will be reduced during the CSAH 102 planning and design process.			

The CSAH 102 relocation will also require the crossing of Parkville Creek, which is a DNR public watercourse. Approximately 122 linear feet of Parkville Creek lies within the proposed right-of-way of the road relocation. There is currently a culvert crossing (four foot diameter concrete culvert, 62 feet in length) for the creek within the proposed alignment, but a larger crossing (with 60 feet of new impact) will be required to accommodate a roadway design that meets St. Louis County’s County State Aid Highway design standards. The new crossing will require a DNR Public Waters Work Permit for work in the bed of the public watercourse.

As mentioned in EAW Item 11, it appears the existing culvert placement may be at an elevation that is higher than ideal – water must rise two to three feet before it will flow through the culvert. DNR would not recommend the culvert be replaced at the same elevation. Typically culverts of this size would be buried 1 to 1.5 feet. DNR recommends that the new culvert be designed and placed following St. Louis County Public Works General Permit 1996-2091 conditions for proper sizing and placement. As is currently planned, the culvert should accommodate wildlife passage beneath the road surface.

Flow through the culvert is and would continue to be from mine dewatering discharge, equivalent to the volume discharged from the Prindle Sump through permitted outfall SD004. Minntac reports that over the past 10 years, the flow has varied from 0-8.2 MGD (5,694 gpm), with an average flow equal to 3.6 MGD (2,530 gpm).

U.S. Steel will work with the DNR, USACE, and MPCA regarding the design and placement of the culvert in a manner that minimizes impacts to Parkville Creek. It is anticipated that wetland impacts from the relocated CSAH 102 will be mitigated by purchasing credits from a wetlands bank. Construction in the vicinity of Parkville Creek will be subject to current construction stormwater regulations and will require NPDES permit coverage under the MN General Stormwater Permit for Construction Activity program (MN R100001).

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.

Mine Extension Area

Three water appropriations permits for the Minntac facility do not contain installations associated with direct discharges to waters of the state. A summary of each is provided below:

- **Permit Number 63-0846** provides for the appropriation up to 27,000 acre-ft of water per year (8,798 million gallons per year, MGY; 16,730 gpm) from either the Mountain Iron Pit or the West Two River Reservoir for the purpose of process makeup water for the taconite processing facilities.
- **Permit Number 98-2002** provides for the appropriation of up to 3 MGY (50 gpm) of groundwater as a source of potable water and fire protection for the Administration Building.
- **Permit Number 99-2063** provides for the appropriation of up to 100 MGY of water from the Dark River Pond as a source of water for rotary drills, haul road fugitive dust control and other miscellaneous mining needs. The permit does not set a limit for a specified pumping rate.

Two additional water appropriations permits allow for mine pit dewatering from the Minntac West Pit (Permit Number 80-2084) and the Minntac East Pit (Permit Number 80-2085) to receiving waters of the state. Each of these two appropriations permits contains three dewatering installations, only two of which are active in each permit. Details of the permitted dewatering installations are as follows:

- **Permit Number 80-2084**
 - #3 Sump - Active: dewatering up to 15,000 gpm to either the East Branch of the West Two River through NPDES/SDS permitted outfall SD001 or to the Mountain Iron Pit (for additional process makeup water inventories).
 - #6 Sump – Active: dewatering up to 5,000 gpm through NPDES/SDS permitted outfall SD003 to Kinney Creek or to the Atkins Pit.
 - #11 Sump – Inactive: dewatering up to 2000 gpm to Kinross Creek.
- **Permit Number 80-2085**
 - Prindle Mine Pit (#10 Sump) – Active: dewatering up to 9,000 gpm through NPDES/SDS permitted outfall SD004 to a drainage ditch to Parkville Creek.
 - #2 Sump – Active: dewatering up to 7,500 gpm to the Mountain Iron Pit (for additional process makeup water inventories, no permitted outfall to waters of the state).
 - Wheeling Pit – Inactive: dewatering up to 5,070 gpm to Parkville Creek.

No expansion of the processing facility (crusher, concentrator, or pellet plant) is anticipated under the proposed project. Additional appropriations for water supply are not anticipated. The rate of production would not increase, so no change would occur to the ongoing use of process make-up water that is obtained directly from the Mountain Iron Pit (Water Appropriations Permit No. 63-0846) and indirectly from dewatering Sump No. 2 in the Minntac East Pit (Water Appropriations Permit No. 80-2085) and Sump No. 3 in the Minntac West Pit (Water Appropriations Permit No. 80-2084) into the Mountain Iron Pit.

The current average rate of discharge for all dewatering installations in the East and West Mine Pits is 20.5 MGD (14,236 gpm), based on pumping records over the period January 2010 – December 2011. A review of pumping records over the period January 2001 – December 2011 showed that dewatering discharge rates have varied from a minimum of 7.5 MGD (5,200 gpm) to a maximum of 30 MGD (20,830 gpm) for all dewatering installations combined. The area subject to surface water runoff and groundwater inflow is estimated to increase by approximately 5% at the limit of the proposed extension. Therefore, dewatering discharges could potentially increase by an equal amount. Dewatering discharge rates will not increase beyond currently permitted maximums.

Water Appropriations Permit 80-2084 describes dewatering from the #6 Sump to Kinney Creek or Atkins Pit as indicated above. However, discharge from the West Pit is also regulated by NPDES/SDS Permit MN0052493. The NPDES/SDS discharge permit allows discharge from the west end of the West Pit by four possible routes, two of which are equivalent to the dewatering routes described above. NPDES/SDS Permit MN0052493 allows discharge “from pipe outfall SD003 to Kinney Lake to Kinney Creek and unnamed wetlands.” The NPDES/SDS permit also allows “pumped flow from a pipe to the Atkins Pit, which overflows...through ditch outfall SD002 [inactive] to an unnamed creek and wetlands tributary to Kinney Lake.” Elimination of the Atkins Pit resulting from future mining in the West Pit extension area will have no impact on NPDES/SDS outfalls which discharge to Kinney Lake and Kinney Creek (only outfall SD003 is active at this time).

U.S. Steel is considering a change in the management of water from the #6 Sump, which dewateres the west half of the West Pit. Dewatering flow from the #6 Sump is currently discharged through pipe outfall SD003 at an average rate of about 3000 gpm to McQuade/Kinney Creek and into Kinney Lake. Kinney Lake subsequently overflows through McQuade/Kinney Creek south into McQuade Lake, and eventually flows into the West Two River south of the West Two River Reservoir. To reduce pollutant levels in the tailings basin and to meet requirements of the Schedule of Compliance (discussed below in Item 17), U.S. Steel is proposing to divert this dewatering flow from Sump 6 for additional/alternative process makeup water, as the #6 Sump represents a source of higher water quality. An analysis of pre-mining baseflow into Kinney Creek at the existing SD003 location is being conducted to define how much of the #6 Sump water could be diverted without substantially changing historical downstream hydrology. The proposed diversion would require an amendment to the existing water appropriations permit prior to implementation. The amendment would likely include a requirement for some amount of stream augmentation, using mine pit dewatering flow, based on pre-mining base flow for McQuade/Kinney Creek (2.91 cfs, as indicated in **Table 12-4**). Permit modification of the NPDES/SDS permit is not necessary for the Sump 6 water diversion project. The diversion project is included in the company's recent application for NPDES/SDS permit reissuance, currently under review by the MPCA.

Additional appropriation of water would not likely be required for dewatering the extension areas. Any changes in water appropriations, as a result of the proposed project, would be based on a preliminary mine plan, mine extension, and additional dewatering requirements. Based on a preliminary evaluation, the annual volumes of dewatering necessary to conduct mining operations would be identified for the life of the project.

A review of the County Well Index (CWI) indicated that thirty one (31) private or municipal water supply wells are located within a ½-mile of the West Pit and twenty six (26) private or municipal water supply wells are located within a ½-mile of the East Pit and proposed roadway relocations (**Figure 8**). Five of the wells are shown to be located in the middle of the West Pit and no longer exist. A number of the other wells identified by the CWI have been abandoned and/or sealed, particularly those wells shown in, or directly adjacent to, the Permit to Mine boundary; it is unclear why the CWI continues to list them as active wells. The status of the other identified by the CWI in the vicinity of the project has not been determined, nor have their locations been verified in the field.

With respect to the remainder of the domestic supply wells located within ½ mile of the proposed extension boundary, properties within 3,000 feet of active mining will continue to be evaluated for buyout to allow for a safety buffer during blasting. Those existing wells beyond the 3,000-foot buffer zone may experience some drop in water levels as the cone of depression from mine pit dewatering moves to the south. Though not anticipated, if maintaining adequate water levels in the wells becomes problematic, U.S. Steel will work with the well owners on an appropriate course of action to address the issue.

New Mine Access Road

The mine access road would not involve installation or abandonment of any water wells, or connection to or changes in any public water supply. The construction may require temporary appropriation of ground or surface water for dewatering during construction.

County State Aid Highway 102 Relocation – Connected Action

The relocation of CSAH 102 will not involve installation or abandonment of any water wells, or connection to or changes in any public water supply. The construction may require temporary appropriation of ground or surface water for dewatering during construction.

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.*

St. Louis County enforces shoreland zoning ordinances surrounding public waters. The county has designated shoreland zones within 1,000 feet and 300 feet of lakes and streams, respectively. The City of Mountain Iron identifies shoreland as:

All lands located within the following distance from the high water mark of public water:

(1) One-thousand feet from the ordinary high water mark of a lake, pond or flowage;

(2) Three-hundred feet from the normal high water mark of a river or stream or the landward extent of a flood plain designated by ordinance on such a river or stream, whichever is greater.

(3) The practical limits of shorelands may be less than the statutory limits where such limits are designated by natural drainage divides at lesser distances as shown on the Official Zoning Map of the city and when approved by the Commissioner.

In order to guide the wise development and utilization of shorelands of public waters for the preservation of water quality, natural characteristics, economic values and the general health, safety and welfare, certain public waters in the city have been given a shoreland management classification consistent with the criteria found in Minn. Rules, part 6120.3300, as it may be amended from time to time, and the DNR Public Waters Inventory for St. Louis County, Minnesota.

Public waters within or near the project area with shoreland protection areas have been classified as follows in **Table 14-1** (Rivers/Streams) and **Table 14-2** (Lakes/Wetlands).

Name	From Section	To Section	Township	Range	Comments	Shoreland Classification
East Two River	26	34	58	18W	Flows through PWI P-726	Tributary
Unnamed Tributary to East Two River (also called Silver Creek)	12	26	58	18W	--	Tributary
West Two River	31	31	58	18W	Flows through PWI P-994	Tributary
Parkville Creek	11	15	58	18W	Flows through PWI P-994	Tributary
Kinross Creek	19	30	58	18W	Flows through PWI P-994	Tributary
Sand River	2	1	59	18W	--	Tributary
Silver Lake Outlet	12	5	58	18/17 W	Flows through PWI P-662	Tributary
McQuade Creek (aka Kinney Creek)	11	16	58/57	19W	Flows through PWI P-781	Tributary
Unnamed Tributary to Sand River	24	1	59	18W	--	Tributary
Unnamed Tributary to Unnamed Tributary (to Sand River)	12	12	59	18W	--	Tributary
Unnamed Tributary to Little Sandy Lake	15	11	59	18W	--	Tributary
Unnamed Tributary to Sandy Lake	2	2	59	18W	--	Tributary

PWI ID	PWI Name	Alternate Name	PWI Class	Acreage	Wetland Type¹
69-0662	Silver		Palustrine	44	5
69-0663	Virginia		Palustrine	29	5
69-0721	Majestic	Haenke	Palustrine	57	5
69-0723	Mud		Wetland	17	4
69-0724	Unnamed		Wetland	17	4
69-0725	Mashkenode	Four-Mile	Palustrine	129	5
69-0726	Manganika	Three-Mile	Palustrine	181	5
69-0727	Kendall		Palustrine	53	5
69-0763	Doherty		Palustrine	71	5
69-0780	Yates	Formerly Yates Mine	Palustrine	13	5
69-0781	Kinney	Formerly Kinney Mine	Palustrine	43	5
69-0782	Dean		Palustrine	1	5
69-0783	Unnamed		Wetland	25	4
69-0785	Unnamed		Wetland	17	4
69-0786	Unnamed		Wetland	15	4
69-0994	West Two River Reservoir		Palustrine	1,260	5
69-1270	Unnamed		Wetland	1	4
69-1271	Unnamed		Wetland	8	4
69-1272	Unnamed		Wetland	9	4
69-0729	Sandy		Palustrine	121	5
69-0730	Little Sandy		Palustrine	89	5

¹U.S. Fish & Wildlife Circular 39 Classification (Shaw and Fredine, 1956)

The proposed project would impact approximately 0.25 acres of the 300-ft shoreland zone of McQuade Creek (aka Kinney Creek) and approximately 0.48 acres of the 1,000-ft shoreland zone surrounding Yates Lake (**Figure 6b**). Based on pre-design assumptions for CSAH 102 relocation, up to 3.5 acres of shoreland zone surrounding Parkville Creek would be impacted. However, these impact areas may be reduced based on final design, which would be described in more detail during the project permitting process.

FEMA 100-year floodplains are shown on **Figure 6**. The southern extension of the East Mine Pit would remove approximately 15.3 acres of 100-year floodplain from the uppermost reaches of Parkville Creek. This would result in a slight reduction in the width of the 100-year floodplain for some distance downstream from the mine extension due to decreased flow in the stream channel. The removal of 15.3 acres of floodplain is offset by removal of a portion of the headwaters area, which results in less contributing area for the downstream 100-year floodplain. The mine pit will act as an equalization basin during extreme precipitation or runoff events, dampening the flood peak. The approximate increase of 5% in mine pit dewatering discharge when the limits of the extension have been reached, is not expected to alter flood levels or floodplains.

There are no designated wild and scenic rivers within the project area.

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.

The proposed project would not directly affect the number or type of watercraft on any water body.

16. ***Erosion and sedimentation.*** Give the acreage to be graded or excavated and the cubic yards of soil to be moved: See details below acres ; cubic yards See details below . 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 Extension Area

The proposed mine extension includes 483 acres of material to be moved including ore, waste rock, and surface overburden over the life of the project. As of 1/1/2012, approximately 1,009,568,000 long tons of ore, 836,716,000 long tons of waste rock and 134,059,000 long tons of surface overburden remain within the mine extension. Mineland reclamation would occur in accordance with the DNR mineland reclamation standards. A description of the slopes of pit walls, maximum lift heights, benches, and vegetation restoration standards will be developed with the forthcoming Permit to Mine Amendment.

New Mine Access Road

The project area for the proposed mine access road potentially includes a 200-foot corridor along the proposed centerline. The project area has been estimated to be 26.6 acres for the mine access road. The future right-of-way for the mine access road is assumed to be 100 feet. It is unlikely that the entire right-of-way would be disturbed, however, therefore these impacts quantities are conservative estimates. Estimates of volume of material graded will be determined upon completion of the final roadway design. The project would result in some potential for erosion as existing ground cover will be disturbed.

A General Stormwater Permit for Construction Activity (MN R100001) and associated Storm Water Pollution Prevention Plan (SWPPP) would be required for this project. Erosion prevention and sediment control best management practices (BMPs) will be followed in accordance with the NPDES permit, which includes an erosion control plan, as well as BMPs such as those contained in Mn/DOT's standard specifications, details, and special provisions for roadway construction. Temporary and permanent erosion control features may include timely revegetation of disturbed areas, silt fences, fabric blankets, and sediment ponds. Erosion and sediment control measures would be implemented to protect all drainage areas leading to wetlands, lakes, ponds, and streams. Regular inspections are required as part of the permit to ensure that erosion and sediment control measures implemented are maintained and function as intended. Generally, inspections are required every seven days during active construction and within 24 hours of a rainfall event greater than 0.5 inches in a 24-hour period. A follow-up inspection is required within seven days of the event.

A SWPPP would be developed as part of the final design plans of the preferred alternative in accordance with NPDES requirements. The SWPPP would specifically identify which BMPs will be used and what purpose they will serve in minimizing potential short-term and long-term erosion and sedimentation that could adversely affect water quality.

County State Aid Highway 102 Relocation

The project area to be disturbed for the CSAH 102 relocation potentially includes 200-foot corridors along the proposed centerlines. The project area has been estimated to be 42.5 acres for the CSAH 102 relocation. The future right-of-way for CSAH 102 is assumed to be 100 feet. It is unlikely that the entire right-of-way will be disturbed however; therefore these impact quantities are conservative estimates. Estimates of volume of material graded will be determined upon completion of the final roadway design. The project will result in some potential for erosion as existing ground cover will be disturbed. Slopes associated with the roadway will be consistent with county and state guidelines. Construction of the road will be subject to current construction stormwater regulations and will require NPDES permit coverage under the MN General Stormwater Permit for Construction Activity program (MN R100001). Requirements of the permit discussed above for the mine access road would also apply to the CSAH 102 relocation.

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.

Mine Extension Area

Currently, U. S. Steel is authorized to discharge to various surface water systems under NPDES/SDS Permit No. MN0052493 (Minntac Mining Area) via seven outfalls (SD001, SD002, SD003, SD004, SD007, SD009, and SD010); the active outfalls are shown on **Figure 6c**. Minntac is working under a Schedule of Compliance (SOC) as of June 9, 2011 to bring its operations into compliance with permit conditions and limits stipulated in Chapter 4, Sections 3.1 and 3.2 of NPDES/SDS Permit No. MN0057207, which require no-net-increase in sulfates and hardness in treated Line 3 scrubber blowdown water quality versus makeup water quality.

Additionally, Minntac is planning construction of a seepage collection and return system to be completed in 2013 to collect seepage to the Dark River Watershed as part of the SOC. This would be similar to the Seep Collection and Return System installed in 2010 which collects surface and shallow subsurface seepage to the Sand River Watershed. Reductions in downstream sulfate concentrations in the Sand River Watershed have been observed since the seepage collection and return system initiated operation in 2010.

The proposed mine extension would not affect the Minntac facility site and the current storm water management practices or water quality related to storm water runoff. Minntac would continue to manage storm water runoff and compliance in accordance with the facility NPDES/SDS permits, SWPPP, and industrial storm water rules and regulations.

There will be an estimated 5% increase in pit area subject to surface runoff and groundwater inflow as a result of the proposed mine extension. The increase in pit volume is expected to result in a small incremental increase in surface runoff and groundwater capture. However, in terms of surface water flow in the affected watersheds, these incremental increases will be negligible in comparison to the natural inputs that the watersheds will receive from seasonal and long-term climatic variations in precipitation.

The proposed mine extension would not result in operational changes that will substantially affect the quantity of wastewater discharged from the facility. The volume of dewatering is expected to increase slightly as the pit expansions increase the catchment area and the mine pits deepen. However, dewatering discharge rates are expected to remain within currently permitted maximum volumes.

As discussed previously, in-pit stockpiling will continue to be utilized as much as possible. In-pit disposal of mine waste materials will continue to be maximized in order to limit the overall mining area footprint. Increased in-pit disposal may result in runoff, and therefore mine sump dewatering discharges, with elevated concentrations of certain dissolved constituents (e.g., sulfate, hardness, alkalinity, chloride). This could result in an increase of these constituents in downstream receiving waters, with concentrations decreasing with distance from the point of discharge. Levels of these constituents in mine pit dewatering discharges will be taken into account in future NPDES/SDS permitting.

The forthcoming Permit to Mine Amendment will describe surface water flow from the mining areas and waste rock stockpile drainage flow directions, storm water flow associated with the mine extension and new stockpile areas, and dewatering activities.

New Mine Access Road

A storm water management system would be designed to meet the requirements of the NPDES General Storm Water Permit for Construction Activity to be requested from the MPCA and any other local requirements. Since the project would result in an increase in impervious area, storm water runoff calculations would be estimated and the increased storm water impacts will be evaluated when the proposed roadways are designed. Management of surface water runoff for the roadway realignment would be described for construction and post-construction timeframes.

The new mine access road is proposed over the existing haul road between the Wacootah and Iroquois Pits. The mine access road is not expected to have adverse effects on surface water discharge rates or volumes within the existing subwatersheds. It is expected that surface water runoff from the mine access road will continue to shed off the roadway as it does currently from the haul road. As described above (Item 16) the General Storm Water Permit and accompanying SWPPP required for the project will define the appropriate surface runoff management for the NPDES permit. Water would be discharged through vegetated swales and/or ditches, but would be managed to ensure that water quality and water volume requirements are achieved. These requirements would offset the effects from the additional impervious surface created and the potential loss of

infiltration. The roadway design is currently in progress, and will account for the appropriate management and treatment of surface water runoff as required. This data will be available upon final design of the new mine access road and described in more detail in the appropriate state and federal permit applications for the project.

County State Aid Highway 102 Relocation – Connected Action

The CSAH 102 relocation is not expected to have adverse effects on surface water discharge rates or volumes within the existing subwatersheds. Surface water runoff from the CSAH 102 relocation corridor will be collected and discharged to the same locations that surface water would naturally flow to under existing conditions. Water may be discharged through ponds, vegetated swales, and/or ditches, but would be managed to ensure that water quality and water volume requirements are achieved. As described above (Item 16) the General Storm Water Permit and accompanying SWPPP required for the project will define the appropriate surface runoff management for the NPDES permit. These requirements would offset the effects from the additional impervious surface created, and the potential loss of infiltration. The roadway design is currently in progress, and will account for the appropriate management and treatment of surface water runoff as required.

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.

Mine Extension Area

Currently, U. S. Steel is authorized to discharge to various surface water systems under NPDES/SDS Permit No. MN0052493 (Minntac Mining Area) via seven outfalls (SD001, SD002, SD003, SD004, SD007, SD009, and SD010); the active outfalls are shown on **Figure 6c**. U.S. Steel currently dewateres Minntac's West Pit using Sump No. 3 and Sump No. 6. Water from Sump No. 3 can be directed to the Mountain Iron Pit reservoir for process makeup water needs. However, depending on various factors, such as climate cycles, Mountain Iron Pit water inventories, etc., Sump No. 3 can be discharged away from the Mountain Iron Pit to SD001, which ultimately feeds the East Branch of the West Two River. Water from Sump No. 6 is discharged to SD003, which feeds Kinney Lake, Kinney Creek, and unnamed wetlands.

Minntac's East Pit is dewatered using Sump No. 2 and the Prindle Sump. Similar to Sump No. 3, Sump No. 2 discharges to the Mountain Iron Pit, but is not permitted for discharge to other waters. The Prindle Sump discharges to outfall SD004, which feeds Parkville Creek. Excavation in the mine extension area will remove a section of Parkville Creek. The sump will continue to discharge to the creek, although its discharge point will be moved further south as mining activity proceeds.

As discussed in EAW Items 11 and 12, impacts to streams and their contributing watershed areas will occur due to excavation of the extension area for mining activities. Avoidance is not feasible because of the location of the ore. In addition to the direct loss of stream habitat, impacts to downstream water bodies (including downstream public waters) will also occur as the natural hydrology of the area is changed. While mine pit dewatering discharge will replace some of the natural flow that is lost, downstream water bodies may also be impacted by the "cone of depression" that results from pumping, particularly groundwater-fed streams and water bodies.

Monitoring could be incorporated into the project to track and then respond to downstream changes due to mining activities. Flow monitoring and/or geomorphology surveys downstream of the mine site prior to the extension could allow changes to be detected. U.S. Steel will work with the DNR, USACE, and MPCA to address stream impacts and mitigation during the wetland permitting process. Impacts proposed to areas considered "streams" by an agency will require a stream mitigation plan and proposal be submitted by the company for review and approval by the agency.

Tabulated below in **Table 17-1** are maximum dewatering rates assigned to each permitted discharge and average daily dewatering rates for years 2006 through 2009.

Dewatering from the mine extension would be directed toward the West Two River via various routes as currently permitted by the DNR and NPDES/SDS permits. The source of the groundwater would remain unchanged, and therefore there would be no anticipated change in water quality.

Location	Permitted Maximum	2006 Average	2007 Average	2008 Average	2009 Average
Sump No. 6	18	3.3	4.0	5.1	4.0
Sump Nos. 2 & 3	33.2	7.8	8.8	9.7	8.4
Prindle Sump	13	3.2	3.4	3.8	4.1

Note: All units in million gallons per day

New Mine Access Road

The NPDES construction stormwater permit and associated SWPPP will identify BMPs for controlling and/or treatment of the runoff discharge. Dewatering during construction may be required depending on the design of the roadways. Opportunities to provide treatment of road runoff will be identified as the roadway design is finalized. Roadway design is anticipated to be rural, and therefore lack curb and gutter and storm water collection infrastructure. Treatment of runoff will likely be accomplished through the use of adjacent roadside ditches and vegetated swales to promote infiltration of runoff and removal of sediment and nutrients prior to discharge into a receiving water.

County State Aid Highway 102 Relocation – Connected Action

A NPDES construction stormwater permit and associated SWPPP will be required for this project.

18. Water quality: wastewaters

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

U.S. Steel holds three NPDES/SDS permits for its Minntac operation: MN0052493 authorizes mine pit dewatering discharges from the Mining Area; MN0057207 authorizes seepage discharge from the tailings basin; and MN0050504 authorizes operation and discharge from of treated effluent from Minntac's main wastewater treatment plant (WWTP). The NPDES/SDS permits for the main WWTP and tailings basin do not need to be modified for the extension project. Similarly, as long as the discharge remains to the same receiving water currently permitted, the NPDES/SDS permit for the mine will not need to be modified to address the relocation of the Prindle Sump and discharge point further to the south as mining progresses southward in the East Pit extension area.

Sanitary facilities at the processing facility buildings generate wastewater of typical municipal composition. Additional sanitary facilities are provided for those locker facilities located in buildings north of both the East and West Pits.

NPDES/SDS permit MN0052493 authorizes operation of three Domestic Sewage Treatment Systems and Mine Pit Dewatering discharge from both the East and West Pits. The Domestic Sewage Treatment Systems are as follows:

1. Mobile Equipment Shop (MES) is an extended aeration activated sludge package treatment plant with a subsurface disposal system for the treated effluent. The sludge produced is removed and transferred to the City of Mountain Iron sanitary sewage system where it is managed and disposed of in accordance with NPDES/SDS MN0040835.
2. West Pit Dry Area is an extended aeration activated sludge package treatment plant with a subsurface disposal system for the treated effluent. The sludge produced is removed and transferred to the City of Mountain Iron sanitary sewage system where it is managed and disposed of in accordance with NPDES/SDS MN0040835.
3. East Pit Dry Area is an extended aeration activated sludge package treatment plant with a subsurface disposal system for the treated effluent. The sludge produced is removed and transferred to the City of Mountain Iron sanitary sewage system where it is managed and disposed of in accordance with NPDES/SDS MN0040835.

NPDES/SDS permit MN0050504 for the Main Wastewater Plant is for the main domestic wastewater for the mine's processing facility. It consists of an extended aeration activated sludge package treatment plant with disinfection of the treated effluent that is discharged to the tailings basin. The sludge produced is removed and transferred to the City of Mountain Iron sanitary sewage system where it is managed and disposed of in accordance with NPDES/SDS MN0040835.

The proposed project is an extension of mining operations and would not change the volume or composition of wastewater generated at the Minntac mine.

b. Describe waste treatment methods or pollution prevention efforts and give estimates of composition after treatment. Identify receiving waters, including major downstream water bodies (identifying any impaired waters), 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.

Sanitary wastewater generated at the processing facility buildings is treated and discharged on-site, either to subsurface disposal via drainfields, or to the tailings basin following effluent disinfection. Waste sludge is transported to the City of Mountain Iron Municipal Wastewater Treatment System for disposal. Because there would be no change or increase in sanitary waste generation, no changes would be necessary for the existing wastewater treatment methods or pollution prevention efforts related to sanitary wastewater.

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.

In addition to the response to item (b) above, sanitary waste generated at Minntac's Administration Building is discharged directly into the City of Mountain Iron's municipal sanitary collection system. No change in sanitary waste volume or quality is anticipated from the Minntac Administration Building as a result of the proposed project.

19. **Geologic hazards and soil conditions**

a. Approximate depth (in feet) to ground water:

0 feet (surface) minimum, 35 feet below ground surface average; Source: <http://pubs.usgs.gov/wsp/1759d/report.pdf>
The source data from the U.S. Geological Survey notes groundwater in wells at 35 feet below ground surface. However, minimum depths could be interpreted as at the surface because of groundwater presence at the surface of streambeds and wetlands. However, dewatering activities at the mine affects depth to groundwater, therefore an average depth to groundwater is highly variable.

to bedrock:

0 feet (surface) minimum, variable average; Source: *Bedrock and Quaternary Geology of the Central Mesabi Iron Range, Northeastern Minnesota* (Jirsa and Meyer, 2007) <http://conservancy.umn.edu/handle/109019>
The source data from the University of Minnesota indicates that depth to bedrock in this area varies between 450 feet to -270 feet. Bedrock in the East Pit ranges from 20 to 90 feet with an average of 50 feet. Bedrock in the West Pit ranges from 35 to 130 feet with an average of 70 feet.

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.

The iron ore formation mined at Minntac is part of the Biwabik Iron Formation in the Mesabi Range, which can be followed over a distance of 100 miles, has a width of 1.5 to 3 miles, and extends to a depth of 600 ft.

The Biwabik Iron Formation is of the Lake Superior type banded iron formation (BIF) of Proterozoic Age, about 2.1 billion years old. The formation is formed of thick-bedded granular units of cherts, iron silicates, magnetite and hematite inter-bedded with thin-bedded to laminated units of iron silicates, carbonates, magnetite or hematite. Generally, the oxide facies is composed of magnetite, hematite and goethite, whereas the silicate

facies consists of minnesotaite, stilpnomelane and greenalite. Local carbonate facies could be encountered with calcite and siderite.

The rock is mildly metamorphosed with metamorphic grade increasing on the eastern portion of the Mesabi Range where the Biwabik BIF comes in direct contact with the gabbroic Duluth Complex. East of Minntac, the Mesabi Range is deformed by a regional Z-fold known as the Virginia Horn.

Local Geology:

In the Minntac area, the Biwabik Iron Formation strikes generally ENE with a 6 to 9 degree SSE dip. Some minor folding and small scale Z-folds that mirror the Virginia Horn are also present. Fault zones exist and are marked by local oxidation of the host rocks.

The geological units that are found in the Minntac Area, from top to bottom, are:

- Upper Slate (Over 100 ft. thick, not exposed at Minntac). Fine-grained argillite/greywacke with occasional granular chert beds. The unit is very lean and uneconomic.
- Upper Chert (140 ft. thick). A variable unit with upper packages of mottled and fragmental granular massive chert with argillitic layers. This grades down into a horizon of very lean jaspery chert and argillitic layers with algal structures. In turn, this package grades into a zone of fragmental to conglomeratic grey chert with a chertmagnetite matrix. The bottom of the Upper Chert unit becomes interlayered with more laminated argillitic chert silicate magnetite beds.
- Lower Slate (L.S., 150 ft. thick). (*Note that the term “intermediate slate” is not used at Minntac because it does not accurately reflect the local geology.*) The top of the L.S. features fine-grained laminated chert-silicate-magnetite-carbonate taconite. Often present in the middle of the L.S. is podshaped massive chert-silicate-magnetite "interbedded chert" or IBC. The IBC pinches and swells laterally and is occasionally stacked. The bottom portion of the L.S. is dark green to black (graphitic) and is finely laminated and fissile. Portions of this unit are economic and marked by a quartz-carbonate vein at the LC5B contact. This contact, at certain exposures along the East Range features pyrite and is denoted in the literature as the “intermediate slate”. At Minntac however, the bottom portion of the L. S. is 20 to 30 feet thick, dark green or gray (graphitic) in color and usually features a thin quartz-carbonate vein at the LC5B contact. The percentage of magnetite decreases as the LC5B contact is approached. This contact subunit is very thinly bedded and fissile; therefore oxidation is not common and is restricted locally. Sulfide mineralization near the base of the L. S. is rare and a noteworthy amount has not been encountered by Minntac’s geologist. This finding is supported by results of a study conducted by Harlan B. Niles of Coleraine Minerals Research Laboratory in 2003. The study report “Chemistry and Mineralogy of Diamond Drill Core Samples from USS Minntac” indicates that random drill holes were selected across Minntac for chemical and mineralogical analysis. Results revealed the presence of sulfur and pyrite in the lowest portion of the L.S. in very small amounts – generally less than ½ of one percent.

Though sulfides (such as pyrite) are present in only small amounts in the L.S., it is acknowledged that sulfate levels in the tailings basin have become problematic for seepage discharged to the environment. This situation is an existing issue that will continue to be addressed though ongoing water quality permitting, whether or not the proposed extension project is implemented. DNR Lands and Minerals and the MPCA are currently exploring if materials handling/stockpiling at the site could be managed in such a way that reductions in sulfate levels could be achieved. The manner in which materials are handled/stored could reduce or avoid long term generation and release of sulfate. Potential changes in operations related to materials handling/stockpiling could become requirements or conditions incorporated into the Permit to Mine Amendment if and when it is issued for the extension project. The timing of the amendment for the extension project presents an opportunity to address this broader issue. Please see EAW Items 17 and 30 for additional discussion.

- Lower Chert 5B (LC5B, 23 ft. thick). Massive to thick bedded, coarsely granular silicate-chert-carbonate taconite. Often interbedded with green to black slate bands. Very rarely economic.
- Lower Chert 5A (LC5A, 23 ft. thick). Granular, fragmental to conglomeratic. Magnetite is disseminated throughout and this unit is sometimes economic.

- Lower Chert 4 (LC4, 60 ft. thick). Upper part is massive to wavy and thick-bedded silicate-chert-magnetite with magnetite-carbonate layers. Lower part features magnetite mottles. Usually of economic grade.
- Lower Chert 3 (LC3, 35 ft. thick). Medium to coarse granular chert-magnetite-silicate-carbonate taconite. This unit is best recognized by wispy veils of magnetite. Occasional magnetite mottles and grains. Usually of economic grade.
- Lower Chert 2 (LC2, 25-30 ft. thick). Thick, even bedded to massive chert-magnetite-hematite-carbonate taconite. Often marked by pink oxides and carbonates and by the first appearance of primary hematite. Usually of economic grade.
- Lower Chert 1 (LC1, 30 ft. thick). Granular massive chert-carbonate-hematite-magnetite horizons, usually interbedded with laminated argillitic layers. Often of uneconomic grade.

The majority of the easily recoverable iron units are found in the Lower Chert.

Mineralization:

The mineralization mainly consists of very fine magnetite with some occurrences of hematite, maghemite and goethite. The mineralization appears as fine layers of iron minerals alternating with chert. The bands in turn may contain laminae in the order of microns in thickness.

Gangue minerals are comprised of chert, minnesotaite, stilpnomelane, greenalite, calcite, ankerite, siderite, graphite with some sulfides as pyrite and marcasite.

Recoverable iron ore grades could vary from 15 to 30% iron content with a concentrate silica content ranging from 4 to 10% and a concentrate weight recovery in the order of 28-32% after flotation.

There are no known sinkholes, shallow limestone formations, or karst conditions observed on, or adjacent to the site according to the DNR's Karst Features Database.

The forthcoming Permit to Mine Amendment will include discussion of measures to prevent or minimize potential environmental problems associated with the proposed extension and roadway relocations related to geology or soil conditions. Methods for stockpiling, volumes, and stockpile locations will be addressed.

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

The Soil Survey for St. Louis County (Web Soil Survey 2.1, National Cooperative Soil Survey, Version 9, November 17, 2008) provides soils information with regards to the project. Soils information for the entire study area was retrieved and reviewed (see **Figure 9**).

The majority of the soils in the project area are composed of loam or sandy loam, often associated with glacial till. Areas of peat and muck deposits are also present. The MPCA's "Groundwater Contamination Susceptibility in Minnesota" map identifies the project area as having Low Susceptibility.

"Soils of Statewide Importance" is a farmland classification for soils as defined by the USDA Natural Resources Conservation Service policy and procedures on prime and unique farmlands as published in the Federal Register (Vol. 43, No. 21, January 31, 1978). Farmland classification for a soil is due to its location, extent, and best suitability for food, feed, fiber, forage, and oilseed crops. In the case of any of the land areas within the Minntac Extension, no areas are currently farmed or utilized for active production of food, fiber (such as silviculture), forage, or oilseed crops. Those soils within the Extension area classified as "Soils of Statewide Importance" will be cleared and stripped in preparation for mining in the same fashion as surrounding soils. It is not feasible to discriminate between differing soil associations during land-stripping activities to stockpile these soils in separate stockpiles based on soil classification. All topsoil and underlying parent material and residuum is stripped and piled together within designated stockpile areas within the active mine.

Table 19-1 provides a summary of the soils within the 483-acre mine extension area. **Table 19-2** indicates the mapped soils within the new mine access road corridor. **Table 19-3** indicates the mapped soils within the CSAH 102 relocation corridor.

Soil Symbol	Soil Name	Approx. Acres	% of Area	Hydric Soil	Prime Farmland
1003B	Udorthents, loamy (cut and fill land)	145.7	30%	Unknown Hydric	Not Prime
1020A	Bowstring and Fluvaquents, loamy, 0 to 2 percent slopes, frequently flooded	16.3	3%	All Hydric	Not Prime
1048	Dumps, iron mine	59.7	12%	Unknown Hydric	Not Prime
1049	Pits, iron mine	8.6	2%	Unknown Hydric	Not Prime
B27A	McQuade-Buhl complex, 0 to 3 percent slopes	31.7	7%	Partially Hydric	Not Prime
B28B	Buhl loam, 1 to 5 percent slopes	11.9	2%	Partially Hydric	Not Prime
B29B	Hibbing-Buhl complex, 1 to 8 percent slopes	53.8	11%	Partially Hydric	Statewide Importance
B31D	Hibbing loam, 8 to 18 percent slopes	3.6	1%	Not Hydric	Statewide Importance
B32A	McQuade-Dora, depressional-Fayal, depressional complex, 0 to 2 percent slopes	10.2	2%	All Hydric	Not Prime
B33A	McQuade-Fayal, depressional complex, 2 to 8 percent slopes	24.5	5%	Partially Hydric	Not Prime
B34B	Majestic-Hibbing complex, 2 to 8 percent slopes	19.8	4%	Partially Hydric	Statewide Importance
B63B	Urbanland-McQuade-Buhl complex, 0 to 12 percent slopes	60.9	13%	Partially Hydric	Not Prime
M-W	Water, miscellaneous	36.4	8%	Unknown Hydric	Not Prime
Total		483.2	100%		

Soil Symbol	Soil Name	Approx. Acres	% of Area	Hydric Soil	Prime Farmland
1003B	Udorthents, loamy (cut and fill land)	17.6	66%	Unknown Hydric	Not Prime
1048	Dumps, iron mine	2.8	11%	Unknown Hydric	Not Prime
1049	Pits, iron mine	3.9	15%	Unknown Hydric	Not Prime
B29B	Hibbing-Buhl complex, 1 to 8 percent slopes	0.7	2%	Partially Hydric	Statewide Importance
M-W	Water, miscellaneous	1.6	6%	Unknown Hydric	Not Prime
Total		26.6	100%		

Soil Symbol	Soil Name	Approx. Acres	% of Area	Hydric Soil	Prime Farmland
1003B	Udorthents, loamy (cut and fill land)	17.8	42%	Unknown Hydric	Not Prime
1020A	Bowstring and Fluvaquents, loamy, 0 to 2 percent slopes, frequently flooded	1.1	2%	All Hydric	Not Prime
1048	Dumps, iron mine	8.4	20%	Unknown Hydric	Not Prime
B27A	McQuade-Buhl complex, 0 to 3 percent slopes	3.2	8%	Partially Hydric	Not Prime
B29D	Hibbing-Buhl complex, 1 to 18 percent slopes	11.2	26%	Partially Hydric	Statewide Importance
B63B	Urbanland-McQuade-Buhl complex, 0-12% slopes	0.5	1%	Partially Hydric	Not Prime
B67A	Rifle soils, Hibbing catena, 0 to 1 percent slopes	0.1	0.3%	All Hydric	Not Prime
M-W	Water, miscellaneous	0.2	1%	Unknown	Not Prime
Total		42.5	100%		

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.

Minntac mine waste will continue to be managed as indicated under the existing Permit to Mine. The mine waste characterization remains the same as under the original permit. In general terms, mine waste consists of surface overburden, loose material, and waste rock. Waste rock consists of blasted material of sufficient size to be loaded into haul trucks – typically 8 feet square down to minus 50 mesh.

Mine Extension

Minntac is currently licensed as a Small Quantity Generator of hazardous waste. Wastes are managed and disposed of in accordance with this license. However, no changes to waste production would result from the proposed mine extension.

New Mine Access Road

Construction of the proposed roadway would not generate substantial amounts of solid or hazardous waste. Contractors would be likely to produce small amounts of solid waste during construction that would be hauled offsite and disposed of in accordance with federal, state and local requirements.

County State Aid Highway 102 Relocation – Connected Action

Construction of the proposed roadways would likely not generate substantial amounts of solid or hazardous waste. It is anticipated that the existing bituminous driving surface from CSAH 102 will not be reused for the relocated CSAH 102 due to the timing of vacating the road. The deconstruction of the existing CSAH 102 will likely occur after the new road is constructed in order to allow for continuity of the connection between Mountain Iron and Virginia. The contractor responsible for the construction/deconstruction activities may stockpile re-useable materials from the existing CSAH 102 for future use in other roadway projects.

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.

Mine Extension

Continuation of mining operations would include the continued transportation and use of blasting agents including ANFO (ammonium nitrate and fuel oil) and emulsion blend explosives. Other materials present would include those associated with mobile equipment including lubricants (greases, hydraulic fluid, oil), fuel oil and gasoline, antifreeze, batteries, and tires. Current operations include preventative measures such as transportation of explosives by vendors in leak-proof trucks, proper maintenance and best management practices in fueling and waste disposal. These practices would continue as mining progresses into the extension area.

New Mine Access Road

During construction, it is anticipated that construction equipment would contain gasoline, diesel fuel, antifreeze, lubricants, and other fluids. If these products are used, they would be disposed of in accordance with local, state, and federal regulations. Fueling of construction machinery and equipment will be completed in areas away from wetlands, water bodies and waterways.

County State Aid Highway 102 Relocation – Connected Action

During construction, it is anticipated that construction equipment will contain gasoline, diesel fuel, antifreeze, lubricants, and other fluids. Fueling of construction machinery and equipment will be completed in areas away from wetlands, water bodies and waterways.

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.

Mine Extension

There are aboveground storage tanks (ASTs) on the Minntac property. Currently at the West Pit, Minntac maintains two diesel fueling sites with ASTs for heavy mobile equipment. At the East Pit, Minntac maintains one diesel fueling site with an AST for heavy mobile equipment. There would be no new above or below ground petroleum product storage facilities within the limits of the proposed mine extension area. All fuels, lubricants and other liquid products to be used would continue to be supplied from existing storage and supply sources within the mining operation. All on-site equipment fueling would continue to be performed using best management practices to avoid and clean up spills.

New Mine Access Road

Minntac has Emergency Response Plans and procedures in place through the ISO 14001 management system which would be utilized for this project. The procedures provide instructions for actions to be taken should an incident occur, such as a spill.

County State Aid Highway 102 Relocation – Connected Action

U. S. Steel has no knowledge of tanks which would be used for this project, or emergency response plans in place.

21. **Traffic.** Parking spaces added: N/A

Existing spaces (if project involves expansion): None

Estimated total average daily traffic generated: No increase over existing traffic levels

Estimated maximum peak hour traffic generated and time of occurrence:

Indicate source of trip generation rates used in the estimates.

If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW. Using the format and procedures described in the Minnesota Department of Transportation's Traffic Impact Study Guidance (available at:

<http://www.oim.dot.state.mn.us/access/pdfs/Chapter%205.pdf>) or a similar local guidance, provide an estimate of the impact on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project's impact on the regional transportation system.

CSAH 102 (also known as Old Highway 169) provides a continuous connection along CSAH 102 between Trunk Highways 53 and 169 and the communities of Virginia and Mountain Iron. CSAH 102 is a public roadway which provides access to the Minntac mine facility as well as connectivity between TH 53 and 169.

The western segment of the roadway provides access to the historic area of Mountain Iron as well as access to the Minntac mine from the west. The proposed mine extension would result in elimination of approximately 1.5 miles of the eastern segment of CSAH 102 and require relocation of the roadway in accordance with Minn. Statute 160.10. Traffic going to the Minntac facility would utilize the new mine entrance road and no longer have the option of going through downtown Mountain Iron. However, the proposed mine extension would not increase the number of personnel at the Minntac operation or result in any net change in daily trips or the time of peak traffic.

A Minntac Entrance Traffic Impact Study was conducted by the St. Louis County Public Works Department in 2009 to assess existing traffic and turning movements at the Minntac entrance and determine the potential effect of the loss of CSAH 102 access from the east. The study investigated whether Mineral Avenue is physically/structurally capable of carrying the additional traffic generated if a new mine access road was not constructed. The traffic study's conclusion addresses only the physical capacity of the roadway quantified in vehicles per hour, i.e. could the road handle the additional traffic.

The study evaluated two options for rerouting mine traffic: 1) routing traffic on the western segment of CSAH 102 (Mineral Avenue) through Mountain Iron, and 2) using a new mine access road that would bypass the old downtown area of Mountain Iron. Traffic projections were completed for CSAH 102 and the mine entrance road.

There are currently an estimated 2,050 vehicles per day using Mineral Avenue through Mountain Iron. The study shows that the loss of CSAH 102 east of the existing mine entrance would result in an additional 510 eastbound vehicles and 400 westbound vehicles traveling through Mountain Iron each day with a peak during the period between 5:30 a.m. and 7:00 a.m. (the shift change involving the largest number of employees). This would increase the traffic volume on Mineral Avenue by 910 vehicles per day to approximately 2,960 vehicles. This represents an increase of approximately 44 percent, but is less than the estimated 4,000 vehicles per day that would use the roadway if mine employment were at the higher levels of the 1970s.

The study reports that the increase in traffic that would result from routing mine traffic along Mineral Avenue in Mountain Iron would not exceed the capacity of the roadway, would not diminish the level of service from an "A" rating without altering existing traffic control. Therefore, no adverse consequences would be expected.

Construction and use of a private mine access road would accommodate approximately 2,790 mine-related trips and reduce traffic in Mountain Iron from 2,050 vehicles per day to 170 vehicles per day.

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.*

Mine Extension

There would be no net effect on air quality as a result of the proposed project. Employees would continue to report to work at existing locations resulting in no increase in personal vehicle emissions. As mining activities continue into the extension area, emissions related to the operation of production trucks, loaders, graders, automotive vehicles would continue at their current operational levels into the adjacent extension area. Haul distance and mining equipment usage requirements would be similar to the current operation.

New Mine Access Road

Employees would report to work using the new access road resulting in no net increase in personal vehicle emissions.

County State Aid Highway 102 Relocation – Connected Action

Traffic on the realigned CSAH 102 is expected to be the same as that carried on the existing CSAH 102. Traffic could increase as development occurs in the area, but this would be unrelated to the proposed project.

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.

No new sources of air emissions would result from the proposed project. The proposed mine extension would not be expected to increase any air emissions above the current levels.

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.)

Mine Extension

The proposed project would generate mining equipment diesel engine exhaust; dust as a result of blasting, materials handling, and equipment movement on unpaved roads; and noise as a result of blasting and heavy mining equipment engine operation.

Dust: Fugitive dust generated from haul road traffic and other routine mining activities would be minimized by following the procedures outlined in Minntac's Fugitive Emissions Control Plan. This Plan includes control measures such as use of dust suppressants, watering, grading, and covering roadway surfaces with crushed rock. Dust generated from blasting would be controlled by blast technique and taking advantage of optimum weather conditions (*i.e.*, wind).

Blasting: Generally, mine blasting is one of the greatest public concerns. Blasting is a necessary part of mining; it cannot be eliminated but it can be controlled to what most people agree is acceptable. Blasting regulation has focused on establishing noise and ground vibration limits designed to prevent structural damage to buildings and other manmade structures. These levels are measurable with sensitive instrumentation, and were developed by observing the impacts on structures exposed to actual mine blasts. The noise and vibration limits that were established are well below the levels that cause damage such as the initiation or expansion of cracks in plaster walls.

Window glass cracking or breakage is the most common type of damage due to blasting. While it can be substantially reduced by meeting blasting limits, it is not always eliminated. Experience has shown that a number of factors beyond blasting influence this type of damage, including extremes in air temperatures, stresses on the glass resulting from poor alignment within the window frame, or simply the age of the glass that can cause it to become brittle. In almost every case where window damage occurs as a result of blasting, the windows affected directly face the direction from which the blast occurred, making it simpler to assess the cause of the damage.

The work on developing noise and ground vibration blasting levels was done by the U.S. Bureau of Mines between 1950 and 1975. While the Bureau's main emphasis was on developing blasting limits to prevent structural damage, the Bureau also studied impacts of blasting on people. On the basis of its research, the Bureau concluded that if blasting is controlled so that the structural damage limits are met, most people find the noise and vibrations tolerable, though sometimes disconcerting.

There are a number of factors that influence the level of noise from a blast. These include: the size of the blast, the amount of explosive ignited at any given instant, the direction and speed of the wind that will carry the noise, the integrity of the rock being blasted (degree of fractures and weathering), the barometric pressure, the physical location of the blast (near the surface or deep in the pit), and many other factors. These factors are so variable that mining company personnel must continually adjust blasting patterns to compensate for the variability. Such adjustments are based on the experience the company gains from each blast and the mandatory monitoring of noise and vibration levels. If the levels of noise and vibration start to approach the DNR threshold

standards, actions must be taken on subsequent blasts to lower them. Frequent adjustments include changing spacing of blast holes, reducing the size of the blast pattern, reducing the amount of explosives ignited at any given instant, or delaying the blast until the wind direction or barometric pressure changes.

U. S. Steel's Minntac facility uses rotary drills to bore widely-spaced, large diameter holes. These holes are loaded with emulsion blend blasting agents. The upper portions of the holes are back-filled with crushed stone to contain the energy. The holes are tied together using a non-electric system. Milli-second delays interrupt the large blasts, breaking them up into many small, closely-spaced blasts that appear to be one event. Seismographs and sound level meters are placed in nearby neighborhoods to monitor whether ground vibration and noise levels are held to acceptable levels.

U. S. Steel completes blasts at its Minntac facility only when the meteorological conditions are conducive. Surface winds, winds aloft and temperatures aloft all have a profound effect on the resulting sound level. Blasts are designed to withstand a wait of several weeks if unfavorable weather conditions persist. To insure that no personnel are in the flyrock zone, affected mine areas and neighboring properties are secured before blasts are set off.

A noise survey was conducted in association with the environmental review conducted for the previous Minntac mine extension in 1996. At that time, the nearest residence was located 2,500 feet from the perimeter of the extension and the study concluded that noise standards would not be exceeded at that location. The proposed extension of the West Pit would not decrease the distance between mine operations and residential uses (i.e.; bring these land uses closer together). Extension of the East Pit would decrease the distance to the Parkville area. Currently, there are two remaining residences within 1200 feet of the future East Pit Extension pit boundary. The closest residence is approximately 250 feet from the boundary. The second residence is approximately 400 feet from the future boundary. Relocation efforts are on-going with both residences. U. S. Steel continues to purchase residences in the northern portion of Parkville in order to provide a buffer between residences and mining activities. It is expected that that portion of Parkville between 2nd Avenue and Township Road 6811 will be vacated by the time mining begins in the proposed extension area, providing a similar buffer as the one that exists today, to ensure that noise standards will continue to be met.

New Mine Access Road

Odors generated during construction are anticipated to be minor. Noise may be generated by equipment during construction. Contractors would be required to follow the local noise ordinances and would follow industry standard for times worked during the day.

Fugitive dust is expected to be generated on-site by heavy equipment during construction. Dust generation would be minimized through BMPs during construction including minimizing the periods and extent of exposed and/or graded areas, watering construction areas as appropriate, and minimizing the use of vehicles on unpaved surfaces.

25. *Nearby resources. Are any of the following resources on or in proximity to the site? If yes, describe the resource and identify any project-related impacts on the resource. Describe any measures to minimize or avoid adverse impacts.*

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

Archaeological, historical or architectural resources

The Mountain Iron Mine Historic Site is a water-filled pit of the previous Mountain Iron Mine (and known as the Mountain Iron Pit). It is listed on the National Register of Historic Places (NRHP) and is a National Historic Landmark (NHL). The mine was first discovered in 1890 and began shipping ore in 1892. This mine, along with the other natural iron ore mines of Minnesota's Mesabi Range, provided more than half the iron ore mined in the entire country between 1892 and 1961. The large amount of ore mined identified the fact that the Mesabi

Range contained the world's largest deposits of iron ore and made Minnesota the leading iron supplier in the nation. The mine closed in 1956, yielding more than 48 million tons of ore during its 64 years of operation. The pit is now used as a reservoir by U.S. Steel. The Mountain Iron Mine Historic Site is on the National Park Service Listing of National Historic Landmarks and is named as an historic place by the State of Minnesota. Mountain Iron Park in the City of Mountain Iron contains some historic mining equipment used at the mine.

The Mountain Iron Landscape Historic District (District) includes ten properties located at the southeast tip of the Mountain Iron Mine water-filled pit. One of the investigations completed in the project area indicated that the District may be eligible for inclusion in the NRHP under Criterion A for its association with early mine exploration and the development of the Mesabi Iron Range.

Neither the Mountain Iron Mine Historic Site nor the District will be directly impacted with the mining extension or construction of the proposed new roadways. The sites are within the Environmental Settings Boundary for the Minntac Mine but are not within the current or proposed permit to mine limits.

No other archaeological, historic, or architectural resources are known to exist within or near the proposed mine extension. A Phase IA literature search and field reconnaissance for archaeological potential (July 2011) and Phase I archaeological survey (October 2011) were conducted for the Minntac extension area and mine access road (Landscape Research LLC and Two Pines Cultural Resources LLC, 2011). The results of the Phase IA literature search indicated a generally low potential for intact precontact archaeological resources to be present within the project area of potential effect (APE). No archaeological sites were identified in the subsequent Phase I archaeological survey and no additional work is recommended within the Extension areas. Correspondence has been sent to the Minnesota State Historic Preservation Office (SHPO) to obtain their concurrence that no historic properties would be affected by the proposed project. The USACE is coordinating with SHPO regarding potential effects on historic properties. Any adverse effects on historic properties would need to be resolved before permits could be issued for the project.

Prime or unique farmlands or land within an agricultural preserve

There are no Prime Farmlands within the project limits; however, there are three soil consociations within the project limits that are classified as Soils of Statewide Importance (B29B, B31D, and B34B). These soils compose 77.2 acres, or 16% of the proposed mine extension, and 0.7 acres (2%) of the proposed new access road alignment. Ownership by U. S. Steel prevents agricultural use, resulting in no adverse impacts to Soils of Statewide Importance.

Designated parks, recreation areas or trails

The Mesabi Trail extends from Grand Rapids to Ely and bisects the project area traversing through the City of Mountain Iron and east to the City of Virginia (see **Figure 4**). The proposed mine access road would cross the Mesabi Trail. There may be temporary impacts to users of the trail during construction of the road, including temporary closure of the trail, dust, and noise. In addition, the trail experience/surroundings in this area will be somewhat different after the road's construction as there will be occasional traffic and associated noise. Other portions of the trail extend through areas with traffic, and the impact to trail users is not anticipated to be substantial. Current plans indicate a below grade box culvert will be used to reroute the trail at the new mine access road crossing, thus trail connectivity through the area will be maintained. The proposed reroute plan has been reviewed and approved by the St. Louis County Regional Rail Authority.

The Minnesota DNR manages a state snowmobile trail (The Laurentian Trail), which has segments that originate on the west side of the project area in Kinney, and on the east side in Virginia. The trail is entirely outside the extension area, and would not be affected by the proposed project.

Scenic views and vistas

Located approximately one mile from Mountain Iron Park, the Wacootah Overlook provides a view of the Minntac taconite plant and mine (see **Figure 4**). Due to the proximity to the existing mine entrance, privatization of the proposed mine access road would eliminate public access to the Wacootah Overlook.

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.

The proposed project would not increase visual impacts related to lighting, cooling towers, exhaust stacks, or other barriers. Due to the isolated location, large property boundary, fencing, berming, and forested buffers surrounding Minntac, adverse visual impacts have been and will continue to be minimal. Height increases in stockpiles and inner tailings basin cells would continue to be noticeable from certain distant viewpoints. However, future mining activity and roadway closures are scheduled to eliminate the current best publicly accessible views of Minntac such as the northbound Highway 53 Eveleth to Virginia corridor, the Virginia “Mine View in the Sky” overlook, and the Mt. Iron Wacootah overlook.

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.

Mine Extension

The City of Mountain Iron has zoned the mine extension area “Mineral Mining District” (MM), the purpose of which is “to provide areas for active mining use and to protect from urban development those areas which have minerals, timber or other potentially marketable natural resources.” Mining, processing, storage and transportation of taconite and other metallic ores are permitted uses.

New Mine Access Road

The new Mine Access Road would serve as an entrance to the Minntac facility to alleviate the need for traffic flow through downtown Mountain Iron.

County State Aid Highway 102 Relocation – Connected Action

Minn. Statute 160.10 provides a mechanism for the relocation of roads on mineral lands. Based on the statute, St. Louis County and U.S. Steel have negotiated a tentative (yet to be signed) agreement regarding responsibility for the relocation of CSAH 102. As it currently stands, the agreement stipulates that U.S. Steel will be responsible for construction of the road and associated permit submittals. Per Minn. Statute 160.10, the roadway must be constructed to at least the engineering standards of the old roadway. Due to roadway designation and funding, it must be designed to current CSAH standards. To that end, Minntac has coordinated with St. Louis County Public Works and the City of Mountain Iron to identify an alignment for CSAH 102 south of the current alignment as shown on **Figure 3**. This is the preferred alignment for the roadway relocation and will connect CSAH 109 and the existing CSAH 102 (Mineral Avenue) in Mountain Iron. It will reasonably replace the functionality of the existing CSAH 102 and provide local transportation connectivity independent of Trunk Highway 169. Final road alignment is pending wetland permitting.

Although the preferred alignment does not provide full replacement of the function of the existing CSAH 102, the proposed alignment minimizes wetland impact and will not likely be eliminated by future mining activities in the area. Other corridors/alternatives explored for the roadway relocation would likely be mined within the useful service life of the reconstructed roadway and would have resulted in a substantial impact to wetlands between existing CSAH 109 and Trunk Highway 53.

28. **Impact on infrastructure 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.)

The proposed mine extension would result in elimination of a portion of the eastern segment of CSAH 102 which impacts the public road infrastructure and access to the mining facility from the east. Elimination of this segment of CSAH 102 will also remove the local highway connection between Trunk Highways 53 and 169 and the communities of Mountain Iron and Virginia.

Minn. Statute 160.10 provides a mechanism for the relocation of roads on mineral lands. Based on the statute, St. Louis County and U.S. Steel have negotiated a tentative (yet to be signed) agreement regarding responsibility for the relocation of CSAH 102. As it currently stands, the agreement stipulates that U.S. Steel will be responsible for construction of the road and associated permit submittals. Per Minn. Statute 160.10, the roadway must be constructed to at least the engineering standards of the old roadway. Due to roadway designation and funding, it must be designed to current CSAH standards.

In cooperation with St. Louis County Public Works and the City of Mountain Iron, US Steel has identified an alignment for CSAH102 south of the current alignment as shown on **Figure 3**. Reconstruction of CSAH 102 is being designed by a consultant engineering firm retained by U.S. Steel and is subject to review and approval by the St. Louis County Public Works Department and the Minnesota Department of Transportation State Aid Office. The roadway reconstruction project will be permitted, funded, and constructed by U.S. Steel, based on the tentative agreement reached between the company and the County. Upon completion and approval of the reconstructed roadway, the St. Louis County Public Works Department will take over ownership of the new CSAH 102 transportation corridor.

29. **Cumulative potential effects.** *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 potential effects. (Such future projects would be those that are actually planned or for which a basis of expectation has been laid.) Describe the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects (or discuss each cumulative potential effect under appropriate item(s) elsewhere on this form).*

Cumulative effects are those that result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency or individual undertakes such other actions.

Stream habitat loss from past, current and future mining activities has a cumulative effect. The health of a river system is dependent on connectivity and access to diverse habitat is important for game fish populations as well as their prey. The West Two Rivers Reservoir dam is a barrier to fish passage, and since the fish and mussel populations in the reservoir are already disconnected from downstream waters and populations, loss of upstream tributary habitat is important. As indicated in Item 12, approximately 4,002 linear feet of stream would be removed through the proposed Extension Project. Approximately 45,123 linear feet (8.5 miles) of stream has already been removed due to past mining activity.

In addition to the direct loss of stream habitat, cumulative effects to downstream public waters and other water bodies will also occur as the natural hydrology of the area is changed. Contributing watershed areas can be severed or completely removed due to mining activity. The proposed Extension Project will impact 470 acres of watershed contributing area. Approximately 10,052 acres of watershed have already been impacted or will be, due to past or current mining activities.

The proposed project would include impacts to 66.7 acres of wetland for the Mine Extension Area and new mine access road. Impacts resulting from the new mine access road are expected to be minimized where possible during the planning and design process. The potential new CSAH 102 relocation corridor could affect up to 2.0 acres of additional wetlands.

The Environmental Assessment prepared in 1976 for the "Step III" Expansion Project does not identify any wetland impacts, but it is likely that wetland loss occurred with the initial development and growth of the mine

as well as from the initial mining in the 1950s. The EAW prepared for the previous Minntac mine extension in 1996 reports loss of 275 acres of wetland habitat from the 1,360-acre extension of the mine pits. Permitting efforts are ongoing for 80.6 acres of wetland impact, the last portion of the 275 acres described in the 1996 EAW.

The proposed extension of the Minntac mine will result in further wetland loss in the headwaters of the St. Louis River watershed. However, upon cessation of mining, dewatering will cease and the mined pits will flood and become other deep water pits. This will result in a loss of the functions and values provided by shallow marsh, shrub, and forested wetland habitat that are not replaced by open water habitat.

The proposed action will result in 66.7 acres of direct wetland impacts. Previous permits have been granted for 5.1 acres of wetland impact. In addition, it is expected that 5.4 acres of additional wetland area will be lost due to indirect impacts by fragmenting portions of wetlands. Subtracting previously permitted impacts (5.1 acres) and adding potential indirect impacts (5.4 acres), mitigation is expected to be required for up to 67.0 acres of impact. These wetland losses will be replaced at an anticipated minimum ratio of 1.5:1 in advance of or concurrent with the extension. The loss of wetland functions and values was mitigated from the last mine extension and will be mitigated from the proposed extension as well.

Reasonably foreseeable future projects within the vicinity of the Minntac Extension area are described in the following table.

Project	Owner	Watershed
Mountain Iron Industrial Park Development	Unknown projects of various potential and ownership	St. Louis River
2012 Reclaim and Overlay of County Highway 16	St. Louis County	St. Louis River
2019 Reclaim and Overlay of County Highway 25	St. Louis County	St. Louis River
2013 Reclaim and Overlay of County Highway 65	St. Louis County	St. Louis River

See **Figure 10** for the location of these potential future projects in relation to the proposed Extension. No other reasonably foreseeable future projects were identified after consideration of potential projects by the individual municipalities in the study area and the St. Louis County Public Works Department.

Construction of the new of County State Aid Highway 102 corridor is expected to generate development in the City of Mountain Iron industrial park (see **Figure 10**). The number, size, and location of potential developments along the relocated roadway corridor cannot be quantified at this time. The National Wetlands Inventory identifies wetlands in the area. However, sufficient upland area is available for development without substantial impacts to wetlands.

The 10-Year Road & Bridge Construction Program of the St. Louis County Public Works Department identifies three “reclaim and overlay” projects as shown on **Figure 10**. Because these projects all include reconstruction of existing facilities, no substantial wetland impacts, if any, are expected.

- 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.*

Existing Site Issue – Sulfate Concentrations in Facility Related Discharges

The following information pertains to sulfate concentrations in facility related discharges, which is an existing issue at the Minntac site. The existing situation is not anticipated to be appreciably affected by the proposed

mine extension project. The issue will continue to be addressed through ongoing water quality permitting, whether or not the proposed extension project is implemented.

Tailings Basin

The ore to be mined through the proposed extension project is of similar sulfur content as the ore currently being mined and processed at the site. Because production rates will remain the same, potential future increases in sulfate levels in the tailings basin are not anticipated. Monitoring at the existing site has shown elevated sulfate levels in tailings basin water. As stated in Item 19, although sulfides (such as pyrite) are present in only small amounts in the Lower Slaty, it is acknowledged that sulfate levels in the tailings basin have become problematic for seepage discharged to the environment. The company has been issued a Schedule of Compliance (SOC) and is working to reduce pollutant loadings from the tailings basin. The SOC requires the company to investigate measures to eliminate or reduce constituents in the tailings basin, or at their source including the installation of dry air pollution controls in place of the existing wet scrubber system, and using alternate water sources with lower concentrations of pollutants for its process make-up water. With these measures implemented, it is anticipated that sulfate levels in the tailings basin will decrease over time.

The company has taken steps toward addressing tailings basin issues, including the installation of a seepage collection and return system on the eastern side of the tailings basin. This system initiated operation in 2010. Construction for a seepage collection and return system on the west side of the tailings basin is scheduled to be completed in 2013, pending USACE/MPCA Section 404/401 permitting. The company has also proposed the use of the #6 sump water as an alternate process water source. This source is lower in sulfate concentration than current sources and it would assist in lowering contributions to the tailings basin.

Mine Site

As referenced earlier the ore to be mined through the proposed extension project is of similar sulfur content as the ore currently being mined and processed at the site. The extension will expose additional materials in stockpile areas as well as in the new pit area. Future increases in sulfate levels could potentially be associated with the accumulation over time of additional materials and areas exposed to the elements.

Monitoring of mine pit dewatering waters in the Prindle Sump (SD004) and the #3 Sump (SD001) over the last five years has reported sulfate levels ranging from 371 mg/L to 501 mg/L and 261mg/L to 358 mg/L, respectively. Sulfate levels in the #6 Sump (SD003) have ranged from 126 mg/L to 154 mg/L. Sulfate levels in mine pit dewatering waters will be taken into account in future NPDES/SDS permitting.

DNR Lands and Minerals and the MPCA are currently exploring if materials handling/stockpiling at the site could be managed in such a way that reductions in sulfate levels could be achieved at the mine site. The manner in which materials are handled/stored could reduce or avoid long term generation and release of sulfate. Potential changes in operations related to materials handling/stockpiling could become requirements or conditions incorporated into the Permit to Mine Amendment if and when it is issued for the extension project. The timing of the amendment for the extension project presents an opportunity to address this broader issue.

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.*

Detailed information about the schedule and implementation of the proposed mine extension has not yet been developed. A detailed mine model and stockpiling plan will be included in the forthcoming application to the DNR for the Permit to Mine Amendment.

Approximately 4,002 linear feet of stream habitat would be removed through the proposed Extension Project. Approximately 45,123 linear feet (8.5 miles) of stream has already been removed due to past mining activity. Stream habitat loss from past, current and future mining activities has a cumulative effect. The health of a river system is dependent on connectivity and access to diverse habitat is important for game fish populations as well

as their prey. The West Two Rivers Reservoir dam is a barrier to fish passage, and since the fish and mussel populations in the reservoir are already disconnected from downstream waters and populations, any loss of upstream tributary habitat is important.

In addition to the direct loss of stream habitat, impacts to downstream public waters and other water bodies will also occur as the natural hydrology of the area is changed. Contributing watershed areas can be severed or completely removed due to mining activity. The proposed Extension Project will impact 470 acres of watershed contributing area. Approximately 10,052 acres of watershed have already been impacted or will be, due to past or current mining activities.

The proposed mine extension will result in the direct loss of 66.7 acres of wetland habitat and potentially affect an additional 5.4 acres of wetland indirectly from alteration of hydrology from fragmentation. Impacts to wetlands will require a permit from the MDNR and from the USACE, as well as certification of the USACE permit by the MPCA. Mitigation for wetland loss will be provided through use of the existing U. S. Steel project-specific wetland replacement bank as well as through replacement at a new U.S. Steel project-specific wetland bank currently being established in Aitkin County, Minnesota and pending approval by the USACE.

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 Lina Jay Date August 1, 2012
Title Planner Principal State

Environmental Assessment Worksheet was prepared by the staff of the Environmental Quality Board at the Minnesota Department of Administration, Office of Geographic and Demographic Analysis. For additional information, worksheets or for *EAW Guidelines*, contact: Environmental Quality Board, 658 Cedar St., St. Paul, MN 55155, 651-201-2492, or <http://www.eqb.state.mn.us>

Attachments

Attachment A – Minntac Subwatershed and Stream Information

Figures

- Figure 1 - Project Location Map
- Figure 2 - USGS Topographic Map
- Figure 3 - 2010 Aerial Photograph
- Figure 4 – Surrounding Land Use
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- Figure 5 – Affected Land Cover
- Figure 6 – Surface Water Resources
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- Figure 10 – Reasonably Foreseeable Projects by Others